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Child Development and the PITS: Simple Questions, Complex Answers, and Developmental Theory

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The enormous popular interest in the field of child development makes it incumbent upon developmental scientists to convey with care the complexity of development lest oversimplified popular accounts gain credibility. Recent attempted models of development do include the range of variables and complexities that need to be accommodated in accounting for development. A model is presented here that incorporates many of the elements of recent models but elaborates on the role of experience in relation to the constitutional, cultural, economic, and social factors that contribute to advantages and disadvantages in children's development. The importance of accommodating data from prior theoretical perspectives and the importance of the contributions from neuroimaging studies are discussed as they are critical for successful theory building in the field of child development.

INTRODUCTION

For those who have not yet heard or figured it out, "Child Development and the PITS" translates into Child Development and the Person in the Street—the person in the street who asks simple questions and wants simple answers, who is puzzled by complex responses, and who is terribly impatient with the nuances and qualifications that characterize contemporary theories of development. Some of you might have thought PITS was a reference to William James' "TCPITS," the common people in the street, but I actually modeled it on the title of a 1940s book on symbolic and mathematical logic by Lillian Lieber: *MITS, WITS, and Logic* (Lieber, 1960). MITS is the Man-In-The-Street and WITS is the Woman-In-The-Street. That slim volume, in its several editions, was and is a clever and sometimes humorous attempt to convey the essential aspects of symbolic logic to the person in the street.

Now if symbolic and mathematical logic for the man and woman in the street was a novelty fifty years ago, not so for child development. From the beginning of the modern serious focus on the study of children, well before the founding of the Society for Research in Child Development in 1933, surely dating back at least to the early days of the child study movement in the 1880s, popularized information about children and their development was aimed at people in the streets—at mothers and fathers and those responsible for the health and welfare of children (Cairns, 1983; Sears, 1975; Senn, 1975). And certainly, throughout the 20th century, there has been no dearth of well- and ill-informed books advising parents on the care of infants and children, wonderful and sometimes scary admixtures of well-grounded evidence and passionate advocacy.

And it continues, increasing geometrically. Hit "parenting" at Amazon.com and one can browse the 75 bestsellers under the general title of parenting and families, or the 75 bestsellers on discipline, or on emotions and feelings, or on morals and responsibility. In the 12 pages that you can print out listing the 75 bestsellers on parenting and families you will note a number of volumes written by members of our Society along with the old standards—*Spock's baby and child care* (Spock, 1998)—as well as recent books of advice on raising the spirited child, the strong-willed child, the emotionally intelligent child, the nonconforming child, and the happy child.

For the web sophisticate there is the National Parent Information Network (*www.npin.org*) which lists, among other items, more than 150 national parent information organizations. All this at the immediate—at the literal—fingertips. And as the information base in child development and the information resources for parents increase geometrically, we have a concomitant geometric decline in the amount of time it takes to access that information, along with a geometric decline in the amount of time it takes for information to go from academic debate and the research laboratory to translation and mutation into advice books, into the Sunday supplement articles, onto the radio and television talk shows, to be formed exquisitely and unforgettably into the media soundbyte.

All this—child development made easy for the PITS, the person in the street—is an understandable

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response to expressed and unexpressed needs of parents and caregivers and teachers. The media are only responding to the market. And responsive they are, proffering advice made sometimes too attractive, especially if it is made up of one part fact to three or four parts exaggeration, hype and overgeneralization.

What we have is a seemingly insatiable hunger for simple answers to simple questions. How else can we explain the relatively frequent headlines that claim the single-variable responsibility for developmental outcomes: it's all about peers (parents are irrelevant), or the genes—more specifically, a gene—for shyness, for intelligence, for personality, for grammar. "First Gene to Be Linked with High Intelligence is Reported Found" headlined science writer Nicholas Wade's (1998) article for *The New York Times* with the tantalizing inset teaser: "A new clue in the debate over what determines ability." "Variant Gene Tied to a Love of New Thrills" was *The New York Times* headline for Natalie Angier's (1996) rather informed article about the "partial genetic explanation for a personality trait called 'novelty seeking.'"

Even when the texts of such articles make reference to appropriate qualifications and note the complexities, the headlines convey the simpler message. These simpler messages get tucked into minds and shape popularized ideas into present and future belief systems.

A number of years ago it was bonding, with dire implications foretold if there was no mother–infant skin-to-skin contact in the first hours after birth. More recently, the popular media have reported new recommendations, liberally mixed with political ideology, about infant feeding on demand needing to give way to feeding on strict schedules as corrective for generations of poorly disciplined children.

Tomorrow, next month, next year, it will be other variables—identified in isolation, heralded as all-important if not all-determining. And there will be no surcease in supplying the stories for the reporters and the headline writers by those who, for a variety of reasons, some sincere and informed, some ideological and self-serving, are more than willing to satisfy the craving for the simple answers to simple questions.

This is not to deny that the ultimate scientific ideal is nothing if not the embodiment of the search for the simplifying and unifying assumptions that will integrate disparate pieces of evidence to explain highly complex phenomena. For sure, given the current state of affairs, our developmental science has a long way to go before we might achieve such scientific elegance—if ever we will. Though one might think, looking at the expansion of our database on children and their development, that we are making significant advances toward an elegant integration of our vast database into overarching theory. Witness the growth of "manuals" and "handbooks" from one volume to two volumes to four volumes to four fatter volumes (Carmichael, 1954; Damon, 1998; Mussen, 1970, 1983), to say nothing of the growth of the program of our own biennial meeting over the years.

We have, I believe, the possibility of making significant progress toward the goal of a theoretical integration of our vast and growing database, but not if we persist in some of the peculiar tendencies of our science wherein each new theoretical formulation, rather than being tested by how well it accommodates existing data, is used to delegitimize data generated in the context of a previous theoretical fixation.

I say delegitimize rather than ignore in the Kuhnian (Kuhn, 1970) sense, because, unlike in other sciences, where the success of new theoretical formulations is judged by how much of the existing verified data can be accommodated by the new theory, in human behavioral development new theories seem to be judged as successful by the numbers of adherents who are eager to reject data and principles generated by existing or older theories. Thus American Piagetian research ignored or rejected the data and principles established in the behaviorist tradition; behaviorism dismissed Gesellian data as uninformative and excoriated Freudian derived psychodynamic data. Behaviorism's data, demonstrating more or less efficacious strategies for learning, were dismissed as nonlearning because they appeared to not consider more generic matters of cognition. Behaviorists were severely criticized and caricatured quite dismissively because they seemingly failed to include in the learning process the role of the "active child" acting on the environment to foster his or her own development.

I've lost count of how often stimulus–response formulations of learning were said to be completely invalid because the S–R approach viewed the child as an entirely passive receptacle. One got the impression that critics were willing to suggest that it mattered little to behaviorists whether their participants were alert or anaesthetized. And to turn the tables, how often have behaviorists dismissed discussions of data that included difficult-to-operationalize speculations and propositions that are, in some important ways, the stuff of the imaginative musings that give rise to scientific and theoretical advances? How often have they eschewed data analysis techniques as representing group fictions?

GROWING CONSENSUS?

All said, however, I detect important progress and some growing consensus in recent years, if not yet

widespread agreement in our science, that recognizes a need to embrace data from a variety of theoretical perspectives in the service of formulating more overarching developmental theories. To be sure, we may just be in an era of a new set of buzzwords and phrases—dynamic, nonlinear, systems, plasticity, life-course trajectories, bioecological, person-in-context, reciprocal influences, mediators, connectionism, and attractors.

It may also be said that we seem to be in an era of enthusiasm for models. In 1983, the first volume of the *Handbook of child psychology* was entitled *History, theory, and methods* (Kessen, 1983); in 1998, the first volume of the *Handbook* is entitled *Theoretical models of human development* (Lerner, 1998). The models include Overton's Bio/Social-Cultural Action Matrix (Overton, 1998), Gottlieb's systems view of psychobiological development (Gottlieb, 1992), Fischer and Bidell's dynamic, domain specific, skill structure developmental web model (Fischer & Bidell, 1998), and Thelen and Smith's dynamical systems and modified epigenetic landscapes (Thelen & Smith, 1994).

Encouragingly, the current academic jargon and models involve more acknowledgments of complexity than has been previously true, driven in large part by the complexity of the data, especially in relation to large cross-sectional and longitudinal data sets. Against the media popularity of single-variable stories, the science itself is moving inexorably toward greater and greater data-driven, integrative theoretical complexity. An exception to this is behavioral genetics. In contrast to the dynamic nonlinear interactive models full of reciprocity between and among levels and variables, behavioral genetics presents a relatively nondynamic linear additive model that tries to assign percentages of variance in behavior and development that can be attributed to genes. The enterprise rests on the assumption that genetic influence can be expressed as a value accounting for a portion of the variance in a nondynamic linear equation for predicting behavioral functioning, and, furthermore, that individual experiences of shared and nonshared environments can be assessed inferentially by the degree of biological relatedness of individuals without empirical observations of experience (Hoffman, 1991; Horowitz, 1993).

Behavioral genetics involves a relatively simplistic approach when compared with the kinds of dynamic system theories currently being elaborated. Perhaps that is why, in the mode of wanting simple answers to simple questions, behavior genetic reports are so media attracting. However, so as not to seem to be repeating the practice I've just criticized of dismissing data in the face of new theoretical formulations, it needs to be said that the data reported in behavioral genetics studies involving degrees of relationships among twins, siblings, and biologically unrelated individuals are in themselves interesting, even if it is doubtful that these relationships tell us anything about the direct and unmediated impact of genes.

In formulating the more recent complex models of development one sees increasing skepticism about what is to be learned from assigning variance percentages to genes (e.g., Elman, Bates, Johnson, Karmiloff-Smith, Parisi & Plunkett, 1998; Kagan, 1998). The skepticism is informed by approaches that see genes, the central nervous system and other biological functions and variables as contributors to reciprocal, dynamic processes which can only be fully understood in relation to sociocultural environmental contexts. It is a perspective that is influenced by the impressive recent methodological and substantive advances in the neurosciences. Data from studies that employ neuroimaging techniques are providing extremely important information about structural plasticity in neuropsychological function. Most critically, this structural and functional plasticity across developmental time is being tied directly to the amplifications and constraints of the social/cultural contexts that determine the opportunities that children and adults have to experience and to learn (Elman et al., 1998; Lewontin, Rose, & Kamin, 1984; Nelson & Bloom, 1997).

TOWARD AN INTEGRATIVE THEORY

Let me suggest that these advances lead us, if not anywhere near the brink of an integrative theory and the elegance to be achieved by a set of unifying and simplifying assumptions, then at least toward a better understanding of the complex and dynamic nature of the relationships that impact development and the operation of developmental processes.

Permit me to enter, not a new model of development per se, but a graphic to represent the range and complexity of what we must understand to achieve a fuller description of development and developmental processes (see Figure 1). It represents a way of thinking that I believe will accommodate and perhaps elaborate a number of the developmental models now being described and the data they are generating. In other words, this is not a de novo entrant into the arena of models but an attempt at a synthesis that might better organize our data and how we think theoretically.

You will recognize in Figure 1 shades of a number of models and graphics by others with respect to organism–environment reciprocity (e.g., Gottlieb, Wahlsten, & Lickliter, 1998; Wachs, 1992) and efforts to parse the environment (e.g., Bronfenbrenner, 1979;

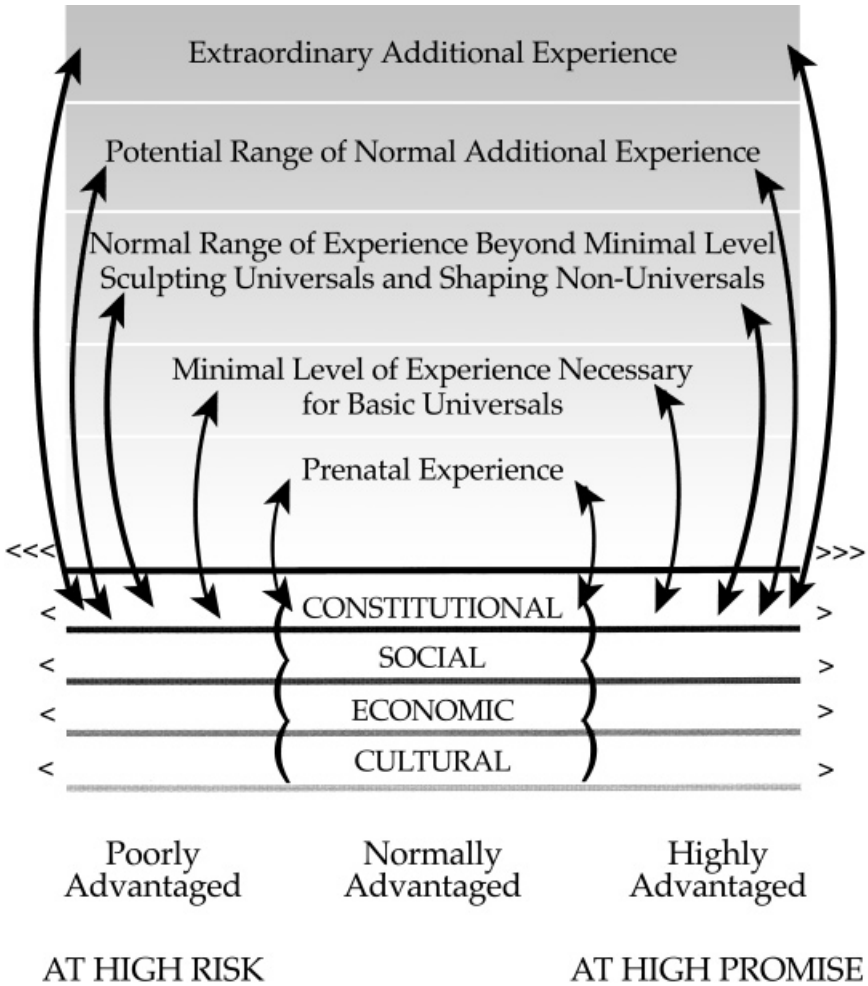

Figure 1 A depiction of the constitutional, social, cultural, and economic sources of influence on development with respect to the nature of experience and in relation to the circumstances of advantage, risk, and promise.

Bronfenbrenner & Ceci, 1994; Horowitz, 1987; Horowitz & Haritos, 1998). In this model, as in some of the others, the assumption is made (supported by data) that from the moment of conception development is influenced by constitutional, social, economic, and cultural factors and that these factors, furthermore, continue in linear and nonlinear relationships, to affect development across the life span, with development broadly defined to accommodate both the increase and decrease in ability and function.

Throughout the model, I use the word "experience" rather than "environment" to emphasize that the operative aspect of environment is experience. What is suggested by large amounts of data, across many different studies (and not surprisingly to many in this audience) is that, taken together or in various linear and nonlinear combinations and permutations, constitutional, economic, social, and cultural factors provide the set of circumstances, or context, for development. These circumstances may, in aggregate, generally provide normal advantage, poor advantage, or high advantage. Unaggregated, as will be illustrated in a bit, they can also provide advantage or disadvantage in a particular developmental domain. In this schematic, the greater the presence of poorly advantaging circumstances, the more overall development is put at risk; the greater the presence of highly advantaging circumstances, the more promise for overall development.

The circumstances that condition the possibilities of risk and promise begin with conception; past the moment of conception, in addition to the normal genetic and biological processes during the prenatal period, social, economic, and cultural variables of environmental origin, mediated by maternal biology, begin to operate. They contribute to setting the base

of the child's initial constitutional circumstances at birth. The point being made here is that already in the prenatal period, as a number of investigators have shown, we have to consider experiential aspects of environmental origin, albeit mediated through maternal biology.

Past the prenatal period, it becomes important and, I believe, useful to think about how to organize our thinking and our data with regard to parsing the functional dimensions of experience in terms of what is the minimal level/amount/nature of experience necessary for the development of the universal human behavioral repertoire—experience that is *highly* probable for the normally developing human organism; experience insured by the extensive amount of naturally occurring redundancy. Beyond the minimal level, I believe the data suggest there is a normal, highly likely range of experience provided postnatally for most children growing up in normal and near-normal environments. These experiences serve to sculpt and elaborate the basic species-typical universal human behaviors. They begin also to shape the vast repertoire of nonuniversal behaviors important to functioning in different social, cultural, and economic societies.

The conundrum for many is to explain the regularities of the postnatal emergence of the normal universal species-typical behaviors in each individual child despite the seeming variations in the gross nature of environments. The nativist answer is recourse to instincts, to predetermined, architecturally and genetically driven explanations, both for the species as a whole and for the individuals in particular (Chomsky, 1965; Pinker, 1994; Spelke, Breinlinger, Macomber, & Jacobson, 1992; Spelke & Newport, 1998). To the Person in the Street these explanations seem to provide the simple answers to simple questions though the nativist position is by no means simplistic and the position is often supported by very interesting data.

The alternative view and, I believe, the more compelling view is to consider that within all the gross environmental variations there is present the essential minimal experience necessary for the acquisition—the learning—of the basic universal behaviors of our species. There is a growing agreement that universal behaviors and physical structures are not built into the organism but that humans are, at the very least, evolutionarily primed to take advantage of the transactional opportunities provided by what Brandstäder (1998) sees as the universal physical and social ecologies available to all normal human organisms—the kinds of transactional opportunities so beautifully analyzed by Thelen and her colleagues with respect to early motor development (Thelen & Ulrich, 1991). As a result of these transactional experiences, the forms and functions of the universal developmental domains are constructed, whether as described in Thelen's dynamic systems approach to motor development (Thelen & Smith, 1994; Thelen & Ulrich, 1991), or in Katherine Nelson's (1996) powerful analysis and synthesis of the role of language in cognitive development, or in Kurt Fischer's notion of the "constructive web" and his attempts to document the linear and nonlinear mechanisms involved in the construction and development of the hierarchies of skills (Fischer, 1980; Fischer & Bidell, 1998).

These points of view are gaining in credibility because, with the aid of neuroimaging techniques (Nelson & Bloom, 1997), we are learning how actively responsive is the developing brain to experience. In all, the evidence is accumulating that the regularities of development are constructed as a result of the transaction of the individual with the seemingly big, buzzing, confusing, noisy environmental surround—an environmental context that provides a high level of redundant experiential opportunities for these universal capacities to be sculpted and, at the same time, for the variations across environments to begin to shape the development of the nonuniversal behaviors that define individuals in linguistic, social, cognitive, economic, and cultural contexts (Horowitz & Haritos, 1998). For example, the capacity for language is a universal species-typical behavior of all normal humans. Its initial development and expression rest on the normally occurring prenatal environment and on the minimal level of the postnatal essential experience of hearing language and experiencing it in a social context. The acquisition of language is then further sculpted by the normal range of experiences involving the language of the cultural surround—Mandarin Chinese for one, Hebrew for another, Portuguese for another, and so on. And I use the word "sculpted" here not to refer to some passive organism on which experience is writing the script but rather to an active collaboration of organismic (read constitutional) characteristics with experiential opportunities that impact the development of nonuniversal behaviors—nonuniversal behaviors that are determined in a social, cultural, economic, and constitutional context.

In the normal range of experience, the capacity for language and the acquisition of a specific language is embedded in the social contexts that influence the use of language in communication, determining how language comes to serve the behavioral repertoire of social and cultural exchange expected of individuals in that cultural and social context. In turn, these experiences affect the development of constitutional characteristics in terms of brain structure and function with the constitutional characteristics also in dynamic

relationship with experience and with the social, economic, and cultural contexts in which development is occurring.

Until now, our attempts to parse and categorize experience have been relatively crude, crude as in Figure 1—suggesting, without much specification, that there is a minimal level of experience necessary for the development of the basic universal behaviors, that a normal range of experience further enables the development of the universal behaviors as well as the initial shaping of the nonuniversal behavioral repertoires. Beyond this, environments can provide for a range of normal additional experience and, further, extraordinary additional experience (all yet to be defined in terms of components and dynamic processes) which may or may not be the same across different environments.

But there is a growing body of evidence that demonstrates the powerful effect of variations in experience, assuming some minima, on language development, on cognitive development, and on intelligence. In a detailed and painstaking study of the language input experiences and of the consequent language output of very young children growing up in different socioeconomic environments, Hart and Risley (1995) have shown that although all of the children they observed learned to talk and acquired the basic grammatical structure of English, children reared by professional parents had five times more words addressed to them over the first three years of life than did children reared by parents in poverty, with the concomitant effect of an increasingly widening gap between the recorded size of the children's vocabulary so that by 3 years of age children reared by the more language-restricted parents in poverty had a vocabulary of less than 500 words, while those reared by language-rich professional parents had a vocabulary of about 1100 words; children reared by middle- and lower-income parents had a vocabulary of about 700 words.

Huttenlocher and her colleagues (Huttenlocher, Levine, & Vevea, 1998) have shown the sensitivity of cognitive growth involving language, spatial operations, and concept development to the experience reflected in the simple measure of amount of time spent in school. Brooks-Gunn, Klebanov, and Duncan (1996) have provided impressive evidence of the powerful impact of impoverished family resources on IQ such that when they controlled for the constellation of the social, economic, and cultural dimensions of poverty, the oft-reported black–white differences in IQ all but disappeared.

It is almost 30 years since Sameroff and Chandler (1975), in their seminal chapter on the "continuum of caretaking casualty," alerted us to the effects of the advantaging and disadvantaging macrosocial characteristics of environments on the postnatal developmental journeys of high-risk infants. The accumulating data since the 1970s has permitted us to refine our understanding of the variables and dynamics that impact the developmental outcomes of those infants.

The data do, I believe, also permit us to conceptualize about the circumstances—constitutional, social, cultural, and economic—that conspire, effectively, to bestow normal, low, or high degrees of advantage during development—in general or with respect to particular developmental domains.

The specific studies I have cited illustrate in a most general way that poorly advantaged environments, defined as providing children with impoverished or limited or sometimes only a little experience beyond the minimum, put the fullest realization of children's development at risk by offering few or fewer opportunities for enriching additional experience or extraordinary additional experience. Conversely, highly advantaged environments, defined as providing many more opportunities for additional and enriched experiences, hold promise for the fullest realization of children's development.

At the extremes, at the ends of the continuum of advantage, a confluence of constitutional, social, economic, and cultural circumstances for poor advantage or enriched advantage can coalesce into what I call "swamping conditions." That is, at the extremes a dense concentration of resources made possible, for example, by high socioeconomic advantage can have the effect of swamping development in a positive manner. Conversely, a dense concentration of disadvantaged circumstances can swamp development negatively.

However, the picture is likely more complex. Swamping conditions at the extremes of disadvantage or advantage may or may not affect all domains of development, and they may have their origin in particular social, economic, cultural, or constitutional circumstances. For example, cerebral palsy or Down syndrome are constitutionally swamping conditions. Cerebral palsy is a swamping condition that involves severe constitutional compromises with respect to motor development. The presence of cerebral palsy may or may not have constitutional disadvantages in other developmental domains, and the child with cerebral palsy may be born into social, economic, and cultural circumstances that hold normal, low, or high degrees of advantage.

In the case of cerebral palsy, its presence can render ineffective the minimal level of experience necessary for the development of the basic species behavioral

universals related to human motor development. One can speculate that someday it will be possible, as it is now possible with the inborn metabolic disorder involved in phenylketonuria, to detect and then provide a physical/biological/socially mediated intervention either pre- or postnatally that would nullify cerebral palsy as a swamping condition for normal motor development. In the meantime, this swamping condition may be ameliorated when children with cerebral palsy are provided with extraordinary additional experience designed to moderate the effect of the condition on motor functioning.

This is not the occasion to explore the combinations and permutations and the linear and nonlinear functions that need to be taken into account in a refined analysis of the constitutional, social, economic, and cultural circumstances interacting with various degrees of experience, by domain and across time. Suffice it to say it is likely that the dynamics and constituents of developmental processes are not static across time, nor are they linear. Further, a systems analysis of these variables accommodates the idea that we are dealing also with the interactive impact of individual differences as well as the power of suddenly appearing or enduring variables to change the dynamics of the system, perhaps to function as disadvantaging swamping conditions: psychological trauma, cultural upheaval, physical disability and disease, social chaos. In the same way, conditions of economic stability and affluence, social cohesion, high-quality education and consistent and saturating extraordinary additional experience can function as advantaging variables and, if intensive enough, as advantaging swamping circumstances. We must recognize, too, the confluence of organism and environment or of particular constitutional and/or social, cultural circumstances that make for individual resilience in the face of adversity, and individual vulnerability in the face of advantage.

As has been noted, poverty in *our* society is clearly a disadvantaging economic variable, although under certain constitutional social, historical, and cultural contexts its disadvantaging effects may well be attenuated (Elder, 1999; Werner & Smith, 1982, 1992), especially when not compounded by the added negative factors of racism and discrimination. Affluence is an obviously advantaging condition, although under certain constitutional social, cultural and historical circumstances *its* advantaging power may be diminished. In other words, the degree to which any constitutional, social, economic, and cultural circumstance is relatively advantaging or disadvantaging is highly contextualized. Further, the functional consequences of these circumstances will rest strongly on the nature and extent of focused and fortuitous environmentally organized and mediated experiences.

At the extremes, in certain domains the constitutionally or economically swamping conditions may well play stronger roles than social and cultural variables in determining the degree of advantage. The presence of cerebral palsy is a disadvantaging condition for motor development, as is Down syndrome for mental development, but not necessarily for all aspects of social development. In the case of Down syndrome, we know that providing early extraordinary additional experience attenuates some of the mental retardation (Carr, 1992). In addition, children who may be constitutionally or otherwise advantaged with respect to extraordinary giftedness and talent in athletics, in music, in art, in language, typically require extraordinary additional experiences in learning, training, and opportunity for such gifts to be fully expressed and realized (Feldman, 1986).

Toward an integrative theory of human behavioral development, the challenge for the approach outlined here, or for any such attempt, is to determine how well this kind of a theoretical approach accommodates, explains, and encompasses our reliable database. I believe we may now be nearer to some partially successful efforts in this regard than we have been in the whole history of our discipline. That is reason to step back and acknowledge that as a result of the collective of our scientific enterprise across the globe, we can say, with some satisfaction, that we are indeed making important progress.

ON SOCIAL RESPONSIBILITY

Of course, for the Person in the Street, our progress may not be all that comforting because it doesn't lend itself to providing simple answers to simple questions. Yet it is often the simple answer that is wanted, the simple variable, the blanket relief from parental responsibility, or the blanket prescription that will fix what is wrong, or, prospectively, the blanket formula that will insure the best developmental outcome. Thus the popularity of the 75 bestsellers giving advice on how to raise the spirited, the strong-willed, the emotionally intelligent, the nonconforming, the happy child, to say nothing of how to increase your child's IQ. Thus the popular media interest in conceptualizations that say not much will make a difference, just good enough parenting is all that is wanted.

It is interesting to think that while "good enough parenting" (Scarr, 1992) may have some appeal, the idea of "good enough teaching" is currently quite out of sync with our expectations of schooling and the almost epidemic fervor in this country about raising ac-

ademic standards and increasing the level of school achievement. Just a little inconsistency here, especially when, increasingly, at both the micro and macro levels, we are coming to understand parenting as teaching, the kind of nondidactic teaching embedded in the subtle and not-so-subtle variations in children's parentally organized experiences, the kind of parental teaching that increasingly appears to be critical for the developing child, especially in relation to the nonuniversal behavioral repertoire.

Yet consider that if you give credence to the notion of "good enough parenting" and combine that with the popularized simple answer that it is really the genotype that is the determining factor and that little the parent does will make a difference, and if you assume that what is true for parental efforts holds true for the teacher in the classroom, then you have a seemingly scientific rationale for the failure to educate, a rationale you can claim is sanctioned by scientific authority citing specific facts. But unlike Gertrude Stein's rose, a developmental fact is only a fact in a theoretical context, a lesson we should have learned well from Piaget, an understanding generally resisted by doctrinaire behaviorists.

Keeping control of facts in relation to theoretical context becomes increasingly important as knowledge grows but also as the posing of simple questions and the desire for simple answers just does not abate. The urge to simplify and especially to geneticize is a strong one. I recall a request to reprint the figure I used in my book on developmental theories. I had labeled one of the dimensions on the figure as organismic and the other as environmental (Horowitz, 1987), but the colleague requesting to reprint the figure in a book had crossed out the word organismic and substituted the word genetic. No, I said, the two were not equivalent and, unless the original label was to be used, my permission would not be granted.

Similarly, in this discussion, "constitutional" is not equivalent to "genetic," and purposely so. Constitutional includes the expressed functions of genes—which, in themselves require some environmental input—but constitutional includes the operations of the central nervous system and all the biological and environmental experiences that impact organismic functioning and that make constitutional variables part of the dynamic and reciprocal interactions that change across the life span as they affect the development of *and* the decline of behavior.

In this perspective, the scientific challenges before us are several-fold. One is, as I have already indicated, to make significant progress in identifying the functional units and roles of experience. We need to learn how best to parse experience for the purpose of seeing its role within the dynamic systems responsible for development. Another challenge is to integrate more fully into our account of behavioral development the evidence emerging from the neurosciences about the effect of experience in shaping neurological function and structure. Still another is to remain vigilant in submitting any new theoretical formulation to the test of how well it accommodates the reliable database of the phenomena it purports to cover. Beyond the scientific challenge, however, is the challenge of helping the Person in the Street to learn to ask less simple questions and the challenge of communicating our knowledge and making clear the limitations of our knowledge in the most socially responsible manner possible.

A fact is a fact is a fact is not analogous to Gertrude Stein's rose. Moreover, the image of Stein's unyielding rose does not carry with it serious social implications for the fabric of a society even though Stein's formulation may have had some existential import and influence on aesthetic appreciation and theory. The social import of *our* facts and their interpretation is something we *must* care about. For good or for ill, our knowledge base is of enormous interest to the Person in the Street. None of us can singlehandedly deter the determined maker of the soundbyte but we can make it difficult. None of us can singlehandedly cause the quest for simple answers to disappear but we can consciously attempt to suggest, in every venue, in every forum, that at the present state of our discipline most simple questions about human behavior and development require complex, often incomplete and unsatisfying answers.

If we accept as a challenge the need to act with social responsibility then we must make sure that we do not use single-variable words like genes or the notion of innate in such a determinative manner as to give the impression that they constitute the simple answers to the simple questions asked by the Person in the Street lest we contribute to belief systems that will inform social policies that seek to limit experience and opportunity and, ultimately, development, especially when compounded by racism and poorly advantaged circumstances. Or, as Elman and Bates and their colleagues said in the concluding section of their book *Rethinking Innateness* (Elman et al., 1998), "If our careless, under-specified choice of words inadvertently does damage to future generations of children, we cannot turn with innocent outrage to the judge and say 'But your Honor, I didn't realize the word was loaded.'"

As SRCD has so clearly acknowledged in its effort to communicate responsibly what we know for the purpose of informing enlightened social policy, we

must do so only if we repeatedly remind the people in the street who ask the simple questions that development is complex, that our theories are incomplete, and that we do not fully understand all the variables and systems in control of development and developmental processes, even though, I believe, we can now say that our growing database points to the critical role of experience interacting with the organism in affecting the realization of human potential in all domains and across the life span.

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