STANDARDISATION OF THE CATTELL'S INFANT INTELLIGENCE SCALE IN INDIA

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SUMMARY

301 children were tested longitudinally upto 3 years using the Cattell's Infant Intelligence Scale. The data was subjected to item analysis and validity and reliability calculated. It was found that with a few modifications Cattell's scale could be profitably used in relevant areas in psychiatric practice for the assessment of children below 3 years of mental age.

Although introduced more than forty years ago, psychometric evaluation of infants is yet to find its place in the routine screening of children for developmental deviations. Both theoretical uncertainty and operational difficulties may be held responsible. The former because some authorities (Piaget, 1936, Bayley, 1969) consider it unlikely that intelligence as measured in the older age groups is present below two years of age. The latter has to do with the great immaturity of the child at these ages, making them incapable of understanding or following any but the most rudimentary instructions, much therefore depending on the examiner's experience and skill.

Mental testing in large numbers of infants and very young children was first conducted by Arnold Gesell. He published a schedule for developmental testing as early as 1925. Many of the later published schedules are modifications of these earlier tests (Griffith, 1954; Lennesberg, 1967). The Cattell's infant intelligence scale claims to be without bias of culture or social class because of the deletion of certain items from the tests. Freeman in his book "Psychological Testing" considers the Cattell's scale to be of "Superior Merit", because of stricter standardisation criteria and better scoring techniques. The Bayley Tests of infant Development also deserve mention as they have been standardised in India.

There is a paucity of reports of Infant development studies in the Indian literature. A Study conducted by Phatak of the Baroda University Child development Centre stands out as the only major work reported thus far. Dr. Phatak has used the above mentioned Bayley Scales of Infant development in her studies. The rest of the available literature comprises of small studies, mostly done as requirement for thesis in Home Science or Child Development.

Since the need for a scale is Universally recognized the present standardisation of the Cattell's Infant Intelligence Scale was done as part of a study of norms of Intelligence of Indian Children (0-2½ yrs), conducted for the I.C.M.R. at Panjim Medical College, Goa.

AIMS

1. To standardise the Cattell's Infant Intelligence Scale on an Indian population using a sample of 300 children living in and around Panjim, Goa. The study is a longitudinal one, and envisages seeing each child at seven age levels hereafter referred to

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as the cardinal ages—3, 6, 9, 12, 18, 24 and 30 months.

2. To establish reliability and validity of the tests on the same population.

MATERIAL AND METHOD

The Cattell's scale was rewritten using Konkani words for the few verbal items. The items were scrutinised to see that they did not carry a cultural bias, e.g. use of a toy egg beater was excluded from the test. But most items were found suitable. The proforma was reviewed by a team consisting of a senior Psychiatrist (the guide in the project), two other Psychiatrists including the research fellow and a clinical psychologist.

Materials used were for the main part found in the Cattell's kit. They consisted of rattle, ring, cube, and bell at earliest level, the bell, string, mirror, pellet and spoons added at the middle level and pegboards, formboards, miniatures of common objects, pictures of common objects interspersed by a few verbal items at the last level.

The scale was administered to a random sample of three hundred children who were first examined between the ages of one month and one year. Initially each child was examined by a pediatrician to see that he was free of any illness. Each child was subsequently followed up from the date of its nearest cardinal age. Eighteen children were followed up to the age of thirty six months to establish validity of the scale.

It takes about half an hour to examine each child. The mother was present throughout and she was made comfortable before the child was approached. All examinations were carried out by the research fellow. Upto the fifth month the tests are administered in the recumbent position after which the child is made to sit on the mother's lap with the test materials on a table in front of him.

Each item was scored as plus or minus. There are five items at each age level, so each item gets a credit of one-fifth of the interval covered, e.g., if tests are at monthly intervals as in the first year, then each item gets a credit of two tenths of a month and if tests are at two monthly intervals then they get a credit of four tenths of a month for each item and so on. All the credits are added up to get a mental age. The I.Q. is then derived from the usual formula.

RESULTS

The standardisation of the tests is based on 980 examinations on 301 children. The average I.Q. for the total number of children seen was obtained as 103 with a standard deviation of 13. When the frequency distribution was plotted against a graph, a bell-shaped curve was obtained. No mal I.Q. obtained with the use of other intelligence tests also shows this distribution. The Bell shaped curve implies that 95% of I.Q.s fall within 2 standard deviations from the mean and 66% within 1 standard deviation from the mean. There was a significant increase in % passing each item at successive ages. The early intelligence tests like the Gessell's scale used this as the only criterion of validity of the tests. It shows that an item distinguishes well between developments at different ages. To illustrate this two sample ages are shown in Table I.

RELIABILITY OF THE TESTS

Reliability was tested by the split half method and corrected for length using the Spearman Brown formula. The reliability at each age is given in Table II along with Cattell's results. We were surprised to get such a high coefficient of correlation at the 3 month level because of all
Table I. % passing each item

| Item                        | 5mth old | 6mth old | 7mth old |
|-----------------------------|----------|----------|----------|
| Cube secures                | 43%      | 78%      | 90.5%    |
| Cup lifts                    | 43%      | 71%      | 90%      |
| Mirror Manipulates          | 46%      | 73%      | 90.5%    |
| Reaching unilateral         | 11%      | 42%      | 66.7%    |
| Reaching persistent         | 18%      | 47%      | 81%      |
| Cube approaches 2nd         | 14%      | 58%      | 81%      |
| Pellet scissor grasp         | 33.3%    | 81.9%    | 100%     |
| Spoon looks where hidden    | 38%      | 65%      | 88%      |
| Bell rings                  | 27.8%    | 64.6%    | 88%      |
| Adjusts to gesture          | 11%      | 68.8%    | 100%     |
| Adjusts to words            | 11%      | 56.8%    | 83%      |
| Imitates sounds             | 5.6%     | 49%      | 83.3%    |

Table II. Coefficient of reliability

| Age  | 3mths | 6mths | 9mths | 12mths | 18mths | 24mths | 30mths |
|------|-------|-------|-------|--------|--------|--------|--------|
| Our Study | 0.86 | 0.87 | 0.61 | 0.80 | 0.77 | 0.72 | 0.72 |
| Cattell's study | 0.56 | 0.88 | 0.86 | 0.89 | 0.90 | 0.83 | 0.71 |

the ages subjectively this seemed the most difficult to score.

From the table we conclude that the Cattell's Infant Scale is a reliable test.

VALIDITY

The validity was established by noting the significant number of passes at successive age levels and also by comparing test results obtained in the present study with results obtained by the same sample on the Binet Kamath intelligence test when they reach 3 years of age. Table III shows the results.

The validity coefficients obtained in our study show that in comparison with the Binet Kamath test of Intelligence, our tests show a fairly high degree of validity, Cattell's results do not show the same degree of validity and she has postulated some reasons why this may be so.

COMMENTS

The results indicate that the Cattell's Scale fulfils the standardisation criteria required in a psychometric test. It is easy to administer and score, and on the whole holds the interest of the child.

The scale would be useful in recording baseline routine assessment of child-
### TABLE III. Coefficient of validity

|        | 3mths & 36mths | 6mths & 36mths | 9mths & 36mths | 12mths & 36mths | 18mths & 36mths | 24mths & 36mths | 30mths & 36mths |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Our study (Compared with Binet Kambath at 3 years) | —   | 0.74           | 0.40           | 0.42           | 0.84           | 0.89           | 0.75           |
| Cattell’s study (Compared with Binet Stanford at 3 years) | 0.10 | 0.34           | 0.18           | 0.56           | 0.67           | 0.71           | 0.83           |

In well baby clinics, diagnosing mental retardation in infancy and identifying developmental delay in only one area during infancy. But it will be of no use in predicting future intelligence.

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**REFERENCES**

Bayley, Nancey (1969). Mental Growth during the first three years. New York: New York Psychological Corporation.

Griffith, R. (1951). The abilities of Babies. New York, McGraw Hill.

Lenneberg (1967). Biological foundations of Language. New York, Wiley.

Piaget, J. (1936). The Origin of Intelligence in the Child. Penguin Books.