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INFANT BEHAVIOR RESEARCH*

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An introductory word may be said about the background of our research program. The Clinic of Child Development started on a small scale back in 1911, as part of the New Haven Dispensary. It then functioned as a diagnostic and advisory clinic, dealing chiefly with backward and problem children of school age. But we soon developed a research interest in children of preschool age and considered the possibility of diagnosing mental deficiency and mental deviations in early infancy. From the standpoint of preventive medicine, if for no other reason, it seemed important to define procedures for the clinical detection and the clinical study of the mental status of the infant.

A psychological examination of an infant, on the face of it, seems a somewhat fatuous undertaking. It ceases, however, to be so if we adopt a biological view of the mind; if we do not separate the so-called mental factors too sharply from the so-called physical; if we do not make artificial distinctions between clinical psychology and developmental neurology.

Even though the infant cannot introspect, even though he cannot give word-of-mouth reply to questions we might ask, he nevertheless has a mental make-up. He has a behavior equipment. He *has*, or he *is*, a reaction system which is open to direct, objective study.

This reaction system expresses itself in characteristic forms of behavior,—in reflexes, in patterns of posture and locomotion, in perceptual adjustments of eye and hand, in approach, grasp, and manipulation, in gesture and vocalization, in social adaptations.

From the moment of birth, the reactions of the infant assume visible and ascertainable patterns. Behavior patterns differentiate and define themselves ontogenetically in the same lawful manner as the chambers of the heart or the ribs of the thorax. *They grow.*

To make the story short, our infancy research attempts a systematic delineation of the patterning of normal human behavior in the

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first year of life. This patterning is being investigated, not from the standpoint of intelligence testing, but from the standpoint of *growth*. Like the body, or through and with the body, behavior is moulded into characteristic forms by virtue of laws of growth. It is the *morphogenesis* of these behavior forms in which we are interested.

At fifteen lunar month intervals we have made inventories of the behavior patterns of one hundred infants. The inventories were made in the home and in the laboratory of the clinic under controlled conditions. Stenographic records of naturalistic and experimental observations and anthropometric measurements were included in the data. But our fundamental research tool has been the cinema.

The cinema is an ideal instrument for the investigation of complex behavior patterns because it captures the behavior in its totality; it sees the whole field of behavior with equally distributed vision, and it remembers infallibly. It registers simultaneously the attitude of the head, trunk, arms, legs, eyes, fingers, and face. It crystallizes any given moment of behavior in its visible entirety. By multiplying these moments the cinema reconstitutes the movements of a whole episode of behavior. But in the service of genetic research the cinema can also make records of succeeding days, months, or years, and bring them into seriation. Thus the cinema makes available for study (a) the behavior moment, (b) the behavior episode, and (c) the developmental cycle.

The cinema furthermore enables us to dissect a behavior pattern and to construe it morphologically, that is, in terms of form relationships, measured in time and space. Indeed, when any given behavior pattern is once captured by the cinema film, and when this record is analytically projected on a viewing desk, it becomes as tangible as tissue. The cinema permits us, so to speak, to bring the behavior of the infant into the laboratory in a dissection tray for analytic study. Cinema analysis is an objective form of behavior research which enables us to approach the problems of mental growth from the standpoint of developmental *morphology*.

Our cinema records, both in 16 mm. and in 35 mm. size, have been gathered over a period of years. These records have been classified and catalogued in detail and are now being used as a working research library. From these records we have edited a series of

twelve sound-scored reels*. I shall show you one example from this series, in silent version. I shall, however, destroy some of the silence by running comments as the pictures appear on the screen. This reel deals particularly with patterns of prehension and manipulation in the latter half of the first year. There will be, however, glimpses of the antecedent stages in the development of prehension. We may well remind ourselves that the process of behavior growth, in a biological sense, begins extremely early. It begins in the embryonic period.

When the embryo is but 4 mm. long and but 3 weeks old the heart begins to beat. At 8 weeks the embryo has been observed to respond reflexly to tactile stimulation. At 12 weeks mouth and chin movements occur on stimulation of the lips, and at this same time the grasp reflex is already established as a spinal mechanism.

A film entitled THE GROWTH OF INFANT BEHAVIOR: LATER STAGES *was now shown with comments as follows:*

Animated diagrams delineate the transformations which occur during the prenatal period. The anterior limb bud first appears, then five knob-like structures which resemble human fingers take form. This development proceeds rapidly and by the end of 12 weeks forearms and finger-nails are defined. The hand remains clenched but has powers of movement long before birth.

Eight weeks after birth the hand still displays prenatal characteristics. The hand is an almost useless organ; it remains predominantly closed in most infants at 4, 6, 8, and 12 weeks of age. But at 24 weeks the fingers open, the hand is unfisted, and the fingers play in a lively manner and curl over every object they touch.

The film now pictures developmental changes in the patterns of cube behavior in an infant at 24 weeks, again at 28 weeks, and again at 40 weeks. Cube behavior may serve as an example of the way in which developmental patterns proceed as the mind grows. We

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* These reels are distributed by Erpi Picture Consultants, Inc., of New York, under a special publication arrangement with Yale University. The subjects include: 1. *The Study of Infant Behavior* (2 reels); 2. *The Growth of Infant Behavior: Early Stages*; 3. *The Growth of Infant Behavior: Later Stages*; 4. *Posture and Locomotion*; 5. *From Creeping to Walking*; 6. *A Baby's Day at Twelve Weeks*; 7. *A Thirty-six Weeks Behavior Day*; 8. *A Behavior Day at Forty-eight Weeks*; 9. *Behavior Patterns at One Year*; 10. *Learning and Growth*; 11. *Early Social Behavior.*

have found these cubes very useful in estimating the maturity and characteristics of an infant. We find, for example, that typically a 12-week-old infant will regard a cube when it is placed before him on the table top; that a 20-week-old infant will contact the cube. At 24 weeks he will grasp it in his palm and at 40 weeks he will grasp it with his finger tips. At 18 months he can build a tower of two or three cubes. It takes him another 18 months, i.e., he must attain the age of three years, before he can combine three cubes into a simple bridge.

In the film we note the infant's reactions to the two-cube situation. One cube has been placed in his left hand by the examiner, a second cube is placed on the table top before him. His behavior reactions will be shown at normal speed, then at slowed speed, and then in dissected, stopped-motion pictures which will delineate the salient phases in the various reaction patterns. Then we shall call upon the technology of the cinema and bring two age levels into immediate juxtaposition. The same infant will be coincidently shown at 24 and at 28 weeks in a comparable behavior situation. This method of coincident projection makes two distinct growth stages simultaneously present, and demonstrates the nature of mental growth increments.

At the age of 40 weeks the index finger and thumb have come into definite opposition. The index finger now takes a leading part in the infant's manipulations. You note that he at once pokes the tip of the handle of the bell with the extended index. He pries its bowl with his poking index. He places the tip of his index upon the tiny pellet; he plucks the pellet with pincer prehension in which the index finger figures predominantly. He pursues the pellet in the bottle with his poking index. This poking projection of the index is a pattern characteristic so well defined that at 40 weeks it is almost as plain as is the nose on his face! It is a new form of behavior and, like the profile of his nose, it is an intrinsic morphogenetic product.

The preeminence of the index (and thumb) can scarcely be set down as an act of skill acquired primarily by learning. The learning process has no architectonic mechanism which can account for such a topographic alteration of behavior pattern. Training and experience perfect and inflect, but always in specific and immediate confines. They do not engender the basic reconfigurations of behavior. Else, why does not our infant become an expert raker of

pellets by gross manual approach, instead of a temporarily ineffectual plucker by refined, digital approach?

It is crucially significant that the poking propensity asserts itself not only in the presence of small objects like the pellet. The poking is not the consequence of an unique stimulus pattern. The infant pokes in the presence of the cube, the bottle, and the bell, as well as the pellet. He may poke at the expansive surface of the flat table top; he may even point heavenward! This behavior denotes the urgency and form-producing character of the internal stimuli which prompt him to poke and pry so inveterately at about 40 weeks of age. The index finger then becomes in fact the *fore* finger.

The poking propensity and the poking pattern therefore furnish a good example of developmental individuation, a selective specialization of a minor member to subserve a larger whole. But that individuation is (normally) never complete or segregated; it is always partial and, by extensive ramification, it remains accessory to a fundamental unity of response.

In the progressive individuations and elaborations which are so palpably, almost naively, exhibited in the behavior pattern of the human forefinger, we have, I believe, a true image of the developmental mechanics of the higher mental processes. I do not wish to hang too heavy a thesis on the infant's extended index, but I would suggest that even in the intellectual spheres of adult invention we are dealing in essence with comparable morphogenetic phenomena. From a mechanistic standpoint, the attention of infant and adult is primarily a function of pattern morphology. Acts of attention are dynamic or kinetic manifestations of patterned structure. They have a morphological status. All behavior patterns are therefore subject to morphological investigation.

In summary: The mind grows. This growth expresses itself in ordered patterns of behavior. Mental growth, like physical growth, is a morphosis. It is a process which produces a progressive organization of behavior forms. This morphogenesis can be investigated by morphographic methods and especially by analytic cinematography. By these methods we can ascertain the lawful sequences and norms of psychological growth. These norms may be used as standards of reference for the analytic appraisal of developmental status. Such analytic appraisal is primarily a task of clinical medicine. Development, as well as disease, falls within the scope of clinical pediatrics.