

REGRESSIONS IN MENTAL DEVELOPMENT:

Basic Phenomena
and Theories

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Revolutionary Periods in Early Development

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INTRODUCTION

To take up again a text 4 years after its writing would necessitate such a fundamental recomposition that we cannot do it. Some remarks nevertheless will be made in the guise of a preamble.

This text takes a position in favor of a certain conception of the psychological development of the child, a conception that we consider “paradoxical” in comparison with usual conceptions. The conception presents itself in Piagetian theory, from which it derives, but diverges considerably from his theory on numerous points that are not made explicit in the text and that we articulate here.

The text focuses on mechanisms of development, on the processes permitting the passage from one organization of behavior to another within each of the large stages of development (infancy—childhood—adolescence). In other words, it attempts to show how the infant comes to infer new significations to the objects (or people) with whom he or she interacts or how new determinants of behavior are defined.

However the text does not sufficiently define: (1) what the infant constructs in the course of his or her development; and (2) that which makes possible these constructions. We will try to articulate these points briefly in order to clarify our position.

With regard to knowing what is constructed by the child, in the last few years our position has become more radical, in that we have come to criticize the Piagetian position according to which the child constructs structures or new forms of action or of thought. By way of an alternative hypothesis we now contend that the child does not construct new structures (new ways for treating information) in the course of his or her development. Nor does he or she construct, as Piaget (1947, 1967) believes, either the general coordinations of his or her actions or the logico-mathematical operations of his or her thought. In our view, formal structures (of actions and of reasoning) are not constructed but are preformed. Instead of constructing structures, the child in the course of development elaborates on internal representations (models or memories) conceived of as structurations or organizations of contents. These representations are elaborated by means of the formal structures that the child possesses. It is by the application of these structures that new representations are constructed. The constructed representations reveal or manifest more or less completely the structural capacities of the organism.

This first point leads automatically to the second, not treated in this text: what makes possible the elaboration of new representation, what gives the child the possibility of redefining and redetermining his or her behaviors differently at the different stages in the course of development. In this regard we propose that new coding capacities appear successively in the course of development. The appearance of these new capacities is subjected to a genetic regulation; it thus shows very little dependence on particular interactions that the child engages in with the environment, unless this is in a large, nonspecific sense. It should be recalled that for Piaget (1947, 1967) the construction of new structures is explained by an interactive process between preexisting structures and different environments or different aspects of the environment. For Piaget, the passage from one stage to the following is due to the achievement (or closing) of new structures, these new structures then revealing new aspects of the environment, with new dimensions engendering new interactions; this process can be endlessly repeated.

We attempt to schematize our position with the following propositions or postulates:

1. The forms or general structures of our actions (coordinations) and of our reasoning (operations) are preformed.

2. There exists in the roots of (internal) representations (particularly of the body) what we call *sensory representations*. These representations (coupled with preformed structures) determine the initial forms of behavior, that is to say the initial exchanges with the environment.
3. Development consists of the construction of new representations (models or memories) of objects, of self, and of other.
4. New representations are constructed because *new coding capacities* appear successively in the course of development. We propose to call *perceptive* those that appear at birth, *conceptual* those that appear around 18 months, *formal* or *semiotic* those that appear around 10 years.
5. The appearance of these new coding capacities is generated by a maturational process that depends only very indirectly on the interactions of the child with the environment (the nonspecific role of the milieu).
6. The construction of these new representations occurs according to a succession of periods or of phases (described in this chapter in terms of revolutions), whose occurrence is equally strongly determined by a genetic regulation (phases of dissociation, integration, decomposition, and syntheses).
7. The constructed representations are directly dependent on the experiences that the child is involved in; the environment plays a specific role in this construction.
8. These new representations intervene in the functional exchanges that the subject engages in with his or her environment and that permit their organization (patterns, programs, procedures, schemes). Preformed sensorimotor organization at birth, perceptivo-motor organization at about 18 months, conceptuo-motor organization at about 10 years, and semiotico-motor organization at about 16 to 18 years.

The principal consequences of these propositions are the following:

1. The existence of stages and of periods are strictly genetically determined.
2. The passage from one stage to another occurs independently of the degree of achievement of preexisting constructions (up to certain limits).
3. The constructed representations are directly dependent on the contents

of particular experiences in which the child engages and even on the nature of previous exchanges. This is why the representations constructed reveal more or less accurately the structural capacities of the organism.

In conclusion, it is possible to say that in the Piagetian conception the structure of the environment plays a nonspecific role despite the interactionist aspects of his model. We are taking the contrary position that although the environment plays a nonspecific role in the appearance of new coding capacities in steps more or less fixed in the course of development, the role of the environment becomes specific in the elaboration of new representations. We have progressively developed this point of view over the past three years in various articles (Mounoud 1977a,b,c, 1979 in press; Mounoud & Hauert in press a, in press b; Mounoud & Guyon-Vinter in press).

It is generally accepted that around the age of 18 months an important period in the baby's life is completed. Much research has centered on this sensorimotor period during the last 15 years and has provided many examples of the great complexity of infant behavior, even immediately after birth. Our own research (Hauert 1980; Hauert & Mounoud 1975; Hauert, Mounoud, Mayer & Erkoeh 1980; Mounoud 1973, 1974; Mounoud & Bower 1974; Mounoud & Widmer 1975; Mounoud & Hauert 1976; Mounoud, Hauert & Quennoz 1976; Mounoud, Mayer & Hauert 1979; Widmer 1980) provides examples of complex behavior at the beginning of the period as well as at its culmination, and our main theoretical interest lies in the possibility of establishing a developmental link between the processes at work in the beginning and at the end of the period.

During the first 18 months the infant repeatedly, and in different ways, reorganizes his or her relationships with the immediate environment. The transitions from one type of organization to the next could be called *revolutions*, because they profoundly modify the baby's relations with the surrounding world. The various "revolutions" appear to have two aspects in common: First, dissociations appear in the organization of the internal apprehension of objects (in the broad sense, including persons), which puts the objects on a different plane as fragmentary representations or prerepresentations; secondly, the revolution terminates in a new composition of the behavioral organization and in a new status of the objects as whole representations. Because these modifications are very gradual and fairly slow and also because experimental data on this period are still rare, their revolutionary character has not been perceived.

The clear demarcation between the sensorimotor period and the next stage traditionally has been considered to constitute a Copernican revolution (in Piaget's terms, see Piaget & Inhelder 1966) in the relationship between the child and his environment. However, despite the fact that the idea of "revolution" constitutes a pivotal concept in Piaget's theory, he describes each new acquisition as starting from a state of absence of organization and culminating in a state of stable achievement. In fact, Piaget focuses his descriptions on the elaboration of certain behaviors without considering the role and possible development of preceding behaviors.

This concept of development as a series of revolutions stands in sharp contrast to the still prevailing view of development as a cumulation of itemized acquisitions. In this view, the neonate has no, or only minimal, capacities, and the description of development is reduced to that of a succession of acquisitions, each of them totally novel and to an increase of capacities of discrimination. This conception of development has led to statements such as: The 4- to 5-months-old infant can grasp objects he or she is looking at; between 7 and 10 months the infant recognizes familiar persons; sometime during the second year the baby can imitate movements involving parts of his or her own body that he or she cannot see etc. Both the further elaboration and the earlier forms of the behaviors are ignored in such descriptions.

By contrast, in theories of development as a series of revolutions, the same reality will be seen as apprehended and mastered in different ways by the growing child. The relation between different parts of the body (traditionally called *corporal schema*) may serve as an example; the organization of these relations exists in different forms, each corresponding to a particular level of representation. At birth, this organization is determined by the postural reflexes, which allow the infant to put his or her hand into the mouth during the very first days of life. However, the shift toward a new organization of these movements subsequently produces an incapacity to put the hand into the mouth in certain postural positions. Similarly, the 18-month-old toddler who can touch different parts of his or her body precisely has once again reorganized these movements into a new structural whole. Much later, another type of reorganization of the same complex of postures and movements can be observed in the child's drawings ("draw a man") or imitations of other peoples' postures.

Parallels also can be found in the successive ways a child organizes internally the ties between the members of his or her family. The Oedipus complex—viewed as a particular instance of these ties—does not appear only once, at one particular period, neither does it disappear for good and all at a

particular moment; on the contrary, it appears at different developmental stages and in function of different family contexts.

From 1964 to 1968, I studied some of the revolutions that characterize the development of children from 4 to 9 years of age through problem situations concerning the construction and use of certain instruments (Mounoud, 1968, 1970). It became clear that an important change takes place when the child makes the transition from mastery of direct manipulatory actions (using parts of the body) to that of actions by means of instruments.

The 4-year-old child possesses an *initial complex organization* allowing a perceptual-motor control of his or her manipulations and of their results. This initial organization develops gradually, and between 4 and 5 years a decomposition into constituent elements (that is, action elements such as touch, take, reach, avoid, circumvent, etc.) takes place. These constituent elements are reconstructed on a different level as *elementary conceptual organizations* that allow a new type of control, conceptual control, which is active in conjunction with the first type but bears only on the results of actions and not on the actions themselves. This development continues between the ages of 5 and 6, during which period the elementary organizations are regrouped into a *new, total conceptual organization* that cannot be decomposed into elements. At this point, the possibilities of control disappear momentarily. In the next stage, the child succeeds once again in decomposing the totality into *new partial organizations*. These partial organizations do not function parallel to the total organization (as is the case during the first step in this development) but combine progressively. The control of manipulations and of the situation is operated as regards both the total and the partial organizations, thus favoring their coordination into a *final complex conceptual or conceptuo-motor organization*. This final organization is the starting point of the next revolutionary period. Simultaneously the tools used or constructed by the child acquire progressively a different conceptual status.

These successive disorganizations and reconstructions modify the child's relations with the environment as profoundly as the development of the capacity to grasp objects modifies the relations between the infant and the surrounding world. The study of children's use and construction of tools, which grows out of sensorimotor control of hand and arm movements, thus leads back to the study of grasping in babies, a type of behavior that has not been investigated in developmental detail. The aim of our research since 1971 (Mounoud, 1973; Mounoud et al., 1974, 1975, 1976) has been to

study the different levels of organization and control of grasping behavior in function of different physical properties of objects, particularly the construction by the baby, between the ages of 8 and 18 months, of physical invariants.

This research takes on particular importance if it is placed inside a general conceptual framework suggesting a new view of the child's development during this period. In the next part of this chapter I synthesize a number of new data on early development and sketch an outline of the conceptualization to which they lead.

The Postrevolutionary State of the Neonate

Embryonic development, in a sense, provides us with the prehistory of postnatal development. The intrauterine activities of the fetus are the result of certain revolutions that resemble those we observe later in the baby. Some of the infant's reactions during the first weeks of life are clearly the result of intrauterine history; they are traditionally called "reflexes" and qualified by the term *archaic*. These reflexes disappear after some months; if they do persist they indicate some disturbance of the nervous system. Little importance has been given to these reflexes, regarded as neonatal curiosities, and they have been studied only in a neurological, not in a psychological context. Their disappearance has been considered an indication that the infant leaves his or her links with the animal and vegetal domain behind and enters the superior, human, and "mental" area. Since the beginning of this century, however, a few psychologists have stressed the importance of these first reflex programs as the source of further development. Indeed, these reflexes determine the infant's reactions to the environmental stimulations, and nowadays we are beginning to discover that they are far better organized, differentiated, and more numerous than was thought (Mounoud, 1971). It can be postulated that:

1. The reflexes are not isolated, heterogenous mechanisms, but show a homogenous, total organization (i.e., they are reciprocally coordinated).
2. This initial coordination is necessary for the infant as well as for the child and the adult-to-be, inasmuch as further coordinations depend on it. (No identity of self or of others could be constructed without this initial organization).
3. The initial coordination carries within it the program for later reorganization.

At birth the infant's world is much better organized than had been thought. Already during the first year of life clearly differentiated reactions can be elicited (Lipsitt, 1967). The infant's perceptions may very well be not vague and indistinct, as has been supposed, but rather without meaning for him or her (just as a series of Chinese characters remains without meaning for those who cannot read them). Perceptions take on meaning when representations and new organizations introduce a schematization of reality.

A number of recent experimental data confirm the plausibility of these postulates. Grasping behavior in 1-week-old babies (Bower, Broughton, and Moore, 1970) is a clear example of an already existing coordination, the coordination between seeing and hearing (Aronson & Rosenbloom, 1971; Wertheimer, 1961). The complexity of the infant's organizing links with environment is even more striking in imitative behavior (opening the mouth, sticking out the tongue are some clear examples discussed by O. Maratos [Maratos, 1973 a, 1973 b]).

These types of reactions belong traditionally to the field of psychology, and one hesitates to call them reflexes. However, these reactions disappear when they are not conserved through external incitation just as reflexes in the more narrow sense do, and they do not seem to have any finality or reason—a fact that runs counter to common sense and shocks psychologists. What, indeed, is the "intention" behind such behavior? Does the infant stick out his or her tongue "in order to" relicit an interesting sight, perceived just before? Does he or she turn the head "in order to" get into his or her mouth an object felt against the face? Does he or she stretch out the hand "in order to" close it on an object? It calls for some courage to ask such questions and for even more to answer them. In my view, though, the answer is unequivocal (if one thinks of the infant and not of the observer) The baby does not behave in these ways intentionally to obtain a certain effect but is linked to the environment by a specific organization (i.e., the nervous system at a certain point of development) that directs his or her reactions. In this sense, baby and environment, during the first days after birth, form a single organized entity. This idea of an initial adualism was elaborated by Baldwin, but the highly organized character of the union has only recently become clear. It is the combination of a state of adualism with the existence of highly diversified activity that led us to a new interpretation of the psychological importance of the very first period of life (Mounoud, 1974).

The Postnatal Revolutionary Period

At birth the infant manifests highly organized and perfectly adapted behavior in contact with the environment. However, his or her reactions are not actively controlled since he or she is submitted to unforeseeable environmental changes. To survive, the infant has to become capable of intervening actively in relations with objects and people and of controlling them to a certain extent. This active intervention is a complex process that cannot bear immediately on all behavior but only on certain activities. Progressive control will be reached through a shattering of the initial organized totality whereby certain behavior becomes individualized and certain properties of objects become isolated from the numerous stimulations the baby receives. In a certain sense, this focusing of certain properties is the result of new representations (the construction of points of reference, of configurations of perceptual indices, etc.). The first psychological revolution in the child's life is this shattering of the organization of the infant-environment totality.

In our view, a parallel can be found in learning situations, even with adults. All learning is based on the existence of already installed activities and automatisms. This existing complex of behavior has to be decomposed and recomposed in a different way so as to be adapted to the new situation. Take, for example, certain aspects of driving. Moving one's feet, one up, one down, and vice versa, is easy, but when the movement of one foot commands the accelerator and the opposite movement of the other, the clutch, these movements have to be dissociated and the effect of each has to be appreciated in order to constitute a new coordinated automatism.

To come back to the infant, the initial phase of the first revolution takes place during the second or third month after birth. At that age, the infant is no longer able to easily put his or her hand into the mouth, he or she can no longer perform two activities at the same time, such as looking at something and nursing, and he or she no longer shows signs of distress when, in an experiment, he or she sees mother's face and simultaneously hears her voice reproduced at a different location. Such behavior can be interpreted in the sense that objects such as mother's breast or baby's bottle give rise to distinct representations according to whether they are seen, heard, felt, etc. Mother herself becomes something different when she is heard or touched, and these isolated perceptual representations cannot yet be regrouped into the genuine representation of a totality (i.e., a whole person).

In other words, the momentary deficit in the coordination of actions and the unitary apprehension of objects is compensated for by an elaboration of isolated activities and the representation of certain aspects of reality. I surmise that, at this point, these activities of the infant and the properties of reality acquire meaning. The infant does fewer things but does them better and begins to control actively his or her actions, which is essential for adaptation. The errors and confusions inherent in this phase of the revolutionary process derive, in my opinion, on the one hand from the lack of differentiation between the representations of certain features of objects and these objects in their totality and, on the other hand, from the confusion between a global activity and one of its constituents.

By the end of the sixth month after birth the infant identifies mother as a total object. Simultaneously the dissociated, and then isolated, action patterns have become coordinated. Many typical behaviors of this age (6 to 8 months) are fairly well known; being separated from familiar persons, particularly from mother, provokes anxiety reactions (Spitz, 1952). This final phase of the first revolutionary period is characterized by a progressive integration of partial, juxtaposed representations of objects, persons, and parts of the infant's own body. This new integration is based on the programming of the succession of substages that is already incorporated in the initial coordination of reflex behavior. Obviously, this first revolution does not take place in this fashion if the infant's environment provides very little or no stimulation; equally obviously, the meanings that people and situations take on are directly linked to specific features of the infant's environment.

The Second Revolution

It could be thought that the 6- to 8-month-old baby has reached a satisfactory relation with the environment. However, if one thinks of his or her anxiety reactions when confronted with disappearances or changes in persons and objects that have become familiar, the infant is not in a very comfortable position. It is precisely because he or she has come to recognize people that many changes and disappearances begin to disconcert and disturb him or her. From this point of view his or her control of the situation encountered is not yet satisfactory. A new adaptation is necessary, and it will be brought about by a coordination of the relations between the different representations. Such a coordination will lead to the construction of equivalences (substitutions of one person or object by another) and of correspondences (links between the different particularities and characteristics of one and the same person or object).

Similarly, the 6- to 8-month-old infant has reached a certain point in the mastery of his or her motor activities and in the knowledge of his or her own body. But once again, this achievement has its limitations. As regards grasping behavior, for example, these limitations can be clearly shown. Infants of this age cannot yet relate their different representations one to the other, they cannot coordinate the different properties of objects such as size, weight, brilliance, etc. When, in an experiment, one of these properties disappears, the object loses its identity. Though the infant has constructed an internal organization of a total object, the various features of the object cannot yet be dissociated; his internal construction cannot be analyzed. Consequently the different properties of objects cannot be related to one another, nor can different objects be related to each other. It is only during a second revolutionary period that the baby will succeed in controlling his or her activities as regards this aspect of reality. This second revolution starts at about the age of 6 to 7 months, and comes to an end between the ages of 16 and 18 months. It leads to the construction of relationships between representations of objects (and persons) and their parts, with different properties and variations being taken into account. In contrast to the first, this second revolution concerns a state of dualism, where subject and objects are no longer fused into one totality.

The important modification introduced into the relations between the baby and his or her environment through this second revolution can be exemplified by our study of the organization and control of grasping behavior in function of certain properties of objects and their variations (which cannot be discussed inside the scope of this chapter). The 6-month-old infant appears to live in a world that is very different from that of the 18-month-old toddler; the infant is surrounded by unique objects, each leading to a particular representation and possessing absolute properties; the toddler lives in a world where objects can be related to each other as well as to their different properties, leading to an internally organized system of representations.

To conclude, it appears that the 18-month-old child has not simply arrived at a first form of object identification, but at far more complex organizations of which this identification is a symptom. In their complexity these organizations resemble, although on a different plane, the complex reasoning of 9- to 12-year-olds. The first revolution leads from an initial dualism to the capacity to identify objects and persons through nonanalyzable representations; during the second revolution the baby constructs new internal organizations, leading to object representation and the structuration of personal interrelationships.

The discovery of early forms of behavior that are generally attributed to

older children (such as imitation during the first weeks after birth or conservation of physical properties at 18 months) does not invalidate the interpretation of these later acquisitions but gives them a new meaning. Infant, toddler, child, and adult construct a succession of different organizations and representations of social and physical realities. Each of these revolutions ensures a different type of mastery of the relations the subject has with his or her environment.

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