1 Applying the developmental perspective to individuals with Down syndrome

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The application of the developmental perspective to atypical populations is characterized by two historical trends. First, the developmental perspective has itself evolved, expanding from its original focus on cognitive and linguistic development to the recent focus on the whole child (Zigler & Hodapp, in press) and the environment in which that child develops (Bronfenbrenner, 1979; Sameroff, 1975). Second, workers have gradually applied the developmental perspective to a wider array of clinical populations (Cicchetti, 1984a). The result is that neither theory nor application has remained static: an expanding theory has increasingly been applied to more varied populations.

In this brief historical review, we attempt to chart trends both in developmental theory and in its application to retarded individuals. After describing the shift from "classical" to "expanded" developmental perspectives, we attempt to show the progression in the application of developmental theory, first to retarded persons not demonstrating organic symptomology (the so-called familial or cultural–familial retarded), later to individuals with Down syndrome and other organic etiologies. Throughout these discussions, we emphasize the strengths and weaknesses of the developmental approach to an understanding of Down syndrome and other retarded individuals.

Classical and expanded developmental perspectives

Classical developmental theory

Any list of developmental theorists must begin with Jean Piaget and Heinz Werner. Even though Piaget is currently undergoing a series of criticisms (e.g., Fischer, 1980; Flavell, 1982), while Werner has experienced a rediscovery by the field (e.g., Wapner & Kaplan, 1983; White, 1984), both are undeniably the developmental

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theorists *par excellence*. A brief overview of the basic principles of both men is therefore in order, if only to delimit the proper domain of "developmental psychology" when we later discuss its expanded version.

According to Piaget and Werner, development involves two processes: differentiation and hierarchic integration. Differentiation is the process by which an organism evolves various parts that are functionally or structurally distinct. As opposed to the undifferentiated mass of cells present in the first few days after conception, for example, the human neonate is characterized by many different organs, each with its own structure and function. The second, and complementary, process is hierarchic integration, or the organization of these separate parts within the structure of the overall organism. In our embryological metaphor, each organ comes increasingly under the control of the brain. Thus, while differentiation leads to the emergence of parts that are distinct and separate, hierarchic integration ensures the organization of such disparate parts in the (now more complex) organism.

Examples of differentiation and hierarchic integration are ubiquitous as the child matures. In early language development, infants first communicate their needs via "holophrases" in which one word, or a word plus a gesture, connotes the child's entire meaning (Greenfield & Smith, 1976). Over time, children develop in their communicative abilities, as an increasing vocabulary of individual words (differentiation) becomes organized into sentences (hierarchic integration) (Brown, 1973; Werner & Kaplan, 1963). Through the use of sentences, children are able to speak of objects and events not in the "here and now," greatly expanding their communicative capabilities. In cognitive development, too, we see instances of differentiation and hierarchic integration. Piaget (1952) has delineated the ways in which neonatal reflexes eventually become the differentiated sensorimotor skills characteristic of later infancy; such skills are then used by the child in combination in order to operate on the external world. Other examples could also be mentioned; the point is simply that increasing differentiation and hierarchic integration can be seen in various domains as the child matures.

Three additional ideas are central to both Piagetian and Wernerian (i.e., classical) views of development. First, classical developmental theory postulates an active organism. According to this view, "the organism is inherently and spontaneously active; the organism is the source of acts, rather than being activated by external or peripheral forces" (Overton & Reese, 1973, 70). This view contrasts sharply with behaviorist and other mechanistic views, which conceptualize the child as the passive recipient of, or respondent to, external stimuli. As summarized by Overton and Reese (1973). "In its ideal form the reactive organism model characterizes the organism as inherently at rest, and active only as a result of external forces" (p. 69). Such views are incompatible with developmental theories, in either their classical or expanded versions.

Second, development is thought to be characterized by regular and invariant sequences, all leading toward a clear endpoint. Zigler (1963) speaks of "the orderliness, sequentiality, and apparent lawfulness of the transition taking place from [birth] to the attainment of maturity" (p. 344), and it is this regular acquisition of progres-

sively more adaptive skills that allows developmental theorists to guide practitioners and researchers. Thus, in Piagetian theory, the child traverses a series of stages in invariant order, beginning with sensorimotor modes of thinking, ending with the acquisition of formal operational thought. In Werner and Kaplan's (1963) analysis of symbol formation, the sequence of development is less well-articulated, but a clear endpoint (the "contemplation of objects") is still present. In short, although different developmental theorists speak of different sequences and endpoints (depending on the domain of interest), each postulates the orderly acquisition of progressively more difficult skills, leading to an endpoint considered to be most adaptive.

Third, development consists of change in internal mental structures, not in behaviors alone. Indeed, behavioral change is thought to reflect changes in underlying mental structures. Thus, the language-using child is thought to be demonstrating an understanding of semantic and grammatical rules when uttering complex sentences. Similarly, the infant who uncovers a ball in an object permanence test, laughs when the mother hides herself in peek-a-boo, or cries when mother leaves the room in Ainsworth's "strange situation" is in each instance considered to be demonstrating an understanding of "object permanence"; that is, the child realizes that objects continue to exist even though out of sight. Again, such a view contrasts sharply with the behaviorist emphasis on the performance of behavior in the absence, or at least without specification, of the nature of the child's internal mental structures. In developmental theory, behavior reflects underlying mental structures.

These three major tenets – active organism, invariant acquisition of progressively more adaptive skills, and changes in internal mental structures – could be considered the strengths of classical developmental theory. These are features that characterize all developmental theories, both "classical" and "expanded" versions. However, classical developmental theory is also characterized by several omissions. We now turn to these inadequately specified areas and to their elaborations in expanded developmental theory.

Expanded developmental theory

The two major contributions of expanded developmental theory involve its emphasis on the "whole child" and its elaboration of both the temporal and ecological aspects of the child's environment. These two contributions help to round out classical developmental theory, but they do not replace it. As we hope to demonstrate below, the issues of development in noncognitive areas and the nature of the environment were at times addressed by Piaget and Werner. The contribution of recent developmentalists has primarily consisted of more comprehensive treatments of both topics.

The first contribution of expanded developmental theory involves the examination of development in areas other than cognition or language. Classical developmental theory, although amply detailing achievements in the cognitive and linguistic domains, has generally neglected the areas of social, emotional, motivational,

and personality development. For Piaget, this lack of attention to noncognitive areas is partly due to his overriding interest in cognitive development (Kessen, 1971; Youniss, 1978; although see Cicchetti & Hesse, 1983; Piaget, 1981), partly to his interest in epistemology ("he is a student of the development of thinking more than he is a student of children"; Kessen, 1962, 77). Werner also wrote little on the areas of social, motivational and personality development, although Werner and Kaplan (1963) did briefly address the issues of psychopathology and dream states from a developmental perspective. The result of the omission of non-cognitive domains in developmental theory is a psychology which does not look at the individual "whole child" (Zigler, 1971) in all of his or her many aspects. In particular, developmentalists have only recently explored the development of self-image, mastery motivation, learned helplessness, and wariness. We address this issue further when discussing the application of developmental theory to retarded individuals, but we should mention here that these areas of the child's development must be included in any expanded version of the developmental perspective.

The second issue involves the nature and effects of the environment. Piaget always considered himself an "interactionist" and Werner spoke of the organism's *Umwelt* (i.e., the environment in the organism's terms), but neither adequately specified what the environment consists of or how it affects development. In fact, it is surprising that two theorists so interested in the development of an active child would view the environment as static. For example, Piaget (1977) spoke of the environment as "aliment" to the developing child, and continually emphasized the child's, rather than the environment's, role in promoting development (c.f., Hodapp & Goldfield, 1985). Werner (1948) also conceptualized the *Umwelt* as changing only in response to changes in the developing organism. Thus, although each theorist realized the importance of the environment, neither elaborated on its nature or role in development.

This need for a "developmental perspective" on the environment has in recent years been partially met by Sameroff's (1975) "transactional model of development". In the transactional model, the environment itself is conceptualized as changing due to its interactions ("transactions") with the developing child. The changing environment in turn serves as an important factor affecting the child's developmental change. According to Sameroff "if developmental processes are to be understood it will not be through continuous assessment of the child alone, but through continuous assessment of the transactions between the child and his environment to determine how these transactions facilitate or hinder adaptive integration as both the child and his surroundings change and evolve (p. 283)."

Although many examples could be given to demonstrate research employing the transactional model, a study by Clarke-Stewart (1978) clearly demonstrates the dynamic nature of the child's environment. Examining the relationships among the behaviors of mothers, fathers, and children in the period from 15 to 30 months, Clarke-Stewart found that the amount of maternal stimulation and play with the baby at 15 months was closely related to the child's intellectual performance at 18 months. For fathers the opposite was true, as children's intellectual performance at

15 months correlated with paternal talk and play at 30 months. Furthermore, the amount the father talked and played with the child at one age was associated with mother's talking and playing at later ages. As summarized by Clarke-Stewart, these findings suggest that "the most plausible causal direction . . . is mother influencing child, child influencing father, and father influencing mother" (p. 476). This type of research, examining the changing nature and effects of the environment over time, is clearly consonant with the transactional model, a view of the environment that complements the developmentalist's traditional view of an active and developing child. The areas of input language (e.g., Furrow, Nelson, & Benedict, 1979) and of mother–infant interaction (see Hodapp & Mueller, 1982, for a review) have particularly benefited from research employing the transactional model.

In another elaboration of the nature of the environment, psychologists are now beginning to investigate the entire ecological context in which children develop. Family, school, friends and neighborhood are all considered open to study. Most research on the ecology of childhood is just beginning, however, and the amount of research into such phenomena as the role of the father in the child's development (c.f., Lamb, 1981; Parke, 1979), the newborn's effect on siblings (Dunn & Kendrick, 1981), or the effects of the birth of a baby on family functioning (Lamb, 1978) remains limited. Even the current "family focus" in developmental research (Bronfenbrenner, 1979; Crnic, Chapter 12, this volume; Crnic, Friedrich, & Greenberg, 1983; Kaye & Furstenberg, 1985) dates only to the late 1970s. But given the developmentalist's interest in the organism's *Umwelt* and in the transactional model, such ecological research is rapidly becoming common in developmental psychology.

The resultant, expanded developmental perspective is one that retains the classic view of the child's development while further elucidating unexamined and underemphasized areas. This expanded developmental theory is characterized by a focus on the "whole child" and on the effects of a changing and multifaceted environment, previously neglected areas that add to and strengthen developmental work. It is this expanded, filled-in version of the developmental perspective which is currently being applied to the Down syndrome population.

Applying the developmental perspective to retarded individuals

The two-group approach to mental retardation

Before examining the application of the developmental perspective to Down syndrome individuals, we should discuss the two-group approach to mental retardation. From the beginning of this century, mental retardation has typically been separated into two diagnostic categories: retardation with a known organic etiology, and cases of unknown or uncertain etiology. In the first type, a circumscribed cause of the individual's retardation is indicated.

For example, mental retardation may be due to a dominant gene, as in epiloia; to a single recessive gene, as in phenylketonuria and amaurotic idiocy; to infections, such as congenital

syphilis, encephalitis, or rubella in the mother; to chromosomal defects, as in [Down's Syndrome]; to toxic agents, as in retardation caused by radiation in utero, lead poisoning, or Rh incompatibility; and to cerebral trauma. (Zigler, 1967, 292)

Thus, damage may occur, pre-, peri-, or postnatally, but an organic etiological factor is present. The group of organically retarded individuals is thought to constitute less than half of the retarded population.

In the second type of retardation, no organic determinants can be identified. Because retarded individuals of this subtype are typically offspring of low-IQ parents and often are raised in poor environments, both polygenic and environmental etiologic factors are possible. Such labels as "sociocultural retardation," "familial retardation," and "retardation due to sensory deprivation" have been used to describe this type of retardation. This group of individuals is thought to constitute the large majority of the retarded population (see Zigler & Hodapp, 1986, for a review of the two-group approach).

This nomenclature, although it provides order to the mental retardation field, may itself be open to further specification, as organically retarded individuals do not constitute a homogeneous group (Lubs & Maes, 1977, have identified more than 200 types of organic retardation). Differences in degree and type of brain pathology may in turn affect overall intellectual functioning (i.e., levels of retardation) and the specific areas of greatest deficit (see Gardner, 1982 for a discussion of how specific brain lesions may cause behavioral deficits). For example, as we discuss later in the chapter, individuals with Down syndrome seem to have particular difficulties with language functioning; this deficit, which is greater than their overall level of abilities (mental age, or MA), may not be present in individuals whose retardation is caused by other organic etiologies.

It is also noteworthy that, even within a single etiological group, individual characteristics vary widely. Among individuals with Down syndrome, for example, there are several types of chromosomal abnormalities (e.g., trisomy of the 21st chromosome; mosaicism, etc.), a wide range of intellectual levels (from profound to mild retardation, with an occasional reported case of a Down syndrome individual of average intelligence; Fishler, 1975), and many other individual variations (see Gibson, 1978). It is with this caveat in mind that we discuss in the next section the developmental approach to mental retardation in general and, later, to Down syndrome in particular.

Developmental versus difference approaches to mental retardation

Early theorists in the retardation field envisioned all retarded children as being "defective" in their functioning as compared to normally intelligent children. Although different theorists emphasized different defects, each defect theorist hypothesized that one or a small set of circumscribed defects was the cause of mental retardation in all retarded individuals. Some theorists (Kounin, 1948; Lewin, 1935) saw retarded children as being more "rigid" in their cognitive systems; others hypothesized that retardation was caused by a defect in selective attention (Zeaman & House,

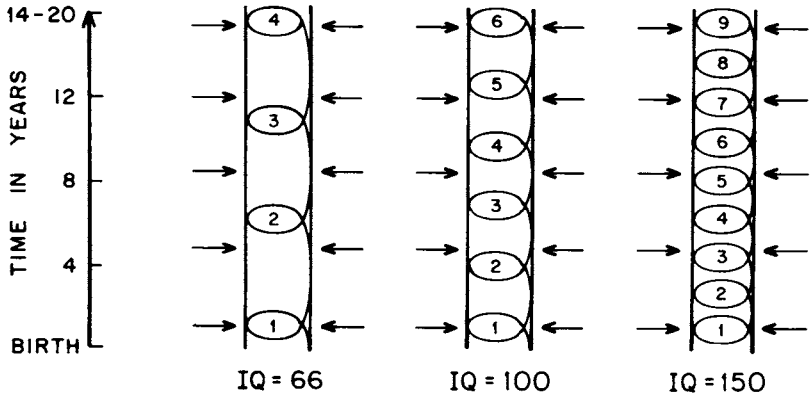

Figure 1.1. Developmental model of cognitive growth. The single vertical arrow represents the passage of time. The horizontal arrows represent environmental events impinging on the individual, who is represented as a pair of vertical lines. The individual's cognitive development appears as an internal ascending spiral, in which the numbered loops represent successive stages of cognitive growth.

1963; 1979), verbal mediation (Luria, 1982), or the prolongation of stimulus traces (Ellis, 1963). In every instance, one or another specific defect was thought to be responsible for the lower level of cognitive functioning in all retarded individuals.

Zigler's developmental formulation of retardation (Zigler, 1969) arose as a direct reaction (c.f., Zigler, 1984) to one of these defect views, the Lewin–Kounin rigidity formulation. In contrast to the idea that all retarded individuals were more inherently rigid than normal children, and that this rigidity was the ultimate cause of their retardation, Zigler stated that retarded children do not suffer from cognitive rigidity but are, rather, globally delayed in the same way that a child with an IQ of 100 is delayed in development compared to a child with an IQ of 130. The only differences between retarded and normally intelligent children are that the retarded child will proceed through the stages of normal development at a slower rate and will stop developing at a lower level. As such, retarded individuals are not different in kind from individuals of normal intelligence; they do not suffer from rigidity or any single defect that causes their retardation.

As originally stated, Zigler's developmental formulation applied only to those retarded children who demonstrate no organic etiology for their retardation. The application to only the group showing no obvious organic etiology is due to the belief that the "nonorganically" retarded population, although composed of several subgroups (Zigler & Hodapp, 1986), essentially comprises the lower end of the Gaussian distribution of intelligence. As Zigler noted, "I have asserted that the same principles of cognitive development apply throughout the normal range of intelligence with the familial retarded representing the lowest end of this distribution" (p. 553).

This model is shown in Figure 1.1. Children of three IQ levels (IQ = 66; 100; and 150) are shown developing across Piagetian, or some other, sequence of devel-

opmental stages. Children of higher intellect proceed at a faster pace and asymptote at a higher level, but the successive stages are identical.

A final feature of the original developmental formulation is that cognitive factors alone do not adequately account for the functioning of retarded children (or of normally intelligent children). One of Zigler's earliest criticisms of much of the defect research was the comparison of institutionalized retarded children to home-reared normal children. The effects of institutionalization, of repeated failure, and of a strong desire for interaction (and a simultaneous wariness to interact) with supportive adults were all shown to differ in the two groups even when retarded and normal children were equated on mental age.

> This is not to say that the cause of retardation is motivational: the cognitive functioning of the retarded unquestionably has a profound and pervasive influence on their behavior. The crucial questions are: just how great is this influence and how does it vary across tasks with which the retarded are confronted? What often is not realized is that the behavior of the retarded, as for all human beings, reflects more than formal cognitive processes. (Zigler & Balla, 1977, 20)

Thus, there was a concern for the whole child in even the earliest formulations of the developmental approach to mental retardation.

Three major hypotheses derive from the developmental perspective as it applies to familial retarded children. First, it is predicted that familial retarded children progress through the same universal stages of development that normally intelligent children traverse. This prediction, called the *similar sequence* hypothesis, applies to Piagetian cognitive, to linguistic, and to other universal stages of development. Second, the developmental perspective predicts that familial retarded children and nonretarded children have a *similar structure* to their intelligence. Thus, across all areas of cognitive functioning, the familial retarded group should perform about equally well from task to task (i.e., at their level of MA), just as normal children do. Third, the developmental perspective predicts that familial retarded children respond to institutions and external factors in ways similar to the responses of normal children (the *similar responses* hypothesis). Retarded children may, because of their retardation, be more likely to experience "non-normal" life experiences (e.g., more failure, more institutionalization, etc.), but their responses should approximate those of normal children who also undergo such experiences.

Although a detailed review of data on each of these hypotheses is beyond the scope of this chapter, all three have generally been supported for familial retarded children. Summarizing across 28 cross-sectional and 3 longitudinal studies on the similar sequence hypothesis, Weisz and Zigler (1979) concluded that "the great preponderence of the evidence is consistent with the hypothesis that retarded and nonretarded persons traverse the same stages of development in the same order, differing only in the rate at which they progress and in the ultimate ceiling they attain" (Weisz & Zigler, 1979, 846). In 30 of 33 studies employing only familial retarded children, the similar structure hypothesis was also supported; that is, familial retarded children matched on MA to nonretarded children performed equally well on a variety of experimental tasks (Weisz & Yeates, 1981). Finally, in a long

line of work (c.f., Zigler & Balla, 1977), Zigler and his colleagues have shown that retarded children respond similarly to normal children when experiencing failure and institutionalization.

It must be noted that each of these studies tests developmental hypotheses only as they relate to familial retarded children. How to conceptualize retarded individuals who show clear organic etiologies is a more difficult matter. These individuals may not be a part of the normal distribution of intelligence because of their organic insults. Furthermore, Zigler (1969) believes it is "illogical to extend those principles to individuals with organic defects (whatever their IQs may be). . . . If the etiology of the phenotypic intelligence (as measured by an IQ) of two groups differ, it is far from logical to assert that the course of development is the same, or that even similar contents in the behaviors of two such differing individuals are mediated by exactly the same cognitive process" (p. 533).

In contrast, other developmentally oriented workers are of the opinion that the developmental perspective is applicable to organically retarded individuals. Conceptualizing development as "organized" or "coherent" across domains, Cicchetti and Pogge-Hesse (1982) advocate the application of the developmental perspective to Down syndrome and other organically retarded individuals. Having shown that Down syndrome children follow the same sequence of development as do nonretarded children in the domains of early affect (Cicchetti & Sroufe, 1976), sensorimotor skills (Cicchetti & Mans-Wagener, 1987), and symbolic play (Motti, Cicchetti, & Sroufe, 1983), they propose that Down syndrome children do indeed traverse a "similar sequence" to that of nonretarded children. In addition, Cicchetti and his colleagues have attempted to examine similar structures of abilities in Down syndrome children across several domains. These workers have shown that the sensorimotor abilities of Down syndrome children correlate to their levels of positive Cicchetti & Sroufe, 1976) and negative (Cicchetti & Sroufe, 1978) affective responses, and that levels of symbolic play and intellectual level are related in 3-, 4-, and 5-year-old Down syndrome children (Motti, Cicchetti, & Sroufe, 1983). Although we will have more to say on this matter later in the chapter, the overall thrust of this work is to apply the similar sequence *and* similar structure hypotheses to the Down syndrome population.

Again, we offer only a brief review of the evidence. As concerns the similar sequence hypothesis, it seems that retarded and nonretarded children do progress along the same sequence of stages "regardless of etiology" (Weisz & Zigler, 1979, 846). With the possible exception of children with electroencephalogram (EEG) abnormalities, all retarded children seem to follow the invariant sequences proposed by Piaget and other developmentalists. This finding, examined more fully in a later section, amply justifies at least a partial "developmental approach" to intervention with Down syndrome and other organically retarded children.

As Table 1.1 demonstrates, however, etiology does seem to matter in relation to the similar structure prediction. Organically retarded children are much more likely to perform worse on a variety of tasks than are MA-matched nonretarded children, whereas familial retarded children performed equally well to the nonretarded group

Table 1.1. *Directional comparisons of MA-matched retarded and nonretarded persons summed across various Piagetian tasks*

	Direction of difference		
Group	MR > NMR	MR ≅ NMR	MR < NMR
Etiology controlled	0	30	3
Etiology uncontrolled	4	45	22

Note: The abbreviation MR stands for mentally retarded subjects; NMR stands for nonretarded subjects; the symbol = indicates that there was no reliable group difference. Adapted from Weisz, Yeates, & Zigler (1982).

in 30 of 33 studies. (We elaborate the exact nature of the intellectual structure of Down syndrome intelligence in the next section.) There are not enough studies employing etiology of retardation as an independent variable to test differentially the "similar reaction" hypothesis for organically retarded versus familial retarded children.

Applying the developmental perspective to Down syndrome individuals

First described in 1867, Down syndrome may be the most investigated of all types of mental retardation. Because of its early identification and relatively high incidence, it has been the subject of much research employing the Down syndrome population. This situation has not necessarily led to a clearer understanding of the behaviors of Down syndrome individuals, however, as a whole range of myths and stereotypes have been advanced (with little empirical support) over the past 100 years. Some of these stereotypes – that Down syndrome individuals are especially musical, good-natured, imitative, and sociable – have begun to receive research attention (c.f., Belmont, 1971; Gibson, 1978), but the "typical" behavior of Down syndrome persons remains far from clear.

Spurred by the developmental perspective and the recent explosion in research knowledge about children, many researchers have examined the performance of Down syndrome children on a number of tasks. As above, we begin our review of this work by examining the similar sequence and similar structure hypotheses, after which we address two developmental issues particular to the Down syndrome population. We end our review with a brief discussion of specific implications of the expanded developmental perspective as it applies to research and intervention with Down syndrome individuals.

Similar sequence hypothesis

Like all organically retarded children, Down syndrome individuals seem to progress in the same sequence as that followed by normal children. Weisz and Zigler (1979)