

Public Policy Issues Research Trends

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NOVA

**PUBLIC POLICY ISSUES
RESEARCH TRENDS**

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**SOPHIE J. EVANS
EDITOR**

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PREFACE

In any society, governmental entities enact laws, make policies, and allocate resources. This is true at all levels. Public policy can be generally defined as a system of laws, regulatory measures, courses of action, and funding priorities concerning a given topic promulgated by a governmental entity or its representatives.

Individuals and groups often attempt to shape public policy through education, advocacy, or mobilization of interest groups. Shaping public policy is obviously different in Western-style democracies than in other forms of government. But it is reasonable to assume that the process always involves efforts by competing interest groups to influence policy makers in their favor.

A major aspect of public policy is law. In a general sense, the law includes specific legislation and more broadly defined provisions of constitutional or international law. There are many ways that the law can influence how survivors of violence against women are treated and the types of services they receive. Likewise, legislation identifies areas in which research grants can be funded and often determines the amount of funding allocated. Thus, it is not surprising that public policy debates occur over proposed legislation and funding. This new book analyzes different aspects of Public Policy from international researchers

Chapter 1 - Theories of neuropsychological vulnerabilities have emerged as a robust predictor of antisocial behaviors, especially with regard to human aggression and violence. This biopsychosocial theory posits that neurological impairments and trauma that impacts an individual's central nervous system are positively associated with acts of interpersonal violence and homicide. This complex framework spans the lifecourse and merges elements of the natural, behavioral, and social sciences. As such, it is a valuable interdisciplinary perspective that has made significant contributions toward better understanding the etiology of human aggression. The present chapter offers a select review of how neuropsychological vulnerabilities may contribute to the genesis of violent behaviors in children and adults. After first considering the methodological considerations of such research, a broad summary of the empirical literature across genetics, neuroanatomy and neuropsychological deficits, head injuries, child abuse and maltreatment are provided. This synthesis suggests that neuropsychological vulnerabilities may additively contribute to human violence. The public policy implications of research that continues to explore the relationship between neuropsychological impairments and violence, as well as the need for prevention and intervention for families and youngsters at-risk, are discussed at length.

Chapter 2 - Disparities in access to healthcare services have special meaning in the U.S. - Mexico Border Region, plagued by disproportionate poverty, inadequate medical resources, weak economy and young undereducated workforce. If the 43-county Texas Border Region were the 51st U.S. state, it would rank 1st in childhood poverty, 1st in birthrate, and 1st in unemployment rate. Shortage of healthcare professionals and up to 36% uninsured population rate augment the suffering of chronic illnesses and infectious diseases that easily cross the international boundary.

The disparities in access to healthcare are most profoundly affecting the children, making the resolution of these issues the frontier to our healthy future. Healthcare access is closely related to insurance coverage and employment status, therefore creating a crisis in the counties with highest unemployment rates. In addition, many children who might be eligible for programs such as Medicaid and SCHIP remain not enrolled due to variety of reasons including parental low literacy, enrollment restrictions, required reenrollment, stringent asset test, unsettled parents' immigration status and fear that their children's enrollment in assistance programs may equal deportation. The inadequate reimbursement to providers makes the access to care even more difficult, forcing the practitioners to see an inordinate number of children to make ends meet, as the poverty of the region does not allow cost shifting. Paradoxically, the children that need the most care get the least.

This chapter utilizes a two-pronged approach in exploring the issues and solutions defining the children's access to healthcare in the Border Region:

1. *Literature Overview*: Through extensive literature review, the authors present an overview of the current research in disparities in children's access to healthcare and the current status of resolving the identified issues.
2. *Qualitative Inquiry*: Utilizing qualitative inquiry research approach, the authors interviewed policy makers, educators, governmental and non-governmental healthcare authorities at the National, State and Borderland levels and organization representatives throughout the U.S. - Mexico Border Region to search for opportunities and solutions to provide better access to healthcare services and equality in health care for the children in the frontier region.

This chapter is important because it sheds a much needed light on the current status and possible solutions for providing equitable access to quality healthcare services in the Border Region, and the opportunities for healthcare policy makers to contribute to improving the healthcare infrastructure and access to care in this frontier of the future.

Chapter 3 - It is the self-defined goal of community psychology to take an ecological view of individual/community interactions. Ideally this occurs by using academic research to inform action, which facilitates positive change where social problems are identified and change is needed. Since community psychology traditionally takes a systemic approach to community health, the focus is on effecting positive second-order change. A basic premise here is that the individual is an out-growth of the functioning of all levels of the system in which the individual is embedded (e.g. biology, individual adaptations, families, communities, political systems, etc.). There is a perceived tension between identifying and serving needs which are always the needs of the individuals in a given community on the one hand, and attempting to make larger systemic changes that improve the well being of all individuals on the other. If the highest goal remains maximizing the positive systemic change,

which is often very difficult both to conceptualize and achieve, then the need exists to identify foundational principles which govern systemic interactions. It will be proposed that foundational principles exist in other domains and that these principles govern all dynamic systems, and that they can be applied to community psychology research and intervention.

The relationship between individuals in the academic communities and the public sector is a dynamic one, in which each level of the system interact bidirectionally to affect change in the other. This reciprocal interaction includes: intraindividual levels of biological systems, to the individual-community interactions, to the policy and perceptions held by these communities, and more and more often, the global influences in which they are embedded. When we use a dynamic systems framework to address public policy and social justice issues, we must also acknowledge the individualistic culture of the United States. The second theme running throughout this discussion suggests that freedom for the individual is our primary cultural value, and asks how activists and psychologists can facilitate a positive dynamic reciprocal relationship between the self and the community in the US? This article will address manifestations and consequences of the concept of the Self from Nativism. Taking an historical perspective, an attempt is made to offer a dynamic systems perspective, and to describe an alternative utilizing examples from: Social Darwinism, genetics, fetal development, brain plasticity, and the education system, to the international human rights movement. Doing this the authors will call into question the goal of respecting all values and behaviors in a given society. Arguing against moral relativism we propose the necessity for foundational values - that arguably already govern Community Psychology.

Chapter 4 - This chapter will describe the research program which led to the development of a viable large lineup. Research is a creative endeavor. Like all creative efforts (Maier, 1963; Prince, 1970; Whitfield, 1975), many steps in the process turn out to be wrong or impractical. However, an error can lead to a very important positive development.

The final report of the results usually omits these steps, presenting the final product as if it were the clear-cut result of a theoretical position articulated from the start. Actually the theory develops along with the research. In contrast, this chapter will endeavor to describe the research as it actually happened. This should provide a better understanding of the process.

Chapter 5 - In recent years we have seen the first signs of a paradigm shift in environmental public policy. While traditional policy has predominantly targeted industrial production, newer approaches offer a more systemic perspective, where the role of consumption is put at the centre. However, this change is not yet well reflected in actual policy making. An evaluation of existing policy instruments for sustainable consumption and production demonstrates that the majority of policy instruments in EU aim to improve the eco-efficiency of production processes and products, and hence only indirectly address consumption.

The aggregate environmental impacts of industrialised economies appear to be on the rise, and this trend will hardly be reversed unless more efforts are put into changing the patterns and levels of consumption. There are however several barriers towards such developments. These include lack of systemic perspective in current policy developments, the reigning paradigm of economic growth, the non-integrative nature of policy tools, and lack of effective instruments for addressing consumption patterns and levels. Unless these problems are addressed, it will be extremely difficult to initiate system level changes in society and stimulate institutional and behavioural changes towards sustainable consumption.

This chapter discusses the complexity of the consumption challenge and policies to achieve more sustainable consumption patterns, and provides some reasons for why the progress has been slow. The main argument is that sustainable consumption is a complex issue that requires the development of policy packages consisting of policy tools that affect various stakeholders and comprise various types of instruments: regulatory, economic and information-based. A relevant issue concerns the role of governmental intervention: moving towards more sustainable systems of consumption and production may require a shift from governing to governance, where the role of governments change away from controlling functions towards more participation and collaboration.

Chapter 6 - Environmental constraints set a clear limit to growth heralding a post-abundance era. Since about the mid 1980s, the use of global resources by humankind, as measured by its Ecological Footprint, is exceeding the biocapacity of the planet. The situation has since only worsened. At present, if all people were earning the same level of income, only living standards of middle income countries would be sustainable, almost keeping humanity within the current global biocapacity. These limits pose a major challenge for public policy, but also for economic theory. Traditional remedies such as pollution control and abatement, recycling, and clean technologies are not sufficient, although they can go a long way toward easing the problem. More profound changes in lifestyles are called for including at the conceptual level: we need a new paradigm. This chapter explores some implications for economic growth. Some distributional issues are also discussed. It argues, quite predictably, that the world population should be kept constant; growth should be “greened” and shifted to poor countries, in particular to Sub-Saharan Africa which is the laggard, until convergence of living standards has been reached (which does not imply perfect equality because it is unfeasible); and simultaneously consumerist life styles in wealthier countries should be curbed to place greater emphasis on quality. In the long run, the global situation would be characterized by zero growth or “quality growth”. However, this need not be a calamity. It is quite feasible, although an important factor of success will be to prevent the formation of destabilizing and unduly pessimistic expectations, which tend to become self-fulfilling prophecies, through appropriate policy coordination and by de-emphasizing the current obsession with fast and positive growth. This chapter attempts to briefly outline what such a situation might entail and some issues that arise while striving to reach this sustainable long run equilibrium.

Chapter 7 - American growth once was largely attributable to exploitation of natural resources and to economies of scale. These sources of growth are behind us; invention must compensate for their passing. Increasing inventive resources, human in particular, is a *sine qua non*. Government first promoted invention through patents and agricultural research. Starting with WWII it affected the pace and direction of inventive activity through research funding and procurement. Much of the economic growth in the past half century was the unintended byproduct of defense R&D. With the growth of regulation the relation between invention and public policy has become reciprocal.

Many inventions have unintended consequences. Policies have evolved to promote pollution abatement, energy efficiency, environment preservation, health and safety, property rights. The government influences the direction of invention through regulatory requirements that channel private research and innovation toward desired outcomes. Some regulations have increased the cost of invention; most have diverted resources from product and process

improvement to compliance with regulations. The result has been a decline in the rate of national productivity growth, and in inventions in some areas.

The negative effects of regulation can be minimized by taking into account costs of regulation as well as benefits; by regulations that specify outcomes rather than particular processes or technologies; by relying on markets and prices rather than command and control. Business should be free to choose the most efficient means of achieving social aims. Public policy responses tend to come late. The unintended consequences of the automobile revolution still plague us. The dominant role of invention in economic growth and social change requires that we pay more attention to its consequences and to policies for dealing with them.

Chapter 8 - This paper examines the relationship of local medical malpractice lawsuits and physician supply in Mississippi. Using a panel dataset confined to a single state, the results indicate a significant negative relationship between the intensity of medical malpractice litigation and number of area physicians. The data suggests that, on average, medical malpractice lawsuit filings lower the number of expected area physicians by between 1.61% and 4.35%. The authors conclude that the relationship between medical malpractice litigation and physician supply found in other studies is reinforced by our own analysis, and suggests the continued need for reform.

Expert Commentary A

REVISITING LABOR SUPPLY: A SYNTHESIS OF ITS IMPLICATIONS

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The present commentary synthesizes the numerous implications, including at the theoretical level, of several related papers on an S-shaped model of labor supply. Dessing (1990, 2002) has shown that the labor supply schedule would be sloping forward at low wage levels because of subsistence constraints, then upward as usual and finally backward again as the wage rate is rising. The complete labor supply schedule would thus be S-shaped and nest the habitual reverse C labor supply model. At very low wage levels, as wages are declining and people approach their subsistence constraint, they must work longer hours in order to keep covering those needs, that is, in order to earn a roughly constant income. The subsistence constraint is therefore a rectangular hyperbola in the wage-hour diagram, along which income remains constant, it is not just some intercept at some positive level of income.

This statement may seem rather trite to any casual observer, yet the standard labor supply model did not account for such a subsistence constraint and the implications are far from mundane. In the standard model, poor people would be working the least. They work fewer hours until they leave the labor market, while in our model they are working exceedingly long hours trying to cover their subsistence needs, until they can no longer keep up with it and drop out of the labor market altogether; they may then turn to begging.

Few additional things must first be specified about this model. Based on empirical evidence concerning our patriarchal societies and the gender division of labor which prevails, it appears that this model best describes the joint labor supply of a family unit, not of an individual as in the standard neo-classical model. The labor supply of primary workers can then be represented by a vertical line in the wage-hour diagram. It remains roughly constant at all wage levels consistent with their role as heads of household who bear the prime

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responsibility for earning a living for the family. Women heads of household thus belong in this category.

Conversely, secondary workers comprise the other family members, mainly married women, but also children and elders. According to this model, they work at very low wages to help cover subsistence needs. Women then typically shoulder a double burden as they try to juggle their family responsibilities with paid work or subsistence production. Children and youth of poor families usually also work, although the relationship between wages and work hours does not necessarily follow the predicted negative pattern because of some complicating factors such as working to acquire the requisite skills. A large share of this increase in labor supply is taking the form of self-employment in the informal sector.

Understandably, when income pressures recede because wages are higher, secondary workers are working less or may even temporarily withdraw from the labor market. They reduce their excessively long working days to more reasonable hours and concentrate on their family responsibilities. However, at yet higher wage levels, they are able to re-enter the labor market and adopt career-oriented work behaviours while transferring part of their household shores to the market.

Since the subsistence constraint does not occur at the same income level for everyone, the result is a rather ambivalent labor market at low wage levels for women in particular. Some will still be at a point along their labor supply schedule where they wish to reduce their double burden and work fewer hours in response to higher wages, while others will have reached a point where they develop stronger ties with the labor market and respond positively to improved income opportunities, and yet others, namely the female heads of household, must work a full day at all wage levels.

The same ambivalence can also be found for self-employment in the informal sector in particular, since women tend to work predominantly in that sector. An increase in hourly returns for the self-employed will have the two opposite effects just noted for different segments of the labor market. Some firms may expand to take advantage of a more favourable economic environment, while others will reduce their activities and shut down. Put differently, employment in the informal sector may thrive either because the economy is growing (expansionary growth), or conversely because the economy is stagnating and people are nevertheless desperately trying to make ends meet (recessionary growth).

Empirical evidence suggests that this model of an S-shaped labor supply schedule would be mainly relevant for poorer countries and in rural areas where wages are generally lower. For the details, we kindly refer the reader to the papers that have discussed this issue at length, noting that changes in the income level can approximate changes in the wage level, even though the model is about the response of labor supply to variations in the wage rate. Moreover, since the model is about the joint family labor supply, it nests both the labor force participation and the hours supply decisions. Finally, the predicted changes in labor supply behaviour can be observed within the same economy across different groups of people, but also over time such as in the course of industrialization and urbanization (Dessing 2002, 2007, 2008).

The implications of this model are numerous. Most importantly, along the subsistence constraint, wages are no longer equal to the physical marginal product of labor: people work longer hours than they really would like. These points are corner solutions in the utility map; workers must settle on a lower indifference curve than they would like because of their subsistence constraint. Second, the labor supply elasticity can be negative in particular at low

wage levels, whereas theoretical models usually assume that it is positive. Third, this supply elasticity is changing from negative to positive and negative again at various wage levels, whereas empirical studies typically estimate it at the point of mean thus missing these very different work patterns at different wage levels. Fourth, to obtain the predicted results, empirical studies must use a comprehensive measure of labor and refer to annual work hours, not to seasonal data. The latter are missing how the overall supply of labor is adjusting in the course of a year, net of the seasonal reallocations of various tasks.

When an aggregate labor supply schedule is derived based on this model, and combined with labor demand, a possible outcome is that labor becomes caught in a Malthusian poverty trap, which is in fact an unstable equilibrium (Dessing 2004a). More specifically, this occurs when the aggregate labor supply schedule is temporarily slopping back due to cohort effects and is flatter than the labor demand schedule. Falling wages below the point of equilibrium generate an increase in the supply of labor, which in turn keeps pushing labor back down to the barest wage levels. The only way out of this trap is to raise wages sufficiently, or to increase labor demand (shift the labor demand schedule out), until the labor market is back in a stable equilibrium at more reasonable wage levels.

Using a two-sector model, it could be shown that, under certain conditions, a minimum wage may have a stabilizing effect. It can help reduce the excess labor supply which appears in response to falling wages, in particular child labor and much of self-employment in the informal sector.

Switching then to the production function of firms, they can choose between multiple points of profit maximization when labor is facing a subsistence constraint (Dessing 2004b). This maximum is no longer a single point along a unique average cost curve, but multiple points within a space. In fact the global maximum -- defined as the point among these equilibria where firms pay the lowest wage for the same quantity of labor -- quite predictably occurs when labor is pushed down along its subsistence constraint. Monopolistic firms may then be driven to produce more than they would, were they not able to exploit labor. The supply of commodities is thus less restricted by the rent seeking activity of monopolists.

However, it is also possible to show that firms themselves can become caught in a poverty trap, and that these additional possibilities for maximizing profits may result in the emergence of sweatshops. It would probably be appropriate to reserve this term for firms that must contend with a rather unfavourable production function. They remain in business only because they succeed in using an exploitative strategy of labor. Competition would drive them out of business under normal circumstances. Needless to say that other firms may also resort to such an exploitative strategy and behave like sweatshops, even though they would be able to pay acceptable wages.

When international trade is added to the picture the economy may experience immiserizing growth: total national welfare is decreasing (Dessing 2000). The exploitation of labor is resulting in a distortion, which is causing a loss that outweighs the gains from trade. Under such circumstances the production of export commodities can readily be expanded, since labor supply will then also increase to keep meeting subsistence needs. The loss of income for labor, which is paid less than its marginal product, is benefiting entrepreneurs. They can expand their profit margin while the suppliers of capital goods increase their sales. Since the latter two groups can be expected to have a larger marginal propensity to import than labor, the trade balance may then deteriorate even though the production of export commodities is increasing. With respect to national welfare, labor's loss is transferred abroad

in the form of more abundant and underpriced exports as well as a stronger domestic demand for imports. The effect of changing capital input prices, technological innovations, a depreciation of the national currency, dumping of exports, import duties, and export subsidies have also been examined.

In short, what may seem at first like a minor and perhaps even trite change of a basic model appears to have far reaching repercussions. Its theoretical implications certainly warrant further research and empirical assessments. In terms of policy making, some implications have already been pointed out. The main one, however, is to highlight the need of keeping firms from using an exploitative strategy of labor by setting up an appropriate institutional framework, both at home and abroad in the current era of globalization. The bargaining power of the two parties – labor and entrepreneurs – is clearly asymmetrical, while pushing labor down on its subsistence constraint results in a market failure in the sense that the wage rate is no longer equal to labor's marginal product. Setting up unions is the most obvious response, although not a sufficient one, while other avenues may be used as well (or as an alternative to unions). We may think of quality circles, employee participation plans, codes of conduct, labelling schemes or simply peer pressure, in conjunction with the wide variety of positive measures that seek to encourage firms to adopt more enlightened management methods. The third component are appropriate legal mechanisms and labor inspections for the effective enforcement of those various mechanisms, but also to curb the most exploitative strategy, namely forced labor, which severely undermines the functioning of the labor market.

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- 2004b *Sweatshops: The Theory of the Firm Revisited*. *Journal of Economic Studies* 31 (6): 549-579
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- 2008 *The S-shaped Labor Supply Schedule: Evidence from Industrialized Countries*. *Journal of Economic Studies* 35 (6), forthcoming.

Expert Commentary B

POLICY, CREDIBILITY, AND DATA: A RESPONSE TO WELLS (2001)

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Wells (2001) makes explicit, in a response to an article by Levi and Lindsay (2001), a central tenet of his strategy to bring about reform in the conduct of lineups. A central challenge of psychologists in recommending change, he states, is to maintain their credibility in the eyes of policy makers. Unwise proposals that conflict with policy needs may lose that credibility. In defending the limited suggestions of the American Psychological Association's White Paper on lineup reform (Wells et al., 1998), he states that a larger list would have "weak, unwise, poorly thought out, or even unreliable recommendations" (p.793). Introduction of such ideas unacceptable to policy makers would severely damage psychologists' credibility. Then no advice would be accepted.

Wells (2001) makes a distinction between experimental findings and policy recommendations. He argues that psychologists are usually not sensitive enough to policy considerations, and thus may make such proposals that, by hurting their credibility, endanger reform. Thus, psychologists should censor their experimental findings when considering giving counsel.

It should be noted that Wells (2001) is not simply mentioning the obvious, that it might be counterproductive for a particular psychologist to suggest a reform highly unacceptable to a particular policy maker. Wells is responding to an attack (Levi & Lindsay, 1998) on the White Paper (Wells, et al, 1998). His position then involves a general policy of self-censorship, which should include official positions such as the White Paper.

This paper opposes self-censorship to maintain credibility as ultimately self-defeating. It is neither a necessary nor sufficient condition for keeping it. Indeed, self-censorship can be a prime cause for losing credibility. In addition, in practice exaggerated concern for external credibility insinuates itself into the scientific process itself, to its detriment.

Wells (2001) bases his case on three lines of reasoning. Firstly, he uses the logic that "two many" recommendations are bound to include unsound ones. Then, he brings an example of how he believes that the White Paper's limited proposals served as a "foot in the

door" for the acceptance of more widespread reform. Finally, he uses examples of further suggestions by Levi and Lindsay (2001) to illustrate how they might prove so unsatisfactory to policy makers as to harm credibility. The first two issues will be discussed, along with the counter-argument that self-censorship may actually harm credibility.

FOCUS PREVENTING UNSOUND RECOMMENDATIONS?

Wells argues that the APA committee (Wells, et al., 1998) limited itself to four recommendations in order to prevent unsound ones. The words "weak", "poorly thought out", and "unreliable" indicate ideas that from a scientific standpoint are unsatisfactory. Thus, such proposals would justifiably reflect on the credibility of psychologists.

Did the committee really believe that psychology had only four sound recommendations to offer policy makers? Obviously not. They themselves refer to the sequential lineup (Lindsay & Wells, 1998) very favorably, and Wells (2001) agrees with Levi and Lindsay (2001) that at least two other reforms they suggest are perfectly sound scientifically. The committee claimed that the four recommendations would handle the vast majority of problems with lineups, but as Levi & Lindsay (2001) note, that claim is unjustified.

Rather, the issue seems to have been to follow the strategy of self-censorship to avoid any danger to credibility resulting from the reactions of policy makers. The committee's reasons for rejecting the sequential lineup are a case in point. A careful reading of the report (Wells et al., 1998) leads to the conclusion that the authors were afraid that the reasoning behind the sequential lineup was too subtle to be understood by policy makers, perhaps particularly the police. This would reflect on credibility.

The report does also raise the issue, which Wells (2001) repeats, of the committee's decision to recommend only those reforms that could be implemented without any other. The authors believed that the sequential lineup required that one of their four basic recommendations also be implemented, namely that the person conducting the lineup be unaware of the identity of the suspect.

This seems quite a weak reason for failing to recommend the sequential lineup, which the authors believed to be a major improvement. On the one hand, the belief that the sequential lineup may be particularly vulnerable to prior knowledge of the identity of the suspect by the person conducting the lineup, while reasonable, was actually supported by quite weak data (Phillips et al., 1999). Also, as Levi and Lindsay (2001) note, using the sequential lineup reduces the need for two other of their four proposals, warning the witness that the culprit may not be in the lineup, and choosing foils that fit the description of the culprit (Lindsay et al., 1991).

Indeed, the strategy of sticking to proposals that can stand alone seems unwise. It opens the door for policymakers to implement even less than their four proposals, though each one makes a unique contribution. It would seem that under these circumstances they could have found a way around their decision to accept only those reforms that could stand alone,¹ if it

¹ For example, they could have included the sequential lineup in their recommendation regarding the need for the officer conducting the lineup being ignorant of the identity of the suspect. They believed, after all, that this recommendation was particularly important for the sequential lineup.

were not for their other concern that recommending the sequential lineup endangered their credibility.²

In summary, then, the concern about “weak, unwise, poorly thought out, or even unreliable recommendations” was not only a concern about unscientifically sound proposals, but rather about the credibility of scientifically sound ones.

A FOOT-IN-DOOR STRATEGY?

Regarding the second issue, Wells (2001) argues that a more focussed approach is required when initially trying to sell research-based reform to reluctant policy makers. A smaller list is easier to remember and presents a smaller target for those who would discredit advocates of change.

Wells (2001) conjectures, for example, that the Justice Department’s guidelines for lineups (Technical Working Group for Eyewitness Evidence, 1999) might never have come into being if a less focussed list of propositions had been included in the White Paper. Justice Department’s policy makers reading the White Paper would find recommendations that they considered unsatisfactory, and they would have rejected the notion of inviting psychologists to a committee.

He also notes that the guidelines were not limited to those proposals, because in committee the psychologists felt free to suggest more reforms. One might interpret his position as being that once the “foot got in the door” with the limited set, the psychologists on the Department’s committee could then put many other suggestions on the table.

The first and likely critical assumption of this line of reasoning is that more recommendations would lead to ones that would be rejected by policy makers, leading to rejection of the psychologists who proposed them. We have already noted that this would occur not because the advice would be unsound scientifically. Rather, it might conflict with policy considerations, or not even be sufficiently understood.

The APA committee members seem to have underestimated both themselves as being able to present credibly scientifically sound proposals, and policy makers’ ability to understand them and resist rushing to judgment regarding their credibility. For example, the sequential lineup was included in the Justice Department’s guidelines. I spoke to a police officer who had been on the committee, and he clearly understood that lineup and its supposed superiority over the traditional one.

Wells (2001) uses some strong language in referring to potential conflict between psychologists and policymakers. For example, he alludes to the anxiety prosecutors might have that introducing new procedures could result in many lawsuits based on the reasoning that the old ones were faulty:

"Researchers do not have to worry about such consequences whereas policymakers do. Eyewitness researchers who *summarily dismiss* such concerns have no credibility with policymakers, and those without credibility with policymakers have no chance to shape policy." (p.794)

² I do not share the author’s preference for the standard sequential lineup. Recent findings (Levi, 2003; Memon & Bartlett, 2002; Memon & Gabbert, 2003). suggest that earlier research indicating the superiority of that lineup (Stebly et al., 2001) suffered from lack of ecological validity.

Wells (2001) discusses the potential conflict with reforms that Levi and Lindsay (2001) suggest, such as banning one person "lineups" (the "show-up", or "field identification"). While agreeing with Levi and Lindsay that these proposals are scientifically sound, he raises the specter of great harm to credibility if these had been proposed. Regarding the issue of show-ups, Wells writes that

"Had the Lineups White Paper maintained the *hard-line position* that show-ups should never be conducted, policymakers would have concluded, perhaps reasonably, that the researchers were incapable of appreciating the broader implications of their arguments. This, in turn, might have led to ostracism of the researchers by the police..." (p.796).

It would seem that Wells (2001) has created in these phrases a straw man. The authors of the White Paper (Wells, et al., 1998) demonstrated no such lack of consideration for policymaker's concerns in making their proposals, nor need that be the case. Researchers who simply back up their recommendations with their data need not fear loss of credibility. Policymakers do not expect researchers to have their perspective any more than they have that of the researchers. They may indeed reject certain proposals because of other considerations, but this in no way impinges on researcher credibility.

Indeed, the White Paper's (Wells, et al., 1998), authors, for all their care in fashioning proposals acceptable to policymakers, failed badly in one of their four recommendations. The police officers on the Justice Department's committee were angered by the idea that the officer conducting the lineup should not know the identity of the suspect. They saw this proposal as putting into question their professional integrity, as if they would knowingly help the witness identify the suspect.

Despite the White Paper's "blunder", the police officers did not ostracize the psychologists who took that position. They accepted the other three recommendations of the White Paper, and others raised in committee. It would seem, then, that credibility can survive even a proposal that turned out to be quite "unwise".

To conclude, then, Wells' (2001) assumption that less "focussed" recommendations would have led to loss of credibility, and therefore influence, seems mistaken. The sequential lineup, not included, was subsequently accepted. Proposals can be presented without causing loss of credibility, even if they are rejected.

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Expert Commentary C

POLITICAL ECONOMY OF HEALTHCARE

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Rising healthcare costs have been of concern to policy makers for a number of years. The most disturbing trend is the cost of healthcare relative to the GDP. Healthcare expenditures reached nearly \$2.0 trillion in 2005, comprising 16% of GDP.¹ Public sources absorbed 45.4% of these costs according to Centers for Medicare and Medicaid Services (CMS) figures. Expenditures are expected to exceed \$4.0 trillion by 2015 and comprise 20% of GDP with public funds paying for 48%. By comparison, healthcare spending comprised 5.1% of GDP in 1960, with public sources accounting for 24.8% of the total.

If current CMS projections hold, one out of every five dollars of the GDP will be spent on healthcare within the next ten years. Typically, 65% of annual GDP consists of consumer goods and services. If healthcare is considered a consumer commodity, within the next ten years one out of every four dollars spent on the consumer market will go to healthcare, with public sources paying for one-half of that amount. Rising healthcare costs have potentially serious macroeconomic and social policy consequences. Less than 13% of healthcare expenditures are paid out-of-pocket so these increases will be funded primarily by the labor force through private insurance and taxation. This is further augmented by annual increases in healthcare costs outpacing income growth.

A large part of rising costs, however, may be the nature of the third-party payment system itself. In 1960, 46.8% of medical expenditures were paid out-of-pocket or directly by the consumer. This figure has been steadily dropping since, and, in 2005 only 12.6% of medical expenditures were paid directly by the consumer. We are in effect “financing” our healthcare. Because the cost to the consumer is lowered in this scenario, microeconomic theory suggests that such a shift in cost allocation would result in increased demand and subsequently higher prices.

¹ Available online: <http://www.cms.hhs.gov/NationalHealthExpendData>.

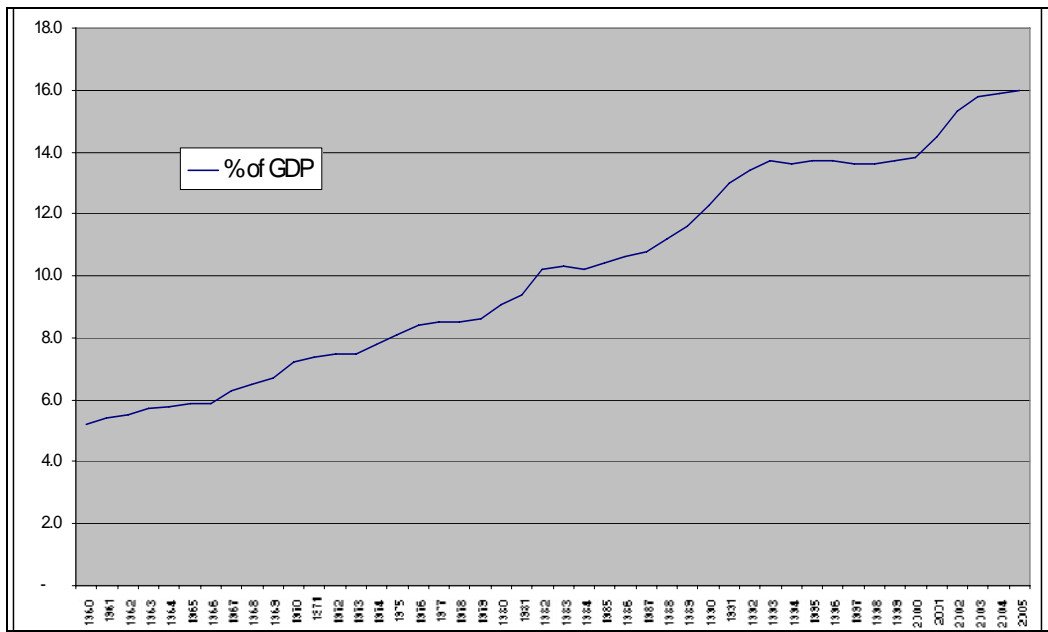


Figure 1. Healthcare Expenditures 1960 – 2005 As a Percent of GDP.

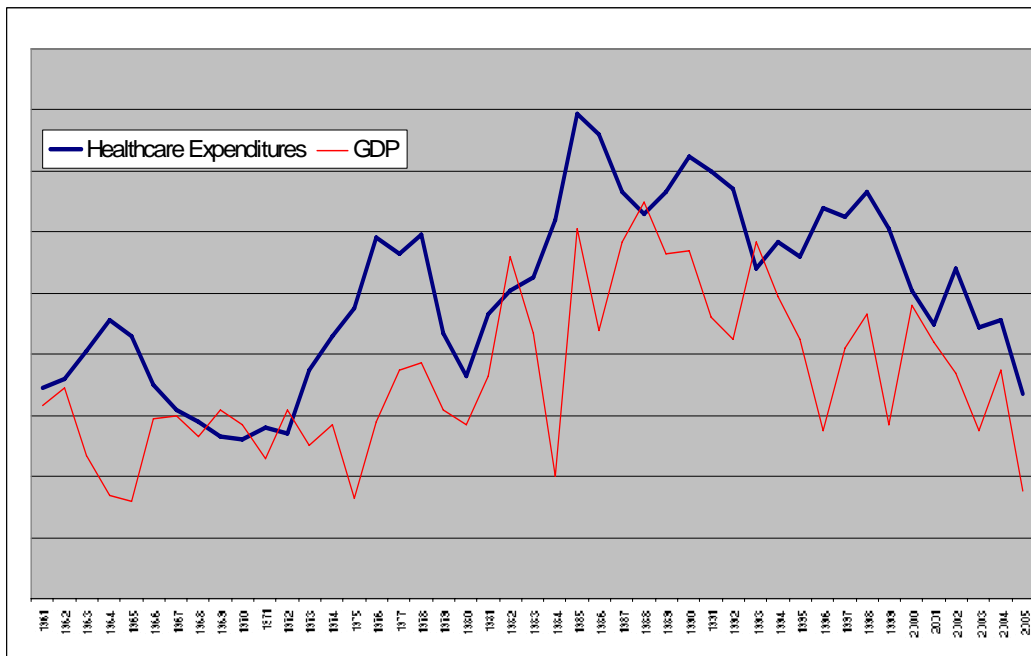


Figure 2. Annual Change in Healthcare Expenditures & GDP.

This is precisely what is suggested in Figure III. The graph depicts annual medical costs as a percent of GDP plotted against the percentage of medical costs that are paid out-of-pocket. The data reveals an inverse relationship – as the percentage of medical costs paid directly by the consumer decreases, medical costs as a percent of GDP increases. As

displayed in the graph, the percentage of medical costs paid out-of-pocket was relatively unchanged between 1994 and 1999, and medical costs as a percent of GDP also remained unchanged. In 2000, however, the percentage of medical expenses paid directly decreased as medical expenditures as a percent of GDP increased.

Defining total medical expenditures y as a function of out-of-pocket expenditures x and controlling for GDP z produces the linear regression equation $Y_i = a + b_1x_i + b_2z_i + e_i$. Estimating this model allows quantification of the relationship indicated by Figure III. The model estimates are shown in Table I. The parameter results indicate a significant and negative relationship between out-of-pocket expenditures and total healthcare expenditures for this time period.

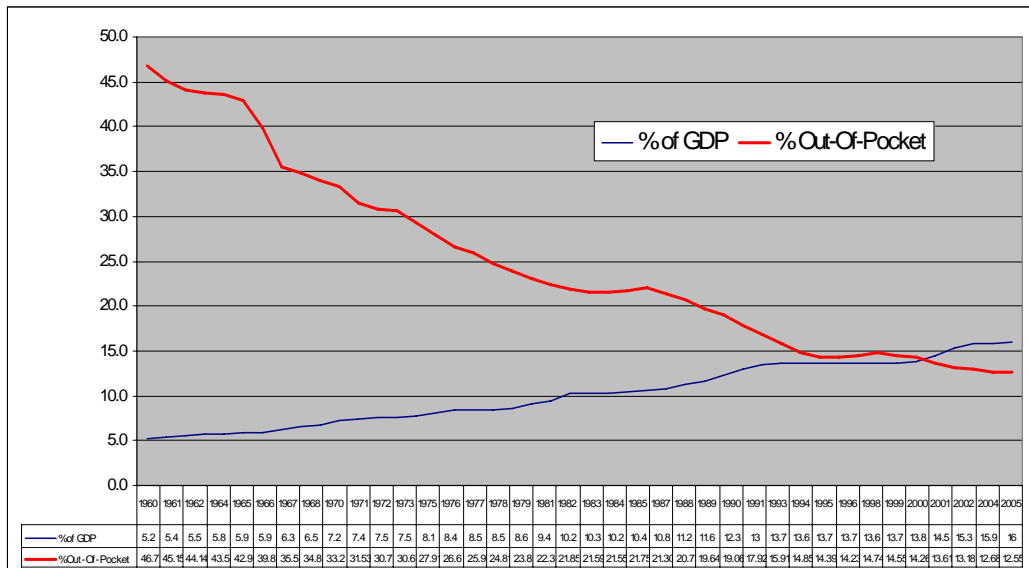


Figure 3. Percent Out-Of-Pocket Expenditures & Total Expenditures as a Percent of GDP.

Table 1. Linear Regression Results Total Healthcare Expenditures Regressed on Out-Of-Pocket Expenditures

	Y = Total Medical Expenditures (Millions)
GDP (Millions)	.0002461 (7.88)**
Out-Of-Pocket Exp (Millions)	-4.474 (2.85)**
Constant	-106,435.833 (6.09)**
Observations	46
R-squared	0.99

Absolute value of t statistics in parentheses.

* significant at 5%, ** significant at 1 %.

The coefficients indicate that an increase of \$1 million in direct costs to the consumer (out-of-pocket expenditures) results in a decrease in expected annual healthcare expenditures of \$4.7 million, with GDP constant. These results imply nearly a \$5 reduction in total expenditures for each \$1 shift in costs from third-party payers to direct costs to the consumer. Although this approach is simplistic, the figures support the notion that the consumer bearing such a large portion of medical costs indirectly has substantial influence on demand for medical services. Specifically, the effect is higher demand and lower demand elasticity, equating to higher costs.

Demand inelasticity also has critical implications with regard to medical malpractice liability. In the current environment, close to 90% of all medical expenditures are paid indirectly through public and private insurance funds. Since only a fraction of the cost is realized directly by the consumer, the sensitivity to price is substantially reduced. This facilitates any increases in costs fostered by malpractice litigation to be passed to the demand side of the market.²

The third-party payment system also eliminates critical incentives that may make for a more efficient market and better care. If the typical consumer is considered, whose medical insurance is paid through an employer, the individual has no incentive to minimize the use of healthcare or shop medical services based on price considerations.³ In addition, the provider is not paid by the patient thereby reducing the accountability to the patient and increasing obligation to the payment source. In a typical physician visit, the cost of treatments and procedures may not even be discussed. If proper incentives were in place, the consumer would be in a position to demand better care, would be less tolerant of price increases, and would be much more motivated to seek healthy lifestyle choices, and to shop medical services. This change may make for a competitive market and may result in better care, lower costs, and a healthier public.

There is a need for alternatives of paying for healthcare in the United States. One possibility may be something similar to the concept of Health Savings Accounts (HSA) which has already been proposed and implemented to some degree. As of March 2005, it was estimated that there were 2.6 million persons enrolled in these types of plans.⁴ This approach allows health insurance premiums to function more as an investment rather than an expense with the account operating similarly to an Individual Retirement Account (IRA). Funds are paid into these accounts before-taxes and can be withdrawn to pay medical claims tax-free. Any unused balances that accumulate belong to the individual. This type of arrangement is usually maintained in tandem with an insurance policy with a high-deductible designed to cover the event of catastrophic illness. Allowing consumers more control and replacing some of the incentives that are missing in the current system could have potentially positive results.

There may be many more yet unexplored alternatives. Aside from the social implications engendered by healthcare, it is expected to comprise one-fifth of the nation's economy in less

² Additional costs are presumed to be a result of higher malpractice insurance premiums for physicians as well as defensive medicine. See Kessler, Daniel and Mark McClellan. 1996. "Do doctors practice defensive medicine?" *The Quarterly Journal of Economics* 111 (2): 353-390, and Roberts and Hoch, "Medical Costs and Malpractice Litigation in Mississippi", *Health Economics*, forthcoming.

³ Manning, Willard G. and Joseph P. Newhouse. 1987. "Health insurance and the demand for medical care: evidence from a randomized experiment." *The American Economic Review* 77 (No. 3): 251-277.

⁴ Robinson, James C. 2005. "Health Savings Accounts – The Ownership Society In Health Care." *New England Journal of Medicine* 353 (No. 12, September 22, 2005): 1199-1202.

than a decade. The funding of healthcare is worthy of a renewed scholarly focus by researchers from economic, public, and social policy fields.

Expert Commentary D

CHILDREN'S ACCESS TO HEALTHCARE: AWAKENING CALL

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The crisis in the U.S. healthcare system is magnified along the U.S. – Mexico border by difficulties in healthcare access and complications derived from the massive presence of undocumented immigrants. Thus far, the envisioned solutions have looked at building fences and enforcing border control. However, we need to search for solutions in a different framework, considering both the humane dimension and the national needs in designing immigration policies. In regard to healthcare, the situation on the border epitomizes the preservation of poverty, as well as insufficient healthcare opportunities and education, determining a vicious cycle that is impossible to break unless there is a thoughtful resource investment to resolve the issues.

In the U.S. history, large immigration waves have coincided with low national unemployment rates and fast economic growth. Most of the immigrants arrive in prime working age and the annual U.S. benefit from immigrant labor is more than \$10 billion. Over the last century, the foreign-born population in the U.S. has ranged between 11% and 15%. Official statistics consider that about a quarter of the immigrants throughout the country are undocumented. Certainly, this number is much higher along the U.S. – Mexico border. During the last two decades, the Border Patrol's budget and number of agents continued to increase; the number of illegal immigrants also continued to increase. The toughening of the crossing point checks and the fortifying of the typical entry points did not work. Instead, opening more legal venues for immigration would increase the number of people legally working, meaningfully contributing to the economy, eligible for insurance and having access to healthcare.

The issue of disparities in health care is a reflection of the large transcendent problem of perpetuating poverty in a global sense by our own society, which narrowly and with no insight to the future preserves the discrimination in healthcare access and makes no real efforts to resolve this problem. A recent report from UNICEF concluded that U.S. lags far behind compared to other industrialized countries in programs and concerns for children,

based on factors such as poverty, health, education, deprivation, happiness, relationships and risky behaviors. This is a call for action throughout the country to reflect on what we are doing for our next generations.

Our future is bleak unless our society, and particularly our government, takes the time to seriously look at the factors that UNICEF considers important for healthy child growth and develop comprehensive programs to address each of these components. If the situation in the U.S. in general shows such poor expectations for our children, then the situation in areas that are extremely underprivileged, such as the areas along our south border will be even worse. This fact has been clearly documented as the gap between haves and have-not's becomes larger and we see areas that are poor through the years become even poorer.

The interdependence between education, quality of jobs, immigration status, income and health has been clearly documented. It has been demonstrated that if the border counties were the 51st U.S. State, this State would be at the level of a developing country in light of education and health care, with huge disparities in access to quality healthcare, presenting a series of problems derived of the lack of educational and other resources to allow the children to meet their potential. The gap in income and education has increased over the last 30 years, and as program development and industry investments depend on the political clout of the areas, the poor areas have less political clout thus the resources that could decrease this gap flow in the direction of wealthier areas.

There are factors with potential to worsen the situation in the border and decrease any expectations for real development. Cultural and language barriers create difficulties for the new migrants in the Borderland communities, and frequently result in the outer migration of the most talented and the retention of the undereducated. This is easily understandable as these communities do not have the kind of jobs or advancement opportunities available in other cities. Thus, the scarcity of employment offerings with healthcare insurance leads to decreased access to healthcare and dearth of health care providers, particularly in some pediatric specialties where the reimbursements are low in the border areas, and the work load is bigger. Many Borderland residents have a transient and unsettled migratory status in a community with clandestine economy, and use the community resources without direct contributions.

The alarming rate of uninsured among the children living in the Borderlands, and their limited access to healthcare quality services is an awakening call. There are models of cost effective interventions that are important for children to reach their potential. These models can be applied and replicated if there was an effort to prioritize the possibility of integrating implementation with resources.

The universal healthcare model, recently resurrected by a legislative proposal, has the tremendous potential to resolve the issues in children's access to healthcare, medical home and adequate preventative services. The question is: Is the society ready to provide health insurance to all as a vehicle to basic healthcare access? If our "vehicle" is not strong enough, it will not take us far.

Given the strong association between children's lack of insurance and the immigration status of their parents, pediatricians, educators and politicians play an important role in shaping immigration policy. While pediatricians and educators routinely act as children's advocates in their institutions and communities, time has come to augment their advocacy activities to state and federal levels, and to play an active role in reshaping the immigration policy. Immigration policy directly impacts the health of children. The interests of children

should be highlighted and taken into high consideration in every immigration reform. The policy-makers are in the position to make a huge difference for children's access to healthcare through re-defining the State and Federal healthcare programs, increased reimbursement rates for healthcare providers in poor areas, economic development of the Borderland, and meaningful immigration reform.

Chapter 1

NEUROPSYCHOLOGICAL PERSPECTIVES OF HUMAN VIOLENCE, AGGRESSION, AND HOMICIDE

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ABSTRACT

Theories of neuropsychological vulnerabilities have emerged as a robust predictor of antisocial behaviors, especially with regard to human aggression and violence. This biopsychosocial theory posits that neurological impairments and trauma that impacts an individual's central nervous system are positively associated with acts of interpersonal violence and homicide. This complex framework spans the lifecourse and merges elements of the natural, behavioral, and social sciences. As such, it is a valuable interdisciplinary perspective that has made significant contributions toward better understanding the etiology of human aggression. The present chapter offers a select review of how neuropsychological vulnerabilities may contribute to the genesis of violent behaviors in children and adults. After first considering the methodological considerations of such research, a broad summary of the empirical literature across genetics, neuroanatomy and neuropsychological deficits, head injuries, child abuse and maltreatment are provided. This synthesis suggests that neuropsychological vulnerabilities may additively contribute to human violence. The public policy implications of research that continues to explore the relationship between neuropsychological impairments and violence, as well as the need for prevention and intervention for families and youngsters at-risk, are discussed at length.

INTRODUCTION

Beginning in the late 1970s, Dorothy Otnow Lewis and her colleagues began to present compelling evidence of the relationship between neuropsychological vulnerabilities and criminality and human violence. This biopsychosocial theory posits that neurological

impairments, or vulnerabilities, within individuals' central nervous systems are associated with antisocial and violent behaviors. Specifically, genetics, neurological impairment, psychiatric illnesses, cognitive deficits and injuries, and child abuse and maltreatment combine to additively handicap certain individuals and greatly increase the chances that these people will act out aggressively (Lewis, Lovely, et al., 1988). Lewis and her collaborators further proposed that violent acts were more likely to be committed by such individuals when they were exposed to intense and/or debilitating psychological, environmental, and social factors (Lewis, Pincus, et al., 1988). As such, these vulnerable subjects have "cope[d] with brain dysfunction, cognitive limitations, severe psychopathology, and violent abusive households" (Lewis, Pincus, et al., 1988, pp. 588-589) that stretch them beyond their limits and lead them to deviant behaviors.

A perusal of the literature surrounding neuropsychological and biological research reveals a large body of multidisciplinary works that offer support for a relationship between neuropsychological impairments and human violence over the lifecourse. This framework does not propose that biology and environment are independent of each other. Instead, this holistic approach to "aggression is based on the assumption that aggressive behavior is multidetermined and dynamic over the life span, and a product of a complex continuous interaction of the multiple psycho-bio-social changes" (Ramirez, 2003).

This chapter discusses the contributions of neurological vulnerability as a rubric in explaining criminal and violent behaviors in both adolescents and adults. While it is not possible to cover each of these diverse areas with a fully comprehensive review, the present chapter offers a broad appraisal of some of studies that have contributed to our understanding of the genesis of violent behaviors. As this synthesis will show, this neurobiological perspective spans the lifecourse and explores a wide range of complex topics, including genetics, neuroanatomy, neuropsychological deficits, brain injuries and disorders, and perinatal and childhood abuse factors that may contribute singularly and additively to human violence. Before examining these topics individually, the methodological considerations of conducting research in these areas are now discussed.

METHODOLOGICAL CONSIDERATIONS

The numerous complexities and limitations of investigating brain dysfunction and neurological vulnerabilities in human subjects are worth discussion at the outset. Animal research has a documented history of the link between neurological disturbances resulting in violent and aggressive behaviors (see Bard, 1928; Mark and Ervin, 1970; Nelson et al., 1995; Cadoret, Leve, & Devor, 1997). In the case of human subjects, there are obvious ethical considerations that prevent human experimentation and manipulation. The "do no harm" doctrine of social scientific research precludes the proposal of experiments that might injure human subjects physically or psychologically.

In a truly experimental design, subjects would be assessed throughout the lifespan, ideally even before birth, and separated into groups to control for all possible social, environmental, and psychological factors. Clearly, this ideal is not practical or ethical if scientific principles are respected. Accordingly, the ethical limitations regarding human research means that much of the literature on neurological impairment focuses on naturally

occurring phenomena in the general population. Other common populations of interest include referred, and/or incarcerated subgroups. The real-life limitations with the populations available for study make inferences of generalizability difficult. As such, it may be unclear whether the population being studied is representative of the general population at large or simply subgroups from which the subjects were taken.

Moreover, due to the retrospective and/or cross-sectional nature of many studies, it is sometimes uncertain how and when the individuals being studied suffered the traumas that render them neurologically impaired. As Lewis (1981) noted, “the nature, location, and extent of such trauma often cannot be determined with great accuracy. It is also difficult to determine whether aberrant behaviors preexisted the CNS (central nervous system) trauma and also whether behavioral changes are psychodynamically rather than neurologically engendered” (p. 68). Temporally, it may be unclear whether the antisocial behaviors or the neurological impairments came first. Such uncertainties make propositions of causality difficult to determine without a close proximity temporally in measures made over the lifecourse. Research with these limitations must be viewed with caution so as not to overstate the causal relationships between variables of interest.

Another limitation that emerges in studies of neuropsychiatric vulnerability is the challenge of establishing valid criteria for measurement. Definitions and criteria of psychopathological behaviors have varied as psychology and psychiatry have evolved, and these changes can make comparisons across studies problematic. Inasmuch as the determination of one’s propensity to commit violence within individuals also varies across clinicians, time, place, and circumstances, measuring aggression in humans is also a difficult endeavor. Again, Lewis (1981) asserts that violence cannot be necessarily measured on past acts alone, as severely impaired individuals who have not acted out aggressively may actually be inherently more violent than the person who has killed another person in self-defense. Whereas a person who is delusional and hears voices that others are trying to “get them” may not have hurt anyone in the past, this person may be significantly more likely to act violently in the future when compared to the person who killed a burglar who broke into their home. This delusional subject, when presented with environmental or situational stressors, could be a much more violent person than the “killer.”

However, the presence of mental illness, brain injury, or a history of abuse will not necessarily be deterministic of human aggression in an individual. Acts of extreme violence are not conclusively determined by the presence of one of these vulnerabilities. It is therefore important to note that, “neurobiological susceptibility to violence may not actually lead to undesirable behaviors and most individuals with brain dysfunction do not commit violent acts. Association is not causation, and a brain lesion may alter the threshold for violence but not prove to be its sole direct cause” (Filley et al., 2001, p. 3).

All of these limitations suggest a note of caution in making causal inferences between neurological vulnerabilities and violent or homicidal behaviors. As the following synthesis of the literature on psychiatric vulnerabilities will show, many of the subjects included for study were referred and assessed *after* committing violent or antisocial acts. A key issue with this sample population of incarcerated or adjudicated offenders is that the studies were based on only those persons with severe neurological or psychiatric illnesses who had been imprisoned or hospitalized. Results and findings of these studies were based on the skewed records of this group possessing official records, leaving out those persons who were violent but who had not been taken into custody, caught, or acted out yet.

A final complication in neurological research is the complexity of measuring the social, environmental, and psychological factors that intertwine across human development. Due to the multifactorial causes of violence (e.g., environment, poverty, alcohol and drug use, child maltreatment, parental psychopathology, emotional stress), “a simple correlation between brain dysfunction and a violent act is rarely possible” (Filley et al., 2001, p. 3). As such, many factors emerge, interact, and combine over the lifecourse to create an atmosphere where neurological vulnerabilities are present in an individual. Although one area can be more dominant than another between persons, typically a combination of genetics/heredity, the neurochemistry of the brain, brain deficits, psychiatric disorders, and abusive or neglectful environments mingle to form the complete picture of neurobiological impairment. As shall be shown in the section that follows, research from many different disciplines that spans the natural, behavioral, and social sciences has contributed to the greater understanding of how the mind and body of these individuals become weakened to the point that they may act out in criminal or violent ways. This area of research holds great promise in the study of aggressive behaviors as it relates to public policy and directions for prevention and intervention.

GENETIC EXPLANATIONS OF VIOLENCE

The idea that criminality and human violence may be linked to genetic components is a controversial one that been argued since the inception of the behavioral and social sciences. Richard Dugdale (1877/1970) undertook one of the earliest studies of the inheritability of deviance in the 1800s as he traced the Juke family. Dugdale found that nearly one-fifth of the 700 descendents were criminals and three-fifths were financially indigent. Citing these findings, Dugdale concluded there was sufficient evidence of intergenerational criminality in the Juke line.

Research on the genetic contributions to criminality and violent behaviors continues today, with debate centering on the “nature versus nurture,” or genetics versus environment theories. Since the first work by Francis Galton (1865) on the nature versus nurture debate was published, the work on genetic links to human behavior has slowly and steadily proceeded in science (Plomin & Asbury, 2005). Indeed, the complex human network of social processes suggests that these heritable traits play a vital role in explaining deviance and the emergence of antisocial behaviors over the lifecourse.

Lewis and Balla (1976), for instance, stated “it would seem possible that a number of delinquents, who at first glance appear merely characterologically impaired, are actually intrinsically more vulnerable to the vicissitudes of a poverty environment than children who are better endowed physiologically” (p. 119). This argument has been made since the 1960s, when Kallman (1961) argued that character development was not predetermined by the genetic inheritance, but shaped by a host of factors. Recent research has explored factors related to criminality, violence, and homicide, by turning toward study designs that target key populations to address these issues. Specifically, twin and adoption studies have been used to determine whether psychopathological and/or criminal behaviors are truly genetically transmitted versus being passed on through non-genetic means such as environmental causes.

Twin Studies on Criminality

Biologically, the more closely people are related, the more genes they share in common. Scientifically, two distinct types of twins are recognized. The first, monozygotic (MZ) or identical twins, are a result of one fertilized egg, or zygote, dividing into two separate cells that grow to form two individuals (Nevid, Rathus, & Greene, 2000). As they are split from the same zygote, these people completely share their genetic code, or DNA. In contrast, dizygotic (DZ) twins, or fraternal twins, are conceived when two egg cells, or ova, are released and fertilized in the same cycle. These DZ twins share the same womb yet only half of their genetic makeup, just as any other set of siblings would. According to hereditary theories, “if genetics plays a role, then the behaviors of monozygotic twins should show more similarity or concordance than is found in the behaviors of dizygotic twins” since MZ twins share the exact same genetic code (Andrews and Bonta, 1998, p. 167).

Few twin studies were conducted within the behavioral or social sciences prior to the 1960s. In the 1920s, the first twin studies on developmental psychology emerged. Later in this same decade, Lange published his (1929) twin-criminality study, which found MZ twins were significantly more likely than DZ twins to exhibit criminal concordance (77 versus 12 percent, respectively). Subsequent studies performed prior to 1961 reported similar results, with an average concordance rate of 67.2 percent for MZ twins and 31 percent for DZ twins (see Mednick, 1981, p. 190; Rosanoff, Handy, & Plesset, 1934; Stumpfl, 1936; Slater, 1953; Yoshimasu, 1961).

Critical analyses of these early works have revealed several methodological weaknesses. First, the sample sizes of the pairs were very small, ranging from nine pairs of twins (Borgstrom, 1939) to 75 pairs (Rosanoff et al., 1934; Kranz, 1936). Secondly, most of these studies were conducted in Germany or Japan during a volatile period of world history around and after World War II. Lastly, the proportion of MZ twins was extraordinarily high when compared to rates in the general population, indicating that these twins were easier to detect in the inmate populations studied. This fact infers that the investigators knew beforehand which twins were involved criminally, thereby inflating the concordance rates of these studies.

More recent studies have sought to remedy these methodological issues. As a consequence, the criminal concordance rate for MZ twins has decreased significantly from Lange’s (1929) earlier finding of 77 percent. For example, Christiansen (1974; 1977) studied both identical and fraternal twins drawn from the Copenhagen birth registry and born in a region of Denmark between 1881 and 1910. Official criminal reports also available in a national registry were used to identify 799 of the 3586 same and different sex twin pairs that had at least one twin registered for criminality. The findings indicated that the base rate of offending for male-male twins was significantly higher than that of male-female twins (1977). The concordance rate for MZ pairs was 36 percent compared to 12 percent for fraternal twins (1974).

Most studies have continued to find higher concordance rates with identical twins when compared to fraternal twins, whether same or different sex pairs are included. Using a relatively large sample of twins, Eysenck (1977) argued that there was a genetic basis for differences in criminals and non-criminal twins. He found a concordance rate of 55 percent for MZ twins ($n = 231$) and 13 percent for DZ twins ($n = 535$) in his synthesis of nine twin studies. Dalgaard and Kringlen (1976) also found higher rates of concordance in identical

(26%) versus fraternal (15%) twins. Ellis (1982) further postulated that twin studies point to a “gene” explanation in a review of 14 analyses of the influences of heredity on criminality.

Contradictions also exist in the literature, with an American study of 99 male DZ and MZ twins reporting an uncharacteristically high concordance rate of 74 and 69 percent, respectively (Rowe, 1983). Several methodological issues make these findings reasonable, however. First, these findings may be inflated since even minor delinquent acts were deemed “criminal” using self-reported data. According to the age-crime curve of criminal offending, it would also be expected that the male adolescent population sampled would be at greater risk of experimental and risky behaviors. Self-reported minor criminal activity would inflate the concordance rate. In addition, urban youths were excluded from the study, possibly reducing the number of serious criminal offenses, including violent acts. In another study around the same time, Gurling, Oppenheim, and Murray (1984) actually reported higher concordance rates for fraternal (14%) than identical twins (7%). This study is the only one known to the author to have such findings, and the small sample size calls the results into question ($n = 14$).

A small number of researchers have also begun to examine genetic versus environmental differences regarding aggressive and nonaggressive subtypes of behaviors in childhood and adolescence. Using self-report data, Button, Scourfield, Martin, and McGuffin (2004) found evidence that childhood and adolescent antisocial aggressive behaviors may be uniquely explained by trait-specific genetic effects that did not influence nonaggressive behaviors. Gelhorn and colleagues (2006) recently interviewed 531 monozygotic and 569 dizygotic twin pairs to explore the heritability of aggressive and nonaggressive behaviors. Their analysis supported those of Button et al (2004), with aggressive and nonaggressive subtypes having different genetic contributors. Such work reinforces previous works that have found varied clinical courses between these subtypes and the need for better understanding of the genesis of aggressive behaviors (Loeber, Burke, Lahey, Winters, & Zera, 2000).

In examining this body of literature as a whole, “a frequently noted criticism of twin studies has been the possibility that identical twins are treated more alike by their social environments than are fraternal twins, and thus, the high concordance was inflated by environmental influences” (Andrews and Bonta, 1998, p. 168; see also Dalgaard and Kringlen, 1976; Lewis, 1981; Brennan and Mednick, 1993). Therefore, the influence of genetic and environmental factors may not be as easily distinguished from one another as these results first suggest. Whereas some social scientists continue to discount genetic explanations of criminality, evidence of this relationship has been provided by recent advanced gene and genotype research (see Plomin, 1989; Caspi et al., 2002; Avshalom et al., 2005) and in studies where identical twins were separated at birth or early childhood (see Grove et al, 1990).

Future studies that help to isolate and identify genetic markers will help to bolster the empirical evidence linking genetics to human violence. Studies might incorporate larger sample sizes, look at interaction and additive effects, and/or include comprehensive environmental factors that could potentially confound results. Such work will give a clearer picture of genetics true role in aggressive behaviors. In the interim, discussions regarding environment continue to stir considerable controversy and are an intense subject of debate in the medical and behavioral sciences communities. In an attempt to address this “shared environment” argument, researchers have used adoptive studies to better distinguish the effects of genetics and environmental factors on criminal and violent behaviors.

Adoptive Studies on Criminality

A large number of studies have examined the concordance rates of siblings separated, adopted or fostered, and raised by non-relatives. Typically, comparisons of these types identify the criminal histories of the child, the biological and adoptive parents, and various combinations of deviant behaviors between these individuals. "The assumption is that if the rate of criminality among adopted children is higher for those who have a biological parent with a criminal record than for the adoptees with a noncriminal biological parent then heredity has an effect" (Andrews and Bonta, 1998, p. 169). Evidence from some of these studies link criminality to genetics, although not always to the exclusion of environmental factors (Mednick, Moffitt, & Stack, 1987; Carey, 1992; Carey and DiLalla, 1994). A considerable body of literature has reported that adoptees are more similar to their biological families than their adoptive families with respect to self-reported aggressive behaviors (Miles & Carey, 1997), personality scores with aggressive traits (McGue, Bacon, & Lykken, 1993), antisocial personality disorder symptomology (Cadoret, O'Gorman, Troughton, & Heywood, 1985), and felony convictions (Raine, 1993),

Perhaps the most influential body of literature in this arena comes from the cross-fostering database housed in Denmark. This comprehensive resource of well-over 14,000 adopted Danish children has produced a large number of studies by Sarnoff Mednick and his colleagues. The conclusions of this research provide moderate support for a genetic-based theory of offending. In one such study, Hutchings and Mednick (1974) found a base rate of 10.5 percent of male adoptees had criminal registries when neither their biological nor their adoptive fathers had criminal histories. Interestingly, the rate increased insignificantly to 11.5 percent when the adoptive father had a criminal past. The sons were twice as likely to be criminal (22 percent), however, when their natural fathers were criminals. When both fathers displayed deviant behaviors, the adoptees' crime rate rose to 36.2 percent. The authors concluded that these findings provided support for a genetic link, as well as some sort of learning mechanism, in criminal offending.

Schulsinger (1972) chose 5483 adoptees from the Copenhagen database and studied 57 identified psychopaths with 57 non-psychopath controls matched by sex, age, socioeconomic status, neighborhood, and age of adoption. Again, Schulsinger found a genetic link with deviant behaviors, with the greatest proportion of psychopathy coming from those adoptees whose biological parents also had psychopathic tendencies. Environmental factors were assumed to have little or no influence in these findings, as the contact between the adoptees and their biological relatives was nonexistent or minimal. Mednick, Gabrielli, and Hutchings (1984), in a later study of Danish adoptees, also noted that adoptees whose biological parents were criminals had a greater chance of being convicted themselves, even when they were raised by noncriminal adoptive parents.

Despite their strong face validity, methodological problems have been raised with the use of this Danish database. For instance, Hutchings (1972) has argued that the fact that Danish adoptive authorities loosely match adoptive and biological families socioeconomically may mediate the findings. In addition, the use of a database in a country such as Denmark, which has limited variability in environmental dimensions, may render the findings non-generalizable to other countries such as the United States. Finally, the intake process at the time of adoption includes a multitude of questions regarding both the biological and adoptive parents, increasing the chances that the child will be labeled "deviant" and placed with a

family with similar “issues” (Mednick, 1981). It is noteworthy to mention that a comparison of Danish biological parents who began their criminal careers *prior* to the adoption of their child versus those parents who began their criminal careers *after* their children were adopted showed no differences in the proportion of children who became criminals. That is, both groups of biological parents were found to have 23 percent of their adopted offspring become registered for criminal acts.

In a Swedish study of adoptees that were grouped by their biological (called a congenital predisposition) parents’ and adopted parents’ (called postnatal predisposition to crime) records of criminality, Cloninger, Sigvardsson, Bohman, and Von Knorring (1982) also focused on genetic explanations of deviance. Cloninger et al. found that, when both congenital and postnatal predisposition factors were present, 40 percent of the adopted children had criminal backgrounds. This figure was considerably higher than the adoptees who had only criminal biological parents (12% had criminal records), followed by those who had only criminal adoptive parents (7%), and finally by adoptees who had neither a biological nor adoptive family criminal history (only 3% of adoptees were criminal). The results in this study were not simply additive, as the 40 percent figure of deviant adoptees from biological and adoptive backgrounds with criminal pasts was a far greater number than the sum of the two groups individually (approximately 19 percent). In other words, an interactive effect appeared between the congenital (genetic) and postnatal (environmental) factors. Cloninger and Gottesman (1987) found similar results when female adoptees were studied, albeit at much lower rates of criminality.

A study conducted by Crowe (1975) in the United States also found evidence of a genetic explanation for criminal behavior of adoptees. Toward this end, Crowe noted the similarity of adoptees criminal activities with their natural mothers. These findings are notable since they focus on biological mothers, unlike most other studies that looked at natural fathers or both parents.

This work predates another influential study at the University of Minnesota, which identified over 100 pairs of monozygotic twins and 25 pairs of dizygotic twins since the 1970s that were separated after birth and reared in different homes. Bouchard, Lykken, McGee, Segal, and Tellegen (1990) attempted to identify whether the genetic explanations of criminality and violence hold true with twin subjects who were raised in different environments. An impressive list of personality traits was identified in analyses of these data, suggesting a stronger relationship with genetic factors between identical twins than fraternal twin pairs. Namely, intelligence, alcohol and drug use, job choice, depression, danger-seeking, hostility, neuroticism, sense of self and well-being, and crime and conduct problems have all been identified by the Minnesota researchers (see Waller, Kojetin, Bouchard, Lykken, and Tellegen, 1990; Plomin, Corley, DeFries, & Fulker, 1990; Bouchard, Lykken, McGue, Segal, and Tellegen, 1990; Bouchard and McGue, 1990). Moreover, these findings appear to be supported in another study of 500 Swedish twins who were also raised apart (Plomin et al., 1992).

Although these findings appear to provide strong support for genetic theories, the ability of heritability to explain these personality traits and behaviors hovers around 50 percent (DiLalla & Gottesman, 1991; Carey & Goldman, 1997; Filley et al., 2001). Thus, genes cannot explain approximately half of these traits and behaviors that lead to criminality and violence. Toward a better understanding of the role of genetics as a part of neuropsychiatric

vulnerabilities explanations of violent behaviors, this next section reviews the body of literature regarding genetics and human aggression

Genetics and Violence

Whereas some researchers conclude that there is a definitive link between genetics and violent behaviors (see Martens, 1997, 2000, 2002; Raine, 2002), others state that the literature has been inconsistent in clearly demonstrating a relationship between the two (see Greene, Lynch, Decker, & Coles, 1997). For instance, Walters' (1992) meta-analysis of 38 family, twin, and adoption studies found that the adoptive studies were less supportive of a gene-violence relationship than family or twin studies. Their analysis of family and twin studies, however, indicated only a weak correlation in explaining the heredity of crime. Tedeschi and Felson (1994) also reported an indirect relationship between genetics and aggressiveness in their summary of twin studies. They concluded that aggressive behaviors are not directly caused by genetics, but rather aggressive behaviors are modified by these factors. Similar findings were reported by Mednick, Gabrielli, and Hutchings (1984), who found that adoptees were more likely to be criminal if their biological parents displayed deviant behaviors, but not necessarily with regard to violent acts.

Yet another body of research indicates that the gene-violence relationship may be more complex. Volavka (1995) concluded that research "suggests a propensity towards violent criminal behavior results from an interaction between genetic, prenatal, and perinatal factors" (p. 153). This statement was further supported by Cadoret, Cain, and Crowe (1983), which found evidence in their review of three adoption studies that an interactive effect appears when environmental and genetic factors were present. That is, together these factors accounted for much more of the antisocial behaviors of the adoptees than either factor was able to account for independently. This interactive effect was further supported in a study of male and female adoptees ($n = 197$) when biological parental psychopathology was measured (Cadoret, Yates, Troughton, Woodworth, & Stewart, 1995). Specifically, adoptees whose parents displayed alcoholism and antisocial personalities were more likely to be aggressive and display conduct disorders themselves. Furthermore, an interactive effect was found regarding negative adoptive home environments, with adoptees genetically predisposed to antisocial behaviors found to have increased aggression when living in these adverse environments. These results suggested that parental behaviors and psychopathology of the adoptive providing parents might have a significant impact on subsequent violence in their adoptees' charges (see Reiss et al., 1995).

In one of the latest twin studies on intimate partner aggression (IPA), Hines and Saudino (2004) suggested that genetic predispositions best explained the variance in physical and psychological abuse, with the remaining variance explained by nonshared environmental factors. Such research contradicts social learning theory, one of the dominant theories within the domestic violence literature. The authors posit that while a person may be genetically predisposed to violence, it is the subject's inclination to seek out peers who share their aggressive tendencies that may most influence their subsequent use of violent behavior against their partners. "Therefore, their eventual use of aggressive behaviors may have little to do with their parents' actual use of aggressive behaviors, but may be due to inheriting a

genetic predisposition from their parents and being exposed to aggressive models in their peer groups” (Hines & Saudino, 2004, p. 714).

In one recent study, Lewis, Yeager, Gidlow, and Lewis (2001) offered intriguing findings regarding six homicidal adoptees interviewed over the course of a twenty-year period. Lewis and her colleagues perused all available birth, adoption, medical, psychiatric, educational, social service, juvenile justice, and adult police records that were available, and conducted their own evaluations when possible. Findings indicated that all these murderers were born with genetic predispositions (at least one biological psychotic parent) that left them vulnerable to serious psychopathology. Combined with the central nervous system damages each suffered, it led to reason that these individuals would also suffer severe mental impairment. Lewis et al. further argued “physical and emotional abandonment by the adoptive parents seemed far more devastating to these adoptees than abandonment by their birth mother” (p. 396). In conclusion, the authors urged future study of adoptive children who murder in a comprehensive manner, taking into account the possible genetic, social, and medical histories of the offenders that might have contributed to their neurological impairment, and ultimately, their homicidal act.

Clearly, parental psychopathology and parenting styles are not the only relevant factors impacting explanations of genetics and violent behaviors. In a comprehensive report on the etiology and understanding of violence commissioned by the National Academy of Sciences, a group of respected researchers identified a host of social, familial, and environmental factors proposed to have a significant impact on genetic heredity. That is, “the effects of any variation in genetic predisposition to aggressive or violent behavior can be expected to depend on such factors as families’ responses to aggressive behavior by their developing children, the availability of weapons, and the financial, social and legal punishments and rewards for violent behavior” (Reiss and Roth, 1993, p. 117).

In sum, behavioral genomic explanations of criminality, violence, and homicide continue to be a source of tremendous controversy and discussion. At the same time, with the stellar rise of genetic knowledge, this area of research is likely to provide incredible insight into the predictive and diagnostic power of genes (Martens, 2002). Clearly, the complex relationship between genetics, environment, medical, and social factors needs to be further probed if we are to truly understand how they interact and contribute to neuropsychological impairment. In turn, this knowledge will further our understanding of violent and homicidal acts committed by persons with neurological vulnerabilities.

NEUROANATOMY, BRAIN DISORDERS, AND BRAIN INJURIES

Just as genetics may contribute to neurological vulnerabilities within violent individuals, researchers have also increasingly explored the correlates between violence and neuroanatomical factors. Specifically, scientists have looked at neuropsychological theories, investigative procedures, studies of aggressive populations, and neurochemical events in an attempt to explain human violence and aggression. Until fairly recently, “explanations for such violence have focused on psychosocial explanations that emphasize such important factors as family structure, poverty, racism, opportunity, overcrowding, employment, and other similar factors. Little of the interest has been directed toward the role of

neuropsychological and neurological factors that may influence our understanding of aggression in humans” (Golden, Jackson, Peterson-Rohne, & Gontkovsky, 1996, p. 3).

Whereas studies of social and environmental factors have produced a large body of literature that supports a relationship with antisocial behaviors, neurobiological explanations are sometimes overlooked in the criminological literature. Yet, the “fact that social circumstances are linked to crime does not exclude the possibility that those who suffered...a significant head injury might be more vulnerable to behaving violently given the same or similar social circumstances” (Miller, 1999, p. 298). Toward this end, this section explores how neurological deficits, disorders, and traumatic brain injuries may further explain violent and homicidal behaviors within individuals. Before conducting this review, a brief background of the key anatomical and biological processes of the brain and central nervous system (CNS) is offered to the reader.

The Anatomy of the Central Nervous System and Brain

At its most basic level, the central nervous system (CNS) is comprised of nerve cells, called neurons, which communicate critical information between cells concerning the functions of life, sensory impulses, and body reactions via chemical substances called neurotransmitters (Nevid et al, 2000). Each neurotransmitter has a unique chemical structure that fits a certain receptor site, or receiving neuron. Examples of these neurotransmitters include dopamine, norepinephrine, acetylcholine, and serotonin. Deficiencies or overproduction of neurotransmitters and hormones have been linked to a myriad of mental health problems such as mood, anxiety, sleep, eating, and schizophrenic disorders (see Zuckerman, 1994; McBride, Anderson, & Shapiro, 1996; McBurnett, Pfiffner, Capasso, Lahey, & Loeber, 1997; Nevid et al, 2000). Other studies have linked imbalances of serotonin, cortisol, triiodothyroine and other biochemicals to impulsivity, irritability, hostility, antisocial personality disorder, and persistent aggression (World Health Organization, 1992; Dolan, 1994; Virkkunen, Kallio, et al., 1994; Virkkunen, Rawlings, et al., 1994;).

Where the spinal cord meets the brain is called the hindbrain, consisting of the medulla, pons, and cerebellum. The medulla controls the vital functions of heart rate, respiration, sleep, and blood pressure; the pons also contributes to sleep, respiration, and attention. Finally, the cerebellum helps regulate motor coordination, muscle tone, and balance (Nevid et al., 2000).

Moving up into the brain, the midbrain area controls many auditory, visual, and motor functions. Lastly, the forebrain area includes many critical areas of the brain such as the thalamus (which relays sensory information to higher areas through the cerebral cortex) and the hypothalamus (which regulates body temperature, body fluids, nutrient storage, motivation, emotions, and sexual activities). The limbic system is located here and is comprised of the thalamus, hypothalamus, septum, hippocampus, caudate nucleus, and amygdala (Golden et al., 1996).

Together, these sensitive areas of the brain can be separated into four lobes of the cerebral cortex (or the surface of the brain with its ridges and valleys). These four lobes include: the frontal, temporal, parietal, and occipital. Connecting these lobes is a thick fiber bundle called the corpus callosum. As will be shown in the next section, most research on the relationship of the brain and violence focuses on the frontal and temporal lobe regions, as well as the limbic areas of the brain. The proposed relationship between various structures in

the brain and human violence appears to be at least somewhat supported by empirical evidence in the neuropsychological literature surrounding brain lesions, imaging technologies (e.g., Positron Emission Tomography or PET scans), electroencephalogram (or EEG) scans, and neuropsychological testing.

Neuropsychological Factors in Explaining Violence

A review of the clinical literature surrounding neuropsychological correlates of violence and aggression indicates several major areas of approach as first set forth by Golden et al. (1996). Such a discussion is particularly relevant to the focus of this chapter since “various kinds of brain injuries and cerebrospinal disorders can be related to severe personality changes and emotional problems, which, in their turn, can be paired with maladaptive behavior” (Martens, 2002, p. 170). These areas include damage to the prefrontal and/or temperolimbic regions of the brain and generalized damage to the brain due to extensive disability or head injury. Relevant discussions of neuroimaging findings and the relationship of neurological vulnerabilities across a variety of specific populations are now discussed.

Frontal Lobe Correlates to Violence

The first case studies to link antisocial behaviors to frontal lobe damage date as far back as 1835 (Blumer and Benson, 1975). Perhaps one of the most famous cases ever documented was that of Phineas Gage, a 25 year-old man who was wounded in an explosion (Rosenhan and Seligman, 1995). An iron bar over an inch in diameter was shot through the front of his skull from the explosion, causing extensive damage to a large section of his frontal lobe. Surprisingly, Gage remained conscious throughout his ordeal and survived the accident, only to suffer a complete change of personality that was in stark contrast to his pre-accident persona. While he was considered to be one of the most capable, amicable, and efficient of all workers on the job prior to the accident, afterward he was found to be “fitful, irreverent, indulging at times in the grossest profanity...manifesting but little deference for his fellows, [and] impatient of restraint or advice when it conflicted with his desires” (Rosenhan and Seligman, 1995, p. 656). So drastic was the change that he was said to no longer be “himself,” and Gage lost most of his old life, friends, and employment due to his newly manifested animalistic and impulsive behaviors.

“Prefrontal dysfunction theory suggests that damage or dysfunction to the frontal lobe of the brain may in part account for, or predispose to, violent and aggressive behavior” (Raine and Liu, 1998, p. 107). That is, empirical studies have shown that “patients with frontal lobe lesions demonstrate an inability to plan for the future, impairment in goal execution, and reduced flexibility in their approach to new problems, despite normal performance on intelligence tests on various perceptual, linguistic, and memory tasks” (Krakowski, 1997. p. 675). Lewis, Lovely et al. (1988) further argued that these neuropsychological and neuroanatomical deficits contribute to the overall neurological vulnerability of such individuals, rendering them less capable of coping with situations and stressors in a healthy or socially acceptable manner.

Human frontal lobes are significantly larger than those of other animals and represent “the biggest and most obvious difference between the brains of humans and other primates” (Pincus, 2000, p. 782). The frontal area of the brain comprises one-third of the mass of the cerebral cortex and plays a vital role in regulating attention, decision-making, inhibitions, impulsivity, and goal executions (Laakso et al., 2001). This “directing and controlling source of the brain” (Hawkins and Trobst, 2000, p. 149) produces most of our crucial human-like behaviors such as planning, higher-order information processing, programming commands, initiating and demanding behaviors, and adaptation to our world. Recent studies have shown that damage to the orbitofrontal cortex has been linked with poor judgment, maladaptive behaviors, emotion regulation of inner drives, and an inability to anticipate poor outcomes (Schoenbaum, Chiba, & Gallagher, 1998; Tremblay & Schultz, 1999). Such impairments often lead individuals to commit impulsive and reckless acts with little regard for inevitable moral consequences (Martens, 2002).

When discussing the frontal lobes, this area includes the entire prefrontal region of the brain. These sensitive regions are greatly affected across the lifecourse and the various stages of personal, biological, and environmental factors that interact across the lifespan. As Golden et al. (1996) explains,

“these are the areas that lie above the orbital ridge, above the eyes, and the last area of the brain to fully develop, coming to complete maturity in the later part of adolescence. The prefrontal area allows us to move from childhood to adulthood, with adolescence being characterized by major changes in prefrontal functions. It should be emphasized that prefrontal development, like the development of most higher levels of the cortex, is not dependent on neurological development alone. Although biology provides the neural substrate for developing the skills mediated by the prefrontal areas, learning and experience must also take place so that the proper final structures are developed. Thus, unlike most organs of the body, development is dependent not only on the physical environment and DNA, but also on the psychological and cognitive environment” (Golden et al., 1996, pp. 4-5).

Thus, individuals with frontal lobe damage are prone to a distinct inability to regulate emotional equilibrium and mood stability, which sometimes results in emotional responses that are disproportionate to the stimuli (Wood, 1987; Devinski, Morrell, & Vogt, 1995). “Because of their egocentricity, lack of empathy, lack of planning, and lack of the inability to anticipate the consequences of their behavior, they are also more likely to engage in behaviors that irritate or offend others” (Golden et al., 1996, p. 5). In addition, the “threshold” for aggressive and violent behaviors may be lower as a result of mood instability in these individuals (Wood, 1987; Hart & Jacobs, 1993).

The “normality” of these people can be quite deceiving from outside appearances. Indeed, the “frontal lobe can be damaged or even surgically removed without causing any abnormality in speech, arithmetic ability, reading, and writing. Although these functions, as tested by MMSE and IQ tests, often remain intact after frontal lobe injury, profound and devastating changes can occur in the social life of frontally damaged people” (Pincus, 2000, p. 783).

That is, “it is possible for a person to become a social imbecile because of frontal damage and still have a normal MMSE and a normal IQ with good ability to speak, write, calculate,

and remember” (Pincus, 2000, p. 783). In this way, frontal lobe damage can be extremely difficult to identify and a methodological challenge for researchers to investigate.

Studies of frontal lobe dysfunction have largely been based on specific case studies such as Phineas Gage. Yet another example was provided by Yudofsky, Williams, and Gorman (1981) in the case of a 63-year-old man who suffered frontal lobe damage in a tire explosion. Upon waking from almost a month-long coma, the subject became uncontrollably violent up to ten times per day with no provocation. Although these case studies offer rich descriptions of selective individuals and behaviors, their conclusions must be viewed with caution due to their weaknesses regarding generalizability and replication. In an effort to better understand the complex relationship between prefrontal lobe damage and violence on a more generalizable scale, researchers have increasingly turned toward larger study populations.

Toward this end, “one way to seek for a link between neuropsychological impairments associated with structural brain damage and offending is to look for evidence of brain damage and/or neuropsychological impairment in various offender groups” (Miller, 1999, p. 300). The obvious hypothesis in these studies is that samples of offenders will display more frontal lobe dysfunction than comparable control subjects. These studies have examined both adult and juvenile offenders and have largely reached similar conclusions overall- “violent offenders tend to have neuropsychological indicators of brain damage as well as decreased, intellectual functioning” (Golden et al, 1996, p. 12).

In one instance, Gorenstein (1982) conducted a series of neuropsychological tests on a group of “psychopaths” and compared their scores to a non-psychopathic control group. In his findings, Gorenstein found that the psychopaths were significantly more cognitively impaired on some measures when compared with the control group. It should be noted, however, that this study was not without scholastic criticism since the subjects were not matched across such salient variables as age and education attainment levels (Hare, 1984). As higher levels of education may produce false-positives regarding intelligence, Hare questioned the reliability of these findings. Moreover, the diagnostic criteria for psychopathology used within the Gorenstein study were questioned by other researchers. Using a similar battery of neuropsychological measures, Hare found no significant differences between offenders classified as low, medium, and highly psychopathic. These results called into question the reliability of Gorenstein’s measures of psychopathology and pointed to an ongoing criticism in the field of the use of neuropsychological criterion.

As illustrated by this example, one dominant theme of the literature surrounding aggression and frontal lobe impairment through the 1980s focused on intelligence. The ease and availability of these measures, combined with a lack of more comprehensive standardized neuropsychological instruments, made intelligence tests a logical choice. Early theories supported their use as well. Within the field of criminology, a direct and causal IQ-delinquency relationship caused by parents genetically passing on low intelligence and primitively criminalistic predispositions was endorsed, many times with little or no empirical evidence (Dugdale, 1877). In another instance, Kahn (1959) hypothesized that poor abstract reasoning skills were manifested in severe aggression due to low impulse controls. Hirschi and Hindelang (1977) argued in an often-cited piece that the magnitude of the IQ-delinquency relationship rendered it just as significant as socioeconomic class.

Yet this theory was met with mixed results throughout the years. Whereas Kuncze, Ryan, and Eckelman (1976) found support for this theory with violent offenders receiving lower subtest scores on the Weschsler Adult Intelligence Scale (WAIS) instrument when compared

to nonviolent offenders, these findings could not be replicated in a similar study (Shawver and Jew, 1978). Other studies investigating the link between violent offenders and IQ have reported lower IQ scores in violent individuals when compared to other non-violent persons. One such study compared violent offenders (or those who had caused others bodily injury) with non-violent offenders (Syverson & Romney, 1985). This analysis indicated significant differences between the groups across several measures, including the WAIS subtests Information, Comprehensive and Object Assembly, as well as lower Verbal and Full Scale IQ scores. That is, the violent offenders had significantly lower IQ scores and less developed verbal intelligence scores than the nonviolent groups.

Similar findings were found in another study by Valliant, Asu, Cooper, and Mammola (1984). Between-group comparisons of “dangerous offenders” (those offenders committing violent personal crimes such as rape, murder, and assault) versus “nondangerous” offenders (those persons who committed property crimes) found differences in IQ scores again. As expected, the violent individuals on average had IQ and WAIS scores two points less than the property offenders and 21 points less than a comparison group of college freshmen. Yet not all studies reported a strong relationship between adult intelligence and aggression. Robertson, Taylor, and Gunn (1987) examined executive functioning of violent versus nonviolent offenders and found no significant differences. While the violent group had lower IQ scores, there was no evidence of a link between cognitive functioning and aggressive behaviors.

Select research on the etiology of juvenile brain dysfunction has similarly focused on intelligence. In a sample of 101 juvenile delinquents, Tarter, Hegedus, Winsten, and Alterman (1984) found no distinct differences across various measures of performance (PIQ) and verbal (VIQ) levels and the likelihood of violent or aggressive behaviors. These results were similar to earlier works by Shulman (1951) and Prentice and Kelly (1963), which found that juvenile delinquents were no less intelligent than control samples.

In contrast to these studies, another body of work has found a significant relationship with intelligence (see Moffitt, 1990a). Weschsler (1958) first suggested that juvenile psychopathy would be characterized by higher performance IQ scores relative to Verbal IQ scores (PIQ>VIQ scores). Support for this hypothesis was reported in two 1986 studies. Walsh and Beyer (1986) found that delinquents with a PIQ>VIQ difference of 15 points or more were significantly more likely to be violent offenders. In addition, Petee and Walsh (1986) also found significant differences in violent behaviors when statistically significant discrepancy scores were found between groups.

Critics of the intelligence link between behaviors cite the difficulty in interpreting the discrepancy between performance and verbal IQ scores. Inasmuch as a proportion of subjects should test as a higher PIQ>VIQ score by simple random chance alone, and vice versa, this correlation is imperfect. An alternative explanation to the IQ-deviance relationship reasons that “since the educational system amongst other things in society, favours verbal abilities over other kinds of abilities, so those with relatively low verbal ability in relation to their overall or Full Scale intelligence, may feel rejected and excluded and so be more prone to offending” (Miller, 1999, p. 310).

In light of these criticisms, intelligence findings should be viewed with caution, as they may be indicative of hemisphere dominance, or lateralization (see Annett, 1985). Tests of lateralization have had mixed results, with adult violent and neurotic offenders appearing markedly right-handed when compared to controls (Taylor, Brown, & Gunn, 1983). Other

research using juvenile offenders, however, have found little or no consistent evidence regarding handedness supporting the hypothesis that certain groups of offenders will display similar brain lateralizations (see Fitzhugh, 1973; Spellacy, 1977; Annett, 1985; Nachson & Denno, 1987).

Despite limited empirical support that intelligence and lateralization may play an important part in neuropsychological testing as in indication of frontal lobe dysfunction, researchers have increasingly turned toward more comprehensive assessment examinations. These assessment instruments seek to better identify the different areas of the brain that may be damaged or malfunctioning. Other researchers have investigated frontal lobe disturbances from a more global perspective, taking into account how the different regions of the brain interact with one another to influence behaviors. Before discussing the literature surrounding these other areas of research, a discussion of another vital area of the brain, or the temperolimbic region, is presented.

Temporal Lobe and Limbic System Correlates to Violence

“The relationship between the temporal lobes of the brain and violent and aggressive behavior has been recognized for many years” (Seidenwurm, Pounds, Globus & Valk, 1997, p. 625). One of the first works to explore the relationship between the temporal lobes and aggression was that of Kluver and Bucy (1939). After performing bilateral temporal lobectomies (removal of the amygdala and surrounding temporal cortex) on monkeys, the researchers observed that the primates exhibited less aggression, a reduction in emotional reactivity, and hypersexual responses.

A plentitude of studies have further explored this region of the brain and have documented the proposed relationship between the temperolimbic areas and human violence. In particular, the amygdala’s proximity to the temporal lobe has been linked to aggression. That is,

“ablation or lesioning of the amygdala or adjacent temporal lobe structures results in a decrease in aggressive behavior because of reduced emotional reactivity to external stimuli. As the amygdala gives affective significance to sensory information by relating it to past experience, stimuli that would have previously elicited aggression lose their past association. Conversely, stimulation of the amygdala and temporal lobe structures results in increased aggression because of enhanced emotional response to external stimuli” (Krakowski, 1997, p. 674).

Patients with such lesions were likely to experience disturbed emotional states and memories, underarousal, and immaturity (Cahill, Rabinsky, Markowitsch, & McGaugh, 1995; Davidson & Sutton, 1995). Hence, temporal lobe abnormalities frequently manifest themselves as unprovoked and disproportionate displays of anger, memory loss, language impairments, a lack of compassion or guilt, and occasional auditory or visual hallucinations.

Other research has linked a propensity for violence to individuals with complex partial seizures or temporal lobe epilepsy (see Terzian & Ore, 1955; Glaser, 1967; Williams, 1969; Mark & Ervin, 1970; Falconer, 1973; Geschwind, 1973; Kiloh, Gye, Rushworth, Bell, & White, 1974; Bear & Fedio, 1977; Bear, 1979; Graber, Hartmann, Coffman, Huey, & Golden,

1982; Weiger & Bear, 1988). Epilepsy is a common disorder whereby damaged neural tissue becomes irritable and prone to increased brain activity. Impaired inhibitory systems or excited adjacent neurons may lead to excessive neural activity, called seizures, which may occur sporadically as the neurons discharge (Rosenhan & Seligman, 1995). While the “part of the brain or type of mental event that appears first in the seizure is an indicator of the location of the primary damage in the brain...some seizures spread progressively from the original site to other parts of the brain” (Rosenhan & Seligman, 1995, p. 660).

Yet experts have highlighted the difficulty in labeling epilepsy. “No doubt there exist as many definitions of epilepsy as there are neurologists and as many definitions of epilepsy as there are patients” (Ervin, 1975, p. 1138). Further complicating these matters is the subtlety and variety of symptoms that may characterize psychomotor epilepsy (versus grand mal or other types of epilepsy). Lewis and Balla (1976) recognized these diagnostic challenges and identified several symptoms that may signify psychomotor-temporal lobe seizures (p. 77) including:

1. auras of anxiety or fear
2. variety of visceral symptoms such as nausea and abdominal discomfort
3. alterations in consciousness (usually without complete loss of consciousness)
4. complex thought processes and feeling states
5. automatic behaviors
6. at times auditory, visual, or kinesthetic hallucinations, visual distortions, and frequent episodes of *deja-vu*.

The authors noted the complexity of the physiological, psychological, and environmental factors that interact to produce such a result in the brain.

Although aggression has been somewhat linked to seizure disorders, most violent acts do not occur close temporally, or “ictally,” to the seizures. Researchers have identified four epileptic phases. The preictal phase, or the period just before a seizure, has rarely been connected to aggression (Fenwick, 1989). Also rare are ictal furies, which manifest as violent and disproportionate reactions close to the seizure event (Elliot, 1988). These furies tend to take the form of resistance versus goal-oriented violence (Jones, 1992). Post-ictal violence includes reactions to partial seizures, or postical automatism, and as a reaction to being subdued, confused, or restrained during the seizure event, or a postical confusion state (see Perrine & Congett, 1994; Fenwick, 1989). Rarely, “interictal” violence has been reported in epileptics without explanation or provocation (Taylor, 1969). Epileptic symptoms have also been well documented across violent populations, such as patients in maximum-security mental hospital (Wong, Lumsden, Fenton, & Fenwick, 1994), adult prisoners (Whitman et al., 1984), and juveniles court-referred for mental health assessment (Lewis, Shanok, Pincus, & Glaser, 1981). A definitive link between epilepsy and personality changes, however, has not been supported empirically (Jones, 1992; Mendez, Doss, & Taylor, 1993) and the stigma surrounding epilepsy and violence continues to be perpetuated by social myth and legal defenses which use it as an explanation for aggression (Perrine & Congett, 1994).

In reality, the vast majority of persons with epilepsy do not commit violence against others. A host of other factors become intertwined and must be considered if a true understanding of why some epileptic patients become violent while the majority does not. Mendez, Doss, and Taylor (1993), for instance, found that aggressive patients with temporal

lobe epilepsy had significant differences only with respect to psycho-pathological and mental retardation variables. Another study analyzed the interictal behavioral abnormalities in temporal lobe epilepsy and found increased aggression, paranoid behaviors, sexual alterations, and obsessive conduct present (Bear & Fedio, 1977). Other researchers have found a relationship between aggression and epilepsy, but specifically for temporal lobe epileptics (Volavka, Martell, & Convit, 1992) and in juvenile homicide offenders (Lewis et al., 1985). A subsequent study found no differences between aggressive and non-aggressive epileptics on neuroimaging and EEG tests, but reported significantly poorer intelligence scores and occupational histories for aggressive subjects (Herzberg & Fenwick, 1988). To date, research on epileptics has generally found acts of aggression as random acts, set off by physical and/or psychological stressors, rather than as premeditated and controlled aggressive acts around the ictal event (Elliott, 1987; Lewis & Pincus, 1989; Perrine & Congett, 1994).

Nonetheless, a documented relationship has been established between epilepsy and a neurological condition known as “episodic dyscontrol.” This form of impairment is associated with temporal lobe and limbic system damage, both of which serve as emotion regulators within the body. Indeed, “studies in animals and clinical reports have suggested that violent individuals suffer from intrinsic neurological deficits and that their violent acts may be the direct result of epileptic-type discharges of neurons in these sensitive brain regions. The term ‘episodic dyscontrol’ has been used to describe paroxysmal outbursts of violent behavior thought to occur in this manner” (Blake, Pincus, & Buckner, 1995, p. 1641). First identified by Kaplan (1899) and Meninger (Meninger and Mayman, 1956), episodic dyscontrol is marked by recurrent acts of anger that vary in severity, intensity, and form, and which may appear without provocation. Rather than presenting as a specific disorder, it

“can be found in a variety of diagnostic categories, including: psychoses, neuroses, borderline personality disorder, conduct disorders, psychopathy, organic brain syndromes, epilepsy, mental retardation, metabolic diseases, and in developmental syndromes including attention-deficit-hyperactivity disorder (ADHD) and specific learning disorders” (Golden et al., 1996, p. 6).

Aggressive behaviors stemming from episodic dyscontrol may vary from unprovoked, primitive, and severely disproportionate acts to more organized, controlled, and directed behaviors toward a specific target. Neurologic abnormalities attributed to traumatic head injury or emotional responses due to various psychological diagnoses, may be the root cause of the reactive episodes. Whether as a result of epileptic or episodic events, however, temporal lobe-related aggression does not have the clear etiology that frontal lobe aggression possesses and, as a result, may be easily misdiagnosed. As Lewis (1981) explains, “where a piece of psychologically induced and potentially controllable behavior ends and a nonvolitional seizure state begins is often impossible to determine. Such situations pose especially difficult tasks for judges and juries wrestling with issues of responsibility” (p. 41). Indeed, Lewis and her colleagues have lacked consistent findings that temporal lobe-mediated events were the cause of violent behaviors. Rather, their findings suggested neurological vulnerabilities were instead multi-dimensional and varied (Lewis, Pincus, et al., 1986).

Lewis and her colleagues have increasingly come to view the psychomotor symptoms (or lapses in awareness and memory) in juvenile subjects as dissociative episodes rather than partial seizures (Lewis, 1991). That is, “subsequent experience suggests that dissociative

episodes, including multiple personality disorder, are an important cause of lapses in awareness and memory among delinquents, especially violent ones. The role of brain damage in dissociative states is not clear but the two are often combined” (Pincus, 1993, p. 867). Other researchers have questioned the diagnosis of brutal, senseless killers as “episodic dyscontrol, with the absence of clear psychotic symptoms” (Cornell, 1989; Ewing, 1990).

While there is no “violence center” in the human brain, it appears “impossible to make a one-to-one correlation between violence and specific forms of neurologic dysfunction or the brain regions involved” (Pincus, 2000, p. 779). Rather, it appears that the “correlation of epilepsy, retardation, alcohol intoxication, and other forms of brain dysfunction with violent acts in a particular individual can only be explained if the violent, damaged individual has other vulnerabilities in addition to brain dysfunction” (Pincus, 2000, p. 780). To better understand and recognize the complexity of neuropsychological vulnerabilities, researchers have increasingly turned to studying specific populations of offenders. Toward this end, the following section further explores the literature surrounding the relationship of brain trauma and injuries within aggressive populations.

Head Injury and Brain Dysfunction in Specific Populations

Head injuries are a relatively common form of brain trauma, especially for younger males. The most frequent causes of head injury comes from traffic injuries (Miller, 1999), sports events, work-related injuries, and violent assaults (Richardson, 1990). Specifically,

“closed head injury occurs when the head sustains a significant blow from an external object...whilst the skull may or may not be fractured, there is no penetration through the skull and into the brain as would be the case in a penetrating head injury, as caused by a bullet wound. Significant head injuries resulting in loss of consciousness for many minutes, or even hours, can have appreciable psychological consequences. Impairments in cognitive functioning are common (in memory, attention, speed of information processing, etc.)...although the brain pathology produced by closed head injury is diffuse, the frontal, temporal, and occipital lobes are especially prone to marked contusion” (Miller, 1999, pp. 299-300).

A convincing link between brain trauma and antisocial behaviors and mental health disorders has presented itself in the last decade (Robinson & Starkstein, 1997; Silver, Hale, & Yudofsky, 1997; Raine, Lencz, Bihrlé, LaCasse, & Colletti, 2000). Researchers have also looked toward a number of specific criminal populations in an attempt to better understand how head injury and brain dysfunction may contribute to the overall neurological vulnerabilities of these offender types. In broad terms, these populations include: 1) domestic batterers, 2) sexual offenders, and 3) antisocial, aggressive, and violent subjects.

The first group addressed in the brain injury literature is domestic batterers. Domestic violence has become a recognized and well-researched social problem in the last few decades (Roberts, 2002). No longer considered a private “family matter,” domestic, marital, and family violence has far-reaching social implications and impacts all racial, ethnic, and socioeconomic classes of society (Wareham, Boots, & Chavez, forthcoming). By far, most violent offenses against intimate partners are committed by males (Barnett, Miller-Perrin, &

Perrin, 1997; Gosselin, 2005). In 2005 alone, a staggering 389,000 women self-reported a violent act committed by their intimate partners. Of these victims, almost 50,000 were raped or sexually assaulted and another 48,000 women suffered an aggravated assault at the hands of their domestic partners (Catalano, 2006).

One area of particular interest in biosocial research on domestic violence involves the contribution of head injury and other neuropsychological impairments in explaining male battering. In examining populations of antisocial individuals, male batterers have become a keen resource to better understand the complex relationship between neurological vulnerabilities and violence. While no controlled research has systematically examined whether males who have suffered head injuries are more likely to batter, preliminary studies have shown that batterers are significantly more likely than non-batterers to have suffered head injuries (Rosenbaum & Hoge, 1989; Rosenbaum et al., 1994). In one of these studies, Rosenbaum and Hoge (1989) found that male domestic violence offenders were significantly more likely than the general population to have suffered brain injury (61.3% versus 5.9%). These findings were interpreted cautiously, however, as the study lacked controls and employed a nonblind design.

Another controlled study provided further support for these previous findings. This study, which compared a group of male batterers with both groups of men who reported non-violent marital problems and those men who reported being happily married, indicated that head injury was more common in the group of batterers versus all others. That is, head injury was present in 53 percent of the violent batterers versus only 25 percent of the non-violent and 16 percent of the happily married men (see Golden et al., 1996). Perhaps most significantly, some form of head trauma appeared to precede marital violence in 93 percent of the male batterers. Although these few studies tentatively point toward the conclusion that domestic violence offenders may have higher incidences of traumatic head injury, no systematic, controlled and longitudinal research has been conducted to determine whether males with head injury are more likely to *become* batterers.

Some other of head-injured males provided only limited support for the hypothesis that head injury may contribute to marital battering in males. Warnken, Rosenbaum, Fletcher, Hoge, and Adelman (1994) identified 982 male subjects who had suffered either orthopedic or traumatic head injury, with 75 of these subjects agreeing to participate. Although no significant between-group differences were found with respect to relationship aggression, female partners of the head-injured men reported significantly greater incidences of verbal abuse and dependency, as well as less communication and feelings of low self-esteem in themselves following the injury when compared to the orthopedic group (precursors of marital violence). Men with head injuries, and their partners, also reported more anger and depression than the comparison group. These findings should be viewed carefully, as the self-selection bias of the study design, the short time period between injury and assessment (5 years or less), and the high mean age of the subjects (age = 40, when the majority of marital batterers tend to be in their 20s and 30s), all limited their conclusions. Future controlled research with experimental and blind designs will undoubtedly provide more evidence that is needed to better determine how head injury may contribute to intimate partner violence

Another group which has specifically been studied in relation to the evidence of head trauma involves sexual offenders. "Although many types of sexual behavior are considered deviant, forced sexual assault, or rape, is qualitatively different. Rape is not a product of sexual desire, but rather an act of aggression and violence" (Golden et al., 1996, p. 15). The

description of sexual assault as an impulsive act is a common report among rapists. Researchers have studied the relationship between poor impulse control and sexual assault and have focused on the role of brain injuries or lesions to the orbital and frontal lobes (see Lishman, 1968), the temperolimbic areas of the brain (see Eysenck, 1964; Mark & Ervin, 1970; Oppenheimer, 1971), and as manifestations of “episodic dyscontrol syndrome” (see Mark & Ervin, 1970).

Beginning in the 1980s, researchers have increasingly looked toward advanced technologies, such as neuroimaging techniques, to examine global cognitive dysfunction in the brain. A select review of this literature points toward a relationship between violent sexual offenders and neuropsychological vulnerabilities. Graber et al. (1982), for instance, studied sexual offenders in Nebraska with multiple sexual offenses. Measures from the Luria Nebraska Neuropsychological Battery- Form I (LNNB), CT mean cerebral hemispheric density, and regional cerebral blood flow tests found 50 percent of the subjects were brain impaired (e.g., decreased blood flow and brain density). That is, three of the six subjects displayed organic impairment that rendered them more prone to displaying poor impulse control and to act more primitively in their sexual behaviors.

These results were supported in a later study by Scott, Cole, McKay, Golden, and Liggett (1984). In studying a group of rapists, the authors compared the subjects’ LNNB scores with those of a control group of men with no known psychological or neurological problems. Again, the results indicated that sexual offenders scored lower than control subjects on almost all summary scales, with 7 of the 14 scales showing significant differences (including Visual, Writing, Pathognomonic, Arithmetic, Speech, Intellectual Processes, and Memory). Moreover, when sexual assaulters were dichotomized by victim-type, 55 percent of rapists and 36 percent of pedophiles displayed brain dysfunction on the LNNB. Despite these findings, the sexual offender group did not meet the diagnostic criteria for neurological impairment. These findings, therefore, are deceiving, in light of the fact that nearly half (47%) of these offenders displayed some brain damage and approximately one third were found to have borderline brain damage.

A few studies, however, have found conflicting results with respect to aggressive sexual offenders. For example, Langevin et al. (1985) found no significant differences between sexually aggressive men and non-violent offenders across neuropsychological or neuroimaging (CT) measures. Despite these findings, the overall evidence in this area appears to support the presence of neurological vulnerabilities in the brains of many sexual offenders when compared to non-violent or normal controls.

A further compelling body of research surrounding brain dysfunction and violent populations focuses on individuals with sociopathic, psychopathic, or antisocial personality traits. These individuals are typically self-involved, fearless, have low frustration tolerance and impulsivity control, and frequently partake in risk-taking behaviors. Overall, “psychopathy is a socially devastating disorder defined by a constellation of affective, interpersonal, and behavioral characteristics, including egocentricity; impulsivity; irresponsibility; shallow emotions lack of empathy, guilt or remorse; pathological lying; manipulateness; and the persistent violation of social norms and expectations” (Hare, 1996, p. 25).

One of the first studies of psychopathic subjects was conducted by Gibbens, Pond, and Stafford-Clark (1959). In an eight-year follow-up study of 72 “severely psychopathic criminals” and 59 control prisoners, findings indicated that 40 percent of the psychopathic

releasees had suffered some form of traumatic head injury. The psychopathic group was found to also have a higher recidivism rate, including for crimes of violence. These results are similar to other studies that have found that antisocial personalities commit a disproportionate amount of violent and aggressive behaviors than other offenders (Ganzer & Sarason, 1973; Hare, 1981; Hare & Jutai, 1983). It should be noted in the Gibbens et al. study, however, that the rate of head injury in the control group was not reported.

As discussed earlier, frontal lobe function controls critical behavior aspects such as self-regulation, judgment, and motivation. Although the genesis of psychopathy is unsettled, a clear connection has been made in the literature between antisocial personality disorder and brain impairment and disorders. Traumatic brain injury or dysfunction manifests commonly in frontal, lobe functions, with these individuals having little control of their emotions or impulses and a lower threshold for aggressive behavior (Miller, 1990). Indeed, studies have indicated that individuals diagnosed with antisocial personality disorder exhibit similar behavioral features as those persons with acquired sociopathy who suffered traumatic brain injury (TBI) which altered their personalities (see Tranel, 1994). Lykken (1995) has argued that these persons may be born with irreversible defects of their central nervous system that render them incapable of learning from negative life events.

Some research supports these claims. Yuedall (1977), for instance, found that 91 percent of the psychopathological patients in Alberta, Canada displayed dysfunction of the left side of the brain, whereas other criminal patients showed vulnerabilities in their right hemispheres. Raine et al. (2000) found that men with antisocial personality disorder had a reduced autonomic activity combined with a significant reduction in the prefrontal gray matter of their brains. Miller (1987) has similarly found that more aggressive and impulsive psychopaths display less intelligence and had more frontal-lobe neuropsychological impairments.

Still other researchers, however, have criticized the proposed relationship between antisocial or psychopathological behaviors and frontal lobe impairment. Kandel and Freed (1989), however, argued that this relationship was tenuous, based on current research, citing problems with studies having uncontrolled designs, varying in their operational definitions, a lack of empirical validity in measures, and a lack of empirical evidence. Still other researchers have argued that the tautological nature of the antisocial and psychopathological personality diagnoses renders this research as meaningless in explaining criminal behaviors.

NEUROIMAGING OF AGGRESSIVE PERSONS

Other studies have utilized neuroimaging technology and have demonstrated that antisocial persons may have reduced prefrontal cortical volumes that are only detectable by these types of advanced biomedical techniques (Raine et al., 2000). Not surprisingly, neuroimaging studies of aggressive and violent subjects has emerged as one of the most significant and exciting advances in recent years. Early tests were those using electroencephalographic (EEG) studies. These measures, combined with neuropsychological, neurological, and cognitive skills tests, consistently argued for an association between violence and poor brain functioning when compared with normal samples (Elliott, 1987; Eysenck & Gudjonsson, 1989; Raine, 1993). It should be noted, however, that "EEG abnormalities do not *necessarily* imply structural abnormalities in underlying brain tissue. On

the other hand, the EEG was once used as a possible index of brain lesions before more sophisticated radiological methods” (Miller, 1999, p. 301) became available.

Some of the first EEG studies focused on murderers to determine if brain abnormalities could be detected within these samples. One of the first studies found half of 105 killers did indeed have abnormal values (Hill & Pond, 1952). Interestingly, whereas the expected rate of abnormalities in the “normal” population usually varied from 5 to 20 percent, most early studies consistently found abnormalities in murderers ranging above these levels (Mednick, Pollock, Volavka, & Gabrielli, 1982).

Other EEG research focused on groups who had committed violent acts (not just murder). A well-known study by Williams (1969), for example, selected a group of 200 aggressive offenders and compared them with a randomly selected group of controls from a larger sample of 1250 offenders who were administered EEGs. While only 12 percent of the normal population and 24 percent of the controls registered abnormal scores, an impressive 62 percent of the habitually aggressive group had abnormal EEGs. Even when excluding “obviously” impaired offenders with head injuries or mental retardation, Williams found that 55 percent of the aggressive subjects still scored abnormally. Numerous other studies have also found higher rates of abnormal EEGs in violent, aggressive, and homicidal populations (Mark & Ervin, 1970; Raine, 1993), with few exceptions (see Miller, 1999). Yet EEG studies have recently given way to more advanced tests that help to better identify what areas of the brain are damaged or dysfunctional, as well as how certain types of brain dysfunction may relate to various types of aggressive behaviors.

In a recent critical review of these more advanced radiological tests, Brower and Price (2001) reviewed numerous studies ranging from 1987 through 2000 that used a host of neuroimaging techniques to determine what differences, if any, appeared in the brains of antisocial, aggressive, and violent subjects. These tests included positron emission tomography (PET) scans, single photon emission computed tomography (SPECT) scans, Oxygen water (O-water) tests, Fluorodeoxyglucose (FDG) tests, cerebral blood flow (CBF), continuous performance task (CPT) exams, magnetic resonance imaging (MRI), and temporal lobe epilepsy (TLE).

Brower and Price’s (2001) review presents compelling evidence of frontal lobe abnormalities across the studies presented. Regarding antisocial personalities, Raine et al. (2000) found a significantly reduced amount (11% less) of gray prefrontal brain matter in ASPD’s compared to controls; they also reported a 13.9 percent reduction in gray matter for ASPD’s when compared with the brains of substance abusers using MRI scans. The authors’ results supported those of an earlier study by Kuruoglu et al. (1996), which found significant frontal hypoperfusion in ASPD’s when compared with controls and alcoholic subjects.

Regarding aggressive populations, Woermann et al. (2000) found that of 24 aggressive patients with TLE, a significant number showed decreased left frontal gray matter compared to 24 non-aggressive TLE patients and 35 control subjects. Hirono, Mega, Dinov, Mishkin, and Cummings (2000) also found in their study of 10 aggressive dementia patients a significant hypoperfusion in the left anterior temporal and bilateral dorsofrontal areas of the brain when compared with 10 non-violent dementia patients. They did not find any significant differences between these groups’ orbitofrontal regions. Finally, Amen, Stubblefield, Carmichael, and Thisted (1996) found that, as a group, aggressive adolescents and adult psychiatric patients had SPECT results indicating significantly less prefrontal cortex activity than the matched, non-aggressive control group.

Additionally, researchers investigated the metabolic and neurochemical differences in violent populations. In two studies using PET brain scans, psychiatric patients with a history of “repetitive” violence (or purposeless violent behaviors) were found to have reduced frontal cortical blood flow or metabolism and greater reduction in the prefrontal and medial temporal regions of the brain (see Volkow & Tancredi, 1987; also Volkow et al. (1995). Another study using activated PET brain scanning similarly found decreased metabolism in the orbitofrontal regions of the brains of 17 personality disordered subjects when compared to 43 controls (Goyer et al., 1994).

Undoubtedly, Raine and his colleagues have presented compelling evidence of a relationship between violence and brain vulnerabilities. In an early review of advanced neuroimaging research, for instance, Mills and Raine (1994) analyzed studies using CT, MRI, PET, and CBF technologies. These studies largely sought to determine the extent of neurological damage in violent offenders when compared to non-violent persons. After reviewing the evidence at that time, Mills and Raine offered two possible explanations. First, the available data suggested that frontal lobe impairment was related to violent offending, whereas violent sexual offending was associated with temporal and frontal-temporal lobe damage, respectively. An opposing viewpoint was also offered that suggested that any form of anterior brain impairment (meaning frontal, temporal, or frontal-temporal) “may represent a general predisposition to offending, irrespective of the specific location of the dysfunction, and that the specific nature of the offense (e.g., violent, sexual, or violent and sexual) may be determined primarily by nonbiological factors, such as life history and personality” (Hawkins & Trobst, 2000, p. 154).

Raine, Buchsbaum, and LaCasse (1997) also found significant metabolic decreases in the prefrontal and left subcortical regions of the brains of 41 murderers who pled not guilty by reason of insanity. This study post-dated an earlier preliminary pilot study of 22 murderers who were compared to 22 normal controls (see Raine et al., 1994). The findings from this initial study supported of some form of prefrontal dysfunction. Results from this larger study of 41 murderers, who were then matched by age and sex with control subjects, found both reduced metabolism in the prefrontal and subcortical cortexes, as well as abnormal asymmetries of brain activity in the amygdala, thalamus, and medial temporal lobes of the homicidal group (Raine et al., 1997).

Similarly, another study of seven subjects with repetitive extreme violence were administered PET, neuropsychiatric, and neuropsychological tests, and then compared to nine control subjects who showed no evidence of organic brain dysfunction (Seidenwurm et al., 1997). Again, the PET scans indicated significant metabolic abnormalities in the temperolimbic areas of the violent subjects’ brains. The authors argued that these results, at least in part, confirm previous studies that have found temporal lobe hypometabolism (Volkow & Tancredi, 1987) and limbic system abnormalities in capital murderers evaluated for psychiatric measures (Raine, 1993; Raine et al., 1994).

Another well-cited study presented by Blake and colleagues (1995) focused on 31 accused or convicted murderers who were referred to psychiatric and neurological testing. Compelling evidence of frontal lobe dysfunction was reported in 64.5 percent of those subjects examined neurologically, and all study participants were found to have some type of abnormalities from the neuropsychological examinations. Moreover, 20 of the 31 subjects were diagnosed with specific neurological problems. These diagnoses included: 1) mental retardation with IQ less than 70 (five persons), 2) fetal alcohol syndrome (five persons), 3)

borderline mental retardations (four subjects), 4) epilepsy (two subjects), and 5) trauma-induced brain injury (three subjects).

In an effort to address the multidimensional perspective of measuring neuropsychological vulnerabilities, Blake et al. (1995) noted a constellation of factors that appeared to predict violence and aggression in this and previous studies. Namely, this constellation included: 1) severe, prolonged physical abuse in 26 subjects (83.8%), 2) overt sexual abuse in ten persons (32.3%), 3) psychiatric symptoms such as paranoia to some degree in all subjects, eight subjects who met the criteria for schizophrenia, eleven meeting criteria for ADHD, and over half having alcoholism, 4) cognitive impairment, and 5) damaged neurologic signs. The pervasive abuse, or “torture,” of these brain-damaged subjects was a significant area of focus of this work. The authors posited that chronic abuse may have created dissociative states that could be easily mistook for partial-seizures. As aforementioned, Lewis, Pincus and colleagues gradually came to recognize that these episodes of dyscontrol characterize many violent offenders.

Blake et al. (1995) cited a triad of factors that may help explain the etiological underpinnings of violent behaviors. Namely, the authors identified: 1) a high frequency of severe and chronic abuse, 2) brain dysfunction and damage, and 3) acute paranoid thoughts and behaviors. Additively, these factors combined to create a “matrix of violence” (Blake et al., 1995, p. 1646) that was far more influential than any would be individually (see also Lewis, Pincus, & Glaser, 1979; Pincus, 1993, 1996, 2000). This concordance of abuse, brain damage, and paranoia were similarly supported by earlier studies of Lewis, Pincus, and their colleagues (see Lewis et al., 1981; Lewis, Pincus, et al., 1986; Lewis, Pincus, et al., 1988; Pincus, 1996).

These advanced technological tests are able to capture information on brain dysfunction and impairment that are not easily identified as “structural” injuries on the comprehensive neuropsychological batteries commonly administered (Filley et al., 2001). Mounting evidence has also appeared that connects dysfunction in the orbitofrontal regions of the brain with antisocial behaviors, regardless of whether these individuals have structural lesions or display more subtle impairments (Grafman et al., 1996). While this relationship between orbitofrontal impairment and aggression remains somewhat ambiguous, “one suggestion is that the antisocial personality disorder as well as other conditions such as borderline personality disorder, histrionic personality disorder, and dissociative identity disorder may result from brain dysfunction induced by childhood physical and sexual abuse” (Filley et al., 2001, p. 9).

In a sense, then, adult violence is proposed to originate in some individuals in the earliest years of development as neurological vulnerabilities additively grow from environmental, genetic, and situational factors. Another rapidly expanding area within the medical, social, and behavioral science community concerns the effects of perinatal and postnatal complications, as well as the role of pervasive childhood abuse and neglect, as it applies to the genesis of human violence. The following section addresses these topics and discusses how they might contribute to neuropsychological vulnerabilities.

PREGNANCY AND CHILDHOOD FACTORS CONTRIBUTING TO VIOLENCE

Researchers have focused on the possible connections of pregnancy and birth complications, as well as childhood abuse, in explaining violent behaviors. While some studies have combined pregnancy and birthing measures as a single variable (see Shanok & Lewis, 1981; Mungas, 1983), others have argued that these variables should be studied separately. For example, Kandel and Mednick (1991) utilized a prospective design of Danish children born in the 1950s and 1960s. From this larger sample, groups of violent, property, and normal controls were selected and compared across a variety of pregnancy and birth complication variables. Their findings indicated that violence was predicted by birth complications, but not pregnancy events. Using the same population in Copenhagen, Raine et al. (1994) found that neither birth complications nor maternal rejection at one year individually predicted violence at 18 years old. When combined in one model, however, these variables more than doubled the rate of violence committed in subjects by 18 years of age. "This report is of particular significance as indicating that brain pathology may well interact with non-biological factors in precipitating offending" (Miller, 1999, p. 305).

These findings have since been supported by other prospective, longitudinal studies. Raine, Brennan, Mednick, and Mednick (1996), for example, found that subjects with both early neuromotor deficits, including birth complications, and unstable family environments consistently had higher rates of adolescent and adult behavior problems, including violent criminal acts when compared to subjects who had these risk factors individually. An impressive 70.2 percent of violent subjects in the cohort reported both of these risk factors.

Earlier studies also provided support for these observations. A study by Moffitt (1990b), for instance, found that boys with developmental trajectories from age 3 to 15 who had poor neuropsychological scores and family adversity had aggression scores four times greater than boys with either risk factor individually. Similarly, Lewis and collaborators (1989) found that the risk factors of neurocognitive deficits and child abuse alone did not predict violence in individuals to the extent that these variables did additively. That is, in positing toward the genesis of violence in delinquents, their follow-up study of 15-year-old juvenile delinquents found that neurocognitive deficits and child abuse was associated with 2.1 and 1.9 adult offenses, respectively. Combined, however, these risk factors were associated with 5.4 violent adult offenses.

As touched on previously, the issue of brain injury caused by child abuse is an important caveat of neurological vulnerability research. The number of reported cases of child abuse and neglect has consistently risen since official records were first gathered in the 1970s. Whereas 669,000 cases were reported in 1976, over 3.1 million were reported to authorities in 1995 (Lang & Daro, 1996). These estimates translate into approximately 47 children per 1,000 social service reports for all forms of child maltreatment in 1994, including physical, sexual, and psychological abuse, as well as neglect (Weise & Daro, 1995). Other research conducted in the National Incidence Studies (NIS) project estimated a 149 percent increase in the amount of reported maltreatment between the first wave conducted in 1980 and the third wave in 1993 (US Department of Health and Human Services, 2003, p. 4). Analyses of the last wave of data from the NIS (NIS-III) indicated that approximately 1.5 million children

were maltreated by a set of criteria more rigorous than state definitions (Sedlak & Broadhurst, 1996).

While it may be that abuse is becoming more common, it is also possible that this increase in reporting is reflective of society's recognition of child maltreatment as a public health concern and that only reporting itself has increased (Besharov, 1992; Finkelhor, 1992). Undoubtedly, there is also an increase in the media and in educational efforts concerning maltreatment that could positively influence the reporting rates of abuse and neglect. Nonetheless, many experts have expressed serious doubt that changes in reporting practices alone could adequately explain the magnitude of these differences.

Several studies have estimated that many more children than those reported may be abused over the course of their lifetimes. An Ohio study, for instance, estimated that nearly 17 percent of all children born between the years of 1998 and 2000 would be maltreated by a caregiver before they reached age 8; the highest occurrence of this maltreatment was estimated to be during the first year of life (Sabol, Polousky, & Billing, 2002). These estimates were supported by other research that has found that children under four years (National Clearinghouse on Child Abuse and Neglect Information, 2004; U.S. Department of Health and Human Services, 2003) and six years of age (Jonson-Reid, 1999) were at the greatest risk for maltreatment. In a recent report released on child maltreatment official reports in 2001, children under age 3 constituted a full 28 percent of all childhood abuse and neglect victims (National Clearinghouse on Child Abuse and Neglect Information, 2004). "In addition, "children with a prior history of victimization were more than three times as likely to experience recurrence compared with children without a prior history" (U.S. Department of Health and Human Services, 2003, p. 3). Studies indicate that perhaps a majority of abused children suffer more than one type of abuse or neglect, with the average child experiencing two or three forms (Manly, Cicchetti, & Barnett, 1994; Cicchetti & Toth, 1995; Kaufman, 1996). Undoubtedly, chronic and severe abuse and maltreatment in youngsters may have devastating effects on brain and physical development during the critical stages of growth that categorize childhood and adolescence.

Nonprospective studies on child abuse have pointed toward the role of neurobehavioral deficits such as head injury in the etiology of violence and aggression (see Sparling & Cohen, 1997). Yet again, prospective studies appear to be the most promising in providing a better understanding of how risk factors like child abuse, head injury, psychosocial factors, and neurological dysfunction combine to create individuals more prone to act out violently. One of the most cited and respected studies on the possible relationship between child maltreatment and violent behaviors in victims of abuse and neglect comes from the work of Cathy Widom (1989a). This study employed a prospective longitudinal design, controlling for age, sex, and race and found that people who were physically abused or neglected as children were significantly more likely to commit and be arrested for violent offenses than controls. That is, 15.8 percent of physically abused adults were arrested for violent crimes compared to only 7.9 percent of the control group. Moreover, 12.5 percent of neglected children also went on to commit violent crimes in adulthood. Thus, both physical abuse and neglect without violence were found to be predictive of future violent arrest. Smith and Thornberry (1995) replicated Widom's findings in a later study. Using both self-report and official data, they also found that victims of child maltreatment were significantly more likely to commit serious forms of delinquency and violent crimes. Such findings point to the salience of psychological

coping mechanisms in dealing with abuse and how they might contribute to violent tendencies later in life.

Pervasive, recurrent child abuse has been shown to be comparable in severity to accidental brain injuries. In a recent study, it was found that mental deficiencies were present in only 5 percent of children who suffered accidental injuries versus 45 percent of kids who were abused (Ewing-Cobbs et al., 1998). Central nervous system (CNS) trauma, including prenatal distress, interpersonal violence, and accident-induced head injuries, are also more frequently observed in violent juveniles when compared to non-violent controls (Lewis & Shanok, 1979; Lewis, Pincus, et al., 1986; Lewis, Pincus, et al., 1988).

Toward understanding the behavioral conditioning that influences various forms of antisocial behaviors, the theory of social learning incorporates the concepts of modeling, imitation, differential association, and differential reinforcement as key components in the learning process (Bandura, 1973). A great body of literature across various disciplines has proposed that learning is inherently linked with the modeling of violent behaviors (Bandura, Ross, & Ross, 1961; Patterson, Littman, & Bricker, 1967; Geen & Pigg, 1970). Along these lines, social learning theorists have posited, “a child’s exposure to aggressive models may begin in the home in the form of witnessing spousal violence or suffering violence firsthand in the form of physical abuse or punishment meted out by parents. One lesson the child may draw from such experiences is that violence in the context of interpersonal relationships is an acceptable way of getting others to do what you want them to do, or of punishing them when they fail to comply with your requests” (Nevid, Rathus, & Greene, 1997, p. 529).

In this way, some researchers have proposed that violence begets violence between generations (Widom, 1989b) and that children are taught from a young age that they must use aggressive behaviors to get the outcomes they desire (Kalmuss, 1984). As such, “children who are exposed to violence in the home or were abused themselves may fail to establish secure, loving attachment with their parents and a sense of empathy and respect for the feelings of others, which may set the stage for wanton acts of violent cruelty toward others” (Nevid et al., 1997, p. 529; see also Wareham, Boots, & Chavez, forthcoming). “It is indeed hard to imagine how a seriously-abused child will not suffer ill consequences from the experience” (Magid & McKelvey, 1987, p. 178).

Researchers have found that being abused as a child differentiated between more and less violent delinquents (Lewis et al., 1979). In another study, male schizophrenics were also significantly more likely to display violent behaviors than other patients when they reported the use of severe and strict discipline in the home as a child (Yesavage, 1984). Studies examining the consequences of child abuse and victimization have also reported that maltreated individuals were at increased risk for such behaviors as dating and courtship violence (Marshall & Rose, 1990; Riggs, O’Leary, & Breslin, 1990; Dodge, Bates, & Pettit, 1990), aggression towards their caregivers and siblings (Kratcoski, 1984), physical abuse of their own children (Kaufman & Zigler, 1987), spousal and partner abuse (Rosenbaum & O’Leary, 1981), higher rates of delinquency (Kratcoski, 1984; Zingraff, Leiter, Myers, & Johnsen, 1993), and adult criminality (Widom, 1989a) when compared to non-abused persons.

Yet it is important to note that in this study, and many others, the majority of abused children did not become delinquents or commit violent crimes against others. These findings raised “questions about whether the correlation [found by Widom] reflected intergenerational transmission of violence or some more complex causal chain that involves both abuse and

neglect” (Reiss & Roth, 1993, p. 239). If it is the case that hundreds of thousands of children are abused, then the larger question becomes why some abuse victims go on to commit violent acts whereas others do not act aggressively. What sets these violent individuals apart from abused nonviolent persons?

Raine et al. (2001) attempted to address these issues in a recent study using functional MRI (fMRI) technology. Raine et al. chose four groups of subjects, including 1) nonviolent and unabused controls, 2) nonviolent subjects who reported severe physical and sexual abuse prior to age 11, 3) violent, unabused participants, and 4) severely abused, seriously violent individuals. The fMRI results indicated that severely abused violent offenders had definitely reduced functioning in the right temporal cortex. Moreover, the abused but nonviolent persons showed lower left hemisphere activity and increased activity in the temporal lobes. These findings appear to support the notion that right hemisphere dysfunction, a neurobiological risk factor, when combined with severe childhood abuse, a psychosocial risk factor, greatly increases the likelihood of serious violent behaviors.

This strong body of research argues that such “neuropsychological and neurological deficits, especially those associated with executive function deficits, are a reasonably well-established risk factor for antisocial behavior in children, adolescents, and adults” (Raine, 2002). Indeed, these works suggest that existence of perinatal and pregnancy complications, as well as childhood-related abuse that leads to physical trauma or injury, are significant contributors to later violence over the lifecourse. Pincus (2000) further argues that these studies signify that “the effect of even mild traumatic brain injury can be permanent and debilitating if there is a history of prior brain injuries. Abuse and neglect magnify the malign influence of traumatic brain injury through this mechanism” (p. 779). Future studies that follow youngsters from the womb and then throughout the various stages of human development will help to identify the unique role that persistent childhood abuse, neglect, and traumatic head injuries may play in human violence while simultaneously controlling for confounding environmental influences.

CONCLUSION

As shown from this comprehensive review, neuropsychological vulnerabilities cover a broad range of topics that have great relevance to investigations surrounding violence and aggression. Additively, the varied areas of genetics, neuroanatomy, brain disorders and injury, neuroimaging, perinatal/postnatal, and child abuse and maltreatment offer a wide-ranging framework within which violence may be better understood over the lifecourse. This rubric provides an impressive body of literature upon which new technology and research will build in the years to come. Such research has important public policy considerations from legal, social, and moral perspectives.

Genetics, neuroimaging, and other advanced scientific techniques have begun to offer great insight into the working of the human brain and body. Of particular concern is the need to identify individuals who pose the greatest risk of committing antisocial acts. In the realm of criminal justice public policy, few issues enjoy universal public support as much as the need to determine whether which persons pose a risk of future dangerousness to society.

Since the time of Cesare Lombroso, mankind has sought out a way to classify those who pose the greatest risk to their fellow men versus those whose crimes are a simple lapse in judgment (Andrews & Bonta, 2006). These judicial determinations of future dangerousness are critical to public safety and have become a major area of concern in present day America especially as they apply to murderers, sexual predators, and terrorists who threaten our national security. Yet the science of dangerousness prediction is a tenuous one at best. Of the few actuarial-based assessment instruments that do exist, predictions of risk are frequently miscalculated and face moral questions about their potential misuse (Grisso, Malamuth, Barbaree, Quinsey, & Knight, 2003; Vega & Malamuth, 2007). While judges typically place great emphasis on the “science” of these assessments, most are slightly better than clinical assessments and have only moderate predictive abilities (Beecher-Monas, 1998). Genomic principles and predictive medicine now appear on the horizon as an area of promise for courts and professionals wishing to more accurately identify persons with genetic predispositions to violence (Beecher-Monas & Garcia-Rill, 2006). Although in its infancy, such scientific inquiries have already begun to uncover relationships between particular genes and certain types of antisocial behaviors (Koenen, Caspi, Moffitt, Rijdsdijk, & Taylor, 2006).

Relatedly, genomic research has become one of the most significant scientific dyadic tools to emerge in our criminal justice system. That is, unlike eyewitness testimony and victim identifications, which can be inaccurate, suggestive, and/or emotion-laden, DNA testing offers objective scientific proof of *either* guilt or innocence. Such research has come into the consciousness of laypeople with the rise in popularity of television shows such as Cold Case Files, American Justice, and CSI. The work of groups like the Innocence Project at Cardova Law School has also helped to expose social injustices due to inaccurate or incomplete DNA analyses and has led to the exoneration of scores of death row inmates and others serving life sentences for crimes they did not commit.

Yet there are considerable moral and ethical considerations that must be taken into account as genetic research advances. Although it is now well-accepted that genes influence human behavior, the specific pathways to violence within the human genome have yet to be unraveled. Moreover, “although information from the biology of violence, including genomics, could vastly improve the way predictions are made, such information must be tested, scrutinized, and properly limited so that the promise of science is not once again perverted into the cynicism of political expediency” (Beecher-Monas & Garcia-Rill, 2006, p. 302). The misuse of genetic typing could potentially lead to a new “profiling” of individuals who have genes that may render them more predisposed to criminal acts before such persons ever commit a crime. To completely disregard the role of environmental influences and free will in criminal decision-making is to simplify the inherent complexities that embody human behaviors. As genetic influences may affect the characteristics of environment and explain how certain behaviors were cultivated (Plomin & Asbury, 2005). Combined with the spectacular advances in molecular genetics (McGuffin, Riley, & Plomin, 2001; Price et al, 2002; Plomin et al., 2001; Plomin and McGuffin, 2003;), the future of genetic research as it applies to neuropsychiatric theories appears bright with possibilities in illuminating a significant piece of the human violence puzzle.

Without question, concerns about violence will continue to propel research in neuropsychological vulnerabilities forward. Present day, “there is a growing perception in society that there is an increase in aggression across the country that has reached epidemic proportions. Although neurobiological theories do not necessarily explain this increase by

themselves, there are implications from recent changes in our society that may interact with those factors that are relevant to public policy” (Golden et al., 1996, p. 20). Medical advances have allowed severely injured or disordered persons to live and work among us. Without a doubt, brain injuries have become increasingly common in our society with the advent of automobiles and high-speed machinery. Combined with the advances in technology, more people who have suffered head trauma survive these accidents and reenter society. Research indicates that the most common form of frontal lobe damage, which are very sensitive to this type of trauma, may come from traffic accidents. Although great resources are used to keep people alive after severe trauma, follow-up post-injury is being restricted in the age of HMOs and large numbers of people who do not have medical insurance. Indeed, Golden, Zillmer, and Spiers (1992) estimate that rehabilitation therapy for head injuries has become a rarer event post-injury. Moreover, rehabilitation stays for head traumas have been dramatically reduced. Whereas rehabilitation stays typically exceeded six months in 1991, by 1996 an average round of therapy only lasted around one month for this type of injury (Golden et al., 1996). As Golden and his colleagues (1996) persuasively argued, “this formula is dispersing a large cadre of young head-injured clients to a society where many are unable to work and face extreme frustrations, increasing the likelihood of injury” (p. 21). On a practical level, this “overrepresentation of brain-injury clients in violent prisoners demonstrates the possible implications of these policies” (Golden et al., 1996, p. 21).

Another consideration with the surge of brain-damaged persons in the general population revolves around the stressors occupational, social, and material success that characterizes American society. That is, with less jobs and occupational opportunities being available to brain-injured individuals in our increasingly educated and technologically advanced job markets, less and less opportunities become available for social promotion and success for these persons. The result can be that such people become involved in peripheral social subgroups or act in antisocial ways, which eventually may lead to acts of human violence for some of these individuals.

The prevention of head injury and abuse in at-risk populations is also deserves attention here. From a social policy perspective, we must question what philosophy government and public agencies should employ when dealing with abusive home environments. How do we reach these families before irreparable damage is done? There are dire consequences on families and communities that come from incarceration of caregivers, including the breakup of family constellation, poverty, stress, and parental absenteeism (Knudsen, 1992). For at-risk families that are already struggling socially and economically, punitive interventions do not address the issue of why such abuse occurs to begin with or how to prevent it spreading to the next generation (Magid & McKelvey, 1987). We must balance legal responses to abuse that protect children with the needs of children to have unified and healthy families. There are long-term costs to individuals and society that will be certain if we do not reach out to these families in crisis.

Head injuries in young babies and children who suffer from physical abuse will have a negative impact on these kids as they enter schools and grow into adulthood. Due to large strides in medical advances in recent years, many children who would have died due to birth complications, neglect or abuse, or poor parenting practices are now kept alive to enter schools and begin their education. “Unfortunately, a large number of these children are now seen in the schools and mental health system with learning disabilities, hyperactivity, and other disorders that may suggest brain dysfunction. With the insight that medical science has

given us into the human brain, the moral obligation to intervene in abusive situations and help caregivers learn prosocial parenting techniques, offer economic opportunities to families living in severe poverty, and help support single parents to provide positive environments for their children has never been more important.

In addition, a “further understanding of the interrelationships between neurological, genetic, emotional, and mental dimensions of morality will be necessary for the construction of more adequate treatment and prevention programs and appropriate defense and legal decisions for some categories of immoral criminals” (Martens, 2002, p. 177). These issues raised here bring forward questions regarding social and public policy implications regarding neuropsychiatric vulnerabilities. Specifically, what programs or initiatives should be considered to reduce the prevalence and incidence of head injuries, child maltreatment, frontal lobe damage, pre/postnatal lack of care, and other genetic conditions that contribute additively to neuropsychiatric vulnerabilities? In addition, what issues are raised when considering the criminal responsibility of persons who suffer from these deficits and subsequently commit violent crimes?

As shown by the review presented here, neurological vulnerabilities within individuals may be produced by a complex interaction of factors as hereditary traits, brain injury and trauma, child abuse and neglect, substance abuse, genetic predispositions, parental psychopathology, and poor parenting and care. Any programs that seek to treat or prevent neurological vulnerabilities must take a multidimensional approach, as these factors interact with one another. “There are many violent forensic psychiatric patients who demonstrate neurological, emotional, and moral abnormalities and/or whose deviant behavior and/or personality traits are determined by heredity” (Martens, 2002, p. 178).

At the present time, there is still much that is not understood regarding the circuitous interaction of environmental and hereditary factors and which are most salient at different developmental periods of life. Public programs and community coalitions of private citizens and businesses that target urban at-risk populations, such as young, poor, single mothers and their children, may also contribute greatly to the reduction of environments that produce neurological vulnerabilities. Progressive, multifaceted programs that enrich families that are at-risk for criminality and violence are needed and should be developed from these types of research. In addition, the lack of prevalence and incidence data regarding the presence of neuropsychological vulnerabilities in the general population and criminal subpopulations at large creates a gap in our knowledge of the pervasiveness of this condition. It is hoped that future research will allow greater understanding of how vulnerabilities are created, how they each add to the likelihood of violent behaviors, including homicide, and what can be done in society to reduce the environmental factors that create these neuropsychological vulnerabilities from occurring.

The greatest chance to better investigate the interactive effects of genetic, neuroanatomical, neuropsychological, neurochemical, and pregnancy and childhood factors as they apply to neurological vulnerabilities will come from prospective, longitudinal studies that begin *prior* to birth and follow individuals throughout the lifespan. These types of study designs will provide insight concerning how best to ameliorate human outcomes of aggression, violence, and criminality, and well us helping us to detangle the relative influence of each of these factors. With the pursuit of more prospective, longitudinal designs that follow people over the lifespan, it will also become clearer what protective factors might mediate the negative effects of negative environments and genetic predispositions to criminality. Such

research offers great hope of taking scientific knowledge from the laboratory and on to a practical level to promote healthier families and communities.

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Chapter 2

**DISPARITIES IN CHILDREN'S ACCESS TO
HEALTHCARE IN THE BORDER REGION:
ISSUES, SOLUTIONS AND OPPORTUNITIES FOR
HEALTHCARE POLICY MAKERS**

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ABSTRACT

Disparities in access to healthcare services have special meaning in the U.S. - Mexico Border Region, plagued by disproportionate poverty, inadequate medical resources, weak economy and young undereducated workforce. If the 43-county Texas Border Region were the 51st U.S. state, it would rank 1st in childhood poverty, 1st in birthrate, and 1st in unemployment rate. Shortage of healthcare professionals and up to 36% uninsured population rate augment the suffering of chronic illnesses and infectious diseases that easily cross the international boundary.

The disparities in access to healthcare are most profoundly affecting the children, making the resolution of these issues the frontier to our healthy future. Healthcare access is closely related to insurance coverage and employment status, therefore creating a crisis in the counties with highest unemployment rates. In addition, many children who might be eligible for programs such as Medicaid and SCHIP remain not enrolled due to variety of reasons including parental low literacy, enrollment restrictions, required reenrollment, stringent asset test, unsettled parents' immigration status and fear that their children's enrollment in assistance programs may equal deportation. The inadequate reimbursement to providers makes the access to care even more difficult, forcing the practitioners to see

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an inordinate number of children to make ends meet, as the poverty of the region does not allow cost shifting. Paradoxically, the children that need the most care get the least.

This chapter utilizes a two-pronged approach in exploring the issues and solutions defining the children's access to healthcare in the Border Region:

1. *Literature Overview*: Through extensive literature review, we present an overview of the current research in disparities in children's access to healthcare and the current status of resolving the identified issues.
2. *Qualitative Inquiry*: Utilizing qualitative inquiry research approach, we interviewed policy makers, educators, governmental and non-governmental healthcare authorities at the National, State and Borderland levels and organization representatives throughout the U.S. – Mexico Border Region to search for opportunities and solutions to provide better access to healthcare services and equality in health care for the children in the frontier region.

This chapter is important because it sheds a much needed light on the current status and possible solutions for providing equitable access to quality healthcare services in the Border Region, and the opportunities for healthcare policy makers to contribute to improving the healthcare infrastructure and access to care in this frontier of the future.

Keywords: disparities in children's access to healthcare, contemporary policy issues, issues and solutions for healthcare access, healthcare in the Border Region

INTRODUCTION

The U.S. – Mexico Border Region is defined as an area of 100 kilometers (62 miles) North and South of the U.S. – Mexico border line, and stretches over 2000 miles, from San Diego-Tijuana to Brownsville-Matamoros (Figure 1). The Texas-Mexico border, from El Paso-Ciudad Juarez to Brownsville-Matamoros, is 1,254 miles long, comprising more than half of the total U.S. – Mexico border length. Ten states form the border: four U.S. states (California, Arizona, New Mexico, and Texas), and six states on the Mexican side (Baja California Norte, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas). Many of the Border Region residents have family on both sides of the border and frequently cross the border back and forth, especially in the vicinity of the U.S. – Mexico “sister-cities” [1].

Poverty is wide-spread in the predominantly desert lands of the Border Region. If the counties constituting the Texas border area were a separate state, it would have been the poorest state in the U.S., ranking first in poverty rate, first in unemployment rate, first in school-age children living in poverty, first in number of adults without high school diploma, and with highest birth rate in the nation. Currently, the state of Texas ranks first in percentage of uninsured children [2]. The Texas-Mexico Borderland has high percentage of Hispanic population (77% in El Paso, 80% in McAllen, 91% in Brownsville and 94% in Laredo) with many areas that are rural and underserved called *colonias* [3, 4]. These areas are especially affected by lack of basic utilities and transportation is a problem to access emergency and primary care providers [5].



Figure 1. U.S. – Mexico Border (Source: <http://www.epa.gov/usmexicoborder/map/sf-index.htm>).

Poverty is the trademark of the Border Region, although there are children who live in poverty in many places throughout the U.S. In a 2000 report, UNICEF classified the U.S. as one of the worst performing countries in reducing child poverty with overall child poverty rate of 22.4%, placing U.S. on 23rd position out of 24 studied countries [6]. Every 44 seconds an American baby is born into poverty, and every minute a baby is born without health insurance [7]. These issues are particularly prevalent in the Border Region, contributing to huge disparities in children's access to healthcare.

LITERATURE REVIEW

Disparities in Children's Access to Health Care

The National Healthcare Disparities Report (2003) defined disparity as the "condition or fact of being unequal, as in age, rank or degree" and noted that disparity in healthcare has been associated with equity [8]. In identifying disparities in healthcare, clear reference points are needed about what is appropriate and reasonable to expect in healthcare access, utilization, experiences with the healthcare system, health management, and outcomes. Data from the National Healthcare Disparities Report indicate that huge disparities in quality and access to care exist. There are compelling racial differences in access to health care, insurance coverage, and quality of health care services, and services of pronounced lower-quality are provided to socio-economically disadvantaged populations [9]. For Hispanics, more than 80% of the disparities in healthcare access are related to differences in insurance coverage, income

and available safety-net services, with the lack of health insurance being the single most important factor for racial and ethnic disparities in access to care [10]. Low rates of insurance, coupled with low rates of provider reimbursement, cause difficulties in retention and consequent loss of providers, leading to a further decrease in access to healthcare services.

Racial and ethnic disparities in access to care, disease prevention and health management have been previously studied in adults [8, 11-17]. However, little is known about disparities in children. The proportion of children eligible for free or reduced-price school lunches has been used as a marker of school poverty and child poverty. Acevedo-Garcia et al. (2007) studied the disparities in children in metropolitan areas, and found that Hispanic and Black children faced severe challenges, augmented by inequalities in school systems and neighborhood environments [18]. The average metropolitan Hispanic child lives in a neighborhood with 19% poverty rate, and the very best metro areas for Hispanic and Black children perform worse than the average-level areas for White children. High poverty schools tend to have less qualified teaching staff, less active parent body, fewer financial resources, and more children subject to negative influences from peers. The border city of El Paso in Texas was identified as the metropolitan area with worst neighborhood environment for children, both Hispanic and non-Hispanic [18]. Weathers et al. (2004) studied the barriers to access to healthcare for children of migrant agricultural workers, which included largely non-financial factors, such as unfamiliarity with the U.S. healthcare system, lack of parental knowledge about where to go for care, high work demands on the caretakers, and lack of transportation [19].

Availability of health insurance, regular source of care and stable income are strong predictors of individual's access to quality healthcare [20]. The number of uninsured Americans is large and continues growing, as shown by four national surveys, with up to 67 million uninsured at any point of the year [21]. About two-thirds in the annual growth of uninsured occur among Americans below the 200th percentile of Federal poverty level [22]. In the U.S., there are more than 11 million uninsured children without healthcare access [23]. Oftentimes, employment-based insurance is unavailable to low- and moderate-income families. Immigrant parents who have lower educational attainment may work in occupations that may not offer health benefits [24]. In addition, children may have less access to health insurance and care when both parents are employed due to difficulties in taking time off work for visits to the doctor's office [25].

Hispanic non-elderly individuals have the lowest rates of employer health coverage and the highest rates of unemployment. The coverage patterns for children are similar, with 40% of the Hispanic children lacking any insurance, and 40% covered by public assistance programs, such as Medicaid [9]. Shi & Stevens (2005) found that when factors such as insurance coverage, poverty status, and health status were considered, disparities in access continued between 1996 and 2000; when controlling for immigration status, Hispanics still received less medical care than non-Hispanic Whites [26]. Utilization of preventive care services is determined by access to care (i.e., being insured and having a routine place for care) rather than acculturation factors [20]. The importance of preventative services is not well understood by Hispanic patients. Frequently, the patients would visit the doctor only if sick, despite availability of insurance. In general, Mexican Americans use preventive care services less frequently than other racial and ethnic groups, which could be explained by the higher percentages of uninsured among Hispanics [20].

The National Health Interview Survey reveals that 73% of the young Hispanic adults without U.S. citizenship are uninsured, with a risk of not being insured 60% greater for Mexican Hispanics compared to Whites [27]. National surveys, such as the Current Population Survey and the Annual Social and Economic Supplement, do not report appropriately health insurance coverage, because of their primary focus on employment and income rather than on health insurance. There are differences between having no insurance throughout the calendar year and having insurance for part of the year only, and these are difficult to identify and report through a survey. The Centers for Medicare and Medicaid Services present actual participation data for enrolled individuals; however, their interview does not focus on insurance, and some people may not be aware that health insurance coverage is available for them and their children [22, 28].

Results from the National Survey of Children with Special Health Care Needs highlighted a variety of reasons why parents did not access services that their children needed. The surveyed parents reported cost as the major reason, followed by problems with enrollment in health plans, lack of transportation, no availability of services in their area, and lack of resources in child's school [29]. Specific marketing approaches maybe more appealing to the potential public healthcare program enrollees. Using appealing images of diverse children eligible for public assistance programs, listing the exact services covered, and giving the actual dollar amounts for qualifying for enrollment have proved to be successful marketing approaches [30].

During the period 2000-2004, the number of uninsured increased by 6 million, with half of the growth contributed to individuals below the age of 34 years [22]. While one in six Americans is uninsured, in Texas one in every four is not insured. More than five million Texans are not covered by health insurance, and the situation is worst in El Paso, Laredo and Brownsville – the three major border metroplexes, where every third individual is not insured [31]. Undocumented immigrants are most likely to lose any insurance coverage compared to legal residents and U.S. citizens, and legal U.S. residents are less likely to gain insurance compared to citizens [32]. In addition to lack of health insurance and decreased access to healthcare, undocumented immigrants also report lower education and income [15]. These factors are of particular importance in the Border Region, where the prevalence of Hispanic population is very high, with a large proportion remaining undocumented. For example, in the state of Texas, Hispanics living in the Border Region tend to be undocumented Mexican immigrants with restricted eligibility for health insurance [33]. The world's biggest border metroplex, El Paso, Texas, has a health delivery system of doctors, clinics and health facilities that is too small for the large population it serves. Contrary to other parts of the U.S., commercial insurance is almost the exception in El Paso, where less than one third of the population has employment-based health insurance, and many individuals are either covered by Medicaid or SCHIP, or are uninsured [34].

In the period 1993-1999, decreases in Medicaid coverage increased the uninsured population especially for Hispanics and undocumented immigrants. Medicaid and the new State Children's Health Plan (SCHIP) expanded the children's insurance coverage between 2000 and 2004, which benefited most minority and immigrant groups. However, the more restrictive asset test and enrollment requirements, which followed shortly after, led to another wave of decrease in the enrollment of both programs [35]. Federal law allows states to set their own Medicaid reimbursement rates. Because the financing of Medicaid is a joint federal and state responsibility, many states are in the process of restructuring their Medicaid

programs into managed care models with the hope that through the efficiency of managed care, the rate of increase in the burden that Medicaid places on state budgets will be diminished.

The State of Texas has 11 separate health service delivery areas, and each has its own reimbursement rate [36]. Physician and healthcare provider reimbursement rates are much lower in the Border counties compared to the state and national average reimbursement rates [34]. These rates range from a high of \$176 per month for each recipient in Houston to a low of \$138 per month per patient in El Paso. State Children's Health Insurance Program reimbursements also vary significantly: from \$86 in Houston to \$54 in El Paso [37]. This geographic indexing preserves the poverty in the Border Region and the poor rural areas in the State, and perpetuates the difficulties in recruitment and retention of professionals.

The Texas Medical Association considers that a physician could not operate a profitable practice if the public payers in the payer mix exceed 50%. Thus, the high percentage of Medicaid patients in the Border Region makes it ever more difficult to recruit physicians to practice in the area. The ratio of direct patient care physicians to served population in the Border Region is disproportionate. For example, for the city of El Paso, the ratio of physicians to served individuals is 1:1,048, while in the state of Texas this ratio is 1:641, and for the Austin area the ratio is 1:365 [34]. For every 100,000 people, El Paso has roughly 95 physicians, of whom only 39 are primary care physicians [34].

About 20% of all children in the U.S. are immigrants or U.S.-born children of immigrants [33]. Hispanic children under 18 years make up about 28% of the population in the state of Texas and even a larger part of the Borderland population [38]. Minority children – Hispanic, Black and Asian - experience difficulties in healthcare access, even after controlling for insurance coverage, poverty and health status [26]. Hispanic children, compared to White children, are more likely to be poor, uninsured, and to have parents with low income [31]. These children are at higher risk for increased morbidity, poor health outcomes, and under utilization of primary care services [26]. Hispanic families tend to have the least access to care, which is characterized by not having a regular source of care, difficulties obtaining needed care, and delaying needed care because of cost [20].

Flores and Vega (1998) identified 21 barriers to access of Hispanic children to healthcare [39]. These barriers included lack of health insurance, poverty, geographic location of residence, lack of transportation, cultural differences, lack of continuity of care, parental factors, such as educational attainment and beliefs about healthcare, and provider-related factors, such as decreased screening, missed vaccinations, suboptimal care plans, and staff attitudes [39]. The provision of health insurance alone does not ensure access. Equity in access is also related to availability of care, convenience of services and cultural barriers [26].

Limiting the undocumented immigrant's access to healthcare services may have many unintended negative consequences on the public's welfare. For example, the Federal Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) restricted the provision of many publicly funded services, including healthcare services, to undocumented immigrants under the premises that such services unduly burden the tax-payers. This law also mandated the healthcare professionals to report the immigration status of their patients, thus placing the healthcare providers in the role of policing immigrants about their status, a role otherwise reserved for immigration enforcement authorities. The only services available to immigrants under PRWORA were immunizations, emergency healthcare, and treatment of symptoms of communicable diseases. The unintended consequences of PRWORA included

provision of healthcare emergency services to undocumented immigrants - services more financially burdening for the healthcare system than preventative care; difficulties in applying preventative measures for communicable diseases such as tuberculosis and HIV/AIDS, because treatment was allowed only for symptoms occurring significantly late in the disease course while little could be done for preventing their spread; and leaving otherwise public program eligible children born in the U.S. without immunizations, because of their parents' fear of exposure of their undocumented status and deportation [40]. For the aforementioned reasons, PRWORA was never fully implemented and its measures were discontinued soon after being enacted.

Immigration status has been identified as an important component of the racial and ethnic disparities in insurance coverage and healthcare access. Non-citizens and their children are less likely to have Medicaid or job-related insurance, and are less likely to have a usual source of care. The non-citizen status is considered as a major reason for the low insurance coverage for Hispanics and their children [33]. Since a large proportion of the Texas Border population is immigrant, an important barrier to care for immigrant children and their families is the fear of possible deportation. Many immigrants may not be aware of their rights to care or eligibility for Medicaid and Medicare. Immigrant parents, however, are more likely than non-immigrant parents to be ineligible for participation in federal and state-supported health programs, consistent with the findings of low enrollment rate among immigrant children [25].

Berk and Schur (2001) examined the effect of fear on access to healthcare among undocumented immigrants and found that 39% of the interviewed undocumented adult immigrants expressed fear about receiving any healthcare services because of their immigration status [41]. This direct relationship between immigration status and likelihood of receiving health care was also fostered by the debates around California's Proposition 187, which would have required doctors to report to immigration service all undocumented immigrants seeking care.

Cultural practices and beliefs also play a role in health care access and choices. Many Hispanics, especially non-citizens, choose to seek medical advice from friends, "healers," *promotoras*, or relatives before going to see a doctor. Such cultural beliefs may be fatalistic, which may deter families from regular screening and create distrust among patients towards providers [42]. In addition, differences in cultural beliefs about respect and relationship between patient and provider may lead patients to feel uncomfortable or distrustful of providers [39, 42].

Due to the close proximity of the sister cities along the U.S. – Mexico border, many immigrants and their children often use Mexico-based pharmacies, circumventing the need for a doctor's prescription. Instead of purchasing expensive prescription or over the counter drugs, border residents are more inclined to visit south-of-the-border pharmacies and private doctors who can give them medications and alternative treatment at a much lower cost, which is seemingly of great convenience to families but may lead to inappropriate medication use, overdose and delay of appropriate treatment [39, 43-44].

The lack of language proficiency and the immigration status are two factors specifically affecting the quality of medical encounters for Hispanic populations [45]. Minority populations experience significant barriers to care related to limited English language proficiency [46]. Acculturation (the process by which individuals of a foreign or minority culture learn the language, habits, and values of a standard or dominant culture), and language barriers are known impediments to parents seeking to obtain health services for their children

[20, 33, 47]. Language barriers and misunderstandings about health and disease management also pose a barrier to low-income immigrants with limited educational attainment. Respondents to a survey who had limited English proficiency were more likely than English-proficient respondents to report problems in understanding medical situations, trouble understanding medication labels, and experiencing adverse medication reactions [48].

The ultimate goal of public health programs is to reduce the health disparities among children through improving healthcare for low-income children. While there is a strong link between health insurance and access to care, having health insurance does not automatically lead to improved health [49]. Although the aim of the State Children's Health Insurance Program (SCHIP) is to provide health insurance to low-income children and adolescents who do not qualify for Medicaid, a survey analysis of newly enrolled SCHIP adolescents found that although 69% of the respondents saw a physician during the year prior to enrollment, 24% of the respondents reported that their health needs remained unmet [50].

Even with access to insurance, parents have great influence on whether or not their children receive access to care. An in-depth focus group study explored parents' experiences accessing health care for their children and whether these experiences influenced their decision to enroll their children in Medicaid or SCHIP [51]. Parents experienced difficulties finding a sub-specialty provider in the area they lived, as well as long waiting times before they could see a specialist. Parents of uninsured children had more difficulty accessing dental care due to affordability, and Hispanic mothers responded going across the border to Mexico where dental services are inexpensive. In addition, Hispanic parents, notwithstanding their insurance status, reported linguistic barriers to getting an appointment and purchasing medications. Although some parents experienced certain access barriers, they were not dissuaded from enrolling or re-enrolling their children into Medicaid or SCHIP [51].

Having health insurance coverage is not equal to guaranteed healthcare access. Families and their children may face difficulties in finding providers in their area who accept their insurance, appointment hours that can accommodate work responsibility, employers who are flexible enough to accommodate parents' taking their children to the doctor, affordable transportation to the doctor's office, as well as finding office staff and healthcare providers with necessary cultural sensitivity and language skills to care for disadvantaged or minority populations. Additionally, public insurance programs may place high administrative burden while paying low reimbursement, so healthcare providers may be reluctant to participate [52].

Current Resolutions

Access to healthcare has emerged as one of the biggest inequalities among individuals. The Healthy People Consortium (an alliance of more than 350 national organizations and 250 State public health, mental health, substance abuse, and environmental agencies) developed the Healthy People 2010 national agenda for health. Healthy People 2010 identified three types of barriers to healthcare access:

- (1) *Financial barriers*, including lack of insurance or not having financial capacity to cover services outside the insurance plan
- (2) *Structural barriers*, including lack of primary care providers and specialists, or lack of facilities

- (3) *Personal barriers* related to cultural differences, belief systems, language barriers, unfamiliarity with the healthcare system, and concerns about discrimination or confidentiality [24, 53].

Healthy People 2010 set 28 focus areas with 467 objectives to achieve the goals of eliminating health disparities and increasing the quality and years of healthy life. Access to quality health services and building public health infrastructure are two of the Healthy People 2010 focus areas. Physical and social environment, access to quality health care services, policies and interventions to improve environment and access are considered as major determinants of health.

In 2003, the U.S. – Mexico Border Health Commission announced its own agenda for improving the health of individuals living in the U.S. – Mexico Border Region through the Healthy Border 2010 goals, structured after the Healthy People 2010 report and intending to achieve its objectives in the border area. Federal and State leaders, health departments and local communities have endorsed this first of its kind bi-national agreement on a set of health indicators to design health improvement programs. Major objectives in Healthy Border 2010 are access to healthcare, expanding immunization coverage and improving maternal, infant and child health [54].

States can use state funds to provide health coverage for children of different immigration status, especially for children ineligible for federally funded services. The expansion of public health insurance support at the state level has been variable across the country. Currently, there is great variation between the different states, ranging from no services for immigrant children (e.g., Arizona, Utah, Nevada, Louisiana) to limited services (e.g., New Mexico, Oklahoma, Florida) to services for legal immigrants only (e.g., California, Texas, Nebraska) to services provided to children of any immigration status (e.g., New York) [55].

The Future of Children report (2003) recommended that public funding is made available to all legal immigrant children, as well as to all children, including undocumented children, who live in poverty, to receive health insurance and culturally appropriate services. In 2001, California launched a program for express-lane enrollment in Medicaid for children based on the application for school lunches [56]. New York and California piloted programs aiming at universal healthcare provision to all children, including undocumented immigrants. States such as California and Vermont have used various “express lane eligibility” strategies to expand insurance among children who participate in other public programs. Vermont implemented a streamlined application process and Los Angeles County started a similar initiative through its food stamp program. Streamlining allows family-provided information from another public program to be used to determine eligibility or recertification eligibility for Medicaid or SCHIP. Another form of express lane eligibility, automatic enrollment, utilizes a child's enrollment in an income-comparable public program to determine the child's eligibility for Medicaid or SCHIP [56].

There are additional opportunities for introducing children's healthcare support programs at the county level to expand the access to healthcare, as demonstrated by the Children's Health initiative in Santa Clara County in California, and the Kids Get Care program in King County in Washington. These local initiatives may serve as models for providing universal healthcare for children [57].

The Santa Clara County's Children's health initiative is a public-private partnership between county and city (San Jose) governing bodies, local hospitals, social services, health

system, private foundations and faith-based organizations to provide health insurance to children from families with income up to 300% of the federal poverty level. The provided services include inpatient and outpatient primary and specialty care, vision care, dental health, mental health, preventive and emergency services. There are very low monthly premiums based on family income (e.g. \$4), and similarly low cost sharing for office visits, prescription drugs and other outpatient services. Children with family income below 300% of the federal poverty level qualify for the program regardless of their immigration status. In 2003, the program covered about 11,000 children with annual cost of about \$11 million [57].

More than 30 local organizations supported the launch of the King County's program in 2001, through a coalition called the King County Health Action Plan. The program screened about 18,000 children and provided medical home to about 3,000 children with annual costs just over \$1 million. Providers screen children for developmental, behavioral and other health conditions, and connect them to a medical home for services and assistance in enrollment in public programs. There is a sliding fee scale for children who are not eligible for public programs. The focus of the program is on community-based risk assessment and screening for children younger than five years, although children up to 18 years of age are generally served [57].

Children's health insurance status is inevitably linked to their parent's poverty and income status, which in turn is linked to racial/ethnic factors and economic infrastructure of the region they live in. The Children Left Behind report (2007) suggested that federal government could remove barriers to enrolling children in public programs, and could provide incentives to home ownership, affordable housing and desegregation, as well as change public health and educational program funding. Investing in early childhood development programs has the potential to positively impact education, health and social development not only through childhood, but also through adulthood [18]. There are recommendations with the potential to improve the access to insurance for all children, including creation of a federal financing system with increased funds for Medicaid and SCHIP, raising the federal matching rates to provide states with fiscal relief, simplifying public program enrollment and administration, coordinating public and private health insurance coverage, coordinating enrollment of Medicaid and SCHIP with programs targeting low-income children such as lunch and food stamps programs, maintaining outreach and public education as a priority, restoring funding for legal immigrant children who lost coverage with the enactment of the welfare reform, expanding public health programs to all low income children regardless of immigration status and expanding the income eligibility levels [18].

METHODS

To corroborate the findings from the literature with the current status of healthcare policy-making and identify opportunities for policy-makers to improve children's access to healthcare in the Border Region, a qualitative study was conducted with a variety of stakeholders experienced in children's access to healthcare and the issues in the border area. The study was approved by the Institutional Review Board – Protection of Human Subjects in Research at Texas Tech University (protocol # E07036).

Sample

The qualitative research interview is a specific interaction between interviewer and interviewee producing data about how knowledge and experiences could be categorized [58]. Sample sizes in qualitative research do not seek statistical representation and are determined by other factors, such as depth and duration of interview, feasibility of obtaining interviews, and expertise of the informants; thus aiming at purposeful sampling of a representative group of participants expected to generate meaningful data [58-59]. Consequently, the sample size in qualitative research varies significantly, from less than 10 to more than 50 interviewees [60-67].

The interviewees sample was selected to represent the multi-faceted picture of the continuum of policy-making in healthcare and the diversity of stakeholders in decision-making and healthcare provision for children in the Border Region. The criteria for selection of the interviewees were:

1. Policy, education or healthcare authorities in the area of healthcare policy development at federal, state or local levels in the Border Region;
2. Expertise in children's access to healthcare in the Border Region, as witnessed in prior publications, decision-making and advocacy for children in the Border Region.

The interviewed individuals represented local, state, regional and national institutions with expertise in policy, healthcare, public health and education. For the purpose of maintaining non-attribution and confidentiality of participants, each interviewee was assigned a designation of "policy-maker," "professional" or "educator" referring to their most recent occupation in the fields of public policy, healthcare or education. The designation definitions were as follows:

1. *Policy-makers*: Individuals actively involved in healthcare and public health policy development and implementation, with ability to influence policy direction and decisions. This designation included policy leaders at state and national levels, decision-makers for bi-national organizations, and government representatives.
2. *Professionals*: Medical doctors working at various levels and capacities in the field of health-care, education and policy-making, involved in child advocacy and experienced in the issues associated with children's access to health care in the Border Region.
3. *Educators*: Individuals involved in the field of education and with expertise in child advocacy. The interviewed educators came from diverse backgrounds involving policy-making, child advocacy, higher education and hands-on work with children in the Border Region.

The study sample included 13 individuals (11 male and two female). Four of the participants were designated as policy-makers, six as healthcare professionals, and three as educators. Two of the healthcare professionals were entirely dedicated to healthcare administration, policy-making and education, while the rest were actively involved in child advocacy and clinical practice. The characteristics of the interviewees are presented in Table 1.

Table 1. Interviewees' characteristics presented in the order of interview completion

#	Designation	State	Background
1	Professional	TX	Policy-making, child advocacy, healthcare
2	Professional	TX	Healthcare, education, policy-making, bi-national organizations
3	Educator	NM	Public health, education, health professions, policy-making
4	Educator	TX	Policy-making, education
5	Educator	TX	Education, child advocacy
6	Policy-maker	TX	Policy-making, public health, bi-national organizations
7	Policy-maker	TX	Policy-making
8	Policy-maker	TX	Policy-making
9	Professional	DC	Policy-making, child advocacy, healthcare, education
10	Professional	NM	Healthcare, child advocacy
11	Professional	CA	Healthcare, policy-making, bi-national organizations
12	Professional	NM	Healthcare, child advocacy
13	Policy-maker	TX	Policy-making, public health, bi-national organizations

Setting

The study participants were recruited in person, via email or telephone by one of the authors (GH). After confirming their interest to participate in the study, an information sheet and the interview questionnaire were sent to the participants, so they could review the questions and prepare for the interview. At that point of time interview dates and times were set. The interviews were conducted in person or over the telephone by one of the authors (RA). For the in-person interviews, the interviewer traveled to the interviewee's location and in one occasion the interviewee traveled to the interviewer's location. Eight interviews were conducted in person, and five were telephone interviews. The same protocol was followed in conducting all interviews. All study documents are confidential and kept on file under lock.

Data Collection

The study data were collected during the period February through March 2007. Using a qualitative research approach, semi-structured interviews were conducted, meaning that the interviewees were allowed to elaborate on the questions in directions not pre-arranged by the

interviewers [68-69]. The interviews were between 25 and 90 minutes long and audio-taped. Permission for tape-recording was obtained from the participants prior to beginning of each interview.

The interview instrument consisted of a set of 10 open-ended comprehensive questions, which were developed based on the literature review of current knowledge about disparities in children's access to healthcare. The study instrument is presented in Table 2.

Table 2. Study instrument

#	Question
1	In your opinion, which are the 3 (three) most challenging issues in children's access to healthcare in the Border Region?
2	In your opinion, what are the solutions most suitable for the resolution of the issues you identified?
3	In your opinion, what is the importance and impact of the following issues in increasing children's access to healthcare in the Border Region: <ul style="list-style-type: none"> • Federal and State support in program funding • Role of parents' immigration status • Perceived language barriers • Location and availability of healthcare access points • Physician reimbursement • Access to sub-specialty care • Transportation • Acculturation • Health literacy
4	In your opinion, what are the main issues around enrollment of children in healthcare programs?
5	In your opinion, which are the health disparities regarding children's healthcare, that you would consider most frequent/most recognized in your field?
6	What could educators contribute to resolving the health disparities for children in the Border Region?
7	What could healthcare professional leaders contribute to resolving the health disparities for children in the Border Region?
8	What could policy-makers contribute to resolving the health disparities for children in the Border Region?
9	In your opinion, what would be the ideal future development that would improve children's access to healthcare and decrease disparities in the Border Region?
10	Would you like to share any other opportunities for improving the access to healthcare for children in the Border Region, not discussed thus far?

Data Analysis

The interview data were transcribed and entered into research software (The Ethnograph, 5.08, distributed by Qualis Research Associates) that is designed to facilitate the analysis of qualitative data. Two researchers independently coded all segments of the text and compiled themes by code. A code book and a code family tree were used to ensure consistency and objectivity in working with text segments across the interviews. In the process of data analysis, the thoughts of separate interviewees were reconstructed into meaningful categories by the processes of data reduction, combining same or similar themes, and induction, identifying new meaningful ideas emerging from the gathered data, with emphasis on the concepts shared by the participants.

RESULTS

Challenging Issues in Children's Access to Healthcare in the Border Region

Lack of Insurance

Inequality in healthcare access, demonstrated by lack of insurance, consequent lack of preventive services, and lack of financial access to care due to the high cost of healthcare, was identified by the study participants as the most important disparity for children in the Border Region. Many children along the U.S. – Mexico border do not have medical insurance and many providers do not accept government insurance; therefore, such children typically do not get preventive care. For these children, having a “medical home” and “continuity of care” appear to be luxury items, particularly if compared to other, more compelling needs. As one study participant described the situation:

I think the biggest issues would have to do with financial access to care, whether the children are insured or uninsured, because that would determine what kind of services they could receive and whether they would have the funds for medications.

Another interviewee added:

The patients frequently have misunderstandings of what kind of financial resources are available, SCHIP, Medicaid... Many children could be theoretically covered by private insurance but because the premium doesn't cover the child's insurance, and the parents are living from one pay check to another paycheck, so they don't pay the three hundred dollars that it takes to extend their personal insurance from their employment to their families.

Lacking preventative care is a severe problem, because when sick, these children will end up in the emergency room, which is the most expensive way to receive medical care. Additionally, if emergency room services are sought, often the medical condition has already become severe and the medical needs are most serious at that time. “Access to care” issues include geographic remoteness of the area, availability of transportation to the location of healthcare services, enrollment of all eligible children in support programs, and availability of healthcare providers accepting the insurance.

Low Reimbursement Rates

Certainly, it is one thing to have insurance, and another to have the provider physician accept the insurance. Not all providers accept Medicaid, due to the low reimbursement rates. As one interviewee elaborated:

I think the general challenge is the issue of equity in children's healthcare. If children are here in our community, and they need service, and we have that service available, they should receive it. The barriers in place make that difficult for some children to be included, whether they are here legally or not legally, whether they have insurance or do not have insurance, whether they are in the network or out of the network; these things shouldn't really matter in the end. I know that they do in some practical ways but that's not a reason why, that's an excuse, that pointing to a fact that our healthcare system is not designed with the needs of children in mind; certainly, these are children who often can't wait for all the barriers to be removed or just so they can get in and get their needs taken care of. So, the equity issue I think is number one and then it applies not only to kids who are here legally or illegally, but really all kids within the community.

The problem with medical reimbursement as related to children's access to healthcare could be summarized by the statement, "the physician reimbursement rate is critically important because physicians may choose to opt out and not provide services to the kids if their Medicaid reimbursement rate is too low." Another interviewee stated that "physician participation in Medicaid in Texas is now down to about thirty eight percent of the practicing physicians, who are now accepting Medicaid patients." Health officials shared that their indigent care funds are usually exhausted by April, leaving the practitioners to contribute to charity for the rest of the year. Besides low reimbursement rates, physicians who accept Medicaid may also incur additional costs, because they are required to provide linguistically appropriate services, and sometimes the amount the physicians would have to pay for interpreters is more than what they get paid for the visits. Children's access to care is impacted by the disparity of physician reimbursement, creating a reimbursement disparity, with a direct impact on children's health. In other words, physician reimbursement drives children's access to healthcare.

Insufficient Access to Sub-specialty Care

The access to pediatric sub-specialty care was considered a huge problem for the border area. Many participants indicated that border cities lack a market for pediatric sub-specialists and that while physician recruitment in the border is difficult, it is even more difficult for sub-specialists. As one official noted, "there is a lack of general pediatricians on the border, there is a complete lack of sub-specialty care. I think it's a real issue. The reason is that we do not have a children's hospital which would attract those sub-specialists to come here." One barrier to recruiting sub-specialty care physicians is related to the low physician reimbursement and high patient volumes in pediatric practices. For example, a pediatric sub-specialist in El Paso would need to see more than three times the number of patients that a sub-specialist would in Houston, in order to have similar revenue. The patient waiting lists for sub-specialty care are long, and many sub-specialists do not accept Medicaid. The only on-the-spot access to sub-specialists along the border is in San Diego, California. In order to access sub-specialty services, children may need to be transported over 250 miles, and sometimes may need to cross state lines. For example, a child from the El Paso area with a

severe burn would need to be transported to Lubbock, Texas or Albuquerque, New Mexico in order to receive care. The respondents felt that sub-specialty care is extremely lacking in the border and that the issue is of great significance for children in need of those services.

Importance of State and Federal Support

The study participants considered the state and federal support crucial for children's access to healthcare in the Border Region. The federal policies, specifically around Medicaid, have impacted the state level of healthcare delivery. Federal and state governments are urged to step up and relieve the road blocks in program funding and participation:

To me it seems that these are artificial road blocks, things that don't make common sense if you really want to make those programs available to children; you should make it as easy as possible to register.

The federal and state support in program funding is extremely important because there is an opportunity for matching federal dollars, an opportunity not fully exploited by the Border States. In the state of Texas, the federal level of funding is not matched, so the state loses money by not increasing its support for programs like SCHIP. As one participant explained:

In relation to access to healthcare for children, federal and state program support is crucial and Texas has been very reluctant politically to expand its Medicaid program, fearful that it would bust the state budget and it does in fact consume a large part of the state budget, but yet is terrifically important. Texas has always taken a very minimal approach to Medicaid providing Medicaid services for strictly what the federal government requires and nothing much else, none of the optional services that they are allowed and encourage to provide, and as a consequence, of course, we leave a lot of federal money on the table that the state could have drawn down and if they had invested a little they would have gained a lot to support these programs, but Texas has up until now not chosen to do that. So, this has hurt us and our SCHIP program that started well, grew very rapidly in a very successful way that reached half a million children in enrollment, frightened our legislature because it was growing, it was going to become a very expensive program, and yet every dollar of state money, I think, brought down two dollars and seventy five cents of federal money, so, I mean, it was a good deal, a good investment, a good return, but yet our legislatures backed away. So, that's important.

Some of the participants felt that while state program administration is essential, federal support is more important than state support because the federal approach would make programs more uniform, allowing for less state-to-state variations. Without federal and state support, such programs would not be possible.

Geographical and Political Remoteness

Working in a system with high rates of uncompensated care, high rates of uninsured and with under-developed economic infrastructure, is a big issue for the border. The remoteness of the Border Region from the seats of power, both geographically and politically, is an added obstacle:

The concept is not really all about political conversation, the idea of equity, the idea of rights of children, of rights to healthcare, rights to protection, rights to education, rights to the conditions that foster normal health and development, that's not in our vocabulary. Without that, children often lose out, because their needs are competing with everybody else's needs and if the other people's needs are represented by more skillful people, obviously contributing more money to the political campaign of the politicians they are trying to influence, then those are the needs that are dealt with and the needs of children are not.

Children's Health Disparities

Access to healthcare was perceived to be the number one health disparity for children in the Border Region. The interviewees were unanimous that the disparities in children's access to healthcare and in children's healthcare services start with disparities in income levels and economic infrastructure. People with well-paying jobs and good income typically have health insurance coverage to go along with those jobs. Those people who do not have employer-provided health insurance may remain uninsured. Therefore, the income level and the related insurance access is the most important disparity:

If the per-capita income on the border is a disparity, which it is, the tax base is lower but the health services cost the same as in other areas; there is going to be a problem when the families are trying to pay 30% of their income for health services. It is not just a problem with the poor; it's people that are not in the poverty level that are struggling to get their health insurance. That's my dilemma as I sometimes want to go from the healthcare steering to the economic development.

There are huge issues with immunization rates, obesity and diabetes among Hispanic children in the Border Region, along with other challenges such as tuberculosis, asthma, neural tube defects, chronic illness, mental health and oral health services.

The education system in the states along the border was also perceived as a huge disparity:

The job of a pediatrician is to have a child go to school and learn, and one of the healthcare disparities along the border is the educational system. How could you have a contributing member of society when their role in society, which is to be in school and learn, is being compromised? If you look at the educational system along the border, there's a tremendous amount of drop-outs. About forty percent of kids that start receive a much, much lower educational program than those in other parts of the states, and then, I hear them saying that the educational programs are very different. I'm hearing the same in Texas and California, the educational systems in Northern California are much, much better than in Southern California; Southern Arizona is much different than Northern Arizona, even Southern New Mexico and Northern New Mexico are different. I think that's a health care disparity even though it is an educational program, it is a disparity in children.

The interviewees emphasized the importance of attracting local children to the healthcare professions and noted the sad lack of interest mainly because of perceived barriers to entering the healthcare education path:

You know, when I met with such students in the border area, I would engage them in a conversation about their career expectations, and of course knowing where I am from, I was

surprised to know that for most of the students, their ultimate career objective would be getting a job in the local dairy, and I think that was very revealing. Partially because of that, with the AHEC [Area Health Education Center] we tried to create health career clubs in the middle and high schools to try to get the students to envision more health-care related career options, and middle and high schools offer some bridge courses with joint or dual credit.

Immigration Status and Enrollment

There is a giant lack of understanding among immigrant families about the process of qualifying for and enrolling into healthcare support programs. Many immigrant families fear that their lack of documentation will be brought to light during the enrollment process and that would lead to deportation. One of the study participants summarized the situation:

I think at this point there is an anti-immigrant sentiment in certain environments and less service may be available to kids that may not be here legally and that can be a serious challenge, serious barrier for the care of these children. If you don't deal with preventive services, often times you could end up hospitalized because the issue was not addressed in preventive care; so you end up having to pay more than if the child was treated preventatively. The anti-immigrant sentiments are strong right now and we all have to speak up, we all have to be involved in advocating on behalf of these children, and we all have to teach our students to care for these kids.

In many border areas practitioners operate on "don't ask, don't tell" in regard to immigration status:

We shouldn't be asking about immigration status when people go to receive medical care. It becomes an issue of the Hippocratic Oath which all physicians take when sworn in as doctors, that they say despite of person's ability to pay or for any other reason, they are to provide the medical care to them.

The system may be failing because it places responsibility on families to enroll in Medicaid and SCHIP rather than linking services. The requirement for frequent reenrollment and the stringent asset test pose a huge burden on the families which may qualify for SCHIP. For example, if a family does not have a second vehicle, this might be a hindrance for both parents to keep employment, or to take their children to the doctor's office when needed. At the same time, having a second vehicle estimated at \$4,650 or more will be considered an "asset" that would disqualify the family from participation [70]. Therefore, raising the eligibility bar and raising the family income to qualify for enrollment may not be enough. A less restrictive asset test should also be considered.

Better marketing and education of the families is needed; it is essential to get the word out in all languages necessary in the particular area. It is important the message about eligibility to be consistent over time and consistently related to all families. First, the programs must be available, and second, the families must be educated about the availability. With a fragmented system, people just do not know sometimes where to go to get enrolled. Community health workers, as well as community-based people knowledgeable about the enrollment process and eligibility requirements could be the source for resolving some of the enrollment barriers. Individuals trusted within the community may be an under-utilized resource in enrollment:

We need to round the many families we know that are eligible for services as Medicaid or SCHIP and deliver them to the proper office and help them fill out the forms and get signed up; and just basically pull forward in the system and demonstrate to the state and to the federal government the true dimensions of need. I think now they've allowed themselves to believe that the numbers that they see that's it; and they are not hearing enough about the people who are not on the system who are eligible and who are qualified. I mean, they are eligible and they're residents and they meet all the criteria but they are just not in, and their response is, well if they needed it and wanted it, well they can come for it, if they don't, they must not need it or want it so, no problem. Well, obviously, that's not right.

The process of enrolling a child in a program is not consumer-friendly. In most states, the enrollment agency is not the public health agency; rather, the human services agency may be in charge. Therefore, there is a huge disconnect between the understanding and approaches of the responsible agencies, aggravated by interrupted communications and lack of bridges between agencies' goals. The perceived lower quality of the education systems in the region, and the lack of healthcare education in the school programs make the effort for enrollment and preventative approach even more difficult. Additionally, having children enrolled in a program is different from actually receiving the healthcare benefits from that enrollment.

Poverty and Expectation for Family Contribution

The financial difficulties in healthcare access are related to the high poverty rate in the Border Region. If the root cause in access to care is affordability of healthcare, program funding becomes a huge issue. The Federal government has made allocations to programs in the Border Region, acknowledging that the border is an area of big impact for the nation. However, the local jurisdictions in the area are still taking an unfair burden. How the Federal government and the states are meeting their responsibility to assist local jurisdictions in the Border Region and provide reimbursement for uncompensated healthcare costs is an issue of paramount importance:

In time and time again a few leaders stand up and say, you know we really need to pull together, we really need to speak as one and go to the legislature and not as four counties and six cities but rather with one voice; and as hard as they try it never happens. So, we hurt ourselves in the end and so the process is slower than it might have been, and so that's another problem that local politics are part of - it is at local level and the city and county level. Politicians at that level are amateurs when it comes to politics and they don't always do a good job and there are some that try and do a good job certainly, but unfortunately we have more than a share of dysfunctional politics and politicians and that hurts us badly in making progress. I think all these things together conspire to keep conditions oppressed and suppressed on the border in ways that make us stand out with the distinction of being the poorest part of the country, the most rapidly growing area of the country, or having the poorest educational systems, the poorest healthcare infrastructures - all those distinctions that no one wants to have, we have for all those reasons.

Another important factor is the common expectation for family contribution to children's access to healthcare. When parents take days off from work, their places of employment may not accommodate sick leave. If the parents need to wait several hours in the doctor's office, they may risk their employment; thus, risking the total economic capacity of the family by taking their children to the doctor. If a child has Medicaid coverage, at least two factors must

come together in order that child to receive healthcare services: there must be a local provider accepting the insurance, and the parents must be willing to contribute by missing work and taking the risk of lower payments. In light of this, families have significant contributions to the capacity of the healthcare system.

Language Proficiency and Cultural Sensitivity

The need to “grow our own” health professionals in the Border Region is compelling. It was noted that a number of non-Spanish speaking, non-local providers who enter the healthcare system in the Border Region may have no idea of the culture they are walking into. City providers with residency on the East coast may have to deal with a whole new culture:

I think acculturation is important everywhere, but I think it’s vitally important to the Border Region as you look to recruit more providers to the community. I think we are clearly seeing significant growth in the healthcare capacity of the Border Region. The more we grow the providers locally, the more acculturated they will be in the provision of services because the providers tend to go where they are comfortable, tend to go where they will have opportunities, tend to stay in the community where they train and the more proliferation of residency programs, the better potential. I’ve always been a believer of growing your own. You have to grow your own. Don’t expect to go harvest somewhere else and you may be susceptible in ways, you may have been susceptible in many, many ways in this community not only in harvesting through out the country but harvesting throughout the world for providers but none the less, we have to grow our own.

If practitioners come to communities where they feel outsiders, they may feel that if they do not speak Spanish, they have no chance, no opportunity to develop their own practice in the border area. However, there are a lot of physicians who do not speak Spanish and have successful practices, and some of them have been settled in the area for many years. They have found out a way to interact successfully with their patients, and are well respected by their patient and peers, without having to speak Spanish. Thus, the linguistic competency is quite useful but not always necessary. It is more important to be culturally sensitive and competent, and to integrate into the community.

Even when resources are available, they may remain not utilized. For example, in the Mexican healthcare system, there are immunization campaigns and frequently an immunization nurse comes out to patients’ homes to give immunizations. Mexican immigrants to U.S. may not know when their children are supposed to be immunized, may not know where the clinic is or at what other locations immunizations are given, and thus their children may remain not immunized.

The study respondents emphasized language as a barrier mainly within the context of health literacy and cultural competence. Health care facilities with non-bilingual physicians may not pose a barrier to access since bilingual community health workers and other staff aid in the communication between physician and patient:

Yes, there is a language barrier between the physician who doesn’t speak Spanish and the patient who doesn’t speak English but I think that’s not as much of an issue as the appropriateness of physician-patient communication. I think we need additional resources and cultural sensitivity, even among the Spanish speakers. The Mexican-American culture is very respectful. It is considered inappropriate and disrespectful to ask questions at an interview and

when that happens, I don't think the healthcare providers are getting enough feedback from their patients. You will very often hear "Si, doctor" when there is not even a hint of understanding. Frequently it is expected that the nurse would translate and even the community health worker is expected to help. We see that very often, the patient will go through the entire interview, the entire process, and then would request clarification from the receptionist, and there's when the questions arise, so I think we need to have cultural sensitivity training and even cultural assertiveness training with some of our patients.

Perceived language barriers do not necessarily deny patients' access to care, but there still may be an issue for patients to feel comfortable with their health providers. By the help of *promotoras* and bilingual office staff, the process of translation includes not only the translation of language, but a culture translation as well, translating the doctor's words into culturally acceptable information.

The Role of Health Literacy

The level of educational attainment and familiarity with the U.S. healthcare system reflect on patient's health literacy and ability to understand how the system works. Health literacy, as well as general literacy may be factors in parents being able to get their children into the system. For chronic illness care, the time physicians and nurses spend ensuring that the patients understand their instructions may be insufficient. The level of being able to comprehend health materials is important for outcomes of care. However, the health literacy may be also viewed from a different angle:

I don't see the problem in the same way as the AMA [American Medical Association] does when they packaged that kit of health literacy; it's not that people can't read or understand what they're reading, I think that doctors and patients are in entirely different cultures; we believe, we live in a culture where we believe in the Germ Theory. My banker and his family don't believe in the Germ Theory; they believe in allergies, they believe that if you're outside on a windy day and your hair is wet you'll catch a cold, they believe that cold will make you sick, they have a whole different belief system and I think that's one of the major problems we have and it's more than simply people are just not educated enough to understand what's the prescription, what the label on a bottle of medicine means, what do they have to do to take that medicine, I think it's more complicated than that.

The interviewees considered that immigrants who are more acculturated to the U.S. are more likely to access healthcare services, while individuals who are less acculturated tend to rely more on other options, such as advice from family members, self-care, or alternative providers. A trend was noted that immigrant families utilize more health services when they are acutely ill as opposed to utilizing the system for preventative services. In general, the immigrant families must find their way in a system that is quite complex and fragmented.

Accessible Healthcare Locations

While the San Diego area in California does not have any problem with healthcare access locations, many small communities along the border experience lack of availability of healthcare access points. An official from New Mexico pointed out that although there are many community centers with numerous access points, for rural residents without transportation, access to healthcare may still be a problem. There is a realization that medical

care must be brought to the people rather than expecting the people to come to a centralized location to receive care:

If people have to travel long distances it impacts access, and one of these interesting things is that we see in our area. I'm sure it happens in your area as well but we have some communities like Sunland Park, New Mexico, which is really in the outside of El Paso, Texas; people that live there that don't have insurance are not really able to access services in El Paso, so they have to travel forty miles north to Las Cruces, New Mexico, just to get services, but El Paso is just, you know, a mile or two away. So, that's one of the geographical issues that we deal with.

Limited Transportation

The ability to secure transportation has been a problem for the poor segment of the population who cannot afford a car or car insurance, as well as for individuals residing in remote areas. The lack of public transportation infrastructure in many border cities and counties makes access to health care even more difficult. Transportation services for communities that are further from the city may be quite limited:

We provide bus services for them but it may only be one or two rides in the morning and one or two rides going back in the evening. You can't always depend on being able to take the bus.

Even if a family has a vehicle, if that vehicle is used by one of the family members as transportation to work, this makes it difficult for the family to access healthcare. As one respondent shared, "I know that there are patients who do not get radiation therapy because they cannot drive 60 miles to get radiation every day." Some community-based organizations try to assist with transportation services. However, if the health service center is not in a convenient location, patients may need to call 911 to get a police car or an ambulance to pick them up and get them where they need to go. Such use of emergency services for transportation is an inadequate solution and could become problematic for the majority of border counties.

Solutions for Improved Children's Access to Healthcare

Communication and Collaboration

The U.S. – Mexico Border Region is plagued by disproportionate poverty, inadequate medical resources, unstable economy and undereducated workforce. However, economic poverty should not be equated to poverty in every other aspect; as one public official noted, "economic poverty does not mean cultural poverty, it does not mean leadership poverty, it does not mean geographic poverty, it does not mean ideological poverty." It is important for those politicians, educators and healthcare professionals, who are working along the border, to talk to each other. The healthcare access issues are of "everybody's turf" and common interest must actively be sought. Development of common vocabulary might greatly facilitate the communication process.

One possible venue for improving the communication lines might be the national conference of state legislators, or creating a border conference of state legislators. Locally, the New Mexico senators have developed a state-wide Town Hall to bring legislators together, and seek input on important issues from educators and various professionals. Another venue is the regional hearings in the legislature of people in the communities. Along the border, it is imperative that bi-national communications are in place, both horizontally and vertically:

When we talk about the border we talk about two things: visually and geographically we speak about a horizontal border - the 2000 mile border from Brownsville to San Diego, from Matamoros to Tijuana, in counties and many municipios in the Mexican side, as well as geographical horizontal region that exists already. What most people forget is that you not only have a horizontal epidemiological region; the work with the border governors' health work table identified five vertical regions along the border. We have horizontal efforts and we have vertical efforts. Vertical efforts are a state to state bilateral relationship: California and Baja California, Arizona and Sonora, the Texas - Chihuahua and Coahuila regions, and the Texas - Nuevo Leon and Tamaulipas regions. California, Arizona and New Mexico communicate with only one or two Mexican States, but Texas, for example, communicates with four, and this makes it more exciting. So, we have that in an informal form with the creation of the U.S.-Mexico Border Health Commission and we are being told consistently now that the Commission is the horizontal mechanism. The Commission forms that epidemiological region. When we talk about developing the border health issues agenda, we are talking about developing the border health issues agenda for the epidemiological region which is there already.

Communication and collaboration are essential along the states on each side of the border, as well as across the border. Another initiative has been sponsored by the American Academy of Pediatrics (AAP) through its Committee on Community Pediatrics (COCP) by the formation of a Task Force for Pediatric Border Health. Many members of the International Committee at the AAP have also been involved with pediatric border health issues.

While advocating for children as an individual is important, advocating as the spokesperson of a national organization makes an even greater impact. As one participant stated:

I like the concept of promoting children's health to our politicians. I'd like to see the efforts that have been made to get the American Academy of Pediatrics to continue to sponsor the border task force. In my perspective, in the San Diego area, I think it's important to have good communications with the pediatric resources south of the border and obviously we need to continue to reduce the barriers for U.S. insurance or possibly border insurance for these kids. I've mentioned two or three times of these resources south of the border. We've had good experiences with that around tuberculosis, following patients from both sides of the border from our records. I think this can greatly affect, hopefully, our ability to lobby for the border kids. I'm also thinking we could be more innovative towards supplying records to parents. I think that Mexican families are very, very good at keeping their immunizations records and we probably need to advise and keep more of their records with them so we could have better continuity, because it's such a mobile patient population; and then, once again, I'd like to hope that we can reinstate the border health task force to assist the American Academy of Pediatrics. I was hoping that we would make border health a component of international health in a way that it's realized more as a visible kind of entity within the Academy.

Universal Healthcare

When asked about what would be the ideal solution for improving children's access to healthcare in the Border Region, the majority of interviewees answered "universal healthcare," providing access to health services for all children regardless of immigration status, regardless of social status, regardless of health status or poverty level. Continued provision of health insurance was considered essential, along with taking out the eligibility barriers and better utilization of existing mobile healthcare units visiting some of the hard-to-reach communities. In order to make a difference in children's access to healthcare and reduce disparities, policy is needed to expand the existing healthcare programs for children. One respondent noted:

The ideal future development that would improve children's access to healthcare...Well, I think two things both of which are federalized system - one is universal health coverage, and two is reproducible standardized access points. Instead of having a fragmented system, to have a system in place where patients can find the providers. I think it sounds like that should be very easy but it's not. I don't believe it's as easy as it seems.

Community centers should be viewed as a priority centers for providing healthcare, with bilingual services and educational help services that are made available to all children. If children could get preventative medical care with frequent check-ups, then the more expensive problems would tend to diminish in the long run.

The study participants suggested that encouraging incentives for small employers to provide insurance may be addressing the root cause for lack of insurance – the affordability of insurance. Income is the best indicator for healthcare access. In light of this, the number one resolution for insurance provision would be economic development:

If we don't have effective economic development and take people out of poverty, we're never going to have full coverage insurance; we'll never have the health manpower, because health manpower is directly impacted by economic development, which is recognized. The solution to health manpower is also economic development.

Education about Available Programs and Marketing

The marketing of programs enhancing children's access to healthcare is of great importance. Clarity and consistency of the related messages would help getting the attention of the families who might be eligible for enrollment. Additionally, creative programs may bridge the gap between the need for managerial skills for grass-root activists:

I know that public health folks are sensitive to the needs but I think maybe they lack some management skills and this is where I thought of Doña Ana County providing the service, because they just signed an MOU [Memorandum of Understanding] with the college of business to create a brand new initiative and to get directions and students to follow marketing programs as part of various programs. In public health, obviously we try to train people with broader views, but our students really don't have management classes. Our students really don't know about this. I think that working with my colleagues in the business college of the Arrowhead Research Center, we thought a lot about social entrepreneur-ship and social marketing, if they had students who did not want to go in the full-profit range, maybe

encouraging them to take a minor in public health and that way get a feel for what this discipline has to offer, so that they could also be a complement to the public health programs.

Individual efforts may be very effective in making children's health issues more visible, especially if political figures at local or state level are involved. For example, the wife of the governor of New Mexico helped improve New Mexico's immunization rates when she personally promoted the immunization campaign.

Growing our Own Healthcare Providers

Establishment of local medical schools in the border area might bring about change in recruitment, allowing development of local students into the health care professions with role modeling and mentoring from physicians practicing in the Border Region, and with understanding of the local culture. Local medical schools would attract more people from different strata in the border area, who later would, hopefully, be willing to give back to their communities. One of the most effective ways to decrease health disparities in children living along the border would be to make an effort to enroll more minority students from local communities in a local medical school.

Facilitating J-1 visa waivers for medical doctors trained in other countries may provide additional help for the tremendous physician shortage in the border area. Educating foreign physicians in residency programs along the border has the added value of helping them to understand the local culture, immerse and integrate into it.

Educating the Policy-makers to Prioritize the Border Region

As one interviewee noted, "we have a weakness in the public healthcare community not being effective enough in educating the policy-makers." The issue of physician reimbursement is vital to resolving the recruitment of physicians and sub-specialists to the region, as well as to improving healthcare access for children along the border. The resolution of this issue calls for increased activity of the medical professionals and collaborative work with the policy-makers, educating them about the impact and seriousness of the issue:

Obviously, we need to have grass-root organizations of physicians; that's happening through the Texas Medical Association and the Border Health Caucus. I think there are opportunities there; you may have to go across the border, across the border of the state, not across the border of the nation, to have other issues addressed. For example, in New Mexico, Arizona, and California, there are other issues with payment, and each one of those need to work with their Medical Association. Having said that, at the level of the state you also need attention paid to the border as an area with several components in all four states, and the solution to that would be to have the border designated as a public health region. Currently, I have more in common with my colleagues in Yuma, Arizona than I have in common with my colleagues in Arkansas. I think the creation of public health region 11 would increase tremendously the focus of the Federal Government on the border.

The creation of the U.S. – Mexico Border Health Commission was the first step in designating the Border Region as one of the most important regions in the country, providing the horizontal framework for collaboration. The next step would be building the health agenda for the border. The Healthy Border 2010 is an example of how to use this epidemiological region. Currently, out of the 10 federal public health regions, there are two

regions that affect the border – Region 6 and Region 9, each of them including two of the Border States. In order the leaders of the regions and the states to work cooperatively, the bureaucratic obstacles should be decreased, the geographical boundaries should be “deleted” and creative thinking should be encouraged:

In my view, we talk about thinking out of the box. I go a step beyond that. I don't have a box. I don't have a box to have to think out of there, there are no boundaries here, we just create what we need, and we work with partners to focus on that creation. It doesn't matter what the bureaucracy does, we will do what we need to do for the entire border to make it work. You know, bureaucracy is a pebble, it's not a bolder; it's a pebble. Nothing is going to keep us back from doing what we need to do.

Creating the research agenda for the border is another important issue. Not only creating research agenda, but more importantly, deploying the results of the research. As one participant stated, “we have to do more than just fund research; we have to fund the follow through of the research and mandate the application of the research.” The research agenda could effectively be used for proactive education of the local, state and national policy-makers, and for eliminating the reactive mode of the policy-makers in the community.

One of the major complaints expressed by the interviewees was that the federal funding programs coming to the Border Region are not cohesive but fragmented. The funding comes down in little parcels, referred to as “boutique shopping.” If an issue arises to catch the national attention, such as bioterrorism prevention, funds may come, but, again, the funding comes to a state or a county, or an organization, rather than to the Border Region. There is no system-wide approach to this geo-politically critical part of the mainland. The first issue is to recognize the problem, and next comes taking action:

We need to have a marriage between the public health community in this country and the healthcare community. We need to have a marriage, even if it's a shotgun marriage. I think we need leadership. We need to develop such leadership for public health in the healthcare community in this country because if we don't do that, if we continue to look out for our own interests, then everybody's interest would be lost.

The Role of the Medical Professionals

The role of the medical professionals was seen mainly in continued lobbying for child advocacy, federal and state support, and designing and implementing programs for children living in the border:

The healthcare professional leaders - we need to continue to get together, we need to continue to lobby for the federal and state support. We need programs for border children. I do like the idea of keeping active a task force through the American Academy of Pediatrics and I also think it's very important to leap across the border to our colleagues south of the border.

Medical professionals are the ideal advocates for children at federal and state level, advocating for improving healthcare access, geographically and financially, and advocating with professional congressional delegations and state representatives around insurance, access and expansion of Medicaid:

So, part of what we need to do, I think, as healthcare and public health leaders, is go out and show the public policy leaders of our community that they have to think beyond their boundaries. They have to think beyond their communities, they have to think beyond their regions. They have to have a vision beyond the designation of a district, or a county, or a city.

Healthcare providers are also in an ideal position to look at models to provide quality healthcare for children more efficiently, at a lower cost and with improved accessibility. Healthcare providers at different places provide different services; however, they have a common goal as children's advocates. Many providers working on the border may feel overwhelmed by the volume of their patients, restrictions posed by program requirements and low reimbursement rates; so, just asking the providers to do more may not work. The role of the professional leadership and collaborative work with policy-makers is essential for restoring positive reimbursement and manpower environment for doctors in the border area. More providers, higher reimbursement rates, more children with insurance coverage and a better, non-fragmented healthcare system need to be in place.

The Role of the Educators

Educators in the Border Region, from pre-K to post-graduate training, have the epic role of promoting diversity in education, including diversity in the healthcare professions. There is an alarmingly low enrollment of Hispanic minority students in graduate programs, especially in public health and health professions programs. Education leaders have to work creatively to attract and retain minority students in higher education:

Some of the colleges offer intro courses to high school students. I think that's kind of the first step. I don't know if they are really going to come to the main campus because our feedback is they were rather intimidated by it, so I thought of branch campus to the main college which is the little learning centers they have embedded in the local community as well as in the high school. I think that's probably a good way for the pipeline to reach to the public schools. Another possible source would be through "promotoras." We are also reaching out to tribal lands through distant education, we have our Master of Public Health program online, we have our Bachelor of Health in Community Service online, we have much of our community bachelor degrees online, and our PhD in nursing is online. So, we are trying to reach out to those who are not coming here.

The role of educators was also seen in promoting the federal and state health programs within the school system. Enrollment could become a part of the school process. All children are enrolled in school; thus, through other assistance programs, such as free school lunches, children possibly qualifying for health assistance programs could be easily identified:

Almost all of our children go to either preschool or head start programs or they are enrolled in school. So, I've always thought that the enrollment should be part of the school process. You have a captive audience and every parent has to enroll their child in school every year, so why not have them enroll their child in healthcare at the very same time rather than having it as a stand alone process. If you really want to make sure that as many kids possible get enrolled into healthcare programs and in insurance coverage programs, then capture them when it's most convenient, not try to pick them up later and have to depend on radio and television ads which people may see or may not hear.

Educators are also wonderful spokespersons, advocating for children. Since they are extremely qualified individuals, knowledgeable about the challenges children face, educators could advocate at the state level, in terms of additional resources for children, as well as at the federal level. Focusing on the high percentages of drop-outs in schools in border counties may be preventing the educators from focusing on the children who succeed, the high achievers, who may need to be further supported to enter health professions colleges.

Many problems around children's health are preventable and having health programs in the schools would enhance the preventative care for children through teaching nutrition, healthy lifestyle and habits, to prevent serious illness and debilitating chronic illness such as obesity and diabetes. Outsourcing part of the educational effort through *promotoras* is also an area to look at, educating not only children but mothers and fathers as well, educating the whole family about the healthcare system, available resources, eligibility of children for Medicare and SCHIP, and healthy lifestyle.

The Role of the Policy-makers

Policy-makers have the opportunity to contribute to access to healthcare for all children, including undocumented immigrant children along the border, by setting an environment that could be friendly as opposed to hostile to the families along the border. Policy-makers are in a position to lift the restrictions around children enrollment in federally and state supported healthcare programs, improve physician reimbursement, and expand the children's access to healthcare. Physicians would establish their practices in places where the quality of life is good for their families. Attractive compensation for healthcare professionals, as well as for healthcare teaching professionals, will relieve the risk of "running out" of those professionals and more heavy reliance on other countries to produce our healthcare providers and educators. The elected officials also have the responsibility to ensure that federal and state moneys are used wisely, and that the programs they support are actually addressing real needs, not invented needs just to be able to qualify for the money:

The policy-makers are critical; in terms of whether the policies they make include immigrants or not, it all comes down to those who are included and whether these kids are excluded from services or not, and at state level it happens, they get excluded and they demand documentation and so forth.

It might be challenging for politicians to think beyond constituents for election, and healthcare may not be in the center of their political platform. One of the participants suggested a way to work with this reality:

You have to take them there. We have to have leaders' support for what we are doing but we have to make them part of the package. People will support that which they help to build. You need to convince them that they are part of the building process.

In addition, the participants considered that the policy-makers should begin looking at comprehensive health for children – not only physical health, but also mental health, dental health, social health and educational health as well. Policy-makers could definitely affect the building of the economic infrastructure of the Border Region which would make it easier to recruit physicians and train physicians in the area; help provide more professionals to provide

these services; build the economy of the area and build the infrastructure for economic progress and better healthcare. Developing federal and state strategic plans for the border carries huge potential for policy-makers' contributions.

AUTHORS' PERSPECTIVE

Today Hispanics constitute the largest minority in the U.S. It is projected that in 2050 there will be over 100 million Hispanics in the U.S., most of them in the Southwest, so states as Texas and California may hold a Hispanic majority. There is extensive documentation of the impact of health disparities on the increased burden of diseases for the Hispanic population. These discrepancies are exacerbated in the border area by a series of contributing factors related to socio-economics (such as education, unemployment, and poverty), lifestyle behaviors (culturally and environmentally determined), social environment (e.g., educational and employment opportunities, discrimination and language barriers), and access to health services (availability, insurance, affordability, comprehensiveness and cultural competency). All these factors are present in the border and have been clearly correlated to an increase of the pathology in recent immigrants, as well as to the persistence of unhealthy habits such as smoking, inappropriate diets, and lack of physical activity. The disparities in children's healthcare are associated with decreased educational achievement and productivity, as well as an increase in reparative healthcare resources utilization. Therefore, it is of paramount importance in the planning for the future well being of our society to address the issues of healthcare disparities for children in the border.

The issues surrounding children's access to healthcare in the Border Region are multiple, complex and intertwined. The access to care is determined by insurability and access to insurance and providers, as well as education and organizational infrastructure of the systems of care available to the community. The challenging issues and possible solutions identified by the participants in the qualitative study and the literature review are presented in Table 3.

It is essential to differentiate the issues that are derived from the people living in a foreign culture from the issues that are characteristic of the border itself. This is particularly relevant, as many authors fail to recognize that the issues of the immigrants are different from the characteristics of the geographic location of the border. This is important as it presents a source of problems, as well as potential solutions.

Poverty is pervasive for the immigrant community and is clearly more accentuated in the border due to low wages, higher unemployment rates and excess offerings for the unskilled jobs. While the per capita income in the U.S. is \$30,906, the per capita income in the Border Region is as low as \$18,823 [71]. The Border Region suffers from high unemployment rates. Compared to the U.S. unemployment rate of 5.2%, and the 6.7% unemployment rate for the state of Texas, the border communities carry a disproportionate burden of unemployment as high as 11% in Brownsville and 13.6% in McAllen, Texas.

The insufficient education is pervasive as well; the availability of resources to provide relief for the immigrants is evidently less developed in the border communities, giving the immigrants lesser chance to improve and creating a philosophy of underachievement. While in the state of Texas as a whole, an average of 79% of the population has at least a high

school diploma, in the border metroplex of Laredo, Texas, only 59% of the individuals have a high school diploma [38].

Table 3. Challenging issues and possible solutions

Challenging Issues	Possible Solutions
<ul style="list-style-type: none"> • Lack of insurance • Low provider reimbursement • Insufficient sub-specialty care • Need for State and Federal support • Geographical and political remoteness • Disparities in children's health • Unsettled immigration status hindering enrollment • Inadequate economic development and poverty • Expectations for family contributions to healthcare • Low language proficiency, health literacy and cultural sensitivity • Availability of healthcare access points and transportation 	<ul style="list-style-type: none"> • Communication and collaboration across states and bi-nationally • Universal healthcare insurance • Enhanced marketing of the available government programs • Support for training of local providers in local health science centers • Educating policy-makers to prioritize the Border Region • Involvement of medical profession leadership in child advocacy • Involvement of educational leadership in child advocacy • Involvement of policy-makers in re-engineering the economic and political environment for ensuring children's access to healthcare

In the Border Region, up to 36% of the children have no insurance [31, 72]. Individual's likelihood to have health insurance is related to citizenship status. However, being a citizen does not ensure being insured. Forty-two percent of the U.S. citizens living in families where family members are both citizens and non-citizens remain uninsured [73]. Despite the current and future efforts of federal, state, and local governments to increase availability and affordability of health insurance, it is important to consider insurance alone does not guarantee equitable healthcare access. Other barriers to care must be considered, both financial and non-financial. Strong economy and increase in employer-based health insurance coverage is a more powerful tool for increasing the rates of insured individuals than expansion of public programs alone [74].

Residents of many immigrant communities, especially *colonia* communities, may find themselves in a psycho-social isolation, without appropriate access to resources available to the rest of the border community. The paradoxical issue is that children and communities that have the highest need usually have the least political power and therefore they are shortchanged in the distribution of program resources and have the least access to good paying jobs, excellent educational systems, after hour programs and access to care.

In the Border Region, there is a dearth of appropriate health care resources and providers, in particular pediatric sub-specialists. About 50% of all U.S. children live within ten miles of pediatric subspecialty provision, and two thirds of all children live within forty miles of a board-certified provider. The majority of subspecialties serve on average between 100,000 to 200,000 children per provider across hospital referral regions [75]. Communities along the

Texas-Mexico border are underserved due to a lack of adequate number of health facilities [34]. El Paso County has a large shortage of health care providers contributing to a high disparity in children's access to healthcare, coupled with disadvantages in mental health and oral health resources. Special activities would be required to maximize the potential for children with special health care needs, foster children, pregnant adolescents, and for children with substance abuse or behavioral disorders.

The complexity of the border is determined by its unique circumstances. Frequently, the families are "bi-national," which links and separates the two sides of the border in a structure that creates a bi-cultural and bi-national system of care. Individuals are frequently cared for by physicians on both sides of the border and none on a continuous basis. The employment of alternative medicine is more pervasive in the border area given the easy access and the low cost south of the border line. The children in the border area frequently grow without a social safety net and often with only one adult member of the family responsible for their care and support. It is not unusual that in the same family one child is an U.S. citizen and has Medicaid and the others do not, as they may be undocumented. It is not the exception that the mother may not have a strong partner support, having children from many male friends that are temporary, and frequently unsupportive. This situation has worsened, as crossing the border has become more difficult and the husband may be unable to cross, or may be caught and deported, or imprisoned. Frequently, there are problems related to child sexual abuse or exploitation. Chronic psycho-social issues are very difficult to manage as they relate to a trans-cultural approach to standards applied differently and interpreted differently from one country to another. To find solutions to these problems, the society has to look at the roots of the problems; there will be no solution if the policy-makers continue treading at the simplest manifestations as opposed to treating the root causes.

The Council on Community Pediatrics (COCP) noted that the border U.S. states have lower Medicaid provider program reimbursement, decreasing the healthcare system's ability to care for all children in the border area [43]. In addition, the Federal Deficit Reduction Act (DRA) negatively impacted the re-enrollment of eligible children, presenting a systematic deficit difficult to address at local levels. For example, an estimated 10 to 20 percent of the children seen in the El Paso healthcare system are undocumented, without any source of health coverage, thus presenting a significant burden on the healthcare institutions, and having local communities subsidize the care with further stretching of the thin healthcare resources. With more children living in poverty in the Border Region, the healthcare system disproportionately takes the burden of the under-funded programs for the poor. As the COCP's "Lessons Learned" letter noted [43]:

We recognize that immigration across the border is a complicated issue, but children who, for whatever reason, find themselves in the United States need to be cared for. During our tour this issue was dramatized by a child with newly diagnosed leukemia and sepsis in Thomason Hospital in Texas, but who lived in New Mexico, and was a citizen of Mexico. Thomason has no [pediatric] hematology-oncology services and had difficulty finding a tertiary care facility that would care for this child.

There have been some positive developments. In March 2007, the Centers for Medicare and Medicaid Services announced that infants born to undocumented immigrants could automatically receive coverage for one year without requirements to prove citizenship to

qualify for Medicaid. This was a reversal of the interim final rule issued in July 2006, requiring undocumented immigrants to provide documentation that their children are citizens before enrolling into Medicaid. Under the new rule, undocumented immigrants would have to provide proof of citizenship of their children after one year of age in order to continue Medicaid coverage. Babies born in the U.S. are considered citizens under the 14th amendment of the Constitution, regardless of who their parents are. In April 2007, the Texas House of Representatives adopted House Bill 109 to restore changes to SCHIP from 2003, with only one amendment requiring the applicant to be either a U.S. citizen or a legal permanent resident. This bill restored 12 months continuous coverage, established a more realistic asset test, allowed families to deduct child care expenses from their income, implemented a more robust outreach effort, and eliminated the 90-day waiting period, meaning that uninsured children do not have to wait to be covered. Hopefully, this bill will be approved by the joint meeting and implemented soon.

Federal policy allows non-citizen immigrants to receive emergency Medicaid services, even if they are ineligible for full coverage. However, the finding that non-citizens have poor utilization of emergency care (contrary to the wide-spread belief that ineligible immigrants are overusing the emergency room services) suggests that current federal policies are ineffective and that the state government needs to widen the availability of Medicaid access to non-citizens [33].

The federal program matching rate is based on a number of factors related to states' resources and, in general, allocates more funding to states with limited income per capita. The federal program matching rate differs for Medicaid and SCHIP, and is also different for individual states. In 2003, the Federal Government was paying roughly 57% of Medicaid program costs and 74% of SCHIP costs, meaning that states received more federal help to support SCHIP than Medicaid, although Medicaid enrolls poorer children. Bringing the federal matching rate for Medicaid up to the support for SCHIP may encourage states to enroll more children in Medicaid programs [52].

The formula for managed care compensation is based on a geographic healthcare index, giving higher reimbursements to areas with higher expenditures. Areas along the border, as well as rural and underserved areas, have decreased expenditure rates due to a lack of patient insurance, decreased access to care (prompting many patients to seek services south of the border) and low provider reimbursement rates. Thus, the formula increases the divide by making the richer areas more rich, and the poor areas poorer. Undoubtedly, the geographic indexing factor in managed care reimbursement deepens the injustice of resource distribution. This system has been created and preserved by the politically powerful areas. Border and rural areas without political clout do not have sufficient support to bring about a more just resource distribution system.

Several recommendations have been made to increase the number of insured and help pay for uninsured children along the Texas-Mexico border. Reforms include Texas restoration of Medicaid and SCHIP program cuts, upgrading Medicaid reimbursement to create parity with Medicare reimbursement, offering a Medicaid waiver to increase healthcare affordability, increasing affordability of employment-based health insurance through small business partnerships, and increasing federal match dollars for Medicaid among U.S.-Mexico Border States [34]. In 2003, a differential was implemented for reimbursement of high volume providers in Texas, which, unfortunately, lasted for only two years, and was abolished in 2005.

There are suggestions to establish a relationship with the Mexican health care system to allow and facilitate the transfer of undocumented children for the provision of health care across the border, as a responsibility of Mexico. Any one who has worked on the border providing healthcare to children knows that this is a theoretical possibility with little practical implementation. For example, parents frequently would sign their kids AMA (against medical advice) from health centers in Ciudad Juarez, Mexico to bring the children to El Paso, Texas. There were instances when children with malignancies were transferred from one hospital in El Paso with appropriate referrals to oncologists in Ciudad Juarez, and the patients returned to the Emergency Room at another hospital in the El Paso community that offers oncology services. Due to the EMTALA rules, U.S. hospitals have to accept such children and stabilize them.

A whole set of issues deals with the disputed possibility of licensing of Mexican physicians to practice in the border area. These issues are very complex and pertain to alteration of the whole system of care and credentialing, need for residency programs, existing standards of care and malpractice coverage. The training of medical students in Mexico has been discussed in light of their preparation to come to the U.S. and enter residency programs with the idea to facilitate a special visa and allow these students the possibility to develop a career in the U.S. This is similar to using any other foreign health education system and resources to solve the U.S. physician deficit, with real ethical questions raised by this proposal.

Another proposal entertains certification of Mexican physicians to provide care for U.S. residents. If U.S. certifies physicians from Mexico to provide services to U.S. residents, this will not lead to resolution of the issues. Rather, it will deepen them, because the physicians in Mexico would provide cheaper care without compliance restrictions or malpractice insurance and would serve insured/paying individuals only, thus hurting the U.S. healthcare system economically. Currently, a silent certification process is ongoing, allowing Mexican physicians south of the border to accept U.S. insured patients and be reimbursed for their services. A phenomenon is emerging, where for-profit Mexican hospitals consider in their revenue planning not only patients from Mexico, but also insured/paying patients from the U.S. For example, two huge hospitals, "Angels' Hospital" and "Star Hospital" are opening their doors in Ciudad Juarez, Mexico, across El Paso, Texas. These establishments use aggressive marketing campaigns to siphon the paying patients from the U.S. side of the Border to Mexico. Liability issues are irrelevant to the Mexican healthcare system, the cost of provision of healthcare is low, and there are no processes for ensuring patient safety or quality of patient care. The process of shifting insured patients and insurance reimbursement from the U.S. side of the border to Mexico will further drain the healthcare resources of the Border Region. This is an alarming trend requiring immediate and proper attention from the U.S. legislators.

Creation of an international agreement urging the Mexican government to provide "border insurance" to undocumented Mexicans living on the U.S. side of the border may be a viable option, along with strengthening the role of the Federally Qualified Health Care Centers as the main organizations serving uninsured children in the border area. The idea is that these organizations would be more culturally attuned to provide comprehensive, culturally sensitive care to the children in the border area.

The creation of a Public Health Region 11 with its own funding and programmatic development may be strongly opposed by each and every one of the Border States for many

reasons, including state autonomy and territorial control. It would be very difficult to reconcile the care provided to children in different areas within the same state, and establish a higher Medicaid reimbursement rate for one region, and a lower federal share for another. The Federal Government would also be opening the doors to creating a series of areas of disparity, such as black ghetto areas, and Indian health services.

The Federal Government has failed to protect our borders appropriately and to enforce legislation to decrease our border permeability, thus allowing the chronic growth of illegal immigration. The Federal Government has the responsibility to protect the U.S. borders and create appropriate measures to care for those already living in the country.

CONCLUSION

The challenges surrounding the disparities in children’s access to healthcare in the Border Region are many. They act in a self-perpetuating cycle, augmenting each other in a chain of predictable events and consequences (Figure 2).

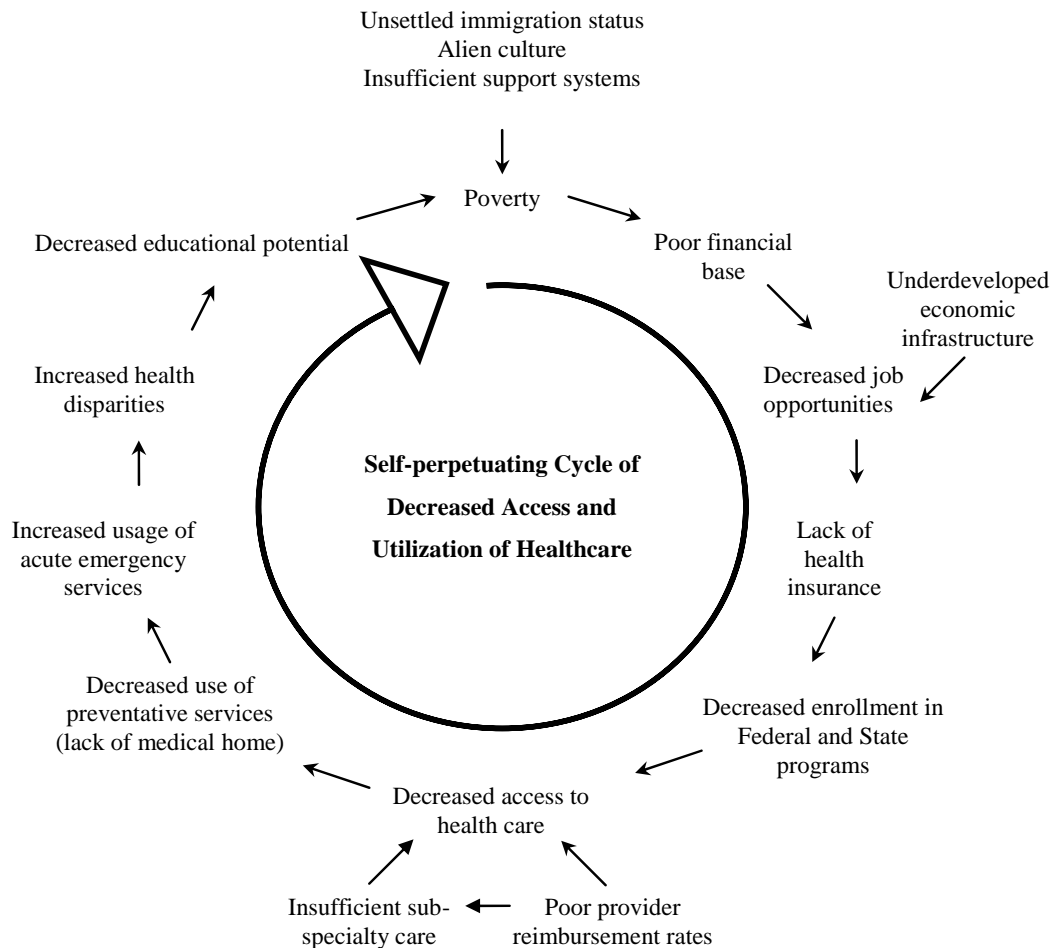


Figure 2. Self-perpetuating cycle of decreased access and utilization of health care.

In order to discontinue the self-augmentation nature of this cycle, interventions could be implemented at any of its stages. For example, a well-developed economic infrastructure will bring about better job opportunities with private insurance, thus improving the access to healthcare. While for some of the needed interventions there is a quasi-universal agreement, many challenges present as systems issues, thus requiring an innovative, systems approach.

The large uninsured population is a consequence of a series of factors, including lack of health insurance for the working poor (with incomes above those eligible for state programs but not sufficient to buy commercial insurance), poverty of the region in result to low wages and unskilled labor, as well as a large population of undocumented people, who although living in the border for many years continue to have an unsettled legal status. Families have children that were born in a Latin American country, most frequently Mexico, as well as children born in the U.S.; the latter as legal residents still do not have access to care as the parents have concerns of deportation. Parents' fear of the immigration system and ignorance of the organizational structure of the healthcare institutions are issues related to acculturation and understanding of the bureaucracy.

The insufficient access to healthcare is a very serious impediment, derived from factors such as low reimbursement from government programs (e.g., Medicaid and SCHIP), low rate of commercial insurance, difficulty in recruiting and retaining physicians, need for supplemental income and program development in the border area, dearth of sub-specialty support, and lack of awareness at the Federal level of the characteristics and diversity of the border. The lack of knowledge or concern about the border situation by the Federal and frequently by the State authorities presents a serious challenge, augmented by increasing prevalence of anti-immigrant sentiment, weak political clout for issues from the border, and insufficient funding for building the economic infrastructure as the border area competes for resources. The weak implementation of immigration rules and border control allow for continued permanence of illegal immigrants using scarce resources without appropriate response and responsibility of the federal system.

Researchers and policy-makers agree that access to care and quality health care are important for the well-being of the American children. However, policy solutions to the issues of access and provision of quality care have not been implemented universally. The high costs of healthcare make it imperative for children to have health insurance in order to benefit from the system. It is critical to provide accessible and affordable health services to children, especially in the light of declining private insurance coverage and increasing dependence on public healthcare programs [76].

Divorcing patients from control over their healthcare spending created thriving third-party insurance companies and led to more than \$126 billion of annual expenditure on defensive medicine while more than 46 million Americans still remain uninsured. Therefore, universal healthcare subsidized by the government looks more and more attractive in discussing solutions for the ever-increasing healthcare spending. Since public-sector financing is currently the most efficient tool for funding universal healthcare coverage, many policy-makers include this idea in their political platforms. The Universal Healthcare Choice and Access Act, as proposed by U.S. Senator Tom Coburn from Oklahoma, promotes preventative care initiatives in a cost-effective and outcome-measurable manner through a uniform federal coordination. It sets a panel of national priorities with measurable goals and outcomes, incorporating science-based recommendations directly to the individual consumers, awarding compliance with lower healthcare premiums, increasing vaccine

availability with targeted immunization rate of 90% of the population, and eliminating counterproductive government programs failing to prove measurable effectiveness [77].

The development of infrastructure and economic support is fundamental and without it the disparities in care for children in the border will not only perpetuate, but worsen as the gap will grow bigger. Some suggested measures may present opportunities for policy-makers to exercise a positive impact in resolving the issue:

1. Provision of *appropriate reimbursement for healthcare providers* in the Border Region would recognize that this is an essential tool to recruit and retain physicians, allowing them to provide appropriate care to a reasonable number of children and thrive professionally.
2. The *implementation of a system of Universal Health Insurance* would guarantee access to a set of basic needs with emphasis on preventative care.
3. Creation of the *basic healthcare infrastructure* needed to develop the health science centers will boost the interest locally for the health professions. This includes development of a medical school in the border area with all the resources needed to spearhead programs for border health development, as well as enhancement of all health related professions.
4. Development of *economic infrastructure* for the border that would allow economic growth could be completed through the creation of empowerment zones or preferential tax treatment.
5. Development of *regional programs* with appropriate funding would support the development of multilateral initiatives to involve the Border States as well as the Federal U.S. Government and the Government of Mexico.
6. The legislators for the border have the opportunity to *form a strong caucus* with clear legislative goals to close the gap in children's healthcare disparities. The most serious problem is the occupation of legislators' agendas by special interest items for their own states, and the priority issues for the border get lost in these agendas. Many legislators from Border States, although very powerful, do not concentrate on resolving issues stemming from the border. To make this political issue worse, the people in the border area, more frequently than not, do not exercise their right to vote, and are written off by any serious candidate to national office.

It is feasible to involve the American Academy of Pediatrics on an ongoing basis in children's health advocacy through establishing a permanent work group and monitoring the advances in resolving the disparities for children in the border. Such approaches have been tried successfully in the management of tuberculosis and diabetes, and could be applied to immunizations and other interventions to children across the border.

Creating partnerships with the educational system would strengthen the health care for children through a variety of venues, facilitating the enrollment of children in different access programs and developing school-based wellness centers. Additionally, a partnership between the healthcare system and the education system has the potential to enhance the inclusion of health education as part of the regular curriculum, and encourage recruitment of minority students into the healthcare professions. The interdisciplinary interventions would help develop strategies for community social interventions in disease prevention.

The interventions with potential to resolve the disparities in children's access to healthcare are multifaceted and quite complex. Nevertheless, most of them relate to improved access to care by enhancing pediatricians' reimbursement, creating a universal access healthcare system and facilitating the enrollment of children into government-sponsored programs. Improvement is needed in recruitment and retention of pediatricians, including pediatric sub-specialists, enhancement of the economic conditions of the area and development of the economy through State and Federal interventions. Such approach would be impossible unless there is a unified border caucus that has the clout to affect changes in the State and Federal arena. It is important to have a central organization to coordinate the investments based on a strategic plan for border health care that brings together the many disconnected federal programs into a cogent plan for interventions and measures their impact. Coordination between the educational and healthcare systems is important in maximizing limited resources and providing multidirectional interventions to the children and their families. The development of a border research agenda in search of reasonable solutions and facilitating the translation of the findings of the research into practice will enable a systems approach in resolving the border issues.

It is essential to create a cogent immigration policy at the federal level and the federal government has to assume responsibility for its failures. Undocumented people living in the border and using community resources should be legalized if they meet certain pre-defined criteria. This would bring the immigrant families into the mainstream, make it possible for them to get insurance and contribute to the economy in a more formal way, while decreasing their exploitation by unscrupulous contractors and businesses. Enforcement of the border crossing is important for many reasons, but equally important is the development of strategies that would allow the communication between the national healthcare systems on either side of the border and establishment of community programs to enhance this trans-national communication. The dialogue between systems of care on both sides needs to be enhanced through scientific conferences and research, as well as continued dialogue. There is a need for continuous, culturally sensitive education that should be concerted throughout the Border Region, addressing the most important issues related to public health and programs that affect the population such as immunizations. There is a huge need to coordinate community activities funded through Federal organizations for the analysis and implementation of interdisciplinary approaches to the many issues of healthcare and access to care for children living in the border area. Strategies designed by public health organizations, particularly the Border Health Commission, ought to be disseminated.

The globalization of the international markets inevitably reflects on the making of health care policy. In order to resolve Border Region health issues, policy-makers would need to consider political, cultural, and social bi-national interdependencies [78]. Systems have been proposed for children from the U.S. side of the border (particularly undocumented children) to be cared for across the border in Mexico. Such systems are difficult to implement, as they would require changes in the international relationships, immigration and legal environment, and healthcare practices on the U.S. side of the border. On the contrary, the development of special incentives, as well as establishing partnerships between academic and community organizations, could help streamline the effort and resolve these issues in a more permanent way that would meet bi-national standards and expectations.

The U.S. policy-makers have the unique opportunity to introduce huge difference in children's access to healthcare through more inclusive federal and state healthcare programs,

increased reimbursement for healthcare providers and economic development of the poorest areas comprising the U.S. – Mexico Border Region. At a time when the U.S. is struggling to have better control of its international borders and is building walls to fend off illegal immigrants, the countries of the European Union are opening their borders to a free flow of travel, work and immigration. The realities of these two regions of the world may be very different; nevertheless, finding an appropriate solution for the Americas still depends solely on good political will and unveiling acceptable solutions. The children of America grow now; they cannot wait; our future cannot wait. The hope for a better future lies in the hands of talented policy-makers to use the available opportunities for improving the access of children to comprehensive healthcare, thus improving children's well-being, education and realization of their full social potential.

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Chapter 3

**INTERCONNECTEDNESS AND THE INDIVIDUAL
IN PUBLIC POLICY: FOUNDATIONAL PRINCIPLES
OF DYNAMIC SYSTEMS**

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ABSTRACT

It is the self-defined goal of community psychology to take an ecological view of individual/community interactions. Ideally this occurs by using academic research to inform action, which facilitates positive change where social problems are identified and change is needed. Since community psychology traditionally takes a systemic approach to community health, the focus is on effecting positive second-order change. A basic premise here is that the individual is an out-growth of the functioning of all levels of the system in which the individual is embedded (e.g. biology, individual adaptations, families, communities, political systems, etc.). There is a perceived tension between identifying and serving needs which are always the needs of the individuals in a given community on the one hand, and attempting to make larger systemic changes that improve the well being of all individuals on the other. If the highest goal remains maximizing the positive systemic change, which is often very difficult both to conceptualize and achieve, then the need exists to identify foundational principles which govern systemic interactions. It will be proposed that foundational principles exist in other domains and that these principles govern all dynamic systems, and that they can be applied to community psychology research and intervention.

The relationship between individuals in the academic communities and the public sector is a dynamic one, in which each level of the system interact bidirectionally to

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affect change in the other. This reciprocal interaction includes: intraindividual levels of biological systems, to the individual-community interactions, to the policy and perceptions held by these communities, and more and more often, the global influences in which they are embedded. When we use a dynamic systems framework to address public policy and social justice issues, we must also acknowledge the individualistic culture of the United States. The second theme running throughout this discussion suggests that freedom for the individual is our primary cultural value, and asks how activists and psychologists can facilitate a positive dynamic reciprocal relationship between the self and the community in the US? This article will address manifestations and consequences of the concept of the Self from Nativism. Taking an historical perspective, an attempt is made to offer a dynamic systems perspective, and to describe an alternative utilizing examples from: Social Darwinism, genetics, fetal development, brain plasticity, and the education system, to the international human rights movement. Doing this we will call into question the goal of respecting all values and behaviors in a given society. Arguing against moral relativism we propose the necessity for foundational values - that arguably already govern Community Psychology.

Keywords: Epigenesis, self, community psychology, eugenics, genetics, biological determinism, individualism, nativism, preprogramming, systems theory, ecology

THE ECOLOGICAL INDIVIDUAL

There is another aspect of the activity and the life of a scientist and another function for science, which is not often enough stressed. In addition to (or instead of) serving a function like that of an engineer, the scientist can also serve a function like that of an artist, or a painter, or poet--that is, he sees things in a way that no one has seen them before and finds a way to describe what he has seen so that other people can see it in the same way. This function is that of widening and enriching the content of human consciousness, and of increasing the depth of the contact that human beings, scientists, and nonscientists as well, can have with the world around them. This function of arousing and satisfying a sense of wonder and curiosity about the riches of the natural world, and of strengthening the civilized human being's weakened feelings of being part of the world around him, is a function which you can see being served in any hall or gallery of the American Museum of Natural History.

Daniel Lehrman

American ideas of community are often considered to be characterized by "wholeness incorporating diversity" and may include people of different ages, ethnicities, educational backgrounds and incomes (Gardner, 2003). Individual rights in the United States are usually referred to as the liberties of each individual to pursue free speech, their religious beliefs, or political opinions (U.S. Constitution) without interference from other individuals, society or government. Examples of individual rights in American discourse commonly include the right to life, liberty, property and the pursuit of happiness, which are grounded as much in the Western mindset as in the United States Bill of Rights and the Constitution. It has been argued that in free societies there is a constant and unavoidable tension between personal rights and social responsibilities, and that every personal right has a corresponding social duty. It is then the social duty of the individual to employ individual agency to watch over a

community to make sure that standards are objective and beneficial to human life (Machan, 2001). But what is the individual?

In Western society individuals are often defined exclusively by their personal rights. Social duty or civic responsibility then becomes equated with giving to the community in the pursuit of one's interest or task (Drucker 1999). This view of social responsibility is based on Individualism, which is seen as the principle of people having the freedom to act on matters concerning themselves (Salamon 2002). Thus, we tend to define both the individual and her or his social responsibility in relation to freedoms and rights for the individual. Social Responsibility becomes only a requirement to do no harm to others in the pursuit of one's own interest or task (Drucker, 1999).

This common view paints a self-centered relationship between individuals and the many communities in which they interact. It is also a simplified view that fails to explain the complex reciprocal inter-relationships between social contexts and individuals. These are, however, strictly Western perspectives of the relationship between the individual and the community. Another view put forth by Sampson in *The Debate on Individualism* (1988) suggests that there are other views of the individual that are not commonly accessible to Westerners. These are the view of the self we intuitively understand in the West as separate and “self-contained”, as distinct from a sense of self based on community interaction, or the “ensemble” individual. It has been argued that this self-contained individualism is distinct from, and incompatible with, the communal version of an ensemble individual (Sampson, 1988). This idea of the ensemble individual suggests a more systemic view of person-community interactions than commonly used.

Indeed, a more systemic perspective is central to community psychology. According to SCRA (Society for Community Research in Action) Division 27, Community Psychology “encourages the development of theory, research, and practice relevant to the *reciprocal relationships between individuals and the social system which constitute the community context* (emphasis added).

As indicated by participants at the Swampscott Conference of 1965 “Community psychology ... is devoted to the study of general psychological processes that link social systems with individual behavior in complex relations” (Bennett, Anderson, Cooper, Hassol, Klein & Rosenblum, 1966). However, Monterey Conferees of 2001 acknowledged that “community psychologists, have not adequately developed that linkage thus far”. A renewed focus on all levels of “individual, group, community and governmental acts, as well as social, cultural and institutional arrangements,” suggests the need for the development of new theories in Community Psychology which can encompass the complexity inherent in these reciprocal, dynamic interrelationships (Angelique & Kyle, 2002).

This article will discuss the emphasis in Western psychology on self determination and biological determinism, and the implications of a value system that relies almost entirely on constructs of self-contained individualism. We will also discuss the repercussions of the failure to explore the dynamic plasticity of self-community interactions. It will be argued that the use of dynamic systems theory, connectionist models and ecological models, particularly those employed by other scientific disciplines, may provide community psychologists with foundation principles and an empirically based theory governing systems interactions.

At Monterey there was also a call to “understand human behavior in context; i.e., we should actively work to develop an understanding of the social institutions and forces in which individual humans are enmeshed, and we should adopt a social-ecological perspective

in our work,” which also directly points to employing complex, dynamic systems theories. Since contextualism is a primary feature of ecological models of community psychology, this renewed commitment is more in line with systems theory than conventional perspectives of Social Competencies (Duffy & Wong, 2000), or Empowerment approaches (Rappaport, 1981).

DECONSTRUCTING OCKHAM’S RAZOR

Ockham’s razor is the precept that all things being equal, the simplest theory is the best, or *lex parsimoniae*. The principle of parsimony is often misunderstood as an argument for simplicity, when it is simply an argument against the superfluous. The complexity of the emergence of life and the interactions of living organisms and the ways in which they aggregate and interact demands complexity.

Dynamic systems theory delves into the embedded contexts which are central to the ecological approach, and acknowledges the reciprocal interactions among observer, observed and the larger social systems (Kelly, 2006). However, problems may result if the consequence of ecological models is to lead to a paradigm which disavows foundational knowledge in favor of “moral relativism” (Ragsdale, 2006) and the groundlessness, detachment and shallow engagement (Spretnak 1991) of deconstructive postmodernism. It is argued here that is an unnecessary conclusion and an error in reasoning. The question then becomes: Does systems theory provide a scientific theoretical framework that can acknowledge our interconnectedness and inform theory building in Community psychology?

Systems theories are used to explain multi-dimensional, non-linear and hard to model complex systems. Systems theories also examine bidirectional reciprocal relationships at all levels of the system. The coactional *System* is considered anything from a cell assembly to a whole person, or the family, society, government, and global context in which “micro-systems” are embedded. In theories of complexity, the conventional, intuitive concept of an independent individual as separate from the system is challenged. Perspectives of individuals as changeable, fluid and interdependent evoke an understanding of the self-contained individual as something of a chimera. The complexity of systems theory provides a knowable and employable alternative with a sound basis in science, and bearing valuable insights which are applicable across contexts and to community intervention.

The evidence of ecological systems theory’s propriety as a foundational system of inquiry comes from many different lines of investigation. The interdisciplinary nature of systems theory is central to its foundational principles and its concepts come to a wide array of areas from mathematical physics. Applications are found in many fields as diverse as: biology, ecology, economics, embryology, geography, geology, management, organizational theory, political science, sociology, and psychotherapy (within family systems therapy) - and as argued here, necessarily, community psychology.

Systems theory is the language early investigators used to describe organization and interdependence of relationships. The ecological perspectives benefit from the system concept when contrasted with the classical perspective of reductionism, which takes as its subject matter a single part of a system. This theory shifts the emphasis from parts, to the organization of parts in a system, composed of interacting and interrelating groups of

activities. As opposed to a focus on individual parts informing the whole, these systemic elements when taken together, form a new whole. In most cases, this whole has unique and counter-intuitive properties of dynamic origin, the emergent sum of which cannot be found in the constituent elements. A central aspect of systems theory is this dynamism of organization, as a scientific method for understanding the behavior of complex interactions. The interrelationship among the behaviors of individuals in the structure of any system is more important than determining the individual components themselves.

Systems theory argues that, in most cases, the behavior of the whole cannot be explained by the behavior of the individual parts. A clear example of this comes from our understanding of non-glyphic languages, such as English. In English the properties of the individual symbols (letters) do not themselves contribute to giving rise to the meaning they confer when considered together as a group (words).

DYNAMIC SYSTEMS AND THE INDIVIDUAL

From the sixteenth century on, concepts of the individual in the West have been based on separateness, best described as Individualism (Baumeister, 1987, Morris, 1972, Abbs 1986, cited in Klein 2005). As previously noted, individualism stresses independence and the importance of individual self-reliance, self-determination and personal freedoms, normally encompassed in and associated with liberty and individual human rights. Individualistic ideals promote the unrestricted exercise of individual goals and desires, as opposed to philosophies of interconnectedness. Similarly, rather than considering the interrelationships of individuals, they express *de facto* opposition to most external interference with an individual's choices. Whether the "interference" is considered as a product of government, society, family, or any other organization, this view necessarily undermines basic premises of interdependence and interconnectedness of individuals. This perspective of Individualism, in which communal motivations represent countervailing secondary values, can be seen in direct opposition to and incompatible with holism, collectivism, communalism, and communitarianism (Sampson, 1988). This is the classic dichotomy exposed by the principles of liberty and justice for all. In this system of self, "Liberty" requires individual restraint; "justice" demands individual action. The attempt to balance selfish values with the needs of the community is often seen as necessary to temper the excesses of self (Perloff, 1987, Waterman, 1981) or the tyranny of the community. It is arguable, however, that this is a reductionist notion based on a false dichotomy.

This theory of individuation can also be seen as a form of "moral relativism", which is fundamentally opposed to the view that tradition, religion, or any other form of external moral standard should be used to limit an individual's choice of actions. Thus, non-systems theories, in support of the dichotomy between individuals and the communities in which they are embedded, may be in direct contrast to the tenants of Community Psychology, which are explicitly holistic, linked to social justice and necessarily a study of interconnected systems. Perhaps we need to redefine concepts of self and community and the attendant beliefs which impact how we assume these concepts must interact, from a perspective of dynamism (Lewin, 1935 Sampson, 1977, 1978, 1988, 2002).

DYNAMICS OF COMMUNITY PSYCHOLOGY

There is often a perceived tension between identifying and serving needs in a given community (which are almost always seen as the needs of individuals) on the one hand, and attempting to make larger systemic changes to improve the well being of all individuals in the community (which require understanding the ecological theories of dynamic interconnectedness) on the other. However, the highest goal consistently remains maximizing the positive second-order change, which is often very difficult both to conceptualize and achieve.

Discussion of difficulty in conceptualization of systemic change by authors, such as Bellah, Madsen, Sullivan, Swidler, & Tipton (1996) and Beauchamp (1976) has been attributed to deficits in the “first language” of Individualism in the United States. The mission of improving the well-being of populations is difficult to advance in public discourse because the language, used to express the values animating the mission, has not been adequately developed. The values associated with the first language of Individualism however, are simplistic and more easily defined, articulated, and conceptualized. While the primacy of self-reliance and individualism in U.S. culture is apparent, it is the secondary values of interconnectedness, such as egalitarianism, humanitarianism, and social responsibility, which lie at the heart of the social justice orientation, and community psychology values.

Discussion of primary and secondary languages, while helpful for framing the issues and identifying and highlighting the dominance of the values of freedom, self-determination, self-discipline, personal responsibility, and limited government, may also be tantamount to recognizing a weakness in the American value system. It is this primary value system that allows this reductionist, individualistic understanding of social problems to prevail and perpetually inform public policy. If “values and priorities lead to policies and practices” and not the other way around (Rappaport, 1992), our values form the basis of social justice.

Academic scientists acknowledge a key classes of determinants of psychological and physical well-being for individuals, are the full set of macrosocioeconomic and cultural factors that operate at a societal level (Jason, 1997, Kelly, 1988, Rappaport, 1981, 1982). To address the systemic nature of social problems necessitates interventions which span all levels of the society in which the positive change is required. Despite the agreement of the importance of the social determinants on public outcomes, community psychologists routinely rely on strategies that are more behavioral and individualistic in nature (Duffy & Wong, 1996, Rappaport, 1981). The question becomes: If the importance of a community’s ability to affect the development of individuals’ mental and physical health is widely agreed upon by community psychologists, why is it so common for interventions to target first-order change that amounts to temporary improvements for a number of individuals?

This disconnect between academic theory and research action may be due to several factors, such as the difficulty of making structural change, financial limitations, time restrictions, and pressures to publish traditional scientific research. A first step to uncovering the foundation for each of these obstacles may require an examination of the value system that supports them. It may be more beneficial and necessary to address the values in which we as society are invested. Perhaps focusing on and tackling the American value system is required as the first line of intervention (Jason, 1997). What are specific strategies to create

change which will lead to more inclusive and communal values? What scientific fallacies motivate this false distinction between self and other? United States Value System

There is much to be said about the spirit of individualism in the United States. Western democracy perpetuates a unique moral resonance with individualism and the attached values of self-determination, personal responsibility, and limited government. American's have internalized the principles of equal "pursuit of happiness" and "liberty and justice for all," and this has consequently solidified their inability to deny the truth of these statements in principle. In practice, our public policy, beliefs about diligence to maintain reciprocity norms, absence of self-sacrifice without reward (Trivers, 1971, 1972, 1974), and demonstration of self-serving Freudian altruism (Kriegman D. 1990; Perloff, 1987; Waterman, 1981), indicate that these are our principle values and signify their supremacy over our an appreciation of communal interconnectedness and fuel public policy. In short "we find it more attractive to blame people, rather than social institutions, for problems in living" (Rappaport, 1992).

One may ask, if we are so self-centered, where does Western social action come from in self-contained individualism – self-consideration? Yet, this may be the case. According to some researchers and activists this is the foundation for community organizing, suggesting marginalized groups are often motivated to act collectively to cause social change for their individual problems (Alinsky, 1972). Unfortunately, this motivation often begins and ends with personal interest groups, as fueled by a personal experience with the given social problem. Problems furthering communal interdependence are often compounded by a leap to human nature to justify this self-absorption.

There are some serious implications for public policy involved in a moral system which considers the self and the community as countervailing American values. A potential barrier and source of support comes from the make up of the Western psyche itself. In this context, "it takes enormous courage and faith to begin a journey toward authenticity, on which one can reap the benefits of learning to follow one's inner truth, as opposed to what society dictates" (Jason, 1997). Embracing a perspective of interconnectedness and incorporating this into our educational system has the ability to change the basis of the core values, without targeting the value system directly. Globalism, multiculturalism, porous borders, etc., have overt consequences for individual values which may inform social dictates, as well as direct public policy. Less immediately obvious are the deep implications of our unconscious perceptions about human nature and human development, as informed by an historical perspective on individuation.

FIXITY AND SOCIAL PROBLEM

Thomas Robert Malthus (1766-1834) was an English political economist and historian who in 1826 published "First Essay on Population". This was in synergistic interaction with the writings of Goodwin (1820), Caritat (1822) and others, who advocated the principles of emancipation and enlightenment for individuals beginning after the French Revolution. Malthus' theories and later works had a surprising historical influence, the repercussions of which are apparent even today.

He proposed that poverty, and thereby also vice and many other forms of social "misery", are unavoidable because population growth will always exceed food production. The

“natural” checks on population growth were seen as wars, famine, and diseases. Malthus proposed “sexual abstinence” for the working class as a means by which the population excess could be diminished and a balance achieved. In this way, the “lower” social classes were made totally responsible for their own social misery.

It is not currently production of food but rather equal distribution of resources which is the primary issue. However, Malthus’ work is an excellent example of the emphasis on fixed and non-interactional individual traits influencing public opinion, and it had direct repercussion for policy regarding the poor in England. Based on Malthus’ notions, it was reasoned that better conditions for the poor would only encourage them to further reproduce, putting those who were capable of more productive work at a disadvantage. In 1834, a new law created the institution of workhouses for the poor, in which the sexes were strictly segregated to curb their inevitable over-breeding. This social policy relied on the assumption that the lower classes are innately subordinate to the intrinsically more civilized upper classes, and that the relationship between the rich and the poor is heritable, fixed and inevitable.

The beliefs behind these nativist perspectives are not only overly-simplified but are often misrepresentations. For example, in “Hereditary talent and character” (1865), as well as in many other writings by Sir Francis Galton, it was argued that eminent men have eminent sons. The source of eminence was inherited at birth from someone of good breeding stock. This is a clear misinterpretation of Darwinian Evolution when applied to heritability, but remains our most popular conception of it (Brüne, 2001)

There is no question that Galton was directly influenced by and made direct reference to Malthus, referencing him the presidential address before the Division of Demography of the Seventh International Congress of Hygiene (1892). Galton disagreed with Malthus’ final solution that we should be moderate, self-denying, and conservative in the traditional sense of conserving our resources. Galton said that this would cause the proliferation of the poorest stock, which were degenerate and could clearly exercise no restraint. Thus, *we* must intervene to restrain *them* from procreating. While criticizing the main Malthusian conclusion *that people could change* individual behaviors to the benefit of social good (exercising restraint), Galton pays him a high compliment: “I must take this opportunity of paying my humble tribute of admiration.”

Galton’s philosophy was based on an attempt to extrapolate human breeding from animal breeding, leading him to create both the term “eugenics” and the phrase “nature versus nurture” (1865, 1869). It is widely accepted that Galton derived his main ideas from the breeding of the race-horse and basset-hound. Just as hounds and horses can be bred for specific traits, so too, can men be bred for desirable traits. An unfortunate truth of animal breeding is that many impure animals are sacrificed over many generations as the breed is being perfected. This point did not escape Galton (1865).

Eugenics, not only in the past, but also today, is based on analogies to animal breeding. The Spartans were the first known to acknowledge the seeming inconsistency of improving the breed of their dogs and horses, while leaving to human kind the unchecked propagation of the mentally defective, the diseased, and those otherwise deemed as unfit. Importantly, these nativist theoretical views have a history of directly impacting the action of legislation, creating governmental policy, and influencing public opinion.

EVOLUTION OF EVOLUTIONARY THEORY

Galton's early studies led him to formulate what he called the ancestral law. According to this principle, the developmental influence on any one individual can be quantified by calculating inherited contributions from predecessors. Galton published *Hereditary Talent and Character* (1865) and *Hereditary Genius* (1868) in which he attempted to demonstrate a quantifiable law of distribution of heritable ability in families which were understood to be unchangeable and predetermined. In a group of ten illustrious men who have illustrious relations, he postulated there are three or four eminent fathers, four or five eminent brothers, and five or six eminent sons. He postulated that simply by mating eminent people with eminent people, more eminent people are produced. He assumed that the mechanism was inherent in the breeding process itself; replicating the social environment in which these individuals were embedded was not necessary. However, according to many current developmental systems theorists, social environment is inherited as well as biology (Blumberg, 2005, Michel & Moore, 1995, Moore, 2004, Oyama, Griffiths, & Gray, 2001), and the transmission of cultural and social environments, while having consequences for developmental processes, is clearly non-biological in origin. In this communal view of the ensemble individual, existing and observed regularities depend not only on some influences of nature but on the historically and contextually embedded continuities

The outgrowth of fixed genetic perspectives can be seen in both positive and negative eugenics. Parenthood of the fit or worthy is encouraged; parenthood of the unfit or unworthy is discouraged. Positive eugenicism then concerns itself with selection in marriage and the exercise of the marital function. Negative eugenics seeks to eradicate the social defects that taint the gene pool with alcohol abuse, venereal disease, feeble-mindedness, poverty, homosexuality, etc. Both occupy the same theoretical territory of fixed preprogramming of the individual.

Nonetheless, Galton remains a precursor of modern evolution for most of western society. In identifying the conflict between nature and nurture, he set-up a false dichotomy we are only now beginning to overcome. Despite caveats from one side or the other, this either/or fallacy still predominates most academic writing, and the majority of theory in post-secondary educational textbooks in the fields of psychology and biology. Dynamic interaction is not commonly explored, researched, or discussed in Western psychology and biology. Attempts at the integration of the complex, reciprocal, and dynamic interaction of all levels of biology and psychology is, at least, a very rare occurrence.

Ironically perhaps, Galton was deeply influenced by the *zeitgeist* of England at the turn of the century. He was Darwin's half-cousin and the two developed an intense intellectual synergy. Darwin had initiated the contact, after he had read Galton's *Narrative of an Explorer in Tropical South Africa*, around 1853. Galton later read *The Origin of Species*, which he would say had a revolutionary effect on his thinking. A regular correspondence between the two followed until Darwin's death. However, "Origin" was read by Galton in 1859 and he began publishing on eminence in 1869, so it can be argued that he contributed no original ideas to evolutionary theory beyond the popularization and misrepresentation of the theory which influenced so much of Western thought. Darwin did not agree with Galton's theory of innate inheritance of intelligence saying in one letter "I have always maintained that, excepting fools, men did not differ much in intellect, only in zeal and hard work; and I still

think this is an eminently important difference.” In this context, his use of the term “eminently” in discussing the effect of training on eminence, while highlighting the difference in perspectives between these two related men from one eminent family, is funny. Darwin had a subtly punny sense of humor.

Darwin himself acknowledged that he was standing on the shoulders of his own developmental history. He did not come upon the idea of transmission and transmutation of traits in isolation, rather he and Galton both learned it from his grandfather, Erasmus Darwin and the dominant ideas of their time and place in history. Through subsequent research and the contribution of data, Charles succeeded in being credited with evolution over others with similar theories. Neither Francis Galton nor Charles Darwin conceived of nor coined the term “Survival of the Fittest”. The direct application of the eugenics perspective to social issues predated them both and was instantiated by an American, Herbert Spencer.

Spencer published *The Proper Sphere of Government* in 1842. The first publication of Darwin’s preliminary reporting of the Beagle’s voyage was published in 1839, three years before Spencer’s writing. However, Spencer’s work is probably another example of the synergistic effects of one idea emerging in several places at the same time, as opposed to a direct interaction and transmission of ideas between these two men. When referencing Spencer’s work Darwin said, perhaps revealing that glimmer of sardonic humor, he is “a dozen times my superior” (quoted in Hofstadter, 1955).

SELECTION FOR THE BEST

Spencer actually came out with a theory of hereditary social change some years before Darwin’s publication introduced natural selection. Moreover, in 1852, Spencer explicitly noted that natural pressures acting upon human populations had a positive impact. It encouraged development and advancement and allowed the best of each generation to survive, therefore steadily increasing the progressive march towards perfection (1852). Accordingly, Spencer was in opposition to social movements or governmental programs that would attempt to in any way help the infirm or under-classes.

Richard Hofstadter’s book, “Social Darwinism in American Thought” cites a passage of Spencer’s perceptions of the underprivileged, saying “the whole effort of nature is to get rid of such, to clear the world of them, and make room for better. Nature is as insistent upon fitness of mental character as she is upon physical character, and radical defects are as much causes of death in the one case as in the other. He who loses his life because of stupidity, vice, or idleness is in the same class as the victims of weak viscera or malformed limbs. Under nature’s laws all alike are put on trial. If they are sufficiently complete to live, they do live, and it’s well they should live. If they are not sufficiently complete to live, they die, and it is best they should die.”

While Spencer is not a Social Darwinist in the strictest sense, he was very clear in his view that society is under the influence of fixed and innate human nature. The weak should die off to improve the proliferation of the strongest, the “best”. His perspective influenced social policy and other scholars, and significantly impacted the Eugenics movement in Europe and the United States.

“Survival of the fittest” is shorthand describing how “selection for” the best and most adaptive traits of individuals, leads to a perfection of the species. Originally used by Spencer in his *Principles of Biology* (1864), he drew parallels between his ideas of “selection for” individuals and creating certain economic and social systems; using theories of evolution via what Darwin simply termed “natural selection.”

Natural selection is a radically different idea and is the term favored by biologists and psychologists. It corresponds to an intellectual difference dating back to Darwin and indicates that the mechanism for inheritance is unknown. There is acknowledged differentiation in transmission of heritable patterns which can be identified, however, the mechanisms for doing so are also often not assumed to be known. Natural selection is informed by changes in the environmental requirements on the individual. Assuming the developmental differentiation does not preclude the ability to procreate, it is considered adaptive. Central to the tenets of natural selection and in opposition to the notion of ‘survival of the fittest’ is that at no time does evolution assume there is any drive or progression toward perfection. Moreover, evolutionary changes are never assumed to be optimal solutions (Brüne, 2001). Transmission and transmutation that is all there is to Darwin’s selection by nature. That is to say *change* is unconstrained by any genetic or evolutionary quest for perfection or anticipation of future environments.

Darwin’s writing is careful not to imply benefits conferred by evolutionary “selection for” better and more perfect traits, as opposed to ‘selection’ against traits which would interfere with procreation. For Darwin and many current theorists, evolutionary “adaptation” is best understood as the ability to be plastic and change with the changing demands of the environment. This is very different from Galton’s predetermined transmission of greatness, and Spencer’s innate Survival of the Best and Most Perfect. Indeed, perfection is explicit in Spencer’s writing: “The well-being of existing humanity, and the unfolding of it into this ultimate perfection, are both secured by the same beneficent, though severe discipline, to which the animate creation at large is subject; a discipline which is pitiless in the working out of good; a felicity-pursuing law which never swerves for the avoidance of partial and temporary suffering. The poverty of the incapable, the distresses that come upon the imprudent, the starvation of the idle, and those shoulderings aside of the weak by the strong... are the decrees of a large far-seeing providence...” (page 322).

Prior to the invention gene, there was no known mechanism for the transmission of traits as theorized by Darwin. Mendelian genetics was rediscovered after Darwin published his theory of long-term environmental pressures on heritability. Moreover, “fitness” and perfection of the species has nothing to do with Darwinian evolution. If a trait didn’t kill you before you procreated, it persisted. This is all there is to Darwin’s selection by nature.

The erroneous views of evolutionary-based eugenics and a self-perfecting “survival of the fittest” predominate in our understanding of the principles of evolution, and influence concepts of social and individual development in the United States. According to historians of modern psychology, “because Spencer’s views were compatible with the American ethos, his philosophical system influences every field of learning” (Schultz & Schultz, 1996).

The greater impact is that these views of nativism and evolutionary preprogramming are tied to fixity and predetermination. These ideas erroneously suggest the individual is at fault for behavior that does not mirror the socially adaptive norm. In this evolutionary perspective, socially accepted normative values determine what is considered “adaptive” and therefore “healthy”. This belief that those things which exist have an important basis in evolutionary

development gives rise to modern “just-so” (Gibson G.,1999) theories. For example, maternal instinct, male-dominance, and the adaptive survival for the most fit, which in turn justifies war, suppression, and doctrines of self/other separatism, which support most, if not all, existing human rights violations (Buss & Malamuth, 1996). For example, because women are the caretakers we assume that it is adaptive and that they must have maternal instinct.

As previously discussed, eugenics is a social philosophy which advocates the improvement of human hereditary of traits through various forms of individual breeding. The promoted goals have variously been to create healthier, more intelligent people, save society's resources, and lessen human suffering. While earlier means of achieving these goals focused on selective breeding, modern methods focus on preimplantation and prenatal testing and screening, genetic counseling, birth control, *in vitro* fertilization, and genetic engineering. Opponents argue that eugenics is pseudoscience, as well as being ineffective and immoral. Nonetheless, historically eugenics has been used as a justification for all manner of coercive state-sponsored discrimination and violations of social justice, such as forced sterilization of individuals with genetic defects, the killing of the institutionalized and, in some cases, genocide of races perceived as inferior. From its inception, eugenics was overtly supported by intellectuals as diverse as Alexander Graham Bell, George Bernard Shaw, and Winston Churchill. Its nativist values have been, perhaps inadvertently, supported by members of the modern academic and scientific community, such as Conrad Lorenz (1940), Sigmund Freud (1933), David Buss (1999, 2004), Herrnstein and Murray (1994), and countless others.

It is widely believed that the reputation of eugenics in the American scientific community started to waver in the 1920's and '30s, when Ernst Rüdin began incorporating eugenic theories into the racial policies of Nazi Germany. The direct link between Rüdin and American social Darwinism is clear (Weber, 1996). He was influenced early on by his brother-in-law Alfred Ploetz, who propagated the ideas of Social Darwinism and "racial hygiene" in the 1880's. Ploetz first proposed the ideology of racial hygiene in 1895, in his "Racial Hygiene Basics" (*Grundlinien einer Rassenhygiene*), fifty years after Spencer began publishing his social ideology (Proctor, 2000).

In 1905, Ploetz founded the German Society for Racial Hygiene (*Deutsche Gesellschaft für Rassenhygiene*) which had between 300 and 400 members, primarily academics advocating for eugenics. As an extension of the work of Spenser and his interpretations of social evolution, Ploetz proposed technocratic selection to reach a better and more perfect society. The term technocracy suggests the proposal of a steady-state, post-scarcity economic system. It is intended for industrialized nations with sufficient natural, technological, and human resources to produce an economic abundance. That is, through the scientific control by government of human action it is believed it is possible to engineer a Utopia (Fox, 1985).

To employ this vision of human perfection, Ploetz suggested that we employ a panel of doctors to decide if infants were fit enough to live or should die. Healthy parents could simply use morphine to accept their doctor's decision and their disappointment, and have another child without problems. One of Ploetz's students, Fritz Lenz (1887-1976), wrote about Ploetz's ideas. Adolf Hitler then used these ideas after reading Lenz's work and included them in "*Mein Kampf*" directly referencing Lenz and Ploetz. He also referenced many American Social Darwinists and eugenicists from the turn of the century through the 20's. Ploetz himself considered his ideas as utopian, and indeed much of Hitler's ideology was based on active intervention, as a means to engineer this utopia. Later due to Ploetz's synergistic

interaction with the German *zeitgeist*, he was backed as a spokesman for German medicine and was rewarded with a university chair by Hitler.

There is a direct relation, not only between physical infirmity and eugenics solutions, but mental defects as well. Rüdin developed the concept of "empirical genetic prognosis" of mental disorders, and published his first results on the genetics of schizophrenia in 1916. From the 20's through the 40's Rüdin was employed as director of the Genealogical-Demographic Department at the German Institute for Psychiatric Research. Rüdin worked at the Institute along with Josef Mengel's mentor Otmar Freiherr von Verschuer.

This institute was founded by the discoverer of *Dementia praecox* and father of clinical psychology, Emil Kraepelin (Eysenck, 1995) who believed the basis of all mental illness was strictly biological. This is interesting in contrast to his contemporary, Adolf Meyer who advocated for a psychobiological basis for illness. For Meyer mental illness was seen as an interaction between constitution and environment in which the key role, and the only treatable one, was that of environment. Instead of biological disease terminology, Meyer spoke of reactions and interactions. This suggests that it is neither lack of exposure to ideas of interconnectedness nor the intrinsic difficulty in furthering and employing these concepts that is the heart of the problem. Rather, a historical perspective of this debate affords us the opportunity to examine what in our Western value system supports the underlying divisive, separatist perspective on which these ideas are founded.

The National Socialist government endorsed Rüdin's work throughout their administration, of which Emil Kraepelin was a member. Nazi mental health policy was directly impacted by Rüdin and in 1934 he prepared the official commentary on the "Law for the Prevention of Genetically Diseased Offspring." The synergistic connections between Rüdin, eugenics movements in the U.S., the department to National Socialism, and the moral *zeitgeist* can be understood as a cause for the critical attitude towards psychiatric heritability in Nazi Germany (Barondess, J. A. 1998, Proctor, 2000). Also, Rüdin's ideas are based on a long history of preferring theories involving fixity, self/other dichotomies, and separatist ideologies, such as those theories from early American psychologists, such as Spenser, Goddard, and Thurman.

Similar to Galton's theory, Hitler believed that our artificial society had caused man to drift away from perfection of natural evolution and left unchecked, a class war would sooner or later condemn both workers of the underclass and the higher ruling classes, to ruin (Hitler, the Second Book, 2003). It was necessary to intervene in human breeding to check the undesirables' growth, and to set evolution back on the right track. The differentiation of undesirable-other and desirable-selves may be a core value causing the atrocities of war, torture, and genocide. According to eugenics, correct breeding, however painful to achieve, would lead us back to the utopian path with nature driving evolution toward perfection, to which *we* were innately entitled and predestined (Proctor, 1988).

If the us/them and self/other separatism is a key element of the Western value systems (whether dichotomized for the self-contained individual or at the community level), then this separatist view deserves careful consideration. From pre-Nazi Germany to modern Iraq, the 20th century was a time of unprecedented violence (Parenti, 2000). According to some estimates, in that 100-year span more than 200 million people were killed in world wars, government-sponsored persecutions, and genocides (Gilbert, 2001). If we can understand the dynamic origins of this history of violence, perhaps similar atrocities can be prevented in the future.

In “Utopia and Terror in the 20th Century”(2005), Vejas Gabriel Liulevicius traces the violent history of the Nazi era to roots in the American war against England and the French revolutions claims of individual freedoms. After the post-WWII period, both the public and the scientific communities in the West associated eugenics ideology with the atrocities and failures of the Nazi experiment. Thus, these previously held beliefs were publicly eschewed, but were privately maintained. They became couched by euphemism in public discourse. The term “eugenics” was replaced by “enforced racial hygiene”, “human experimentation”, and the “extermination of members of undesirable groups including the ill and the innately inferior stock”. Now these terms have reappeared in theories of biological determinism, and evolutionary preprogramming. Developments in genetic, genomic, and reproductive technologies at the end of the 20th century have explicitly raised many new ethical questions and concerns about what exactly comprises the meaning of eugenics and what constitutes its ethical and moral status.

HISTORY OF AMERICAN EUGENICS

Taken to their logical conclusion at the turn of the century, “fixity” and predetermination fueled the eugenics movements in the US, and twenty years later directly influenced political movements in Germany. Many respected (particularly American) intellectuals strongly advocated for eugenic based public policy and these theories had international impact since the US had become the forerunning influence in establishing Psychology as a scientific discipline (Schultz & Schultz, 1996). Examples of eugenics policies are: forced sterilization and segregation of the mentally and physically infirm, euthanasia for the old and diseased, elimination of social and welfare programs, IQ testing and track-oriented education as opposed to remedial systems, removal of funding for all reform programs for criminals, and elimination of rehabilitation for addicts. Seen as unavoidable, innate, and preprogrammed disorders, these social problems were and are overtly blamed on the individuals (Spenser, 1852; Galton, 1865, 1868, 1892, Thurman, 1916; Goddard 1913; etc). There is no reason to fund prevention or remediation for an individual or group that is inherently and -- as understood by theories of fixity - permanently defective.

A Yale study tracing the American breeding movement indicates that large scale state sanctioned sterilizations were carried out in the United States throughout much of this century. Beginning with the first state eugenics law in Indiana in 1907, 27 states employed forced sterilizations which continued until the 60’s, and were ended as a result of successful court challenges fueled by the civil rights movements.

It is untrue, despite modern assumptions that American eugenics was on the decline during the 1920s. New research indicates that while overtly waning, support was still strong in the US through the 30’s and 40s (Sofair, & Kaldjian., 2000). By 1944, legally mandated sterilizations had been conducted on 40,000 of our inferior stock who were genetically tainted via the demonstration of some objectionable trait. From 1944 to 1963, another estimated 25,000 of the defective and “feebleminded” were also sterilized by law. If there is any question of the impact of the American eugenics movement on Nazi ideology the following quote may dispel some doubt. In 1924 in *Mein Kampf* Hitler wrote: “There is today one state,

in which at least the weak beginnings toward a better conception are noticeable. Of course, it is not our model German Republic, but the United States.”

GERMAN AND AMERICAN PSEUDOSCIENTIFIC SYNERGY

It is currently accepted that these eugenics movements originating in the United States are directly traceable to Social Darwinist perspectives and the belief that science could engineer heredity. Breeding practices for individuals then could solve all manner of social problems. Poverty, moral decadence, crime, venereal disease, homosexuality, sexually wonton women, tuberculosis and alcoholism could simply be bred out of society. As indicated by a recent review, “the comparative histories of the eugenic sterilization campaigns in the United States and Nazi Germany reveal important similarities of motivation, intent and strategy” (Sofair, & Kaldjian., 2000).

German and American eugenics advocates both believed science could solve social problems. This faith in technological and hypothesized future scientific development to cure our system-level problems persists today. While, we also hope that scientific development will cure biological diseases and improve the human quality of life, we must not begin to plan on a scientific bail-out. Nonetheless, many trust that global warming; the energy crisis, starvation and overpopulation will be cured by future scientific advancements.

Another interesting parallel between historical German and American eugenics is that both also tended to measure the worth of the individual in economic terms. Mental and physical illness was considered a grave threat to social economics, and thus necessitated compulsive sterilization. The argument was and is framed in terms of the contributions made to society, which are usually effectively measured in monetary value. According to Malthus, Spencer and Galton, the rich should be encouraged to breed. This is because we assume the person of wealth and eminence is more adaptive, more perfect, and therefore more valuable. Behaviors which support wealth building are then considered more important than any traits or behaviors exhibited by the poor, even if those traits and behaviors improve filial relationships, social interactions, community building, and any other myriad of potential human values. You are rich, eminent, and noticeable by society for some reason which is self-validating, and in some manner this circular argument proves you deserve the good fortune. This is not very different from the value system we are currently exporting to the rest of the world, which is one that supports the proliferation of self-interested materialism, individual consumption, and big-box capitalism, at the cost of human quality of life and social responsibility.

Nazi claims of Aryan superiority are seemingly well understood, but their influence on Western values is less so. Hitler’s second, unpublished book (2003), indicates the eugenic necessity of future war with the US. What is surprising is that this war, according to Hitler, was inevitable and unavoidable because he believed all of the most ambitious and strongest Europeans were immigrating to America. This would most certainly lead to America breeding a stock of mankind that was superior to those bred from the weaklings left behind in Germany. There does not seem to be any specific Jewish plot that Hitler is trying to foil. His Social Darwinist model of history does not require any Jews at all. Hitler did not care about the perfection of any (mongrel) race however it was achieved, just that *his* nation was the

foundation leading to future perfection of the human race. If there was nothing in it for *us* (Germans), there was nothing beneficial in *them* (Americans) evolving toward human perfection.

Interestingly, U.S. advocates of sterilization were vocal in their concern for the survival of “old-stock” America that was being threatened by the influx of “lower races” from Europe. Margaret Sanger in “A Plan For Peace” (1932) recommended birth control as a means of negative eugenics to achieve what the Nazi’s had set out to accomplish. She advocated for “a stern and rigid policy of sterilization and segregation to that grade of population whose progeny is already tainted or whose inheritance is such that objectionable traits may be transmitted to offspring”. Sanger founded Planned Parenthood for this purpose. She also believed we should “keep the doors of immigration closed to the entrance of certain aliens whose condition is known to be detrimental to the stamina of the race, such as feebleminded, idiots, morons, insane, syphilitic, epileptic, criminal, professional prostitutes, and others in this class barred by the immigration laws of 1924”. Finally, in reference to the Nazi eugenics plan she says, “The campaign for birth control is not merely of eugenic value, but is practically identical with the final aims of eugenics.” It was not the ideas fueling Nazi atrocities that Sanger found questionable and “sad”, it was the methodology.

This intellectual harmonization is perhaps representative of German admiration of the US and vice versa. America noticed Germany as well. In a landmark eugenics case in 1926, Supreme Court Justice Oliver Wendell Holmes said “It is better for all the world, if instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind.” Rulings such as this, affirmed the rights of the state to interrupt the transmission of objectionable traits from tainted and inferior stock across generations.

In 1936 the first German sterilization law went into effect and was written by an American eugenics researcher, modeled on American laws (Barondess, 1998). Canada also enacted compulsory sterilization laws as did France, Norway, Finland, Sweden and Japan. A year after Hitler became chancellor; editors of the *New England Journal of Medicine* wrote that Germany was “perhaps the most progressive nation in restricting fecundity among the unfit.” These examples and many more indicate that active acceptance of eugenics, by the American political system and academia, persisted well into the 1940’s. Indeed the German’s on trial at Nuremberg cited American eugenics laws in their own defense, as well as the words of Holmes, at their trial.

Perhaps it is not an accident that there are several overlaps between the early “human genetics” movement that came to be known as “behavioral genetics”, and what had been called eugenics. For example, beginning in 1949 Verschuer, Mengele’s mentor, after escaping prosecution, held honorary memberships or appointed affiliations with several fledgling international genetics societies: the American Society of Human Genetics, Institute of Human Genetics, Italian Society of Genetics, Anthropological Society of Vienna, Japanese Society of Human Genetics, etc.

In 2001, as reported in the bulletin for the Center for Genetics and Society, the professor emeritus at the University of Ulster called for “rethinking our opposition to eugenics.” He said “what is called for here is not genocide, the killing off of the population of incompetent cultures. But we do need to think realistically in terms of ‘phasing out’ of such peoples... Evolutionary progress means the extinction of the less competent.” The social uses of genetic modification through biotechnology are appealing to modern eugenicists. Steve Sailer, the

head of the Human Biodiversity Institute said in 2005 that "Americans should be biased in favor of the welfare of our current fellow citizens over that of the six billion foreigners." He argues that white people are too idealistic and self-sacrificing for "explicit white ethnocentrism" to succeed. In *Redesigning Humans: Our Inevitable Genetic Future* (2002), Stock extols the virtues of our future abilities to program human evolution. Even some biopolitical liberals advocate the use genetic engineering, as a means of empowerment of the people, arguing that we should embrace the science and the promise of forthcoming technological salvation from social ills (Hugues, 2002).

The question becomes: What is in about the value system in the United States and the West in general, that gave rise to the popularization of the modern eugenics movements which predate and influence Nazism? What underlies an academic inquiry that supports these views? In the United States, what core value system influences an enculturation process that takes such a diverse set of individuals, inculcating, unifying and motivating them toward individualistic, as opposed to communal, social action?

SYSTEMIC BASIS OF PSYCHOBIOLOGICAL ILLNESSES

This individualistic, nativist, and Social Darwinist perspective is theoretically no different from the many common perceptions of illness. Some disorders are more acceptable because they are beyond the control of the individual, and thus deserving of social support and intervention. Those behaviors, that the individual alone should be able to control, are not the responsibility of the society. Biological illness, such as cancer, is considered an unfortunate event, while a mental illness such as depression is a laziness of mind that can and should be overcome with personal effort. Research documents that an individual is more likely to be perceived deserving of support and intervention if a given disease is labeled with a name that is seemingly biologically based (e.g. Myalgic Encephalopathy), as opposed to a syndrome (e.g. Chronic Fatigue Syndrome) that could be perceived as more psychogenic (Jason & Taylor, 2001). Chronic biological illness and deformity is also often treated with discomfort and embarrassment, particularly because it is often perceived as something about which nothing can be done. It is accepted that all illnesses are psychobiological and something clearly should be done to eradicate the psychobiological illness and congenital defects, whenever possible.

Health differences, whether perceived to be physiologically or psychologically based, are discomfiting for others and are always seen as social deficits, whatever the opinion and actual experience of the individual with the difference. For example, few autistic children mind being left alone to over-interact with objects and under-interact with humans. It is their parents and society at large that push for behavioral change, with much frustration exhibited on the part of the autistic child to these efforts to "correct" their "defects". How much we will intervene or perceive an illness to be socially acceptable is, in part, a product of how extensively the *other*, unhealthy individual is implicated in their own (socially defined) defect/difference, and how fixed and predetermined we believe to be the outcome.

The stigma attached to both mental illnesses and biological defects bares consideration here, since from a true systemic perspective, diseases are always a product of reciprocal, bidirectional and continuous interaction between all levels of biology, individual cognitive

processes, and all levels of environmental and social factors. The Stress response is an example. It is conceptualized as a biological, psychological, neuroendocrine, cognitive, environmental, cultural, and social process, and is implicated in all manner of psychobiological illnesses. Infant experiences and psychobiological interactions are now implicated as well in future stress responsivity (Gunnar & Barr, 1998; Gunnar, Bruce, & Hickman, 2001).

While we could potentially blame the individual for poor stress management, a connectivist, psycho-bio-social or ecological perspective of interconnectedness would identify dynamic systemic causes and solutions to this problem (e.g. the 60 hour work week, consumerism, fast-food culture, messages in mass media, etc.), in addition to person-centered solutions (e.g. time management, stress reduction techniques, and positive thinking, etc.).

Another example of the psychobiosocial influences on health comes from new research on the heritability of diabetes. It is now known that the experiential effects of starvation and malnutrition, such as during the Irish potato and Dutch famines, are transmitted to offspring. The metabolic changes are transmitted across generations from grandparents to children (Hales & Barker, 2001). An example of these fetal origins of adult disease is type-two diabetes, which is more prevalent in children and grandchildren of women who were malnourished during pregnancy. These changes are not transmitted in a simple genetically inherited program, but rather there is a basis to suggest that gross systemic influences, in this case of poverty, have long term consequences for generations of physiological development. In this case it is considered *in utero* effects on a change in food metabolism persisting over generations, which cause greater intolerance to high-fat environments. The best research is not, indeed, reductionist to the caricature of one cause/one disease but a recognition of the complexity that only probability can help us to describe for the convergence of factors.

More importantly we must distill our deeper values of quality of life. Even in the highly individualistic Western traditions, most people identify family and community interactions as of primary importance. If this is true, self-contained capitalistic, individual values do not further self-satisfaction even from the perspective of the self-contained individual. Therefore, we may need to realize that this selfish path will continue to lead us to dissatisfaction and interpersonal friction, and not simply as a need for correction of society toward a countervailing value of self versus individual, but as a need for a shift in what truly underlies the possibility of interconnected, communal activity (Brüne, 1998).

An additional example of the stigmatizing nature of the Individualistic perspective on the level of social illness can be found in the perpetuation of the myth of the “welfare queen.” This view of personal failure by an individual (e.g. “feble-mindedness”, ignorance, lack of a positive work ethic, moral weakness, etc.) is still seen by many to be a true representation of poverty for single mothers living in the ghetto or barrio (Henry, Reyna, & Weiner, 2004). The developmental perspective highlighting self-determination and self-responsibility, as opposed to one rooted in the systemic nature of poverty, causes us to blame individuals and withhold social support. The more difficult alternative is to identify the ways in which the larger social systems cripple interconnectedness, and its attendant values of egalitarianism, humanitarianism, and appeals to collective social responsibility. Conversely, and perhaps more importantly, it indicates the necessity of actively denigrating and discouraging those perspectives which emphasize the self-contained individualism, as opposed to ensemble individualism and systemic interactions.

Addressing psychobiological health issues from a perspective of interconnectedness may require a reconceptualization of human rights, as well as a redefining of the individual. Forced sterilization for the disabled is not in our distant past, according to the reports on the “Ashley treatment.” The parents of a developmentally disabled girl had her growth medically stunted and her breasts and uterus removed. This was done to spare her from future discomfort (Gunther & Diekema, 2006). According to human rights activists, due to the presentation of developmentally disabling outcomes, she is not considered entirely human and not entirely availed of inclusion in the right afforded the human community. Some argue that Ashley was inappropriately divested of her individual rights since she is disabled.

This is a complicated issue, and the debate about whether or not this was the appropriate choice, or even a choice for the parents and committee of doctors to make, is beyond the scope of this article. However, it is interesting to note that the “basic human right” to one’s body is usually aligned with civil liberties, and is supported on the basis of individual and personal freedoms. Could we perhaps see this as the right of the community to be free of the mutilation of little girls? Or also perhaps it could be said that we dehumanize people by defining them as a set of rights, and that rather than dichotomize self and community, we could simply decide we don’t want to live in a world with atrocities and make it our goal to work to remove them. Would it be less meaningful to say that a community’s lack of access to “effective health care” is unacceptable, as opposed to saying individuals are entitled to a “right to health”?

It could be argued that were “effective health care” the goal, we would be more efficient and effective than attempting to address “rights” on an individual basis. For example, a woman may be acknowledged as having a legal right to health according to an international treaty or local constitution. Whatever the legislation, does she have that right in any meaningful way if that individual “right” may only be exercised as a result of: the whim of her husband, the allocation of family resources, the geographic location of hospitals, culturally accepted devaluation of women, her socially trained passivity, state and national norms for healthcare and the treatment of women, or international norms of American non-intervention in authentic human rights violations? In this case, what is to be said of the legal “rights” of the individual? Clearly, this is not just an issue of individual rights. Perhaps individual rights are just a byproduct of an illusion from Western self-contained Individualism. How would these issues change if reframed in terms of interconnectedness? It is argued here that these issues (individual rights) would be enhanced by addressing them from a basis of communal responsibility. Without dichotomizing the community and the individual, it could be argued that it is not the right of a given woman to have access to healthcare, but rather the responsibility of the community to provide all women with access to effective health care. Perhaps we need to begin to speak in terms of “social responsibilities” as opposed to “individual rights”.

It could be argued that we need to expand our understanding of human rights, viewing them from the perspective of interconnectedness and as inclusive of the values of egalitarianism, humanitarianism, and social responsibility, rather than individual entitlements. Community responsibilities and individual entitlements are not mutually exclusive, neither are the needs of the community and the individual counter-veiling values vying for support and balancing each other. From the perspective of interconnectedness, the role of the individual is *necessary* but not *sufficient* to the development and maintenance of a healthy social system. Moreover, there is much more to the various levels of community and their

interactions than allowed for in the reductionist dichotomy of self versus community. For example, it is unclear in this dichotomy, which level of and which aspect of community it is that we are discussing. For these reasons, describing human rights in terms of individual rights may be a reductionist notion, and a stanchion of self-contained individualism and its attendant problems.

Development, whether for the individual system or a community system, is a much more plastic, complex, and reciprocal process than the movements rooted in Social Darwinism and the eugenics of the 20th century would suggest. Surprisingly, these reductionist and deterministic views are not an antiquated part of the distant past. They are current issues informing public policy today.

FROM EUGENICS TO EPIGENETICS

A similar example of the impact of the “fixity” inherent to self-contained individualism is provided by genetics. In the retraction published by the Human Genome Experiment in 2000, they admitted what many geneticists already knew and freely acknowledged - they had not identified a single one-to-one relationship between a gene and the expression of any personal trait, physical disease, or behavior. Moreover, they admitted that this finite relationship between traits and genes could not be found (Human Genome, 2001). Indeed, and in true reductionist fashion, many scientists now suggest that it may be the enfolding of proteins, produced by genes, by which the traits, disease and individually expressed behaviors are generated. However, not only are genes not the instructions and codebook for development, they do not cause developmental events (Blumberg, 2005; Gottleib, 1976; Lewontin & Franklin, 1970; Moore, D., 2004).

Similarly, it has become popular to discuss an environmental role in “turning-on” genes, but if in this model genes still hold the role of primary programmer then this is not an accurate depiction. If genes aren’t the program, what do they do? We know what genes do; they code for proteins. How those proteins unfold, into one of the many possible and almost infinitely complex shapes they take on, is still mysterious. What we also know is that it has nothing to do with alleles on hypothesized genes (Moore, 2004, Lewontin & Franklin, 1970).

The mechanism for heritability of the individual and the larger society remains as much a mystery in our day as it was for Darwin. Moreover, the discovery of several processes underlying developmental events, such as the inheritance of structural changes in ciliates such as *Paramecium*, call genetic preprogramming into question. Genetically identical cells show heritable differences in the patterns of ciliary rows on their cell surface. The patterns of cilia, physically and mechanically altered in the laboratory experiment, can be transmitted to daughter cells with no changes in gene sequencing. It seems existing gross structures act as templates for new structures. Again, the mechanisms of such inheritance are unclear, but reasons exist to indicate that multicellular organisms also use existing cell and systems structures to assemble new ones - without any modification of the DNA sequence.

New developments at the beginning of this century and the end of the last have challenged the prevailing notions of genetic determinism (Lewontin & Franklin, 1970), and have also begun to replace the adjective, epigenetic with the verb, epigenesis. The systems models now emerging and gaining momentum are based on an interactionist perspective of

coactional, reciprocal events in which the entire developmental manifold is participatory. It is the concatenation of the entire developmental cascade which determines future developmental states, as opposed to a fixed preprogramming of a single, finite, and closed system.

There is an emerging scientific consensus on what can be considered exclusively caused by genes, and the current conclusion is: nothing. It is now often conceded that what we perceive to be an inherent defect is more a matter of sociocultural values and the zeitgeist in which a given “defect” is embedded and presents itself. What appears to be a defect of genetic origin in one context may not be perceived as such in another environment. This is the case for genes with a heterozygote, such as sickle cell anemia or Tay-Sachs disease. In their heterozygotic form, they may offer an advantage against, respectively, malaria and tuberculosis.

Differences in non-genetic based variability of developmental trajectories and acquired differences is illustrated by the breadth of developmental outcomes (or multifinality), of several complex developmental events, such as the appearance of secondary sexual characteristics (Moore, 1994), intelligence (Bruer, 1999), and language acquisition (Bateson, 1894). As opposed to an unfolding of preprogrammed developmental events, scientists are now proposing that processes of epigenesis underlie all developmental interactions, which impact future events, as well as the development at all levels of interacting systems (Blumberg, 2005; Gottleib, 2000; Lehrman, 1997; Michel & Moore, 1995; Moore, 2000).

There are additional difficulties in labeling phenotypic outcomes as defects. People can succeed in life with “disabilities” and our intellectual heritage is replete with examples of those with psychobiological differences making important, unique contributions to human knowledge. For example, Neils Bohrs was an obsessive-compulsive and John Nash experienced frequent psychotic breaks. Einstein was at least heavily socially impaired and DaVinci is considered by some historians to have had dyslexia. Beethoven had tinnitus and became deaf, and the list of mental disorders evinced by historical *originators* in the field of psychology is notable (Okasinski & Porter, 2006).

MISUNDERSTANDING BIOLOGICAL HERITABILITY

Many of the conditions early eugenicists identified as (biologically) heritable, such as pellagra, are currently considered exclusively attributable to environmental conditions (also inherited). Now it is difficult to imagine attributing this disorder, caused by dietary deficiency of vitamin B3 and protein, to biological inheritance. However, at the turn of the century, it seemed obvious that the poorer people were, the more likely they were to have pellagra. Since pellagra clearly ran in families and parents usually passed the disease on to their children, it was widely considered to be acquired by genetic inheritance at birth. It did not improve matters that institutions such as prisons, asylums, and orphanages had a great deal of pellagra among inmates. The disease causes skin rashes, mouth sores, diarrhea, and if untreated, mental deterioration and death, which made it an object of fear and distaste and caused it to come to attention of the U.S. government.

The pellagra epidemic of the 1910's motivated a federal investigation. Joseph Goldberger was assigned to research the subject and he concluded that the disease was neither infectious nor biologically heritable as feared and assumed, but strictly a matter of diet brought on by

increasing economic hardship and widespread famine, in turn brought on by draught and the destruction of viable harvests. Many accounts portrayed the disease as communicable and biologically heritable despite early evidence to the contrary. However, an insightful essay by Chris Leslie shows that assumptions of genetic determinism hindered efforts to understand and treat pellagra (2002). This is a clear example of the tendency to blame individuals for system-level problems; however it is also clear that no fruitful information was yielded by blaming individual biological deficits. Similar concerns have been raised when an identification of a congenital disorder leads to abortion via preimplantation or prenatal genetic diagnosis. The multiple interactions leading to a given developmental outcome are still largely unknown. What we do know of the interplay between complex epigenetic events suggests only caution and restraint when extrapolating from individual developmental processes to social theory.

So, other than a foray into interdisciplinarity, what can the topic of genetics add to the discussion of bridging systems research and intervention in Community Psychology? Despite the multiple allures of reductionist perspectives, these lines of research and their theories rarely yield correct interpretations of the facts. Life is a set of complex interactions which are poorly and inaccurately reduced to individual parts. Moreover, it should be noted that the new eugenics arena is the genome and biological determinism. The implications of behavioral genetics and nativist evolutionary perspectives for public policy, have led to a resurgence of eugenics and Social Darwinist perspectives, which in turn reinforce our simplistic desires to blame other people for their circumstance. Unfortunately, like most or all oversimplifications, genetics is no panacea for explaining developmental outcomes (Lewontin and Franklin, 1970, Wilmot, 2000) and is best understood from the conversely plastic and interconnected perspective of psychobiological dynamic systems theory.

FROM EPIGENETICS TO EPIGENESIS

Epigenesis, as distinct from epigenetics, is the traditional term describing development from embryonic morphogenesis, in which the dynamic environmental manifold guides increasing complexity, and where cells, tissues, organs, organ systems, and organisms are formed *de novo* (or as beginning anew in a self-organizing system each time life recreates itself).

This principle is seen as in contrast to, and direct conflict with fixity, preformationism, and genetic and evolutionary determinism. While the process of genetic interaction and cellular differentiation is seen as *necessary* to epigenesis, it not *sufficient* to explain inheritance from one cell (genotypic) generation to the next, or from one individual (phenotype) generation to the next. Indeed this is what makes somatic cell cloning possible, because of processes of epigenesis, a normal organism can be recovered from a differentiated cell nucleus. Because cell differentiation requires the process of epigenesis, a somatic cell can be seen as *totipotent* (having the potential to develop any of the possible types of differentiation), with deep implications for the nature of heredity.

Epigenesis is more than (but can be most easily understood as) the study of *inheritance* as a concatenation of developmental events in a cascade of a set of multiple, reversible changes in development. This genesis is often focused on processes underlying the recognizable

organismic (phenotypic) changes that occur without a change in DNA sequence (genotype). Changes may occur spontaneously, in response to macro-environmental factors, such as in the example of the paramecium, in response to the presence of a particular micro-environmental pressure, such as a given allele as in Tay-Sac's, due in part to hormonal or other chemosignals, such as the climbing movement of Purkinje cells in brain development (Hodgkin and Huxley, 1952), as a consequence of the properties of the inter or intrauterine environment (Michel And Moore, 1995), "external" familial environment (Bronfenbrenner, 1977; Sameroff, 1977), or via community or social factors (Kelly, 2006; Sampson, 1988), whether or not the environmental influence is present for subsequent generations (Hales & Barker, 2001).

Epigenesis, Epigenetics, and genetic determinism are distinct ways of describing development and seeking to explain the development of organic systems and their levels. In epigenesis individual development can be seen as beginning with unformed tissue, with form emerging only gradually, over time, as a function of the micro and macro-systems interactions in which they are embedded. From the egg and sperm material, as well as inherited micro and macro environments contributed by the parental systems, to the individual zygote, or the specific embryo, the individual does not begin life in any universally preformed, prefixed, or predetermined manner. That is, there is no predetermined form beyond the guiding conditions present in development. Nor is there a point at which its development will ever stop to reach a fixed and final outcome. Therefore, outcomes are only points of measurement, and the determinants can be considered preexisting conditions.

Epigenesis encompasses a theory of development in which the organism is seen as beginning from an inherited egg and sperm that are not preprogrammed by genes, but do include genes within them. In this way genes are *necessary* but not *sufficient* for development to occur. Examples of this come from: Ian Wilmut's team's success in cloning Dolly (1997), and Gearhart and Thomson's successes with developing human stem cell lines (1998), and others which challenged assumptions from genetic determinism (Gearhart 1998; Lewontin and Franklin, 1970; Shablott et al. 1998,). The most mature versions of this theory of epigenesis in psychobiological interaction comes from several authors who have consistently challenged theories of individual fixity from a strict basis in fine-grained, psychobiological research on development, such as Blumberg (2001), Gottleib (1976, 1979, 2000, 2001), Lehrman & Rosenblatt (1971), Honeycutt & Lickliter (2001), Michel & Moore (1995), Moore (1981, 1982, 1983) Moore (2004) and many others.

Stem cell research is important here for the very reason that the development of cells is not determined by the genes. Currently most apparent in the blastocyst stage prior to implantation, undifferentiated cells can be harvested and cultured. Because they are totipotent, they have the ability to become any of the possible types of cells. What seems to determine what type of cell they become is governed by mircoenvironmental interactions in which the cell is embedded. For example, where cells are located in the zygote during formation of the initial neural tube, determines whether they become part of the brain stem and spinal cord or some other system or body part (Cowen, 1979; Gazzaniga, Ivry, & Mangum, 1998, Kolb, 1984). Cell differentiation can then appropriately be seen as governed by the interaction of biological matter with a specific environment. We know the most about this dynamic interaction in relation to the location of cell systems in the organism during early embryologic development, in relation to the other cells and the physical and chemo-interactions in which they are enmeshed.

FROM FIXITY TO NEUROPLASTICITY

Historically, the prevailing doctrine in neuroscience and indeed most of biology has led to the belief that the adult human is essentially fixed, hardwired, and preprogrammed in form and functional outcome. This is important because it suggests the development of the brain is unchangeable, and supports the false belief that by the time we reach adulthood we are stuck with the brain structure, and thus the abilities we have previously acquired. However, it is true that the brain does create and lose synapses, based on use and disuse, and degeneration. This neuronal activity impacts the connections between neurons that encode memories and learning (Gazzaniga, Ivry, & Mangum, 1998; Kolb, 1984). The brain and its development can, at any time during these processes, from the cellular levels (cancer) to the gross systems levels (stroke), suffer injury and degeneration. This is acknowledged by theories of fixity, but the deterministic view is fundamentally a localizationist perspective of brain development in which genes and neuronal location dictate function. That is, if one cluster of neurons processes visual signals from the eye and another motor movements of the fingers, they are preprogrammed to do so and unable to do anything else. There is much research that this is not the case. For example, Kaas (1991) has replicated the ability to reprogram the motor cortex. In monkeys, based on the changing available use of their fingers they have shown that the motor cortex in the brain is capable of neural reorganization (Recanzone, Merzenich, Jenkins, Grajski & Dinse, 1992). Brain organization is then based on the competitive use or disuse of the neurological signals sent to that region of the cortex. This indicates a much more plastic view of the brain than ever before demonstrated. Moreover, we have now demonstrated this neural plasticity in several brain regions governing several different senses and behaviors (Aslin, Alberts, and Petersen, 1981, Moore, C. 1981, 1982, 1983)

In humans it is clear that musical expertise (Demany, 1985, Elbert, Pantev, Wienbruch, Rockstroh & Taub, 1995), deafness (Finney, Fine & Dobkins, 2001), stroke (Shepard, 2001), physical loss (Irvine, Rajan & McDermott 2000) and regaining sight (Gilbert and Wiesel, 1992) can cause far reaching and global neural changes. For example, in those individuals who are deaf, the visual cortex is subsumed by language processing (what we would normally consider the function of the auditory cortex alone). Also, probably due to the motor requirements of American Sign Language (ASL), fMRI show language activating regions of the motor cortex in deaf subjects (Sterr, Müller, Elbert, Rockstroh, Pantev, Taub et al., 1998). The blind use the Wernicke's area for processing of visual stimuli. Moreover, these differences in neuronal activity may explain improved perceptual differences in the opponent abilities related to these "deficits". For example, acute auditory processing in the blind (Pascual-Leone & Torres, 1993) and fine tuned peripheral vision in the deaf.

Similarly, we see demonstrated ability for neural reorganization in adults having experienced a stroke or who have lost brain function in surgery or accident. It is possible for these individuals to regain functional ability (language use or motor control) without regaining localized brain function (of injured neurons in the auditory or motor cortex). Indeed in the neurosurgery performed on epileptics this recovery of function is a requirement for the success of the surgery. Conversely, the phantom limb phenomenon in those having lost an appendage, demonstrates the reverse process of a firing motor cortex in absence of direct stimulation of the associated physical correlates (Petitto, et.al., 2000; Nishimura, et. al., 1999). As use becomes transferred and firing of the area occurs during other neural processes,

stimulation of the area associated with the missing limb leads to the experience that the limb is still attached.

These differential processes occur in different neuronal configuration between healthy individuals. In fMRI of musicians, blood flow associated with the neuronal activity in what is considered the auditory cortex is higher than those who are untrained (Elbert, Pantev, Wienbruch, Rockstroh & Taub, 1995). The activity of the motor cortex in those that play an instrument is higher than those who do not. Changes in neuronal configuration of long-term meditators are related to increases in production of Gamma frequency brain waves (Lutz, Lawrence, Rawlings, Ricard & Davidson, 2004). As opposed to any sort of preprogramming, use and disuse in this competitive environment determines brain configuration.

The doctrine of the unchanging human brain has had profound ramifications. For one thing, it lowers expectations about the value of rehabilitation for adults who have suffered brain damage from a stroke or about the possibility of fixing the pathological wiring that underlies psychiatric diseases. Research in the past few years has begun to overthrow this perspective. Conversely, the possibility of neuroplasticity of the adult brain suggests we must reframe our previous ideas of behavior, health, intellect and learning. Similarly, theories of fixity can be seen as a furthering of the nature-nurture (mind-body) duality, in which biology is seen as independent, and indeed playing a primary role in predetermining behavioral processes.

NOTES OF THE NATURE/NURTURE DEBATE

The ancient debate between Nature and Nurture currently plays out in the arena of genetic determinists, which appeal to fixity and determinism through genetic inheritance, while others insist on the efficacy of environmental plasticity. Even if proponents of one factor acknowledges the importance of the other, these traditional views do not often discuss the dynamic systems interactions between biology and environment taking into account foundational principles of systems theories. Is it nature or nurture, epigenetics or preformation, genetic determinism or environment; or is a theoretical version of the dynamic interaction of epigenesis available? There is a dynamic foundational theory unifying these inquiries which shape debates about when life begins, how it proceeds, and how and when we measure outcomes, with profound bioethical and policy implications.

The questions are in part often metaphysical dichotomies: is what exists predetermined by outside forces or due to chance? This is opposed to developmental theories of cell, self, or community, which involve dealing with the messy but more accurate arena of mathematical probabilities. However, we enjoy our finite explanations – those life systems and boundaries that are clearly definable, when quantifiable with simple statistics, and where events are easily predictable.

According to Elizabeth Spelke the true meaning of this research on nativism is the implications of the Divine perfection, according to Blumberg there is something of the reverse perhaps (2005). This should become irrelevant to the mechanisms underlying development or the understanding of the creation of the individual. While all gross interpretations of cosmological theory are unknowable and untestable at this level of experience and at this point in our scientific development, we have a mechanism for

beginning to understanding the complex and probabilistic development of human systems. This is not to say that spiritual meaning is not important to human inquiry and communal development, or that there is no spiritual meaning in scientific research. Proof and disproof of spirituality is not a *necessary* part of scientific discourse here. It does suggest that a spiritual element to ideology is unnecessary to scientific truth, since they must be as interconnected as all interactions from the cell, to the individual, the community, to the species. Moreover, scientific findings should not contradict spiritual beliefs, or rather it can be argued that those beliefs are best thrown out.

Science may often be misinformed in its quest for defining the soul, whether for or against its existence. This is as yet unknowable. When we try to employ science to serve our interpretations of the perfection from the Devine or in service of some future Utopia, we often fall far from the mark (Fox, 1985).

INSTINCT AND HUMAN NATURE

On the level of behavioral organisms we can see and interact with, it has been argued that there are deep academic ramifications of the belief that *instinctual* behavior is innate and preprogrammed. The scientific basis of this belief can be traced directly to Konrad Lorenz (most active from the 1930's to the 1960's) and his influence in directing the future research of ethology - the field he originated. Ethology is the modern study of animal behavior and is impacted by his view that behavior could be consider innate and preprogrammed when it can not be shown that there is some prior opportunity for it to be learned (Lorenz. 1940). This default position assumes that if it is not immediately apparent what is causing behavior or where it originates, it can be considered inborn. If it is inborn: it is innate, preprogrammed, and hard if impossible to change. More importantly this preprogramming usually implies a certain *striving for* perfection which considers those things which exist to be adaptive. This often is employed to support of the *status quo*.

This is problematic because there is much evidence to suggest that this view of human instinct and the origins of human behavior is incorrect. An interesting historical review of the debate between Lorenz and early epigenesists, such as Lehrman (1971, 1974), Beach (1955), and others, can be found in 'Basic Instinct' by Blumberg (2005). He says "Lorenz sought the "inner structure of inherited behavior", the ancient kernels of behavior that reveal the shared genetic heritage of widely divergent species." There is no question, however, that the answers to several behaviors are in the entire developmental manifold, which are not innate to the organism.

As for nonobvious experiences, Gottlieb asks, who would have dreamed that a monkeys' fear of snakes derives from experience with insects, or a chicks pecking at meal worms comes from experiences with their own toes (2001). Indeed, the corpus of Gottlieb's work with duck calls does much to undermine Lorenz's maternal instinct, since it is actually the ducklings experience with it own voice that allows it to make species specific calls, and it is simply early visual stimulation that will cause it to recognize mother. Whether a swan, Lorenz himself, or a blue cylinder, the early experience of the duckling determines who or what this chick treats as though it is (what human's call) its mother. The experiences, necessary for

recognition, can be manipulated by outside forces making it not innate, but rather a product of experience.

While we might expect that experience with mother's voice or the voices of nest-mates would influence the nestlings ability for replicating species specific calls of mother, this is not the case. Oddly, the acoustic properties of its experience with its own voice (necessary to recognize mother and to the ability to make species specific calls) bears little resemblance to those sounds produced by its mother or the rest of the adult duckling species. So, it is developmental experience, as opposed to innate processes, that causes maternal recognition and species specific calls in ducklings, and moreover, it comes from a counter-intuitive and seemingly unlikely source (ducklings experience with there own voice). So, the question becomes: if it is simply learning, how could all members of a species be so similar?

As Hailman writes, "this strongly suggests the normal development of instinct entails a component of learning. It is necessary only that the learning process be highly alike in all members of the species for a stereotyped, species-common behavioral pattern to emerge."(Hailman, as cited in Blumberg, 2005). What this suggests is that many things which seem to us to be innate from birth are in fact probably learned. We only assume they are fixed and preprogrammed because we have not yet investigated and learned enough to understand their developmental pathways, and this is perhaps because we have asked questions which lead us to fixed answers that are not appropriate for open, dynamic systems.

The implications of this erroneous view of preprogrammed instinct support much of modern eugenics-based public policy. They suggest that *man* is the way he is because he was created that way by Nature and or the Devine. Unfortunately, where we once looked to Divine birth-right to explain human differentiation and justify the *status quo*, we now seek scientific rationalization from evolutionary preprogramming and innate biological inheritance.

PRENATAL EXPERIENCE AND FAMILIARITY LEARNING

As previously discussed there are problems with identifying "genetic deficits." The difficulty here is that we have little idea about the interplay of epigenetic factors in most complex developmental events. We know much less about where, wellness and illness, eminence and the absence of greatness, poverty and wealth, or a given evolutionary adaptation originates. For example, some theorists suggest the only common element in an exceptional person is the time spent (5 hours a day) doing the activity that eventually makes one *seem* exceptional (Simonton, 1999, 2001, 2004).

Familiarity born from similarity to *in utero* experience is another aspect of epigenesis guiding future developmental trajectories. Similarity of events to *in utero* experience has been argued as a catalyst for future individual preferences, governing motivation and learning. Infants preferentially attend to phrases and sounds experienced *in utero* (Jusczyk, 1983), and everything from human food preference (Marlier, Schaal, & Soussignan, 1998), neonatal head turn preference cascading into handedness (Goodwin & Michel 1981), the ability to acquire language (Bates 1997, 2003) to our appreciation of Beethoven (Abrams, Griffiths, & Huang, 1998) can be traced to systemic interactions with the environment and experiences prior to birth. Here again, even those things which seem intuitively and obviously innate and

predetermined, are influenced by our psychobiological interactions with reciprocal experience.

For example this is clearly illustrated in research on language acquisition once argued to be innate (Chomsky, 1965). Beginning with an infants preferential attention to sounds and phrases heard prior to birth, this cascades into the pruning which occurs as infants are exposed to their language of origin, and this demonstrates the critical interplay and reciprocal, bidirectional interaction of biology and environment (Bates, 1994). Between seven months and two years of age the infant “tunes-in” to those sounds they have experience in their social surround, and biologically losses the ability to hear sounds they have not experienced (Jusczyk, 1983). What is most interesting is that the infant brain is plastic, born with the ability to tune-in to the panoply of all sounds possible in human languages. It is the social surround however that delineates the individual biological ability to recognize the phonemes, as well as the personal preference for the phrases found in its own environment (Bates, 2003)

Language is not, as Chomsky argues, a preprogrammed unfolding of developmental events caused by a hypothesized “Language Acquisition Device” somewhere in the brain. However, this is evidence of our general lack of information of the implications of attributing fixity to complex and dynamic developmental events. These beliefs have a long history of informing public policy; however, ignorance, of the dangers involved with these inaccurate theories of biological heritability can be found in the anomalous works of Noam Chomsky, who can simultaneously advocate *fixity* and *social responsibility*, without seeing a contradiction in these political and developmental perspectives. Chompsky himself strongly advocates for socialist healthcare and intervention for the disadvantaged (Chomsky 1973, 1981a, 1981b), while also forcefully arguing for the fixity of developmental events associated with Language acquisition. This contradiction suggests that even the most educated and socially aware activists may not understand how their developmental perspectives inform issues of intervention and public policy.

In addition to undermining the Social Darwinist perspective of development, there is another important issue at hand. If we do not reliably know what factors influence development of the most clear cut preferences and abilities (such as maternal recognition and language acquisition), much less more socially defined abilities (such as eminence, poverty, intelligence, creativity, or illness), then we must be very careful before we draw derogatory and stigmatizing conclusions about seemingly impaired individuals. Compassion and empathy is probably a better position, and this is so much more so the case since these perceptions always inform public opinion. If we know so little about the potential interactions causing maladaptive outcomes (i.e. abnormal and untraditional social behavior), and we can guess almost nothing about their evolutionary consequences for the species, how can we begin to marginalize those who are unique?

In addition to being a profound misunderstanding of evolutionary and developmental theory, fixity and predetermination in their many forms (Brüne, 2001), whether intentional or unintentional, inform policy with what are usually grave implications. The positive implications of the dynamic systems perspective are also far reaching. This developmental theory then is a basis for training-out self-contained individualism, and training-in social responsibility and interconnectedness.

CRITICAL PERIODS IN THE FIRST THREE YEARS

Another example of the underpinnings of Social Darwinism in American thought directing perceptions of individual development is the "I Am Your Child Foundation". Founder and actor/director Rob Reiner, suggests there is a *critical period* in which development occurs and that children are "cooked" by three years old (Bruer, 1999). Based on this erroneous conviction, Reiner lobbied during the Clinton administration to end all funding for all social programs for children and adults over three years old. The preprogrammed developmental events had occurred, they were fixed and uncorrectable, and funding was therefore better allocated exclusively to early education. The implications of this perspective are clear cut, and potentially influence all levels of research and intervention.

The problems is that scientific misuse, misrepresentations and misunderstandings often play themselves out in the public policy arena, and this is no exception. In the 1994 paper called "Starting Points: Meeting the Needs of Our Youngest Children" by the Carnegie Foundation, the brain's development between the birth and the first year of life was considered to critical, more extensive than previously thought, and long-lasting. In short, early environment influences how the brain becomes "hard-wired." Carnegie goes on to say these effects may be "irreversible". They advocated that the U.S. make a "national investment" by devoting more resources to early childhood development programs. While this promotion of resources for early education is, in itself, highly positive, the belief that fixity occurs at some point around three years of age and that everyone else is cooked, is unacceptable in the face of the evidence to the contrary and the implications for public policy and popular opinion.

In 1997, Reiner created his foundation inspired by the Carnegie Foundation's report to develop a national campaign to raise public awareness of the preprogramming occurring between zero and three years old. He claimed "It has been determined that a child's first three years are the *most critical* in brain development." He lobbied for Proposition 10 which called for the proceeds of a 50-cent increase in the state tax on tobacco products to be directed toward anti-smoking and early childhood development programs. In 1998, by a slim margin, the measure was passed by Californian voters, and became the Children and Families First Act. Again, while intervention in access to, and targeting decreasing desirability of tobacco products for minors is an honorable pursuit, based on sustaining the premise of fixity in public consciousness it is, at best, inaccurate, and at worst, quite dangerous.

The Zero-to-three campaign entered national politics in 1997 during the White House Conference on Early Development and Learning. The conference held by the Clinton administration, brought together academics, pediatric physicians, and specialists in child development around the topic of the latest developments in pediatric neurology. The conference resulted in several positive policy initiatives: such as the expansion of the *Early Head Start* program which specifically targeted children from ages zero to three and pregnant women, and the extension of health care to millions of uninsured children. However, the cost in terms of education of the public and legislators on the role of fixity on development could be seen as too high a price.

Rob Reiner gave the keynote address and argued that the zero-to-three theory was a way of dealing with "problem solving at every level of society," saying "If we want to have a real significant impact, not only on children's success in school and later on in life, healthy

relationships, *but also an impact on reduction in crime, teen pregnancy, drug abuse, child abuse, welfare, homelessness, and a variety of other social ills* [emphasis added], we are going to have to address the first three years of life. There is no getting around it. All roads lead to Rome." Here again, the contradiction between Reiner's developmental views of fixity and his public policy suggests he may not fully understand the risks he is taking in supporting the fixed model of human becoming.

In 1998, Governor Zell Miller used a copy of Beethoven's Ninth Symphony to theoretically demonstrate these developmental processes. Citing research (conducted on adult college students at Harvard), he proposed a connection between listening to classical music and increased (exam scores) for mathematics and spatial reasoning ability (Chabris, 1999; Rauscher, Shaw, & Ky, 1993). The governor asked for over a hundred thousand dollars to produce and distribute a classical music CD to parents of newborns throughout the state of Georgia. To add some theatrical drama to his proposal, Miller played a few minutes of "Ode to Joy." He asked legislators "Now don't you feel smarter already?.. Smart enough to vote for this budget item, I hope."

It is often argued that for certain functions, neurologists have found a *critical period* of time at which a child must have sensory or motor input. This indicates that if a particular stimulus is not present at that time in early development, the window closes and the opportunity is lost forever. In a famous experiment, two scientists, David Hubel & Torsten Wiesel (1965), illustrated that a kitten, temporarily blinded in one eye would not recover its sight in that eye simply by removing the blindfold and would not develop binocular vision. Instead of indicating that neural function is a production of the interaction between biology and learning and training by the environment, many use this type of research to demonstrate fixity and innate preprogramming of form and function. This is a misinterpretation of the intent and meaning of the work. Indeed the converse is true. In this research previously believed "hard-wired" sensory systems were demonstrated to be open to manipulation and it was demonstrated that environmental stimulation was necessary to normal development of sensory systems. In research from Developmental Psychobiology, experiences are believed to shape basic neural systems, such as those involving sight, hearing, and movement (Aslin, R.N., Alberts, J.R. and Petersen, M.P. (1981). While these ideas are taken by some to indicate a critical period and a time frame in which "hard-wiring" occurs, they better demonstrate that localization of brain function is an inaccurate model of development, and incontrovertible evidence of developmental plasticity, which must be addressed.

The Myth of the First Three Years, by John Bruer, is a popular attempt to redress these established misconceptions about fixity in brain development. Moreover like his academic work "Education and the Brain: A Bridge Too Far," (1997) the book attempts to amend the misconception that development is preprogrammed, is fixed, or stops at a certain age. It is hopeful that there are psychologists and biologists advocating for plasticity and making reparation for the views which blame the individual for their developmental outcomes. His work provides an astute examination of the ways in which recent findings in neuroscience have been misused to imply that we know how to increase the neural connections in a child's brain and ultimately, the child's intelligence. Accordingly the only effect Beethoven or Mozart recordings will have is to potentially cause your child to sometimes prefer classical music (Aslin, Alberts, and Petersen, 1981).

It is interesting to note that Bruer is president of the James S. McDonnell Foundation, which awards \$18 million annually for biomedical, educational, and international research

projects. However, he has no formal training in either neuroscience or child development. This is not troubling since his writing is accurate. What is troubling is, at a systemic level, the affiliation with a non-federal funding institution, such as the National Institute of Health (NIH). That the primary champion in popular culture of systemic causes for developmental events is outside of our politically defined funding structure is of great concern. Our political policy extensively supports funding for genetics and evolutionary determinism, and research supporting theories of fixed development, which is targeting the individual and seeks biologically reductionist answers to problems that are in actuality subject to systemic influences of complex developmental events (Dobzhansky, 1974). The question becomes, why are we as a society more apt to fund research advocating personal blame over social interactions?

IQ TESTING AND EDUCATION IN THE UNITED STATES

These ideas of an innate, preprogrammed unfolding of developmental events have implications for our educational system, and our use of standardized testing. At every level of the United States educational system, progress and failure is based on standardized IQ testing. The validity of standardized tests, such as Stanford-Binet, for evaluating general intelligence has been widely disputed. It is interesting to note that the originator of the Stanford-Binet was Piaget's mentor, Alfred Binet. He originally intended his test to be carried out one-on-one with the child, for the purposes of identifying French school children in need of remedial help - with the intention of mainstreaming them after they received additional tutoring. Binet believe intelligence was a product of training (e.g. the experience of education).

The test was imported to the US by Terman (1916), who assumed that intelligence tests measured innate ability. This was a point of view shared by the other American testers who revised the Binet-Simon scale. Binet disagreed, and while some argue that he believed that there are biologically determined upper and lower limits, he also believed intelligence was significantly affected by environmental influences – so much so that this range usually became functionally meaningless. For example, if you are biologically capable and appropriately socially connected to gain an optimal education (allowing you to receive a score of 140 –genius), but due the experience of relentless neglect and abuse you are unable to take these opportunities (causing you to score an 80 - retardation), then what is meaningful about this biologically predetermined range?

If the tests were measuring a meaningful innate ability, as Terman argued, it was possible to use test performance to make long-range predictions for achievement, based on innate intelligence. This achievement was then seen as a fixed and predetermined outcome, not as a measure of the opportunities afforded the individual through the familial, community, cultural, social, state, and national resources allocated to this individual's education and intellectual growth. However, Binet viewed his tests as diagnostic tools, and developed training methods (called "mental orthopedics") intended to improve learning skills and increase test performance. The implications of and conclusions drawn from these perspectives are of great importance.

Fixity was the implication of Terman's perspective, and this had an enormous impact on how these tests would be used and viewed in the American educational system. While Binet

wanted to target children for remedial education programs, this was done with the goal of improving their academic performance and returning them to mainstream classrooms. For Terman, the interest was our need to identify the retarded for removal from the mainstream classroom (to protect the normal students) and eventual segregation in special institutions for the abnormal. His perspective resonated with the commonly-held views about, what he called, the "menace of the feeble-minded." Reflecting the common misinterpretations of evolutionary thinking of his time, and our own, he believed the problem of "feeble-mindedness" was a symptom of the escalating of degeneracy, due to poor breeding practices. The lower classes were reproducing at a faster rate than those of superior stock, and the inevitable mixing was causing humanity to become mediocre at best. Since, Galton's theories of selective breeding still held wide appeal; it caused Terman and the other American intellectuals to conclude that mental tests could be used to control degeneracy by identifying and removing the defective from circulation in the normal population. The intellectually deficient, once identified, should be moved to a "segregated" "colony" where they would be unable to infect the more valuable population with mental defects.

An extensive list of the problems with the premise of innate intellect, I.Q. testing, and errors in this research is detailed in *Measure of Man*, by Steven Jay Gould. The idea of intelligence tests measuring an intrinsic characteristic, and its central role in the American educational system today belies the underlying perpetuations of these nativist beliefs. While many professors and teachers of psychology will currently acknowledge the many biases in standardized testing, they are still quick to support their continued use. Perhaps it is because there is a subtle, fundamental conviction that being a good test taker (which professors are) means something about the innate intelligence of the individual (that these teachers are smart). Unfortunately this is a sampling error based in poor and biased selection methods, moreover, it has become a barrier to identifying new ways to evaluate and educate our at-risk populations.

There is no effective way to separate servers and change agents, and the people we serve through what we call community intervention, from politics, which we describe as public policy, systemic intervention, and second-order change (Levine, Perkins & Perkins, 2004). Here again, public opinion is shaped by the Social Darwinism of the 20th century. The educational programs of "No child left behind" have led to the closing of low scoring schools and the highest dropout rates in modern American history. Echoes of Thurman's views of innate, preprogrammed intelligence as separate from educational training are reflected in the policy. Current U.S. immigration policy mirrors Goddard's (1913) restrictions at Ellis Island. Multitudes were turned back with the declaration that 85% of European emigrants were "retarded" or "imbeciles" and should not be allowed to mix with and dilute our good American stock; should they already be on American soil, compulsory sterilization and segregation were Goddard's preferred methods of controlling breeding of the tainted undesirables. The decrease in funding for all social services, lack of access to effective health care, reliance on punitive and discriminatory criminal justice policies, over-incarceration and execution of minors, and drug policies that punish and without offering treatment, effectively take Galton's, Spencer's and Goddard's advice to allow the weak to die, restricting them from diluting the gene pool. Like Terman's solution to the "menace of the feeble-minded", the current belief is that *they* should be punished and/or removed from society, as opposed to being effectively remediated and reintegrated (1916).

BELL CURVE

Additional evidence of the popularity and currency of the modern, American eugenics movement, and its influence on the perception of intellectual development is provided by the book sales and rating on the New York Time's best sellers list, of *The Bell Curve* (Herrnstein & Murray, 1994). This text presents original research showing significant correlations between intelligence, and social and economic outcomes. For example, based on 1989 data, intelligence levels for Whites (called the cognitive class) are a better predictor of SES than parents' socioeconomic class. The privileges conferred by society on those who are "White", like all other systemic influences, remains unexamined. The inability of skin color to function as an effective indicator of heritable background, which we often inappropriately considered a suitable designation of "race", is not addressed either. However, racial conclusions are considered as indicative of more than skin color by Herrnstein and Murray, and unless the assumption is that melatonin production is linked to heritability of intellect...in either case, this is an untenable argument.

While this book argues less vehemently and more discreetly than the authors' other work, the repercussions are obvious. If women and people of color are innately less adept and inherently less intelligent than men of European or Asian descent, then we should support the growth of one individual over the other and one group over the other. Murray's other work is more transparent on this point (Murray, 1997, 1999, 2006).

If there is any uncertainty about the implications intended by Herrnstein and Murray's work, it is clarified when they specifically recommend a eugenicist solution in the elimination of welfare programs: "We can imagine no recommendation for using the government to manipulate fertility that does not have dangers. But this highlights the problem: The United States already has policies that inadvertently social-engineer who has babies, and it is encouraging the wrong women. If the United States did as much to encourage high-IQ women to have babies as it now does to encourage low-IQ women, it would rightly be described as engaging in aggressive manipulation of fertility. The technically precise description of America's fertility policy is that it subsidizes births among poor women, who are also disproportionately at the low end of the intelligence distribution. We urge generally that these policies, represented by the extensive network of cash and services for low-income women who have babies, be ended" (p. 548).

Despite quality rebuttal research, two years later, the 1996 U.S. welfare reform substantially cut these programs. In more recent work Murray asks "do we want a system in which the government divests itself of responsibility for the human needs that gave rise to the welfare state in the first place? I think the reasons for answering "yes" go far beyond the Plan's effects on poverty, retirement and health care. Those issues affect comparatively small minorities of the population." Arguing for an end to social programs, and following it by saying that this will impact a small minority, is a ridiculous claim in the face of growing poverty, the vast majority of uninsured Americans, and a quickly aging population. It is also meaningful that he calls for a government that divests itself of the responsibility for the human needs. What else is the role of government, if not to protect the needs of its citizens? Even Hobbs, and many other more cynical intellectuals would disagree with this definition of the role of government. But what is most telling is the "Yes"; we want a government that is

totally uninvolved in social welfare. We do not want those of poor stock to gain social support and proliferate.

In a discussion of the future political outcomes of an intellectually stratified society, they stated that they "fear that a new kind of conservatism is becoming the dominant ideology of the affluent - not in the social tradition of an Edmund Burke or in the economic tradition of an Adam Smith but 'conservatism' along Latin American lines, where to be conservative has often meant doing whatever is necessary to preserve the mansions on the hills from the menace of the slums below" (Herrnstein & Murray, 1994, p. 518). This bares comment since so much of our argument thus far has suggested an intimate connection between the values encompassed by individualism, consumerism, and social Darwinism. Moreover, since Herrnstein and Murray's solutions to this problem are a form of a passive eugenics, which suggests we allow undesirables to sink into the dissipation and destruction that is a product of their own creation.

Herrnstein and Murray fear that welfare will create a "custodial state" in which "a high-tech and more lavish version of the Indian reservation for some substantial minority of the nation's population" will emerge. It is perhaps ironic that the social policy Herrnstein and Murray advocate, which differentially distributes resources to the more or less favorable races (e.g., consumer based health care, economically status-based education, etc.), is the most likely candidate for causing the growing disparity between the rich and the poor that they fear. There is also a certain *Schadenfreude* (or dark humor) in their reference to Native Americans as an example of the problems resulting from supporting the under classes. They clearly believe that readers will see the state of the current native society as a product of their own innate and predetermined shortcomings, as opposed to the devastating effects of dominance by Western culture and what amounts to large scale exploitation, divestment of resources, and disenfranchisement of social rights of America's indigenous populations.

This is an additional indication of the role of individualism impacting political beliefs, which is supported by feelings of entitlement to self-contained personal freedoms. This view does nothing to address systemic reasons for poverty and places the responsibility squarely on the individual. It bears mentioning that in like Galton, Herrnstein and Murray misuse Central Limits Theorem. In additionally to statistical misuses, it also indicates complete ignorance of the biopsychosocial development of intellectual faculties. It is essentially a Social Darwinist perspective, which provides fuel for the modern eugenics movements and capitalist agendas, and espouses Laissez-faire economics, debilitating social programs. It may be no accident then, that as a first world nation we are unique in our lack of federal funding for health care, punitive incarceration without rehabilitation, execution of minors, poor public secondary education, etc, since all of these are also related to ideas of self-determination, and stand in opposition to determination by systemic, reciprocal dynamic interactions.

The Bell Curve had direct implications for our conception of intelligence and policy for education as well. In response to the controversy surrounding the book, the American Psychological Association's Board of Scientific Affairs established a special task force to investigate the implications of this research. The final report was titled "Intelligence: Known's and Unknowns". Their findings largely supported most allegations and extrapolations from The Bell Curve, and concluded that IQ scores (for whatever reason) have high predictive validity for individual differences in school achievement. Moreover, without seeing evidence to the contrary (Cronbach, 1975; Eels, Davis, Havighurst, Herrick & Tyler, 1951; Frisby, 1998; Hilliard, 1995; Jencks & Phillips, 1998; Reynolds & Brown, 1984), they

agreed that IQ scores can effectively predict both educational success and adult occupational status, even when variables such as education and family background have been statistically controlled. More importantly, much like Galton's view of the supremacy of nature over nurture, the APA determined that while these *individual differences* are influenced by the environment as well, intelligence is substantially influenced by genetics. This is additionally important since Central Limits Theorem and reduction to the mean involve statistical theories that are only appropriate to test population means of large samples, and disallow any extrapolation to a particular, tested individual.

Perhaps most importantly, the APA task force lacked in their examination of contradictory research, which indicated that the difference between the races is much lower than reported by Herrnstein and Murray's statistics. They stated that "the differential between the mean intelligence test scores of Blacks and Whites (about one standard deviation, although it may be diminishing) does not result from any obvious biases in test construction and administration, nor does it simply reflect differences in socio-economic status. Explanations based on factors of caste and culture may be appropriate, but so far have little direct empirical support. There is certainly no such support for a genetic interpretation. At present, no one knows what causes this differential." However, failure to examine prejudices in test construction or to consider the extensive biases in access to education is troubling. The inability to recognize that the race should be included in the model as a covariate is additionally troubling.

MECHANICAL INTERACTIONS AND THERMODYNAMICS

All of the evidence from interpretations of epigenesis discussed thus far (e.g. from genetics, to embryology, to neural development across the life span), suggest that development is a radically flexible, plastic, and interactive. For example, immature systems theory in engineering was competent at identifying directly connected and intuitively accessible interactions. The difference between living dynamic systems and mechanical analogies lie in the simplicity that allows for predictability. In a mechanical system there are several fixed, preprogrammed and predictable properties of what can be seen as a relatively *closed* system. To achieve a functioning expectation for the future behavior of a mechanical system (e.g. a locomotive or an automobile), it is not necessarily required that one appeal to the properties of thermodynamics which are involved in the dynamic properties of *open*, complex systems interactions (Feynman, Leighton, & Sands, 1963).

Feynman indicates that thermodynamics, at its most fundamental level, is the study of energy. While this is not one of the laws of thermodynamics, this is the foundation of these dynamic systems theories. Energy can take many diverse forms, such as heat, light, mechanical, chemical, and electrical energy. It is a property of energy that it has the ability to influence systemic change. The First Law of Thermodynamics indicates: energy is conserved in an open system (Feynman, Leighton, & Sands, 1963). This states that energy is always conserved and cannot be created or destroyed. In essence, energy is foundational, unfixed, and is consistently converted from one form into another. So, what is important here is that *change* itself is a central element in the theory of the properties governing complex, interactive system. And as we have seen, humans, throughout development, from the

particulate to the gross systems levels, are open systems with permeable boundaries – and are thus subject to the laws of thermodynamics and properties of continual change.

An important element of the unfixed system is that it does have permeable boundaries. The Second Law of Thermodynamics states that: every open system includes the exchange of energy. If no energy enters or leaves the system, the potential energy of the state will always be less than that of the initial state (Feynman, Leighton, & Sands, 1963). This can be understood as energy being expended which is not replaced in the system. That is, the potential energy of a given state will decrease from one state to the next in relation to the use of and exchange of energy in an open system. In other words, closed systems have lowering levels of exchange, and conversely lack of energy exchange is a property of a relatively closed system. This is also commonly referred to as “entropy”, and in complex systems, such as those exhibited by cells, if the system is not disordered they will have low entropy, high energy exchange and high levels of order. High levels of order, high levels of energy exchange, and low entropy are properties of open systems.

There are important implications of thermodynamics for biology (Wicken, 1987). The exchange of energy maintains order in complex systems, which we call life in living organisms. Entropy causes larger systemic changes when organic systems cease to take in energy. In this case they incur disease, and if homeostasis cannot be reestablished, they die. Using the popular example of an automobile engine, even in a predictable, relatively closed, mechanical system, when we run out of gas, if no additional energy is introduced to the system, it becomes dysfunctional. The common view of genetic preprogramming is of a fixed and closed cellular system and/or individual organism. In evolutionary determinism the view is of a totally fixed and closed organismic system (Lewontin & Franklin, 1970; Wilmot, 2000) with states occurring as a consequence of genetic programming. In the First Three Years, the view is of a fixed and preprogrammed, closed developmental system defined by a given time period. While most domains have come to acknowledge the fundamental nature/nurture interactions superficially, few of these perspectives fundamentally take into account the changeability involved in the systemic exchange, which is necessary to explain an open system. This provides the foundational principles of dynamic systems interactions as integral to the understanding of gross systemic organizations, such as communities. To understand communities it would be advisable that we understand the properties of systems.

ECOLOGICAL SOLUTIONS

The evidence thus far indicates that complex dynamic perspectives are not usually employed by academics or in public dialog. Yet dynamic systems theories have been used to explain some of the most basic and complex concepts important to human understanding and experience. For example, consider the precipitation model taught in public high schools or used by weatherman in the evening news. Rain comes from a multitude of factors, not just clouds. Most people understand that precipitation arises as a result of the wind speed, amount of moisture, topography, and temperature, which are just some factors important to influencing the immediate weather. The dynamic perspective of interconnectedness addresses interactions at several levels of the weather system. Additionally, probability analysis is understood as a central feature of predicting weather systems.

This complex set of reciprocal interactions among elements in the environment probabilistically causes the given types of weather. We would never attempt to identify which element of the weather system, such as water, is *at fault* for, or causes the rain. Water, in the atmosphere, interacts with all levels of its environment. The physical properties of water allow this compound to easily change from one state to another. Rain is the liquid form and snow, sleet, and hail are the solid form, while water vapor is the gaseous form. Melting occurs when the environmental cascade causes a solid to change to a liquid, and freezing is the reverse process. When events conspire to lead to a solid to go directly to a gaseous form, or the reverse, this probabilistic process is called sublimation. In an ecological model it is necessarily impossible to blame the individual factor.

Thus, there is a basis to argue that ecological concepts are not too complex to be understood or employed. Also, we have no sound reason from the dynamic systems perspective to attempt to identify a single, unicausal circumstance to explain individually expressed social problems. However, it can be argued that there are a lot of reasons for supporting reductionism that are often related to our individualistic desires for oversimplification of the argument. For example, it is easier. It also supports the *status quo*, and it protects white hegemony. So, we often end up blaming the weathermen for the way the wind blows.

Taking poverty as our example, from this perspective, we needn't expect to identify the specific failings of an individual embedded in a social system which supports their *failure*, but should attempt to identify the interactions between all levels of the system which probabilistically cause the lack of money. For example, poverty may be related to an illness or other socially defined deficit, to moral or spiritual convictions, differences in priorities, to lack of conformation to popular cultural values, or to training and skills, which do not conform to accepted norms of excellence in the ability of acquisitiveness. It may be more appropriate to identify the many possible probabilistic outcomes caused by the same society (multifinality), as opposed to assuming we would find a reductionistic, fixed cause with a single known outcome of poverty, illness, or other human failure or social problem. It may be more appropriate to attempt to identify the many different causes (multicausality) of poor nutrition, education, and community values, etc. associated with the single outcome (equifinality) of poverty. Efforts by authors such as Duncan and Sampson attempt to examine this multilevel interaction, and to develop statistical techniques appropriate to its complex analysis, such as econometrics and multilevel RASCH modeling.

Failure to address dynamic reciprocal and developmental multicausality is also true of attempts to understand the epidemiology of health. Indeed it may be more appropriate to attempt to identify the many different probabilistic causes (multicausality) of Epstein-Barr, Mononucleosis, and HHV-6, associated with the single outcome (equifinality) of immune dysfunction associated with ME/CFS, as opposed to stigmatizing the illness with the assumption of a psychogenic cause (Corradi, Jason, & Torres-Harding, 2006). Additionally, the multifinality of pneumonia can lead to anything from a full recovery, to brain damage or death. That is, epidemiology must be redefined to encompass systemic interactions of all levels of the health system, if it is to lead us to complex models and systemic conclusions of health expression.

The complex set of reciprocal coactions among elements in the psychobiological environment, probabilistically cause the expression of health or disease. Perhaps we should not compulsively attempt to identify which fixed individual element of the specific organic

physical system is at fault for the disease, anymore than we should attempt to identify a single cause for a given developmental, social, or meteorological problem. This means seeing the person or individual as a “system” as opposed to simply viewing the larger health care system, governmental agency, or educational institution as a system. Additionally, we must acknowledge the bidirectional, reciprocal relationship between the micro and macro health systems to build a true understanding of psychobiogenic, individual, community, national, and international health.

INTERCONNECTEDNESS

Importantly, the implications for our social welfare and the manner in which academics and science informs social values, and thereby construct public policy, suggests that their relationship is also reciprocal. Thus, dynamic systems theory and interconnectedness should not be viewed or discussed as at odds with development of the individual, nor can we see the individual and community as part of countervailing values. Both are inextricably intertwined, as is their illumination. All levels are intrinsically tied together in complex, bidirectional relationships, in which the understanding of one is not meaningful outside of the contextual environment of the other. Complexity then becomes a required element in community psychology, and biopsychology a necessary element of its discourse.

In social and community psychology, systems theory has not approached the same comprehensive level of maturity as in thermodynamics, mathematics, or physics. While Kelly (2006) gives a sound initial framework, this perspective does not incorporate the same specificity of foundational principles of study as those disciplines with a longer dynamic systems/epigenesis history, such as meteorology, embryology, ecology, physics, human development, geology, statistical probability theory and engineering.

While responsible for pioneering efforts on research methodology and data analyses techniques, nonetheless, psychology has been slow to develop and incorporate dynamic models and relevant statistical techniques capable of systemic analyses of human’s communal interaction. It is likely and arguable that including dynamic systems interactions into theory and practice in these other disciplines is often a product of functional of necessity. This may explain the limited efforts of researchers to employ ecological models in community psychology. Similarly, while it is very difficult to define an isolated system within meteorology, ecology or embryology, everything in the psyche of the Western scientist seeks to support the existence of the separate closed individual “self” in psychology (Dennett, 1991, Lakoff, 1987). Many theorists find this to be an illusory sense of self, based exclusively on the emergent nature of consciousness (Dennett, 1991). Nonetheless, even in its infancy, community psychology, demands the acknowledgements of interactions between self and society and has begun to examine the ways in which these interactions occur.

Hopefully somewhat effectively argued here is the necessity of community psychology to utilize systems theory to explain complex interactions between individuals and community systems. We must employ foundational principles between different levels of communities, between various levels of homogenous populations, and the interactions of heterogeneous groups. While Bronfenbrenner’s developmental (1977, 1979) and Kelly’s ecological theories (2006) are acknowledged by community psychology and currently in a favorable manner, this

often lingers as a caveat and does not actively incorporate bidirectional, reciprocal coactions. The coactions often remain strictly limited in description and explanation, and are lacking in detail, direct examination and fine-grained analyses of dynamic interactions of probabilistic developmental events in these systems. In addition to dynamic systems interactions, the effort to identify the “counter-intuitive” influences identified by Kelly (2006) is otherwise largely unexplored and undefined by community psychology, however, this theory requires a foundational principle of non-obvious, unique interactions (Gottlieb, 1976). Moreover, the micro-environments within the individual and the psychobiological interplay at different levels, is totally absent from the ecological models in psychology. For theories from complexity to mature within Community Psychology, we need an unpacking of dynamic ecological theory that can incorporate these ideas, and a set of foundational principles which govern them (see Fig.1).

CROSS CULTURAL PERSPECTIVES

Currently, the disparity between Individualism and Interconnectedness is discussed most often in cross-cultural comparisons of collectivist cultures as in opposition to our extremely individualistic society. But here the conversation often stops short. Western Europe, India, and Japan, with about 1/7th our incarceration rate, maintain lower levels of violent crime. Throughout twenty years of increasing imprisonment in the U.S., crime rates also continue to climb. No marked decline in violent offenses were apparent until 1993, which also corresponded to a fall in unemployment and the lower percent of males in the high-risk fifteen to twenty-four-year-old age group (Parenti, 2000).

Buddhism and Taoism are the value systems of many collectivist cultures currently studied. This can be said to transmit with it a deep internalization and unquestioning belief in the value of social good taking primacy over personal gratification (Jason 1997, Jason, Reichler, King, Derryk, Camacho, and Marchese. 2001, Jason & Moritsugu, 2003). Personal virtue and self-esteem indeed become defined by the advantage to the group. While these values are secondary in the United States, they are essential to interconnectedness (Bellah, Madsen, Sullivan, Swidler, & Tipton, 1996; and Beauchamp, 1976; Perloff, 1987; Sampson, 1988; Waterman, 1981).

Egalitarianism, humanitarianism, and social responsibility are primary and integrated with ideas about social roles, ethics, and self-esteem in collectivist cultures. As opposed to dichotomizing countervailing values, the values of the individual and the community are more unified and integrated. Healthy development (of both individuals and communities) is more likely when foundational values are supported, and the well-being of the individual is acknowledged as interdependent upon the well-being of the larger social system (Jason & Moritsugu, 2003).

INTERNATIONAL COMMUNITY SYSTEMS

As previously noted the membership of SCRA 27 recently adopted a new set of guidelines, designed to provide direction and focus to community psychologists' work. SCRA members have the opportunity to examine the sometimes invisible values which inform our views of communities, and relationships among individuals, groups and settings. The new guiding concepts are that we become global in nature; use multi-sectoral, interdisciplinary partnerships and approaches, focus on creating policies informed by community psychology and social justice values; and research and action that promote social justice.

How might a dynamic systems theory help us move forward? How can community psychologists contribute to, and learn from, our interactions with the diverse range of human experiences that contribute to progressive social change, even as we respect diverse cultures?

The forces of globalization affect economic systems, human rights, environmental systems and health trends. According to a 2000 report of the Institute for Policy Studies, 51 of the top 100 economic systems in the world are multinational corporations. The consequences from cutting down rain forests in the Democratic Republic of Congo are world-wide climate change (Rainforest Foundation). Avian flu is transmitted by a virus that is carried by birds that cross borders, boundaries and immune systems. A globalized social justice movement needs a common framework within which individual, community, national and international interests are negotiated.

The international human rights discourse can provide that global framework, and provide the alternative to a nation-dominant set of values. One of the first acts of the United Nations was to develop the Universal Declaration of Human Rights (UDHR) a statement of principles that advises governments of their obligations to protect the human dignity of the individual person (1948). They were created from a broad consultation of political, religious, and philosophical perspectives found throughout the world. The UDHR is the basis of seven international human rights treaties, carrying the same legal and political enforcement obligations as do trade treaties. As the UDHR is relied upon by judicial, legislative and executive authorities to create national and international law, it is evolving into customary law. Customary law requires legal conformity, just as ratified treaties do.

The UDHR has been criticized as reflecting western values, particularly values that prioritize rights of individuals over collective and cultural practices. Aryeh Neier, a leading human rights advocate and president of the Soros Foundation, declared that human rights existed to protect the individual against the tyranny of the majority. A more systemic view of human rights and their globalization, however, may incorporate the dynamics of community and individual rights.

International human rights are a fairly new conceptual framework. Historically, the majority of effort from the human rights movement has been to protect the civil and political rights of individuals. These rights offer protections to individuals from inhumane exercise of authority (e.g. to be free from torture, to due process of law and the right be free from discrimination), as well as individually-asserted rights, to speech, religion, and to choose a marriage partner, for example. This contrasts with economic, social and cultural rights. Economic, social and cultural rights are rights to food and shelter, to health and education, to cultural life and protection for social groups.

Human rights are not fixed; they are expressed through the reciprocal interactions of government, corporate, cultural and individual actors. They are also violated by all these actors. As the human rights movement moves to advocate more broadly for economic, social and cultural rights, the understanding and obligations to protect and advance human rights change. The focus is changing from stopping violations of individual rights to developing strategies that promote fulfillment of all human rights.

The right of one individual woman to safety is not protected unless all women have rights within the society to a safe home and community life. Until all women have rights to shelter, food and health; until all women can participate in the decision-making policies that govern the societies in which they live, no single women can be truly free to exercise these rights. As community psychologists work globally in collaborative efforts to advance human rights, there will be tension as community, cultural, social and individual rights compete. Bronfenbrenner (1971) and Kelly (2006) have already identified the interdependence of these interactions in the eco-systems in which people live. The tensions of negotiating the interrelationships among these contexts are as yet under-explored by community psychology.

SCRA's new goals call on community psychologists to respect all cultures. Respect is a funny word. How much respect are we to afford a culture that promotes violence against women, exploits children's labor, and protects the rights of a privileged few at the expense of the hungry, unhealthy, unsheltered masses? But then again, which culture does not do this? Perhaps the principle advocated by SCRA, to understand people within their social, cultural, economic, geographic and historical contexts, is also how SCRA encourages us to respect all cultures. The Eco-Transactional perspective is of note here (Jason, 1997). Can this respect be seen as a foundational value then? The interactions of social, individual and cultural rights will require us to do more than respect. It will require us to make difficult decisions about the implicit values supporting those changes and to get our hands dirty in the political struggles that compel social change.

When we looked at the dynamic system that creates rainfall, we recognized that precipitation is a function of air temperature and wind, evaporation and atmospheric pressure. Globalized human rights, universal human rights are as dynamic a system as is the weather. Individual rights are exercised within communities, within groups, and the rights of an individual are dependent upon the rights of communities. So those of us from the United States may need to look at the metaphorical rainfalls of other countries, to see how they developed systems that incorporated the developmental pathways of cultural values to promote human rights-friendly climates. Just as deforestation affects global climate change, so too might advocacy for human rights of individuals, communities, families and societies.

The ramifications of the dismantling of apartheid in South Africa provide an example of how dynamic systems theories can help us understand coactions between individual and the various levels of communal rights and value systems. As the apartheid regime of the National Party was dismantled and replaced by a government led by Nelson Mandela, the entire governing system needed to be revised. The South African government did this in large part by adopting a new national Constitution that was influenced by international human rights norms. Those norms stemmed from widespread acceptance of the Universal Declaration of Human rights, as adapted into individual countries' applications of the UDHR. South African communities were extended human rights through a political process influenced by global movements, as adapted to meet the unique needs of the nation.. It is not incidental that the South African Constitution is now influencing our understanding of how international human

rights norms get applied. This bidirectional coaction between different levels of community demonstrates the interconnectedness of values and practices at the global level. As community psychology becomes more global in nature, the recognition of social rights, rights of communities and social groups, along with individual rights, will provide opportunities to exercise research and action that creates policy which advocates for humanity and prosperity, based on interactions among communities and individuals. The human rights movement needs us.

INTERNATIONAL FOUNDATIONAL VALUES OF SOCIAL JUSTICE

The invisible influences of culture on values affect everyone concerned with social justice. How can we in the U.S. acknowledge our individual-focused values system, respect its contributions, but advocate for evolution to a system that recognizes, values and incorporates community rights and responsibilities as well? And how can we negotiate the relationships with others' values and understandings of social justice?

It's interesting to note that there is no universal definition of social justice. The Universal Declaration of Human Rights (UDHR) is the most widely accepted statement of values in the world (Weissbrodt, 1988) and defines what human rights are, yet it does not define "social justice". There may be well understood principles of community psychology, but our definition of social justice may be as individual-focused as: the understanding of poverty from the myth of the "welfare queen"; the idea that pellagra was a strictly biogenic illness as opposed to a vitamin deficiency brought on by systemic changes in the environment; or that intelligence and "feble-mindedness" are innately preprogrammed by genes.

The UDHR was adopted by the United Nations in 1948, and was reaffirmed by the 171 countries attending the Vienna Conference on Human Rights in 1993. In its preamble, the UDHR acknowledges that "recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world". The UDHR defines civil, political, social, economic and cultural rights. It compels governments to a "common standard of achievement" in realizing rights of individuals to an adequate standard of living, to equal treatment (and not just opportunity), to the full range of rights which protect human dignity. In this way it can be seen as an internal code of ethics defining human values.

The UDHR assures rights to individuals, to protection against tyranny and oppression. It also provides for community rights, in its protections of social rights and the rights of people to participate in cultural life. Article 29 also specifically addresses the responsibilities of this rights-based approach, balancing individuals' human rights with recognition of rights due to others, for what is necessary to meet the just requirements of general welfare in democratic society. This article of the UDHR remains under-explored. Mary Robinson is the past Secretary General of the UNHRC, and has only within the past few years begun to lead an international discussion about the duties human rights standards oblige.

South Africa again provides an interesting insight into the evolution of community and individual rights, and illustrates the interactions which must be negotiated. A South African man sought emergency treatment when he went into renal failure. The hospital denied him that treatment. It had established guidelines that limited access to its dialysis equipment to

those who would also be eligible to receive a kidney transplant. The man in renal failure was ineligible, due to a heart problem. In its decision, the Court is seen as balancing the individual's rights to life and to health care, with the community's right to regulate limited access to treatment facilities. It weighed the right to health with the consequences of treatment that prolonged chronic unwellness. The Court's decision demonstrates how we may balance the intersection of rights and values (e.g. social responsibility, individual health, just allocation of resources, etc. (Asian Forum for Human Rights, 2000). These are the debates that community psychologists can and must contribute to, as this relatively new arena of human rights policies develop.

RESEARCH AND ACTION THAT PROMOTES SOCIAL JUSTICE

This SCRA concept encourages community psychologists to develop the discipline as a tool to promote social justice. SCRA offers a definition of social justice, as "conditions that promote equitable distribution of resources, equal opportunity for all, non-exploitation, prevention of violence and active citizenry" (SCRA, 2007).

The emphasis on equality of opportunity reflects U.S. norms. Equal *opportunity* is a foundation of U.S. values and law. Social justice advocates champion that everyone in the United States should have equal opportunity for employment, for housing, to education, etc. Yet the idea that everyone should have an equal opportunity to food challenges the emphasis on *opportunity*. Equal opportunity to access food is not enough; everyone has equal rights to have food, have shelter and to have those things necessary for an adequate standard of living. Many international human rights treaties are outcome-focused and create affirmative obligations of governments to take action that fulfills the goals expressed for human rights. The individual opportunity is not *sufficient* to creating equal access to resources within a given community.

SCRA begins to recognize this in its advocacy for a social justice that promotes equitable distribution of resources. In the dialogue that has ensued in the wake of these concepts' among SCRA division 27 members, community psychologists have debated the meaning of what it is to be an international organization. It may be easier to sort out what that might mean if we understand who in the United States are understood as equal, what constitutes opportunity and how we have developed the concepts and values of social justice that guide our work. How do we as community psychologists contribute to a scheme of social justice that not only attempts to balances the needs – the rights -- of individuals and communities, but truly takes into account the dynamic coactions between all levels of community - from the self to the international levels (see Figure 1).

Community psychologists have a great to deal to contribute to research and action affecting social justice for ecological perspectives of communities. The international human rights movement is relatively young and has been widely influenced by western perspectives. It is challenged by conventional views that artificially construct a dichotomy between the rights of individuals with the needs of the community. How can community psychologists share our science to in ways that negotiates the rights of women and. traditional cultures, or rights to health, shelter, and housing even when there is a dearth of community resources?

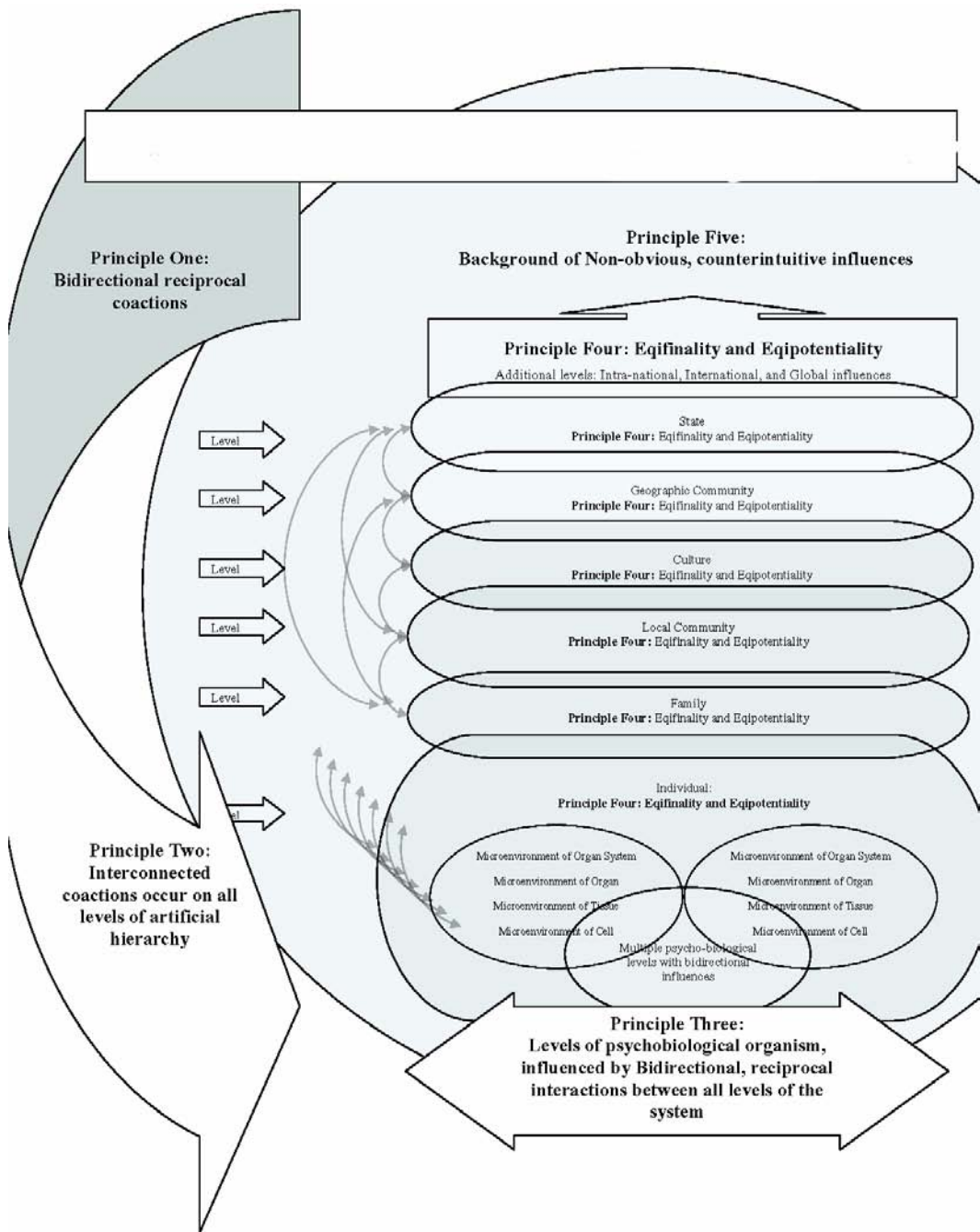


Figure 1. Foundational Principles of Dynamic Systems Models in Ecological Theory.

The United States government has historically fought recognition of social rights and is currently isolationist with respect to participation in international treaties (e.g. Kyoto accord, etc.) Conversely, our civil rights movements have been a model for social change in other countries. The experiences of communities inside and outside of the United States may provide insight and expertise as the global human rights movement addresses social injustice

through advocacy of a minimum standard of living for the entire community. The U.S. has much to learn from those countries where community psychology has been interlinked with the human rights movement. Activists in other countries could be informed by our movements toward social justice. It is clear that reciprocal coactions cascade bidirectionally from nation to nation, nation to communities and individuals, and nationally to global levels of interaction. This must be taken into account when utilizing a given theory of community psychology and points to the necessity that we use systemic perspectives.

As community psychologists explore how to work with community partners and other activists on how to promote social justice, it will be difficult to curb our enthusiasm about what has worked well, in order to understand what has not. The progression of individual-focused values in the United States provided opportunity for progress, but at what cost? What might have been different if communal values had been better integrated, or the reciprocal coactions between individual-community interactions were better understood? We are additionally compelled to focus on public policy, to develop the skills, political astuteness, and long term strategic determination necessary to create social change.

INTERVENTION IN AMERICAN VALUES

To make needed changes to advance individual and community health, the fundamental values on which policy is based must acknowledge the complex dynamic systems in which individuals and communities exist. Even using the skeptical Freudian view of altruism, behavior and values based on belief in individual segregation is not in one's personal best interest (Kriegman, 1990). With a profound comprehension of the nature of Interconnectedness, stark Individualism becomes irrational. The prevalence and persistence of this contradiction suggests that even some of the most educated and socially aware activists and academics may not understand how their perspectives of the self-contained individual inform issues of intervention and public policy.

This dynamic systems theory tactic for social change only requires transformation in academics to be effective. Students become the peer-reviewers, secondary teachers, college professors, department chairs, and tenure review committees – in addition to developing into parents, friends, family and community activists, state and national voters, and citizens of the world. Since academics hold the reigns of educational content and the legacy of published subject matter, we can assume they influence textbook topics, lecture content, test material, and the growth of future academia as well. We have also seen that through out history public opinion and policy makers have turned to academics to substantiate legislation. All of this suggests that teachers could influence public opinion and values of interconnectedness through teaching and supporting a community of intellectuals and activists valuing interconnectedness.

The implications for our social welfare, and the manner in which science informs values and thereby constructs public policy, suggests: 1) we cannot continue to devalue interdisciplinary and/or non-traditional interventionist research, 2) complexity and dynamic systems theories should be required course material in community psychology classrooms and across disciplines, and 3) because their relationship is reciprocal, Interconnectedness, and indeed communities, should not be viewed or discussed as at odds with Individualism.

Finally, and arguably most importantly, 4) we must identify our foundational values and founding research principles.

If self-contained individualism is at the heart of the American value system and this is inappropriately hindering social and individual well-being, the opinions supporting this self-serving sense of individual entitlement must be curtailed through education on interconnectedness, complexity, and dynamic systems theories. It must be made clear that the individual is *necessary but not sufficient* for optimal functioning of the social system. At all levels, systemic intervention must support positive individual interactions with the community, as well as a more beneficial social system for everyone. We must begin to see individuals and human rights, not as exclusively personal, but as larger, interconnected, multi-systems levels issues involving community ensemble interaction. Similarly, we must begin to disperse boundaries between the self-contained individual and society to improve understanding of their true coactional dynamic relationship – one which is often quirky, probabilistic, complex and counterintuitive. Finally, this is always based on a cascade of interdependent events which through a concatenation of experiences and confluence of events, we come to measure as a developmental “outcome” for the individual, community, state, nation or planet.

CONCLUSION

We needn't worry about changing our primary language, bridging gaps in dichotomous values, or resolving the seeming contradictions of individual vs. setting or person vs. surround. We must only start treating the selfish perceptions of societies “looters” (the needy who turn to crime) and “moochers” (the needy who turn to the state) (Ayn Rand, 1957), and eugenics-based Individualism (Dawkins 1976) with the intolerance they deserve.

It is no accident, that Rand is often reprinted in popular texts in the west, such as *Money and Capitalist Magazine*: "Yet these were the words for which Americans were denounced by the rotted cultures of the looters' continents. Now the looters' credo has brought you to regard your proudest achievements as a hallmark of shame, your prosperity as guilt, your greatest men, the industrialists, as blackguards, and your magnificent factories as the product and property of muscular labor, the labor of whip-driven slaves, like the pyramids of Egypt" (page 387).

Individualism has a seemingly inconsistent relationship with egoism, however, it can be argued that selfishness underlies both value systems. Nonetheless, while some individualists are egoists, they usually do not argue that selfishness is inherently valuable. Instead, they argue that morals are relative and individual freedoms preclude the imposition of any external values, except perhaps regarding the right to the freedom to be self-concerned. Indeed, for both, this usually precludes the necessity for internally imposed morality as well. Rather, in support of the reductionist morality of unbridled freedom, they define the individual pursuit of desire as the code of conduct. For example, Ayn Rand, argues explicitly for the "moral relativism" of everything except the virtue of the freedom to be selfish (1997).

We live in a society of *laissez-faire*, *ad-hoc* ethics, opportunism, and grand acquisitiveness. We glorify unethical action and promote mental dysfunction. While implicit in these arguments is that others may say what they like, everything is not a matter of opinion

to which everyone is equally entitled, and we needn't be sensitive to faulty reasoning. We only need to call self-contained individualism what it is: socially sanctioned selfishness. The individual desire of one human, while important and *necessary* to proper social functioning, is not *sufficient* to, and should not be equated with the optimal functioning of the multiple levels of the entire system. While we cannot leave the needs of the individual to the unchecked requirements of the larger community systems in which they are embedded, neither can we allow individual requirements to go unchecked by the needs of the larger communities. While it can be argued that the latter is currently occurring in Western society, this perspective holds within it the dichotomy of self and other as countervailing values which are only sensible from the perspective of Western values (Sampson, 1988). Thus, a revolution in systems thinking may be necessary.

A concise perspective from dynamic interactions on U.S. values is offered by activist David Gilbert (2001) and suggests that whether or not there is a conscious eugenics agenda behind any social practice is irrelevant. He says:

“Overall, the conditions for people of color within the U.S. can best be described as a concatenation of epidemics cascading down on the ghettos and barrios: AIDS-TB-STDs; unemployment, deteriorating schools, homelessness; drugs, internal violence, police brutality, wholesale incarcerations; violence against women, teen pregnancies, declining support structures for raising children; environmental hazards. All of these mutually reinforcing crises very much flow from the decisions made by government and business on social priorities and the allocation of economic resources. (The numerous public health essays of Rodrick and Deborah Wallace provide excellent analysis of the sources and effects of this series of epidemics.) When governmental policies have such a disparate impact on survival according to race, that fits the crime of genocide as defined under international law. Whatever term one uses, the cruelty of tens of thousands of preventable deaths is unconscionable.” (Page 7)

What are the premises and attendant values underlying the agreement with this expanded ecological perspective? That is, that the development of complex and open systems (e.g. cellular processes, human mind-body systems, created societies, governmental structures, interactions of human motivations and mass media, political funding practices, public policy, governmental agencies, etc.) are coactional and changeable, and probabilistically trainable and knowable. The foundational precepts of a dynamic systems perspective must be utilized, investigated, explained, and understood in the context of community psychology, to the benefit of developing positive social values for ensemble individuals in concert with the various levels of their community. This transformation is typified by the maturing dynamic theories in, and popularization of systems theory in several fields (including community psychology), which also used to appeal to fixity and preprogramming and by necessity abandoned the practice in favor of more explanatory and functional model of interconnectedness (Jason, 1997, 2003; Kelly, 2006). Physics, Mathematics, Embryology and Ecology all have a long history of appealing to fixed and finite principles to predict behavior and development of entities in their domains. Within human systems, this more expansive prospect is additionally supported by current trends toward interdisciplinary perspectives in academic discourse in psychology and biology, inclusion of dynamic systems theories in Introductory Biology and Psychology textbooks, and increased emphasis on systemic issues in academic journal articles over the last decade.

The current trend in interdisciplinary investigations, relative prevalence of dynamic topics, and integration of teachings of epigenesis in biology and psychology, go against formidable preconceived notions. They challenge deeply ingrained ideas of self-contained individualism in the West, and challenge perspectives stanchioned by centuries of intellectual acceptance. These ingrained ideas are deeply enough accepted by many to be considered unavoidable, genetically preprogrammed, innate, fixed and evolutionarily determined. That countervailing forces contradicting the primary value system underlying the psyche in the West - those that support self-serving individualism - are challenged, indicates that further transformation is possible. Indeed the whole human developmental manifold indicates that *change* in some direction is both immanent and unavoidable. While this immanent growth in the necessary direction is difficult to identify, direct and to achieve, we are supported in our communal efforts toward interconnectedness. If these underlying trends in academics and education can persist, despite our primary values and innate and preprogrammed intentions to the contrary, there is the possibility to influence future developmental pathways for community psychology and human understanding at large. Finally, for the ecological perspective in community psychology to mature, we need to define the foundational principles underlying our theory. We believe this is a necessary goal.

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Chapter 4

IMPROVING THE POLICE LINEUP*

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ABSTRACT

This chapter will describe the research program which led to the development of a viable large lineup. Research is a creative endeavor. Like all creative efforts (Maier, 1963; Prince, 1970; Whitfield, 1975), many steps in the process turn out to be wrong or impractical. However, an error can lead to a very important positive development.

The final report of the results usually omits these steps, presenting the final product as if it were the clear-cut result of a theoretical position articulated from the start. Actually the theory develops along with the research. In contrast, this chapter will endeavor to describe the research as it actually happened. This should provide a better understanding of the process.

I was recruited in 1987 by Dr. Avital Ginton, commander of the Behavioral Section of Forensic Sciences of the Israeli Police, to take on a unique task: to work on research and development in improving the police's tools of eyewitness identification. I was to be the first and only police officer working on such a project. My colleagues would all be academics based in universities.

At the age of 45 at the time, I had a list of heterogeneous publications attesting to my research experience in applied psychology. However, I knew absolutely nothing about the extensive research literature on eyewitness identification. This may have been an advantage. I brought experience and the confidence to try new approaches which comes with the experience, yet a fresh outlook to a field that had established some patterns of research that perhaps could use a new slant.

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THE POLICE LINEUP

After about six months of reading the literature, I had gained some understanding of the challenges ahead. The police have three basic eyewitness identification tools, the lineup, the mug-shot album search, and the composite. If they have a suspect, they conduct a lineup. This is the best method for bringing an identification to court as evidence of the guilt of the defendant. The most common lineup technique, the simultaneous lineup, was invented by Scotland Yard towards the end of the nineteenth century. In the British variation, the suspect is put in a line along with eight people known to be innocent (called foils or distractors), and the witness is asked whether he can identify the culprit from among the lineup members.

Elsewhere smaller lineups are usually used. Israel requires eight lineup members. Canada and the USA have no minimal requirement. In Canada, Brooks (1983) reports, major police department lineups range from five to eleven members, with most consisting of six or seven. In the USA, nonbinding guidelines of the Department of Justice (Technical Working Group for Eyewitness Evidence, 1999) recommend five, or six if photos are used instead of an actual line of the lineup members (these six-person photo-spreads are usually used in the USA).

This process provides a test of witness memory. When suspects are innocent yet witnesses still choose someone, in most cases they will pick a foil. Each person in an ideal lineup has an equal chance of being chosen, and therefore innocent suspects are only chosen one time out of six (17%) in a six-person lineup. When a foil is chosen, the police know that the witness has erred.

This is a vast improvement over the routine of showing only the suspect to the witness, and therefore has been widely accepted. It became the standard method in most of the Western world. If the witness "identifies" the suspect, the suspect will usually be convicted.

However, is this standard lineup good enough? Are we satisfied that 17% of innocent suspects go to jail when witnesses choose someone? Experimental witnesses often compare lineup members and "identify" the person who seems the most similar to the "culprit" when the culprit is not in the lineup (Wells, 1993), and do so very often.

This much I understood from the start, and it remained my position in a paper on the lineup that I published in 1995 (Levi & Jungman, 1995). It was only in preparation of a sequel that I published in 1998 (Levi, 1998a) that I realized that the situation is worse than the 17% figure. Courts must decide, on the basis of a lineup "identification" and other evidence, whether the defendant is guilty. (This is opposite from knowing that the defendant is innocent, and calculating the probability that he will be "identified").

What is the probability that defendants are innocent, even though they have been "identified" in a six-person lineup? This is a Bayesian situation (Levi, 1998a): In the simplest case, that probability is: (number of innocents chosen)/ (total number of those chosen). The total number of those chosen is: (number of innocents chosen + number of guilty chosen). The defendant is either innocent or guilty. Our formula is then:

$$\text{(number of innocent chosen)} / \text{(number of innocent chosen + number of guilty chosen)}.$$

We have calculated the number of innocent chosen, 17%. We need still an estimate of the guilty. The average rate of witnesses choosing the guilty was found, over 47 experimental studies, to be 67%.

If we put the 17% innocent and the 67% guilty chosen in our simple formula, we find that the probability of suspects/defendants being actually innocent even if "identified" (chosen in the lineup) is $17\% / (17\% + 67\%) = 20\%$. That is, if the judge or jury convicts on the basis of a six-person lineup "identification", which they do in practice, in about 20% of the cases they are convicting someone who is innocent!

This is true if the other evidence points to a 50-50 chance of the suspect being guilty. In the real world this a priori probability may be considerably more or less. Suspects are put in lineups sometimes after the stolen goods have been found in their possession. In such cases the a priori probability of guilt is likely more than 50-50, and the probability that the "identified" defendant is actually innocent will be less.

Sometimes the suspects only fit a very general description of the offender common to many. In such cases the a priori probability of guilt is less than 50-50 and consequently the chance that the suspect is innocent is greater than 20%. The complete Bayesian equation (Levi, 1998a) takes this into account. Table 1 gives the probabilities that the defendant is innocent for various a priori probabilities.

An inspection of Table 1 should be sobering. If judges and juries convict on the basis of the existing evidence, which includes the lineup "identification", then unless the other evidence points to about a 90% chance of guilt without the identification, judges and juries are erring at a greater rate than the minimum allowed for a psychological experiment, 5%.

The consequences of an error are much more severe. The liberty, and sometimes even the life of the defendant, hangs in the balance. Judges and juries are supposed to convict only if the guilt of the defendant has been proven beyond reasonable doubt. Judges have been very careful in refraining from putting a precise probability on the somewhat vague "reasonable doubt" criterion. Nonetheless, we might even wonder whether a 3% error rate (when the a priori probability of guilt is 90%) should be considered acceptable.

In practice, judges and juries convict on the basis of one "identification" from a lineup without any other evidence, or with extremely minimal other support. The gap between their willingness to convict and the actual probative value of the lineups must result in many innocent people being convicted and sent to prison or their death.

Table 1. The probability that the suspect is innocent despite having been "identified" in a nine-person lineup, for various probabilities of being guilty based on other evidence

A -priori p guilty	.10	.20	.30	.40	.50	.60	.70	.80	.90
p innocent	.74	.56	.42	.32	.24	.17	.12	.07	.03

The situation is likely even worse. The experimental conditions upon which the 67% rate of culprit identifications is based comes from experimental eyewitness conditions. However, real life conditions are far more difficult (Deffenbacher et al., 2004; Levi, 1998a), which lead to fewer identifications and more mistaken identifications. As can be seen from our simple equation, the relative probability of the suspect being innocent grows as culprit identifications decrease: The relative size of the mistaken identifications grows.

In addition, the 17% rate of mistaken identifications is based on perfectly fair lineups, in which the innocent suspect has no more chance of being chosen than any other lineup member. In real police lineups, the suspect, even if innocent, is often more likely to be

chosen, either because he stands out or because some lineup members can be discounted by the witness (Doob & Kirshenbaum, 1973, Malpass & Lindsay, 1999).

If witnesses can discount foils, the lineup is actually smaller for them. For example, in the *State of Israel vs. Kedoshim* (1999) the witness described the perpetrator as "the small one". Only two foils were the same height of the suspect, while the rest were obviously taller. For the witness there were only three lineup members, the suspect and these two foils. The chance of choosing the suspect, even if he was innocent, was 33% for the witness who was highly motivated to "identify" someone.

Valentine and Heaton (1999) found, using photographs of English police lineups, that "mock witnesses" (research participants asked to guess who the suspect was), chose the suspect 25% of the time. This was significantly higher than the expected 11% if indeed the suspect had no greater chance of being chosen than any other lineup member in English nine-person lineups ($1/9 = 11\%$).¹

Furthermore, there is a very basic weakness in standard simultaneous lineups. Wells (1984) argues cogently that witnesses, when faced with a simultaneous lineup, often use the strategy of choosing the person most similar to the culprit in the lineup. The trouble with this strategy is that they then are not "identifying" the culprit.

The Concise Oxford dictionary (Fowler & Fowler, 1964) defines to identify "to treat (thing) viewed as identical", and "identical" as "(of one thing viewed at different times), the very same". This is of course what we and the courts understand. When a suspect is "identified" as the culprit, they believe then that he or she is indeed the culprit.

However, when witnesses merely choose the person most similar to the culprit among six people, that is a far cry from an "identification". If the culprit is not in the lineup, they will choose someone innocent. It is even scandalous that the term is used, but it is. The court is thus often fooled into believing that an identification has occurred, when in fact it has not.

We must add that there is a strategy which can somewhat increase "identifications" of the culprit. This could increase the reliability of lineups, by decreasing the chance that the suspect would be innocent if "identified". Luus and Wells (1991) have noted that if foils are chosen to fit the description of the culprit provided by the witness, they should manage to "identify" more culprits than when the common method of choosing foils similar to the suspect is used.

The reason for this is that witnesses give very vague descriptions of the culprit (Lindsay, Martin, and Webber, 1994). Therefore, the foils chosen differ more from the culprit, making it easier to differentiate him or her from the foils. However, we might note that this strategy should be particularly required by witnesses with weaker memory of the culprit, who are likely choosing the person most similar to the culprit in the lineup rather than actually identifying him or her.

I have gotten ahead of myself, in order to set out clearly the problem of the present standard police lineup. Back in 1987, almost all of the studies that I have quoted were not yet published. However, even back then I understood that there were serious problems with the lineup. Israel mandates an eight-person lineup. The chance of an innocent suspect being chosen by mistake when a witness chooses is $1/8 = 12.5\%$.

¹ Lineups consisting of short video-clips of lineup members has been recently legalized in England as an alternative to the actual lineup members standing in line (live lineup). Valentine and Heaton (1999) found that only 14% of mock witnesses chose the suspect in such lineups. However, video lineups is only an alternative today in England. Live lineups continue to be conducted.

THE MUG-SHOT ALBUM SEARCH

The second tool of the police is the mug-shot album search. Police forces take a photograph of most suspects when they book them. If the police do not have a suspect but have a witness, they invite him or her to look through photographs, in the hope that the witness will "identify" the culprit among the photos. Crime is, after all, a profession. The same people commit crimes time and again, and therefore there is a real possibility that the perpetrator's photo is in the album.

We should note that the mug-shot search is by far inferior to the lineup as a tool for bringing an identification to court as evidence against defendants. The crucial difference is that there are no known innocents (foils) in the mug-shot album. Therefore there is no test of witness memory.

Anyone that the witness chooses becomes the suspect. Witnesses only have to want to choose someone, they have no need of any memory whatsoever. The police have no way of knowing from the mug-shot search whether the witness has correctly identified the culprit, has mistakenly picked someone who had nothing to do with the crime, or has simply made a wild guess.

However, as an investigative tool the mug-shot search can be critical. Without a suspect the police have little to investigate. With one provided by the mug-shot search, the police can collect evidence that either implicates the suspect or exonerates him or her.

In practice, police all too often do present an "identification" in a mug-shot album search in court as a bone fide identification in a photo lineup, and the court does not always understand the distinction and convicts the defendant (for example, Supreme Court, 1991). However, in 1987 my task was to improve on the traditional function of the mug-shot search, finding suspects.

The problem with the mug-shot search is clear. The police today have too many photos in their albums. In 1987 tiny Israel had more than 100,000 photos in the national album, which included suspects arrested over the previous ten years. The police can of course only show a witness a small fraction of these photos. A witness can maintain his ability to concentrate only for so long.

The police must therefore choose a relatively small number of photos, perhaps a few hundred at most (Clifford & Davies, 1989; Laughery, Rhodes, & Batten, 1981). And here lies the rub. Unless the photos are chosen very judiciously, the culprit may be in the album but not among the photos shown to the witness.

The police seemingly have very few options. One method is to include only photos of suspects known to have committed the same crime, but that is an uncertain criterion. Criminals often commit a variety of different crimes. One major police station found a method for dealing with certain minor offenses. They organized their album according to the home address of the suspects, since in their experience these culprits commit their crimes close to home.

The only other source is usually the description of the culprit provided by the witness. However, there are two problems with using this information. Witnesses are not good at providing detailed descriptions. Only a few general categories are used, that often fit many photos in the album (Lindsay, et al., 1988), and witnesses forget verbal descriptors very quickly (Ellis, Shephard, & Davies, 1980).

The other problem is that witnesses also err in their descriptions. All it takes is one such error to remove the culprit from the list of photos shown the witness. A special case that did not even depend on poor memory happened in Israel when a man lived with a woman for a while, and then absconded with her valuables. The woman had an opportunity to get to know the man's appearance well.

She described him as being of Eastern descent (Jewish Israelis can for the most part be divided between those originating in the Middle East, Eastern, and those originating in Europe and the American Continents, Western). She also estimated his age as being about 40. Unfortunately, while indeed looking Eastern he was actually Western, and he looked much older than his 24 years. Needless to say, her description failed to help find him in the mug-shot album.

It might therefore not come as a surprise that quite often witnesses fail to find anyone in the album, and even when they do police release from custody about half of those that they arrest because they have been "identified", having reached the conclusion that they are innocent. They of course do not arrest those who have the iron-clad alibi of serving a sentence in jail for another crime.

THE POLICE COMPOSITE

The composite is the eyewitness identification tool of last resort for the police. If witnesses fail to identify a suspect, they at least can do a composite. As the last resort, composites have been subjected to surprisingly intensive research (for example, Caldwell & Johnston, 1991; Davies & Christie, 1982; Davies Milne, & Sheperd, 1983; Ellis, Shepherd, & Davies, 1975; Jenkins & Davies, 1985; Laughery & Fowler, 1980; Mauldin & Laughery, 1981; Rakover & Cahlon, 1989; Wogalter & Marwitz, 1991).

The experimental studies that evaluated the accuracy of the composite have consistently shown rather poor results. Ellis et al. (1975), for example, showed photos of white males to subjects for 10 seconds, and then immediately had them construct composites with the help of an operator. Each photo was inserted into an array of 36 faces, and judges picked the photo (target) which they thought fitted the composite. First choice accuracy was 12.5%. Laughery and Fowler (1980) found that police artist sketches were consistently better than composites. Davies (1981) expressed the hope that computerized versions of the composite would bring improvement. However, empirical tests have proven disappointing (Christie et al., 1981; Morier, 1995; Wogalter & Marwitz, 1991).

The traditional composite relies primarily on individual facial features. However, as Clifford and Davies (1989) point out, this is based on a logical rather than a psychological analysis: It does not seem to be the major way that people remember faces. Rather, we need a greater emphasis on a global approach, memory of the entire facial gestalt (Davies, 1981).

A variety of studies have established that memory for the total face is not simply the sum of the memory of the parts. The total face takes precedence (Davies & Christie, 1982; Davies, Ellis, & Shepherd, 1977; Harmon, 1973; Purcell & Stewert, 1988; Tanaka & Farah, 1993). Witnesses can provide only vague and limited details of even well-known faces (Phillips, 1978; Shepherd, Davies, & Ellis, 1978). The recognition advantage of familiar faces is not related to better memory of facial parts (Klatsky & Forest, 1984).

RESEARCH ON THE COMPOSITE AND MUG-SHOT SEARCH

An important question was: with problems associated with all three tools of identification, where was I to start? In retrospect, I should have started with the police lineup. The lineup is by far the most important tool, since it is the only one that has probative value in court. I chose the police composite, which can be considered the least important.

In my defense I can cite some mitigating circumstances. First of all, in Israel the courts prefer live lineups like the English example. In Israel such lineups are conducted by police detectives, outside the jurisdiction of forensic sciences. (Photo lineups, in which the photo of the suspect is placed among the photos of the foils, is permitted under certain circumstances and is under the jurisdiction of forensic sciences). It seemed prudent to begin my research within my home base. Secondly, a lot of research had been conducted on composites.

Perhaps the most important factor was the discovery at police headquarters, where I was stationed, of a copy of the MA dissertation of Weil (1982). Her approach opened up an entirely new way of making composites, which seemed to provide a better fit between the method and the way people perceive and remember faces.

Her suggestion was for the witness to pick from some collection of photos a number which seemed similar to the culprit, and superimpose them, basically making an average of them. With the critical aid of Noam Jungman from the computer programming section of forensic science, I tested some resulting composites against ones made by an expert in creating composites by the traditional method. The new composites were no better.

My hunch was that the photos that the witnesses picked were not similar enough to the "culprits". I needed a far greater collection of photos from which my witnesses could choose. I thus found myself squarely in the problem of the mug-search. I had in mind about ten thousand photos, a number too large for witnesses to view. I therefore needed a method of choosing a smaller number. This is of course precisely the mug-shot search quandary.

I hit upon a method based on the notion of similarity that Weil (1982) had introduced. Witnesses were shown a somewhat random screen of 24 photos. They were requested to pick if possible photos that were similar to the culprit. This caused photos that were similar to the photos that were chosen to come up on the next screen.

The method was successfully tested in three experiments (Levi et al., 1995). The culprit appeared on the screen much faster than if the witness had to look through all the photos. The only problem was that my experimental album had only 2000 photos in it. I had myself coded each photo into a similarity network required for the system to work.

When it came to applying the method to the national album of the Israeli police, we were faced with over 100,000 photos that had to be coded. There was no way that I was going to volunteer to the mammoth task of coding them all as I had the 2000 experimental photos. We joked that we needed a large team of dwarves to accomplish the task.

There was another alternative. We could make use of a computer program (Turk & Pentland, 1991) to establish a similarity network between the photos. We tried it. We failed. The similarity network based on the computer did not enable me to reach the culprit any faster than if I viewed all of the photos.

To make matters much worse, my computer programmer colleague, without whose aid I could not possibly continue researching mug-shots, decided that there was no point in continuing. The major reason was that even if we came up with a successful method, we

needed the very active collaboration of the Computer Division at headquarters, and he had good reason to believe at the time that such collaboration would not be forthcoming.

Circumstances thus happily forced me to begin research on lineups. I could conduct such research, even using computers, with no help. I had been appointed chairman of a committee of forensic science to decide what to do about the very old cameras that were still in use in the division to photograph suspects for the mug-shot album. The cameras were excellent but really required professional photographers, which the forensic technicians who took the pictures, having to deal with many varied evidence, were no longer. Even more severe, spare parts were becoming harder and harder to come by.

The committee agreed with me that the ideal route was to buy digital cameras hooked up to desk computers, and thus dispense with the cost, time and effort entailed in the whole process of developing and storing photos the old way. Copies could always be printed from printers attached to the computer. I overrode their concern about getting the required cooperation from the Computer Division, and forensic sciences moved ahead to the new system.

The new system enabled me to capture not only photos of people for experiments on lineups, but also video-clips if I wanted to experiment with video lineups. But first I should report on research conducted on the behest of the commander of forensic sciences, Joseph Almog (Levi & Almog, 2000).

The question was a very practical one. The traditional method of conducting a composite can be very time consuming. Is the effort worthwhile? How often do composites actually play a role in finding a suspect who subsequently turns out to be the culprit?

Companies selling the new computerized composites have made claims that a large number of cases in which composites were constructed led to convictions, but that is a false measure. It is not sufficient. The composite has to be a factor in the apprehension of the culprit, not just a method used that had no effect.

I therefore took all the composites that had been constructed during two years, and followed up on each case to determine which ones had led to a conviction. For those cases I delved deeper to discover how the culprit had been apprehended. This was often reported in the police file of the case, but sometimes I had to track down the detective who had been involved.

The results were not favorable for the composites. At most in 2% of the cases the composite was actually instrumental in apprehending the culprit. This led to the next question: why was the composite so ineffective?

The most obvious possibility was that the composites were simply poor. Composites are constructed by forensic technicians, and we have noted that they must be jack of all trades. Perhaps they therefore were not masters of composite construction?

If this was the reason, then the few composites that had been instrumental in apprehending the culprit should be exceptionally good composites, in contrast to the rest. I tested this hunch by using a traditional method of testing composites. I found the mug-shots of the culprits who had been apprehended with the help of the composite, and picked seven additional photos for each one of similar age, ethnic group and amount of hair. I did the same for a random selection of other composites of culprits who had been apprehended by other means.

For each composite, I now showed the eight photos to colleagues at police headquarters and asked them to solve a simple riddle. Whose photo was the culprit for whom the

composite had been constructed? If the composites of the culprits who had been apprehended with their help were better, more people should be able to pick the correct photo.

This did not happen. As a matter of fact, only for one composite did my colleagues succeed in picking any substantial number of the right photo. Each one tended to choose another photo.

It would seem that almost all of the composites were "bad" representations. This may be a bit unfair, since none of my colleagues knew any of the culprits. People familiar with the culprit are supposed to be the ones who will recognize the culprit. Nonetheless my results verified previous studies on the poor performance of composites in general.

Why, then, were some composites useful while the others were not? A common element in the successful composites seems to have been how they were used by the police. They were part of a focused investigation. For example, in one case a soldier had been murdered and his weapon stolen. A witness claimed to have seen a gun of that type change hands in a particular location.

Before investing too much effort in following up on this lead, the police first had the witness construct a composite of one of the two people he had claimed to have seen, and they took the composite to the location and asked people if that person had been seen in the area. People agreed that they had seen that person, and then the investigation began in earnest. The person turned out to be a gun dealer from Gaza, and through him the investigators reached the murderers.

This focused approach contrasts with alternate approaches like hanging the composite in police stations or getting it printed in newspapers. I surveyed officers involved in recent composite cases, and found that the focused approach was very rarely used. My tentative conclusion was that the fault did not lie in composite quality, but in the way the police were using the composites.

LINEUP RESEARCH

Theoretical Background

I published my first article on lineups, a theoretical piece, in 1995 (Levi & Jungman, 1995). I would recommend to every researcher to read an article they wrote over ten years ago. It can be a most humbling experience. My position on certain matters definitely has changed since then.

The paper consisted of a critique of the standard lineup, and suggested an alternative. The critique consisted of six major points. The first of these was that courts over-believe lineup "identifications". They forget that their personal experiences identifying people are almost all of persons who are familiar, while in lineups the members are all strangers. The difference is so great that "identification" may very well be a misnomer. What witnesses may actually be doing is deciding whether some lineup member is similar enough to their uncertain memory of the culprit for them to decide that he or she is the perpetrator.

My second point did not survive long in my research program. I argued against the all-or-none nature of "identifications" and argued for the possibility of a "partial identification". We will visit this idea a few times, as long as it survived.

In my third point I discuss the two alternate means of choosing foils for the lineup. I noted Luus and Wells' (1991) critique of the traditional method of choosing them, picking ones that are similar to the suspect. I mentioned the problem that there is no way of determining the optimal amount of similarity, or which aspects of the suspect should be similar. An extreme example would be to pick clones of the suspect, which would make identification of the culprit impossible.

Luus and Wells argued in favor of choosing foils that fit the description that the witness gives of the culprit. They noted that witnesses give very limited descriptions (Lindsay, Martin, & Webber, 1994), and therefore foils chosen on that basis are quite different from each other and the suspect. If the suspect is guilty, this makes it easier for witnesses to differentiate him or her from the foils.

I only discovered four years later, when I appeared in court for the first time as an expert witness in *The State vs. Kedoshim* (1999), that the similarity-to-suspect method of choosing foils had a far more serious flaw. The public defender in charge of the file turned to me to help defend her client against problems she found in the lineup. One of the problems dealt with the choice of foils.

The witness had described the culprit as "the small one". The suspect was 1.73 Meters in height, almost precisely the average height of Israeli males. Two of the foils in the lineup were the same height as the suspect, while the other five were clearly taller.

The public defender realized that the witness could ignore the five taller foils as definitely as if they had been women. They did not fit the memory of the witness as possibly being the culprit. Thus, for the witness, the lineup consisted of three members only, the suspect and the two shorter foils. When the witness chose someone, his chance of choosing the suspect, even if he was innocent, was $1/3 = 33\%$!

Precedent in Israel, as almost everywhere, mandates the similarity-to-suspect method of choosing foils. Since that method does not require that the foils fit the description that the witness gives, the police conducted a perfectly acceptable lineup from the legal standpoint. Yet the lineup was obviously grossly unfair to the suspect. He was "identified", but the probability of his being innocent nonetheless was very large.

In my 1995 paper I also quoted various criticisms of the new method (Wogalter, Marwitz & Leonard, 1992). This was useful, because the lineup method I was recommending, aside from allowing partial identifications, had a unique third way of choosing foils. However, the full force of one point that Wogalter et al. (1992) made escaped me until 2005.

They wrote that "another source of error comes from interpretation of the witness description by other persons (e.g., police officers)...to form a lineup" (p.451). I suddenly realized that if police officers interpreted "the small one" differently from the intent of the witness, the lineup would again have foils that the witness would ignore. I therefore recommended (Levi, 2006d) that police officers use the characteristics mentioned in the witness description of the culprit as with the fit-to-description method, but pick foils that fit the suspect on those characteristics.

For example, in the *State vs. Kedoshim* (1999) case this would mean choosing foils whose height was 1.73 Meters as the suspects. The advantage of doing this is that there is no ambiguity. The suspect is available to make the appropriate match. There is now no way that witnesses will be able to discount any of the foils.

The next point was a critique of the sequential lineup. The sequential lineup was introduced by Lindsay and Wells (1985) to prevent witnesses from choosing the person most

similar to the culprit, a major source of mistaken identifications. In the sequential lineup, witnesses view the members one after the other, and they must decide whether each one is the offender or not before seeing the next person. They are also not informed of the size of the lineup. This indeed thwarts witnesses from choosing the lineup member most similar to the perpetrator. They can never know whether one of the people yet to be seen will be more similar than those they have already seen

I argued that the sequential lineup could prevent witnesses from choosing people only because they were the most similar to the culprit in the lineup, but could not prevent witnesses from mistakenly identifying innocent suspects who were genuinely similar to the culprit. I noted that the median rate of false identifications in a number of sequential lineup experiments (Lindsay, Lea, & Fulford, 1991; Lindsay, Lee, Nosworthy, et al., 1991; Lindsay & Wells, 1985) was 6.7%. We have noted that such rates could be considered a problem under the standard of conviction only when there was no reasonable doubt.

I also noted, somewhat prophetically in light of an article I published three years later (Levi, 1998a), that the research paradigm of Lindsay used rather optimal eyewitness conditions leading to rather optimal memory. Real witnesses, with less optimal memory, might very well confuse innocent suspects less similar to the culprit with the culprit.

I was stating, then, that while the sequential lineup was better than the traditional simultaneous lineup, it still was not good enough. Regarding the former part of the statement, early research indeed led to the conclusion that the sequential lineup resulted in far less mistaken identifications while paying a smaller price in correct ones (Stebly, et al., 2001). If this were indeed the case, then the sequential lineup would be more reliable.

However, recent research has cast doubt on this conclusion. When foils are chosen to fit the description of the target rather than according to their similarity to the suspect, researchers (Levi, 2006a; Memon & Bartlett, 2002; Memon & Gabbert, 2003) have found that simultaneous lineups enabled more target identifications relative to sequential lineups than previously found.

The theoretical underpinning of this finding is that the sequential lineup benefits far less from choosing foils that fit the description of the perpetrator. The extra advantage to the simultaneous lineup, we have noted, results from the foils being more different from suspects when they are chosen by the fit-to-description method (Luus & Wells, 1991; Wells, Rydell, & Seelau, 1991), and therefore witnesses can more easily discriminate between guilty ones and the foils when they compare lineup members. Since witnesses cannot compare them in the sequential lineup, they benefit less from less similarity between the offender and the foils.

Also, the earlier research exaggerated the number of mistaken identifications in simultaneous lineups. Researchers would designate the person most similar to the "culprit" as the "innocent suspect". This led to many "identifications" of the "innocent suspect" in simultaneous lineups, because witnesses choose the person most similar to the "culprit" (Wells, 1984). However, in the real world innocent suspects are not always the most similar to the culprit, but rather only 1/6 of the time in ideal six-person lineups.

The sequential lineup suffers far less from the similarity of the innocent suspect to the perpetrator, because, again, witnesses cannot compare lineup members. Thus, the early research found a far greater difference between the two lineups in favor of the sequential lineup than we should expect in real world lineups that are fair. This research underestimated correct identifications of the simultaneous lineup and overestimated its mistaken

identifications. With these two factors corrected, I found (Levi, 2006b) no difference in the reliability of the two lineups.

My next point also criticized the sequential lineup, on the grounds, as I have just mentioned, that the sequential lineup should lead to less identifications. I reasoned that, especially using the similarity-to-suspect method, witnesses might mistakenly identify a foil before they had a chance to see the culprit, and thus miss identifying him or her. This may happen to a certain extent, but there is another more important reason for reduced identifications in the sequential lineup.

The reason is that sequential lineups reduce the rate of choosing in both target-present and target-absent lineups. Ebbesen and Flowe (2002) have termed this phenomenon a criterion shift, but do not explain why it occurs. I (Levi, 2006b) theorized later that the reason for this is that since in the sequential lineup witnesses must decide whether a person is the offender or not before they have seen all lineup members, they hesitate to choose any particular person if their memory is imperfect. They fear missing the culprit who might be among those that they have not yet seen. That is, the chief reason for reduced identifications is not that they actually choose someone before the culprit, as I theorized in my 1995 article, but ironically because they fear they will do just that, and therefore also fail to choose the culprit.

My last point in the 1995 article was that lineups are too small. We have noted that even with the English nine-person lineup, the innocent suspect has a chance of $1/9 = 11\%$ chance of being chosen, and how over the years I have perfected the estimate of the chances that suspects/defendants are actually innocent despite being "identified". One obvious method to improve the situation is to enlarge the lineup. This notion has survived intact until today.

That brings us to the solution I proposed, which we can dispense with quickly. When I wrote the article I had not had to give up yet on the mug-shot search program. My idea was to use basically the same system for the lineup, except that we would have to make sure that the suspect was among the photos the witness viewed. Once I was forced to abandon the mug-shot search, the lineup based on it became impossible too.

It might be important to note that it may not be possible yet to use a similarity network based on a computer program for either a mug-shot search or a lineup. McAllister, Stewart, and Loveland, J. (2003) also tried unsuccessfully to use a computerized similarity network. They then compared human and the computer judgments of similarity, and found no relationship. It seems that so far the computer programs interpret similarity differently than people.

Testing the Boredom Hypothesis

The next major step was to devise a different alternative to the traditional lineup. But first there was an idea I wanted test with the help of my computerized mug-shot photos (Levi, 1996).

One obvious direction was to enlarge the lineup, but two research articles advised against it (Davies, Shepherd, & Ellis, 1979; Laughery, Alexander., & Lane, 1971). They both found a reduction in identifications when witnesses viewed about 100 photos rather than about 40 before the "culprit" appeared.

Both experiments followed an experimental strategy popular at the time. The witnesses could not control the time that they viewed each photo. The time between each photo was about ten seconds. This may seem negligible. However, I invite the reader to do almost nothing for 100 consecutive periods of ten seconds. My hunch was that the experimenters had bored their witnesses, and by the 100th photo they were barely paying attention any more.

In my mug-shot research my witnesses were kept occupied by having to decide for each screen which if any photos were similar to the culprit. As soon as they made their decision I would move on to the next screen. My witnesses also viewed the photos 24 at a time, rather than one at a time. I had not noted any signs of boredom among my witnesses, so I decided to test witnesses who were given such a task versus the one used in the experiments.

Noam, my programmer partner, provided me with a program that enabled me to show photos one at a time. I used the program based on my personal judgments rather than the computer version to show photos 24 at a time. I also compared having the "culprit" appear in the 50th position versus the 150th position.

The results were clear-cut. There was essentially no difference in identifications of the culprit when the photos were shown in groups or when there were only 50 photos. The one group that did much more poorly was the group that saw 150 photos one at a time. This was also the group that I had quickly learned to dread doing. It bored me to tears showing 150 single photos.

There was one technical problem with this experiment. When the photos were shown in groups and witnesses picked someone as similar to the culprit, the program worked as it did in the mug-shot search, showing on the next screen photos more similar to the one they chose. Thus the witnesses in these groups saw photos that were different from those who saw them one at a time,

I could argue that by having more similar photos appear I had made the task more difficult for the witnesses, since they had to discriminate the culprit from more similar photos. It would still have been better to replicate the experiment making the small adjustment so that both groups saw the same photos. However, my interest moved on to another issue.

Comparing Real Life Eyewitness Conditions to Experimental Ones

In my 1995_paper (Levi & Jungman, 1995) I had expressed concern that experimental eyewitness conditions were too optimal, and that in the real world witnesses would have poorer memory and therefore less identifications and more mistaken ones. I noticed that I could use the composite files that I had gathered in my office in order to test this concern of mine.

Each composite form included a brief description of the crime that had been committed. From it I could learn whether witnesses were victims or bystanders, whether, if they were the victim, they had been attacked physically, whether a weapon had been displayed by the culprit, how many culprits had been present, and whether the witness had been further distracted from paying attention to the culprits' face by some other task he or she had to perform. The age of the witness was also recorded on the form.

I also found that in a small number of cases the nature of the crime was completely different. The culprit used stealth to steal something, and the victim was totally unaware at

the time that the crime was being committed. Therefore little attention was paid to the culprit. Finally, I estimated the time length of the criminal event.

I extracted the same information from the large collection of experimental reports that I had collected over the years. Table 2 compares the data from real life cases to the experimental sample. We note an extreme difference between the samples.

In only 8% of the experiments did the culprit brandish a weapon, while 44% of the culprits did in the real world. Only 4% of the experimental witnesses were victims, while 60% were in the composite cases. No experimental witness were physically assaulted, while 37%, more than half the victims, were in the composite cases. While in only 10% of the experiments there was more than one culprit, 41% had more than one in the real world (Levi, 1998a).

Only 9% of the experimental witnesses were distracted for some other reason from paying attention to the culprits face, in the real world 74% were distracted. In only 1% of the experiments was the witness unaware of a crime being committed, while this occurred 10% of the time in the composite cases. In the experiments the age of the witnesses was suboptimal, being over 30, only 10% of the time, while in the real world this occurred 57% of the time.

Table 2. A comparison of eyewitness conditions between experiments and real world data

	EXP	ARC
WEAPON DISPLAYED	8%	44%
WITNESS IS VICTIM	4%	60%
VICTIM ASSAULTED	0	37%
OFFENDERS: >1	10%	41%
OTHER DISTRACTIONS	9%	74%
LITTLE ATTENTION	1%	10%
AGE OF WITNESS: >30	10%	57%
*EXPOSURE: > 5 MIN	2%	24%
N	104	115

The only factor that worked in favor of witness memory in the real world was length of the incident. I estimated that its length was over 5 minutes 24% of the time in the real world, while the experiments reported on this occurring only 2% of the time. With almost every factor the experimental evidence points to a large reduction in identifications, and sometimes to increased mistaken identifications, for the conditions prevalent in the real world.

The existence of a weapon seems to both decrease identifications and increase mistaken ones (Cutler et al., 1987a, Cutler, Penrod & Martens, 1987b; Johnson & Scott, 1976; Maass & Kohnken, 1989; O'Rourke, et al., 1989). Cutler et al. (1987b) found that average correct choices were reduced from 46% to 26% when a weapon was visible, O'Rourke et al. (1989) found a reduction from 55% to 37%. "Correct choices" refer to the sum of correct choices of the culprit (in culprit-present lineups) and refusals to choose anyone in culprit-absent ones. Their results indicate then, that a visible weapon can reduce identifications and increase mistaken ones up to 20%.

The evidence from the field is that *victims* tend to focus on the weapon in a situation of sudden fear (Hinkle & Malawista, 1987). Maass and Kohnken (1989), who approximated

such a situation with a syringe as the "weapon," found mistaken identifications to increase from 33% to 64%. Steblay (1992), in her meta-analysis of the weapon focus effect, concluded that the effect was greater with higher emotional arousal. This is much more likely to occur in real cases, especially when the witness is the victim.

Hinkle & Malawista (1987) report that while their witnesses had very poor memory of the criminal, they gave excellent descriptions of the weapon. Witnesses will remember better that on which they focus. Loftus, Loftus and Messo (1987) recorded eye fixations of witnesses to a series of slides depicting the perpetrator holding a gun or a check. Witnesses focused more on the gun.

The witness being the victim could also negatively impact on eyewitness accuracy. For obvious ethical reasons, this is an under-researched topic. Kassin (1984) found that identifications were reduced from 27% to 0 when the witness was a victim rather than a bystander. Deffenbacher (1991) notes that in 13 of 15 studies in which the violence level or intensity of personal threat was successfully manipulated, higher arousal has resulted in reduced eyewitness accuracy. Deffenbacher et al. (2004), in analyzing experiments that varied the stress felt by witnesses, found a large reduction in identifications with increased stress..

The witness/victim is physically assaulted: A further complication occurs when the victim is physically attacked. Obviously we have no experimental evidence whatsoever. A rather mild analogy was conducted by Peters (1988). He compared identifications of a nurse who inoculated the witness to those of a person who took their pulse 2 min. later. The nurse was identified 41% versus 66% for the other person. In addition, Deffenbacher's (1991) and Deffenbacher et al., (2004) summaries of violence, personal threat and stress should be relevant to victim assault, albeit, again, as a mild analogy. Being physically assaulted should be a more powerful situation, effecting identification even more.

Weapons, being the victim and being physically assaulted all distract from paying attention to the offender's face. The most obvious additional distraction is the presence of more than one criminal. Shapiro and Penrod (1986) found that "load at study" correlated mainly with the number of faces seen, and effected both real and mistaken identifications. Clifford and Hollin (1981) found that adding four additional people to the incident reduced identification of a culprit from 30% to 10%.

Witness involved in distracting activity: Shapiro and Penrod (1986) concluded from their study that attention to the face of the culprit was a critical variable. We have noted that a gun or many perpetrators can distract a witness. When Cutler et al. (1987b) had witnesses focus on aspects of the incident other than the face, correct choices were reduced from 44% to 28%. A distraction reduced them from 42% to 30%.

Minimal attention: Experimenters are so sensitive to the need to pay attention to the perpetrator that they make special efforts to ensure that the witness does. Lindsay and his colleagues, for example, had the perpetrator talk to the witness and establish eye contact with him (Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, et al., 1991; Lindsay & Wells, 1980; 1985). Field studies have had the perpetrator engage in some unusual behavior (Brigham et al., 1982; Krafka, & Penrod, 1985). In contrast, in the real world the offender in these cases is interested, for the same reason, in being as inconspicuous as possible.

The nearest test of a difference was done by Gross and Hayne (1996). They compared the identification of a "workman" seen rather incidentally for 30 seconds to a "poleslider" seen for the same duration who was severely reprimanded in the presence of the young witnesses. The rate of identifications for the first case was 25%, 65% for the latter.

Even the age of the witness can make a large difference. O'Rourke et al. (1989) found that when older witnesses were substituted for university undergraduates, correct choices, a joint measure of both correct and mistaken identifications, were reduced from 51% to 25% with increasingly older witnesses. Similarly, Scoglin, Calhoun, & D'errico (1994) found a reduction in "culprit" recognition from 45% to 33%.

Another important point is while in the experimental studies only one factor was involved in each experimental test, the average of the number of factors in a typical real world crime was four: For example, the witness would be a victim who was attacked physically, a weapon would be in evidence, and the victim would be over 30 years old. We should expect a piling up of factors to further reduce identification accuracy.

Finally, the experimental tests were never as traumatic as real crimes. Witnesses saw weapons in video-clips, rather than having them pointed at them. Victims were barely so, as was any "physical assault" on them.

The MSL Lineup: The First Experiment

Since the mug-shot analogy could not work for an improved lineup, I tried a different route. The sequential lineup seemed a conceptual improvement over the simultaneous lineup because it eliminated comparing lineup members and picking the person who looks most like the culprit. The problem seemed to be that witnesses failed to choose often enough when the culprit was in the lineup for fear of mistakenly choosing a foil and thus missing the culprit.

I (Levi, 1998b) therefore gave witnesses the opportunity to choose more than one person. I reasoned that this would increase choosing. Witnesses could choose a person when in doubt without losing the chance of later identifying the real perpetrator. As with almost all the lineup experiments I did while still in the police, the lineup consisted of video-clips of the "culprit" and the foils.

Table 3. Choices of witnesses for culprit-present and culprit-absent lineup, Levi (1998b)

Lineup Condition:		Culprit-present	Culprit-absent
Choice of culprit	Culprit only	26 (43%)	NA
	Culprit + foil	5 (8%)	NA
	Culprit + foils	11 (18%)	NA
Choice of innocent suspect	Suspect only	NA	0
	Suspect + foil	NA	3 (3%)
	Suspect + foils	NA	2 (2%)
Choice of foils	One foil	3 (5%)	16 (17%)
	More than one	5 (8%)	15 (16%)
No choice		11 (18%)	57 (61%)
Total		61	93

I recruited police officers who were not stationed at headquarters to visit offices there and recruit participants for the experiment. When the participants arrived at my office for the experiment, I informed them that I would conduct a lineup, and the person they had to identify was the person who had recruited them for the experiment.

Table 3 gives the results. Witnesses indeed chose more often, 43% choosing only the "culprit". This rate compares favorably to the 44% average rate I found in the previous study for simultaneous lineups.

An additional 19% chose him along with one or more foils. I continued to call the latter situation a partial identification, providing less proof of the suspect's culpability. Indeed this was accomplished because far fewer witnesses failed to choose anyone in the culprit-present lineup, only 18% instead of the usual 50% in sequential lineups.

I was also very encouraged by the results of the culprit-absent lineup. In almost 100 lineups, no witness chose the suspect by himself. Only 5% made a partial identification of him.

The other aspect of the MSL lineup was that it was large. In this first test of the MSL the lineup consisted of 20 members. Since in half of the lineups the "culprit" appeared up to the 10th position in the sequential lineup, I could also test whether there was any difference between a ten- and twenty-person lineup in either identifications of the "culprit" or mistaken choices when the "culprit" was absent.

I found no differences in the number of identifications of the culprit or mistaken choices when the culprit was absent between ten- and twenty-person lineups. However, as we have noted in general, the chance of choosing the innocent suspect in the ten-person lineup was $1/10 = 10\%$ of the mistaken choices, while in the 20-person lineup the chance was only $1/20 = 5\%$. The 20-person lineup was twice as reliable.

The Second MSL Experiment: 40-person Video Lineups

The biggest weakness of this first experiment was that there was no comparison with either the simultaneous or sequential lineup. This I corrected in my second experiment (Levi 2001; 2002). I conducted three different types of lineups. In all of them the witnesses saw the lineup members sequentially, but in the first witnesses were told that they could request to see any lineup member as many times as they wanted before they made their decision.

I did not know how to show more than one video-clip at a time. Therefore I could not conduct a classic simultaneous lineup. However, the critical factor of the simultaneous lineup seemed to be the ability of witnesses to compare lineup members before making a decision. This enabled witnesses to choose the lineup member most similar to the culprit. This may increase identifications, since when the culprit is present he is clearly the person most similar to himself. However, we have noted that when the suspect is innocent this strategy increases mistaken choices, and therefore mistaken identifications. Since witnesses did not see the lineup members simultaneously, I called this lineup the comparison lineup.

The second lineup was a sequential lineup, except that, like all the lineups in this experiment, it consisted of 40 members. The third lineup was an MSL lineup. I added twenty more foils, all police officers as in the previous experiment) to have 40-person lineups.

All my experiments up to this point had been run out of my office at police headquarters, and the witnesses had all been police officers. I could no longer follow this practice. It was important that the witness would not know he was a witness during the eyewitness event, as happens in real events. Otherwise he would pay too much attention to the culprit. My fellow police officers were becoming too savvy. I had to find other locations where I could put my computer and invite witnesses to them.

I was teaching a couple of courses at the Cholon Institute of Technology and I had an office there, so the first witnesses in my experiment were the staff of the institute. A government building housing the Ministry of Internal Security, which oversees the police, was right next door to national police headquarters, and the ministry was kind enough to give me a room there for the experiment. Therefore, the next group of witnesses were government employees in that building. Finally, the Faculty of Law at the Mount Scopus campus of the Hebrew University were also kind enough to give me a room (with a rare air-conditioner during a hot summer!), which opened up the campus.

In my previous experiment I had great difficulty finding appropriate confederates. Many recoiled from the prospect of having to ask officers far more senior to them to participate in my experiment, and having to face refusals. Others had the necessary gall, but simultaneously had the audacity of goldbricking on the job.

I therefore decided this time to accompany each accomplice. My presence served both to deflect any rejections on to me, and prevent any goldbricking. This also turned out to have an unanticipated advantage.

I visited prospective witnesses in their offices, with a confederate. I elicited agreement to participate in the experiment. The confederate then found a suitable time and asked the witnesses for their name and office phone number. We thereupon departed. When witnesses arrived for the experiment, I informed them that a lineup would be conducted, the confederate being the "culprit."

I had unintentionally created a more difficult eyewitness condition, closer to real world conditions. In the previous experiment my confederate interrupted them in their work. Some had to check their calendar, others their phone number. The age of witnesses was often not optimal for memory

In the present experiment, there was also more than one "culprit" at the "crime", the confederate, and me. Moreover, the confederate was an inconspicuous appendage performing a technical task. I did most of the talking. Witnesses often mentioned that they had paid little attention to him.

The incident was not, of course, a crime. It was similar to crimes such as fraud, of which the victim is unaware at the time of the event. However, that is beside the point. I managed to create a difficult eyewitness situation, with some elements like those of a crime.

Almost as an afterthought, I asked each witness who chose someone in the lineup to give a number, from 1 to 100 (the percentage) indicating how confident they were in their choice. The accepted finding of a weak confidence-accuracy relationship (Bothwell, Deffenbacher, & Brigham, 1987; Deffenbacher, 1980; Kassin, Ellsworth, & Smith, 1989; Wells, 1993; Wells & Murray, 1984) was recently challenged. (Juslin, Olsson, & Winman, 1996; Lindsay, Read, & Sharma, 1998). Conscious of Juslin et al.'s criticism of the biserial correlation that had been used in the earlier studies to measure the relationship, and in line with their recommendation, I decided to use Bayesian inference (Levi, 1998a; Wells & Lindsay, 1980) as the means of measurement.

My results were so promising for the MSL lineup that, for the first time during my research program, I reached the conclusion that I had something that should be implemented in the police. I began meeting with police, the public defenders, and the prosecution to explain my new method. In one of the districts of the prosecution I met with the district prosecutor and her deputy.

The deputy raised a wise concern: Some witnesses might choose foils in addition to the culprit only to hedge their bets, even though they were actually able to identify the culprit. In doing so they would be weakening their identification. Instead of a full identification they would be displaying only a partial identification.

I realized that by a stroke of luck I could look into the concern, since I had gathered data on the confidence of witnesses in their choices. I discovered a very useful fact. Whenever witnesses chose foils along with the suspect, if the suspect was chosen more confidently than they had chosen any foil, then the suspect was the culprit. This was so to the same extent as was the case for those witnesses who only chose the suspect.

The major implication was that I could dispense with the notion of partial identifications. I had a means of dividing the multiple choices which included the suspect into full identifications (when the suspect was chosen most confidently) and non-identifications (when he or she was not).

I returned to my data and reanalyzed the MSL lineup identifications and mistaken choices in the light of this new finding (Levi, 2001). Table 4 presents the results for the culprit-present lineups.

I found that when the single and multiple choice identifications were added together, the MSL identifications fell between the higher number of the comparison lineup and the lower number of sequential ones. While the sequential lineup had significantly less identifications than the comparison lineup, the MSL identifications did not differ significantly from either of the other two.

Table 5 gives the results for the culprit-absent lineups. Mistaken multiple choices were divided into two categories. If the witness has given two lineup members their highest confidence rating, these were known non-identifications and therefore need not be treated as mistaken choices. Only one lineup member can have the highest rating to be considered an "identification". All the rest are treated as mistaken choices.

Table 4. Lineup Choices for Culprit-Present Lineups, Levi (2001)

Lineup type	Foils chosen?	Suspect chosen:	MSL ¹	Comparison ²	Sequential ³
Choice of culprit	Culprit only		(7) 9%	(12) 27%	(5) 14%
	Culprit + foils	Most confidently	(6) 8%	NA	NA
Choice of foils	Total		(13) 17%	(12) 27%	(5) 14%
	Culprit + foils	Not most confidently	(11) 15%	NA	NA
No choice	Total		(24) 32%	(12) 27%	(5) 14%
Total			(29) 39%	(14) 31%	(17) 46%
			(22) 29%	(19) 42%	(15) 41%
			(75)100%	(45)100%	(37) 101%

¹ Sequential (no comparisons allowed), multiple choices allowed.

² Comparisons allowed, single choices only allowed.

Sequential, single choices only allowed.

Table 5. Lineup choices for culprit-absent lineups (Levi, 2001)

Lineup type	# of foils	Highest confidence given to:	MSL	Comparison	Sequential
Choice of	1 foil		(12) 17%	(22) 71%	(15) 50%
	More than 1	Only 1 member	(14) 20%	NA	NA
	Total		(26) 37%	(22) 71%	(15) 50%
Foils	More than 1	More than 1 member	(14) 20%	NA	NA
	Total		(40) 57%	(22) 71%	(15) 50%
No choice			(30) 43%	(9) 29%	(15) 50%
Total			(70) 100%	(31) 100%	(30) 100%

Regarding mistaken choices, the MSL had the least, followed by the sequential lineup and then the comparison. While the number of mistaken choices of the MSL and the sequential did not differ between themselves significantly, both had significantly less than the comparison lineup.

One final set of comparisons made, adding correct responses in culprit-present lineups (identifications) to correct responses in culprit-absent ones (non-choices and multiple-choices that can not be identifications), put the MSL in a particularly positive light. The MSL had significantly more correct responses than either sequential lineups or the comparison lineup. There was no significant difference between the sequential and comparison lineups.

The MSL lineup thus became an even more attractive alternative. Its former biggest drawback, having to make do with partial identifications, had been dispensed with. In having more correct responses than either the simultaneous or sequential lineups, it began looking like the best lineup choice. We should add that this was true even with the large simultaneous and sequential lineups in this experiment which are not mandated anywhere. It seemed obvious that the MSL lineup would be even more superior vis a vis the normal small lineups, because the chance of mistakenly identifying innocent suspects when choosing in culprit-absent lineups becomes smaller the larger the lineup.

I also had the opportunity to test the effect of lineup size (Levi, 2002). There was no difference between a ten-person, twenty person and forty-person lineup in identifications. An increase in mistaken choices was found as lineup size increased. However, the number only doubled from the 10-person to the 40-person lineup, while lineup size of course grew four times. The result was that the 40-person lineup caused less mistaken identifications. Thus, the conclusion was that for video lineups at least, the lineup should be at least 40.

Testing the Effectiveness of Voice with the MSL Lineup

In my next experiment I turned to another issue. Melara, Dewitt-Rickards, and O'Brien (1989) compared sequential photo lineups to ones that also included voice recordings. Witnesses who heard the voices (a) identified the target more, and (b) chose less in target-absent lineups. Both of these lessen the chance that a chosen suspect will be innocent (Levi, 1998a).

Melara et al.'s (1989) data were supported by theory that similarity between eyewitness conditions (encoding) and lineups (retrieval) improves memory (Humphreys & Bains, 1983; Tulving & Thompson, 1973). If so, using video-clips with people talking should enhance performance even more. This is a superior fit between encoding and retrieval than Melara et al.'s pairing of photos and voice recordings.

Furthermore, conversing is superior to passive listening for voice identification (Hammersley & Read, 1985), but inferior for visual recognition (Levi, 1998a). Melara et al.'s (1989) study involved listening. Lineups with voice after an event in which witnesses are actively involved should lead to better performance than without voice.

On the other hand, Melara et al.'s (1989) data conflict with other's (Cutler, Berman, Penrod, & Fisher, 1994). Only one study (Cutler, Penrod, O'Rourke, & Martens, 1986) tested voice independently, and it failed to find an effect. The rest (Cutler & Fisher, 1990; Cutler & Penrod, 1988; Cutler, Penrod, & Martens, 1987a; O'Rourke, Penrod, Cutler, & Stuve, 1989) confounded voice with visual enhancements. These should increase identifications. The effects were weak and inconsistent.

Voice should not always aid identification. It is susceptible to outshining (Smith, 1988), being overpowered by visual cues. We are visual beings and voice might be too weak unless conditions favor it. Melara et al. (1989) increased its strength. Their events were five to six minute videotapes, with the target talking throughout. The culprit in real crimes will not usually speak as much.

Visual factors were not ideal: The photo lineup foils were chosen "on the basis of their facial similarity" to the targets. This makes discriminating between them difficult (Wells, 1993, Wells, Rydell, & Seelau, 1993). Photos are inferior to video (Cutler & Fisher, 1990).

Witnesses were told to pay attention. Warning should aid voice (Hammersley & Read, 1995), but not visual, recognition (Narby, Cutler, & Penrod, 1995) Witnesses also saw the lineups right after the video. That short interval should also help voice (Hammersley & Read, 1995; Yarmey, 1995). In the real world witnesses are not warned, and the interval is longer.

On the other hand, the evidence against voice (Cutler et al., 1994) is weak. Voice cannot be blamed for failures when it was confounded with visual improvements. Perhaps their eyewitness conditions were so good that, as the outshining hypothesis posits, the additional verbal cues added little. Their conditions were more favorable than in the real world (Levi, 1998a).

The real crime witness unexpectedly finds himself a participant. In all but one (Cutler & Fisher, 1990) of Cutler's studies, the witnesses viewed a videotape. Melara et al. (1989) also used videotapes, but differently. Cutler's video-tape centered on the target, a robber. Melara et al. (1989) had no such focus. In one episode the police officer, not the suspect, was the target. In another two people were equally prominent. These were more difficult for eyewitnesses.

Cutler included factors that reduce recognition, as a weapon. These should create interactions, whereby better cues would aid identification in more difficult conditions (Cutler, et al., 1987b). This sometimes happened. Their research design, however, chosen for maximal efficiency in testing main effects, was less suited for finding interactions. Also, their measure was a sum of hits in culprit-present and correct rejections in culprit-absent lineups. Cutler and Fisher (1990) found only less mistaken choices using a more realistic eyewitness event. The combined measure may have hidden such a result.

The conclusion: the effect of voice with an authentic eyewitness event and a superior lineup was unknown. The issue has significant practical implications, as it is very important to use the best lineup possible. The next experiment therefore attempted such a test (Levi & Winesberg, 2004).

I therefore compared the MSL lineup with and without voice. This required some basic changes in experimental procedure. The digital camera employed by the police does not have a voice option. I therefore moved to the professional video camera used by forensic units. This required transferring the video to the computer, which turned out to be complicated. I lost some foils.

Two other changes resulted from my experience in the previous experiment. First of all, I had great difficulty getting fellow police officers to act as confederates and join me in recruiting witnesses. I therefore used a young fellow psychologist who was interested in my research, and my son who was kind enough to take the time to help me. We videotaped students at Tel Aviv University as foils in place of the police officers formerly used. Both my confederates had blue eyes and dark hair, a combination harder to find among foils in Israel than the dark eyes of my previous confederates. I thus ended up with a smaller MSL lineup, 14 members.

Finally, I had found in the previous experiment that witnesses often had difficulty leaving their offices to come to the room where my computer was situated. I therefore moved to a laptop computer, and conducted the lineup in the office or lab of the witness. The experiment was conducted at the Givat Ram campus of the Hebrew University.

Table 6 presents the results for culprit-present lineups, and Table 7 for culprit-absent ones. I found that there were more identifications and less mistaken choices with voice compared to no voice, but neither difference was statistically significant. However, when I added identifications to correctly refraining from choosing anyone in the "culprit"-absent lineup as I had done with the previous experiment's results, I found a statistically significant difference in favor of voice lineups.

Whether the additional reliability that voice adds is worth the additional cost is an issue. We have noted that the Israeli police system does not support voice. Also, choosing foils that not only are sufficiently similar in appearance but also have voices that are not too different from the suspect adds an additional burden. The advantage of voice is not so overwhelming as to make the decision clear-cut. Perhaps less expensive improvements should be implemented first.

The 160-person Mug-shot Experiment (Levi, 2000)

In the next experiment I returned to the issue of lineup size. I decided to make a big jump in the size, and decided to compare a 160-person lineup with a 20-person one. This could not be a video lineup. Showing 160 videos one after another seemed too much for witnesses. The advantage of photos was that I could show more than one at once, as I had done with the mug-shot research.

The notion of photographing 160 people for the lineup seemed daunting, so I decided to use police mug-shots. At headquarters there were plenty of photos that were no longer active ones in the police album. I had my confederates photographed in a local police station so that I had similar photos of them also.

Table 6. Lineup Choices for Culprit-Present Lineups (Levi & Wimesberg, 2004)

Lineup type	Culprit chosen?	Voice	No Voice
Choice of culprit	Culprit only ID	9(19.6%)	4(9.5%)
	Culprit + foils ID	10(21.7%)	7(16.7%)
	Total	19(41.3%)	11(26.2%)
Choice of foils	Culprit+foils (Non-ID)	3(6.5%)	5(11.9%)
	Total	22(47.8%)	16(38.1%)
No choice		2(4.5%)	7(16.7%)
Total		46	42

Table 7. Lineup choices for culprit-absent lineups (Levi & Wimesberg, 2004)

Lineup type	# of foils	Voice	No Voice
Choice of foils	1 foil	11(28.9%)	12(27.3%)
	More than 1 ("ID")	9 (23.7%)	17(38.6%)
	Total	20(52.6%)	29(65.9%)
No choice	More than 1 ("not ID")	7 (18.4%)	5 (11.4%)
Total	Total	11(28.9%)	10(22.7%)
		18(47.4%)	15(34.1%)
Total		38	44

Israeli mug-shots of the traditional variety consist of three photographs of the suspect: The frontal view, a profile of the face, and the entire body. I was able to get four such photos on a page of a normal photo album that I used for the 160-person lineup. With the album open witnesses saw two such pages (8 photos), so for 160 photos I used 20 such double pages (8 x 20 = 160). For the 20-person album I used a lot smaller album, on which I put one photo on each page. Thus all witnesses saw 20 "pages".

The albums had the similar advantage of the laptop computer in that I could take them with me to the offices of my witnesses. My witnesses this time were recruited in downtown Jerusalem. Most of them came from the offices of the municipality.

In this experiment many things went wrong. I recruited my confederates from a local manpower agency. All but one turned out to be extremely irresponsible, often simply not showing up. The one exception had an unusual hair style which made it much easier for witnesses to remember him. A disproportionate number of witnesses saw him.

As a result of all the mishaps I was less than confident in the meaningfulness of my data. However, one finding was so overwhelming that I could not ignore it. Very few of the witness who chose the "culprit" along with foils (made a multiple choice) made an identification, since they failed to choose the witness most confidently.

This may have occurred partially because each lineup member appeared in three photos (frontal, profile, full body), and this may have distracted the witnesses. Perhaps 20 pages is a lot to view. Perhaps 160 photos is a lot. My hunch was that the total situation caused witnesses to forget how confidently they had chosen the "culprit". They thus chose some foil with equal or even more confidence.

Failing to Get a 40-person Video MSL Lineup Implemented

In the meantime I was working to get a 40-person video lineup accepted by the police. The first hurdle was my division commander of forensics, who was very supportive of my research but required more backing to broach the subject with the head of investigations, his commander. As we have noted, live lineups were not conducted by forensics. My proposed lineup was intended to replace live lineups, and therefore we needed the agreement of the head of investigations.

My division head had two demands: That I get recommendations from top experts in the field, and that I get at least one publication on my MSL lineup. Getting recommendations from Gary Wells and Rod Lindsay was no problem. Also quite fortunately, my first MSL lineup article (Levi, 1998b) had just been accepted for publication.

I therefore reached the second hurdle, the head of investigations. He was willing to give his go ahead on a provisional basis (courts would have to accept the new lineup before it could become established) with one major limitation. The video lineup would replace only the photo lineup, not the live lineup.

I could live with that. It would also be easier for judges to accept a video lineup in place of a photo lineup than it would for them to give up so readily their preference for live ones. Also, as the deputy of the head of investigations commented wisely at the meeting, two different lineup procedures, mine and the traditional small simultaneous lineup, would not be able to coexist for long. I counted on judges realizing that the MSL lineup was superior, and begin demanding it in place of small live lineups.

The next hurdle was to create a computer program to run the new lineup. The option of having it done in-house by the computer division was not realistic. I had passed the supposedly mandatory retirement age of the police. I was living off of borrowed time in the force. From our experience with the computer division, it could take them a number of years to complete such a program. I therefore found a private company who agreed to do the job for a mere 10,000 Israeli Shekels (about \$2000).

Strangely the head of investigations refused to donate that sum, but I found another source in the police, and the program was ready quickly. Investigations provided guidelines, and a couple of field forensic units agreed to begin collecting video-clips of the suspects they were photographing via their digital camera.

A major hitch developed when the forensic units moved to a more advanced computer. Suddenly the photos were not getting recorded. After a few months of my searching for the reason, my computer company tracked down the problem to a slightly different computer card that had been purchased for the new computer, and found a solution.

When we had enough foils to conduct lineups for the culprits fitting the most common descriptions, I was ready to begin. At that moment the State Prosecutor finally set a date for a meeting of her top staff to get a report on the new lineup. Upon hearing my report she immediately understood that my lineup would kill the standard one, and called up the head of investigations to put a hold on the new lineup until she could conduct an independent study of it.

Unfortunately, no one in the office of the prosecutor had the scientific knowledge to conduct a meaningful study. Lawyers by and large know almost nothing about scientific method. She sent a very general summary that I had written in Hebrew to her district offices

for comment, but they were in no better position to evaluate my scientific findings. She refused my offer for help, and she did not understand that she needed some scientist.

As the "independent study" dragged on, a new development made matters much worse. In the course of my lectures to various relevant bodies, my immediate commander arranged for me a talk to the head of the Public Defenders and his staff. One of the public defenders present soon turned to me to help her on the Kedoshim case.

Since police officers in Israel are prohibited to appear for the defense unless under court order, I was served such an order and presented an expert opinion. The District Prosecutor where the case was being heard was livid that I was appearing as a witness for the defense, and phoned the new head of forensics, the head of investigations, and her own superior, the State Prosecutor, slandering me with a totally false motive behind my role in the case, a figment of her own imagination.

This caused me problems within the police (I came within an inch of being sacked), and gave the State Prosecutor good reason to drop consideration of a lineup devised by such a rogue as she now saw me. My new division commander, with no previous police experience but his own plans, was happy to facilitate the process of sending me off to pension and free my position for those plans.

The savvy State Prosecutor then freed herself of a hot potato and sent the reevaluation back to the police. Without me, however, there was no one interested enough to conduct the reevaluation. Implementation of the new lineup is thus in deep freeze.

Table 8. Lineup Choices for Culprit-Present Lineups (Levi, 2004)

Lineup type	Foils chosen?	MSL	SEQ
Identifications	Culprit only ID	9(19%)	4 (10%)
	Culprit + foils ID	7 (15%)	NA*
	Total	16 (34%)	4 (10%)
Choice (Non-ID)	Culprit+foils Non-ID	6 (13%)	NA
	Choice of single foil	3 (6%)	16 (39%)
	Choice of foils	10(21%)	NA
	Total	19(40%)	16(39%)
No choice		12(26%)	21 (51%)
Total		47	41

* Not Applicable.

Testing the Multiple Choice Option with Children and Adults (Levi, 2004)

My retirement did not diminish my interest in searching for a better lineup. The main purpose of my next experiment was to see whether I could find, in photos, that the ability to choose more than one person increased lineup reliability. A secondary issue was to test the MSL lineup with children. Research had found that children were less reliable than adults, because they chose more often, thus making more mistaken identifications. (Pozzulo & Lindsay, 1999).

With the kind help of the principal of a local school I acquired the home addresses of ten- and eleven-year olds. I visited the homes when an adult was present, and recruited both child and parent following my usual procedure.

Since I was no longer in the police I needed another financial source, mainly for paying confederates. I was now teaching a course on eyewitness identification in the Faculty of Law of the Hebrew University, which included a Department of Criminology. I became a member of the Crime Group in the department (a gathering of members interested in research), and they awarded me a grant to continue my research.

I decided to use 20 to 25 lineup members, and for that purpose I photographed foils at the Mount Scopus campus of the university, all male students with dark hair and eyes, short hair, and medium build. I recruited my confederates through the student union manpower agency, which over the next series of experiments provided me with excellent workers.

I asked the children who participated in the experiment if they knew what a police lineup was. All but one child did not. This helped explain to me why researchers had found that children tended to choose more than adults. If children did not know the function of lineups, they would not know that they were supposed to be careful in deciding to choose or not. There is evidence that when children are given appropriate instructions they reduce their choosing (Parker & Myers, 2001).

In all events, after being given a short explanation of the purpose of lineups, the children in our experiment did not exhibit more choosing than their parents. Therefore the data from the children and adults was combined to test the effect of allowing multiple choices.

Table 8 gives the results for culprit-present lineups. The large sequential lineup showed the typical pattern of sequential lineups. Half of the witnesses failed to choose anyone, and therefore there was a low identification rate. The MSL lineup, on the other hand, which differed from the sequential only in allowing multiple choices, had only a quarter of the witnesses failing to choose anyone. The other quarter became identifications, so that the MSL had many more identifications. There was no difference between the lineups in mistaken choices.

My conclusion was, then, that allowing multiple choices in photo lineups of about 20 persons performed the function that I had theorized that it should. Identifications increased while failures to choose decreased. Since there was no difference in mistaken choices, the MSL lineup is more reliable than even a sequential lineup which is as large.

Comparing Standard Simultaneous and Sequential Lineups to the MSL

It was finally time to conduct the "critical" experiment, demonstrating that the MSL photo lineup was more reliable than standard 6-person simultaneous and sequential photo lineups (Levi, 2006b). I had put off conducting such an experiment because I was not expecting to learn anything new myself. It seemed to me that the research conducted up until then clearly predicted that such a test would show an advantage of the MSL over the sequential lineup in identifications and an advantage of the MSL over the simultaneous lineup in less mistaken choices. In addition, the larger MSL lineup would reduce mistaken identifications vis a vis both lineups. Nonetheless, it seemed also clear to me that my colleagues were interested nonetheless in seeing a direct comparison between the traditionally sized simultaneous and sequential lineups and the MSL.

I decided to conduct 24-person MSL lineups, within the range of the previous successful experiment and exactly four times larger than the other two lineups. I had the required photos from the previous experiment, except for my new confederates who I photographed in the same surroundings. There were still plenty of downtown offices that I had not yet visited, so I continued visiting new ones with my confederates.

For each 6-person lineup I randomly picked foils from the larger set required for the MSL lineup. The order of the photos was randomly changed for each lineup, except that in the sequential and MSL lineups the confederate never appeared in the first place.

The experimental results indeed held no great surprises. Table 9 presents the results for culprit-present lineups. The simultaneous lineup produced significantly more identifications than the sequential lineup, with the MSL lineup falling in between and not differing significantly from either of the smaller lineups. The sequential lineup had again about 50% failures of choose anyone in these "culprit-present" lineups.

Regarding mistaken choices, as expected there were more of these in the simultaneous lineup than the other two, which again, as in the previous experiment, had the same number (Table 10).

I calculated, for each lineup, the probability of the suspect being innocent despite having been "identified". I found that the chance of that being so was four times greater in the smaller lineups than in the MSL lineup. The MSL: lineup was then four times more reliable.

We note also that the MSL lineup was four times larger than the smaller lineups. This indicates that the MSL gained its advantage mainly from its larger size. This fact clearly suggested that further enlarging the lineup might be quite profitable.

Table 9. Lineup Choices for Culprit-Present Lineups

Lineup type		Simul- taneous	MSL	Sequential
Identifications				
Choice	Culprit only ID	25 (62.5%)	9 (22.5%)	14 (35%)
	Culprit + foils ID	NA*	8 (20%)	NA
	Total IDs	25 (62.5%)	17 (42.5%)	14 (35%)
Non-Identifications				
of culprit	Culprit+foils (Non-ID)	NA	8 (20%)	NA
Choice of foils		9 (22.5%)	12 (30%)	7 (17.5%)
No choice		6 (15%)	3 (7.5%)	19 (47.5%)
	Total Non-IDS	15 (37.5%)	23 (57.5%)	26 (65%)
Total		40	40	40

We might note, though, that the sequential lineup fared far better in this experiment than in the previous one. Less foils were chosen, and more culprits were. There are two possible explanations. The first is that the "culprits" were easier to identify, a rather uninteresting possibility.

Table 10. Lineup choices for culprit-absent lineups(Levi, 2006b)

	Lineup type	# of foils	Simul-taneous	Sequential	MSL
Mistaken choices					
	Choice of	1 foil	19 (48.7%)	12 (30%)	8 (20%)
		More than 1 ("ID")	NA	NA	4 (10%)
		Total mistaken choices	19 (48.7%)	12 (30%)	12 (30%)
Correct non-choices					
	Foils	More than 1 ("not ID")	NA	NA	5 (12.5%)
	No choice		20 (51.3%)	28 (70%)	23 (57.5%)
		Total correct	20 (51.3%)	28 (70%)	28 (70%)
	Total		39	40	40

The other could be more significant. In the previous experiment the "culprit" was always the last person in a 20- or 25-person lineup, while in the present one he was placed randomly in the five last places in a six person lineup. This seems to suggest that there is some validity to my reasoning in my 1995 paper that sometimes witnesses pick a foil before they have a chance to view the culprit. In the present experiment there was much less chance of this occurring than in the previous one. I had noted in the 1995 paper some signs of the same phenomenon in Lindsay's studies (Lindsay & Wells, 1985; Lindsay, Lea, & Fulford, 1991).

This would be a serious problem for the sequential lineup. It is important in the real world that the culprit be placed randomly in the lineup to prevent knowledgeable witnesses from choosing according to some standard placement. The likelihood of identifying the culprit would then depend on this chance placement.

Further Evidence for the Viability of the Multiple-choice Identification

We noted that a multiple-choice "identification", when witnesses choose the suspect most confidently, predicted that the suspect was guilty as much as a normal single-choice "identification", mainly because both occurrences were equally rare when the "culprit" was not in the lineup and the suspect was innocent. When I examined the data of the last few experiments (Levi, 2006b), I found more evidence supporting my contention that when witnesses choose the suspect most confidently they have identified the culprit.

First of all, multiple-choice identifications occurred relatively often. Fully half of the time that the "culprit" was among the lineup members that the witness chose, the "culprit" was chosen most confidently. This would not happen if witnesses were randomly choosing the suspect most confidently.

Secondly, we should expect that once witnesses "identified" the culprit by choosing him most confidently they would stop choosing. Witnesses with good memory choose foils because they are uncertain of their memory and take advantage of the opportunity of being

able to choose more than once in order to be sure that they pick the "culprit". Once they actually see the "culprit" and identify him or her, however, they should now be far more confident, and therefore stop picking anyone else. This indeed happened in 2/3 of the cases.

Thirdly, we should expect such witness to limit the number of foils that they choose. With their relatively good memory of the "culprit", the vast majority of the foils should seem to them too different from the culprit to be chosen even to hedge their bets. Indeed, very few of these witnesses chose more than three foils, much less than the witnesses who chose the culprit with less certainty, and therefore had poorer memory.

Finally, we should expect that in general witnesses who choose the "culprit" most confidently would also exhibit their confidence by giving a high percentage to their confidence. Indeed, 2/3 of the witnesses chose the "culprit" with 90% or more certainty.

However, while preparing this chapter I noted another interesting finding. The larger the lineup, the smaller the number of multiple-choice identifications and the larger the number of times that witnesses failed to choose the suspect most confidently in such multiple choices. We have noted that when the lineup has 160 members, the number of multiple choice identifications reached zero.

42-person Simultaneous and MSL Photo Lineups (Levi, 2006a)

A large simultaneous lineup has an advantage over the MSL in that it is a far less radical departure from current practice. It would therefore be a lot easier to introduce in place of the smaller simultaneous lineup. I had not yet tested a large photo simultaneous lineup. A comparison between the two lineups was therefore important.

Maintaining the term "simultaneous" becomes troublesome as lineups grow radically in size. It becomes technically more difficult to present all lineup members simultaneously. On the other hand, the significance of the simultaneous lineup seems to be the ability of witnesses to compare all lineup members before making a decision. Therefore, I have decided to term as "simultaneous" lineups that maintain that ability of witnesses to compare members, regardless of the number of members actually presented simultaneously. The comparison lineup was thus also a simultaneous lineup, albeit an extreme example.

The results of Beaudry (2004) suggest that a price in identifications is paid in photo sequential lineups (including the MSL) when they are enlarged. Beaudry (2004) found that the effect was small in a twenty-person photo lineup, but quite large in a 40-person one [However, we recall that I (Levi, 2002) failed to find a difference between 10-, 20, and 40 person MSL video lineups].

There is evidence that presenting photos in groups can mitigate these effects. Successful identification results have been achieved in mug-shot search studies with photos placed after hundreds of photos when the photos were presented in groups (Ellis et al., 1989; Levi et al., 1995). Stewart and McAllister (2001) found that grouping photos gave superior results than showing them one at a time. A theoretical explanation might be that witnesses are capable of rejecting many photos very quickly when a number are presented simultaneously, thus reducing the time the lineup takes and the strain on the witness.

We have noted the advantage of large lineups in reducing false identifications. Moreover, the larger the lineup is, the larger the advantage. A 40-person lineup, being double the size of a 20-person one, could reduce false identifications by half.

Therefore, an important research goal is to find ways of increasing lineup size without much loss in identifications. Grouping photos seems a likely candidate, and therefore was tested in this experiment. This experiment (Levi, 2006a) presented witnesses with sets of six photos simultaneously on two pages of an open photo album. Witnesses in the "simultaneous" condition were informed that they could leaf back and forth between the pages of photos, and even remove a photo from a page in order to compare it with another on some other page. This maintained for witnesses maximum ability to compare the photos they considered the most likely candidates.

Witnesses in the MSL condition, on the other hand, were informed that they had to decide whether any of the photos on a given page might be the "culprit" before turning to the next page, because they would not be able to return to the previous one. While departing from the tradition of one at a time presentation, this method preserved the essential element of the sequential lineup that witnesses had to choose before viewing all the photos (they did not know in advance how many pages they were to view). Being able to compare six photos on one page could not help them in deciding whether the "culprit" was on the page, since they were still in doubt as to whether the "culprit" might appear on a subsequent one.

Some witnesses viewed three pages of six photos, for a total of 18 photos, while others viewed seven pages, for a total of 42. More students were photographed at the Mt Scopus campus of the Hebrew University to reach the required number. Additional areas of the city were visited to recruit witnesses. The national office of the Ministry of Social Welfare opened its doors to me, and provided a healthy share of the witnesses.

Table 11. Lineup Choices for Simultaneous Lineups (Levi, 2006a)

		18-person	42-person	Total	
Target-present Identifications	Choice of Culprit	11 (22%)	12 (24%)	23 (23%)	
	Non-identifications	Foil	30 (60%)	29 (58%)	59 (59%)
		No choice	9 (18%)	9 (18%)	18 (18%)
		Sum misses	39 (78%)	38 (76%)	77 (77%)
Target-absent Mistaken choices	Foil	35 (70%)	36 (72%)	71 (71%)	
Non-choices	No choice	15 (30%)	14 (28%)	29 (29%)	

Table 11 presents the results for the simultaneous lineups. The results of the experiment were extremely positive regarding the comparisons between 18-person and 42-person lineups, in particular for the simultaneous lineup, where there was virtually no difference between the two sizes in either identifications or mistaken choices. Table 12 presents the results for the MSL lineup. In the MSL lineup the differences in lineup size were not significant.

On the other hand, the simultaneous lineup produced more identifications than the MSL lineup, along with the usual larger number of mistaken choices. A closer look at the MSL data disclosed that the MSL lineup performed somewhat like a sequential lineup. The smaller number of identifications was caused by a larger than usual number of failures to choose anyone, 34%.

This figure is smaller than the usual 50% in sequential lineups, but considerably higher than the usual low figure for MSL lineups. Perhaps the longer instructions to the witness that were used to explain the groups of six photos caused some witnesses to forget that they could choose more than one person, and therefore they reacted as if the lineup was a sequential one.

Table 12. Lineup Choices for MSL Lineups

		18-person	42-person	Total
Target-present				
Identifications	Choice of			
	Culprit	8 (16%)	3 (6%)	11 (11%)
	Culprit + foil(s) ID	0	3 (6%)	3 (3%)
	Sum identifications	8 (16%)	6 (12%)	14 (14%)
Non-identifications				
	Culprit + foil(s) non-ID	2 (4%)	2 (4%)	4 (4%)
	Foil(s)	25(50%)	23(46%)	48 (48%)
	No choice	15 (30%)	19 (38%)	34 (34%)
	Sum incorrect	42 (84%)	44 (88%)	86 (86%)
Target-absent				
Mistaken choices				
	Foil	22 (44%)	17 (34%)	39 (39%)
	Foils ("false ID")	4 (8%)	11 (22%)	15 (15%)
	Sum incorrect	26 (52%)	28 (56%)	54(54%)
Non-choices				
	Foils (non-ID)	3 (6%)	7 (14%)	10 (10%)
	No choice	21 (42%)	15 (30%)	36 (36%)
	Sum correct	24 (48%)	22 (44%)	46 (46%)

In all events, the results were so positive for the large simultaneous lineup because the larger number of mistaken choices was more than counteracted by the larger lineup size. For example, the number of expected mistaken identifications in the 18-person MSL lineup was $52\%/18 = 2.9\%$. The 42-person simultaneous lineup had more mistaken choices than the 42-person MSL lineup. However, the number of mistaken identifications was $72\%/42 = 1.7\%$, less than the 18-person MSL lineup.

A final important finding was that the witnesses completed the task in only a few minutes. This is evidence that the task was relatively easy. It seems that indeed witnesses could discount most of the photos very quickly.

We have noted a concern that increasing the MSL lineup may eventually reduce significantly identifications, while large increases in the size of the simultaneous lineup can cancel out the increase in mistaken identifications. I have opted then for the strategy of concentrating on enlarging the simultaneous lineup for the time being. When the optimal size has been reached, I may return to test the MSL lineup at that size, modifying it if needed to deal with any lessening of identifications.

Testing an 84-person Lineup

My next experiment (Levi 2006c) built on the previous one, and simply doubled the size of the lineup being tested. I photographed more foils at the Hebrew University, and cut away enough of the background of each photo to enable putting two photos in each place in the album intended for one. I thus had on each open page of the album 12 photos. I compared a two-page lineup (24) to the same seven pages used in the previous experiment, only now there were $12 \times 7 = 84$ photos. In this experiment I almost completed using all the offices of downtown Jerusalem, as well as a couple of other neighborhoods too.

Table 13 presents the results for culprit-present lineups. Even with a lineup of 84 members compared to 24, there was no difference in either identifications or mistaken choices between the two lineup sizes. The only difference found was that in the 24-person culprit-present lineup almost 50% of the witnesses made no choice, while the results for the 84-person lineup were basically the same as the 18- and 42-person lineup in the previous experiment and previous ones using the simultaneous lineup, with few witnesses failing to choose and many more choosing a foil.

Of course there is no practical significance to this difference, since both foil choices and failures to choose constitute non-identifications. I have no convincing explanation for this finding. All that can be said is that researchers of smaller lineups have also found such a difference (Gibling & Davies, 1988). It is also important to note that witnesses were able again to complete the identification task within only a few minutes.

Table 13. Lineup Choices for Target- Present Lineups (Levi, 2006c)

		24-person	84-person
	Choice of		
Identifications	Target	9 (18%)	8 (16%)
Non-identifications	Foil	17 (34%)	33 (66%)
	No choice	24 (48%)	9 (18%)
	Sum misses	41 (82%)	42 (84%)
	N	50 (100%)	50 (100%)

The next obvious step is to double again lineup size, and test a 168-person lineup. I found a larger photo album so that if I cut away the rest of the background from my photos and the additional new photos that have to be photographed, I shall now be able to put on an open page 24 photos, so the entire set of 168 photos will still be displayed on the same seven pages used in the two previous experiments. I may have to leave Jerusalem for the experiment, as I am not sure that I can conveniently canvass enough more offices in Jerusalem.

Another Archival Study

In the meantime, I have begun another archival study with a couple of lawyer colleagues of mine. We have evidence that faulty eyewitness identification is a primary cause of mistaken convictions. However, we do not know how prevalent such mistaken convictions

are. It can be argued that perhaps mistaken convictions are quite rare, and therefore faulty eyewitness identification is also a rare phenomenon.

The study we are now engaged in can answer that question, as well as gain a better understanding of the dynamics of faulty eyewitness identification. We have collected a sample of court cases that have an eyewitness identification component in the evidence presented to the court. A similar sample of cases that have reached the prosecution offices from the police is also going to be collected. This latter sample will provide insight regarding the degree that the prosecution fulfils its function in weeding out cases with insufficient evidence.

We have some important preliminary evidence on the court cases. Convictions are the rule: 72% of the cases ended with a conviction, 73% of those from the Supreme Court that upheld a previous conviction on appeal. Of all the convictions I judged 51% to be mistaken, and 62.5% of the convictions that the Supreme Court reaffirmed were mistaken. Only 26% of the mistaken convictions, either original or on appeal, were based on a lineup that may have been fair but had insufficient other evidence. The rest were based on very faulty eyewitness evidence that did not have such strong additional evidence that could render the eyewitness data redundant.

These facts paint a picture of courts that are biased towards convictions, at least in eyewitness cases. False convictions are very prevalent, about half of the total convictions. The Supreme Court as the last resort in the appeal process that can reverse mistaken false convictions is failing to fill this function, with almost two thirds of mistaken convictions being upheld.

I also divided the cases into more and less recent. I found no evidence that the courts have been improving with time.

IDEAS FOR FUTURE RESEARCH

Back to Video Lineups?

There is reason to believe that video lineups are superior to photo lineups, in particular with regards to minimizing mistaken choices (Cutler & Fisher, 1990). However, we have noted that we cannot show 84 videos one at a time without endangering identifications. There is another option.

It is possible to show video-clips of different people simultaneously on a computer screen. Thus, perhaps instead of showing witnesses groups of photos, we could show them groups of video-clips. However, viewing simultaneous video-clips may confuse witnesses. The issue requires an empirical test.

Video Back-up to Photos

There is another alternative. We could remain with the photos. However, whenever a witness many think that a lineup member might be the culprit, we could then show the video-

clip of that person. McAllister et al. (2003) found that when more than 70 photos were shown to witnesses with video back-up, witness stopped requesting the video.

However, I strongly suspect that this was a function of the video that they showed their witnesses. Their videos were a full minute long, showing the head from all angles. Once witnesses requested to see a video they were forced to wait the full minute during the video showing, even when they had quickly made a decision based on the first few seconds of the video. This was likely quite boring, and explains why the witnesses ceased asking to see videos.

This contrasts with the way I have used video-clips in my experiment. They were either 15 or 8 seconds long, though witnesses could request to view the video more than once. In addition, I stopped the video as soon as witness announced their decision. With these modifications in McAllister et al.'s (2003) procedure, I expect to get far better results.

Improving the Very Large MSL Lineup

Once I have found the maximal size of the simultaneous, I may return to improve the MSL lineup. I have noted the concern that witnesses may forget, if the lineup gets larger, what ratings of confidence they gave to the culprit. This may result in their giving a foil the same rating, or even a higher rating. This would destroy the identification.

One idea I have is to display continuously each lineup member that the witness chose along with the confidence rating that the witness gave. This will certainly serve as a reminder to the witness. Of course, it may have other less desirable consequences. Alternatively the problem may lie elsewhere, and therefore this solution may miss the mark.

Using Direct Measurement of Brain Activity to Determine Identifications

There has been significant progress in tapping into cortical activity and connecting it to cognitive processes. There is reason to believe that an "identification" based on comparing lineup members would show a quite different pattern from that based on a direct identification. There might even be a different pattern for false "direct" identifications versus accurate ones. I failed to get an expert on cortical measurement interested enough in this issue, but if I had funding I might manage to facilitate a test of these ideas.

Implications for Public Policy in Eyewitness Identification

I have up to now conducted seven successful experiments with large lineups, the first being published in 1998, about nine years before these lines are being written. In addition, two other articles have explained in depth the inherent unreliability of the traditional small police lineup, the first published in 1995 and the second in 1998.

This research is but a continuation of continuous data published since 1932 on the unreliability of eyewitness evidence in general and on the lineup in particular. Criminal justice systems have proven themselves rather impervious to the findings, and continue to conduct business as usual, the conviction of many innocent.

The recent Justice Project (Conners, et al., 1996) is an abject example. DNA evidence was found for a large number of people convicted of rape in the US before the advent of DNA testing. A full 25% of those convicted were exonerated and released from prison.

When the court evidence of these cases was examined, faulty eyewitness evidence was found to have been the chief cause of the false convictions. These findings were widely publicized, and led to DNA evidence replacing eyewitnesses in rape cases. Yet in cases with eyewitnesses but no DNA evidence, criminal justice systems continue to use the same faulty eyewitness data to convict as if they had no reason to know better.

In light of the Justice Project's findings the Department of Justice established a committee to provide recommendations on eyewitness practice. This committee added some of the best experts in psychology on the topic in North America to the committee, which consisted of police officers, prosecutors, and defense attorneys. The committee's recommendations (Technical Working Group for Eyewitness Evidence, 1999) were inadequate, and recommended lineups the smallest in the Western world.

My experience is also relevant. In contrast to my colleagues, my research and recommendations developed within the system, since I was a police officer. The police even had a superior lineup ready for implementation. My findings have also reached the highest decision makers within the criminal justice system. Nonetheless nothing has changed. These highly capable and dedicated decision makers have been too busy dealing with other matters to devote serious attention to methods designed to decrease considerably the number of mistaken convictions.

I once tried to get members of the Home Office in England to participate in a symposium looking into ways of improving the English law on eyewitness identification, since they are the crucial people in effecting reform in that country. They too were too busy. I organized instead a symposium of psychologists on how to get the attention of the decision makers.

There are many factors contributing to this situation. Firstly, the expert psychologists have to shoulder part of the blame. First of all, they cannot yet agree on the most important reforms required. We have not managed to create consensus among ourselves.

I could not agree with the white paper produced for the American Psychological Association by an esteemed panel of experts (Wells, et al., 1998). Wells (2001) wrote a rebuttal to a paper I wrote with Lindsay (Levi & Lindsay, 2001). When psychologists are in conflict, it is quite hard to expect anyone to accept their recommendations.

This is especially a problem for issues at the frontier of the science such as determining the appropriate lineup. On the one hand, there are psychologists who legitimately want to improve a bad situation. On the other hand, the empirical facts have not always been yet clear-cut enough to make a correct recommendation.

The case of the sequential lineup seems like an unfortunate case. The meta-analysis of Steblay et al. (2001) seemed to provide a solid empirical base for the superiority of that lineup. Therefore very senior experts put their reputation behind it in an attempt to get it accepted as the replacement for the simultaneous lineup, with some success.

Sadly, as I have noted, this seems to have been a premature conclusion. The result must be loss of confidence of decision makers in the recommendations of psychologists. By what right, it might be argued, have I to now recommend enlarging the lineup to 84 members, or even 42, when the issue has been barely researched by others?

It would seem that as much as there is value for psychologists to participate in committees with members of the criminal justice community, it is also crucial to create

frameworks for dialogue between psychologists. Conferences provide an appropriate venue. However, the usual format of sessions consisting of papers presented by participants is far less appropriate. More open discussion is required.

That brings us to another problem that must be attributed to psychologists. I have noted that my first research using a larger lineup (20 members) was published in 1998. That article also presented an as yet incomplete view of multiple choices, a point against premature adoption of a new method, which a colleague of mine discovered to his sorrow when he did just that.

It took another four years until I could get another article published dealing with lineup size, in a journal I highly respect but which is yet unavailable to most psychologists, and another four years before I could publish research presenting the true picture on multiple choices and further research on larger lineups. Some researchers heard me at conferences I had attended during those eight years. Yet it is not surprising that only three attempts have been made, by students of my colleagues who attended such conferences, to check my findings (I am still trying to get a report of one of those attempts).

Such lags between research and publication can even cause the strange situation in which the researcher has moved on to new approaches which differ from the publication. Thus, in 2006 when the full account of multiple-choices was published, I already had decided to concentrate on simultaneous lineups and had completed the experiment testing an 84-person simultaneous lineup. Of course, that study has yet to be accepted for publication. Researchers basing their research on such publications will find themselves trying to publish their research after the frontier has moved elsewhere.

The solution is easy. Researchers should be in close contact with their colleagues whose research interests them via e-mail. In practice, however, this rarely happens. Even better, an on-line journal could enable far quicker up-dates.

Finally, psychologists have been by and large too insular. Criminal justice practitioners read psychology journals about as often as psychologists read legal journals, which is of course, rarely. Psychologists will have a greater impact to the extent that they engage in outreach, like teaching at a police academy that occurs in Ontario, Canada or lecturing to judges as has occurred in Ontario and Israel, or even teaching a course to law students as has occurred in Israel. Surely publishing in legal journals seems like an excellent idea.

However, only part of the blame lies with the expert psychologists. Psychologists have been publishing books for many years that have been intended for non-psychologists, indeed at times focused on the criminal justice community, with absolutely no effect. The psychologists on the US justice department's committee seem to have been quite unified in their approach, yet the resulting guidelines fall far short from what they would have preferred. It is hard to imagine a better outreach than being a police officer, and the decision makers I dealt with had no clue of disagreements among experts. Nonetheless my new lineup found itself in deep freeze.

Put bluntly, there are forces against reform. These seem to be situated mainly within the prosecution. The expert psychologists on the US department of justice's committee were doubtless surprised at the openness of the police officers on the committee. The main opponents of reform were the prosecutors. Opposition from that quarter was so great that the professional association of prosecutors filed suit in court to prevent the committee's recommendations from being published, even though they were completely nonbinding.

In the case of my lineup, the police were prepared to begin conducting lineups the day before the State Prosecutor stepped in. The heavy hand of the prosecution was most notable again.

We can of course put blame on system forces operating. The Anglo-Saxon adversarial system of justice which so many of us have inherited pits defense against prosecution in a contest to convince judge or jury of the innocence or guilt of the defendant. As the saying goes, "All is fair in love and war", and trials are a civilized form of warfare.

In the case of the defense the rules of the game justify the complete loyalty to the defendant. The prosecution, on the other hand, represents the state, and is supposed to be interested in justice, not conviction. The dynamics of conflict, however, often overpower that principle. All too often, prosecutors view reforms through the prism of successful prosecution, not insuring justice. Reforms often provide extra protection to the defendant, and are not always welcomed by prosecutors. Never mind if the protection may be for innocent defendants.

The blame can thus be put on the adversarial system of justice, and indeed thought would wisely be given to alternatives that might create more justice. However, we must beware putting solutions so beyond the horizon as to foment despair in achieving reform in the foreseeable future. There is no more certain means of preventing something than by convincing people that it cannot be done.

Reform must be achieved then, in the face of opposition from some of the prosecution. Recent events have proven that reform, even if perhaps somewhat misguided, can be achieved. Lindsay (1999) succeeded in getting acceptance of the sequential lineup in much of the Canadian province of Ontario by gaining support of police officers at the Police Academy there. Wells has focused successfully on the prosecution in some American states for acceptance of that lineup.

The police and prosecution are then a definite possible means of achieving reform, and should not be written off from the start as obdurate in their opposition. However, there are even more influential decision makers. Judges, for example, are often an important force for reform. Certainly in such issues as eyewitness evidence they are usually the final authority. If the police and prosecution realize that they will not get convictions with insufficient evidence, they will fall in line and provide better data.

I myself have had difficulty reaching judges. I have managed to give talks to judges only three times in six years. However, appropriate publications aimed at the legal community have also had an effect. One article of mine in a legal journal (Levi, 2005a) was quoted by the Supreme Court, even if it still managed in that case to misunderstand the eyewitness evidence and falsely convict. In another, the judge used my book (2005b) to discount faulty eyewitness evidence, even though he went on to convict on the basis of other strong findings. Lindsay, on the other hand, has given a course to judges in Ontario.

We should not expect immediate acceptance of recommendations by judges. Eyewitness identification was been part of the legal system for many centuries, and in the absence of scientific findings judges have based their judgments on precedents based on common sense (on course, there was a time when common sense determined that the earth was flat). It is unreasonable to expect quick abandonment of these precedents. The legal profession, as we have noted, is not well schooled in scientific method, and has reason to suspect data that it cannot properly evaluate.

In all events, the division of authority makes reform difficult. I passed the hurdle of the police in getting my better lineup accepted, only to fail in passing the hurdle of the prosecution. I may have passed that hurdle only to have been tripped up by the courts.

One tempting solution is get the legislature to pass laws on eyewitness identification. Then all others must fall in line. In England, which has a law dealing with eyewitness evidence, reform requires amending it, a process conducted by the Home Office. I wish my English colleagues the best of luck in traversing that bottle neck. The English law provides a very progressive foundation for dealing with eyewitness identification. Problems arise when additional change is required.

We have noted that the English lineup consists of nine members, more than in most countries but still quite inadequate in size. Furthermore, photo lineups, the one available means today of enlarging the lineup, are not allowed. Video lineups are, but so far lineup members can be presented only one at a time, likely a problem for an 80-person lineup.

That is the best argument against attempting reform through legislation. Even if a good law can be enacted, which cannot be assured, remaining imperfections may last a long time.

Perhaps one of the most crucial ingredients for eventual success in eyewitness evidence reform is patience. As a Jewish sage said many years ago, "I am not required to complete the work, but neither am I absolved from the responsibility of beginning it".

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Chapter 5

PUBLIC POLICY FOR SUSTAINABLE CONSUMPTION

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ABSTRACT

In recent years we have seen the first signs of a paradigm shift in environmental public policy. While traditional policy has predominantly targeted industrial production, newer approaches offer a more systemic perspective, where the role of consumption is put at the centre. However, this change is not yet well reflected in actual policy making. An evaluation of existing policy instruments for sustainable consumption and production demonstrates that the majority of policy instruments in EU aim to improve the eco-efficiency of production processes and products, and hence only indirectly address consumption.

The aggregate environmental impacts of industrialised economies appear to be on the rise, and this trend will hardly be reversed unless more efforts are put into changing the patterns and levels of consumption. There are however several barriers towards such developments. These include lack of systemic perspective in current policy developments, the reigning paradigm of economic growth, the non-integrative nature of policy tools, and lack of effective instruments for addressing consumption patterns and levels. Unless these problems are addressed, it will be extremely difficult to initiate system level changes in society and stimulate institutional and behavioural changes towards sustainable consumption.

This chapter discusses the complexity of the consumption challenge and policies to achieve more sustainable consumption patterns, and provides some reasons for why the progress has been slow. The main argument is that sustainable consumption is a complex issue that requires the development of policy packages consisting of policy tools that affect various stakeholders and comprise various types of instruments: regulatory, economic and information-based. A relevant issue concerns the role of governmental intervention: moving towards more sustainable systems of consumption and production

may require a shift from governing to governance, where the role of governments change away from controlling functions towards more participation and collaboration.

1. INTRODUCTION

We can notice that the traditional, production-oriented environmental policy discourse has been complemented by a much stronger focus on the role of consumption in later years (see relevant publications by (OECD 2002d; OECD 2002c; OECD 2002b; OECD 2002a; UNEP and Consumers International 2004; UNEP 2005; UNEP 2006). It is increasingly recognised that it is the human strive towards higher standards of living and associated consumption that - while utterly being something positive - are the very root of virtually all man-made environmental impacts, as escalating consumption leads to higher aggregate environmental impacts, increasing the pressure on the eco-system. Consequently, sustainable consumption has become a key concept in the sustainability discourse, and this is also reflected in the increasing calls for governments to work towards 'sustainable systems of consumption and production (SCP)'.

However, while sustainable consumption has become an established topic in environmental/sustainability policy and research, there are yet few examples of progressive consumption policies that would reduce the aggregate environmental impacts of consumption, neither from national governments nor the European Union (Mont and Dalhammar 2005). Much of the inaction depends on both the vague nature of the sustainable consumption concept and the political controversies involved. Sustainable consumption is often used as an umbrella term, bringing together issues relating to human needs, quality of life, resource efficiency, equity issues, and consumer safety (Mont and Dalhammar 2005). There is however lack of consensus on the definition and scope of the concept among businesses, consumers, NGOs, academia and governments.

There is also wide disagreement on the need for governmental intervention in the consumption area, which makes sustainable consumption a politically sensitive field. The environmental impacts of consumption activities are very dependent upon consumption patterns and levels. While there is some consensus on the need to change consumption patterns by making products and services more sustainable, addressing consumption levels encounters wide opposition from numerous stakeholders (Durning 1991; Stahel 2001; Princen 2003). Many stakeholders in developing countries fear that consumption policies may restrain the consumption aspirations in growing economies. Therefore, UNEP has stressed that sustainable consumption is mainly about consuming differently, not less. A further problem is that effective governmental interventions aimed at promoting more sustainable consumption practices will undoubtedly interfere with consumer choice and marketing practices. However in the past and at the present time, the main sustainability strategy promoted by industry and governments is a continuous quest for efficiency, or eco-efficiency. Its focus on the need for innovation, which reduce the environmental impacts of current production methods, allows further expansion of production and ever increasing economic growth, making it a politically viable strategy. However, environmental NGOs and many researchers advocate a complementary approach, often labelled 'sufficiency' that emphasises changed behaviour and

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the role of ‘appropriate’ consumption (Princen 2003). The main argument is that eco-efficiency gains may not be able to offset the environmental impacts associated with economic growth and associated increases in consumption. The main concern is the existence of ‘rebound effects’ (Binswanger 2001): simply put, as we become more (eco) efficient, products and services cost less, and we therefore tend to consume more of them, and thus rebound effects occur. Rebound effects do and will offset many of the eco-efficiency gains: cars become more fuel efficient, but we drive longer distances; refrigerators become more energy efficient, but they also become larger in size. For these reasons, there may be a need to ask how much consumption that is enough. And is there a need to set limits? The sufficiency approach will inevitably challenge some main foundations of modern society, not least the reigning paradigm of economic growth and the freedom to consume (Huber 2000; Princen 2003). Therefore, developing effective policies will be a painstaking process.

In order to move towards more sustainable systems of consumption and production, a systems perspective is needed. Current policies and knowledge is rooted in the traditional view of environmental problems, mainly focusing on pollution from point sources, and mainly addressing the production system, not the drivers of increased consumption. This perspective needs to be broadened. An effective sustainable consumption policy must start by analysing consumption within its wider context, discussing why people consume more and more, taking into account the complex relationships between economic growth, material standards, and human well-being, and by having a continuous public debate on these issues. Further, addressing consumption will probably mean that the role of governments needs to change. Governments in modern democracies have limited possibilities to regulate how companies develop and market products or to restrict certain product development practices. Such regulations would jeopardise some fundamentals of the market economy, and would also be questionable from the perspectives of consumer choice and democracy, and therefore there would be little political acceptability for such measures. For the same reasons, it would be difficult to use regulations to force consumers to choose environmentally sound goods and services, or regulate the level of consumption. This means that much change will need to be driven by participation and collaboration rather than by command-and-control strategy. This requires governments to adopt new approaches.

The next section will discuss the complexity of the ‘consumption challenge’; the consumption patterns and consumption levels, the various forces that influence consumption, and the relevant actors. We then go on to discuss the means that governments can use in order to stimulate more sustainable practices. The fourth part discusses some reasons for why there has been little progress in the policy field. Section five discusses the necessary change processes required in order to move towards more sustainable systems of consumption and production.

2. CONSUMPTION COMPLEXITY

2.1. Consumption Levels and Consumption Patterns

Consumption patterns and consumption levels are two key concepts in sustainable consumption discourse. Whereas the former relate to the type of consumption that takes place

(for instance whether people commute by car or through collective schemes, if they prefer organically grown food or not), the latter relate to the level of consumption (how much do people drive, eat, etc.). Different activities may substantially differ in terms of associated environmental impacts, depending on the material and energy intensity associated with them. Theoretically, a decoupling of economic growth from material and energy intensity is possible, if consumers would spend more of their disposable incomes on labour intensive services instead of material and energy intensive products and activities. However, there is little evidence to suggest that this behaviour of consumers is actually taking place. What we witness instead is that consumption levels and consumption patterns are moving in a direction that appear to be unsustainable: the number of cars on the roads is increasing, as well as the distances travelled; the business air travel is growing despite improved accessibility of substituting activities, such as videoconferencing and teleconferencing; the leisure travel of private people is growing constantly; the living space per person is increasing in the Western world and the number of appliances in households is growing (Durning 1992; SCB 2003). In Europe, the amount of waste generated (of all categories) is on the rise, as well as electricity and paper consumption (EEA 2005).

Within this aggregate increase of consumption, specific areas of household consumption have been identified as the most environmentally burdensome. Food, housing and personal travel are the three areas of consumption responsible for up to 85% of the total greenhouse gas (GHG) emissions, water consumption and land use in USA (Brower and Leon 1999) and studies from Europe show similar trends (Spangenberg and Lorek 2002). Later European studies, for instance the EIPRO study on behalf of the European Commission, demonstrate that these three domains contribute to over 70% of the life cycle impacts of household consumption (Tukker, Huppes et al. 2005).

Several reasons for the increasing aggregate levels of consumption of various groups of products and associated environmental impacts can be identified, by analysing trends in their design and use patterns. First of all, material products create problems not only because they use resources in their use phase or need resources for their production, but because environmental and social impacts are created along the entire life cycles of products, including life cycle phases such as raw material extraction, transport, and final disposal. Each product has an ecological backpack, comprising the total volume of resources that are being misplaced, extracted and used in the life cycle. According to a study from the Wuppertal Institute, a four gram golden ring has a 'backpack' of 2 000 kilos of various resources that are used in its production (von Geibler, Ritthoff et al. 2003). Indeed, it is quite worrying that 99% of the material content of goods become waste within 6 weeks and that 80% of all products are one-way products¹ (Allenby and Richards 1994). In addition to these inefficiencies in the use of materials, products also tend to become larger, thereby using more resources per product than before. According to the Wired magazine, data from the period 1980-2000 show that 7-Eleven soda increased its size from 32 ounces to 64 ounces; McDonald's French fries from 4 ounces to 7 ounces; refrigerators increased in size from 19.6 inches to 28.6 inches; cruise lines have increased in size from 46,052 tons to 88,500 tons. Even athletes grow in size: from 1974 to 2000, the average weight of NFL players (American National Football League) increased from 255 pounds to 322 pounds (Wired 2002).

¹ One-way products are neither reused nor recycled, they are used once and then thrown away.

Another emerging trend is that consumers often have multiple versions of different products, such as TVs and computers (Schor 2005), as well as more luxurious versions of goods. The useful life of products is decreasing, and the use time of 80% of all products is under 15 minutes (Allenby and Richards 1994),² and for longer lived products repair services are often either unavailable or their price is prohibitively high for the majority of consumers. One reason for this is that the cost of labour is high in many industrialised economies, compared to the cost of raw materials and products.

2.2. Forces Shaping Consumption Choices

Our understanding of the forces shaping consumption patterns and levels is still rather limited, despite the already large and constantly growing body of literature. This can be explained by the complexity of consumption processes and the various meanings people attach to consumption. Consumption is driven by a number of factors, including economic forces and technological development, political settings and environmental issues, as well as sociological contexts and psychological determinants (Figure 1). This may explain why changing consumption patterns and levels towards more sustainable ones is perhaps the most challenging part of the sustainable development agenda. In addition to the numerous factors shaping consumption patterns and levels, different actors influence consumption, all having their own vested interests in existing structures and institutions that drive consumption to the current levels. In order to understand how unsustainable consumption patterns can be changed it is useful to identify the main forces that shape individual consumption and discuss how they can be modified in such a way that they would drive consumption into a more sustainable direction.

Economic development based on market competition leads to productivity increases and as a follow-up to decreasing prices on products. On the other hand, there is a clear tendency towards increasing incomes, leading to the growing purchasing power of individuals, which, stimulated by advertising industry and market push and being guarded by sovereignty principle, leads to increasing consumption (Galbraith 1958). Serving the task of continuously increasing economic growth, prevailing economic and political institutions make people believe that the pursuit of higher material prosperity is the expected behaviour (Kilbourne, Beckmann et al. 2001) or even a patriotic duty (Princen 1999).

Technological advances greatly affect consumption at several levels. There is a micro-level of products and their design, which affects environmental impacts of the product along the life cycle as well as in the use and disposal phases. In addition to the direct effects of shopping and ownership, there are also indirect or so-called rebound effects that undermine intended results of technological improvements by creating additional needs and conditions that encourage people to consume more. For example, car was a product that was supposed to help people with mobility and to save time. Together with these outcomes, mobility also led to increased distances travelled because now people can afford to live a long way from the places of work, from shopping malls, and from their friends and family (Røpke 1999). At the macro-level, technological developments affect the infrastructure in society, which to a large degree influences consumer choices as well. The infrastructure as well as products can be

² This is considering packaging to be a product.

designed so that to prompt consumers into more sustainable behaviour, or to lock-in consumers into very unsustainable actions (Otnes 1988; Sanne 2002). In a way, since infrastructural systems are so large and embedded into many aspects of everyday life, at a certain point of time they become a barrier to change even if consumer is interested in shifting to a different mode of consumption (Otnes 1988).

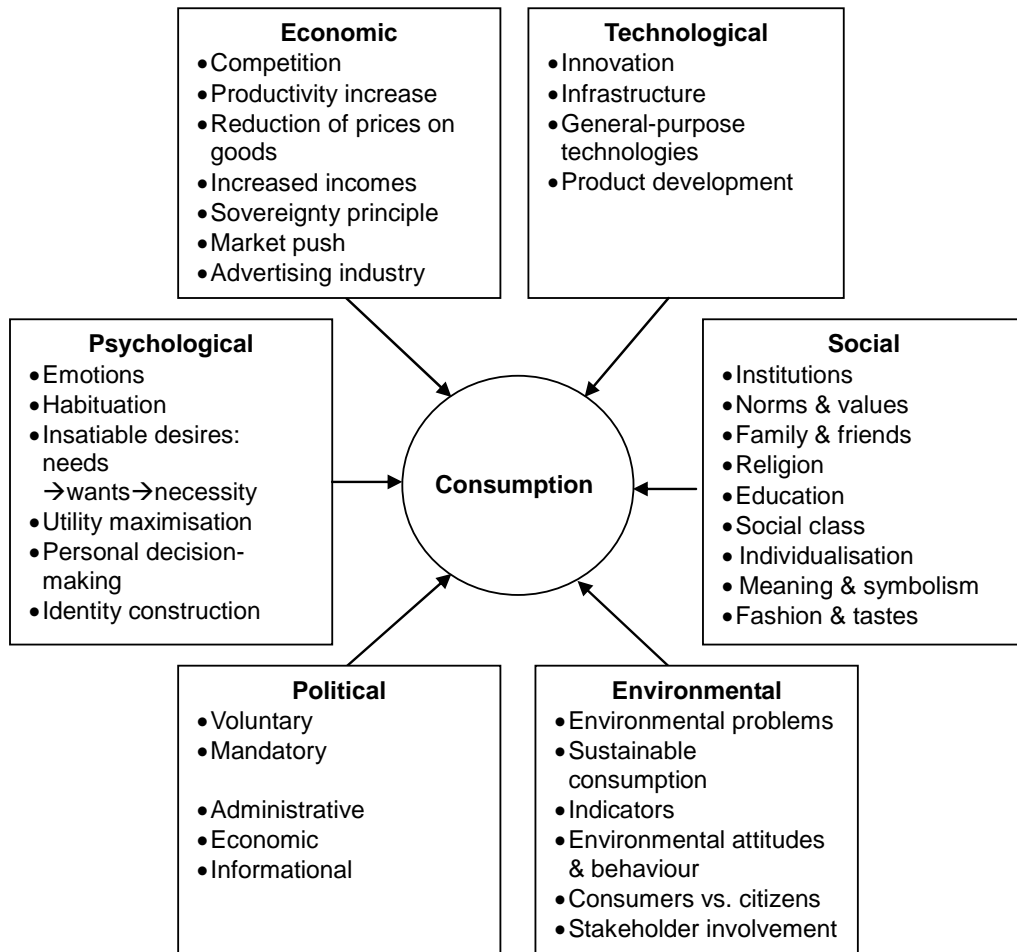


Figure 1. Forces shaping consumption choices (Mont and Plepys 2005).

Policy strategies and tools that influence consumption are largely oriented at protecting consumer sovereignty and at monitoring features of products and consumer information. Consumer agencies deal with issues of advertising and contract terms, consumer information and education, domestic finances, product safety, product quality, and in some cases also with product environmental impacts. The consumer policy objectives are typically set by governments. Despite the fact that impacts of products on consumer health is one of the main focal points of consumer agencies, the environmental and sustainability impacts of consumption have not yet been widely addressed (Mont and Dalhammar 2005). The policies and instruments for sustainable consumption will be discussed in Section 0.

A number of studies considering environmental impacts of consumption are based on the aforementioned economic theories of rational behaviour and develop their models for changing towards more sustainable consumption behaviour on the assumption that people's beliefs and knowledge about environmental issues will directly translate into action. Based on these assumptions, the following recommendations are developed: to reduce institutional and financial barriers, which prevent sustainable consumption patterns that people otherwise strive for. One of the most often mentioned practical suggestions is to use such policy instruments that provide information to consumers and help educate them on the environmental issues (OECD 2002b).³ Several streams of research, however, fail to identify a direct correlation between general levels of awareness and actual purchasing behaviour. Perhaps the first stream of studies, which started two decades ago, investigated waste management behaviour of households and individuals including waste collection, sorting, recycling and final disposal, see e.g. (Pieters 1991; McCarty and Shrum 1993; Moisander 1996; Bartelings and Sterner 1999; Strasser 1999; Fenech 2002). The results of these studies are inconclusive when it comes to identifying the characteristic features of a typical recycler (Barr 2002). A similar trend can be seen in marketing studies that failed to find any conclusive correlation between the level of environment-related knowledge of consumers and the use of this knowledge in practice (Minton and Rose 1997).

There are many studies that investigate people's behaviour in relation to product use and the amount of these studies is growing in recent years, e.g. (Box 1983; Thøgersen and Grunert-Beckmann 1997; Järvi and Paloviita 2005). These and other studies try to uncover structural, sociological and psychological determinants that contribute to the explanation of consumer behaviour and affect associated environmental impacts. Still, it seems that the majority of studies on sustainable consumption concentrate on green purchasing behaviour, e.g. (Berlin Blackman, Luskin et al. 1999; Grankvist and Biel 2001), provision of green products and information about them through eco-labels, fair trade and organic labels.

Socio-psychological explanations of consumption include psychological motives and effects of the social environment. People purchase goods and services for their qualities and functions, as well as for their symbolic or identity value (Bauman 1990). Some psychological explanations of consumption are based on the Maslow's hierarchy of needs (Maslow 1954) as the main driving force of consumption. Needs may be perceived as insatiable or satiable and can be satisfied with both material means and through non-material personal and social processes and services (Max-Neef 1991). Whether needs are insatiable or not, to some degree depends on their nature: absolute needs are felt by an individual independently from the surrounding environment, while relative needs arise from the comparison with other people (Howarth 1996). Since the second set of needs depends on someone else, it is impossible to satisfy them – there will always be someone in a 'better' position - while absolute needs is possible to satisfy (Hirsch 1976), whether through material or immaterial means. Acquisition of material products is often associated with happiness, although for example the World Value Survey demonstrates that up until \$13,000 of annual income per person (in 1995 purchasing power parity) income and happiness tend to track well (WVS 2006), but after this level they start delinking. Other studies also confirm the so-called Max-Neef hypothesis that until a certain level of GDP the level of happiness, which could be measured as Index of Sustainable Economic Welfare (ISEW), and GDP go hand in hand, after which they start to

³ See more discussion on drawbacks of informational instruments in Section 0.

decouple (Max-Neef 1995). So if the goal of humans is to be happy then increasing material prosperity is not the best way to reach this goal. On the other hand, a body of sociological literature on habit formation confirms that consumption behaviour is dependent on preceding consumption patterns. The implication of this is that since we have the habit of increasing our personal material wealth, and even if we would have reached the point of income after which more earnings does not necessarily bring us more happiness, it is very difficult for us to change our behaviour. The fact that material possessions are perceived as a measure of success, power and control in life in contemporary society and are thus symbolically significant (Bourdieu and Nice 1984) reinforces our behavioural patterns.

Taking this into account, many studies analyse how institutional settings affect consumption patterns. Among important institutional settings is the cultural embedding of consumption choices. For example, “The fact that most consumers consider spatial mobility or a holiday trip as important contributions to the enjoyment of their lives is not a law of nature, but a cultural phenomenon” (Cogoy 1999). Another important institution is the level of individualisation in society. There are however several arguments against individualism: “habits of mind and behaviour develop in a social and cultural context” (Zey 1991). Organisational psychology suggests that in social groups individuals adopt social roles that are prescribed, assigned or expected of them. For these reasons more and more studies focus on consumption as a collective and shared process and consider contexts and conditions within which it takes place, e.g. (Georg 1999). Based on these studies it has been suggested that behavioural change towards sustainable consumption must occur at the collective level – individual changes are clearly insufficient (Jackson 2005). This has implications for both governmental policies and for business strategies for sustainable consumption.

Although each perspective provides useful and complementary views and insights into consumption drivers, processes and outcomes, it is important to remember that each discipline is based on its own assumptions and prejudices. There are therefore plenty of explanations and practices that are contrary to those that are elucidated within the discipline-narrow prerequisites.

2.3. Actors Affecting Consumption

In addition to the many explanations of consumption concept from multiple disciplines, it is useful to understand how the production and consumption of products and services is influenced by many different actors, including businesses, governments (acting as regulators and standard-setters), private and organisational consumers, standardisation bodies, financial institutions, marketing and advertising industry, NGOs and academia. The role of the main stakeholders in consumption is briefly outlined below.

The private sector has traditionally been under scrutiny and in the focus of governmental policies directed at cutting pollution and improving resource and energy efficiency of processes and products. Some (in several cases significant) progress has been reached with respect to pollution cuts, and improved energy efficiency, and some (rather modest) improvements have been made in product design practices. The main concern is that productivity improvements lead to lower prices and drive increased consumption, offsetting improvements of eco-efficiency and dematerialisation strategies (Heiskanen, Jalas et al. 2000). Reaching sustainable consumption demands that both consumption patterns and levels

should be changed. Reducing the level of material consumption does not necessarily mean reduction of economic gains for businesses. On the contrary, selling fewer products, but offering more services can be a profitable business model, judging by the profitability of after-sale services in some sectors, for instance the automotive sector.

Advertising and marketing have so far not played a prominent role in promoting more sustainable consumption, but have a huge potential to contribute to sustainable consumption by shaping social norms and values. Their modest contribution can be explained by the fact that sustainable consumption offers a challenge to the existing marketing paradigm (Peattie 2001). Those few efforts undertaken by advertising agencies to promote green message perhaps have done less good by promoting the image of the environment as an additional cost for both producers and consumers. They have not yet greatly contributed to increasing understanding in society that the majority of goods are unrealistically priced and subsidised by the environment. Internalisation of environmental costs in green products is necessary in order to make green products less expensive than traditional products. In addition, advertising had negative influence by promoting green products as boring, grey and totally not fashionable goods. What is needed instead is to change this perception and make green products and sustainable lifestyles a fashionable and appealing option.

Individual consumers have been mainly excluded from the focus of policy makers as purposeful actors, behaviour of which to a great extent affects the outcomes of both governmental policies and business efforts alike. Individual consumers associate diverse meanings with the act of consumption: they find their identity and self-esteem, feel the sense of loyalty and belonging to a certain social group, obtain possibility to display their status through products and services they buy, or even make political statements or vote on the market with their purchases or by abstaining from shopping of specific brands or on the whole, e.g. through the campaign 'Buy Nothing Day'. In reality any of these meanings can compete or on the contrary support the desire to consume more sustainably. In addition to these psychological meanings people attach to the act of shopping, there are other factors that influence what gets consumed, why, in what way and in what quantities. Individual consumers are influenced by the existing infrastructures and institutional and cultural settings and act within technological and market boundaries, as well as the boundaries of their own knowledge. In their actions they can be viewed in different roles: as decision-makers in their purchasing activities, as citizens-consumers who are aware about sustainable choices and exercise their purchasing power to drive market towards more environmentally and socially sustainable products, and finally as practitioners involved in household production and creation of specific lifestyles (Shove 2003). So far, policy instruments towards consumers have been based on the assumption that increasing levels of consumer knowledge will be translated into increased environmental concern and will lead to increased markets for green products and services (Oskamp, Harrington et al. 1991). Research however does not provide concluding evidence that such a correlation actually exists (Diamantopoulos, Bohlen et al. 1994).

Non-governmental consumer organisations (NGOs) are widely involved in campaigns and initiatives that increase public awareness about sustainable consumption patterns and levels at local and national level. At international and national levels they act as lobbyists against slow progress towards sustainable consumption, they do ask sensitive questions regarding sustainable consumption and production, they challenge the current economic premises and call for sufficiency oriented approaches (Church and Lorek 2006). Local and

regional NGOs often cooperate with local authorities, community representatives and various activity groups, all together driving sustainable consumption from the bottom up. International NGOs, on the other hand, are seen as having controlling function of the progress towards sustainable consumption and in such a way drive sustainable consumption agenda at political level.

The public sector does not only set regulatory frameworks within which all actors act, it also affects infrastructure that can facilitate more sustainable consumption choices or indeed ‘lock-in’ actors into unsustainable consumption practices (Sanne 2002), even though individual actors would be willing to act differently. In addressing the issue of sustainable consumption and production, three types of policy instruments are being used. Typically, administrative or regulatory instruments are applied to producers (e.g. pollution control, product standards). Economic instruments (tax reforms, product charges), although affecting producers, are directed towards final consumers, but also shape markets and eventually influence institutions. Informative instruments are being used for both consumers through e.g. awareness raising campaigns, education and eco-labels and for producers through labelling schemes or voluntary initiatives, as well as through mandatory reporting. Besides setting overarching societal goals and rules of the game, governments themselves practice green public purchasing and in that way serve as example for other actors and simultaneously stimulate demand for more sustainable products and services. While green public purchasing has been the focus of recent policy developments, the role of public investments in more sustainable infrastructure, e.g. public transportation, energy-efficient buildings, systems for shared use, et., has seen much less attention. It is also foreseeable for the public sector to provide guidance for private sector regarding advertising and marketing in promoting more sustainable consumption choices. Creating conditions, within which social innovation and not only technical innovation can be facilitated, is perhaps even more important. Examples of new forms of community engagement are emerging and provide an interesting perspective on potential societal developments, see for example (Manzini 2006).

3. POLICIES FOR SUSTAINABLE CONSUMPTION

In the last five decades we have seen the birth and growth of environmental policy. Recognition of unsustainable development patterns lead to advances in environmental policy directed towards producers. Producers were seen as the main culprits behind growing pollution and waste volumes. A variety of policy strategies and instruments were formulated to encourage progress in production processes and management practices of enterprises. In their nature, these policy instruments range from strict bans and regulations of punitive character to a broad range of voluntary measures with soft suggestions on information disclosure and provision.

Perhaps for the first time consumption-related problems have been mentioned in a policy document in the late 1980s in the report from Brundtland Commission, which envisaged that *“[p]erceived needs are socially and culturally determined, and sustainable development requires the promotion of values that encourage consumption standards that are within the bounds of the ecologically possible and to which we can all reasonably aspire... Major changes in policies will be needed to cope with the industrial world’s high levels of*

consumption” (WCED 1987). Not much action towards addressing consumption patterns and levels followed. It was believed that technical advances would be able to cope with escalating pollution and waste volumes and counteract growing population and levels of affluence. Following this belief we have seen the proliferation of policy and business strategies been developed to foster technological innovation and improvements in production processes.

In 1992 the Rio Declaration also highlighted the importance of sustainable consumption by stating in Principle 8 that unsustainable patterns of production and consumption should be reduced and eliminated. This was followed by several other international gatherings dealing with sustainable consumption and production, including an OECD expert seminar on sustainable consumption and production patterns in 1994, and a ministerial Roundtable on Sustainable Production and Consumption in Oslo in 1995. However, again the practical realisations did not proceed beyond eco-efficiency, cleaner production and environmental management systems. The closest policy tool that was devised and promoted for addressing sustainable consumption was ecolabelling.

In the 2002 World Summit on Sustainable Development in Johannesburg, the devised Plan for Implementation formulated three objectives: eradicating poverty, changing unsustainable production and consumption patterns, and protecting and managing natural resources. Regarding sustainable consumption the plan stressed, “*Fundamental changes in the way societies produce and consume are indispensable for achieving global sustainable development. All countries should promote sustainable consumption and production patterns, with the developed countries taking the lead and with all countries benefiting from the process... Governments, relevant international organizations, the private sector, and all major groups should play an active role in changing unsustainable consumption and production patterns*”. The Johannesburg Summit called for the development of a 10-year framework of programmes (10YFP) in support of regional and national initiatives to accelerate the shift towards sustainable consumption and production patterns that will promote social and economic development within the carrying capacity of ecosystems. The strategy for the 10YFP will be presented and reviewed at the 2010-2011 cycle of the Commission on Sustainable Development. The United Nations Environment Programme and the United Nations Department for Economic and Social Affairs are the coordinators of this work. The Marrakech Process was initiated as an international effort to help formulating the 10YFP. The implementation of the Marrakech Process currently involves four phases: organising regional consultations in all regions to promote awareness and identify priorities and needs for SCP; building regional strategies and implementation mechanisms with regional and national ownership; implementing concrete projects and programmes on the regional, national and local levels, and monitoring and evaluating progress, as well as exchanging information and experience at the international level (SCSP 2006). The current activities take place within seven Task Forces lead by European countries, including a Task Force on sustainable lifestyles (Sweden), green public procurement (Switzerland), sustainable products (UK), sustainable building and construction (Finland), cooperation with Africa (Germany), sustainable tourism (France) and education for sustainable consumption (Italy).

The 10-year Framework is supposed to catalyse and guide the transition to “a more sustainable global economy”. However, despite the grand visions, the consumption side of the equation has become subdued to the broader concept of sustainable consumption and production. Both international and national documents and reports tend to develop little space for consumption issues. Although the original intentions might have been to highlight the

importance of a more holistic thinking, the end result is further efforts, at political and business levels, concentrated on eco-efficiency improvements and greening of the markets. There is yet little attention given to the role of consumers and households; their role in the consumption cycle and policies suited to make an impact on their consumption habits.

The EU has so far not developed a concrete programme, or umbrella policy, specifically aimed at sustainable consumption. Few individual states appear to have a more developed strategy than the EU. UK has produced a document outlining the main principles and policy instruments for dealing with sustainable consumption challenges (DEFRA and DTI 2003), but so far there seem to have been much more debate than action. Sweden also developed a national strategy for sustainable consumption (Regeringens skrivelse 2006), but so far little concrete action has been taken. Finland is also among the few European countries that have developed their national SCP programme, called 'Getting more and better from less'. The evaluation of the Finnish programme reveals the risk of "politics of lowest common denominator": in order to reach consensus the text of the programme had to be watered down so that it currently provides little support to the government in the implementation work (Berg 2007).

There are some policies emerging that address consumption patterns, as will be discussed below. However, sustainable consumption is still implicitly defined as the consumption of more eco-sound or ethical products, and there are no clear strategies for the absolute reduction of consumption levels. Thus, the understanding seems to be that technological improvements in processes and products will allow for necessary environmental improvements without significant changes to contemporary lifestyles.

At the national level (and the EU level), there are a large number of principles, strategies, policies and tools that have been developed to address problems related to current production and consumption levels and patterns. Here, we will focus on some instruments employed in order to promote more sustainable consumption patterns. Instruments can be classified in different ways, for instance as in the table below.

When it comes to administrative instruments, the potential to regulate consumption patterns and especially levels is clearly limited. Such interventions could jeopardise the very fundamentals of the market economy, and therefore would hardly be politically accepted. But obviously there are exceptions. Products that cause much nuisance have negative health effects or large environmental impacts are often banned or their use is restricted. Examples include tobacco, drugs, jet skis, and chemical products. This also implies that the scope for measures very much depends on the cultural context, and this context is changing; what appears to be impossible today can be possible tomorrow. Indeed, laws can have great effect on consumption patterns, because laws affect the social context, in which ideas of human-nature interactions, consumption, well-being, morale, and identity are shaped. Regulations concerning advertising, product standards, trade, social policies and education are of great importance, as they may influence the attitudes of different actors. Our knowledge on how these mechanisms work is however limited. Traditional regulations tend to focus on high-risk activities from point source pollution. This means that both the environmental administration and industry has focused their training and resources to the regulated issues. This also means that there is a limited understanding in industries and governments for the need to work with consumption issues, and for the problems associated with the life cycle impacts of products (Dalhammar 2004). When education, policies, resources, etc. are all targeted towards the 'traditional' problems, the tendency can become self-reinforcing: it is hard to change the

system to fit the challenge. A very relevant example concerns the service sector. The environmental impacts of the service sector are often neither well known, nor addressed through policies. Quite often actors in the service sector, or consumers of services, tend to think that their activities do not have any significant environmental impact, even when these impacts are quite significant (for instance connected to heating, food, and transport of goods and people), and the potential for cost-efficient improvements seems to be high (Kisch, Mont et al. 2002). One of the reasons for these attitudes is perhaps that regulations tend to focus on direct environmental impacts from manufacturing and have rarely forced the service sector to deal with their environmental problems (Dalhammar 2004).

Table 1. Policy instruments for sustainable consumption and production (Mont and Dalhammar 2005)

	Mandatory instruments	Voluntary instruments
Administrative	Bans, licenses, requirement on EHS information, EPR, recycling and recovery quotas, material and quality requirements, emission levels, chemicals regulation	Responsible Care and similar initiatives, POEMS, application of product standards, product panels, EMS, functionality panels, agreements between government and industry
Economic	Deposit-refund systems, taxes and charges, liability rules	Green public procurement, technology procurement, R and D investments
Informative	Requirement on EHS information, emission registers, material and quality requirements, chemicals regulation on information for professional and private users, energy labelling, marketing regulations	Eco-labelling ISO type I, EPDs, green claims, energy labelling, organic labelling of food, certification schemes of e.g. hotels, consumer advice, consumer campaigns, education

Although the majority of legislations affect the production side, we can notice that environmental regulations increasingly focus on products and their life cycle impacts. One of the first attempts in this field was the development of extended producer responsibility legislation, which sets mandatory targets for recycling of materials that are often combined with design requirements, restrictions of hazardous materials and the obligation to produce and make available information on the products that are useful in the end-of-life stages. Producer responsibility laws are common in Europe (although less common in other parts of the world) and address various product groups including electronics, packaging, tyres, and batteries.

Upcoming legislation on energy intensive products aims to stimulate design changes that improve energy efficiency and other environmental parameters. The increased focus on product regulation has implications also for the consumption side. Take-back legislation has stimulated the development of recycling systems, which require consumers to sort and recycle waste, thus changing consumer behaviour and making the consumer more aware of the environmental implications of consumption. As product oriented legislation increasingly affects the chemical content and energy efficiency of products it becomes very interesting from the consumer perspective as well. However, the regulations are still mainly directed towards producers.

Voluntary administrative instruments have become more popular in later years, not least the use of voluntary environmental agreements between governments and industry (Swedish EPA 2000; OECD 2003). These instruments seldom involve consumer more directly, but may nevertheless have implications for impacts of consumption. For instance, there are several government-industry agreements in place in Europe concerning the energy efficiency of energy-demanding household products.

Many researchers and international organisations, such as OECD, heavily promote the use of economic instruments. Taxes and charges on products, raw materials, substances and environmentally damaging activities can ensure that the products' price incorporates the environmental costs, thereby steering production and consumption towards more sustainable direction. Waste disposal charges can have an influence over both producers and consumers, and eventually aim at extending the life span of products. There are great differences in Europe (and worldwide) when it comes to the use of environment-related taxes and charges. Some states have initiated a green tax reform, with the aim to (in the long run) substitute income related taxes with taxes on natural resources and energy. This has the potential double dividend of shifting consumption towards less environment-damaging products and services, and to provide more jobs. However, it appears as the green tax reforms that has been initiated in some Northern European countries in later years are progressing slowly, if at all, or has in some cases even halted (Albrecht 2006; Beuermann and Santarius 2006; Deroubaix and Leveque 2006). Further, environmentally harmful subsidies are still common. In contrast to resource prices, labour costs are high in most industrialised countries and they are frequently the reason why firms shed labour and replace it with resource-intensive equipment. In the EU, in excess of 80% of all taxes are income related. To a considerable extent, the high cost of labour (not salaries) is the consequence of deliberate policies.

Most existing taxes and charges do not appear to be a strong driver for environmental product innovations, nor for changes of consumption patterns, due to the limited internalisation of external costs provided for by current instruments (Markusson 2001; Swedish EPA 2002; Rennings, Kemp et al. 2003). The relatively limited internalisation can be explained by the resistance towards economic instruments from vested interests (Hahn 2000). There are some examples of more effective economic instruments. For instance, subsidy schemes for costly energy efficient products (like refrigerators, cars, and boilers and other heating equipment) can be quite effective under the right circumstances, especially when a relatively strong economic incentive (due to high operation costs) is supported by information campaigns.

When it comes to voluntary economic instruments, green public procurement has been heavily promoted both by researchers and governments in the last decade. The main idea is

that governments should use their considerable purchasing power to stimulate the development of greener products and services, and to ensure larger market share for such offerings. At present, various EU member states and regions within member states use green public procurement in varying degrees. Apart from a supportive legal framework, effective green procurement requires that procurers have knowledge, support, and effective tools at their disposal. Most progressive procurement policies in Europe can be found at local and regional levels. The great potential for public procurement as an instrument for change is however not fulfilled yet: public procurement has not been a strong driver for eco-design yet (Swedish EPA 2002), although its potential to stimulate green innovation should be high (Ahlner, Hurtig et al. 2006; Borg, Blume et al. 2006; Gunther and Scheibe 2006; Hochschorner and Finnveden 2006).

While economic instruments are a vital part of a consumption strategy and can help in shifting consumption towards more environmentally sound products and services, they do not necessarily change the reigning view that individual consumption is tightly linked to individual welfare.

A third category of instruments is informative approaches. There are few informative instruments of mandatory nature. Recent initiatives include legislation that assures the public's right to environmental information (based on commitments in the Aarhus Convention) on pollution from facilities. When it comes to consumer products, only a few mandatory schemes for environment-related information have been launched. The energy labelling system for refrigerators and other energy-consuming products in EC was previously voluntary for producers and had very limited success. It was not until the labelling became mandatory (Directive 92/75/EEC) that consumers and manufacturers started to pay attention to these issues, and the scheme was considered as a success, driving innovation of less energy-using products and making it possible to ban sales of inefficient refrigerators and freezers (Kemikalieinspektionen 2005). The most controversial EU initiative concerns planned rules on traceability and labelling of GMOs, which have been challenged by the US in the World Trade Organisation (WTO). If these rules come into force they will most likely significantly affect consumer attitudes to GMOs, and probably restrict the marketing and sales of products containing GMOs.

EU has advertising laws that regulate the use of environmental claims and certain words, e.g. 'organic', in marketing. EU Directive 89/552/EEC also states that television advertising and tele-shopping shall not encourage behaviour prejudicial to the protection of the environment (see Article 12). However, more progressive initiatives from member states have not been accepted in the EU. One example is the Swedish attempt to promote EU rules that limit marketing practices aimed at children, in line with national regulations (Jacobsson 2002). The main idea behind the Swedish rules has been to make sure that children, who are not considered to be in a position to differentiate between marketing and facts, shall not be subjects of direct marketing efforts. Some authors also mean that children should be allowed 'safe zones', not being subject of commercialisation, which creates stress, as it makes children aware of the need of the right clothing, the right toys, etc. For the same reasons, many European schools restrict or forbid pupils to take certain toys to school. Some European cities have also enacted policies to remove marketing in public places, trying to provide citizens with 'safe zones'. The most effective way to stimulate real change is probably to further regulate marketing practices and provide citizens with more safe zones. However, such regulatory measure would be heavily resisted by powerful vested interests.

There are a greater number of voluntary informative instruments used in Europe. Most of these instruments aim at private or institutional consumers and include: eco-labelling (ISO type I), environmental product declarations (EPDs, ISO type III), organic labelling of food, certification schemes of e.g. hotels and beaches, consumer advice, consumer campaigns and consumer education. Most European initiatives are undertaken by private actors or at national, regional and local levels, while there are also few EU-wide initiatives. In recent years, the role of governments has expanded to include not only the promotion of green products through eco-labelling, but also ethical products through Fair Trade schemes. However, there is reason to question the effectiveness of voluntary informative instruments. Many of the instruments got little response from industry and consumers, and some of the instruments may not be easy to use for the desired purpose. The high hopes that were put on eco-labelling have been tuned down in later years. Despite updating the rules and scope of the EU Eco-label, the label is still awarded to too few products and is rarely visible in shops. However, some national eco-labelling schemes have been more successful, e.g. Germany's Blue Angel and the Nordic Swan. The effectiveness of consumer campaigns is affected by the level of consumer knowledge, strength of attitudes and by concrete actions, which are hard to measure. Besides, studies have shown that information in itself is not sufficient to achieve change due to the significant gap between consumer attitudes and actual behaviours.

4. BARRIERS FOR MORE EFFECTIVE SUSTAINABLE CONSUMPTION POLICIES

Despite the aforementioned list of policies developed in recent years to address production-consumption related problems and environmental impacts, the overall progress towards sustainable consumption has been considered slow. A number of reasons can be identified that contribute to such a state of affairs and they will be discussed below.

In their decision-making processes policy makers typically rely on assumptions grounded in the traditional *neo-classical economic views*, which see consumers as utility maximisers with bounded rationality who express their preferences in a formal market. The consumer behaviour model underlying the mainstream policies is based on the assumption that inappropriate price signals and lack of trustworthy and authoritative information provision are the main barriers to more sustainable behaviour of consumers, who are otherwise are totally committed to the goals of sustainable development. Although the use of economic instruments to ensure that the price of products and services reflect environmental and social costs of their production and consumption remains pivotal, these are only two variables that influence consumer decision-making and in that sense might not be the most crucial ones (OECD 1997).

Despite that and based on these assumptions a range of consumption-oriented policies or policy instruments have been developed. The majority of them focus on *adjusting the market failures* by *providing more accurate information to consumers* (e.g. ecolabelling) and by setting the prices right (calls for internalising environmental and social costs). Ecolabelling and similar information providing tools face a difficulty in that consumers have proven to become easily confused by the amount and the diversity of the information (Salzman 1997). In addition, these tools reduce the complexity of human behaviour to few features of human

beings universal for everyone. Reliance on measures to improve market information provision to consumers and in this way allow consumers to vote on the market through their purchasing decisions has a drawback in that only products that are familiar to consumers or those directed at private consumers will become subject to consumer pressure. All other types of purchases, including those along supply chain, governmental and business purchasing and investment purchasing are beyond the influence of consumers and broader society (Lodziak 2002). Additional drawback of information provision tools is that the majority of them provide information on material offers and in this way stimulate consumption of green goods, which anyway has negative impact on the environment, even if it is smaller than consumption of traditional goods (Bougherara, Grolleau et al. 2005).

Within the neo-classical perspective, policy makers are typically reluctant to instigate measures that intervene in consumers' *sovereignty* and treat consumption domain as being beyond the reach of legal influence. First of all, the sovereignty of consumer is purely ephemeral because consumers make their decisions while being influenced by a number of social, contextual, and psychological factors, not in isolation and not only based on individual preferences. Secondly, there are several product groups that have been violated by the legal intrusion despite the sovereignty principle, such as tobacco, alcohol, drugs and firearms. Nowadays, no one questions the governmental control of these substances, since they affect human health, but the interference into the sphere of products that have adverse effects on the health of our planet are being heavily criticised.

Government authority is heavily based on its capacity to *keep economic growth* and to secure continuous expansion of the economy. Restraining consumption is seen as a suicidal mission by the majority of decision makers, both in governmental and business organisations. Therefore, governments in many countries in order to keep GDP growing, under-price natural resources in comparison to social costs (externalise negative environmental and social impacts), improperly define property rights and provide perverse subsidies (Arrow, Dasgupta et al. 2004), (EEA 2006). However, the assumption of the contemporary public policy that economic growth typically measured in monetary terms is a pre-requisite for happiness and quality of life does not hold true. There are three fundamental problems with this assumption. First of all, research does not show that increasing individual income is directly linked to the level of happiness. Secondly, not any economic growth is environmentally problematic. The financial growth of the economy that is delinked from material and energy intensive products and services is quite plausible in environmental terms. And lastly, even for companies the growth factor is more beneficial if it is linked to provision of value and services and not if it is based on heavy and dirty production. To contribute to the process of identifying alternatives to the economic growth model based on material- and energy-intensive consumption and production, ecological economics (Princen 1997) and some social theoretical frameworks (Gorz 1987; Iwata 1997) elaborate proposals for lifestyles based on self-sufficiency.

The first decades of environmental policy have largely failed to recognise and acknowledge the *pivotal role of consumers* in material and energy consumption and in taking action in changing its patterns and levels. The fact that the only type of decision-making of final consumers is associated with purchasing decisions is socially unjust. First of all, focus on purchasing and even green purchasing excludes consumer decisions to delay or avoid purchase and creates a false sense that the only choice consumers have is to buy green, forgetting another choice - to stay away from shopping or satisfy their needs in less materialistic ways through visiting theatres or their families or by using services and

community sharing systems instead of purchasing and owning products (Peattie 2001). This only way for people to express their preferences undermines systems of exchange other than competitive and formal market. It also neglects the right to vote of those who are unable, cannot afford to or simply not willing to participate in the market. One of the reasons for the latter might be lack of options that are preferred by consumers on the market or the feeling that their purchasing decisions would not make a difference in, for example, stimulating the supply of more environmentally- or socially-sound products and services (Holdsworth 2003).

In addition to the neo-classical economic assumptions that underlie contemporary policy-making, a so-called *technocratic approach* has also been used by policy-makers, which relies to a great degree on technical solutions to achieve sustainability goals. Within this technocratic approach it is assumed that the society's environmental problems can be reduced by technological innovation, undermining the complex nature of humans and their interactions among themselves and also with technology. Policy tools and approaches being developed from this technocratic worldview are typically supply-oriented and include pollution prevention, cleaner technologies and product design for the environment. Although technological improvements no doubt have large potential to reduce environmental impacts of current lifestyles, their contribution to sustainable consumption is potentially rather limited. Human behaviour is very diverse and the intended outcomes of technology or product use might be shaped in a totally different way by user practices. In addition to that, increasing consumption of technologically advanced and eco-efficient products is in fact increasing consumption, which nevertheless implies consumption of virgin resources and energy and environmental impacts from their production.

The truly interesting question is why, despite their limitations, neo-classical economic and technocratic views dominate contemporary public policy landscape. Several reasons can be offered. First of all, since their assumptions about consumer behaviour and market forces are rather limited and simplified, they are able to provide easy solutions to fix the identified problems and are thus politically attractive. Secondly, following the assumptions provided by these perspectives, the view is very atomistic and fixing problems requires instrumental approaches that are typically developed by experts in technology or economic disciplines, which are usually employed by policy-makers for analytical investigations (Cohen and Murphy 2001). Thirdly, due to the political sensitivity towards radical changes in society that the strong sustainability models propagates, neo-classical economic and technocratic approaches frame sustainable consumption within the weak sustainability discourse suitable for policy-makers. Obviously the options provided by the two approaches are potentially too weak themselves to advance sustainable consumption to the level of strong sustainability.

In *modern consumption theories* that widely draw on the fields of psychology and sociology, consumer behaviour is seen as much more complicated than simply a rational response to price signals or to availability of technical solutions, and society at large is seen as an intricate network of actors, factors and institutions. Social institutions, social groups and behaviours mutually reinforce each other and shape the development of society and people. Sociology proposes that consumer choice is influenced by functional, conditional, social, emotional and epistemic values of products, which for policy makers means that these values need to be affected if changes in consumer behaviour and lifestyles are searched for. Psychological studies contribute to sociological perspective by studying how consumer's purchasing decisions are influenced by emotions (e.g. feeling of satisfaction) and habits, and how some of them can be shaped by education in a relatively short time, while others,

especially those related to societal pressures, are more difficult to change without addressing the issues of social culture. So far formal markets failed to offer non-commoditised goods or local connectivity, which many people desire and express the need for by developing alternative consumption models and social enterprises and communities (Manzini and Jegou 2006). In addition to this, many commercialised and commoditised lifestyles promoted by formal markets around the globe fail to accommodate the diversity of cultures existing on the recipient end of the Western marketing and advertising. Furthermore, policy also marginalises such community initiatives to a large extent (Leyshon, Lee et al. 2003) and prevents these 'islands of sustainability' to scale-up and provide competition to the formal market offers.

In a way, economic and technocratic perspectives offer a rather unified response to sustainable consumption problems within the contemporary economic frameworks, while sociological sciences offer a multitude of explanations and neo-liberal worldviews much less influenced by formal markets and conformist visions of how society should evolve. The latter also point out to the weakness of educational campaigns that address public knowledge problem since they face the complexity of human interaction with other members of society and with institutions that are deeply rooted in contexts and infrastructures that are largely not conducive of living sustainable lifestyles.

5. TOWARDS SUSTAINABLE SYSTEMS OF CONSUMPTION – THE CHANGE PROCESS

5.1. The Changing Nature of Institutions

How the new insights into the context of consumption outlined above and goals of sustainable consumption shape the response needed from public policy? The main difference between managing consumption from managing production is that while the production side has two main actors: businesses and governments, the shaping of consumption side depends on actions of many more actors, but primarily including consumers, businesses and governments, non-governmental organisations and also academia. This fact alone makes the traditional role of governments old-fashioned. In addition to this, governments are currently under pressure to delegate the responsibility for dealing with environmental problems to other actors in society in part because of the alleged state failure in the environmental field (Jänicke 1990). Therefore, in recent years, there has been an observable shift from government- to governance-based model of societal management. Governance is a new way of coordinating development in society, which includes new relationships and coordinating mechanisms among institutions, actors, processes and ideas. Perhaps the most vital features of governance in comparison to government-based model are the transparency and accountability of decision-making processes and opportunities for wider stakeholder participation. This corresponds well with the latest calls for collective effort within the sustainable development discourse, rather than relying purely on market-based and policy-driven approaches. The scale of the challenge is large because "*when responsibility for environmental problems is individualized, there is little room to ponder institutions, the nature and exercise of political power, or ways of collectively changing the distribution of power and influence in society*" (Maniates 2002). The collective efforts in changing the institutional basis of the society

should therefore be complemented and include horizontal and vertical networks of formal market players, policy-makers and civil society to confront the existing regimes of materialism and anthropocentricity (Manno 2002), which are based on neo-classical economic and technocratic premises.

Since governance is still a new concept, precise definition, scope and mechanisms within the concept may not yet be outlined (Bregha 2003). However, the concept provides an opportunity to realise much wider and more advanced reforms in the society, needed for reaching strong sustainability. These reforms will require development of a tool-box of policy, market and civil society oriented strategies, instruments and measures.

5.2. Acknowledging the Variety of Consumers

Despite the shift towards much more participatory processes in managing society, the role of public policy is still to develop frameworks that enable and trigger changes towards sustainable consumption. In this task, policy makers face a great challenge in understanding what instruments and how to develop so that consumption patterns and levels can be changed. Studies of consumer behaviour stress the need 1) to develop instruments and approaches that stimulate new patterns by challenging the old behavioural patterns. In order to change the old patterns, 2) steering processes that have shaped those patterns need to be changed. And finally, 3) instruments need to be developed that would stabilise the new behaviour and facilitate its embedding into every day routines by securing that infrastructure and products and services supporting the new behaviour are available. Spaargaren's recommendation that policy ought "not limit itself to consumer behaviour on the market, but should also be directed at intermediary organisations and systems which can have a direct influence on changes in household consumption patterns" (Spaargaren 1997) supports this line of thought.

Coming back to the first stage of the change process it is useful to distinguish different types of consumers and develop measures that would address each group. For example, there is obviously one category of consumers who are not interested in the environmental issues, and are happy to trust science and governments in solving the environmental problems for them. For these types of consumers supply of environmentally sound products and services to the market could provide an opportunity to make sustainable choices. This would especially hold true if environmentally sound products and services were also cheaper than traditional 'dirty' products. At the other end of the scale are environmentally aware consumers who are willing either to pay extra for environmentally sound options or to change their behaviour, whether purchasing or in the household, towards a more sustainable one. One also has to realise that there are various 'shades of green', which may very well translate into that some groups of consumers are willing to pay extra, but are totally not prepared to change their lifestyle, while others, perhaps more price-sensitive consumers, who are willing to invest time in sorting waste or postpone-avoid purchase, but are absolutely not interested in paying extra (Peattie 2001). For the various types of consumers different measures could be feasible:

- Avoiding consumption implies questioning the needs and wants, as well as values and predominant market 'freedom of choice';
- Reducing consumption is based on the same assumptions as avoiding consumption;

- Postponing consumption through, for example, extending product useful life can also lead to reduction of associated environmental impacts;
- Using alternatives or substitutes provided by the market with lower environmental and social impacts;
- Using the same products and services, but choosing brands with lower environmental and social impacts.

Another feature of consumer behaviour that needs to be taken into account when developing policy measures is that even if consumers express general concerns for the environment, the degree of their concern differs significantly depending on the environmental issue, product group or the level of effort that the needed change requires (Jackson 2004). Therefore, understanding and accepting the differences in people's level of knowledge and interest in environmental issues, attitudes and cognitive capabilities, as well as the variety of contextual factors shaping their lifestyles should provide a solid background for developing strategies and measures for this diversity. And last, but not least, although the starting point for the development should be contemporary values, in order to proceed "modern societies need to take a reflexive look at their values and how they achieve their aspirations" (Cohen 2001).

5.3. The Systemic and Integrative Nature of Policy Involvement

How to develop a truly systemic and integrative by nature public policy for sustainable consumption with the shift from controlling and monitoring by government towards participatory approach and governance? The package of policy instruments should combine voluntary and soft measures with coherent and stringent, but also clear legislative framework that would include concrete targets in terms of decoupling economic growth from levels of material and energy consumption, as well as reporting and monitoring mechanisms.

More specifically, the package of policy instruments directed to numerous stakeholders should have two goals: promoting more sustainable consumption patterns and levels. For Western world changing consumption levels means reducing material and energy intensity of economy, household activities and products and services while providing the same lifestyle in terms of necessary functions and advocating much less materialistic lifestyles and much higher quality of life, and increasing levels of well-being and happiness. Many of these alternative systems and activities can be provided outside the formal economy. Therefore, new indicators of well-being need to be used. A range of alternative systems of indicators is already available that measure social well-being on a broader, than just economic, scale, e.g. ISEW (Index of Sustainable Economic Welfare). The new accounting systems would help identify possible intervention points in a wider system and would be able to support restructuring of institutions and lifestyles towards more sustainable consumption.

In addition, policy tools and mechanisms need to be developed that would support community activities instead of just concentrating on measures that provide information and build up consumer knowledge with the purpose of selling more environmentally sound products and services within the existing markets. The bottom-up community initiatives are so far decentralised, marginalised and organised by people who start questioning traditional values and cultures (Gardner and Stern 1996). These collective initiatives and networks

provide interesting examples of alternative lifestyles, which, with support of the government, could eventually become mainstream, and provide inspiration for less developed economies and future generations. One of the important features of these collective systems is that they encourage learning and through that initiate the change process leading to less environmentally burdensome and more socially and psychologically fulfilling lifestyles. Thus a new and important role for governments is not simply to provide information and raise awareness of consumers, but instigate changes that encourage learning, initiation and active participation of all stakeholders in the change process (Jackson and Michaelis 2003). Emerging social norms might be much easier to internalise for stakeholders if they are involved in the process of creating these new patterns through processes of social learning (Bandura 1977). Potential ways to do this is to support community groups and projects, and local multi-stakeholder processes, and in general support contexts/projects that provide well-being not directly connected to consumption activities. It is also suggested that governments should be more involved in setting up public workshops where mental models for the future of regions and communities could be developed, as people's own mental models about the future highly influence future outcomes (Tsitsia, Frias et al. 2004).

In order to facilitate more sustainable lifestyles governments can also contribute by supporting the development of more sustainable infrastructure. Infrastructure projects, including city planning, transport systems, and communications heavily influence the choices people can make. City planning heavily influences crime rate, commuting patterns, shopping patterns and so on. Further, planning influences people's housing and their energy use, but also their access to meaningful leisure activities. Infrastructure is also crucial for transport patterns. While people might be willing to abandon car commuting, this requires that alternatives are available, as for example good quality public transport or bike lanes. Many large cities have poor public transport, and biking to work is often a dangerous project. This is an example of a situation where consumers are locked-in and as a result often resort to car travels despite traffic jams, congestion, noise and expenses. The role of national and local governments in providing consumers with opportunity to exercise more sustainable choices by developing sustainable infrastructure is clearly vital.

CONCLUSION

In this chapter we provided a state-of-the-art analysis of the drivers and contextual factors that shape the consumption domain and sustainable consumption discourse. We demonstrated that the list of current efforts by governments (and to lesser extent of businesses and consumers) is far from being exhaustive. Current policies often avoid the most politically contentious issues. There is also a lack of systems perspective in sustainable consumption policy. Consumption patterns are taken for granted, and little effort is taken to change them. Economic growth continues to be the main parameter for measuring the success of politics. Current policy instruments for sustainable consumption are few and not very effective. Even in areas where there appears to be a wide consensus for action – for instance the more progressive use of economic instruments – little progress has been made. The EU does not even have a genuine policy for sustainable consumption, and only few European countries have developed national strategies, e.g. UK and Finland. Thus, the general conclusion holds:

environmental policies that do not challenge the status quo - in terms of divisions of labour, resources and time, or social and cultural representations of the good life – and ultimately the current policies may have the perverse effect of legitimising ultimately unsustainable patterns of consumption (Shove 2003).

We therefore claim that it is high time to develop intellectual and political space for sustainable consumption to be shaped and embedded into everyday life of various stakeholders and people in their business and private undertakings. In our view, governments and international bodies can and should do more than is currently done. This includes traditional government measures, relying on traditional policy instruments, and a new more cooperative, ‘change agent’ approach, supporting new and interesting projects. It is however not very surprising that little has been done. The need to take a systems perspective, work with long term targets, and question the reigning paradigms and beliefs, makes sustainable consumption an issue that fits poorly into current political structures.

We suggest that governments can support more sustainable consumption patterns in numerous ways, but effective policy for sustainable consumption would require governments to take the following issues into account. First of all, there are no quick fixes. Taking a systems perspective and changing mindsets and attitudes in the current societal system takes time and effort. Secondly, while there is a need for traditional policy instruments, governments may also have to take on a new role, as a partner. Michaelis and Jackson also stress that governments need to get involved in a learning process, be the willing listeners to other stakeholders, and also be prepared to question its own beliefs and assumptions (Jackson and Michaelis 2003). Thirdly, under the assumption that eco-efficiency is not enough, because people will always aspire to consume more, government will ultimately have to deal with the sufficiency issue, taking on the problematic issue of levels of consumption. This will challenge many vested interests, and thus be met with much political resistance. Here the role of social sciences would be invaluable. So far, the insights of social sciences into sustainable consumption have been too intricate, comprehensive and deep to be easily translated into clear and simple suggestions and instruments of public policy. This means that social scientists will need to learn about ways to communicate their knowledge to policy makers, businesses and broader society. In their turn governments will have to improve their dialogue with both scientists and public, and provide forum for reflexive thinking and collaborative exchange on the values of modern societies and the ways we achieve our aspirations. Enhancing linkages of public policy with traditional lifestyles and cultural values to increase their acceptance and facilitate embedding into everyday practices is clearly a priority.

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Chapter 6

**RETHINKING ECONOMIC GROWTH:
ENVIRONMENTAL CONSTRAINTS
AND THE POST-ABUNDANCE ERA**

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ABSTRACT

Environmental constraints set a clear limit to growth heralding a post-abundance era. Since about the mid 1980s, the use of global resources by humankind, as measured by its Ecological Footprint, is exceeding the biocapacity of the planet. The situation has since only worsened. At present, if all people were earning the same level of income, only living standards of middle income countries would be sustainable, almost keeping humanity within the current global biocapacity. These limits pose a major challenge for public policy, but also for economic theory. Traditional remedies such as pollution control and abatement, recycling, and clean technologies are not sufficient, although they can go a long way toward easing the problem. More profound changes in lifestyles are called for including at the conceptual level: we need a new paradigm. This chapter explores some implications for economic growth. Some distributional issues are also discussed. It argues, quite predictably, that the world population should be kept constant; growth should be “greened” and shifted to poor countries, in particular to Sub-Saharan Africa which is the laggard, until convergence of living standards has been reached (which does not imply perfect equality because it is unfeasible); and simultaneously consumerist life styles in wealthier countries should be curbed to place greater emphasis on quality. In the long run, the global situation would be characterized by zero growth or “quality growth”. However, this need not be a calamity. It is quite feasible, although an important factor of success will be to prevent the formation of destabilizing and unduly pessimistic expectations, which tend to become self-fulfilling prophecies, through

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appropriate policy coordination and by de-emphasizing the current obsession with fast and positive growth. This chapter attempts to briefly outline what such a situation might entail and some issues that arise while striving to reach this sustainable long run equilibrium.

INTRODUCTION

We must rethink growth, both in practice and at the conceptual level, as we are moving into the post-abundance era. Our current thinking, economic models and life styles are premised on the fast growth that high income countries in particular have experienced in the Post-War period, so much so that we speak of a recession as soon as growth is merely slowing down. However, such fast growth and lavish (wasteful) lifestyles, with their associated negative impact on the environment, appear to be globally unsustainable. At the current size of the world population, the living standards of middle income countries remain just short of the Earth's biocapacity if we were all living at those levels of income.

This is the main conclusion that emerges from the Living Planet Report 2006 just published by the World Wildlife Fund, based on data from the Global Footprint Network (GFN) of the planet's biocapacity and humankind's Ecological Footprint (WWF 2006). The picture is quite contrasted and greatly differs from one region to another, as well as for low, middle and high income countries. The United States is the main polluter in the world followed by China in terms of their total Ecological Footprint. Set against some main economic indicators, even such a cursory overview provides some useful insight on how to tailor the solution to the specific situation of various nations. Moreover, the recent conclusion of the International Panel on Climate Change (IPCC) is that the predicted climate warming will affect tropical countries most severely, at least initially (Dubuis 2007).

This chapter does not appraise ecological measures as such, but offers insights on some key issues for economic policies with respect to growth. It elaborates upon a scenario that was summarily sketched out in a paragraph in Dessing (2001, p. 35),¹ namely of moving economic growth to Southern countries until convergence between living standards has been reached, while tapering it off in Northern economies. The long term global situation would be one of zero growth. The first section briefly sets the stage and outlines the overall environmental situation. The second section stresses the necessity of keeping the current population constant. The third section considers the difficulties of Sub-Saharan Africa to lift its people out of poverty. The fourth section moves to the main thrust of this chapter, namely of curbing growth in high income countries and placing greater emphasis on "quality growth" with a more efficient use of resources. It briefly discusses what such a zero growth situation might entail. The fifth section appraises the scope for the redistribution of wealth and income opportunities within the global constraints to growth, both in Southern and Northern countries. And the sixth section provides the conclusion.

¹ This report has been prepared in April-May 1997 and widely circulated since. It was presented at several seminars and workshops, and first published by ICTSD as a Discussion paper (vol. 1, no. 1) in oct. 1997.

THE OVERALL SITUATION

The figures presented in the Living Planet Report 2006 (WWF 2006) yield some striking results. The overall per capita Ecological Footprint (EF) of humankind is 2.2 global hectares (gha), half a hectare in excess of the biocapacity of the planet of 1.8 gha. This means that, with a projected moderate population growth rate, the per capita EF should be reduced to less than half the current global average by 2050, in order to remain within the Earth's biocapacity while leaving a minimal buffer for the preservation of some biodiversity. The Ecological Footprint shows the extent of human demand on the ecosystems, for production, consumption and waste generation, while the biocapacity is the amount of biologically productive area that is available to meet the needs of humanity. Since the late 1980s, the former has exceeded the latter. In 2003 this overshooting has reached about 25%, which leads to an erosion of the planet's ability to support people. Some ecological debt is reversible. However, the larger it is and the longer it persists, the greater are the risks of becoming irreversible, leading to permanent loss of assets and a large-scale collapse of ecosystems. Most importantly, there can be a considerable time lag until ecosystems benefit from people's positive actions.

The main contributor to this Ecological Footprint is the way in which we generate and use energy, climate-change emissions now accounting for almost half (48%) of the global footprint. According to the latest results of IPCC, in the Fourth Assessment Report 2007 on Climate Change: Impact, Adaptation and Vulnerability (Dubuis 2007), global warming will affect tropical countries most severely, at least initially, which are already the poorest nations in many cases: that is, Southern Europe, The Middle East and North Africa, Asia except the Russian Federation, Africa except Southern Africa, Latin America and the Caribbean except most of Chile and Argentina. However, for other dimensions of the global Ecological Footprint, Northern countries enjoy a less privileged situation and sometimes face a disadvantage.

The WWF report points out that a wide range of technical and other measures exists which can be taken to reduce the Ecological Footprint. They are not discussed here, and include: switching to greater energy efficiency in manufacturing, transportation, and in the homes; reducing consumption, minimizing waste, and increasing recycling; and eliminating the use of toxic chemicals that are degrading ecosystems.

Simultaneously, we cannot appropriate all the Earth's biocapacity. It is essential that a sufficient share is left and preserved for the survival of other species. Biocapacity can be improved by reclaiming degraded lands, terracing or irrigation, and generally with a more careful land management; by improving agricultural technologies, while at the same time reducing their negative impact on the environment; and by ensuring that it is not being lost, for example, to urbanization, salinization, desertification, or soil erosion. Biocapacity can further be preserved by safeguarding river basins, wetlands, and watersheds to secure fresh water supplies, and by maintaining healthy forests and fisheries.

The WWF report then proceeds to outline three scenarios for future growth. They entail more or less drastic measures to curb this unsustainable trend, based on the United Nations projections of a moderate population growth, namely that the world population will reach close to 9 billion in 2050.

Table 1. Ecological footprint set against some economic indicators (2003 data)

	Ecological Reserve (+) or Deficit (-)	Total Ecological Footprint	Carbon Emissions Footprint	Total Biocapacity	Population	Population growth		GDP per capita	GPD per capita growth	Human development index (HDI)	HIV prevalence
	(global ha/person)	(global ha/person)	(global ha/person)	(global ha/person)	(millions)	annual growth rate (%)		(PPP US\$) 2004	annual growth rate (%) 1975-2004	2004	adults 15-49 (%)
						1975-2004	2004-2015 ^a				
World	-0.5	2.2	1.07	1.8	6 301.5	1.6	1.1	8 833.00	1.4	0.74	0.95
High income countries	-3.1	6.4	3.58	3.3	955.6	0.7	0.5	31 331.00	2.1	0.94	0.37
Middle income countries	0.2	1.9	0.85	2.1	3 011.7	1.4	0.8	6 756.00	2	0.77	0.62
Low income countries	-0.1	0.8	0.21	0.7	2 303.1	2.2	1.7	2 297.00	2	0.56	1.7
All developing countries	-0.5	1.4	0.51	0.9	5 314.8	1.9	1.3	4 775.00	2.4	0.68	n.a.
Least developed countries	n.a.	n.a.	n.a.	n.a.	n.a.	2.5	2.3	1 350.00	0.6	0.46	2.86
East Asia and Pacific	-0.6	1.5	0.63	0.9	1 880.5	1.4	0.7	5 872.00	6.1	0.76	0.19
Europe and Central Asia^b	0.2	3.2	1.76	3.3	477.3	0.3	-0.2	8 802.00	n.a.	0.80	0.61
Latin America and Caribbean	3.4	2.0	0.59	5.4	535.2	1.9	1.2	7 964.00	0.6	0.80	0.54
Middle East and North Africa	-1.0	1.6	0.86	0.6	290.7	2.6	2.0	5 680.00	0.3	0.68	0.1
South Asia	-0.3	0.7	0.23	0.4	1 433.9	2.1	1.5	3 072.00	2.5	0.60	0.7
Sub-Saharan Africa	0.5	1.0	0.18	1.4	697.1	2.7	2.2	1 946.00	-0.6	0.47	6.38
High income OECD members (24)	-3.1	6.5	3.57	3.4	916.3	0.6	0.4	32 003.00	2.2	0.95	0.37
North America	-3.7	9.4	5.50	5.7	325.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Rest of high income OECD	-2.7	4.9	2.51	2.2	590.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other High income countries	-4.4	5.3	3.90	0.9	38.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Environmental statistics come from the Global Footprint Network, Oakland, CA (www.footprintnetwork.org), and have been published in modified form in the Living Planet Report 2006 (LPR), World Wildlife Fund, Gland, Switzerland.

Population, GDP, and HDI come from the Human Development Report 2006, UNDP, New York (<http://hdr.undp.org/hdr2006/statistics>).

HIV prevalence come from the World Development Indicators 2006, the World Bank, Washington, DC (<http://web.worldbank.org/wbsite/external/datastatistics>).

The table is based on the World Bank classification of countries, which is not the same as the classification used in the LPR for the environmental statistics. Regional groups include only developing economies.

The various categories do not necessarily include the same number of countries for the various indicators, as data may not have been available for all of them.

For the environmental statistics, the table includes all countries with a population greater than 1 million, except Bhutan, Oman, and Singapore, for which insufficient data were available to calculate the Ecological Footprint and biocapacity figures.

Totals may not add up due to rounding.

Built-up land is part of both Footprint and biocapacity. Hydro is included in the built-up land Footprint.

^a Data refer to medium variant projections.

^b Central and Eastern Europe, and the CIS for UNDP statistics.

The figures for the current Ecological Footprint and biocapacity greatly differ from one region to another, or between high, medium, and low income level countries. In Table 1, regional totals have been recalculated using the World Bank classification of countries; they include only developing economies, while high-income economies are grouped together separately. These regional totals therefore differ from those reported in the Living Planet Report.

For high income countries, the per capita Ecological Footprint is 6.4 gha, while the per capita biocapacity 1.8 gha, yielding a per capita ecological deficit of 3.1 gha. For middle income countries those figures are respectively 1.9 gha, 2.1 gha, and 0.2 gha, while for low income countries they are 0.8 gha, 0.7 gha, and -0.1 gha. Only middle income countries manage to remain within their biocapacity; even low income countries register a small deficit.

In order to gain an idea of the scope of the problem, these figures have been recalculated on the assumption that everyone enjoys the same level of income. The comforting news is that, if we were all living at middle income levels, we would almost be able to stay within the current global biocapacity. The population in excess would only reach 331.7 mio or 5.3% of the total. However, if we were all living at high levels of income, the current total biocapacity would only be able to sustain 1'772.3 mio persons. This means that nearly 72% of the world population would be in excess. If we all were living as lavishing as in North America, the total biocapacity could sustain even fewer people, namely 1'206.7 mio persons, which implies an excess population of just over 80%. Those numbers are however only indicative to gain a sense of the severity of the problem, because such a large reduction in the world population would also cause a reduction in the global biocapacity.

The United States is by far the worst polluter in the world, both in terms of per capita EF of 9.6 gha and total national EF, due to the size of its population (294 mio). Only the United Arab Emirates have a higher per capital EF of 11.9 gha, but a population of only 3 mio. Next comes Canada with a per capita EF of 7.6 gha and a population of 31.5 mio. Further, North America has the highest per capita carbon (CO²) emission footprint in the world of 5.5 gha.

As a group, however, non-OECD high income countries have the worst per capita ecological deficit of 4.4 gha. They have a low per capita biocapacity of only 0.9 gha and a per capita EF which exceeds that of high income OECD countries (when North America is excluded), mainly because they have the highest per capita carbon emission footprint of 3.9 gha, only second to that of North America. Clearly, these other rich countries have not yet developed much of an ecological awareness. They include countries such as Kuwait and the United Arab Emirates, which have a very high per capita EF of 7.3 and 11.9 respectively. Other main polluters on a per capita basis are: Finland 7.6 gha, Australia 6.6 gha, Estonia 6.5 gha, Sweden 6.1 gha, New Zealand 5.9 gha, Denmark and Norway with 5.8 gha each.

Looking at large countries with more than 100 mio. people, the two most populated ones of China (1'311.7 mio) and India (1'065.5 mio) have a per capita EF of 1.6 and 0.8 gha respectively. Therefore, the former is now just above the overall average per capita EF that is sustainable, while its HDI index of 0.76 puts it just short of the 0.8 threshold UNDP considers to be "high human development." Cuba is the only other country with China that managed to meet both objectives of reaching a high human development, with an index of 0.82, while remaining within a sustainable per capita EF of 1.5 gha. However, because of the large size of its population, China is only second to the United States in terms of total national EF, followed by India. China therefore must be closely watched because the policies adopted there can make a major difference for the global situation. However, it is in its self-interest to

rapidly take action since it figures among the countries that will initially be most severely affected by climate warming. In this respect, the United States is less under pressure.

Next, in terms of total national EF, come the Russian Federation and Japan. They have a per capita EF of 4.4 gha, for a population of 143.2 mio. and 127.7 mio. respectively. Two other large polluters are Mexico, with a per capita EF of 2.6 gha and a population of 103.5 mio., and Brazil with 2.1 gha and 178.5 mio. people respectively. For these large polluters the situation is the same as for China, unlike for the Russian Federation which is less under pressure by the impact of climate warming.

The other very populated countries remain below the sustainable overall average in terms of the per capita Ecological Footprint: Nigeria 1.2 gha with 124.0 mio. people ; Indonesia 1.1 gha with 219.9 mio. people; Pakistan 0.6 gha with 153.6 mio. people; and finally Bangladesh, 0.5 gha with 146.7 mio. people.

By and large the worst polluters are not those that will be affected most severely by climate-change global warming, at least initially, bearing in mind that the Ecological Footprint covers other items in addition to climate-change emissions. On other dimensions of ecological degradation they may therefore not fare as well or even face a disadvantage.

KEEPING POPULATION CONSTANT

The above figures suggest that a main target for policy purposes should be to keep population at current levels. This objective must be pursued much more earnestly.

The urgency for reducing demographic growth is understated in the Living Planet Report (WWF 2006). It outlines three scenarios for the evolution of the ecological damage with the adoption of more or less drastic measures to reduce this stress, under the assumption of the moderate population increases projected by the United Nations. However, these scenarios do not seem to account for the legitimate demands of low income countries for lifting their people out of poverty and for global convergence of living standards. As explained in the previous section, only middle income levels are sustainable for all at the current size of the world population.

Therefore, former policies that were seeking to foster population growth as an engine for economic growth are no longer sustainable, no matter in which part of the world. Nor can they be advocated to address the problem of an aging population. Other, more imaginative, solutions must be found, such as raising the age of retirement, facilitating the self-sufficiency of elderly, and developing appropriate services and support networks.

Demographic growth can be curbed by means of birth control, but also education of women in particular for their empowerment, improving health services, raising income levels, and by creating adequate social security systems. The latter is a main component. At present, in many parts of the world, the requisite safety nets are provided by children and relatives, therefore encouraging continued high levels of fertility. However, when such facilities become available, reproductive strategies also change. Migrant families in Northern countries provide a striking illustration of such adaptive behavior. The responsibility for providing a safety net should therefore be shifted from the family to the community in order to help curb population growth and de-link the issue from fertility.

Sub-Saharan Africa experienced the fastest population growth rate between 1975 and 2004 of 2.7% per year, followed by the Middle East and North Africa with 2.6% per year, and South Asia with 2.1% per year, while in high income countries as well as in Europe and Central Asia population growth is near replacement levels. The United Nations has even projected a negative growth of -0.2% per year for the latter group for the period 2004-2015, while for Sub-Saharan Africa, the Middle-East and North Africa, and South Asia, it remains at high levels of 2.2%, 2%, and 1.5% per year respectively for that period.

In the case of Sub-Saharan Africa a main caveat with respect to reproductive health is the exceptional high prevalence of HIV (6.8% for adults 15 to 49 years of age), which is by far the highest in the World. Elsewhere, the HIV prevalence reaches at the most 0.7%, namely in South Asia. The HIV epidemic has primarily become a problem for low income countries, followed by middle income ones, thus compounding the problem of poverty. In some areas of Sub-Saharan Africa the adult population has been devastated, causing serious economic disruptions in the capacity to earn a living and to care for dependents. Life expectancy has thus begun to decline since 1990, from 49 to 46 years, mainly due to the adverse impact of AIDS coupled with a high infant mortality rate (WID 2006). It is also partly reflected in the sharp reduction in the projected population growth rate for that region for the period 2004-2015, although not enough to keep population constant. In Sub-Saharan Africa a main priority for public health will remain to encourage the use of condoms, both for safe sex and to help curb population growth.

Conversely, for other countries with a rapid population growth, the HIV prevalence is the lowest in the world for the Middle East and North Africa (0.1%), while in South Asia it remains at medium levels (0.7%). An important dimension for curbing population growth in those regions is the preference for large families, but also low income levels and their consequences such as poor health services, as reflected by a very low human development index (HDI), only second to that of Sub-Saharan Africa: 0.68, 0.60., and 0.47 respectively. In comparison, high income OECD countries have an HDI of 0.95, Europe and Central Asia as well as Latin American and the Carribean of 0.80, and East Asia and the Pacific of 0.76. Curbing population growth has a positive effect on income levels and living standards, which in turn help reduce population growth.

FOSTERING GROWTH IN SUB-SAHARAN AFRICA

Rethinking growth to achieve global sustainability does not exclude growth altogether in every region. Sub-Saharan Africa in particular is facing severe problems in raising the living standards of its people, lagging behind the rest of the world in this respect, even though progress has recently been made. For this region, and for low income countries in general, the question remains as before how to foster economic growth, but with the additional qualification of using ecologically friendly approaches.

The annual growth rate of GDP per capita in Sub-Saharan Africa, for the period 1975-2004, has the singularity of having been negative (-0.6%), while it has been positive for all other regions, reaching a high 6.1% for East Asia and the Pacific. The growth rates were slightly better for the Middle East and North Africa (0.3%) and Latin America and the Carribean (0.6%). In comparison, for high income OECD countries, it has reached 2.2%,

surpassed by South Asia (2.5%), leading to an overall annual growth rate for the world of 1.4% over the period. Surprisingly, there is hardly any difference for countries grouped by income levels; it stayed between 2% to 2.1%. Differences in GDP per capita were therefore still sizeable in 2004, even after adjusting for differences in purchasing power parity with the US dollar: it reached 31'331.-, 6'756.-, and 2'297.- respectively for high, middle, and low income countries, or a difference of nearly 1 to 14 between the former and the latter.

Prior to the oil shock of 1974 growth rates were positive, but then a long decline set in for the continent, turning negative in the late 1970s, while recovering a little since the second half of the 1990s. GDP grew at 4.8% in 2004, while FDI increased eightfold between 1990 and 2004 (WDI 2006). Artadi and Sala-i-Martin (2003) have estimated changes in poverty rates and the distribution of income during the 1970-2000 period. The disturbing feature is that inequality has risen, in particular for Sub-Saharan Africa, even though growth rates were negative. The Gini coefficient increased from 0.58 in 1970 to 0.65 in the year 2000 (for the continent as a whole it was 0.57 and 0.63 respectively).¹ In Africa, most inequality can be accounted for by within-country inequalities, not across-country inequalities as for the rest of the world. Rich people have been able to shield themselves from Africa's tragedy. The most extreme and shocking case is Nigeria, where their share of national income has markedly increased. Therefore, the people who should implement the requisite changes to turn Africa around have little incentives for introducing them.

Poverty used to be primarily an Asian phenomenon, but it has since become an essentially African problem, with 40.5% of the African population living below the one-dollar per day line of extreme poverty in 1998 (60% for Sub-Saharan Africa by 1995), against 22.2% in 1970 (48% for Sub-Saharan Africa), or an increase from 59.2 mio. to 234.7 mio. persons. In this respect Tanzania is the laggard, followed by Ethiopia and Guinea-Bissau, based on available data (see also Sala-i-Martin 2002b).

Without going into the details of the causes for this abysmal growth record, Artadi and Sala-i-Martin (2003) have estimated, for some key factors, how much larger the annual growth rates of GDP per capita would have been over the past 40 years if they had reached values similar to those of OECD countries. Results are revealing and presented in Table 2.

The most obvious adverse factor is violence. Wars have plagued the continent since it began to become independent in the 1960s. If Africa had less of an ethno-linguistic fractionalization, as measured by the index of Easterly and Levin (1997), its growth rate would have been 0.52 percentage points larger. Further, if life expectancy in Sub-Saharan Africa had reached OECD levels of 68 years, instead of 42 years, its growth rate would have been 2.07 percentage points higher, while the scourge of Malaria has reduced it by 1.25 percentage points. As stated above, life expectancy, after some substantial improvements over the past 40 years, has deteriorated in the late 1990s due to AIDS, to a low 46 years in 2004. Next comes schooling by order of importance. The growth rate would have been 1.47 percentage points larger if its primary school enrollment rate had reached OECD levels (of nearly 100%, against its low rate of 42% in 1960). Since then, however, school enrollment rates have improved dramatically boding well for future prospects.

¹ A Gini index of 0 indicates perfect equality, while an index of a 100 implies perfect inequality.

Table 2. Why africa grew so little

Indicator	African Value	OECD Value	Forgone Annual Growth
	Average value for African countries	Average value for OECD countries	Per capita GDP. percentage points
Human capital, life expectancy (years)	42	68	2.07
Human capital, primary school enrollment (%)	42	97	1.47
Human capital, malaria prevalence (index)	0.80	0.00	1.25
Geography (area in the tropics, %)	85	3	1.21
Economic openness (Sachs and Warner index)	0.10	0.66	0.67
Conflict, ethnolinguistic fractionalization (Easterly and Levine index)	0.58	0.12	0.52
Price of investment goods (investment price ratio relative to consumption goods, %)	123	70	0.44
Public spending in consumption (% of GDP)	16	7	0.40

Source: Artadi and Sala-i-Martin (2003), based on estimates of Sala-i-Martin, Doppelhoffer and Miller (2003).

Note: A figure of 0.40 in the fourth column for, for example, indicates that the annual growth rate of GDP per capita, instead of being 1.1%, it would have been 1.5%, or 0.40 percentage points higher if the indicator had reached OECD values.

Various institutional factors appear to have played an important role. The two authors refer to “tropical geography” which, in light of their explanations, can be taken as a short hand for institutional factors. Thus, Africa’s growth rate would have been 1.21 percentage points larger over the past 40 years if it had a more favourable “geography”. Conversely, economic factors (keeping everything else constant) had a less adverse impact. The growth rate would have been 0.67 percentage points higher with a greater degree of economic openness to trade and FDI, at par with OECD levels. Africa is still quite closed with an index of 0.10 compared to 0.65 for the OECD, as calculated by Sachs and Warner (1997). Further, investments rates, in particular private investments, have been low, somewhat recovering during the 1990s. The price of investment goods relative to consumption goods is quite high (a ratio of 123 whereas it is only 70 for OECD countries). If it had been at the OECD level, the growth rates for Africa would have been 0.44 percentage points larger, while devoting a lower fraction of GDP to public consumption (at OECD levels of 0.07 instead of 0.16) would have raised it only by 0.40 percentage points.

Much has been written on ways to foster economic growth, which is beyond the scope of this chapter. Institutional factors recently feature more prominently in the literature in an attempt to move beyond the “Washington consensus” and adopt a broader perspective on

growth. One may note that political stability, which is important for economic growth, is facilitated by raising educational levels, having a more egalitarian society, and applying the principles of good governance (Stiglitz 1998).

More specifically with regards to environmental concerns, low income countries have three main comparative advantages they can use to secure more funds from wealthier countries in the new geopolitics that is emerging between ecological debtors and creditors. They are only beginning to industrialize and therefore they can embark from the start on ecologically sound manufacturing in particular, benefiting from the technologies and experience acquired elsewhere, just as they can embark from the start on a more equitable growth rather than painstakingly trying to change path subsequently when strong adverse vested interests are in place. For example, their tropical geography will be an asset for the extensive use of solar energy.

“Greening” the production process can stimulate growth in several ways. In agricultural in particular, measures that reduce the environmental stress can raise the level of output as with the prevention of soil erosion. Moreover, in that sector, the work environment and the quality of the environment in general are inextricably linked. Therefore, environmental measures will improve working conditions and thereby raise labor productivity. In other sectors, reducing the negative ecological impact of firms also entails, among other things, better training on the reduction of polluting emissions, improved waste disposal and more adequate handling and disposal of pollutants -- all of which directly contribute to raise the health and safety of employees. In addition, higher environmental standards have a positive spillover effect on the public health of the community at large, thus again benefiting employees as well. Finally, these standards include measures for the prevention of environmental accidents and disasters through improved training. All these factors ultimately have a positive impact on the productivity of labor and the profitability of firms (Dessing 2000).

Second, the marginal cost of reducing carbon emission markedly differs between countries. It is much lower in poor economies than in high income ones because industries in the former are typically less energy efficient than in the latter. The World Bank has therefore offered to set up a carbon investment fund that would allow countries and companies that need to reduce their carbon emissions to invest instead in carbon-reducing projects in developing countries. It would increase investment flows in the latter economies as well as the transfer of pro-environment technologies (Stiglitz 1998, p. 32).

Third, they can secure funds by trading other measures for the preservation of the environment, such as carbon sinks, the protection of biodiversity, or as repositories of genetic material and unknown medicinal plants. More generally, low income countries stand much to gain from a global system of tradable polluter permits -- to make polluters pay for the damage they are inflicting on poor countries in particular -- debt for environment swaps, and similar instruments. In this respect, one may note that Latin America and the Caribbean has the second highest per capita biocapacity (5.4 gha), second to that of North America (5.7 gha), yielding the worlds’ highest per capita ecological reserve of 3.4 gha. Next comes Sub-Saharan Africa with a per capita reserve of 0.5 gha, and Europe and Central Asia with 0.2 gha. All other regions register a deficit, most notably non-OECD high income countries as already stated.

In the approach we are outlining in this chapter, low income countries will be the new growth pole in the world. Therefore, it is of particular importance to emphasize pro-

environment technologies and life styles from the start, while mitigating the adverse impact of climate-change, rather than merely duplicating the historical evolution of industrial countries, in order to avoid a drastic increase in the global Ecological Footprint as their people are lifted out of poverty.

SHIFTING TO QUALITY-GROWTH IN HIGH INCOME COUNTRIES

For high income countries the challenge looks radically different. They have indulged in very lavish and wasteful lifestyles and have long been little concerned about their environmental impact. To achieve global sustainability those lifestyles can no longer be tolerated, although switching to “quality growth” may not hurt as much as may seem at first. It will mostly require a change in consciousness and priorities, emphasizing quality instead of quantity, in order to adapt to a situation of virtually zero growth.

Various technological solutions exist that would greatly ease the stress on the environment: they range from switching to renewable sources of energy, increasing the energy efficiency of machines and infrastructure, to producing ecologically friendly goods and improving waste management, as stated in the first section.

Other changes, however, reach somewhat deeper as they call for a change in consumerist lifestyles, for example: using energy and water less wastefully, following fashions less assiduously, reducing excessive packaging, curbing lavish advertisements, producing goods with a longer life cycle, placing greater emphasis on recycling and repair, but also switching to a predominantly vegetarian diet. The cultivation of vegetables requires less energy, water, and land than the production of meat, for an equivalent amount of calories. Reducing the consumption of meat also has a beneficial impact on health, consuming proteins from other sources instead. A wide variety of very tasty vegetarian dishes can be prepared, especially among exotic cuisines. People are all too often unaware of these possibilities; for them a vegetarian diet merely means boiled vegetables.

Most importantly growth will hover near zero. With a constant population and a retreat from consumerist lifestyles, consumption and production are bound to decline, although services may expand instead, or people may simply devote more time on various do-it-yourself activities and hobbies of all sorts. Most new activities will consist of replacement activities, for example more efficient and ecologically sounder technologies replacing obsolete ones. Conversely, Southern countries will continue to grow for a while to lift their people out of poverty, but that objective can only be achieved if the benefits of this growth remain in the South.

At present, speaking of zero growth is considered a calamity. Positive and fast economic growth has become the main economic objective in the post-war era of abundance, the promise that poor people may one day share in the bounties of growth provided it persists at high rates. We are unable to think of growth otherwise than in those terms. However this need not be so. In fact it should change. The scenario briefly presented here is best conceptualized as a “move to the long term sustainable equilibrium”, or “quality growth”, instead of using the current concepts which convey an unduly pessimistic view of the situation and trigger the sort of expectations that become self-fulfilling prophecies. Therefore, an important element for successfully moving to this new equilibrium is to preempt the formation of destabilizing

expectations through appropriate policy coordination and by de-emphasizing the current obsession with fast and positive growth. Reconceptualizing growth addresses this central role of expectations.

Zero growth does not lead to sizeable unemployment if economic actors have adjusted their decision making and expectations to this new long run equilibrium. Employment can be shared accordingly. Technological progress has already led to a secular decline in work hours which is set to continue. Retreat from consumerist lifestyles will merely accelerate that trend. There is no reason that few should work exceedingly long hours while large numbers are left unemployed. The demand is increasing for shorter work hours in order to have more time for self and the family. Moreover, considering the cost of unemployment payments, ways can be found in the last resort to subsidize the fixed costs of employment in order to facilitate the creation of jobs and the sharing of employment.

Those solutions however overlook the main issue, namely of how salaries and prices are determined. Ultimately, they are set by the willingness of consumers to pay, or people's values, and social conventions about prices and salaries that derive from this founding factor. Combined with the evidence over the astronomical salaries of CEOs in particular, it is rather disingenuous to claim that the work of some persons would be worth so little that they cannot earn a living wage. Labelling schemes provide a vivid example of how such social conventions can be changed to the benefit of the more destitute. In an overall zero growth situation, we can expect an extensive restructuring of prices and salaries of this kind for two main reasons. First, the prospect no longer exists of rapid economic growth eventually trickling down to the poor. Therefore, they will be keener on improving their relative position by other means; negotiations over salaries can be expected to place renewed emphasis on distributional issues. Second, as growth is temporarily shifting to the South and living standards are converging, there will be less pressure on unskilled wages in particular through international competition.

Some may fear that the cost of adapting technologies and infrastructures in order to reduce the environmental stress will trigger inflationary pressures. However, a zero growth situation would rather tend to have the opposite effect. The cost of "greening" the existing stock of capital and infrastructure can be partly absorbed by the usual expenditures for repair, maintenance and replacement. The remainder will partly offset the reduction in consumption and production due to the retreat from consumerist lifestyles. Inflationary pressures are more likely to appear in specific markets as some raw materials become exhausted until satisfactory substitutes have been found. Industrial restructuring can therefore be expected to prevail over inflationary pressures.

Financial markets will have more time to adjust since growth will persist in the South until those economies have caught up. Accordingly, financial markets will continue to register growth for a while and gradually adjust to the new long run equilibrium with lower interest rates and rates of return. Markets can adjust to such a situation, especially if it is gradual and economic actors have time to adjust their expectations. How this will work out for various financial instruments remains to be seen. Some can be expected to become obsolete. In any case, if growth is shifted to the South, one can expect an important restructuring of the international financial systems. For instance, the prominence of the US dollar may further erode as a currency for official reserves, akin to the current move to the Euro.

The more problematic issue, however, in a zero growth situation, is the storage of wealth. With limited returns on capital assets, taxation systems will have to adjust in order to avoid an

erosion of people's wealth in real terms. The scope for taxing wealth will become more limited, except for redistributive purposes of very sizable fortunes past a given threshold level. Whether this is an efficient way of redistributing wealth is another question. One can imagine extending the system of tax breaks, as found in the United States for donations, in order to promote simultaneously social and ecological objectives, while leaving some say over the use of their fortune to extremely wealthy people.

THE SCOPE FOR REDISTRIBUTION

There is much scope for redistributing wealth and income opportunities both North and South, inequalities tending to be more pronounced in the latter economies. A globally zero growth situation in the very long run raises understandably important distributional issues. Pressures for redistribution of economic opportunities are bound to increase, as noted in the previous section, because of the vanishing prospect that growth will curb existing inequalities.

At the national level, the motivations for a more egalitarian society can readily be understood. The negative externalities associated with large pockets of poverty soon become evident and affect the community as a whole. At the international level, the situation is the same, even though some people would like to believe they can shelter themselves from tragedies that occur abroad. Epidemics, environmental disasters, political and financial instability and their consequences or economic crises, all have important spillover effects that cross national borders. The fact that global warming, for example, will initially primarily affect tropical countries, and not the main polluters in the North, should not be of much comfort to them, and certainly not a reason to delay taking decisive action against climate-change pollution.

Based on the comprehensive estimations of Sala-i-Martin (2002b), the current situation is somewhat encouraging, with the notable exception of Sub-Saharan Africa. During the period 1970 to 1998, there has been some convergence at the global level (between income levels of 125 countries covering about 90% of the world population), mainly due to the rapid economic growth in China, and to a lesser extent in India. Therefore, by 1998, only 7% of the world population lived below the one-dollar per day poverty line with respect to their income (or 352 mio. persons), down from 17% in 1970 (or 554 mio. persons), while a "world middle class" has emerged at around 5'000.- US\$ per year. Using the two-dollar per day poverty line yields similar results (these poverty rates are calculated in real terms adjusting for purchasing power parity with the US dollar).

On a regional basis, Asia has proved most successful, the one-dollar per day poverty rate declining from 22% in 1970 to 1.7% in 1998, or down from 420.9 mio to 52.1 mio. persons. Almost half of this decline is accounted for by China, although by 1998 the bulk of extremely poor people as defined here lived in China (32.4 mio). South Asia did not as well as the rest of Asia in eliminating extreme poverty in terms of poverty rates, Nepal being the laggard. Next comes Latin America where the one-dollar per day poverty rate has declined from 5% in 1970 to 2.2% in 1998, or down from 19.3 mio to 10.7 mio. persons. All the progress occurred in the 1970s, but the situation has then deteriorated again most notably during the "lost decade" of the international debt crisis of the 1980s. The record is rather mixed across the continent. Africa has already been discussed.

Estimation of decomposable inequality indexes, between within- and across-country inequalities, reveals an overall increase for the former but a much more substantial decline for the latter, leading to a global convergence. Between 1978 and 1998, the Mean Logarithmic Deviation (MLD) index, for example, increased from 0.18 to 0.23 for within-country inequalities whereas it declined from 0.67 to 0.51 for across-countries inequalities (Sala-i-Martin 2002a). Within country inequalities have increased monotonically over the period. Indonesia, the fourth most populated country in the world, stands out in this respect, because it was also able to reduce inequalities in addition to showing an outstanding record in eliminating extreme poverty (from 37% in 1970, for the one-dollar per day poverty rate, down to 0% in 1998).

With growth shifting to the South until global convergence has been reached, the relationship between growth and equality remains of particular importance for these economies, especially since inequalities tend to be sharper in these countries. The highest values for the Gini index of income inequality are found in Sub-Saharan Africa and Latin America, with the notable exceptions of Rwanda and Ethiopia, while the lowest ones prevail in Europe, Central Asia and Japan (which has the third lowest Gini index after Azerbaijan and Denmark). The data are however not available for most Middle-Eastern countries.

The relationship between equality and growth is a highly controversial topic. In the early 1970s, the short-lived basic needs approach advocated distribution with growth. With the rise of neoliberalism in the early 1980s, poverty alleviation was deemed to depend mainly on growth in the trickle-down approach of the "Washington consensus". In the 1990s, a broader perspective on poverty has been adopted, where education, health and institutional factors feature prominently.

Some new contributions argue that high initial inequality reduces the capacity for growth and vice versa, while it has also been noted that income inequality tends to remain stable as countries are growing (Shorrocks and van der Hoeven 2004). The proceedings of a recent conference on the subject are illuminating. Thus, while there is no systematic relationship between the two, Ravallion (2004) found that extreme poverty (one-dollar per day) declined almost eight times faster in countries with rising average income and declining inequalities than in countries where both increased. Heltberg (2004) elaborates on this and shows that initial inequality, especially asset inequality, is harmful for growth. The growth effect itself is a function of the degree of inequality. The dichotomy between growth and equality is therefore false and misleading. Naschold (2004) finds that, in LDCs in particular, the distribution of income is as important as changes in the level of consumption. Therefore, they must improve the distribution of income in order to meet the Millennium Development Goals by 2015 (MDGs). The empirical simulations of Dagdeviren, van der Hoeven, and Weeks (2004) suggest that, for the overwhelming majority of middle income countries, poverty reduction is most effective by redistributing income. LDCs require a growth strategy, but for most of them redistribution with growth is nevertheless more effective than distribution-neutral growth. Finally, in a review of recent research, Bigsten and Levin (2004) conclude that the initial level of income inequality is not a robust factor in explaining growth. Among the strategic elements that have contributed to reduce poverty they emphasize: rural and agricultural development, investment in physical infrastructure and human capital, efficient institutions, effective social policies and a social net to protect the poor.

A main reason greater equality yields faster growth is that the poor spend a higher share of their income on consumption -- they have a higher propensity to consume -- thereby

increasing the multiplier effect on GDP. The industrial base is then also broader and more vibrant, while greater equality facilitates the acquisition of the requisite skills for economic growth and reduces social tensions.

In the North, an important distributional issue are the astronomical salaries of CEOs compared to the low wages paid to the working poor. While perfect equality is no viable because it does not provide sufficient incentives for personal initiatives and improvements, such excessive compensations siphon away sizeable resources that could be shared instead among the rest of employees, or to pay higher prices to subcontractors and suppliers. Therefore, it also affects incomes in the South.

Before reviewing the rather unconvincing arguments that are put forward to justify excessive CEO salaries, we will begin by suggesting that, given the size of the wealth they control and the number of persons who are dependent on their decisions for their livelihood, their salaries should be commensurate to those of heads of state which, needless to say, are much lower for democratically elected officials. Table 3 shows that, among the top 100 entities in 2005, 47 were corporations and 53 countries, based on GDP and total revenues in current US dollars. Therefore, one may increase non-monetary rewards, but the salaries the CEOs of large firms are currently receiving do not find any justification from an economic or social perspective. In fact they are counterproductive because they undermine social cohesion and undermine the morale of subordinates, according to several studies cited by Schütz (2005), not to speak of the future prospects of the firm itself over the longer term.

This proposal answers the first argument put forward for justifying these salaries, namely of the size of the firms they are controlling and the heavy responsibilities they are shouldering. This comparison would certainly be more befitting in terms of job content than the one they sometimes put forward, comparing their salaries with the remuneration of sportspersons and artists whose careers are typically short.

The present proposal answers the second argument as well, namely of the CEOs' market price. There is in fact not really such a market, as Dembinski (2006), Schütz (2005) or Dominique Biedermann, Director of the foundation Ethos (Chapatte, Lelièvre and Pécelet 2006) have pointed out, for example. About a few thousand CEOs in the world receive such high compensations. European CEOs compare themselves to American CEOs, who were formerly paid much more, when in fact no US firm has ever hired a European CEO. Therefore, in the Netherlands, they use a pool of very diverse European firms of similar size in order to draw comparisons with a sufficiently large group of firms. Moreover, Crystal (2001), a compensation consultant, explains how CEOs effectively control the decision over their remuneration and how statistics on compensation can be fiddled around to yield suitable results and move the compensation committee in the desired direction. The competitive pay strategy, originating in the US, has therefore led to upward-spiralling salaries for CEOs, because each time an increase is granted somewhere, other firms follow the movement.

The third argument claims that the interests of the CEO must be aligned with those of shareholders to resolve the principal-agent problem due to the separation of management and ownership. Murphy (1997) argues that CEOs' pay must be linked to the wealth creation of firms, which may call for downsizing and shifting resources elsewhere into new sectors, rather than linking them to the traditional measures of performance such as firm size and profits. CEOs have therefore increasingly been paid the most sizable part of their salaries in the form of stock options.

Table 3. Top 100 countries or firms (2005 data)

Name	GDP or revenues (current US\$, billions)	Name	GDP or revenues (current US\$, billions)
1. United States	12 500,00	51. Colombia	122,00
2. Japan	4 510,00	52. <i>Conoco Phillips</i>	121,66
3. Germany	2 780,00	53. <i>Axa</i>	121,61
4. China	2 230,00	54. <i>Allianz</i>	118,94
5. United Kingdom	2 190,00	55. Singapore	117,00
6. France	2 110,00	56. Chile	115,00
7. Italy	1 720,00	57. Pakistan	111,00
8. Spain	1 120,00	58. <i>Volkswagen</i>	110,65
9. Canada	1 120,00	59. Hungary	109,00
10. Brazil	794,00	60. New Zealand	109,00
11. Korea, Rep.	788,00	61. <i>Citigroup</i>	108,28
12. India	785,00	62. <i>ING group</i>	105,89
13. Mexico	768,00	63. Algeria	102,00
14. Russian federation	764,00	64. <i>Nippon Telegraph & Telephone</i>	100,55
15. Australia	701,00	65. Nigeria	99,00
16. Netherlands	595,00	66. Romania	98,60
17. Switzerland	366,00	67. Philippines	98,30
18. Belgium	365,00	68. <i>American Intl. Group</i>	97,99
19. Turkey	363,00	69. <i>Intl. Business Machines</i>	96,29
20. Sweden	354,00	70. <i>Siemens</i>	91,49
21. Saudi Arabia	310,00	71. <i>Carrefour</i>	90,38
22. Austria	305,00	72. Egypt, Arab Rep.	89,30
23. Poland	299,00	73. <i>Hitachi</i>	83,99
24. <i>Wal-Mart Stores</i>	287,99	74. <i>Assicurazioni Generali</i>	83,27
25. Indonesia	287,00	75. Ukraine	81,70
26. <i>BP</i>	285,06	76. <i>Matsushita Electric Industrial</i>	81,08
27. Norway	284,00	77. <i>Mc Kesson</i>	80,52
28. <i>Exxon Mobil</i>	270,77	78. <i>Honda Motor</i>	80,49
29. <i>Royal Dutch/Shell Group</i>	268,69	79. <i>Hewlett-Packard</i>	79,91
30. Denmark	254,00	80. <i>Nissan Motors</i>	79,80
31. South Africa	240,00	81. Peru	78,40
32. Greece	214,00	82. <i>Fortis</i>	75,52
33. Ireland	196,00	83. <i>Sinopec</i>	75,08
34. Iran, Islamic Rep.	196,00	84. Kuwait	74,70
35. <i>General Motors</i>	193,52	85. <i>Berkshire Hathaway</i>	74,38
36. Finland	193,00	86. <i>ENI</i>	74,23
37. Argentina	183,00	87. <i>Home Depot</i>	73,09
38. Hong Kong	178,00	88. <i>Aviva</i>	73,03

Table 3. Top 100 countries or firms (2005 data) (Continued)

Name	GDP or revenues (current US\$, billions)	Name	GDP or revenues (current US\$, billions)
39. Thailand	177,00	89. <i>HSBC Holdings</i>	72,55
40. <i>Daimler Chrysler</i>	176,69	90. <i>Deutsche Telekom</i>	71,99
41. Portugal	173,00	91. <i>Verizon Communications</i>	71,56
42. <i>Toyota Motors</i>	172,62	92. <i>Samsung Electronics</i>	71,56
43. <i>Ford Motors</i>	172,23	93. <i>State Grid</i>	71,29
44. <i>General Electric</i>	152,87	94. <i>Peugeot</i>	70,64
45. <i>Total</i>	152,61	95. <i>Metro</i>	70,16
46. <i>Chevron Texaco</i>	147,97	96. <i>Nestlé</i>	69,83
47. Venezuela	139,00	97. <i>U.S. Postal Service</i>	69,00
48. Malaysia	130,00	98. <i>BNP Paribas</i>	68,65
49. Israel	123,00	99. <i>China National Petroleum</i>	67,72
50. Czech Rep.	122,00	100. <i>Sony</i>	66,62

Source: World Development Indicators 2006, The World Bank, Washington, DC (<http://web.worldbank.org/wbsite/external/datastatistics>)

Fortune Global 500, Fortune Magazine (<http://money.cnn.com/magazines/fortune/global/500/2005/index.html>)

However, the current system of base salaries, bonuses and stock option grants fail to penalize poor performances while under-rewarding exceptional performances (Crystal 2001, Hostettler 2006), in part because of the sheer size of large firms. The annual variations in their value are too sizeable to link them more closely with the salary of the CEO (Hall and Liebman 1998). The findings of these two authors nevertheless suggest that, accounting for the value of stocks and stock options, CEO pay and firm performance are strongly linked, for a sample of 478 of the largest publicly traded US firms over the period 1980 and 1994; similarly for a sample of 420 British firms during the period 1981-1989 (Main, Bruce and Buck 1996). Conversely, Hallock (1997) finds that CEO pay is 17 % higher when boards of directors are inter linked, that is when a director or employee of firm A is serving on the board of firm B and vice versa, while Guy (2005), for a sample of British firms, finds that in the 1980s CEOs' salaries have been delinked from the pay of subordinates in the managerial and professional ranks. Similarly, in 2004, the average CEO salary in large US firms was 437 times the mean salary in the firm, while in 1990 it was only 107 times higher (Dembinski 2006).

The owner of a large French firm, for example, admits that short term benefits can readily be increased by cutting into personnel and investments, but to the detriment of long term perspectives (cited in Richard 2007). One may therefore wonder whether CEOs' pay have not been delinked as well from shareholders' interests. A proposal has been put forward at the last World Economic Forum in Davos of keeping CEOs' salaries within the 1 to 40 range compared with the lowest salaries in the firm (Peter Ulrich, Director of the Institute for Business Ethics at the University of St.-Gallen, Switzerland, cited by Péclet 2007). It is a

variant of the present proposal of comparing the salaries of CEOs of large firms with those of heads of state. Considering the broader social responsibilities of such firms in particular, and the difficulties in those cases of linking CEOs' pay with the various dimensions of a firm's success, it would seem more suitable to hire persons who are motivated by a larger and more balanced set of values, not just by greed. The environmental challenges that lay ahead provide additional reasons for moving to a wider set of incentives and motivations. Focusing on prices and profits alone does not always offer a suitable guidance in this respect because too many externalities are involved.

In any event, those findings illustrate that there is much room for adjusting low wages without threatening the competitiveness of firms, contrarily to what is so often asserted, especially since the performance of a firm is the result of a collective effort.

CONCLUSION

Given the current biocapacity of the planet and the Ecological Footprint of humanity, we could nearly stay within the limits set by the former if all people were living at middle income levels. At present, overshooting of this ecological stress compared to the global biocapacity reaches 25% and is mainly due to high income countries, the United States being the worst polluter both in total and per capita. China is important to watch because of its sheer size. It ranks second for total Ecological Footprint, but not on a per capita basis. Almost half of the global Ecological Footprint is due to climate-change emissions, which at least initially will primarily affect tropical countries and dry regions.

Keeping population constant at the current level is therefore a high priority. It can no longer be advocated for economic growth or as remedy for demographic aging. Other solutions must be found, such as raising the age of retirement, facilitating the self-sufficiency of elderly, and in particular setting up effective social security systems to shift from the family to the community the responsibility of caring for elderly or in case of necessity.

Sub-Saharan Africa has the highest population growth rate, followed by the Middle-East and North Africa. In the former case, in sharp contrast with the later, HIV infection rates reach exceptionally high levels. AIDS has devastated some areas of its working age population. The question of reproductive health is therefore of crucial importance for Sub-Saharan Africa, which can be eased in part through poverty alleviation.

Globally, growth must be curbed to stay within the ecological limits of the Earth, which raises major distributional issues. The rationale for combating poverty and reducing inequalities is similar at the national and international levels, namely their negative spillover effects such as political instability, violence, public health problems, and environmental degradation.

Accordingly, growth should be temporarily shifted to Southern countries in order to lift their people out of poverty while "greening" their process of industrialization. Sub-Saharan Africa is in this respect the laggard. It stands out for having experienced negative growth during most of the past 40 years, and has recovered a little since the second half of the 1990s, but inequalities have nevertheless increased. Poverty used to be primarily an Asian problem, but it has since become an essentially African phenomenon. The reasons for this poor record are manifold. Issues relating to human capital and institutional factors seem to have played a

more important role than economic ones (keeping everything else constant). Conflicts have also plagued the continent.

In the new ecological geopolitics that is emerging, low income countries have three major comparative advantages they can use to secure more funds from high income countries and apply the “polluter pays” principle. They can embark on ecologically sound industrialization from the start, which can have a favourable effect on growth. The cost of reducing carbon emissions of existing facilities is markedly less in those countries, thus leaving room for swaps such as the carbon investment fund proposed by the World Bank, especially in a global system of tradable polluter permits. Finally, they can exchange other environmental services, such as carbon sinks and the protection of biodiversity, including repositories of genetic material and unknown medicinal plants.

In high income countries, sustainability calls for curbing growth to emphasize quality, or “quality growth”, while reducing the environmental stress imposed by existing products, technologies and infrastructures. Various technological solutions exist that can ease part of the problem, but other changes reach deeper and call for adapting lifestyles. The retreat from consumerist lifestyles can be expected to more than offset the cost of adopting pro-environment technologies and facilities, because part of the latter cost can be absorbed in the usual expenditures for maintenance and replacement. Inflationary pressures are more likely to occur in specific markets as some raw materials become depleted, until they are replaced by substitutes. Therefore, industrial restructuring is likely to prevail over inflationary pressures.

In the long run, the present scenario for sustainability suggests that zero growth prevails globally, population stays constant, new activities consists of replacement activities that improve on existing ones but without seeking to promote consumerism, interest rates and rates of return are presumably lower, although some growth will persist in Southern countries until convergence has been reached (but not perfect equality which is unfeasible), thus giving more time for financial markets to adjust. The scope for taxing wealth is also significantly reduced.

However, moving successfully to this new equilibrium hinges crucially on preventing destabilizing and pessimistic expectations to form through appropriate policy coordination, but also by reconceptualizing growth away from the current paradigm of fast growth inherited from the post-war period of abundance. The sharing of employment in order to avoid rising unemployment will also play an important role, thus accelerating the secular decline in work hours, but also the redistribution of income opportunities and wealth since growth will no longer be a main process for alleviating poverty.

Globally, income inequalities are primarily accounted for by across-country inequalities, which have diminished mainly due to the economic growth of China, although within-country inequalities have overall increased, but not sufficiently to offset the former decline. Within country inequalities tend to be sharper in Sub-Saharan Africa and Latin America, while data are not available for most Middle-Eastern countries. More recent research on the controversial link between growth and equality places renewed emphasis on their mutually reinforcing effect. A main reason is that the poor spend a larger share of their income on consumption, thus amplifying the positive effect of growth.

In Northern countries a main distributional issue are the astronomical salaries of CEOs of large firms. None of the justification that is given is holding upon closer examination. Evidence suggests that they have been delinked from salaries of subordinates in the managerial and professional ranks as well as from the average worker, thus undermining their

morale. However, they also seem to have become delinked from shareholders' interests, even though they should arguably be aligned with them (which may entail downsizing and moving into new sectors), rather than with the classical measures of company performance such as firm size and profits. The competitive pay system originating in the United States has been sending CEOs salaries spiralling upward, since each adjustment leads to a cascading round of increments.

In any case, this leaves much room for revising compensation structures on a more equitable basis, which could have a broader positive effect on prices and low incomes via subcontractors and suppliers. Simultaneously, this leaves some room for greening production processes, although large firms have more leeway than smaller ones.

In sum, moving to a long run sustainable equilibrium entails moving to a globally zero growth situation with redistribution to reduce inequalities within and between countries. It is quite feasible, even though it sharply contrasts with current thinking on growth.

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Chapter 7

INTERACTION BETWEEN INVENTION AND PUBLIC POLICY

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ABSTRACT

American growth once was largely attributable to exploitation of natural resources and to economies of scale. These sources of growth are behind us; invention must compensate for their passing. Increasing inventive resources, human in particular, is a sine qua non. Government first promoted invention through patents and agricultural research. Starting with WWII it affected the pace and direction of inventive activity through research funding and procurement. Much of the economic growth in the past half century was the unintended byproduct of defense R&D. With the growth of regulation the relation between invention and public policy has become reciprocal.

Many inventions have unintended consequences. Policies have evolved to promote pollution abatement, energy efficiency, environment preservation, health and safety, property rights. The government influences the direction of invention through regulatory requirements that channel private research and innovation toward desired outcomes. Some regulations have increased the cost of invention; most have diverted resources from product and process improvement to compliance with regulations. The result has been a decline in the rate of national productivity growth, and in inventions in some areas.

The negative effects of regulation can be minimized by taking into account costs of regulation as well as benefits; by regulations that specify outcomes rather than particular processes or technologies; by relying on markets and prices rather than command and control. Business should be free to choose the most efficient means of achieving social aims. Public policy responses tend to come late. The unintended consequences of the automobile revolution still plague us. The dominant role of invention in economic growth and social change requires that we pay more attention to its consequences and to policies for dealing with them.

INTRODUCTION

American growth in the past was largely attributable to exploitation of natural resources and to economies of scale. Today these sources of growth are behind us; invention must compensate for their passing. Increasing inventive resources, human in particular, is a *sine qua non*. Initially government promoted invention indiscriminately through patent policy. Later, it affected the pace and direction of inventive activity through research funding and procurement requirements. Recently the relation between invention and public policy has become reciprocal, with policy in ascendance, to prevent or counteract the unintended consequences of innovation.

Natural Resources

Through much of the 19th century the country prospered by exploiting its natural resources: agriculture, forestry, fisheries, mining. In 1870 half the population was still engaged in agriculture. Technology played a supporting role: railroads and steamships cut transport time and costs; cotton gins and barbed wire cut production costs. But it was fertile land, timber, and minerals that drove the economy. Old growth forests are nearly gone, high quality iron ore of the Mesabi range is depleted, much topsoil from the great plains has flowed down to the gulf of Mexico. But it is population increase that led to a huge decline in the ratio of natural resources to population, whether resources are renewable or not, no matter how much remains to be discovered or how much new technology can increase the supply of economically usable resources. The population of the United States grew from 6.3 million in 1800 and 23.2 in 1850 to 76 in 1900, 150.7 in 1950, and 300 today. We have become net importers of lumber, steel, oil, and other minerals or mineral products, many agricultural products. which we once exported or in which we were self-sufficient.

Scale Economies

The huge increase in population was a necessary condition for large economies of scale in production and distribution. Again, railroads and steamships helped realize this potential by increasing the geographic size of markets. Large increases in income per capita were a further factor increasing markets, and potential for scale economies in production and distribution. A growing number of new technologies contributed to rising productivity, not all of which required large scale production or distribution for implementation.

The steam engine was harnessed to numerous manufacturing activities. Fertilizer, seed selection, pesticides contributed to a large increase in agricultural productivity. Food and beverage, which was 58 percent of the average household budget in 1875, has declined to a mere 13.5 percent, of which 5.2 is eating out, despite increase in amount, variety and quality of dietary intake. Some of this decline is attributable to the increase in per capita income, itself partly the result of higher productivity on the farm and in transport and distribution.

The increase in market size is never over. Population and income keep growing. The large decline in tax and other barriers to international trade by most nations in the latter part

of the 20th century have made many markets world-wide. But the possibilities for growth are now limited, and their contribution to scale economies in production or distribution may be nil in most cases.

Invention in the 21st Century

Since the mid-20th century, growth in income has depended almost exclusively on discovery, invention and innovation. Discovery, invention and innovation must compensate for decline in resources per capita, as America shifts from a resource-exporting to a resource-importing nation, and for the slowdown in growth trend in scale economies of production and markets. It must also take into account the increased international mobility of capital and of production facilities. In fact, the widening of markets beyond national boundaries means that production locales and employment have also been internationalized. As low income, low wage nations advance in labor skills, they replace advanced high income nations as the main producers of many products and some services. The economic life cycle of a new product once may have been lived largely in the country of origin, or only in advanced nations. Now its life in the country of origin may be shortened, its production is more likely to emigrate. The payoff from a particular innovation to the country of origin may be reduced. Hence more innovation is needed than before simply to maintain current income in an advanced economy. This is not new, but the scope is expanding. The textile industry, once concentrated in New England, moved to the South, but most of it long since has emigrated to low wage nations. Innovations in this industry will benefit consumers everywhere, but producers will gain only where they work.

Discovery and invention today are predominantly the contribution of scientists and engineers. The scientist discovers new possibilities; the engineer solves specific problems. We depended heavily for high caliber scientific and engineering talent on immigrants who came shortly before and after World War II, but this supply is gone. In 2003, foreign-born workers accounted for 37 percent of PHD physical scientists in the work force, 43.1 percent of mathematical scientists, and 34.6 percent of engineers. [1] The future supply of scientists and engineers depends on the number graduating with majors in these fields. In 2004, majors in mathematics were 0.96% of all bachelors degree recipients, 1.3% in the physical sciences, less than one third and one half respectively of the share in 1970. Actual numbers have declined. In engineering the numbers have changed little, but the share has been declining since 1991, to 5.73% in 2004. [2] As a result on one hand we lack the teachers of math and science needed in high school, on the other, our graduate schools are filled with foreign students, who accounted for 49.8%, 43.1%, and 62.6% of doctorates awarded in math, physical sciences, and engineering respectively in 2003. [3] To reverse these trends requires improvement in the science and math faculty and curriculum in elementary and high schools. But that is another subject. Federal policy is limited to visas for foreign students and scientific manpower. Federal financing of university research helps indirectly by supporting and training graduate students.

PUBLIC POLICIES AND INVENTION: FUNDING, PROCUREMENT

Public policy played little role in the rate or direction of invention before the 20th century. The government encouraged invention with provision for patents in the Constitution and the founding of the Patent Office. The Morrill Act of 1862 funding land grant colleges to educate in agricultural and mechanical arts also helped, in particular through the agricultural experimental stations they fostered. The military contributed to the beginning of interchangeable parts manufacturing and naval engineering.

The unprecedented clustering of discovery and invention in the late 19th and early 20th century around electric power, including the incandescent light bulb, and the internal combustion engine, motor vehicles and airplanes, owed little to government funding or other public incentives. Neither did radio and the telephone, which presaged the coming revolution in communication and information. Regulation as an influence on invention came much later.

Today public policy affects the pace and direction of inventive activity in three ways. The first is research funding, basic research in particular, and mission-oriented research whether conducted by public facilities such as NIH, the Department of Defense, NASA or in universities, nonprofits and business firms with federal government funding. Funding of research might include graduate education of scientists and engineers, the individuals who will account for much of future invention. Second, government agencies have procurement demands for research-intensive goods and services, particularly the Defense Department. Some procurement needs require further invention and innovation. Third, public policies to cope with the unintended consequences of invention have been increasingly affecting the direction if not the pace of R&D and resulting technological change. It is regulation that has grown rapidly in recent decades, whose effect is most difficult to estimate. Regulation itself is made feasible through research determining harmful effects and providing means of detecting, measuring, and reducing the harmful substance or effect.

On funding we have data, although on inputs rather than outputs. The federal government spent some 86 billion dollars on R&D in 2004, some 30 percent of the national total, of which 23 billion were spent by federal research facilities. It financed two thirds of college and university R&D and over half of nonprofit R&D. University research in turn played a significant role in industrial invention and innovation. [4]

Federal R&D Expenditures in 2004 by Sector

<i>Performing Sector</i>	<i>Percent of Sector R&D</i>	<i>Percent of Federal R&D Expenditures</i>
Federal	100.0	26.5
Industry	11.8	28.0
Colleges, universities	67.3	36.0
Nonprofits	57.2	9.5
U.S. total	30.0	100.0

Source: calculated from *Science and Engineering Indicators* 2006, Appendix table 4-4.

Defense R&D, which accounted for two thirds of all R&D spending by the federal government in the 1980s, remains over half of the total, 58.6% in 2006 or 65% if one includes space research. Most of the rest goes to health, which accounted for 22.7% of the total in 2006. Its share has been increasing. The only other major function is general science, most of it basic research conducted by universities. [5] Natural resources/environment, transportation, and energy each account for less than two percent.

Starting with WWII, universities have become key performers of research, dominant in basic research but major performers of applied research as well. [6] Their research is highly dependent on federal funds. This dependence is likely to grow. Federal funding for biological research has risen rapidly, primarily through NIH. It relies far more on universities for research than does the Defense Department. More biological research is basic; secrecy is not an issue, and the funding agencies are not the market for resulting products and processes. Energy research, which declined since the 1980s, seems certain to grow. One might add that the products of biological and potentially of energy research impact the civilian economy directly, whereas Defense and NASA research and procurement require technology transfer or further invention for civilian uses.

Procurement providing incentives for R&D and invention by the private sector has been primarily by the Department of Defense. The fact that Defense and NASA were and remain the primary customers for the products of research they performed and funded means that their research funding represents a net addition to R&D, whereas other federal government research funding may have displaced private research in part. Research funding combined with procurement of its products also gives these agencies control over the direction of research.

The military has long been a driver of invention. A clustering of inventions was induced or advanced by WWII and its aftermath: the computer, the internet, radar, and the orbiting satellites of NASA. It was a revolution in information and communication, plus the nuclear bomb and nuclear industry. All of these major inventions advanced as defense, not commercial, projects, some of which were performed by universities, others by private firms, but the Department of Defense supplied the funding and, in consultation with the relevant scientific community, initially determined the objectives. Today, decisions on military research projects, procurement of research-intensive systems, and location of manufacturing are all subject to political pressures with little bearing on defense needs or technological prospects.

The evolution of airplanes from the first tentative flight to fighter planes and bombers a dozen years later was accelerated by military demand. Commercial jet airliners would have been developed in time, but with an increasing lag, perhaps by now, several decades. Computers and the internet were initially developed for military purposes, and communications satellites for a space program with public goals and public funding. Again, it would have happened in time, but would we all have personal computers yet, and what sort of inter-computer communication and information would be in place in the absence of public support?. Would there be global communications satellites yet? War and inter-government military competition was the necessary and sufficient cause. This is above all true of nuclear weapons, from which grew the nuclear energy industry. But for WWII, it might not have happened at all.

The experience of invention and innovation under the priorities of WWII and the subsequent cold war led to the creation of the research enterprise. It is a large organization

engaged in complex scientific and engineering activities whose primary objective is not a product or service, but invention and innovation. The Manhattan project was its progenitor. Edison was its predecessor, on a very small scale.

Much of the economic growth of the past thirty years was based on the spillovers and technology transfers from defense R&D to the civilian economy. [7] The economic productivity of defense research and development has been very high. The bonanza of byproducts from military research after WWII cannot be assumed to repeat itself in the future. The issue for the future is the transferability of technology developed for the military to civilian uses. Supersonic flight, now half a century old, has never made it to market; the Concorde was an economic disaster. Is there a commercial future for stealth technology? How valuable for other uses is guided missile technology, or materials designed for the extreme conditions found in space exploration?. What more will be invented to provide a significant advance in information and communication is hard to imagine. What of the robots developed for military uses? Perhaps they have the potential for major spillovers to the civilian economy.

There are forebodings of a future cluster of inventions, originating in the decipherment of the genetic code, whose consequences we can no more characterize today than we did those of the WWII-induced innovations at that time. But biological research does not appear to offer the prospect of driving the economy in the future, as defense did in the past; it is too limited in the range of industries affected, in the range of products which may result. Government financing, especially of basic research, seems likely to play a major if not a dominant role, with universities as more important actors than in the past. But government activity will not be funded or directed by the Defense Department, with its urgent time tables and clear priorities, but by the Department of Health and Human Services, secondarily the Department of Agriculture, and very likely the Department of Education. NIH will be the principal actor.

Research dollars and research staff are only inputs; what matters is output. We are faced with the prospect of a decline in the economic productivity of research at a time in history when invention must play the major role in economic growth. Perhaps there will be major breakthroughs in energy, with ramifications throughout the economy, but that is in the realm of hopeful speculation.

UNINTENDED CONSEQUENCES OF INVENTION

Major innovations have vast consequences. Of the cluster of inventions in the late 19th and early 20th centuries, perhaps the electric light, the telephone and the automobile had the greatest impact on people's lives. Electric lighting turned night into day for both workplace and household, especially important in the long winter nights of northern latitudes. The telephone brought an end to isolation - anyone could be in contact with anyone else instantaneously. Radio brought news and entertainment to the most remote locations. These inventions did not have major undesirable unintended consequences. From today's perspective, the spread of telephone and electric power poles destroyed cypress forests in the deep South, an environmental crime that should have been prevented.

It is a different story for the automobile, whose direct consequences were cheap and rapid individual mobility (as well as great flexibility in moving goods from suppliers to customers), but indirectly led to restructuring of urban areas with dramatic further changes in society. The principal undesired unintended consequences were air pollution, traffic congestion, and dependence on foreign oil

More recent inventions and discoveries have had undesired consequences or their use has such a potential. Nuclear energy is the most prominent. It produces no harmful emissions, but there is a problem of disposal of radioactive waste and the fear of an accident at a nuclear power plant, such as that which occurred at Three Mile Island.

The computer was originally developed to calculate ballistic trajectories and to decipher enemy codes. The internet, originally developed by DARPA, was a means of maintaining command and control through instant global communication in case of a nuclear attack. The personal computer replaced the typewriter; this consequence was intended. But the computer in combination with the web, has revolutionized information processing and quantitative analysis in most fields through its ability to process vast amounts of data and to handle many variables simultaneously, and to do so swiftly. It has changed the way in which business and other organizations are managed and run. Individual access to the internet did great harm to the U.S. Post Office, to libraries, it reduced subscriptions to newspapers and magazines and is a factor in decline of book sales. Whether these are regarded as gains or losses depends on one's perspective. They are both. These consequences were unintended and largely unforeseen. Pornography gets most publicity, but other consequences include tidal waves of spam - unwanted e-mail ads; e-commerce, including false advertising and tax evasion; the invasion of privacy, stolen identities, the threat of viruses. Copyright violation is an issue as more and more copyrighted material is placed on the web. Vast amounts of misinformation are available for an undiscerning public.

Radar, initially used to alert British pilots to imminent German air attack, is now essential for operation of passenger planes crowding the skies, and for timely weather forecasts. It also led to the microwave ovens found in most kitchens, and contributed to TV, FM radio and VHF communication. Unintended consequences of microwave exposure are few; they can damage human tissues by overheating, especially the eye, and disorient some species of wild birds.

More recently, antibiotics have improved health and longevity, contributing to the crisis of both Social Security and Medicare, and redirecting some medical research to the problems of the very elderly. But their widespread use has accelerated the evolution of antibiotic-resistant microorganisms, creating new threats to human health. A current debate is about the prospect of shortening the effective life of a new antibiotic if it is given routinely to cattle.

The biotechnology revolution in discovery and invention has already produced major gains in agriculture, and is creating undesired consequences. Genetically-modified crops may contaminate nearby crops through pollination. In some countries the GM foods are banned. Biotech production of new pharmaceuticals is relatively recent and subject to the same risks as other drugs.

Through DNA analysis it will be possible to improve the effectiveness of medical care by adjusting medication and dosage to individual requirements, to calculate individual propensities for diverse medical problems. Already we know about the relation of certain DNA components and probabilities for certain types of cancer, for cystic fibrosis, sickle cell anemia, heart disease, arthritis, diabetes, Alzheimers and other diseases. Such information is

more reliable than what we have now, family histories, available to M.D.S.. Such information would be of great value to insurance companies, which would be able to make more informed choices on whom to insure and how to calibrate insurance premiums. But its availability could do great harm to many individuals. Abortion of Downs syndrome fetuses is common. Detailed knowledge of the DNA of most fetuses might have a dramatic effect on demographics.

DNA 'fingerprinting' has brought major gains to the system of justice. It has convicted many criminals and exonerated many suspects and in particular, innocents who had been convicted of crimes they did not commit.

DNA research could provide valuable information for school counselors, for college admissions officers, for faculty advisors, and for potential employers. Who should go to college, what majors would be most appropriate, which job applicants are best suited for a particular job. There would be enormous resistance to such information. Already there is strong opposition to the means currently available to guide such decisions: SAT and ACT tests for high school seniors, GREs and other tests for college seniors. For some clerical and secretarial jobs and occupations, a few hours of testing would be more reliable than four years of college with an English major, but it is illegal to employ them for this purpose. Here the vested interest of the educational establishment is in alliance with the egalitarian ethic. An individual may use them to guide his/her decisions, but the DNA results would not be available to prospective employers (or insurance companies). An individual may be able to improve his/her test scores by study and practice, but not the DNA birthright.

Genetic therapy is still in the research stage. There have been concerns about possible consequences of unrestricted access to stem cells for research. In time we may be able to eliminate undesirable genetic traits and perhaps insert desirable ones. At some remote point, genetic technology may raise the issue of who or what is an individual; how far can one modify the DNA 'fingerprint'. Future unintended consequences of economic significance are a further escalation of the share of medical costs in national income and further growth in the burden of the idle elderly on the working population. A significant increase in average life expectancy without a slowdown in the aging process would be a socioeconomic disaster.

The great product of a biogenetic revolution is information and how to use it. But for some people, for some things, ignorance is bliss. This is a moral dilemma. Should the individual be made aware of his/her propensities for various ailments? Yes, but should that information be made available to M.D.S.? Yes. What about insurance companies and employers? They would benefit, but some individuals would be worse off, some better off. Should the right of educational institutions to information on individuals be different from the right of employers and insurers? The quest for certainty is universal, but the results of such a search are unacceptable to many, among them unassailable evidence of human diversity and, yes, inequality, beyond the reach of individual or institutional correction.

THE GROWING SCOPE OF PUBLIC REGULATION

Law and regulation have evolved to counter undesirable consequences, promoting health and safety, pollution abatement, environmental preservation, energy efficiency, property rights. Compliance may require appropriate invention and innovation, both in this country and

among nations exporting to the United States. Federal government R&D support and procurement increase the amount of invention and innovation. But its regulatory policies tend to have the opposite effect.

Federal regulation directed at the consequences of inventive activity first became a factor early in the twentieth century, but its scope was limited almost exclusively to health. The FDA was established in 1906. But it was the Food, Drug and Cosmetic Acts amendments of 1962 which first had a major impact on the pharmaceutical industry. The FDA now required proof of benefit as well as safety, and prescribed testing procedures for demonstrating both. Food regulation in the 1950s set standards for pesticide residues and other toxic chemicals, for the safety of food additives. FDA standards for drugs and food promoted improvements in analysis and testing. Food standards also encouraged agricultural research to develop crops resistant to disease and pests.

Public safety is a more recent concern. It is true that early locomotives had cowcatchers and whistles, but the safety issue became important when millions of cars crowded the roads, most of them capable of going 100 mph. The early public response was speed limits, traffic lights, rules of the road, driving licences. More recently, seat belts and air bags have become mandatory, and cars have been designed to reduce the risk of accidents and of passenger injury in case of collisions. Information as well as regulation by the Department of Transportation have influenced research toward these objectives. The costs of airline safety regulation, to which have been added those of security, surely reduce resources available for innovation in this industry. Safety concerns have been extended to building construction. Lead paint and lead pipes are out, so is asbestos. In many small ways these regulations and practices have resulted in research and innovation responsive to regulation.

Water quality was a local and regional responsibility which required development of testing and treatment procedures. Regulation at the national level became important with the passage of legislation in the 1960s and 1970s, setting standards for pesticides and herbicides as well as pathogens in food and water, and requiring permits for industrial and municipal discharge. Fish were major beneficiaries.

The health consequences of burning dirty coal in urban areas have been known for centuries, but little was done about. Air quality became a subject of national regulation only in the 1960s, culminating in the Clean Air Act of 1970. The main problem, burning of hydrocarbon fuels, has remained the same over several decades, but public perception of the consequences has changed repeatedly, and so have policy responses. The problem of smog and its effects on health was the initial public policy concern and policy response - motor vehicles in Los Angeles, elsewhere including coal-burning power plants, steel mills, some industries, a variety of pollutants: particulates, sulfur, lead. But the health problems were local. Law, policy and public funds were first directed toward removing pollutants from motor vehicle exhausts: Then it was discovered that burning hydrocarbons with high sulfur content caused acid rain downwind, and the problem also became the health of trees, regionally and across national boundaries. After the OPEC oil embargo in 1973, oil consumption and import dependence became a leading issue. Then the stress shifted to energy efficiency, increasing engine performance, reducing vehicle weight, cutting fuel consumption to lessen dependence on foreign oil. At that time the climate concern was global cooling. Only recently has the contribution of cars and power plants to global warming via carbon dioxide emissions become a public issue. Lately government concern with self-sufficiency has focused on alternative fuels. It is now providing incentives for purchase of cars with

hybrid engines and development of alternative fuels. Thus in many ways government has forced the private sector to increase its investment in research and innovation and direct it toward public policy objectives of efficiency, pollution abatement and safety.

As to urban congestion, response has been mainly at the local level: construction of rapid transit facilities, development of suburban subcenters to disperse traffic, and more recently, the building of huge shopping and service malls around parking space, staggering of working hours, and working at home with internet access to office and co-workers. The innovations were mainly socioeconomic rather than scientific, by the private sector enabled by the public power of eminent domain.

The internet has many unwanted consequences in search of regulation directed at preserving privacy, preventing fraud, protecting property rights and defending computers and the internet from attack. Pornography and spam concerns the FCC. False advertizing and tax evasion in e-commerce concern the FTC and the IRS. The basic problem is that the internet is world-wide, beyond the reach of any nation. Regulation in this country is opposed as a violation of freedom of speech. Most efforts to minimize these consequences are technological: filters available for individuals who want them to screen out whatever is desired, and protect from viruses.

Regulation in the new field of biotechnology reflects concern about the unintended consequences of releasing new biological entities into the environment. It involves the Department of Agriculture for crops, but also the EPA when GM crops produce pesticides and herbicides, and in the development of biological agents as scavengers in the environment. New biotech drugs fall under the jurisdiction of the FDA, which is also involved in approving new GM foods.

Genetic information on individuals poses new challenges for regulation. The issue of privacy is likely to move front and forward. One concern is diagnosis: regulation must balance rights to privacy with the therapeutic value of information flow among practitioners. Another is access to educators, employers, insurers, government. Other issues are ethical: what uses can be made of genetic knowledge, whether eugenic or in terms of allowable genetic modification, including indefinite prolongation of life. At this time we can only speculate on the prospects for regulation and its consequences.

The range of public policy concerns is ever widening. From health and safety of humans it has been extended in some cases to the animal and vegetable kingdom. DDT was banned because of its threat to bald eagles, some GM foods have been attacked because of their threat to monarch butterflies. Habitat preservation and species survival have become goals of public policy. The environment, initially viewed in terms of health and safety for the current generation, has been extended to encompass climate, and the threat that global warming allegedly poses for the well-being of future generations. Now there is another vast expansion of the role and range of public policy; directed toward climate preservation and toward energy efficiency (as well as energy independence). Climate and energy are closely interrelated insofar as it is assumed that burning of hydrocarbon fuels are the main human contribution toward global warming, and the main activity over which governments can exercise some control. But energy policy is not limited to efficiency; it seeks to direct research toward development of economically viable alternatives to combustion as energy sources in response to political as well as climatic fears. Regulation in the next generation will be concerned with information the uses and misuses of the internet, and of DNA analysis and manipulation. This is new territory.

Public policy was once reactive, a lagged response to perceived social evils, a response to some consequences of invention as well as to other changes. Now it has become preemptive, imposing large research demands on industry toward environmental and energy concerns not about present harm but about predicted remote future disaster. Such research commitments are directed toward objectives determined politically rather than in the market place. The relation of cause and effect of invention and regulation is being reversed.; such a redirection of private R&D is likely to reduce its contribution to economic growth, to commercially viable new or improved goods and services.

ECONOMIC IMPACTS OF FEDERAL REGULATIONS

One approach toward estimating the economic consequences of regulation is to measure the change in productivity growth in the industry subsequent to regulation. The basic assumption is that regulated industries redirect their investment toward meeting regulatory requirements, away from product and process improvements. There is always the logical problem that post hoc is not necessarily propter hoc. But when there is a major shift in public policy with widespread impact, it is plausible to assume that much of the change in economic performance is attributable to that shift. The productivity consequences of the initial imposition of a regulation need not persist indefinitely. Counting patents before and after regulation has its own problems; not all patents are of equal value.

There were many studies of the impact of environmental legislation, especially the Clean Air Act of 1970 which established EPA, on productivity, invention, investment. in the 1970s.. Some were at the national level, and consistently found a decline in the growth rate of productivity. This decline was largely attributable to a decline in investment and innovation in products and processes, as resources were shifted toward compliance with regulation. Denison estimated that pollution abatement (mainly EPA) and worker health and safety (mainly OSHA) reduced output per unit of input some 2 percent in 1982 below what it would have been absent the legislation in the late 1960s and early 1970s. [8] There are other estimates, but general agreement that environmental regulation in particular made a significant contribution to the decline in the growth rate of productivity in the 1970s. [9] Hazilla and Kopp estimated the costs of the clean air and clean water acts for 1981-1990 and concluded that they reduced GNP by 5.85 percent and growth in private domestic investment by 8.35 percent. [10]

Denison's estimates were limited to the direct compliance costs of regulation in terms of investment and operating costs. There are other, less easily measurable costs that reduce resources available for productivity-enhancing activities. "Regulation ... may delay projects and the introduction of products and methods that raise productivity.; raise paperwork costs; reduce the efficiency of production; and prevent resources from being allocated among uses in such a way as to maximize output. Some of these costs are imposed deliberately in order to protect regional, industrial, or other special interests." [11]

Others focused on the industries most affected by the changes in regulation, energy-intensive industries in particular. What they found was increased invention focused on compliance with pollutant emission regulations, but a decline in investment and invention related to product or process improvements, a "crowding out" process, and resulting decline

in the rate of productivity growth. Barbera and McConnell [12] found a 30 percent decline in paper, twelve percent in chemicals, 11 percent in steel, and 10 percent in stone, clay and glass.

Changes in regulatory procedures also offer opportunity to examine the differences in their impact on invention and innovation. Coal-fired power plants were required to install stack scrubbers from 1977 on. After 1990 they were given tradable emission allowances and choice of method. Innovation was no longer limited to improving stack scrubber efficiency but focused on cost-effective emission reduction. It was more environmentally friendly. [13]

The Food, Drug and Cosmetic Acts amendments of 1962 was a major change in regulation, permitting study of its impact on the pharmaceutical industry. FDA now required proof of benefit as well as safety, and prescribed procedures for demonstrating both before approving a new pharmaceutical product. These requirements raised the cost of research and development, delayed the introduction of new drugs, and were a major factor in a large decline in the rate of new drug development in subsequent years. [14] They also influenced the direction of research, discouraging search for drugs with limited markets.

Health and safety regulation has had a major impact on the cost of invention, slowed its pace, and influenced the direction of inventive effort. The two principal agencies involved, the FDA and EPA, have different attitudes toward risk, therefore different impact on inventive activity. Specifically, there is a difference between regulation of pharmaceuticals, which are prescribed to individuals by M.D.S., and chemicals added to or found in the water, air, or environment. The FDA considers the benefits of a new product for specific purposes as well as the risks and arrives at a reasoned decision. Whether it is too conservative or too slow is a debatable issue. Environmental hazards, on the other hand, are readily politicized, often engendering unwarranted panic. The result is excessive risk aversion, setting standards for harmful substances one hundredth of the minimum concentration shown to cause harm, or setting it at zero, with little regard to the benefits foregone as a consequence. [15] Both approaches increase the cost of R&D and slow invention, but a proper cost-benefit approach is much to be preferred to the panic button which escalates the uncertainty of research and may render its costs prohibitive

There are large differences between firms, government, and individuals in tolerance of risk and uncertainty. Business firms do not consider all the external costs of their products or behavior, whereas the government should. But cost-benefit analysis does not provide a simple metric for behavior or regulation; it is intermediated by the risk tolerance of the agent, and by the relative weight given to present vs. remote future risks. Governments, or bureaucrats, tend to be more risk-averse than individuals. Governments also give more weight to costs far in the future than do individuals or firms. Health and safety legislation is partly overkill.

One expression of risk aversion afflicts many of the bureaucrats who make decisions on awarding federal research grants and contracts. They feel safe from criticism by sticking with well known names and leading universities. But research is a risky exploration of the unknown. When research administrators were often themselves first rate scientists and engineers there was more equality of opportunity for new ideas, new researchers. A decline in the quality of government research bureaucrats is one consequence of a shortage of talented scientists and engineers today.

REGULATORY CHOICES

What is the role for public policy? There are agencies, departments that promote technical advance in particular areas: NIH, Department of Defense, Agriculture, NASA, the Department of Energy. But they are not focused on the unintended consequences of the new technologies they promote or finance. There is government R&D directed to some of these consequences, but after the fact. Two agencies whose major function is precisely to avoid or eliminate undesired consequences are the FDA with regard to food and pharmaceuticals and the EPA with regard to diverse threats to the environment and now climate. OSHA is concerned with the work environment but has little impact on inventive activity beyond diverting resources to compliance with regulations. If there is an agency which could or should be concerned with unintended consequences of new technology across the board, it is the National Science Foundation. But that is not its role. There is no agency, not limited by industry, product, problem or goal, that might undertake such a task.

Public policy directed at consequences of invention takes various forms, with different impacts on inventive activity. [16] The traditional approaches were prohibitions on the use of an invention or regulations restricting its use. The case of DDT is an example of banning use of a product because of its unintended consequences. It is rare in this country. It discourages research in specific areas. Banning research in one country merely means that it will be conducted elsewhere: stem cell research; animal experiments, human clinical trials. More common is the restriction of the use of a product with potentially harmful side effects. Prescription drugs are prime examples. It limits the market for a new product, reducing its potential profitability. Prohibitions and restrictions of use tend to reduce invention by increasing research uncertainty and lowering potential payoffs.

An alternative approach is imposing standards which a product or process must meet. Regulations that prescribe specific technology such as stack scrubbers for coal-burning power plants are the least efficient. Technology selection by regulatory agencies diverts research from alternative approaches. Policies that specify targets but leave firms free to achieve them by whatever means are more efficient and more compatible with innovation. Standards beyond current capabilities but believed achievable within a grace period, are similar to Defense Department procurement requirements promoting invention. To keep on promoting invention and innovation, standards must keep moving ahead of the technological frontier.

It is widely believed that market-based regulation, such as emissions charges, emission permit trading, fuel taxes, is a more efficient stimulant to invention than command and control. It provides a permanent incentive to modify behavior, to innovate, whereas innovation under other policies is limited to a particular technology or target. Unlike proscription and prescription or standards, a monetary incentive cannot specify outcomes or time lines. It is often indirect. A higher tax on gasoline encourages consumers to demand more fuel-efficient cars; but both consumer demand and producer response may be unpredictable. On the other hand, a tax on emissions is levied directly on the producer. Nevertheless the market-based approach to regulation is the exception in the United States. It minimizes public control over the pace and direction of invention and innovation.

The cost of enforcement as well as of compliance must be considered. Monitoring of emissions or fuel economy may be feasible for power plants, but not for cars. In the later case, regulation must be at the level of the manufacturer. Fuel taxes avoid monitoring costs.

Whereas opportunities for invention still seem open-ended in promoting human health, there are rapidly diminishing returns in advancing environmental quality or accident prevention. Once dangerous chemicals are reduced to one hundredth of the concentration believed to present a hazard to human health, how much further should we go? How much extra cost or vehicle weight and fuel consumption are we willing to accept in order to keep increasing passenger safety? Can we keep on inventing additional hazards whose reduction requires regulation? I'm sure we can.

Apart from policy choice, there is a question of timing. Public policy responses tend to come too late, and do too little. It took the tragedy of thalidomide to give the FDA the tools to enforce safety and effectiveness of pharmaceuticals. The unintended consequences of the automobile revolution still plague us. Is there a case for more thorough and more timely public assessment of major innovations aimed at prevention of side effects in some cases, early warning and countermeasures in others? Can we reduce disagreement and delay in problem-solving? This is a dangerous path into unknown territory.

Should a government agency or public interest group be responsible for forecasting consequences and recommending policies to prevent or counteract? (This is done all the time by many groups, but not as a matter of public policy.) The answer is not in the foreseeable future, because the future is not foreseeable. Individual experts make mistakes of course. But so does the Nobel prize committee. Scientists around 1970 looked at cooling temperature trends and foresaw a new ice age. There were proposals to dust Greenland with soot to lower the albedo. We are not very good at prediction. But the dominant role of invention in economic growth and social change requires that we pay more attention to its consequences, intended or not, and to policies for dealing with them.

CONCLUSION

Until the second half of the twentieth century, public policy dealing with unintended consequences of innovation was pretty much limited to health: the safety of water, food and drugs. It expanded to environmental concerns, especially with the establishment of EPA and OSHA in 1970. The concept of environment itself was expanded from an extension of health and safety to habitat, species preservation, climate, global warming. The most recent element in the policy agenda is energy: efficiency, national self-sufficiency, alternative fuels, alternative sources of energy. These new policies are a spur to invention directed toward compliance with regulation, but divert resources and diminish research and invention directed toward other goals. They imply an increased federal role in selecting the goals and setting the pace of inventive activity. Their impact on economic growth is negative. But they have not been designed to minimize adverse effects while still attaining their goals. A shift toward market-based incentives would help; so would an evaluation of the costs as well as the benefits of regulation as a counterweight to bureaucratic risk aversion and populist panic.

The combination of federal government dominance in financing basic research and its bias toward mission-oriented research and procurement, divert R&D from market-oriented goals but make a net addition to total research and invention. The huge economic payoff of defense R&D in the twentieth century is unlikely to be repeated in the twenty-first. Growth is not the only national desideratum, but it does provide the resources for pursuing other goals

and helps maintain public support for them. Public policy influencing inventive activity, once concerned with the tradeoff between the costs and benefits of modern technology, is facing a different tradeoff; growth vs. other national goals. This is no time to reduce the resources, human and financial, devoted to invention and innovation.

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Chapter 8

IMPACT OF MEDICAL MALPRACTICE LITIGATION ON PHYSICIAN SUPPLY: EVIDENCE FROM MISSISSIPPI

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ABSTRACT

This paper examines the relationship of local medical malpractice lawsuits and physician supply in Mississippi. Using a panel dataset confined to a single state, the results indicate a significant negative relationship between the intensity of medical malpractice litigation and number of area physicians. The data suggests that, on average, medical malpractice lawsuit filings lower the number of expected area physicians by between 1.61% and 4.35%. We conclude that the relationship between medical malpractice litigation and physician supply found in other studies is reinforced by our own analysis, and suggests the continued need for reform.

Keywords: Medical Malpractice, litigation, physician supply, tort reform

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I. INTRODUCTION

Recent studies have examined the effects of various derivations of tort reform efforts on the supply of area physicians. Although research in this field is somewhat limited, some of these studies have indicated that counties in reforming states have either a greater supply of physicians or a faster rate of growth in the number of area physicians (Hellinger and Encinosa, 2003; Encinosa and Hellinger, 2005; Kessler, Sage and Becker, 2005). Similar to most of the contributions related to the issue of medical malpractice, these studies have centered on the effect of policy changes across states.

This analysis uses a different approach as we attempt to measure directly the effects of varying levels of malpractice litigation on the quantity of area physicians. Instead of relying upon policy differences as the explanatory variable of interest, our analysis uses as the independent variable the number of medical malpractice lawsuit filings in each political jurisdiction, which in our case are individual counties. This analysis is confined to a single state. Using a number of factors as control variables and jurisdictional fixed-effects, we measure the impact of variation in levels of malpractice litigation on the supply of area physicians.

II. MISSISSIPPI AS A MODEL

Mississippi has received a great deal of attention in recent years for alleged “lawsuit abuse” and civil litigation. A Harris Interactive poll found that Mississippi’s liability system was ranked as the worst in the nation by businesses around the country.¹ The state has been a target of tort reform advocates for some time. A great deal of political pressure has been brought to bear concerning tort reform, resulting in the Mississippi Legislature enacting comprehensive tort reform in 2003 and 2004.² Specifically, certain judicial districts and particular counties have been the focus on much of the attention. The American Tort Reform Association labeled the 9th and 22nd judicial districts, and specifically Jefferson and Claiborne Counties, as “judicial hellholes.” It is argued by some that these jurisdictions tend to be “plaintiff friendly” and thus target venues for civil litigation. Most of the criticism has stemmed from the size of jury awards in civil cases.

One result of increased medical malpractice litigation cited by tort reform proponents is a diminution of the supply of medical services in high litigation areas due to elevated costs of malpractice insurance. The higher insurance premiums could potentially discourage physicians from practicing in jurisdictions where the operating cost would be higher. In 2003 for example, the American Medical Association declared that 18 states were in “full-blown liability crisis” and that 27 other states were “showing signs of problems.”³ The assumption was that physicians would be unable to continue practicing in certain states or in high-risk specialties due to the increase in operating costs. This could potentially limit the availability of medical services.

¹ U.S. Chamber of Commerce, State Liability Ranking Study, 2003.

² The data in this analysis spans 1998-2002.

³ American Medical Association, Press Release, 3/3/2003, “18 States Now in Full-Blown Medical Liability Crisis.”

It is clear how the direct cost of higher malpractice premiums could create an incentive for physicians to practice medicine in less expensive jurisdictions, but what about the indirect cost associated with litigation? It is believed that physicians practice “defensive medicine” in contending with the threat of litigation (Kessler and McClellan, 1996, 1997).⁴ Because physicians are fully insured against the financial costs of being sued, defensive behavior is aimed at avoiding the indirect costs of being sued, such as the time and stress associated with being the defendant in a civil case along with the obvious potential damage to one’s professional reputation that may be incurred. It may be possible that physicians have an incentive to minimize this possibility by steering away from jurisdictions which have a greater propensity for litigation.

Using data from a single state allows testing the possibility that physicians act strategically by avoiding particular jurisdictions independent of legislative differences and dissimilarities in medical malpractice insurance premiums. The laws governing the state are constant, and do not vary. Insurance premiums are also constant, differing only by specialty. By using data by county within the state, we are able to hold these factors constant by virtue of the research design. Then by empirically controlling for other factors, we are able to test the hypothesis that the supply of area physicians varies with the level of litigation across jurisdictions.

III. RESEARCH DESIGN

This research uses a panel design for data covering 1998 – 2002. The econometric modeling is conducted as a pooled, spatial and time fixed-effects regression. A number of alternative regression equations were estimated using differing functional forms, including linear and non-linear regression. The results of three separate models are discussed and presented in the results section. The models included factors known to effect physician supply as variables in the models, and the effects of time and unobserved variation are addressed in the fixed-effects framework (Kennedy, 1998; Judge et al., 1984).

IV. DATA

Unit of Analysis

The data used in this analysis is a county-level analysis of Mississippi. Mississippi consists of 82 counties with the dataset covering a 5 year time period. The data includes a total of 410 observations which include 82 observations each for 1998, 1999, 2000, 2001, and 2002. The data are complete with no counties or data missing from either side of the equation.

⁴ “Defensive medicine” is defined as additional treatments that are motivated by the desire to avoid litigation, and will not generally benefit the patient.

Dependent Variable

The dependent variable is the number of physicians in each county measured on an annual basis. This data was obtained from the Mississippi State Medical Licensure Board (the medical licensing agency for the state) for each year of the study. The dependent variable was expressed as a ratio of the number of physicians per 100 persons in the linear model, derived simply by dividing the number of physicians in each county by the population divided by 100. This was used to standardize for population and transform the variable from discrete to continuous data. Using a discrete dependent variable with linear regression may not be the best functional form (Long, 1997; Gujarati, 2003).

In addition to the linear form, non-linear regression was also employed with the dependent variable being the actual number of area physicians. Initially, Poisson regression was used for the parameter estimation, but a goodness-of-fit test and examination of the data indicated over-dispersion with the variance of the dependent variable much greater than the mean. The use of the Poisson model when the conditional variance is greater than the conditional mean could result in inefficient estimates and biased hypothesis testing (Long, 1997). A negative binomial regression was determined to be the better form, but the Poisson results are reported as well.

Independent Variable

To measure the level of malpractice litigation, the explanatory variable used is the number of medical malpractice lawsuits filed in each calendar year. This data was obtained from the Mississippi State Supreme Court which maintains data on filings in the state courts. This data was obtained at the county level and represents the total number of medical malpractice lawsuits filed in a given year. An important point to note is that this variable is the number of medical malpractice lawsuits filed, not the number of judgments or settlements.

The number of malpractice lawsuits is largely a function of the number of area physicians. Figure 1 is a scatter plot of physicians per capita and medical malpractice lawsuits as a ratio to the number of area physicians. The graph suggests a negative relationship between the frequency of malpractice litigation as a ratio to area physicians and the physicians per capita. Figure 2 compares physicians per capita in counties in which the level of malpractice litigation (measured as a ratio to physicians) is above the mean and below the mean over the five year period. The graph suggests that there are fewer physicians per capita in areas in which litigation is above the mean and more physicians per capita in geographies in which litigation is below the mean when measured as a ratio-to-physicians.

Using this ratio as the independent variable would result in having physicians in some form on both sides of the equation. As an alternative, lawsuits enter our models as a total number, and we use other independent variables to control for utilization and the availability of medical services.

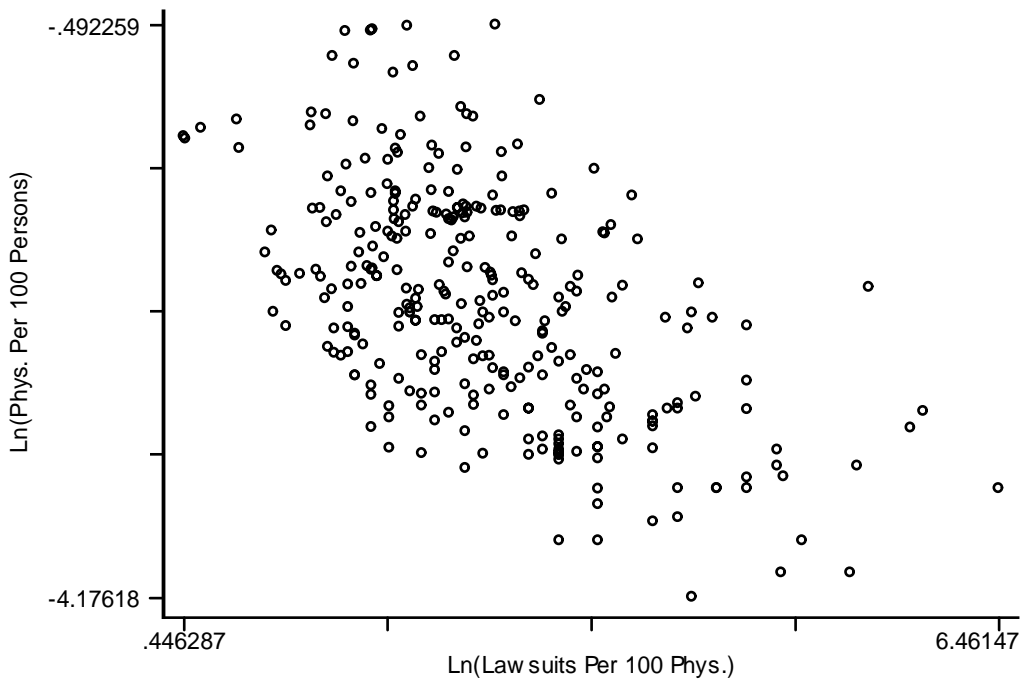


Figure 1. Plot of Physicians Per Capita & Malpractice Lawsuits Per Area Physician Logged Values.

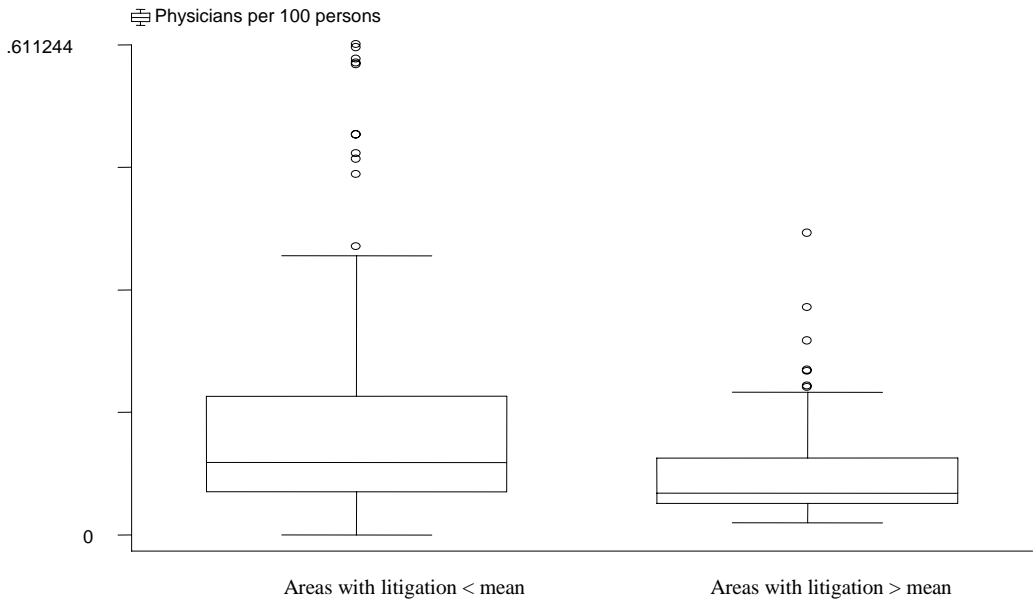


Figure 2. Physicians Per Capita by Level of Malpractice Litigation Measured as a Ratio of Lawsuits-to-Physicians.

Selected Covariates

A number of factors were identified that account for area variation in the number of physicians. Among these are population size, age, income, race, poverty, education, and the availability of medical services. To gauge the level of medical utilization, we also include total Medicare expenditures for the aged population. The number of physicians was defined as a function of 14 key variables along with area and time fixed-effects.

Area and Time Fixed-Effects

The panel dataset covered years 1998 – 2002. A simple pooled regression exposes the results to temporal and spatial unobserved heterogeneity. The base model is elaborated in this analysis by incorporating area and time fixed-effects.

Mississippi consists of 82 counties with 22 separate judicial districts. The legal system in terms of medical malpractice litigation is administered by districts. The analysis includes area fixed-effects at the judicial district level. Time is controlled by entering a dummy for $t - 1$ time periods.

V. MODEL SPECIFICATION

The basic regression equation for the model is given as:

$$y_i = a + T_t + A_j + BX_{it} + CZ_{it} + u_{it}$$

where

- y_i = Number of Area Physicians
- T_t = Time Fixed-Effects Dummy
- A_j = Judicial District Fixed-Effects Dummy
- B = Medical Malpractice Litigation Coefficient
- X_{it} = Medical Malpractice Litigation Variable
- C = Selected Covariate Coefficients
- Z_{it} = Vector of Selected Covariates
- u_{it} = Uncorrelated Disturbance Term

The Poisson and negative binomial forms are given as $u_i' = \exp(x_i B' + e_i)$ where u_i' is a random variable = $E(y_i | x_i)$; x_i is the vector of independent variables, B' are the parameter estimates, and e_i is an uncorrelated error term.

The formal statement of the hypothesis to be tested is as follows:

H₁. The number of area physicians is negatively related to the level of area medical malpractice litigation.

Regression Diagnostics

An initial model was estimated without fixed-effects and then the results examined for violations of OLS assumptions. Plots of the residuals against the dependent variables indicated non-constant variance in the error term.⁵ The variance of the error term was inversely related to population size. To avoid weighting by a variable in the model, the OLS regression was weighted by the total number of households. There was no autocorrelation detected in the model, and multicollinearity was not deemed to be serious enough to warrant changes to the model specification.

VI. MODEL RESULTS

The models were executed with time and area fixed-effects, the control variables, and litigation. All of the models indicated a negative relationship between litigation and number of physicians which was significant in all of the models. The linear model produced a negative coefficient for the litigation variable of -0.0003661 which was significant at 5% (Model 1) with an R Squared of .95. The Poisson model produced a coefficient of -0.0030319 and was significant at 1%, which also generated an R Squared of .95 (Model 2). The negative binomial model (Model 3) produced a coefficient of -0.008338 (significant at 1%) with an R Squared of .27.

Table 1. Dependent Variables

Variable	Operational Definition	Mean / Std Dev.	Data Source
Area physicians/(population/100)	Ratio of licensed physicians to population each year by county	.113 / .101	MS State Medical Licensure Board
Physicians	Number of licensed physicians each year by county	67.9 / 181.2	MS State Medical Licensure Board

Table 2. Independent Variable

Variable	Operational Definition	Mean / Std Dev.	Data Source
Lawsuits	Number of medical malpractice lawsuits filed annually	7.06/ 17.7	MS Supreme Court

⁵ See footnote 6.

Table 3. Selected Covariates

Variable	Operational Definition	Mean / Std Dev.	Data Source
Income	Median Household Income 2000 in \$1,000's	27.9 / 5.7	U.S. Census Bureau
Poverty	Percent of the population that is at or below the poverty level	19.89 / 5.79	U.S. Census Bureau
Race	Percent of the population that is black	39.67 / 20.05	U.S. Census Bureau
Population	Population 2000 in \$1,000's	34.7 / 38.3	U.S. Census Bureau
Education	Percent 25+ with B.S. or >	13.55 / 5.83	U.S. Census Bureau
Population Growth	Annual % population growth	.872 / .961	U.S. Census Bureau
Age	% age 65 – 69	3.63 / .536	U.S. Census Bureau
Age	% age 70 – 74	3.24 / .547	U.S. Census Bureau
Age	% age 75 – 79	2.56 / .426	U.S. Census Bureau
Age	% age 80 – 84	1.79 / .353	U.S. Census Bureau
Age	% age 85+	1.67 / .380	U.S. Census Bureau
Hospital Beds	Total number of area hospital beds	205 / 422	Area Resource File
Nursing Home Beds	Total number of nursing home beds	196 / 190	Centers for Medicare & Medicaid Services
Medicare Expenditures	Total Medicare expenditures for the aged population annually in \$100,000's	213.8 / 207.7	CMS fee-for-service files

Table 4. Fixed-Effect Models

	(1) Weighted Least Squares	(2) Poisson	(3) NBREG
	Y = Phys. Per 100,000 Weight = Households	Y = Physicians	Y = Physicians
Lawsuits	-.0003661 (2.54)*	-.0030319 (3.41)**	-.008338 (3.32)**
Time			
yr1999	0.016 (2.40)*	0.190 (3.71)**	0.140 (1.95)+
yr2000	0.007 (1.14)	0.062 (1.51)	0.014 (0.21)
yr2001	0.005 (0.81)	0.018 (0.44)	-0.115 (1.75)+
yr2002	-0.005 (0.66)	-0.110 (1.65)+	-0.261 (3.63)**

Table 4. Fixed-Effect Models (Continued)

	(1) Weighted Least Squares	(2) Poisson	(3) NBREG
Demographics			
Population	-.0017774 (3.71)**	-.0079755 (2.00)*	-.0312397 (6.77)**
Median Household Income	.0067472 (4.33)**	.0756293 (5.98)**	.046428 (2.60)**
% at or < poverty	0.005 (3.10)**	0.040 (2.67)**	0.019 (1.28)
% Black	0.002 (4.16)**	0.011 (2.76)**	0.009 (2.55)*
% 25+ with B.S. or >	0.007 (9.18)**	0.095 (15.20)**	0.085 (10.34)**
Annual % Population Growth	0.046 (7.71)**	0.281 (4.76)**	0.230 (3.76)**
Age			
% 65_69	0.053 (2.67)**	0.817 (4.34)**	0.213 (1.24)
% 70_74	-0.003 (0.21)	0.203 (1.39)	0.424 (3.38)**
% 75_79	-0.028 (1.23)	-0.496 (2.09)*	-1.019 (4.32)**
% 80_84	-0.036 (1.55)	-0.608 (2.42)*	-0.019 (0.10)
% 85ovr	0.094 (4.03)**	0.618 (2.35)*	0.072 (0.35)
Medical Services			
Nursing Homes Beds	.000241 (4.88)**	0.004 (10.51)**	0.005 (10.98)**
Hospital Beds	0.000 (3.19)**	-0.000 (0.71)	-0.001 (3.29)**
Utilization			
Medicare Expenditures (\$100,000's)	.0002975 (4.13)**	0.003 (4.81)**	0.008 (9.76)**
Constant	-0.604 (6.48)**	-4.635 (5.18)**	-0.634 (0.65)
Observations	410	410	410
R-squared or Pseudo R Squared	0.95	0.95	0.27

Robust t statistics in parentheses.

+ significant at 10%; * significant at 5%; ** significant at 1%.

Table 5. District Coefficients

	(1) Weighted Least Squares Y = Phys. Per 100,000	(2) Poisson Y = Physicians	(3) NBREG Y = Physicians
district1	0.035 (2.02)*	0.229 (2.07)*	0.213 (1.66)+
district2	-0.085 (4.47)**	-0.972 (6.05)**	-0.808 (5.07)**
district3	-0.015 (0.90)	-0.124 (1.03)	-0.099 (0.73)
district4	-0.019 (0.97)	0.268 (1.71)+	-0.030 (0.19)
district5	-0.067 (3.55)**	-0.883 (4.45)**	-0.662 (4.41)**
district6	0.039 (2.17)*	-0.056 (0.36)	0.016 (0.10)
district7	0.026 (0.68)	-2.367 (7.55)**	-1.067 (2.55)*
district8	-0.092 (4.75)**	-0.889 (4.94)**	-0.862 (5.67)**
district9	-0.077 (4.11)**	-0.702 (4.85)**	-1.205 (6.76)**
district10	-0.045 (2.34)*	-0.533 (3.21)**	-0.446 (2.31)*
district11	-0.030 (1.75)+	0.016 (0.11)	-0.368 (2.60)**
district12	0.171 (7.84)**	0.208 (1.82)+	-0.215 (1.56)
district13	-0.078 (4.83)**	-0.927 (6.24)**	-0.716 (5.57)**
district14	-0.011 (0.70)	-0.016 (0.13)	-0.162 (1.23)
district15	-0.101 (4.42)**	-1.143 (4.88)**	-0.887 (4.39)**
district16	-0.050 (3.31)**	-0.279 (2.58)**	-0.096 (0.88)
district18	-0.010 (0.56)	-0.047 (0.42)	-0.394 (2.30)*
district19	0.000 (0.00)	-0.179 (1.42)	-0.007 (0.03)
district20	-0.350 (16.14)**	-3.000 (20.67)**	-2.277 (9.01)**
district21	-0.086 (4.44)**	-0.564 (3.37)**	-0.667 (4.94)**
district22	-0.072 (4.47)**	-0.773 (4.87)**	-0.906 (5.47)**
Constant	-0.604 (6.48)**	-4.635 (5.18)**	-0.634 (0.65)
Observations	410	410	410
R-squared or Pseudo R Squared	0.95	0.95	0.27

Robust t statistics in parentheses.

+ significant at 10%; * significant at 5%; ** significant at 1%.

All of the demographic variables were significant in all of the models with the exception of the percent of the population at or below poverty which was insignificant in the negative binomial model (Model 3). Some of the age variables were significant, and the number of nursing home beds and Medicare expenditures were significant in all of the models. The number of hospital beds was significant in all models with the exception of the Poisson regression.

Spatial fixed-effects were introduced into the models by the judicial district dummies coded as 1 or 0. District 17 was dropped and used as the base case because it was the district with a mean ratio of physicians per 100 persons that was closest to the overall mean (.118 versus the mean of .113). This allowed intercept differences to be compared to a close approximation of the overall mean value for the dependent variable. Seventeen of the twenty-two districts were significant in at least one of the models. The coefficients for the districts are shown in Table V.

VII. LITIGATION'S IMPACT ON PHYSICIAN SUPPLY

The impact of litigation on physician supply can be estimated by applying the parameter results from each model. Because the fixed-effects methodology for our purposes is designed to control for possible unobserved variation not captured by the specific variables, we assume that the variation suggested by the significance of judicial district dummies is a function of latent attributes unique to those geographies and unknown. We therefore limit our impact estimates to the litigation coefficients.

The impact estimated from the linear model was assessed in real terms by decomposing the ratios. We interpret these ratios at the means and then use the coefficients generated by the models to calculate marginal and average effects of litigation.

The average value for the dependent variable expressed as a ratio of physicians-per-100 persons was .113. The average population for counties in the dataset was 34,690 or 346.90 in hundreds.⁶ Solving for the average number of physicians yields 39.2 physicians in each county over the five year period $[346.9 * .113]$.⁷ Applying the coefficient of -0.0003661 from the linear model (Model 1) indicates that an additional lawsuit would translate to a reduction of .13 physicians $[39.2 - (-0.0003661 * 346.9)] = 0.13$ with the other variables constant.

There was an average of 5.34 lawsuits filed annually in each county between 1998 and 2001.⁸ Applying the coefficient from the linear model (Model 1) and putting 5.34 into the equation yields a change of $[39.2 - (-0.0003661 * 5.34) * 346.9] = .68$ physicians with all the other variables constant. At the mean then, the linear model estimates that litigation lowers the expected number of physicians per 100 persons from .113 to .111 which translates to a real change from 39.2 to 38.5 or a decline of 1.79%.

Additionally, we could consider the effect of lawsuits in "high-litigation" areas, defining those as counties which have an average number of malpractice lawsuit filings above the

⁶ The dependent variable is expressed as physicians per 100 persons given as $[\text{physicians}/(\text{population}/100)]$.

⁷ The average of the ratios turned out to be different than summing the variables and then computing an average (see Table II & III). We solve for physicians here for interpretation, assuming population is fixed.

⁸ Tort reform was passed in 2002 in Mississippi and went into effect in 2003. There were provisions regarding medical malpractice which consequently resulted in a substantial increase in malpractice filings in 2002; thus we exclude 2002 in calculating the average.

mean. There were 88 observations in which the lawsuit filings exceeded the overall mean of 5.34. The average number of lawsuits for these observations was 16.1—three times the overall average. The average mean population was 70,810, or 708.1 in hundreds, with an average for the dependent variable of .213 for these counties. Solving for physicians produces an average of 150.8 physicians. Applying the mean of 16.1 for lawsuits to the OLS coefficient would lower the expected value of the dependent variable to .207, which would equal 146.7 physicians or a decline of 4.13 physicians. This reduction would constitute an expected average decline of 2.74% in the number of physicians in geographies in which litigation exceeded the overall mean for the state.⁹

The Poisson (Model 2) coefficient of -.0030319 is interpreted as $100[\exp(-.0030319)-1]$ and yields -0.30 which indicates that the addition of one lawsuit lowers the expected number of physicians by .30%. This would constitute a change of -0.12 physicians with the addition of a single lawsuit, which is very close to the OLS estimate. At the mean number of lawsuits of 5.34, the expected reduction would be 1.61%, which would constitute .63 physicians. If we limited our calculation to only “high-litigation” observations (those in which litigation exceeded the mean) and applied the average number of lawsuits (16.1) to these areas, our estimate would increase to 4.76%.

The negative binomial regression (Model 3) generated a coefficient of -.008338 with the effect given as in the Poisson model. Applying the coefficient yields a marginal change of $100[\exp(-.008338)-1] = -.83$, indicating that the increase of one in the independent variable results in a .83% reduction in the actual number of physicians, or .33 physicians. The change at the mean would be $100[\exp(-.008338(5.34))-1] = -4.35$ or a decline in area physicians of 4.35%. A 4.35% decline in physicians would represent a change of -1.71 physicians at the mean. Again, limiting our calculations to only observations in which litigation exceeded the mean yields an estimated average impact of -12.6% in high-litigation areas.

VIII. SUMMARY AND CONCLUSION

This study measures directly the effects of malpractice litigation on the number of physicians across geographical and political jurisdictions. Importantly, this analysis aims to measure directly the effects of differing levels of malpractice litigation. We do so by restricting our analyses to a single state, Mississippi. As noted earlier (section II), Mississippi has received considerable attention in recent years for civil litigation relating to illegal medical malpractice lawsuit abuse. Limiting our analysis to a single state enables us to avoid many political methodological pitfalls.

Using a panel design for data covering the 1998 – 2002 time period, we estimated a series of equations designed to evaluate whether the supply of physicians per county is a function of lawsuit activity. Our results indicated that the level of litigation (as measured by the number of medical malpractice lawsuit filings), was highly important. The results suggest that, at the

⁹ Between 1998 and 2001, there was an average of 439 medical lawsuits filed annually and an average of 5,544 physicians. Aggregating these figures for the state using a linear interpretation (with each lawsuit representing a change of -.13 physicians) equates to a redistribution of approximately 57 physicians annually due to litigation.

mean, malpractice lawsuits reduce expected area physicians by 1.61% to 4.35% and possibly up to 12.6% in high-litigation jurisdictions.

The findings offer some reinforcement for the advocates of medical malpractice reform. This analysis suggests that lawsuit abuse does indeed matter, in that physicians act strategically, either avoiding jurisdictions in which the likelihood of litigation is higher than other jurisdictions, or “voting with their feet” by leaving those jurisdictions in which they may have settled. Although the present analysis does not speak directly to the increased cost of physician services, it is also, of course, not at all unreasonable to expect that the decline in physician supply will produce significant increases, net of other effects, in the cost of physician services.

This examination of the patterns of physician activity in Mississippi lends support to what some observers of the Mississippi political and economic scene have long contended, i.e. that the forum shopping by plaintiffs’ attorneys has probably, if unintentionally, had the most dire impact on the poorest citizens of the state who can least afford such outcomes. Although the poor have their basic health care needs paid for through Medicaid, the federal program for the poor and indigent, the inability to obtain medical service in poor Mississippi counties is not an inconsiderable obstacle, and is an impediment possibly worsened by lawsuit abuse.

We readily acknowledge that the findings presented here as they relate to Mississippi do not necessarily extend to other jurisdictions. However, in spite of the dangers of over-generalization, this case study is quite compelling, and should provide impetus for further research into the importance of lawsuit reforms in the medical area.

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