Toward Equalizing the Developmental Opportunities of Infants and Preschool Children

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The social issues that we psychologists study are always complex. They concern distressing states of affairs that we call social problems. These problems are, in part, a function of values held. People differ in the values they embrace and in their beliefs about causation. The belief about causation determines whether an individual will consider a given value relevant to a given problem. Thus, solving a social problem calls for locating and understanding the cause, using this understanding to formulate a means of coping with the problem, testing the efficacy of this means of coping, obtaining sufficient agreement among people to obtain the support required for concerted action. In a democracy, dissemination of understanding of problem causation, choosing plans for coping, and executing them must all come about through the political process. When I was an undergraduate exam-grader in economics at the University of
Nebraska, one of my favorite economists was Thorstein Veblen. Veblen was fond of distinguishing *exoteric* from *esoteric* knowledge. Contributions of the former might be inelegant in theory and/or method, but they had practical significance for the lives of people; those of the latter sort might be elegant and a source of professional status, but had little practical significance. Veblen favored the former and I agreed, even though I also valued theoretical and methodological elegance. It has, therefore, been exceedingly gratifying to receive the Kurt Lewin Award because it means that the investigations I have done during these last 25 years of my career have been deemed by some of my colleagues in the SPSSI to have some promise of practical significance for the lives of children.

The social problem with which my investigations have been concerned is the old one of children who fail in school. This is the problem that has troubled teachers through the ages. It is the problem that the city of Paris, France, asked Alfred Binet to solve nearly 90 years ago.

**HISTORIC CONCEPTS OF CAUSATION AND THE RELEVANCE OF SOCIAL VALUES**

Those children who fail are considered inferior. How people feel about those considered inferior to themselves is largely a matter of their beliefs about the causation of this presumed inferiority. Our founding fathers embraced "equality of opportunity" as a central social value for American society. They were not entirely consistent, however, for even though they rejected caste and class as legitimate bases of social inferiority, many of them accepted the institution of slavery for Black people because, as Jay Gould (1981) has documented, they believed both Black Africans and American Indians to be inherently inferior to the White race.

Historically, causation of inferiority in either competence or status or conduct has been conceived in terms of theistic control, in terms of individual moral choices, and in terms of beliefs about the nature and cause of human development.

The idea of causation in theistic terms antedates the Christian Era, but also persists for many people today. It is illustrated by the words of an English hymn that living people today recall singing through the first third of this century. It goes:

*The rich man in his castle,*  
*The poor man at his gate,*  
*Thank the Lord Almighty,*  
*He has ordered their estate.*

With such a belief about the causation of inferiority, whatever be its criteria, the value of "equality of opportunity" has no relevance.
Conceiving of the causation of inferiority defined in terms of some combination of economic status and folkways is probably best reflected in the opinions expressed by Parson Thomas Malthus (1798), in his famous *Essay on the Human Population*, about the “underserving poor” of the Industrial Revolution in 18th-century England. The chief interests of poor people, he contended, were “not Christian piety and saving for a rainy day, but vice and debauchery.” Thus, he argued, such people deserve the scourges of famines and plagues that have regularly decimated their ranks, for these are the ways in which Nature or God limits the population by destroying the weak of low nature in favor of the virtuous strong.

Despite the emphasis of our founding fathers on “equality of opportunity,” something akin to this Malthusian view has been common in the United States. Its prevalence during the 19th century was evidenced by the popularity of Herbert Spencer’s writings that lauded rugged individualism and regarded wealth as a certificate of virtue. Many still regard people of poverty with limited competence and dependability as “no damn good.”

**IMPLICATIONS OF HISTORIC CONCEPTIONS OF DEVELOPMENT**

What even well-meaning and sympathetic people believe about development, or about how incompetent “losers” get that way, is an important determiner of whether they vote for educational facilities and social services or for “law and order.”

Four major beliefs about the nature of development have existed, each with implications for problem causation. The oldest, *preformationism*, concerned chiefly embryonic development. It is attributed to Anaxagoras, a Greek philosopher of the fifth century, B.C.. Having no conception of the chemical transformations of matter, he contended that “hair cannot come from not-hair nor flesh from non-flesh,” so everything in the embryo must be present from the beginning. With causation generally attributed to the Diety, presumed implications of this belief entered such other domains as: epistemology in the form of “innate ideas,” religion as “original sin,” and politics as “the Divine Right of Kings” and other social status differences. When John Calvin followed Martin Luther in establishing schools to teach the young to read and thereby to give them direct access to the Biblical word of God, it proved difficult to keep the attention of seven-year-olds focused on Biblical texts. This he blamed on “original sin,” and it was used to justify corporal punishment—to “beat the devil out of them,” as was often said. Preformationism and its presumed corollaries thereby had the effect of removing causation from all human endeavor. Thus, the practices based on this view tended to produce people
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with an “external locus of control,” to use a term from Julian Rotter. This view also made the value of “equality of opportunity” meaningless.

The nature-nurture controversy may be said to originate, or at least to acquire official philosophical status, with John Locke’s (1690) Essay on Human Understanding. There, Locke denied the existence of innate ideas, the epistemological form of preformationism, and contended that the mind of an infant is like a blank page on which experience writes. Experience he defined as sensory impressions. Later some developments in neurology led to the concept of the reflex, and to the view of original nature as a multiplicity of reflexes that could, at least in principle, be elicited and combined in an infinite variety of ways. These ideas became the neuro-psychological foundation of the extreme environmentalism of John B. Watson (1924). This view became the Hegelian antithesis of preformationism, and later of hereditary predeterminism.

Predeterminism emerged from preformationism following a series of developments. The transformations of matter investigated by chemists contradicted the proposition that “hair cannot come from not-hair,” yet, during World War II, I had students quote it after hearing my lecture on embryonic epigenesis in child psychology. Moreover, investigators reported seeing animalcules both in the ova and sperm through the compound microscope newly invented by Leeuwenhoek and Ham (1677). Debates between ovists and spermatists weakened the hold of preformationism so that the marvelously clear drawings of the epigenetic transformations taking place in the formation of the circulatory (1759) and intestinal (1767) systems by C. F. Wolff could convince at least the cognoscente of anatomy about the reality of embryonic epigenesis (see Needham, 1959, pp. 170–221). Wolff borrowed from Leibnitz the concept of a monad that develops into an organism by means of its own inherent force, and used this to explain the epigenetic sequence. In so doing he invented predeterminism. Once this supposedly powerful monad had been identified with heredity, his conceptual invention became hereditary predeterminism. Thus was set the foundation for the debates over the relative importance of heredity and environment, or over nature and nurture, that have persisted for over two centuries.

These debates have persisted even though a conceptual and methodological synthesis appeared in the first decade of this century in the contributions of Wilhelm Johannsen (1903, 1909), a Danish botanist, and Richard Woltereck (1909), a German zoologist. Johannsen demonstrated the existence of both environmental and genetic effects on observable plant characteristics, which he termed phenotypes, and distinguished them from their inferred genotypes. Woltereck measured the effects that environments could produce in pure lines or genotypes, called it the “norm” or “range
of reaction," and found what we now call a statistical interaction between the two types of effects.

It was Francis Galton who established the traditional slant of investigations of individual differences by accepting the prevailing British view that observable variations among people's characteristics are of genetic origin. He did it through his book entitled *Hereditary Genius* (1869), through starting the testing movement (1883), through authoring the idea of regression (1886) with the aid of Karl Pearson, and inventing statistical correlations (1896), and through launching the eugenic movement. If Galton and his followers had had available the work of Johannsen, and especially that of Woltereck, the history of our psychology of individual differences might have been quite different from the one we know. Had those who developed the tests of intelligence, other than Alfred Binet (1909), known Woltereck's work, they might have believed less confidently in a constant IQ. Actually, the average individual range of IQs has been found to be 28.5 points, and the maximum range found is 74 points for the population studied longitudinally at the Fels Research Institute (McCall, Applebaum & Hagerty, 1973).

One major reason we are still debating heredity versus environment, more than 70 years after the synthesis of interactionism came on the scene, has been methodological. After Galton (1886) had discovered filial regression and Pearson (1896), in generalizing the regression principle, had invented the statistic of correlation, it became the standard method of investigating heredity versus environment. I believe it has obscured more about psychological development than it has revealed. Ironically, Alfred Binet (1909), who deplored the "verdict that the intelligence of an individual is a fixed quantity," contributed to the obscuring. Once Binet and Simon (1905) had hit upon the idea of giving to each test passed a value in months of mental age, they obtained the single metric they sought for intelligence because they considered it to be a unitary faculty. Unfortunately, this single metric permitted a given mental age to represent a variety of achievements and to hide the relationship between kinds of experiences and kinds of developmental achievement. It failed to hide them completely, however, as the studies of "scatter" on the Stanford-Binet demonstrated (see Harris & Shakow, 1937; Wallin, 1922). Once Wilhelm Stern (1912) conceived of dividing mental age by chronological age, the resulting IQ-ratio provided hereditarians such as Galton and Pearson with a metric that could readily be presumed to assess individual potential, rather than to be an index of the average rate of achievement, which it can only be.

The IQ also lent itself to the correlational analyses that have yielded what purport to be measures of the heritability of intelligence (Jensen,
1967, 1969, 1972), and of other phenotypic traits similarly measured. The fact that the correlations between pairs of individuals increase with the proportion of genes they share demonstrates that heredity has an influence. On the other hand, the correlations between the IQs of pairs of related individuals cannot separate the effects of heredity from environment, nor can the various statistical treatments of correlations between pairs of individuals with differing proportions of genes in common. When the percentage of variance in the IQ attributable to heredity is subtracted from 100 to obtain the percentage of variance attributable to the environment, the result is at best an indirect approach to measurement, and at worst, largely irrelevant to educability (see Hunt, 1977).

The methods that my collaborators and I have been employing more nearly approximate that of Woltereck. We have measured separate branches of sensorimotor development, inspired by Piaget's (1936, 1937) observations of the hierarchical development in his own three children (Hunt, 1976; Uzgiris & Hunt, 1966, 1975). The separate branches are seven: (1) Visual Following and Object Permanence, (2) Means of Attaining Desired Events, (3) Gestural Imitation, (4) Vocal Imitation, (5) Operational Causality, (6) Object Relations in Space, and (7) Schemes for Relating to Objects. The scales for these separate branches are ordinal in character with high inter-observer reliabilities, high test-retest stability in sessions separated by 48 hours, and on Green's (1956) scalogram analysis the coefficients of reproducibility range from a low of .80 to a high of .99 with only two below .89.

We have used these scales in three different ways. Each way has involved the relationship between a set of rearing conditions or the prevalence of certain kinds of experience, on the one hand, and the degree of developmental advance along several or all the scales on the other. In cross-sectional strategy, with "experiments of nature," we have compared the means and standard deviations of the ages of children being reared under differing conditions who are at specified levels of development on these scales, with these levels being defined by the child having passed a sequence of landmarks but failed those above the last one passed. Second, in longitudinal strategy, where we have intervened longitudinally and examined infants repeatedly, every other week during the first year and every fourth week thereafter, we have compared the means and standard deviations of the ages at which the treated and the control infants, from the same population, have achieved successive landmarks on these scales. Third, both we and others (e.g., Caldwell, 1964; Wachs, 1978; Yarrow, Rubenstein & Pedersen, 1975), have measured the prevalence of various kinds of experience available to infants and correlated these measures with assessments of development as measured by our scales or the Bayley
scales. The findings have demonstrated the fictitious nature of a number of the presumed implications of predeterminism that still prevail.

**SOME PREDETERMINISTIC FICTIONS DEPOSED**

The fiction that psychological development has a fixed rate predetermined by heredity is hard to reconcile with the finding, already mentioned, that the average range of IQs for individuals tested repeatedly is 28.5 points. It is even harder to reconcile with our finding, namely: that there are differences of 111 weeks in the average ages at which groups of children, who are living under conditions of obviously different development-fostering quality, have achieved the top step on our Scale of Object Permanence. The earliest mean age at which this landmark has been attained, in our experience, is 73 weeks. This was the case for eight consecutive infants born to poorly educated parents of poverty served by the Parent and Child Center of Mt. Carmel, Illinois. The latest mean age of attainment was 184 weeks. This was the case for children of working class parents being reared at the Municipal Orphanage of Athens where the infant-caregiver ratio was about 30 to 3. The Mt. Carmel infants had the advantage of a program of educational day care (Badger, 1971a, 1971b). For purposes of communication, this difference of 111 weeks between mean ages of attainment of top-level object permanence can be transformed into an IQ-ratio for the single branch of object construction. The difference is one of 90 points of IQ-ratio (Hunt, Paraskevopoulos, Schickedanz & Uzgiris, 1975).

According to a second such fiction, the environment operates in threshold fashion. As Jensen (1969, p. 60) has written, "Below a certain threshold of environmental adequacy, deprivation can have a markedly depressing effect on intelligence. But above this threshold, environmental variations cause relatively small differences. . . ." Three kinds of evidence are radically dissonant with these statements. First, even the audio-visual and the untutored human enrichments made statistically significant differences in the mean ages of attaining the top steps on our ordinal scales at the Tehran Orphanage (Hunt, Mohandessi, Ghodssi & Akiyama, 1976).

Second, studies correlating measures of development with indices of the prevalence of various kinds of experience that infants have, through interacting either with their parents or with inanimate materials in their homes, have shown the existence of both negatively correlated, development-hampering and positively correlated, development-fostering kinds of experiences (Wachs, 1976, 1978; Wachs, Uzgiris & Hunt, 1975). A study by
Yarrow et al. (1975), which was concerned with only the first six months, got some surprising findings. The correlations were as high or even slightly higher from experiences with inanimate materials as for human interaction experiences. The most clearly development-fostering type of experience was the prevalence of situational responses that were contingent on infant actions, and the frequency with which infants were involved in interaction with attentive adults.

Third, there are substantial differences in the standard deviations of the ages at which samples of toddlers being reared under differing sets of conditions achieve the top steps on our ordinal scales. The more nearly standardized are the sets of experiences provided for a group of infants, the smaller is the standard deviation of the ages at which they achieve the top steps. For instance, in Athens, at the Municipal Orphanage, where the infant-caregiver ratio was about 30 to 3, and where favored and neglected children were inevitable, the standard deviations in the ages of achieving the top steps on the scales of Object Permanence and Vocal Imitation were from three to four times as large as those at Metera Center, where the infant-caregiver ratio was 3 to 1 and the caregivers were both trained and supervised. Even more interesting, perhaps, is the finding that the standard deviation of the ages at which home-reared infants from working-class families in Athens achieved the top steps was even larger than that for the infants at the Municipal Orphanage. This suggested that the standard deviation of IQs in children from lower-class homes might be larger than that of children reared in middle-class homes. When we compared the standard deviations in Peabody Picture Vocabulary IQs for children in several year classes in Head Start with those for children in corresponding year classes at a low-cost Nursery School, the former were from 1.5 to 2 times larger than the latter, even though the means of the former were smaller than the latter. One of my collaborators is investigating this matter to determine how general the finding is. We believe that the size of the standard deviation in measures of achievement reflects largely the variation in the development-fostering quality of previous experience. Clearly, the early environment does not function in threshold fashion.

A third such fictitious corollary of hereditary predeterminism was a favorite of Arnold Gesell. As he put it, "The child always reacts as an integer" (1954, p. 329). In his sound cinema entitled Life Begins, he made this proposition even more explicit by saying that "Maturation proceeds apace along all systems simultaneously." Its fictitious nature is demonstrated by the fact that rates of development in sensorimotor systems or schemes vary independently. Moreover, their rates are a function of which intimate, proximal components of the environment are encountered most frequently by a child. Those that invite the use of certain schemes
encourage the development of the used schemes, and those that discourage their use hamper their development. For instance, when Burton White (1967) placed a stabile over the cribs of institutional infants that invited them to see and touch its parts, the effect was to reduce the median age of achieving top-level visually directed reaching and grasping from 150 days to 89 days. But advancing eye-hand coordination failed utterly to advance vocal imitation. None manifested the landmark of pseudo-vocal imitation even as late as 210 days of age. On the other hand, the subjects whom Dr. Uzgiris and I employed in the construction of our ordinal scales (Uzgiris & Hunt, 1975) had achieved pseudo-vocal imitation at ages ranging from 60 to 90 days, but they failed to achieve top-level reaching until they were about 150 days old. Our subjects had no stabiles over their cribs to encourage looking and touching. On the other hand, home-reared infants are generally engaged in vocal interaction, but those in institutions have fewer such opportunities.

For a second illustrative instance, the educational day-care provided at the Mt. Carmel Parent and Child Center enabled eight consecutive offspring of the poorly educated parents of poverty served by the Center to attain the top steps on three of the four ordinal scales, used to evaluate the educational component of the day care, at average ages 20 to 25 weeks younger than did a group of 12 home-reared offspring of predominantly middle-class parents in Worcester, Mass. This educational component focused on providing the Mt. Carmel infants with inanimate toys that held their interest, but made no special attempt to facilitate the acquisition of either vocal imitation or language. Since these Mt. Carmel infants were progeny of poorly educated parents of poverty, who interact vocally and verbally less frequently than do parents of middle-class (see Hunt, 1969, pp. 204-208), they were 20 weeks behind the Worcester infants on the average in attaining the top step on the scale of Vocal Imitation. We have a number of such findings (see Hunt, 1977).

This particular example also has special significance for my story. Because the Mt. Carmel infants were ahead of the progeny of middle-class parents in achieving the top steps on three of the four scales employed, we fully expected them to have IQs well above the Worcester infants. Not so. When my collaborator, Girvin Kirk, went to Mt. Carmel to examine these eight children (then in their fourth year) with the Stanford-Binet, he returned with the longest face I have ever seen. With one exception, their IQs ranged from the low 70s to the low 80s. The exception was a little girl whose parents were serving as paraprofessionals in the Center. Her father had taken delight in interacting with her, first vocally and then verbally. She alone was advanced in vocal imitation, and her IQ tested at 138.
Once our disappointment had waned enough to permit thought, this finding began to have theoretical meaning. The fact that poorly educated parents of poverty are less prone to interact vocally and verbally with their infants and young children (see also C. Deutsch, 1964; Hess & Shipman, 1965; John & Goldstein, 1964) helps to explain their deficit in vocal imitation. On the other hand, the inanimate toy in which they had expressed the most interest was a shape box into which an object disappeared, making a noise as it hit the bottom of the box. With only a few assisted trials, any infant who could sit up could master the act of lifting the lid of the box that enabled him or her to see the block and retrieve it. In consequence, they developed top-level object permanence at a mean age of 73 weeks, the earliest of any group we have tested.

There are yet others, but I have said enough about these predeterministic fictions.

DEVELOPMENT AS A FUNCTION OF DYNAMIC INTERACTION WITH SPECIFIC CIRCUMSTANCES

These illustrative instances of the specificity between kinds of experience and kinds of developmental advance (Hunt, 1977) indicate that while the term environment is generic in nature, it per se has no influence. Rather, it is the intimate, proximal situations within the generic environment that are important. These are important because they determine which schemes will be used, and with use advance developmentally, and which will be hampered in their development by lack of use. Thus, development is a dynamic function of interacting with the intimate, proximal situations encountered. This conception, I believe, is a useful theoretical step beyond the statistical interactionism of Richard Woltereck. Even though it is a complication, it is one needed for dealing with the epigenetic hierarchies of achievements that are characteristic of mammals, and especially of human beings for whom the symbolic processes are of the essence.

THE DYNAMICS OF THE RELATIONSHIP BETWEEN EXISTING ACHIEVEMENTS AND SITUATIONAL DEMANDS

In all organisms where psychological development goes through a hierarchy of transformations, the existing achievements of a young organism determine whether it can cope with the demands of any situation encountered. If the demands of the situation are beyond the cognitive appreciation of the young organism, the demands do not exist for the
young one. It is, as I have often said, like talking to a pig about Sunday. This is the idea that Jean Piaget (1947, 1977) encapsulated with his terms *equilibrium* and *equilibration*. I agree with Piaget that cognitive appreciation is an essential aspect of the matter, but mere cognition fails to suggest the emotional and motivational aspects of the interaction. If at least some degree of perceptual recognition and cognitive appreciation of the demands of a situation exist for the infant or child, a demand for analysis and/or action exists. If the analysis or action is beyond the child’s limits for accommodation or adaptive modification of her or his ready-made achievements in knowledge and skill, the situation will be a source of distress unless someone can help the child make the adaptive modifications in his or her existing knowledge or skills. If the situation encountered is thoroughly understood and demands no accommodation whatever, the child can readily respond, but such a situation holds little interest. It may even be boring. If the situation makes demands for which the child can make the necessary accommodations, it is interesting. Moreover, in coping with it, the child develops. The problem for caregivers, parents and teachers is to provide infants and young children with situations that make demands that match the ability of a child to cope. This is what I have been calling “the problem of the match.”

In our present state of ignorance about the hierarchy of achievements in early childhood, the behavioral signs of interest on the part of a child provides the best criterion I know of for having achieved an appropriate match. Yet, if the caregiver, parent or teacher can discern the nature of the child’s coping difficulty and help him or her to cope, this not only facilitates development, but endears helper and child to each other.

**PRESCHOOL DEFICIENCIES IN LANGUAGE SKILLS**

Deficiencies in preschool language skills, found so commonly in the offspring of poorly educated parents of poverty, provide the basis for a societal failure to solve the problem of the match for such children. Communication with language has always figured heavily in performance both in school and on tests of intelligence. Even so, a number of sociological students of language contended in the 1960s and early 1970s that children of poorly educated parents of poverty, and especially those who are Black, are without deficiencies in their cognitive and language skills or in their motivation for school learning. They made these claims on the basis of comparisons of the complexities and lawfulness of the syntactical structures in the corpora of utterances of Black children with those in standard English. They maintained that the difficulties such children
have in school derive from having learned at home a dialect that, although adequate for communication, differs from standard English. Thus, in learning to read, such children must cope not only with learning to read, but with learning to do it in a strange dialect (Baratz & Baratz, 1970; Goodman, 1969; Labov, 1970; Shuy, 1969; Steward, 1969).

Basil Bernstein (1959, 1970), an English investigator of language and social class, took the opposite view. He contended that children of poorly educated families of the lower class had in their home experiences attained only a "limited linguistic code." Bernstein's methods had focused on semantics rather than on syntax which had become the focus of language investigation following the Chomsky (1957, 1959) revolution.

To investigate the validity of these two interpretations, Girvin Kirk and I (Kirk & Hunt, 1975), with our collaborators, did a series of studies of children from three year-classes in Head Start and a Nursery School for children from middle-class homes. We compared the semantic mastery of some elementary abstractions: colors, positions, shapes, and numbers. Both categories of children were in their fifth year. On tasks involving only perceptual matching, children of Head Start did approximately as well as those of Nursery School, but on tasks involving semantic mastery, the percentages of children of Head Start showing understanding of the names of the colors, positions, shapes and numbers were less than a third of those of the children of Nursery School: for colors—Head Start, 25%, Nursery School, 90% (Kirk, Hunt & Lieberman, 1975); for positions—Head Start, 19%, Nursery School, 68% (Hunt, Kirk & Volkmar, 1975); for shapes—Head Start, 24%, Nursery School, 71% (Hunt, Kirk & Lieberman, 1975); and for numbers—Head Start, 15%, and Nursery School, 50% (Kirk, Hunt & Volkmar, 1975).

The percentages of children performing correctly on encoding or naming tasks differed between Head Start and Nursery School in approximately the same degree. Naming colors, positions, shapes, and numbers demands recall of the terms, but understanding these terms demands only recognition. As might be expected, the percentages of children from Nursery School who correctly named all six abstractions three times were somewhat smaller than the percentages recognizing the names correctly: for colors, by 10%; for positions, by 14%; for shapes, 15%. For the children of Head Start, these differences were less, a finding that may reflect the fact that poorly educated parents of poverty used these terms in verbal interaction with their children less frequently than did the better educated parents of middle-class (see references already cited).

The contention of the sociological students of language, that Black children have unstandard vocabularies, prompted a study of child-to-child communication in which Black children of Head Start were paired with each other, and White children were paired with White. The paired
children were seated at the opposite ends of a table with an opaque screen between them. Each member of each pair had a set of the materials. The examiner asked one (i.e., the child then in the speaker role), to “Tell X (the child in the listener role) to give you one like this block.” Whereas 56% of the Nursery School dyads communicated all six colors correctly on the first trial, only 5% of Head Starters did. For positions, these percentages were 33% for Nursery School and 0% for Head Start; for numbers, they were 70% for Nursery School and 0% for Head Start. Instead of naming the elementary abstraction demanded by the examiner’s instruction, for example, the color of the particular block, a majority of Head Starters simply said, “Gimme this block,” while pointing to the one indicated by the examiner (Kirk, Hunt & Volkmar, 1979).

Submitting the children of Head Start to this situation demanding communication actually reduced the number of colors they named correctly below that when they were merely asked, “What color is this block?” In these studies of semantic mastery, the Black children showed no special dialectical terms for these elementary abstractions—with one exception: the brown block was called “black” by significantly more of the Black children than of the White.

**RACE DIFFERENCES ARE OF SOCIAL CLASS ORIGIN**

Race differences are of special interest in these studies for their absence within the children of Head Start—with the one trivial exception. The presence of Black people among the poorly educated people of poverty reflects the fact that they were brought to America against their will, that they spent 300 years in slavery during which survival depended on absence of initiative, and that they spent 100 years during which the laws of the dominant White race relegated them to largely unskilled employment, to inferior schools, and to poverty or near poverty. This history inevitably left most Black people poorly equipped to utilize the new educational and occupational opportunities that opened following the Supreme Court rulings of 1954, that called segregated schooling unconstitutional, and the Congressional Act of 1957 to protect the voting rights of Black people. Thus, for less than 30 years, only slightly more than a single generation, have the Black people of the United States had even legal access to the ladder of economic, educational, and social status. I join those who contend that the differences that do exist on the average between the academic competencies of Black and White children are a special case of social-class or cultural origin.

Nevertheless, the sociologists of language are wrong. The deficits in language competence of the children of poorly educated parents of
poverty are real. They involve both cognitive skills and language or communication skills. Moreover, their existence means that school programs typically fail to solve the problem of the match for these children of poorly educated families of poverty. Without well-developed motivation for school learning, they are faced with demands with which they cannot cope in classes too large to allow teachers time for providing the extra help they need. Since their rearing conditions have typically built into them what Julian Rotter (1966) has termed "generalized expectancies of external locus of control," they lack the self-direction and self-winding motivation for a desperate struggle to cope. Inevitably, instead, they come to hate school and to see school success of those better prepared as a gift that they have merely failed to receive.

**EVIDENCES OF ADEQUATE GENOTYPIC POTENTIAL**

Yet this analysis does not mean that these deficiencies, however real, are of hereditary origin. The evidence dissonant with the fictional corollaries of predeterminism is helpful in disposing of such a view. Even more direct and crucial, however, is that coming from adoption and intervention studies. In his study of the children of the Crèche in Lebanon, Wayne Dennis (1973) found that those foundlings who remained in the orphanage to adolescence had IQs averaging only 50, while those who were adopted attained IQs inversely related in size to their age of adoption. Those adopted during their first year attained IQs that approximated the average for the social class of their adoptive parents.

Schiff and her collaborators (1978) have studied the evidence from all of the abandoned French children of parents without higher education or professional status for whom adequate records existed. Those who were adopted into families of high socio-professional status attained IQs averaging 108.7, but their older siblings being reared by their biological parents attained IQs averaging only 94.9, a difference which approximates the aggregate difference between middle-class and working-class (McNemar, 1942, p. 38). The rate of school failure for the adoptees was only 23%, but that expected from the social status of their biological parents was 69%. Both of these studies indicate that the higher development-fostering quality of the experience received in homes of the better educated professional class can prevent the downward drift in competence reported by various investigators for children raised in the homes of the poorly educated lower class (see Heber, Dever & Conry, 1968).

Other studies have shown the same to be true for race differences. Scarr and Weinberg (1978) found that the IQs attained by Black and
mixed-race children adopted by educated White parents of the middle-class averaged 106, whereas the mean IQ for Black children of the North Central region was only 90. Moreover, the IQs of those adopted during their first year averaged 111, and those adopted later averaged only 97.5. This effect of early adoption is probably due to the need to establish the language acquisition skills before children seem too mature for the vocal games through which these skills are acquired. Without provision of special compensatory experiences, adoption in the first half year appears to effect an increase of 10 points in IQ scores, which approximates two-thirds of the standard deviation of IQ scores in the total population.

The Milwaukee study of Rick Heber (1978) and his collaborators is perhaps even more dramatic. Forty progeny of Black mothers with IQs of 75 or somewhat below were divided into control and treatment groups. The infants in the treated group received home visits beginning when they were three months old, and later, they attended day care from 9 to 4 o'clock daily, five days a week, until they entered public school. Each infant had its own caregiver tutor. The curriculum of the one-on-one tutoring focused on the perceptual-motor, cognitive-language, and social-emotional domains. By age two years, those tutored had attained a mean IQ of 120, the controls one of only 94. By 66 months, the average IQs were 124 for the tutored infants, and only 90 for the controls who were showing the commonly observed drift downward in IQ. The Illinois Test of Psycholinguistic Abilities revealed differences of the same order.

From such evidence, it is clear that the range of reaction in the phenotypic abilities measured by tests of intelligence and language skill is sufficiently large on the average to account for the observed differences between both social classes and races. The evidence is clear that these differences should not be attributed to unmodifiable heredity. They result from inequalities of opportunity to acquire the abilities and skills required to cope with the demands of the schools. They are social problems that require a eugenetic approach for solution, not biological problems to be solved by eugenics. Our traditional value of equality of opportunity is clearly applicable to the preschool years of children.

**HOW ARE WE TO SOLVE THIS SOCIAL PROBLEM?**

Although knowing the nature of the cause of a social problem is the first step toward solving a social problem, it does not solve it. Knowing that the value of equality of opportunity is relevant may have some motivational significance for some people, but it does not solve the problem. When I wrote *Intelligence and Experience*, I said that "with a sound
scientific educational psychology [for infancy and early childhood], it might become feasible to raise the average level of intelligence . . . by . . . something of the order of 30 points of IQ” (Hunt, 1961, p. 267). I still believe that a “sound scientific educational psychology” for infancy and early childhood is crucial for a solution of this social problem. Project Head Start was launched without it. It failed to achieve the unrealistic hopes for it, but we learned something from it and from the investigative attempts at compensatory education. First, we learned that the younger the children involved, the greater the effects attained. Second, we learned that it is difficult, if not impossible, to make up in a year or two of compensatory education, beginning at an age of four years, for the damage that is often done in the first four years. I say this even though delayed, sleeper effects of participating in Head Start and compensatory education have been found and reported by Lazar and Darlington (1978) and have also been found to be cost effective by David Weikart and his collaborators (Weber, Foster & Weikart, 1978). From what I know today, I believe that the focus should be preventive, that the effort should start at birth for the children, and that it should be carried out by the parents with the help of tutelage such as we employed with our caregivers at the Queen Farah Pahlavi Charity Society in Tehran and is being employed by Earladeen Badger (1971a), Phyllis Levenstein (1976) and others.

STARTING AT BIRTH AND TEACHING NEW MOTHERS

Starting at birth calls for melding the goals of caregiving and education. Findings derived from studies relating rearing conditions to infant development and infant traits can help to effect this meld. Infants arrive at birth capable of feeling discomfort and with a ready response to distress, namely crying. The more promptly caregivers respond to the behavioral signs of distress, the less infants cry (Bell & Ainsworth, 1972; Mowrer, 1938), and the more likely infants are to develop secure attachments to their mothers or caregivers (Ainsworth, Bell & Stayton, 1971, 1972). Positive and secure attachments to caregivers decrease the likelihood that infants will develop into children who manifest emotional problems upon entering kindergarten (Sroufe, 1983). Conversely, when caregivers delay in responding to infant distress, infants cry louder and louder. If such delays are repeated, infants learn to cry loud at the first signs of distress and to develop into loud-voiced, demanding children with anxious or defensive attachments to the mothers or caregivers (Ainsworth, Bell & Stayton, 1972).
Such early patterns of attachment are also prone to persist and to be manifested in kindergarten as emotional problems and as various unattractive behavioral traits (Sroufe, 1983). If the delays in caregiver response to infant distress are further prolonged, the child ceases to cry, or is said “to cry it out.” If this occurs repeatedly, as in the case of infants in understaffed orphanages, infants appear to give up crying, to wear glum expressions with no sign of interest in surrounding events and with no initiative. The situations of such orphanage-reared infants remind one of the dogs in Martin Seligman’s (1975) shuttle box that received shock and buzzer treatment uncontingent with efforts to escape, and in the process, learned “helplessness.” The absence of interest and initiative in the glum lumps that many orphanage-reared infants become appears to be a human form of “learned helplessness” (see picture of such children below). In cases where the food and care that infants receive is uncontingent with their strivings, as is the case in many underclass homes, infants fail to learn that their efforts can bring relief from hunger, discomfort, boredom, etc., and acquire instead what Julian Rotter (1966) has termed an “external locus of control.”

Research based on correlating the prevalence of various rearing conditions with measures of development has demonstrated the existence of both development-hampering and development-facilitating conditions. For instance, the prevalence of irrelevant noise, or noise uncontingent with infant acts, is negatively correlated with level of development in several branches throughout the first two years (Wachs, Uzgiris & Hunt, 1971). Conversely, the prevalence of contingent responsiveness by both human caregivers and inanimate materials shows positive correlations with amount of development (Wachs, 1976, 1978; Wachs, Uzgiris & Hunt, 1971; Yarrow, Rubenstein & Pedersen, 1975). Yarrow and his collaborators report the interesting finding that paper is perhaps the most responsive of inanimate materials. As it is manipulated, it makes an audible noise and also changes visual shape. Some of you may have observed that young children are often more interested in the paper wrappings than in the present that came in them. Such materials are of importance early.

Contingency of caregiver responses to such distress-free actions as facial expressions and vocal cooing is highly important for development of trust, initiative and confidence. This I discovered unexpectedly at the Tehran Orphanage. I would like to summarize the findings from the fifth sample or wave of foundlings in that study both to illustrate this principle and to illustrate what might be taught to women becoming mothers for the first time as a step toward solving the problem of failure in school.
A MODEL FOR LANGUAGE ACQUISITION AND PERSONALITY DEVELOPMENT

This ten-year program of research at the Orphanage of the Queen Farah Pahlavi Charity Society in Tehran began as a test of propositions from my theorizing about intrinsic motivation. The subjects were foundlings without detectable pathology who were taken from the Municipal Orphanage of Tehran when they were believed to be no more than a month old. The first, control wave of 15 foundlings was reared according to the customary practices of the orphanage where the infant-caregiver ratio was about 30 to 3. The only intervention consisted of repeated examining with our ordinal scales every other week during the infant’s first year and every fourth week thereafter. The second wave of 10 foundlings received what was intended to be audio-visual enrichment contingent with infant acts, but it was abortive because the person then resident director failed to keep the apparatus running. The second wave received what we called “untutored human enrichment” where the infant caregiver ratio was reduced to 10 to 3 and the caregivers were to do whatever came naturally. The fourth wave of 20 foundlings received the audio-visual enrichment originally planned for the second one, and the fifth wave of 11 foundlings received what we called “tutored human enrichment” (see Hunt, Mohandessi, Ghodssi & Akiyama, 1976).

By the time we were ready for a fifth wave, we had learned that the controls and those receiving the abortive attempt at audio-visual enrichment were without either receptive (understanding) language or expressive language at more than three years of age. Noam Chomsky (1959) had argued that because children all over the world acquire the main rudiments of their first language between the ages of 12 and 30 months, and because Skinner’s (1957) attempt to explain syntax in terms of reinforcement failed, he contended that experience is of little or no importance in language acquisition. Our empirical finding was at such great variance with this contention of Chomsky that we changed the focus of our effort, with the fifth wave, to the study of language acquisition.

From what I had learned from the literature on language acquisition while teaching social psychology at Brown University, and from the failure of merely providing infants with toys of interest to them to facilitate language acquisition at the Parent and Child Center of Mt. Carmel, Illinois, I formulated a hypothetical scenario for the three components of language. According to this scenario, phonology depends most on imitative motivation and skill, and semantics on a combination of imitation of sound patterns and their association with perceived objects, places, and persons. From the writings of Roger Brown (1973) and others, I gleaned that syntax begins as a creative act in which an infant employs
his or her existing phonemic and semantic achievements in an effort to communicate. Then, through a combination of imitating parental elaborations of telegraphic infantile utterances and accepting deliberate parental corrections, a child gradually masters the complex grammatical structures of the parental language.

The task of translating this hypothetical scenario into effective tutelage for the caregivers of our fifth wave of foundlings brought to mind the fact that vocal imitation has its own epigenesis clearly reflected in our ordinal scale for this branch. It also brought to mind the fact, repeatedly observed, that the easiest way to start games of vocal interaction with very young infants is to imitate their distress-free cooings. Trevarthen (1974) has also described “conversations with a two-month old” and used video-tapes to demonstrate that once an infant has repeatedly experienced a cooing pattern being imitated, the infant comes to hesitate after its own utterance as if waiting for the mother to respond in kind. I suspect this occurs because the neural representation of the sequences that mediate immediate memory run off faster than the events. Thus, they give rise to an expectation of the imitator’s response. Once the expectation is established, the imitator’s response may become a goal to be waited for.

Such distress-free actions as vocal cooing or facial expressions constitute what Fred Skinner (1938) has termed operants. Imitating them will establish the earliest form of intentional behavior, well ahead of the age of about 5 months at which Piaget (1936) first detected the beginnings of intentionality in his children.

We therefore started the tutelage of the caregivers of our 11 foundlings in wave five by instructing them to imitate the cooings of the two or three infants in their charge as soon as they became charges. They were also instructed to play these games often and to observe the vocal achievements of each child so as to be prepared to utilize their achievements as the signals for modifications in the treatments. What I envisaged was a combination of experimental and longitudinal methods in which modifications of the treatment were to be tied directly to observed achievements in order to solve the problem of the match.

In this hierarchical sequence, the simple, imitative vocal games were continued until a foundling had achieved at least three different spontaneous, distress-free, vocal patterns. At this point, the caregiver was to introduce vocal games of “follow the leader,” in which she was to use pseudo-vocal-imitation to get a vocal game going by repeatedly modeling one of these familiar patterns until her foundling responded in kind. Caregiver and charge were then to utter it back and forth for a time. Then the caregiver was to take the lead in changing to another familiar pattern by uttering it and repeating it until the foundling followed her lead. After playing this second vocal pattern back and forth for a time,
the caregiver was to shift to the third, and then, if a fourth existed, to it and so on. Once these "follow-the-leader" games had been established, the caregiver was gradually to reduce the number of interactions with each pattern between shifts until the child could follow directly from the caregiver modeling one familiar pattern to another familiar pattern.

This achievement signaled the caregiver to introduce as models short, unfamiliar vocal patterns and to repeat them until the infant could produce a good copy. Unfamiliar patterns were to be alternated with familiar ones at first, but the proportion of unfamiliar patterns was to be increased until the child could imitate unfamiliar models of from one to three syllables directly, without going through a series of gradually improving approximations of the models.

Once a foundling could match his or her utterances to strange models directly, the experiences designed to facilitate semantics were introduced. Our paradigm was based on ear-washing. The caregivers were instructed to say, in their native Farsi, of course, “Now I am going to wash your ear,” and as her vocal emphasis came to the word, ear, her washcloth was to make contact with her foundling’s anatomic ear. This procedure was employed with parts of the body, with pieces of clothing worn, and with objects used in caregiving. Here the tutelage of the caregivers ended.

When I arrived for what proved to be my final planning visit in November of 1974, I observed caregivers employing this same procedure with the colors of rings for the stacking toys. It is now easy to see that I might well have continued the instructions to include asking such questions for receptive semantics as “Where is your mouth? . . . nose? . . . knee? . . . stocking? . . . etc.” I might also have included such questions for expressive language as, “What do you call this?” while touching the parts of the body, pieces of clothing, and objects used in caregiving. I might also have instructed the caregivers to ask questions about the choices of their charges, and to ask “Why?” questions.

Even without these additional instructions, at 18 to 22 months these 11 foundlings could all name more than 50 parts of their bodies, pieces of clothing, and objects involved in caregiving. They were also observed to use language with each other, but not with the caregivers because the caregivers found it unnatural to converse with the infants.

Not only did these foundlings demonstrate this degree of semantic mastery, but the average age at which they attained the top steps on the seven ordinal scales was 87.7 weeks, whereas the corresponding mean age for the controls was 145.6 weeks. Thus, the tutored human enrichment advanced the mean age for these attainments by 57.9 weeks, a gain of 40%. If transformed into an IQ-ratio for these 7 Piagetian achievements, this gain constitutes an average gain of 49.9 points. This transformation used as the standard or norm, the mean average ages at which home-
reared children from working-class families of Athens (Paraskevopoulos & Hunt, 1971), and children from predominantly middle-class families of Worcester, Mass. (Hunt, Mohandessi, Ghodssi & Akiyama, 1976) attained the top steps on the seven ordinal scales. Since Humphreys and Parsons (1979) have found that measures of intelligence based upon averaging successes on Piagetian tasks correlate +.87 with measures from standard IQ tests, this may well be a relatively accurate estimate of the average IQ difference between the controls and the 11 foundlings of wave five.

Another comparison may also be helpful. These 11 foundlings achieved the top steps on 5 of the 7 ordinal scales at average ages younger than those at which these top steps were attained by 12 home-reared progeny of predominantly middle-class parents of Worcester, Massachusetts. The mean of the average ages of attaining the top steps on the 7 scales was 92.9 weeks for the home-reared children from Worcester. Thus, the foundlings who received the tutored human enrichment were ahead by 5.4 weeks, or by 5.8%. This gain lends credibility to our estimate that the mean IQ of these foundlings was of the order of 125. Had we employed Phyllis Levenstein's methods of teaching mothers from the poverty sector to use toys to facilitate communication, I am confident that the attainments of these foundlings could have been increased even further.

From such evidence, it seems clear that combining language-fostering experiences with such caregiving practices as prompt responding to the behavioral signs of distress can increase the kind of competence that we assess with tests of intelligence substantially more than the most effective of compensatory educational programs begun at age four or even at three.

**EFFECTS OF LANGUAGE FOSTERING EXPERIENCES ON SOCIAL ATTRACTIVENESS AND PERSONALITY**

There was, however, another kind of effect from our longitudinal experimental intervention that I did not then know enough about, from the work of Ainsworth and her collaborators, to expect. I believe it is every bit as important as the gains in language skill, if not more so. Especially interesting is the fact that it came from these experiences designed to facilitate language acquisition.

This other kind of effect concerns personality and social attractiveness. From about the end of their first year till they were transferred to another orphanage at a little over three years of age, the controls were "glum lumps" without behavioral signs of interest, without trust, without initiative. A sample of four of them is pictured in Figure 1.

These are snapshots originally taken to help me remember the individual children, not to be evidence. Others have been so impressed with
Fig. 1. Four of the control foundlings at about 21 months of age who were reared according to the customary practices of the orphanage.
Fig. 2. Four of the foundlings at about 21 months of age who received the "tutored human enrichment".
them that I have decided that they do constitute evidence. Note the glum expressions. Note the absence of evidence of engagement with anyone or thing shown. By its absence, this is evidence of a lack of initiative. Perhaps I should say here that after showing an audience at the Educational Testing Service pictures of two children from each category, they agreed unanimously in placing each but one of the other seventeen in the proper category. That one wore an expression of interest while in my arms because I was modeling sounds I had heard him make.

Now, for contrast, see in Figure 2 snapshots of four of those who received the “tutored human enrichment.”

On the left in the top row is Cambiz, the oldest of the eleven. Note the enthusiasm with which he attacks the ball hung on a string from a ring in the ceiling. During my final planning visit, after an inordinate delay, I was finally taken to the playroom where these children with their caregivers were arranged in a semicircle inside the entrance. I had never heard one of these orphanage-reared infants do anything but cry and yell. Usually they were quietly resigned, but would withdraw and cry if I approached. As I entered the playroom, these 11 uttered “Ahlow,” in unison. Then I learned that the delay had resulted from an attempt to teach them to say, “Hello, Dr. Hunt.” It was too much, so they settled for “Hello,” actually pronounced “Ah-low.” Immediately following this greeting, Cambiz came forward with his arms up saying something I did not understand. But I did understand the gesture, and I picked him up. Such evidence of trust I had never seen before in one of these orphanage-reared infants. When the chief examiner, Miss Sakhai, wanted to show me the new examining room, Cambiz did not want to be put down, so I carried him along. As we entered through the door, he saw an irrigation sprayer outside, and began shouting: “Ab, ab, ab,” the Farsi word for water.

On the reader's right in the upper row is Shabnam, the youngest, here about 17.5 months old. She, too, wished to be picked up. Once up, the examiner proceeded to show me that she could imitate well the names of all the other children in the group. When the examiner, proceeding alphabetically, got to “Yass,” Shabnam’s manner and posture changed abruptly as she reached and looked toward the door behind us and said clearly, “Yass rafteh.” This means “Yass gone.” Yass had been adopted the week before I arrived. She was Shabnam’s closest friend. With this two-word utterance, Shabnam put into language symbols a situation of which she had poignant cognitive appreciation. This utterance was, I believe, a creative act in which this orphanage-reared foundling put together the phonemic and semantic attainments that she had acquired from the tutored human enrichment to make a comment—one especially significant to her.
The other children pictured are Samira, who appears to be playing a stepping game of her own device, and Monee, who is clearly seeking the attention of one of the caregivers.

All of these children of wave five were generally engaged in activities of their own choosing. This is evidence of initiative along with their trust. These characteristics along with facial expressions of interest and joy comprised their charm. They contrast sharply with the apathy and glum expressions of the controls. The charm of those who received the "tutored human enrichment" resulted in seven of the eleven being adopted. Of the preceding 55 foundlings in these studies, only two were ever adopted, and these two before they were six months old because they were pretty infants.

Trust was shown in all of those receiving the tutored human enrichment by the fact that within a visit or two, every one of the 10 remaining voluntarily sought my attention. They wanted to be picked up or to show me something. If I was already engaged with a child, the others would wait patiently. In fact, on a few occasions, several of the children came forward and formed a kind of queue as if they recognized the turns of those ahead. No one had made any effort to teach such behavior. It appeared to come from a combination of recognition of the rights of others and a sense of security that their turns would come. This is prosocial behavior of great value. That it appears to result from a background of experiences designed to facilitate language acquisition continues to impress me whenever I consider the fact.

I am sorry that I cannot report a repetition of this longitudinal experiment with the extensions I have mentioned. Queen Farah Pahlavi had agreed to support a continuation of this work indefinitely as soon as I could find an Iranian with proper interests and training to carry it on as an Iranian investigation with me as advisor. The revolution of the Ayatollah Khomeini has destroyed that possibility along with many others that I considered highly promising for Iran.

Be that as it may, the robustness of both the cognitive-linguistic and the personality effects and the absence of individual exceptions lead me to a fair degree of confidence that they are not only reproducible, but that the findings can be used as a guide for the training of first-time mothers for more effective parenting. They still do not constitute that scientifically validated educational psychology for human infancy, but I believe they deserve a tryout in a pilot-program with poorly educated mothers from the poverty sector. I would not want to start with a very large program for I have become convinced that we shall solve our problems faster by starting small and through successive approximations, gradually growing to the size required to solve a problem.
One more consideration. Despite the motivation that may come from the relevance of our traditional value of "equality of opportunity," such a program must prove to be clearly cost effective in the long run if it is to survive. Since the experiences provided in the "tutored human enrichment" served to foster prosocial behavior as well as competence in the symbolic processes, applications may well serve to help prevent antisocial behavior as well as to promote competence and mental health. Since it costs on the order of $30,000 to $40,000 a year to imprison a criminal offender (Anderson, Branagan & Constable, 1982), any program showing evidence of preventing the development of such offenders, as well as preventing school failure, may become highly cost effective. Unfortunately, plasticity cuts both ways. The traits of two-year-olds can be reversed. Fortunately, however, there is also considerable inertia in the abilities and traits concerned. Who can doubt that the socialized charmers who received the tutored human enrichment will have a far better chance to become ethical, productive citizens than those glum examples of "learned helplessness."

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