

## **The Gesell Developmental Schedules: Arnold Gesell (1880–1961)**

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A proud and self-confident man, Arnold Gesell was always outstanding in a group because of his distinguished carriage and dignity. Tall and well built, meticulously dressed, he seemed to embody an air of authority. Surely, the adequacy of his methods of infant and child study could not be questioned. Little real effort had been concentrated on the assessment of mental development in infancy until Gesell began his normative studies in 1919. These normative studies were not set up as mental tests. Gesell was convinced that such devices as measures of intelligence were not acceptable or scientific. He used a new and acceptably scientific method of evaluating infant growth by means of a longitudinal series of motion pictures. These were permanent records of each infant from neonatal age, throughout babyhood until the age of 56 weeks, then again at 18 months, 2 years, 3, 4, 5, and 6 years. Further examinations on children who were available were continued until 10 years. These normative samples were accompanied by extensive observations and supplemented by a large number of clinical studies. It was a truly magnificent research.

### **OBSERVATIONS OF AND REPORTS ON BEHAVIOR**

Voice records were not available at that time, but notes were made by the observers of what was called "language behavior." The mothers were present at the time the records were taken and many of the items included are really reports of the mother's observation. The methods used were standardized. A "photographic dome" was used; positioning was the same for each child. The exposure methods and recorded notes were equivalent for each of the child studies. These included a clinical crib, infant supporting chair, test table, observational playpen, and standard test objects.

The result was a superior longitudinal, permanent, detailed presentation in photographic record of activity and growth. These records were available for study and for checking by the research group, by comparative methods of the interpretation of activities and behaviors. It was canned data available for repeated viewing.

In addition to the original viewing experience, these motion picture records, along with supplemental notes, were the basis of Gesell's interpretation of infant development. He and his research associates spent long viewing hours over each developmental record to note the changes, the rate of growth, and the patterns of behavior revealed. The child was no longer present, nor was the mother available for further questions. One could not check aspects of behavior not collected at the time of exposure. However, the extent of data available was tremendous and offered a challenge to organize and describe the behaviors and changes revealed. Schedules were made and the results were a mass of purely observational material that required organizing into descriptive terms. These were selected and labeled according to arbitrarily chosen aspects of development.

The standardization procedures used by Gesell and his co-workers constituted a longitudinal study by repeated observations of 107 infants from carefully selected homes of middle economic status, all of North American extraction. The infants were observed at the ages neonate, 4, 6, and 8 weeks and continued until the age of 56 weeks at intervals of 4 weeks. Follow-ups were made at 18 months and at 2, 3, 4, 5, and 6 years. There was approximately an equal number for each sex.

Four schedules were selected:

1. Motor behavior: includes both gross bodily control and fine motor coordination. It includes postural reactions, balance of neck and head, rolling over, sitting, creeping, standing, walking, reaching, grasping, and manipulation of objects.
2. Language behavior: facial expression, gestures, prelinguistic vocalizations, babbling, speech, and communication with others.
3. Adaptive behavior: eye-hand coordination, reaching for and handling objects, reactions to various test objects such as dangling ring, drawing, and simple form boards.
4. Personal-social behavior: includes the child's reaction to the social culture in which he lives, feeding, toilet training, play, development of a sense of property, smiling responses to persons, and responses to a mirror.

These schedules were either purely observational or a result of the mother's report. The scoring of the data involved a recording of the responses obtained for each of these aspects of development. No composite measure was obtained, but the responses for each schedule were checked as to whether the child had reached the expected developmental level in months. It was an approximation

and the total schedule for each aspect was handled as to the degree of attainment reached in each of the four areas. The division was largely arbitrary and judgmental.

These normative studies were not set up as mental tests. Gesell was convinced that such devices as measures of intelligence were not acceptable or scientific. He was opposed to statistical treatment of his data. He was opposed to composite measures, but the behavior and development attained was indicated by a process of comparison with the percent of success of children at that age who had shown that particular aspect of development. It was a judgment in terms of the level reached.

### SCORING AND INTERPRETING THE SCHEDULES

Since the observation and process of interpreting the mother's report involved a considerable amount of subjectivity, these results are not as highly standardized as in most psychological tests. To facilitate the scoring and evaluation of the schedules, different grades of success were indicated for the separate items as A+, A, B+, B, and C. According to the directions, an item is passed if it reaches the classification of A or B+. A+ is very superior and B is much below average. This is confusing because usual concepts of these ratings are quite different. In the process of classification, there is no possibility of finding the at-age value of any item in terms of the 50% passing criterion, hence an average performance is not clearly indicated. The classification is rough and gives only a general idea of how the child compares with the standardization group.

Not only is the scoring a problem because of the statistical difficulty in determining the average performance level of the child, but also a certain amount of subjectivity is present to confuse the scoring picture. No statistical analysis of the reliability or validity is given. The result is a refined kind of observational schedule useful in clinical evaluation of infant development but offering little as an accurate placement of developmental level.

The percentile range of success for the various levels may clarify the problem.

- A+ was superior from an analysis of the data; it equals success in from 1% to 19% of the cases.
- A equals success in from 20% to 49% of the cases.
- B+ equals success in from 50% to 64% of the cases.
- B equals success in from 65% to 84% of the cases.
- C equals success in from 85% to 100% of the cases.

There was no attempt to secure equality of the grades for different age levels, but for each schedule there were 40 to 50 items to evaluate, distributed in diffi-

culty among these five grades of success. Thus, when the schedule was scored, a general idea of the child's developmental level can be obtained by tabulating the number of A+'s, A's, etc., reached and interpreting the percentage for each level. In evaluating the median at-age level it was necessary to evaluate the performance for each schedule as compared with those items having the value of A or B+. It was a complete failure if the child could not be scored B+ and it was a superior performance if the child could do items in the A+ category, so that a child whose attainments were mostly at the C level was definitely retarded in development.

Hence the average or at-age performance is not clearly indicated. The classification is rough and not statistically useful. Apparently, this was what Gesell wanted — a way of roughly gauging the levels of development, avoiding mental age, I.Q., standard deviation, or other derived scores.

In making this scoring indefinite and vague, Gesell took a legitimate stand against the current tendency to place too much reliance upon an exact score. Had his test items been more carefully evaluated this tendency might have been corrected and a more satisfactory tool might have been placed in the hands of persons who feel the need of "exact scores."

Gesell has made a distinct contribution because of the unusual variety of test items which have the merit of easy observation and being well adapted to the study of infants.

From Gesell's initial study several infant tests have later been evolved. Few of these have covered the range of development represented by the original test items, and while exact scoring has been introduced in the later tests, the subjectivity that was present in the Gesell schedules has not been eliminated and exists in the reliance upon observation by both the examiner and the mother's report.

### GESELL'S THEORIES OF INFANT DEVELOPMENT AND THE SCHEDULES

It was from Gesell's results in the study of the process of development that his theories of infant growth were promulgated.

To Gesell, mind is a process of organizing, integrating, and controlling individual function. Growth is therefore a process of change, of increase in mental effectiveness. "The child's mind," he wrote, "does not grow by a simple linear extension. He has a persisting individuality but his outlook on life and on himself transforms as he matures. He is not simply becoming more "intelligent," in a narrow sense of this much misused term. 'He alters as he grows'" (1940a, p. 15). He defines mental growth as the maturation of the neuromuscular system and the other involved physical structures. Nerve cells "become organized into patterns of responsiveness or into reaction systems," so that in a fundamental sense, he says, "the patterning of the mind is inseparably connected with the microscopic and ultramicroscopic patterning of nerve cells" (1928, pp. 11-12).

Thus he emphasizes the great primary importance of predetermined biological maturation. He puts into a secondary and limited role the effect of the environment in mental development. For example, the neural mechanisms for walking are laid down before the child can walk. The environment does not engender the arrangements, experience does not create them. The neural organization has anticipated them.

Gesell was primarily a physiologist, a physician rather than a psychologist. The developmental schedule that grew out of the observation and inspection of the voluminous accumulation of records is set forth as being not a test of infant intelligence but rather a normative device for appraising the developmental status in young children. He had a certain prejudice for the use of "intelligence" in connection with this process of evaluation. His schedule is designed to be a measure of mental growth. Thus in his presentation of the four major fields of behavior — motor characteristics, adaptive behavior, language, and personal-social behavior — he considers the "adaptive behavior aspect" a convenient "category" for dealing largely with intelligence. He regarded mental development as the functional aspect of biological maturation in which change is both quantitative and qualitative in nature. Environment plays only an "inflecting" and "specifying" rather than an "engendering" role and takes place under the control and within the limits of a genetically determined developmental potential.

### FACTOR ANALYSIS OF THE SCHEDULES

Various studies have been made of Gesell's schedules. A few factor-analytic studies have been made that suggest a changing nature of "mental ability" during the process of growth. Stott and Ball (1963, pp. 96-103) factor analyzed separately both the 6-months level and the 12-months level of the Gesell schedules.

The 35 originally selected items were reduced to 19 in both schedules because of dependent relations that were not always evident by inspection.

Eight factors were found. In Factor 1, seven items were selected as having a factor meaning involving exploratory manipulation of objects; Factor 2 selected tests with a high loading in memory responses; Factor 3 involves reaching directly; Factor 4, locomotor ability; Factor 5, reflex development; Factor 6, exploiting materials to make noise; Factor 7; visual recognition of relations — visual responses to a stimulus provided by examiner; Factor 8, whole body control (psychomotor).

At the 12 months level, again 19 items were selected as being independent. Again eight factors were obtained. Factor 1, social intercommunication — a response that is culturally or socially oriented; Factor 2, semantic language related, verbal communication; Factor 3, awareness and relatedness to the environment; Factor 4, psychomotor control, manual-small motor; Factor 5, gross psychomotor control; Factor 6, memory for behavioral relations; Factor 7, inhibits hand to mouth; Factor 8, a deductive response, with element of reasoning.

The four major areas as selected by Gesell do not conform to the factor findings indicating a faulty original subjective selection of these areas; for example, in Factor 2 (12 months) a semantic language verbal communication, the items included are: says 4 words, says "bye-bye," inhibits hand to mouth, bowel control.

Certainly the logic of the first two items as language-related is obvious. But "inhibiting hand to mouth" requires major communication and so does "bowel control," which is usually a resultant of language training. The factor analysis brings out these hidden relations. And while the items in Factor 4 seem logically related, their placement in the original Gesell categories does not agree with the factor finding. These items all appear in Factor 4, which was labeled psychomotor control: builds tower of two, stands alone, puts cube in cup – play, tries to put on shoes, uses spoon.

Every factor shows disagreement with the placement of the item in the original schedule.

## CONCLUSION

It is quite possible that the suggested "changing nature" of mental ability may have an explanation in the selection of items in the four original schedules set up by Gesell and in their scoring usage. Most studies of these tests give them small credit for later predictive value, stating their value lies in neurologic and intellectual evaluation of the infant at the time of testing, rather than any agreement with later tests as the infant matures.

Later and more extended evaluation of the test items indicates that if they were treated with modern methods of scoring and standardization they might yield results that would give predictive information about infant development. More precise directions for giving the items is essential. Surely the contributions of these elaborate studies of infants deserve to be absorbed as they have been in our modern analysis of infant behavior.

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