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RELIABILITY OF MOTHERS' REPORTS ON CHILD DEVELOPMENT

by

Leslie Taylor Hefner

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Doctoral Committee:

Associate Professor Sarnoff A. Mednick, Chairman
Professor Anna S. Elonen
Professor Charles A. Metzner
Assistant Professor Warren T. Norman

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CHAPTER I

INTRODUCTION

Child development and child-rearing practices are the subject of thought, discussion, hypothesis, and decision among a vast range of scientists and practitioners. Personality theorists postulate causal relationships between early childhood experience and the emergent adult personality. Social psychologists and social anthropologists relate child-rearing practices to culture and class variables. Clinical psychologists, psychiatrists, and pediatricians assess the nature and severity of a child's condition in the context of the case history.

Where does the clinician, researcher, or theorist get his raw materials? How does he know what has actually gone on in the early lives of particular children or groups of children - how they have developed and what child-rearing practices have been exercised upon them?

Some researchers have enlisted the cooperation of mothers in bringing their children to a clinic or nursery school situation at regular and frequent intervals to be examined or observed in interaction with the mother (Gesell, 1948; Stott, 1955; Rheingold, 1960; Crandall, Preston, & Rabson, 1960). Reliance on such techniques would confine research to those variables which are accessible to direct observation in limited, intermittent time periods, and to elicitation in this kind of setting. In addition, it would restrict the number of subjects available for study and provide information on samples biased in favor of a particularly cooperative and dependable selection of mothers.

In order to study a broader population and to learn about past or unique events in the child's life, researcher and clinician alike must turn to a "reliable informant," someone who has been on the scene in some natural capacity during the critical period. Almost invariably, in this culture, it is the mother who serves this function.

Scores of investigators rely on the mother's report of her child's development and her interactions with him, with only a formal bow to the idea that information thus gained might contain error or distortion. The classical study by Davis and Havighurst (1946) on "Social Class and Color Differences in Child Rearing" in Chicago has been followed by publications by Maccoby and Gibbs (1954), Klatskin (1952), White (1957), Littman, Moore, and Pierce-Jones (1957), Havighurst and Davis (1955), Miller and Swanson (1958b), and Sears, Maccoby, and Levin (1957), seeking to demonstrate patterns in child-rearing practices, and relationships between these and social class variables of the mother or behavioral variables of the child. Other investigations have focused more on discovering relationships between child-rearing practices and the emergent personality as the child grows toward adulthood (Miller & Swanson, 1958a; Moulton, 1957). With rare exception, these studies have relied upon mothers' reports for information about how the children were reared (when they were weaned, toilet trained, etc.), and facts about the children's behavior (how much they fought with their siblings, etc.). Most investigators who use mothers as informants mention briefly the possibility of biases entering into the reports, but after a speculative comment or two, dismiss the matter and proceed to state their findings in terms that imply complete confidence in their data sources.

Wemar (1961) discusses the fact that some personality theories and

schools of psychotherapy discount the importance of validity on the grounds that a person's behavior is based on his feelings and perceptions, rather than facts. Some views even go so far as to disclaim interest in reliability, and propose to deal with the past only as it is mediated through the person's present perceptions and feelings. Such approaches, as Wenar points out, preclude the possibility of developing a body of knowledge about the relation between maternal behavior and personality development in the child. He cites, for example, the question of whether differences observed in the parents of schizophrenic children, as compared with parents of normal children, bear a causal relation to the child's pathology or reflect the parent's attempt to adjust to the pathology already existing in the child.

Carrying Wenar's position one step further, it is possible that the invalidity and unreliability of the mothers' perceptions (i.e., the discrepancy between fact and perception and the fluctuations in perceptions over time) are precisely what we must study in order to understand the child's problems in learning to perceive and cope with "reality."

Be that as it may, differential diagnosis in the clinic still relies heavily upon "facts" of the child's present and past physical and psychological condition, and generally there is no choice but to rely on the mother's report for a large proportion of these "facts." The need for a broad, systematic look at the nature of mother-reported information is pressing from both practical and theoretical standpoints.

A few investigators have addressed themselves directly to the question of how accurate mothers' reports may be. Pyles, Stoltz, and Macfarlane (1935) present some findings on the validity of mothers' reports regarding prepartum circumstances and postnatal development, the reports

being made when the children were 21 months old. A study by Haggard, Brekstad, and Skard (1960) compares similar material reported by 19 working-class Norwegian mothers at four points in time covering a seven- to eight-year span. Wenar and Coulter (1962) present a suggestive reliability study on 22 mothers, comparing their reports on developmental and attitudinal material with reports on the same material six years later.

These investigators generally agree that "factual" data are more accurately reported than attitudinal data. Distortions or shifts in reports are usually interpreted as being in the direction of creating a more acceptable picture, with facts being "idealized" and anxiety-provoking material disappearing. For example, Pyles et al. (1935) state that birthweight was accurately reported but disturbances and injuries involved in pregnancy and birth tended to be omitted, and ages at which the children first walked and had their first tooth tended to be reported as having happened earlier than the records indicated.

But the pattern indicated by these generalizations about the type and directionality of shifts in reports is by no means clear-cut, nor completely consistent with other studies. In a study by Mednick and Shaffer (in press) comparing pediatricians' records with mothers' reports nine years later, ages reported for completion of bowel training do indeed show a regular shift in the direction of the "ideal" -later reports giving earlier ages. But the mean shift in this "factual" information was nine months. Smith (1958) and McCord and McCord (1961) suggest that mothers are able to report some socially undesirable information accurately, but at the same time may distort or disguise other information. In the study by Haggard et al. (1960), some of the initial reports on attitudinal information correlated only .02 with reports one year later, but as high

as .60 with reports eight years later! This calls attention to the fact that the relation of time span to the reliability and validity of reports may not be a simple one. Haggard et al. also found the ability of a mother to recall certain attitudinal material to be related to the sex and birth-order-position of the child in question. In studies by Takala, Nummenmaa, and Kauranne (1960), and Antonovsky (1959), information obtained from mothers varied as a function of the data-gathering technique. Antonovsky was unable to account for the variability in terms of the degree of anxiety and conflict evidenced by the mothers.

The picture presented by this array of studies is far from coherent. Although all agree in raising substantial doubts about the wisdom of taking mother's reports at face value, the variety of results reflects the complexity of the problem.

What we ultimately need to know is: Under what conditions are mothers' reports valid? To answer this question, objective observation will have to be made of mother-child interaction and developmental events over long periods of time and on large numbers of children, a tremendously complicated and expensive undertaking. One way of narrowing the task is first to study the problem of reliability, for in general, a report can be valid only to the extent that it is reliable.

The reliability of a mother, as an informant, can be tested by comparing her report at one point in time with her report on the same information at another point in time. If the discrepancies are consistently small, and random as to direction, we can conclude that, given the conditions of the study, mothers are reasonably reliable informants. If this is not the case, the data can be analyzed further regarding the conditions under which discrepancies of various sorts tend to be maximized

or minimized.

It will be helpful, at this point, to set up a conceptual framework within which the problem of reliability can be discussed.

Strictly speaking, validity in the present context means that the mother reports the same information that we record from an independent source. Accurate acquisition, stable retention, and correct reporting of the information are presumed necessary on the mother's part. We will use the word reliability to mean that the mother reports the same information at different points in time. Acquisition (not necessarily accurate), stable retention, and correct reporting of the information are presumed to be involved in this case. Thus, establishing that a report is reliable also establishes that two of the three prerequisites for validity have been met. And any demonstrated weakness in reliability is also an indication of lowered validity, as these terms are defined here.

The present study asks, to what extent and under what conditions is a mother a reliable informant? The focus is on "factual" questions of the sort usually asked in developmental histories. Variables related to the mother's opportunity to acquire the facts, and variables in the reporting situations are held constant (in so far as possible) through selection of subjects and design of the report condition, rather than manipulated. A selection of variables considered to be differentially related to the likelihood of her acquiring the facts, to her ability to retain them, and to possible tendencies to distort them are analyzed. The mother's awareness of, and ability to compensate for unreliability are tested. The time interval between reports is held constant, but the significance of the placement of this interval relative to the time of the event in question, and to the rates of various phases of development, is

explored.

Chapter II describes the population chosen for the study, the kinds of questions asked, and the circumstances under which they were asked. Chapter III presents a description of the degrees and types of reliability found, and explores relationships among reliability, mothers' certainty, and time and measurement factors. The magnitude and directionality of shifts in reports are further examined with regard to characteristics of the child, the parents, and the interviewer. Chapter IV concludes with a discussion of the results and some conjectures regarding further implications of these findings.

CHAPTER II

METHOD

Subjects

The School of Public Health at The University of Michigan has been engaged in a long-term study of disease health and environment, involving the entire community of Tecumseh, Michigan. In May and June, 1958, as part of this Community Health Study, every mother of preschool age children in the community was approached regarding the motor development of each of her children. Of the 618 families contacted for the 1958 interviews, 13 refused to participate. The subject population for the present study consists of every mother interviewed about a child who was between nine months and three years of age at that time (i.e., who was born between May, 1955 and September, 1957). This particular age range was used because of the significant developmental functions emerging at that time, and because of special characteristics of the subquestionnaire administered to mothers of children in this category.

Whenever a mother had more than one child in the eligible age group, one was selected to be the subject of the interview planned for the present study. Two criteria were used in this selection (otherwise the choices were made randomly). Children were preferred who (a) were born in the local hospital, because birth records would then be available, and (b) belonged to a birth-position category that was less well-represented than others in the total subject population, because more-

nearly even frequencies in these categories would make certain analyses more feasible. A child was excluded from the study if (1) he was the product of a multiple birth or there were stepsiblings in the family (making birth position ambiguous); (2) he was not living with the natural mother; (3) he had been separated from his mother for longer than one month at any time; (4) someone other than the mother had responded to the 1958 interview; (5) the family was not a member of the predominant white, English-speaking subculture (no negroes were encountered but there were a few Mexican families); (6) there was evidence of gross physical or developmental abnormality (cerebral palsy, cleft palate, clubbed limbs, etc.). There was also some attrition of the sample over the two and one-half year interval between the 1958 interview and the 1960 study, as people moved out of the study area or refused to participate in further studies. Of the 417 pre-schoolers on whom data were gathered in 1958, 288 remained eligible and available in 1960; of these 30 were used in pretests for the present study, and 24 were rejected after the 1960 interview because of information about the child or family which then came to light. The study sample used for the analyses totals 232 mother-child pairs.

Table 19, showing the frequencies in each rejection category and Table 18, comparing the occupational characteristics of the study sample with those of the total population can be found in Appendix I.

Questionnaires

1958 Questionnaire. The interviews administered in 1958 as a part of the Community Health Study were aimed at getting a picture of each individual child's development. A great many of the questions sought qualitative information about the contemporary situation (i.e., Have you

tried to toilet train him yet? How is it coming along?), and were therefore poorly suited to a reliability study. There were, however, a number of questions which asked for the age at which a particular function had emerged, and responses to these provide the basis for the present analysis.

The design of the 1958 questionnaire permitted flexibility in the choice of questions to be asked about each child. The particular subsets of questions used in each case depended upon (a) the general age group to which the child belonged (i.e., the mother of a nine-month old infant was never asked whether the child had learned to do up buttons), and (b) particular developmental features revealed during the interview (i.e., having responded to "How does Jimmy get about?," the mother was then questioned in detail regarding either crawling or walking, depending upon the level Jimmy had reportedly reached). Some questions used at the earlier age levels were also included in some form on questionnaires designed for later age levels. For example, mothers of nine-month olds and three-year olds alike were asked to give the age at which the first tooth had emerged. Since accurate developmental information was sought, the mothers were often encouraged to refer to records (baby books, birth certificates, etc.), and the use of records was noted by the interviewer.

The kinds of questions available for this study, and the various numbers of mothers responding to each one,are thus largely a function of the manner in which the 1958 questionnaire was constructed, and the ages of the children at the time of its administration.

The 1958 questionnaire appears in Appendix II.

1960 Questionnaire. For the present study, a new questionnaire was devised containing:

(1) questions based on the 1958 questionnaire, asking the ages at

which various developmental events had occurred. A pool of questions worded as much like their 1958 counterparts as possible was built for each developmental area involved (i.e., talking, locomotion, eating, and toilet training). Every interview schedule was individually tailored to match the 1958 interview of that particular mother, with questions drawn from the pool. Thus, while different mothers were asked about different arrays of events, all mothers who were asked about any one event were asked exactly the same question.

(2) inquiries regarding the mother's certainty about the ages she had given. After all the age questions had been asked the mother was asked to qualify each response according to the exactness with which she felt she could date the event in question - was it an extremely rough and hazy guess? was it accurate within a specified number of months? was it exact? Every effort was made to set an atmosphere in which any of these possibilities would seem completely acceptable and natural. The interviewers had to approach this task with some degree of flexibility, but the inquiry appearing on pp. 74-75 of the questionnaire in Appendix II served as their guide.

(3) factual questions about the family setting (current number of children, mother's work history, etc.). These were used in updating records, eliminating unsuitable cases, and providing facts which would be used in the analysis.

(4) a variety of questions tapping the mother's opinions, attitudes, and sources of information on various phases of child rearing. These lie beyond the scope of the present analysis.

The 1960 questionnaire appears in Appendix II.

Procedure

The first child development questionnaire was administered as part of the long-term research program being carried out by the Community Health Study. Interviewers trained and supervised by the directors of the study administered the questionnaire to the mothers in their homes during May and June, 1958. The second questionnaire was administered during October and November, 1960, providing a span of from 2 years 3 months to 2 years 7 months between the 1958 and the 1960 reports. These interviews were also administered in the home by nine experienced interviewers employed by the Community Health Study. None of the nine interviewers for the 1960 study had participated in the 1958 study.

The interview was pretested in the field, revised and pretested again. A manual was developed on the basis of these experiences to provide interviewers with uniform policies and instructions. The manual is presented in Appendix II. Through individual and group training sessions and the pretest experience, the interviewers became thoroughly familiar with the instrument and its purpose and grew proficient in its use. Training and field supervision were done by the author.

Half of the mothers were interviewed by five male and half by four female interviewers. Mother-interviewer assignments were carefully randomized and a randomized order of administration was adhered to insofar as possible. For example having interviewed mother #1, the interviewer then approached mother #2 on his list, even if #2 lived across town and #3 lived next door to #1. If #2 was found not to be at home, the interviewer proceeded to #3.

The interview was introduced to the mother as being sponsored by the Community Health Study with which the community was already familiar,

and was described as an attempt to learn how normal children grow up and what mothers think about how children should be reared. Every effort was made to distract or dissuade the mother from referring to baby books or other records. When the mother was insistent she was urged to give a "guess" before looking up a fact. In a few instances, this was unsuccessful and the response had to be omitted from the analysis. The interview took from one-half hour to two hours, but most often about 45 minutes. In general, the mothers were interested and cooperative. Only two out of the 234 approached refused the interview.

CHAPTER III

RESULTS

Indices of Discrepancy

In order to examine the reliability of mothers' reports, an index of discrepancy between the two reports and an index of the uncertainty about the second report were computed. Each mother was asked to report the age at which her child first:

1. started walking alone without holding on to anything (Walk Age),
2. started crawling on his hands and knees (Crawl Age),
3. started speaking words other than "mamma" or "dadda" (Word Age),
4. could be depended upon to use the toilet for bowel movements (B.M. Age),
5. could be depended upon to use the toilet for urinating (Urine Age),
6. got to the stage of always staying dry through the night (Night Dry Age),
7. started eating with a spoon (Spoon Age).
8. started using a fork (Fork Age),
9. started holding a cup or glass (Drink Age),
10. got a tooth (Tooth Age);

and:

11. how much he weighed at birth (Birthweight).

The mothers were free to give their reports in any units but throughout the analysis variables 1-10 are dealt with in months, and Birthweight in ounces. For variables 1-10, the age reported by the mother in 1958 was subtracted from the age reported in 1960, yielding an Age-Age

Discrepancy. This value is positive if the mother's second report presents the developmental function as having emerged later than did her first report; that is, the report shows a positive shift over the 2½-year period. This value is negative if the mother's second report presents the function as having emerged earlier than did her first report; that is, the report shows a negative shift. This value is zero when the ages reported in 1958 and in 1960 are identical. The same sort of discrepancies were computed for Birthweight.

In the case of Birthweight, hospital records available on 42% of the sample made it possible to check the validity of the '58 and '60 reports. Discrepancies were computed between the hospital report and each of the mother's two reports, in addition to the 1958-60 discrepancy.

On the 1960 questionnaire, the mothers were given an opportunity to qualify their responses regarding variables 1-10, and these qualifications were coded as follows:

(1) Exact - mother feels certain the event occurred exactly at the age she has reported.

(2) Range - mother feels the event might have occurred earlier, or later, or either; lower and upper age limits of the range within which she feels confident it occurred were recorded.

(8) Don't know - mother really has no recollection of when the event actually occurred, so gave her best guess, but does not feel able to give a range.

All these cases are considered to represent ranges, covering regions varying in size from a point (range = 0) to an indeterminate number of months, no greater than the age of the child in 1960.

An Age-Range Discrepancy (which will be referred to as the Range Discrepancy) was computed, parallel to the Age-Age Discrepancy, but using the mother's qualified 1960 report for comparison with the 1958 report.

When the qualified response is exact," the Range Discrepancy is identical with the Age-Age Discrepancy. In the case of a "range" response, the Range Discrepancy is zero if the range encompasses the age reported in 1958 (e.g., the '58 response is "10 months," and the '60 response is "between 8 and 11 months"). When the 1958-reported age falls below the range, the Range Discrepancy equals the lower limit of the range minus the '58-reported age, and is positive (e.g., if the '58 response is "10 months," and the '60 response is "between 11 and 13 months" the Range Discrepancy = + 1 month). When the '58-reported age falls above the range, the Range Discrepancy equals the upper limit of the range minus the '58-reported age, and is negative. Thus positive and negative shifts are represented in the same fashion as in the case of the Age-Age Discrepancies. When the mother's response is "don't know," the range is considered to be maximal, and the Range Discrepancy must therefore equal zero. The Range Discrepancy is always equal to or less than the Age-Age Discrepancy.

Age-Age Discrepancies

The average amount of discrepancy between the 1958 and 1960 reports in a developmental question can be expressed in terms of the mean of the absolute values of the Age-Age Discrepancies in that question. Table 1 gives this value for each of the 11 questions, along with the standard deviation and the values between which we can be reasonably sure that each true mean lies[1] (i.e., the 95% confidence interval for the true mean). These values are also shown for the discrepancy between the Birthweight reported in the hospital records and those reported by the mothers in 1958 and 1960,

[1] Strictly speaking, a statement in this form is one of "likelihood," rather than "probability," in that it expresses a degree of rational belief about the population in terms of the sample outcome. (Fisher, 1930). This form is useful in relating the findings to the "true" situations confronting the clinician or researcher without becoming involved in complicated verbal circumlocutions. Table headings are expressed in terms of likelihood, rather than probability.

TABLE 1

ABSOLUTE AGE-AGE DISCREPANCY, IN MONTHS*

FUNCTION	N	MEAN	SD	95% CONFIDENCE INTERVAL
Walk	210	.98	1.57	.76 to 1.20
Crawl	131	1.22	1.34	.98 to 1.46
Word	136	4.19	4.00	3.41 to 4.87
B.M.	82	6.78	6.39	5.36 to 8.20
Urine	89	6.15	6.27	4.83 to 7.47
Night Dry	47	5.23	6.18	3.43 to 7.03
Spoon	157	3.75	3.74	3.15 to 4.35
Fork	89	6.67	5.90	5.41 to 7.93
Drink	136	4.42	3.98	3.74 to 5.10
Tooth	222	1.24	1.70	1.02 to 1.46
Birthweight				
1958-Hospital	92	.96	2.79	.38 to 1.54
1960-Hospital	98	1.49	3.02	.89 to 2.09
1960-1958	218	1.61	3.73	1.11 to 2.11

* Except Birthweight, which is reported in ounces.

respectively, for those cases where hospital records were available.[2]

The frequencies of Age-Age Discrepancies (1960 minus 1958 values) having positive, negative, and zero values in each question are summarized in Table 2. Confidence levels derived from a sign test (Dixon and Mood, 1946) carried out on the positive and negative frequencies, indicate the degree of confidence with which we can assume the non-zero discrepancies to be truly more frequent in one direction than the other. The full frequency distribution for each question is given in Table 3.

Some information as to the relationship between size and direction of the shifts is shown by the mean of the algebraic values of the Age-Age Discrepancies. Table 4 gives these means, along with the standard deviation, 95% confidence intervals and notes on significant directionality.

Table 5 shows the Pearson product-moment correlation coefficient between the 1958 and 1960 reports for each question, representing the extent to which the relationship between the two reports is described by a straight-line function. The reliability of the r's themselves has been taken into account by converting to Fisher's z and calculating the standard error of z (Guilford, 1950). We can be reasonably certain (95%) that the reliability of the mothers' reports for a given question lies between the confidence limits shown in the table.

For purposes of comparison, the most important statistics from Tables 1 through 5 have been summarized in Table 6 giving the values of six discrepancy measures for each of the 11 questions. Table 7 shows the

---

[2]The hospital records of Birthweight were collected on a more extensive age group in the course of a validation study by Smith, Moore, and McReynolds (1960). Comparison of the hospital records with the mothers' '58 reports in the larger group yielded results very similar to those of the present study.

TABLE 2

SUMMARY OF

FREQUENCY AND DIRECTION

OF AGE-AGE DISCREPANCIES

FUNCTION	N	DISCREPANCY			LIKELIHOOD*
		ZERO	NON-ZERO		
			NEGATIVE	POSITIVE	
Walk	210	100	66	44	< .05
Crawl	131	45	43	43	ns
Word	136	31	60	45	ns
B.M.	82	16	21	45	< .01
Urine	89	19	24	46	< .05
Night Dry	47	10	20	17	ns
Spoon	157	37	83	37	< .01
Fork	89	15	20	54	< .01
Drink	136	23	80	33	< .01
Tooth	222	86	78	58	ns
Birthweight					
1958-Hospital	92	69	14	9	ns
1960-Hospital	98	68	16	14	ns
1960-1958	218	149	37	32	ns

* Computed from the positive and negative frequencies by the sign test, under the null hypothesis of no difference in positive and negative frequencies.

TABLE 3

FREQUENCY DISTRIBUTION OF AGE-AGE DISCREPANCIES

FUNCTION	N	Size of Negative Discrepancy (in mos., except birthweights in ozs.)																				
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	...	24
Walk	210	100	46	11	4	3		1				1										
Crawl	131	45	25	9	5	3		1														
Word	136	31	4	8	13	4	1	8	4	4	3	3		4	1	1	1			1		
B.M.	82	16	2	2	3	3		5		1	2	1		2								
Urine	89	19	1	4	1	4	2	6	1	1	1	1		2								
Night Dry	47	10	3	4	2	3		3				1	1	2					1			
Spoon	157	37	5	14	14	7	7	18	4	3	4		1	3	2					1		
Fork	89	15	2	3	1	2		10						1	1							
Drink	136	23	9	12	12	5	8	8	5	8	2	2	3	1	1		1		2	1		
Tooth	222	86	39	27	6	3		1	1	1												
Birthweight																						
58 - Hosp.	92	69	5	2	2	1	1	1	1									1				
60 - Hosp.	98	68	5	1	2		1	2	2	1	1	1										
60-58	218	149	12	9	2	3	2	1	3	2		1	1									1

(Table continued on next page)

TABLE 3

FREQUENCY DISTRIBUTION OF AGE-AGE DISCREPANCIES

FUNCTION	N	Size of Negative Discrepancy (in mos., except birthweights in ozs.)																			
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	...	24
Walk	210	100	46	11	4	3		1				1										
Crawl	131	45	25	9	5	3		1														
Word	136	31	4	8	13	4	1	8	4	4	3	3		4	1	1	1			1		
B.M.	82	16	2	2	3	3		5		1	2	1		2								
Urine	89	19	1	4	1	4	2	6	1	1	1	1		2								
Night Dry	47	10	3	4	2	3		3				1	1	2					1			
Spoon	157	37	5	14	14	7	7	18	4	3	4		1	3	2					1		
Fork	89	15	2	3	1	2		10						1	1							
Drink	136	23	9	12	12	5	8	8	5	8	2	2	3	1	1		1		2	1		
Tooth	222	86	39	27	6	3		1	1	1												
Birthweight																						
58 - Hosp.	92	69	5	2	2	1	1	1	1									1				
60 - Hosp.	98	68	5	1	2		1	2	2	1	1	1										
60-58	218	149	12	9	2	3	2	1	3	2		1	1									1

(Table continued on next page)

TABLE 4

ALGEBRAIC AGE-AGE DISCREPANCY, IN MONTHS*

FUNCTION	N	MEAN	SD	95% CONFIDENCE INTERVAL	DIRECTIONALITY
Walk	210	-.05	1.84	-.31 to .21	ns
Crawl	131	.06	1.81	-.26 to .38	ns
Word	136	-1.00	5.70	-1.98 to -.02	negative
B.M.	82	3.93	8.45	2.07 to 5.79	positive
Urine	89	3.18	8.18	1.44 to 4.92	positive
Night Dry	47	.60	8.08	-1.76 to 2.96	ns
Spoon	157	-1.66	5.03	-2.46 to -.86	negative
Fork	89	4.34	7.78	2.70 to 5.98	positive
Drink	136	-2.04	5.59	-3.00 to-1.08	negative
Tooth	222	-.05	2.11	-.33 to .23	ns
Birthweight					
1958-Hospital	92	-.20	2.94	-.82 to .42	ns
1960-Hospital	98	.04	3.37	-.64 to .72	ns
1960-1958	218	.27	4.05	-.27 to .81	ns

*Except Birthweight, which is reported in ounces.

TABLE 5

CORRELATION BETWEEN AGES REPORTED IN 1958 AND 1960

FUNCTION	N	r	95% Confidence Interval
Walk	210	.63	.54 to .70
Crawl	131	.58	.52 to .68
Word	136	.34	.18 to .48
B.M.	82	.39	.19 to .56
Urine	89	.38	.19 to .55
Night Dry	47	.70	.52 to .82
Spoon	157	.30	.15 to .44
Fork	89	.39	.19 to .56
Drink	136	.12	-.05 to .28
Tooth	222	.58	.48 to .66
Birthweight	218	.98	.97 to .99

TABLE 6

SUMMARY OF TABLES 1-5

AND MEAN AGE REPORTED IN 1958, IN MONTHS*

FUNCTION	N	MEAN AGE 1958	MEAN ABSOLUTE DISCREPANCY	MEAN ALGEBRAIC DISCREPANCY	SD ABS. DISC.	SD ALG. DISC.	RANGE OF DISCREPANCIES	AGE-AGE CORRELATION
Walk	210	11.6	.98	-.05	1.57	1.84	20	.63
Crawl	131	8.1	1.22	.06	1.34	1.81	12	.58
Word	136	15.6	4.19	-1.00	4.00	5.70	39	.34
B.M.	82	21.7	6.78	3.93	6.39	8.45	42	.39
Urine	89	22.0	6.15	3.18	6.27	8.18	48	.38
Night Dry	47	23.8	5.23	.60	6.18	8.08	47	.70
Spoon	157	13.7	3.75	-1.66	3.74	5.03	39	.30
Fork	89	16.3	6.67	4.34	5.90	7.78	43	.39
Drink	136	12.0	4.42	-2.04	3.98	5.59	30	.12
Tooth	222	6.5	1.24	-.05	1.70	2.11	18	.58
Birthweight	218	119.9	1.61	.27	3.73	4.05	48	.98

* Except Birthweight, which is reported in ounces.

order of the first 10 questions[3] in relation to one another, by the '58 reported age (col. 1), and by each of the six measures from "good reliability" to "poor reliability" (top to bottom, columns 2-7).

From these tables, it is clear that the Age-Age Discrepancies obtained for the developmental questions are heterogeneous in magnitude and character.

Birthweight is reported with astonishing consistency, the correlation between '58 and '60 reports being .98, the average discrepancy being 1.6 ounces, and the maximum discrepancy being 24 ounces. Furthermore, neither the magnitude nor the frequency of shifts is greater in one direction than the other.

In contrast, Urine Age, B.M. Age, and Fork Age reports show discrepancies as great as 30 and 36 months, with an average size of about $6\frac{1}{2}$ months. These are significantly larger and more frequent in a positive direction. The correlations between the '58 and '60 reports are less than .40.

Discrepancies in Drink Age and Word Age reports are smaller on the average and in the extreme, and the shifts tend to be in a negative direction. In the case of Drink Age, the directionality shows up both in frequency and magnitude measures; but the '58-'60 correlation is the only one not significantly different from zero. Shifts in Word Age reports tend to be larger but not more frequent in a negative direction, while the '58-'60 correlation is .34.

The shifts in Walk Age reports also tend to be more frequently

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[3]Birthweight is omitted because of the incomparability of weight and time units of measurement.

TABLE 7

RANK-ORDER OF DEVELOPMENTAL FUNCTIONS

BY 1958-REPORTED AGE AND BY

DISCREPANCY MEASURES

RANK	MEAN '58 AGE	MEAN ABSOLUTE DISCREPANCY	MEAN ALGEBRAIC DISCREPANCY	SD ABS. DISC.	SD ALG. DISC.	RANGE OF DISCRE-PANCIES	AGE-AGE CORRE-LATION
1	Tooth	Walk	* Tooth	Crawl	Crawl	Crawl	Night
2	Crawl	Crawl	* Walk	Walk	Walk	Tooth	Walk
3	Walk	Tooth	Crawl	Tooth	Tooth	Walk	* Tooth
4	Drink	Spoon	Night	Spoon	Spoon	Drink	* Crawl
5	Spoon	Word	Word	Drink	Drink	* Spoon	* Fork
6	Word	Drink	Spoon	Word	Word	* Word	* B.M.
7	Fork	Night	Drink	Fork	Fork	B.M.	Urine
8	B.M.	Urine	Urine	Night	Night	Fork	Word
9	Urine	Fork	B.M.	Urine	Urine	Night	Spoon
10	Night	B.M.	Fork	B.M.	B.M.	Urine	Drink

* Equal scores

negative, but the average discrepancy is small (less than one month), the maximum discrepancy 10 months, and the '58-'60 correlation .63.

Reports on Crawl Age shift about as far, on the average, as those on Walk Age but are smaller in the extreme (six months) and are not directional. Tooth Age follows a very similar pattern.

Reports on Night Dry Age are also nondirectional, but as large as 30 months in the extreme, and five months on the average. Despite these extremes, the '58-'60 correlation (.70) is the largest of all, excepting Birthweight.

These tables are based on all the data available in the study, for each developmental question. The variation in N from 222 to 47 reflects the number of mothers responding to each question, which is due in turn to the number of children having completed various stages of development at the time of the first questionnaire, and to special characteristics of the questionnaire design already discussed. Of the 232 mothers on whom we have data, variously overlapping subsets are represented in the data for the 11 questions.

The observed heterogeneity of discrepancies among developmental questions is demonstrated more specifically in separate analyses (described more fully on pp. 46-51) on a less extensive but factorially complete set of data. Walk, Word, Urine, Spoon, and Tooth Age data were used. Both algebraic and absolute Age-Age Discrepancies were subjected to analyses of variance and found to be significantly related to variation in developmental question.

Analyses of sources of significant differences between questions by the Tukey multiple comparison method (Tukey, 1953) yield the following groupings:

Absolute Discrepancies			Algebraic Discrepancies		
Spoon Word Urine	significantly larger than	Walk Tooth	Urine	significantly larger than	Walk Word Tooth Spoon

(See footnote, p.48)

Another type of discrepancy encountered involved the fact of an occurrence rather than its date. Of the 131 mothers who responded to the crawl question in 1958, 14 at that time said their children had never crawled (i.e., had begun walking without going through a crawling stage). Of these 14, seven gave a Crawl Age in the 1960 report, two of these following up with "exact" when allowed to qualify the response. An additional 15 of the 131 mothers gave Crawl Ages in 1958 but in 1960 denied that their children had ever crawled. Similarly, in 1958, of the 222 mothers who responded to the Tooth question, five reported that their children were born with the first tooth. None of these mothers mentioned this fact in 1960, and four of them gave Tooth Ages, the fifth giving a blanket "don't know" response to the question.

Reliability of Age-Age Discrepancies

Returning to the original question "Are mothers' reports reliable?" it is clear from these data that the answer is manifold, and must be qualified according to the kind of reliability and the particular developmental area or question in which one is interested.

As would be expected, averaged algebraic group data show the greatest stability. If we were seeking normative information, and simply used these mothers' reports to calculate the mean developmental ages for the various functions, our data would have varied as little as .27 ounces

for Birthweight, and .05 months for Tooth and Walk Ages, from 1958 to 1960. The largest discrepancy we would have to contend with would be 4.34 months for Fork Age. However, while the mean discrepancies are small, six of the 11 are significantly directional, suggesting that the mothers' reports may be systematically biased, and thus not usable for normative purposes without appropriate corrections.

If we were to use the data more extensively as, for example, correlating one phase of development with another (e.g., Walk Age with Birthweight, or toilet training ages with some personality or child-rearing variables), we would be faced with the fact that the validity of our results, at best, could be no higher than the square root of the reliability of our measures, and the reliabilities range as low as .12 for Drink Age, and are below .40 for Fork, Spoon, Word, B.M., and Urine Ages.

The relatively high reliability coefficient of .70 and low average algebraic discrepancy of .6 months for Night Dry Age should be heartening in this context. But the average absolute discrepancy is 5.23 months, the extreme discrepancies are +30 and -17 months, and the standard deviations of the distributions of absolute and algebraic discrepancies are 6.18 and 8.08 months respectively. This reveals that the consistency being reflected in the r of .70 is that of the position of a mother's report relative to the position of other mothers' reports. Mothers who gave early Night Dry Ages in '58 tended to give earlier ages in '60, and mothers who gave late ages in '58 tended to give later ages in '60. On the average, the shift was about five months, and the positive shifts were about as numerous and as frequent as the negative shifts. So, it can be seen that, while the mothers showed a certain consistency relative to one

another in what they did, and there is an over-all directional balance, the reports themselves could not be called reliable in the sense of yielding the same information at two points in time, even on a group basis.

When individual data are needed, as in a clinical setting, the problem is even more pronounced, and the variation among developmental questions more striking.

How reliable are the 1960 reports of any single mother randomly selected from among the 232 here represented? In the case of Birthweight, there is a 68% chance that her report will be identical, to the ounce, with the report she gave in 1958. The chances of the two reports varying by more than four ounces are less than one in six, and the maximum variation expected is 24 ounces. For Walk Age, the odds are nearly equal that the two reports would be identical, and for Walk, Crawl, and Tooth Ages, the odds are about two to one that the '60 reports would not be more than three months different from the '58 report. In a few extreme cases, however, the reports will be as much as six or 10 months discrepant in these areas, and in the case of crawling the very occurrence of the event may be in question.

On the other hand, in the toilet-training questions, there is only a 20% chance in this sample that the '58-'60 discrepancy will be zero, and a 50% chance that the reports will vary by six months or more, with possible extremes up to 18 and even 36 months. In the cases of B.M. and Urine Ages, there is a 20% chance that the mother in question will give an age which is 12 or more months at variance with the '58 report. Our best guess is that in '60 she will report the training to have occurred later than the age given in '58.

Age-Age Discrepancies Related to Scale of Measurement

This comparison of questions raises a problem regarding the equality of measurement units. Is one month, during the first six months of life comparable to one month during the second, third, fourth, twentieth, or fiftieth six-month periods of life? Clearly, the developmental significance of one-month intervals from birth to death is not constant, and probably neither linear nor unidimensional (Thompson, 1954, pp. 303-306). But during the first three years of life, there is a deceleration in many spheres of development, and functions appearing later tend to emerge more gradually and to show more interchild variation in age of emergence (Shirley, 1931).

It seems possible, then, that the variation in Age-Age Discrepancies might be accounted for by a temporal "expansion" of our yardstick. In order to explore this hypothesis, Pearson product-moment correlation coefficients were computed to compare the age of emergence of the 10 functions with three different measures of relationship between the two reports for those functions. The '58-reported age was used as the best available estimate of the actual age of emergence.

The means of the absolute Age-Age Discrepancy distributions for the 10 questions (shown earlier in Table 1) correlate .83, and the corresponding standard deviations correlate .92 with the estimated mean ages of emergence. These are both significant beyond the 1% level of expectancy. When the correlation between the '58 and '60-reported ages for each function is correlated with the age of emergence of the functions, the result is insignificant ($r = -.03$). Apparently, a large proportion of the variance among functions is accounted for by the "expanding scale," and the amount of inter-mother variation in discrepancy size is highly

related to the "expansion" of the scale. But the variation among functions in test-retest intercorrelation is not predicted by this "expansion" over time. Thus, at one level, most of the reliable variance is accounted for by the age of emergence of the function, while at another level of description most of the variance remains unaccounted for.

Range Discrepancies Compared with Age-Age Discrepancies

When the mothers are permitted to give the 1960 report in the form of a range, the discrepancy between the '58 and '60 reports necessarily diminishes. Even if the size and position of the range were randomly assigned, the probability of its encompassing the '58 age would be higher than when the '60 age is expressed as a point. The question is, can a mother judge the accuracy with which she remembers the time of an event and express this judgment in a compensating range of appropriate size and placement?

Table 8 gives the mean absolute discrepancy between the '58 age and '60 range for each area, along with the standard deviation and 95% confidence interval for the true mean.

Comparison of the absolute Age-Age and absolute Range Discrepancies for each question appears in Table 9, which shows the mean difference ($\underline{d}$ = the mean of the individual Age-Age versus Range differences), the $\underline{t}$ value for the mean difference between matched groups, and the significance of the $\underline{t}$.

The mean of the algebraic Range Discrepancies for each question is shown in Table 10, which also gives the standard deviation, the 95% confidence interval, and a note on the directionality of the mean when significant.

TABLE 8

ABSOLUTE RANGE DISCREPANCY, IN MONTHS

FUNCTION	N	MEAN	SD	95% CONFIDENCE INTERVAL
Walk	210	.86	1.49	.66 to 1.06
Crawl	131	.94	1.22	.72 to 1.16
Word	134	3.24	3.69	2.60 to 3.88
B.M.	82	6.13	6.23	4.75 to 7.51
Urine	89	5.57	5.90	4.31 to 6.83
Night Dry	45	5.00	6.04	3.20 to 6.80
Spoon	157	3.17	3.84	2.55 to 3.79
Fork	89	5.75	5.50	4.59 to 6.91
Drink	135	3.72	3.95	3.04 to 4.40
Tooth	221	.92	1.53	.72 to 1.12

TABLE 9

COMPARISON OF ABSOLUTE AGE-AGE

DISCREPANCY AND ABSOLUTE RANGE DISCREPANCY

FUNCTION	N	MEAN DIFFERENCE	t	LIKELIHOOD
Walk	210	.11	3.698	$<.0005$
Crawl	127	.24	5.282	$<.0005$
Word	120	.66	5.294	$<.0005$
B.M.	81	.58	3.263	$<.005$
Urine	89	.57	3.202	$<.005$
Night Dry	45	.20	1.426	ns
Spoon	147	.35	2.858	$<.005$
Fork	86	.63	3.123	$<.005$
Drink	127	.47	4.471	$<.0005$
Tooth	215	.30	4.824	$<.0005$

TABLE 10

ALGEBRAIC RANGE DISCREPANCY, IN MONTHS

FUNCTION	N	MEAN	SD	95% CONFIDENCE INTERVAL	DIRECTIONALITY
Walk	210	.02	1.72	-.22 to .26	ns
Crawl	131	.05	1.53	-.21 to .31	ns
Word	134	-1.03	4.80	-1.85 to -.21	negative
B.M.	82	3.65	7.95	1.89 to 5.41	positive
Urine	89	2.90	7.58	1.30 to 4.50	positive
Night Dry	45	.73	7.80	-1.59 to 3.05	ns
Spoon	157	-1.90	4.60	-2.64 to -1.16	negative
Fork	89	3.51	7.14	1.99 to 5.03	positive
Drink	135	-2.03	5.03	-2.89 to -1.17	negative
Tooth	221	-.05	1.79	-.29 to .19	ns

These tables show a generally significant but uniformly small (less than one month) improvement in the average reliability of the mothers' reports for the various questions, when, at the second reporting, the mothers are permitted to express the age in the form of a range.

The absolute values of the Range Discrepancies show the same sort of inter-question variation (although slightly muted) as do the Age-Age Discrepancies, and the directionality of shifts is maintained.

Range Discrepancies, Certainty, and Reliability

If mothers are appropriately sensitive to the accuracy of their memories, the sizes of the ranges they allow themselves in reporting times of events should be directly related to the sizes of their Age-Age Discrepancies for those events.

Table 11 shows the average size of Range for each question, based on all cases where a measurable range was given (i.e., including the "exact" responses, but omitting the "don't know" responses) and also the Pearson product-moment coefficient of correlation between the size of the Range and the size (absolute value) of the Age-Age Discrepancy for each question. Again, if the response was "don't know," the value of the Range was indeterminate and thus the case could not be included in the correlation.

The effect of these omissions can be roughly estimated. If values could be attached to "maximal" ranges, the omitted cases would appear at the high end of the Range scale. Therefore, if these same mothers show high Age-Age Discrepancies, their omission will have lowered the correlations, while if they show low Age-Age Discrepancies, their omission will have raised the correlations. Table 12 shows the frequency of responses,

TABLE 11

MEAN RANGE IN MONTHS, AND CORRELATION OF RANGE WITH ABSOLUTE AGE-AGE DISCREPANCY

FUNCTION	N	MEAN	r
Walk	210	.16	.23
Crawl	127	.66	.06
Word	120	1.44	.04
B.M.	81	.90	.27
Urine	89	.82	.39
Night Dry	45	.53	.22
Spoon	147	1.02	.18
Fork	86	1.74	.09
Drink	127	.88	.18
Tooth	215	.46	.30

and the algebraic and absolute means of the Age-Age Discrepancies within each question for (a) those mothers who gave "don't know" responses, and (b) the total group. Fork Age is the only case where the mean of the omitted mothers' Age-Age Discrepancy suggests that the correlation might be misleadingly low.

None of the ten correlations indicates a high degree of relationship between the size of the Range and the Age-Age Discrepancy. The skewed distribution of the absolute Age-Age Discrepancies makes the interpretation of a linear correlation coefficient uncertain, so significance levels are not presented.

Another way of looking at the mothers' sensitivity to the accuracy of their memories is to regard the numbers of "exact" and "don't know" responses as indices of subjective certainty and uncertainty, respectively. These, in turn, can be related to the reliabilities of their reports. The proportion of "exact" responses, per question, was correlated (Pearson product-moment coefficient) with the mean absolute Age-Age Discrepancy, per question, yielding nonsignificant results ($r = .07$). Similarly, the proportion of "don't know" responses was unrelated to the absolute Age-Age Discrepancy ($r = -.06$). Thus, it seems that we do not get an accurate picture of the reliability of mothers' reports by looking at these expressions of the mothers' certainty.

Certainty Related to Scale of Measurement

If the mothers' certainty is not related to their accuracy, perhaps variations in certainty can be accounted for by the "expanding scale." The proportion of "exact" responses, per question, correlated with the estimated mean age of emergence of the functions yielded a non-

TABLE 12

ABSOLUTE AND ALGEBRAIC MEAN AGE-AGE DISCREPANCY, FOR MOTHERS GIVING "DON'T KNOW" RESPONSES FOR RANGE COMPARED TO ALL MOTHERS

FUNCTION	N		ABSOLUTE MEAN		ALGEBRAIC MEAN	
	Total	"Don't Know"	Total	"Don't Know"	Total	"Don't Know"
Walk	210	0				
Crawl	131	4	1.22	1.50	.06	-1.00
Word	136	14	4.19	3.64	-1.00	-2.79
B.M.	82	1	6.78	6.00	3.93	-6.00
Urine	89	0				
Night Dry	47	0				
Spoon	157	10	3.75	4.20	-1.66	.10
Fork	89	3	6.67	9.33	4.34	9.33
Drink	136	8	4.42	4.12	-2.04	.25
Tooth	222	6	1.24	1.17	-.05	-.50

significant result (r = .42). However, when the "exact" and "don't know" responses were excluded, the mean size of Range correlated .86 with the estimated mean age of emergence of the functions. Thus, the tendency to express absolute certainty about the report is not predictable on the basis of the "expanding scale." But when certainty is expressed in the form of a Range, its span is highly related to the average age at which the function reportedly emerges.

Time Lapse

At the time of the 1958 interview, some of the events the mothers were asked about had just occurred, and others had happened as much as three years earlier. Therefore, although the time interval between the two reports is kept a uniform length, it varies in its distance from the event. The relationship between time and the reliability of the reports is unknown. Presumably, reliability implies a memory process, and therefore could be expected to diminish with time, the rate and acceleration of change depending upon the type of memory process involved.

There are any number of possible relationships which might be postulated between time and reliability. The data in hand make it possible to test a simple assumption, namely that the discrepancy between pairs of reports given a constant number of months apart is not related to the Time Lapse (defined as the amount of time elapsed between the event and the first report). The left half of Table 13 shows the Pearson product-moment coefficients of correlation between the absolute Age-Age Discrepancy[4] and the Time Lapse for each question.

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[4] In those instances where the '58 age was based on records, the case was omitted, because both the time period between reports and the time between event and first report are altered by an unknown amount, depending on when the record was made. The use of records was not permitted in the 1960 interview.

TABLE 13

CORRELATION OF ABSOLUTE AND ALGEBRAIC

AGE-AGE DISCREPANCY WITH TIME LAPSE

FUNCTION	N	ABSOLUTE	ALGEBRAIC	
		r	r	Likelihood
Walk	154	-.08	.05	ns
Crawl	96	-.13	-.05	ns
Word	136	-.25	.47	< .01
B.M.	82	.20	.28	< .05
Urine	89	.13	.26	< .05
Night Dry	47	-.15	.01	ns
Spoon	157	-.19	.33	< .01
Fork	89	.17	.29	< .01
Drink	136	-.25	.43	< .01
Tooth	158	-.09	.11	ns
Birthweight	137	-.16	-.01	ns

The Time Lapse is here computed by using the '58-reported age as an estimate of the actual time of the event. If this estimate is unbiased, the correlations will tend to be decreased by any error inherent in the '58 reports. If the error is systematically related to the Age-Age Discrepancy, the correlations might be raised or lowered, depending on the nature of this relationship. Therefore, interpretations of Table 13 must be made with caution.

Tentatively, then, there appears to be a slight tendency for the discrepancies to be larger when the reports are made soon after the event.

In the case of Birthweight where the hospital records are available, a progressive increase is shown in the discrepancies as the time of report moves farther from the event (Table 1). In this comparison, reliability and validity are confounded.

It should be noted that none of these situations has controlled for the effect of the mother's previous response on her later one. This effect may be confounded with the effects of time on reliability.

Directionality of Discrepancies Related to Time Lapse and Certainty Measures

If imperfect reliability were simply the result of random variability and unmotivated forgetting, or the effect of an "expanding" time scale, the size and direction of shifts should be normally distributed about zero. But it has been shown that not all of the variance can be accounted for in this way; the shifts are often significantly directional. The problem now is to explore and account for this directionality.

The Pearson product-moment coefficient of correlation between the Time Lapse and the algebraic Age-Age Discrepancy for the 11 questions is shown in the right half of Table 13. There is a small but significant (1% level) tendency for reports made long after the event to shift positively in the cases of Word, Spoon, Fork, and Drink Ages, and a less significant (5% level) tendency for B.M. and Urine Age reports to do the same. These are exactly the same questions which show significantly directional mean Age-Age Discrepancies but the means are shifted negatively for Word, Spoon, and Drink Ages and positively for the others (see Table 4).

Is subjective certainty related to the direction of discrepancies? Table 14 presents the correlations between the algebraic Age-Age Discrepancy and the size of the Range when measurable (i.e., including "exact" responses where Range = 0, but excluding "don't know" responses). The correlations are all extremely small, although four are significant at the 1% level, and two more at the 5% level. In the case of Walk Age, larger Ranges (implying lower levels of certainty) are associated with a tendency toward negative Age-Age Discrepancies while in Word, B.M., Urine, Spoon, and Tooth Ages the larger Ranges tend to be used when the discrepancies are positive.

Age-Age Discrepancies and the Social Context

At the outset, it was postulated that the accurate reporting of a developmental event requires that it be noticed, remembered in some form, and effectively communicated. It was suggested that characteristics

TABLE 14

CORRELATION OF RANGE WITH ALGEBRAIC AGE-AGE DISCREPANCY

FUNCTION	N	r	Likelihood
Walk	210	-.19	<.01
Crawl	127	.12	ns
Word	120	.27	<.01
B.M.	81	.24	<.05
Urine	89	.32	<.01
Night Dry	45	.27	ns
Spoon	147	.28	<.01
Fork	86	.18	ns
Drink	127	.10	ns
Tooth	215	.15	<.05

of the mother and her relationship to the social context might affect the likelihood of her noticing a given event, and her ability to remember and communicate about it accurately. In order to explore this notion, two types of analyses were undertaken. In the first, χ^2 tests were made, using the frequencies of positive, zero, and negative Age-Age Discrepancies for each question as the dependent variable. In the second, analyses of variance were performed on the absolute and algebraic magnitudes of the Age-Age Discrepancies. Independent variables explored as potential sources of variation were the occupational and educational statuses of the parents, the sex and birth-order position of the child, and interviewer differences.

Occupational data on the parents had been coded in United States Census Bureau categories. On the basis of the frequencies within these categories in the total community, adjacent categories of men's occupations were grouped so as to provide three occupational levels containing approximately equal numbers of fathers. Women's occupations were grouped into five levels. The occupations included in each group are shown in Table 20 of Appendix III.

The categories into which men's and women's education were coded are shown in Table 21 of Appendix III. Again adjacent categories were grouped so as to provide appropriately large expected values in the cells of the χ^2 tables. The groupings vary slightly from one table to another because of the variation in the number of respondents to each question, and a policy of grouping only enough categories in each case to bring the expected values up to the minimum required to satisfy the χ^2 model. The groupings are indicated on the χ^2 tables themselves.

Position of the child in the family was coded into six categories:

only child, older of two, younger of two, oldest of three or more, middle of three or more, and youngest of three or more. Only children were sufficiently rare in the sample that this category often had to be omitted entirely. In the analyses of variance and whenever grouping proved necessary in the χ^2 analyses, only children were omitted, older and oldest were combined, and younger and youngest were combined. This yielded three groups of nearly equal frequencies.

Interviewer effects were analyzed from the standpoint of variation by individual interviewer, and by sex.

Table 15 charts the combinations of variables which were subjected to χ^2 analyses, and indicates those 11 yielding χ^2 values significant at or beyond the 5% level of confidence. One comparison significant at the 1% level of confidence out of 88 comparisons in all, is far from impressive. The fact that there are 11 comparisons significant at or better than the 5% level (including two better than the 2.5% level) is certainly no more than suggestive. The lack of independence in the data makes this especially difficult to evaluate. It is probably wisest not to interpret the χ^2 results. The contingency tables which produced the "significant" χ^2 values are shown in Tables 22 to 25 of Appendix III.

For the analyses of variance, the total sample was divided into three groups according to the father's occupational level. Each of these was subdivided according to the sex of the child. These were further subdivided into three "position of the child in the family" categories: first-born, middle-born, and last-born (only children being omitted). Four cases were chosen to represent each of the resulting 18 categories. The choices were made randomly among those cases with complete data for the develop-

TABLE 15

LIKELIHOOD VALUES ASSOCIATED

WITH SIGNIFICANT χ^2 RESULTS *

FUNCTION	FATHER VARIABLES		MOTHER VARIABLES		INTERVIEWER VARIABLES		CHILD VARIABLES	
	Occupational Level	Educational Level	Occupational Level	Educational Level	Sex	Individual	Position in Family	Sex
Walk			<.01	<.05				
Crawl							<.05	
Word					<.05			
B.M.								
Urine	<.05							
Night Dry								
Spoon								
Fork								
Drink								<.025
Tooth		<.05	<.025	<.05				
Birthweight					<.05		<.05	
Table Showing Details of Significant Comparisons	Table 22		Table 23		Table 24		Table 25	

Note: All 88 comparisons were carried out; the 11 significant results are indicated and are more fully described in Tables 22-25, App. III.

* Analyses were performed on the frequencies of negative, zero, and positive discrepancies.

mental questions being used. For this analysis, Walk, Word, Urine, Spoon, and Tooth Ages were chosen as representative of the areas involved in the total study, the data for these questions being most complete. (Since the Urine and B.M. questions were asked only if the child was within the 18-month to 3-year age group in 1958, inclusion of a toilet training question cut down the number of cases available, but resulted in a more homogeneous age group). The data table on which the analysis was performed thus consisted of 90 cells containing a total of 360 scores, with each mother contributing five of these scores (one score per question). In seven instances a missing score was estimated by the mean of the other scores in the cell. The df for error was adjusted accordingly. Two analyses of variance were done according to procedures developed by Collier (1958) for a four-dimensional system with constant correlations between levels of one dimension. One analysis was performed on the absolute values of the Age-Age Discrepancies (Table 16) and the other on the algebraic values (Table 17).

The main effect of variation in developmental function on the absolute discrepancies was discussed earlier. In this same analysis, position-of-the-child and occupational-level main effects appeared. The following sources of significant variation were found by the Tukey multiple comparison method.[5]

Position			Occupation		
First-born	Significantly smaller discrepancies than	Middle- and Last-Born	Highest Level	Significantly smaller discrepancies than	Lowest Level

[5] Once a variable is shown to have an effect the sources of the effect can be examined by making appropriate comparisons among the means of the categories within that variable. Methods for doing this are presented and discussed by Tukey (1953) and Scheffé (1959).

TABLE 16

ANALYSIS OF VARIANCE OF ABSOLUTE

AGE-AGE DISCREPANCIES AS A FUNCTION OF CHILD'S SEX AND POSITION,

AND FATHER'S OCCUPATION

Source	df	MS	F	L
Between mothers	54			
$\mu=0$	1	2394.13	152.349	<.0005#
Sex (S)	1	46.46	2.956	ns
Position (P)	2	60.34	3.840	<.05
Occupation (O)	2	53.03	3.375	<.05
S X P	2	3.58	<1	ns
S X O	2	5.45	<1	ns
P X O	4	40.09	2.551	ns
S X P X O	4	18.82	1.198	ns
Error (b)	36	15.71		
Within mothers	216			
Between Functions (F)	4	148.20	11.732	<.0005
S X F	4	21.93	1.736	ns
P X F	8	9.69	<1	ns
O X F	8	23.53	1.863	ns
S X P X F	8	12.72	1.007	ns
S X O X F	8	8.16	<1	ns
P X O X F	16	7.92	<1	ns
S X P X O X F	16	9.38	<1	ns
Error (w)	137 (144)*	12.63		

#This analysis deals with absolute magnitudes. Therefore, the fact that the total mean is significantly different from zero is an "artifact."

*The df for error would be 144 for complete data. Seven missing data values were estimated from the means of the individual cells (Lindquist, 1953, p. 148).

TABLE 17

ANALYSIS OF VARIANCE OF ALGEBRAIC

AGE-AGE DISCREPANCIES AS A FUNCTION OF CHILD'S SEX AND POSITION,

AND FATHER'S OCCUPATION

Source	df	MS	F	L
Between mothers	54			
$\mu = 0$	1	27.39	<1	ns
Sex (S)	1	58.80	1.853	ns
Position (P)	2	7.25	<1	ns
Occupation (O)	2	6.96	<1	ns
S X P	2	5.03	<1	ns
S X O	2	35.43	1.117	ns
P X O	4	24.13	1	ns
S X P X O	4	43.90	1.383	ns
Error (b)	36	31.74		
Within mothers	216			
Between Functions (F)	4	109.31	5.547	<.001
S X F	4	22.31	1.132	ns
P X F	8	10.39	<1	ns
O X F	8	23.89	1.212	ns
S X P X F	8	34.04	1.728	ns
S X O X F	8	12.76	<1	ns
P X O X F	16	24.61	1.249	ns
S X P X O X F	16	41.40	2.101	<.025
Error (w)	137 (144)*	19.71		

* The df for error would be 144 for complete data. Seven missing data values were estimated from the means of the individual cells (Lindquist, 1953, p. 148).

No interaction effects appeared in the analysis of absolute discrepancies.

Analysis of the algebraic discrepancies revealed the significant effect of variation in developmental function described earlier. In addition, it yielded a significant (2.5% level) third-order interaction effect indicating that the reliabilities of reports in these five developmental areas are differentially affected by the sex of the child, the position of the child in the family, and the occupational level of the father, in interaction with one another. A third-order interaction effect is too complex to be meaningfully interpreted.

CHAPTER IV

DISCUSSION

The first purpose of this analysis has been to explore the reliability of mothers' reports on some facts of child development about which mothers are commonly asked. Various types of reliability have been discussed in terms of the purposes for which the report data might be used. Responses to questions in a variety of developmental areas have been compared in terms of these reliabilities.

Results for different questions varied widely, but in general the findings discourage the unqualified use of mother-reported facts on child development. Nor do the data lend themselves to a broad generalization about the degree and character of errors in such reports. On the one hand, birthweight is reported here, as in earlier studies, with a high degree of reliability and validity. (Ironically, birthweight has not been shown to predict anything of interest in later life). On the other hand, ages for the completion of toilet training are reported here, as in the study by Mednick and Shaffer (in press), with large average discrepancies, and significant directionality. Furthermore, the reliability of reports about child rearing appears to be related, sometimes directly, and sometimes by way of complex interaction effects, to features of the family which are often considered to be meaningfully related to the events themselves. This would seem to cast a shadow of doubt over the interpretation of any relationships found to exist between mother-reported data on child development and other variables, particularly when the latter may be systematically related to the nature of the mothers' reports.

For example, among the many significant findings in the careful and extensive study by Sears et al. (1957) are the following: (1) age at which the child stopped wetting the bed related to severity of toilet training, (2) average age of beginning of bowel training related to percent of mothers rated "high" in sex anxiety, (3) median age at beginning of bowel training related to ordinal position of the child, (4) median age at completion of bowel training and mother's sex anxiety each related to social class level. All these findings are discussed in relation to one another, and to a host of others, the whole being woven into a very plausible picture of child-rearing practices and their relationships to the personalities of mother and child. The raw data for these elaborate analyses are drawn from interviews of the mothers, done when the children were five years old. If these data are subject to the same sorts of shifts over time as are revealed in the present study, the picture will be distorted as in a "fun house" mirror.

One clings to the hope that some formula or technique can be devised for decoding or neutralizing the effects of such distortions. Taking a cue from Mednick and Shaffer (in press) who point out that mothers frequently claim vagueness of memory or hesitate in dating an event, the present study has tested the hypothesis that mothers actually know how reliable their reports are, and can give us the information rather directly. Although the reliability of responses did not show impressive improvement under the qualified-report conditions, and none of the three certainty indices examined was dramatically sensitive to the reliability, one feature of the data is worth mentioning. Inspection reveals that when asked to give a range within which they felt confident the event had occurred, the mothers did not usually place the range

symmetrically around the age they had reported earlier in the interview. Instead they started or ended the range with that age. For example, having said her child walked at 12 months, she would later say it must have occurred between 12 and 16 months, rather than between 10 and 14 months. And, in a few cases, there was no overlap at all between the age and the range, despite the fact that the interviewer had just reminded her of the age she had given.

In connection with this, it is interesting to note that in the frequency distributions of discrepancies for certain questions, the discrepancies concentrate at 6, 12, and 18 months, implying that both the 1958 and 1960 ages have been thought of and reported on a six-month unit scale basis.

These two sidelights on the manner in which the reports were given suggest that mothers may not conceptualize the stream of development in the way the researcher or diagnostician does, and may not always be inclined to use numbers in the way we expect them to. In the first place, the dating and cataloguing of events is an activity involving habits and techniques of thought associated to some degree with intelligence, education, and professional and bureaucratic occupations. This might account for the positive effect of occupational level on reliability revealed in the analysis. In the second place, there is really little reason to expect something as emotionally involving as the socialization of one's child to be universally perceived in the same units (i.e., the set of developmental events we have chosen to ask about), and expressed in terms of an objective time scale. In our bureaucratic attempt to devise norms and

achieve uniform research data, we ask every mother to date the exact same event, whether she has noticed its occurrence or not. True, nearly every mother has been forced to notice the birthweight of her child. Quite a point is made of it in the medical care of the infant during its first few days. The information is further imprinted through social interaction as friends and relations are told of it, or informed by birth announcements, generally filled out by the mother herself. But in the case of walking development, some mothers react to the fact that the child can walk around holding on to the furniture, and report, "He's walking." Others ignore this stage, but become very excited when he takes his first step without holding on; and there are those who would still say at this stage, "He'll be walking soon." These events usually all take place within a month or so, while in the case of toilet training, the span from beginning to end of the process is usually a matter of many months. It makes sense, then, that the mother's frame of reference for thinking and remembering about toilet training would be on a different scale in terms of months from her frame of reference for walking development. And indeed, under the conditions of the present study, two-thirds of the variance in reliability among developmental questions is accounted for by what we have called the "expanding scale."

Another source of difficulty in obtaining accurate information lies in the nature of the evidence signifying the occurrence of a developmental event. The conclusion that walking has occurred is based on observation of a positive instance, while the conclusion that toilet training has been completed depends, in part at least, on observation of negative instances - i.e., the lack of accidents. As we take our measurements closer and closer to the time of the event itself, in an attempt to minimize error

due to memory shifts over time, we may actually be increasing the ambiguity of the evidence, and introducing greater error. Such a process may account for the discrepancy between the negative shift in toilet training ages found by Mednick and Shaffer (in press), and the positive shift shown in the present data. Suppose, for example, the child is 24 months old and has not had an accident for two months when we first interview the mother. She reports him trained at 22 months. Then suppose that at 30 months a sibling is born, and as so often happens, accidents occur for a month or so. When we re-interview at 48 months, that month of accidents is still vivid in the mother's memory, and she reports that training was not complete until 31 months. (Similarly, her pediatrician has recorded the month of accidents for she has called in distress for his advice). But, if we re-interview when the child is nine years old, chances are that from this vantage point, the month of accidents will be defined as a temporary relapse, and the earlier age will be reported. To be sure, the likelihood that the mother will define the accident-ridden month as evidence of incomplete training rather than as a relapse is undoubtedly related to factors in her personality and social setting. And all sorts of other errors (as, the effects of interpolated material, etc.) may be superimposed on those due to measurement ambiguity.

Sears et al. (1957) postulate that characteristics of the mother's general situation and attitudes affect her attitudes toward her child and her child-rearing practices. These, in turn, are seen as affecting the child's behavior and personality development. There is no quarrel with this. But we would add that the mother's situation and attitudes also affect her <u>perception</u> and <u>memory</u> of conditions and events. In order to

use her properly as a data-collecting agent, we will need to know more about these effects.

Exploration of these effects involves a variety of methodological considerations. Basic to the whole problem is the distinction between validity and reliability, and the fact that we are mainly interested in the former, but have much more ready access to data on the latter. Certain inferences can be drawn about the one from the other, but a reliability study inevitably leaves many of our questions unanswered.

Further study on the relationship of time to the accuracy of reports is badly needed. Ideally, mothers' reports would be sampled repeatedly over a long period of time, and validated against objective criteria which would also be kept up-to-date. But even in the absence of the validation data, such a study would be extremely valuable if appropriate steps were taken to control for the effects of the mother's earlier interview experience on her later reports.

Analysis of the excellent interviews tape-recorded by Sears et al. (1957) in the course of their study could provide information as to the ways mothers think about child development, and clues as to the amount and type of interview structuring necessary to achieve comparability among mothers, without lowering the meaningfulness of the questions and validity of the responses. Sears et al. gave considerable thought to this problem in designing their study, but their use of the interview material, once gathered, has focused on content, rather than methodology. For example, comments of the sort so vividly described by Mednick and Shaffer (in press) regarding the mothers' inability to remember events, are never mentioned.

Hopefully, further research on the problems of validity and relia-

bility, per se, combined with some sort of distillation of the wisdom gained through experiences such as the study by Sears et al. (1957), will eventuate in knowledge and techniques enabling researcher and clinician to make effective use of mothers' reports.

CHAPTER V

SUMMARY

Mothers' reports are widely used by clinicians and researchers as a source of information about child development. Little is known about the reliability or validity of data thus obtained.

The present study explored the reliability of reports given two and one-half years apart. Each mother was asked for certain factual information about one child (e.g. birthweight, age bowel training was completed, etc.). In the second interview, she was also asked to indicate how certain she was of each answer. Correlations were computed between the first and second report for each question. Discrepancies between the first and second report for each question were also computed and analyzed as to frequency, magnitude, and directionality. These characteristics of the discrepancies were then related to indices of the mothers' certainty length of time elapsed between the event and the first interview, average age reported for the event, sex of the child birth-order position of the child in the family, occupational and educational levels of the parents, and interviewer characteristics.

Report-report correlations were small. The size and character of the discrepancies varied widely from one question to another. A large proportion of the variance among questions in the absolute values of the discrepancies was accounted for by the average age at which the event reportedly occurred (i.e., events occurring in infancy were generally more reliably reported than those occurring in the second and third year).

First-born position of the child and high occupational level of the father were individually associated with small discrepancies. A third-order interaction effect on the algebraic values of the discrepancies was found between father's occupational level, sex, position, and question asked. In general, the mother's certainty was not related to the reliability of her responses.

The meaning and practical implications of various types of reliability and the relationship between reliability and validity were discussed. Some special methodological problems brought to light by the study were considered in terms of further research needs and possibilities.

APPENDIX I

POPULATION AND

SAMPLE CHARACTERISTICS

TABLE 18

COMPARISON OF OCCUPATIONAL CATEGORIES AS OCCURRING IN SAMPLE AND TOTAL POPULATION

Question asked: What kind of work are you doing now (did you do on the last job you had)?

Code Categories for first-mentioned Occupation	Males		Females	
	Sample %	Population %	Sample %	Population %
1. Professional	9.4	9.6	8.7	12.6
2. Semi-professional	4.5	2.5	1.4	1.5
3. Managerial and official	10.3	10.7	1.4	4.9
4. Clerical and kindred	7.2	5.6	46.2	29.3
5. Sales and kindred	4.0	4.7	9.6	9.0
6. Domestic service	0.0	0.2	3.8	7.8
7. Personal service	0.9	2.2	13.5	19.3
8. Protective service	0.9	1.4	0.0	0.1
9. Building service and porters	0.4	0.6	0.5	1.3
10. Agricultural, horticultural and kindred occupations	5.4	7.4	0.5	0.7
11. Skilled in manufacturing, mining, construction, transportation, communications, trade and service, public service and other occupations not elsewhere classified	25.1	22.7	3.8	3.0
12. Semi-skilled in occupations mentioned in code 11	29.6	27.9	8.7	9.4
13. Unskilled in occupations mentioned in code 11	2.4	4.9	1.9	0.9

Note: This information was obtained in interviews conducted by the Community Health Study during 1959 and 1960, and coded according to classifications from the Dictionary of Occupational Titles, Part II.

TABLE 19

FREQUENCY OF SUBJECTS EXCLUDED FROM SAMPLE,

BY REASON FOR EXCLUSION

Reason for Exclusion	N
Sibling included in study	47
Moved away	35
Used in 1960 pretest	30
Absent parent	21
Address unknown	19
Have step siblings or adopted siblings	13
Physical disability	5
Twin	4
Mexican and/or Spanish-speaking	4
Refused Community Health Study between 1958 and 1960	3
Refused 1960 interview	2
Rejected for unknown reason	2
Total excluded	185

APPENDIX II

QUESTIONNAIRE AND INTERVIEW MATERIALS

1958 QUESTIONNAIRE*

Block No._____

D. U. No._____

Section I Line No. _____

SECTION III-C DEVELOPMENT OF CHILDREN 9 UP TO 18 MONTHS

NAME OF CHILD: _____

45. How does _____ get about by himself?

IF WALKING, (If NOT WALKING, skip to Q. 45c)

45a. Does he usually walk alone or does he usually hold on to something or someone?

How old was he when he started doing this?

R M#

45b. How much does he walk and how much does he get around other ways-crawling or creeping?

Now skip to Question 46

IF NOT WALKING - BUT ON ALL FOURS,

45c. Would you describe the way he gets about - for example, does he pull himself along on his stomach or creep on his hands and knees or what?

How old was he when he started doing this?

R M

45d. How old was he when he started moving about from one place to another?

45e. Does he stand either holding on to someone or something or all by himself? How does he do it usually - can you describe the usual situation?

How old was he when he first started doing _____? (the most advanced activity)?

---

* Condensed portions of the Child Development Questionnaire administered by the Tecumseh Community Health Study in 1958 are reproduced here. Sections and individual questions not pertinent to the present study have been omitted. Space provided in the original form for recording answers is not shown here.

Interviewer code for mother's use of records (baby books, etc.) vs. memory.

IF HE STANDS AT ALL, (If NOT, skip to Q. 45g)

45f. Does he ever pull himself up or does someone have to stand him up?

IF CANNOT STAND AT ALL,

45g. Does he put any weight on his feet when someone is standing him up?

47. What kind of sounds does he make or what words does he say?

47a. Is there anything or any particular situation that gets him started "talking" - for example, seeing someone, or playing with a toy or wanting something? What does he say in these different situations?

47b. Does he recognize some things you call by name; for example, if you say, "where is your ball?" would he look at it?

48. Does he eat or drink anything without help or do you always feed him and give him drinks?

IF EATS ANYTHING OR DRINKS BY HIMSELF: (If NOT, skip to Q. 48b)

48a. What are the things he can do?
(Does he hold a bottle or a cup,)
(Eat anything with his fingers)
(Use a spoon?)
When did he first start doing it?

IF HE DOESN'T DO ANYTHING TOWARD FEEDING HIMSELF,

48b. Has he ever tried to feed himself or drink by himself? _____
What happened?

49. Have you tried to train _____ to use the toilet yet?

IF YES, (If NO, skip to Q. 50)

49a. For bowel movements or urinating or both?

49b. How is it coming along?

SECTION IV - DENTAL INFORMATION

1. About how old was _____ when his first tooth came in? R M

Block No. _____

D. U. No. _____

Section I Line No. _____

SECTION III-B DEVELOPMENT OF CHILDREN 18 MONTHS UP TO 3 YEARS OF AGE

NAME OF CHILD: _____

34. Does _____ walk without holding on to anything?

IF YES, (If NO, skip to 34e)

34a. About how old was he when he first started walking alone?

R M

34b. Does he ever creep or crawl any more?

34c. About how old was he when he first started crawling?

R M

34d. Does he ever really run, rather than just walk fast?

IF NO,

34e. How does he usually get about?

37. Does he talk much?

IF TALKS AT ALL, (If does not talk, skip to Q. 38)

37a. Can you tell me some of the things he says? For example, something he said today or yesterday.

(Does he speak only one word like "mamma" or "dadda" at a time or has he started putting words together two at a time, or does he speak sentences --putting 3 or more words together?)

37b. About how old was he when he first started to speak words other than "mamma" or "dadda"?

38. When he eats his regular meals, do you generally feed him, help him eat, or does he feed himself?

IF DOES ANYTHING HIMSELF, (If NOT, skip to Q. 38b)

38a. What does he do by himself? Like using spoon, fork or a cup

When did he first start using a _____?

ASK OF ALL

38. What does he need help with? Why?

40. Does he use the toilet for his bowel movements?

Usually Sometimes Other

IF USUALLY, (If sometimes or less, skip to Q. 41)

40a. Does he go himself, or do you take him, or sometimes one and sometimes the other?

IF GOES AT ALL BY HIMSELF,

40b. About how old was he when he first started?

41. Does he use the toilet to urinate?

Usually Sometimes Other

IF USUALLY, (If sometimes, or less, skip to Q. 42)

41a. Does he go by himself or do you take him, or sometimes one and sometimes the other?

IF GOES AT ALL BY HIMSELF,

41b. About how old was he when he first started?

42. Is he able to go through the night without wetting the bed?

Always Usually Occasionally Other

IF ALWAYS, USUALLY, (If occasionally or less, skip to Q. 43)

42a. How old was he when he started doing this?

1. About how old was _____ when his first tooth came in? R M

1960 QUESTIONNAIRE

TECUMSEH COMMUNITY HEALTH STUDY

SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MICHIGAN

CHILD DEVELOPMENT QUESTIONNAIRE*

NAME _____ SEX _____ I.D.# _____

ADDRESS _____ SERIAL # _____

PHONE _____ INTERVIEWER _____

BLOCK _____ D.U. _____ LINE # _____ DATE _____

One of the things we are trying to do in the Community Health Study is to find out how normal children grow up nowadays --how they develop and how they learn things. We feel that mothers are the people who know most about this, so we are trying to find out what mothers think about the job of being a mother, and how to raise children.

1. What do you feel is the most important thing about the job of being a mother?

2. How does a mother know what is the best way to bring up a child?

3. How do you decide what to do when problems come up about raising the children? (Do you decide what to do by yourself or do you try to get help or advice about it).

4. Do you ever talk about how to raise children or handle problems

	Never	Sometimes	Often
a. With your husband			
b. With other relatives			

5. Do you ever get advice without asking for it

	Never	Sometimes	Often
a. From your husband			
b. From other relatives			

---

* This reproduction of the questionnaire omits space for recording of answers. The actual form filled out by the interviewer required 16 pages.

6. Do you ever get advice or ideas on how to raise children or handle problems from

	Never	Sometimes	Often	Which
a. Magazines?				
b. Newspapers?				
c. Books?				
d. T.V.?				
e. Other mothers?				
f. Child study groups?				
g. Your doctor?				
h. Anyone or any place else?				

7. Have you ever been a member of a child study group?

NO _ YES
- a. Which one?
- b. Are you still a member?
  YES
  NO
- c. Why not?

8. Have you ever had (child) (any of your children) in Nursery School?

NO YES
- a. Where? (name of Nursery and City)
- b. Altogether, about how long have you had him/ anyone in Nursery School?

(Question further if necessary to find out how long she has been a Nursery School Mother.)

9. Have you ever had (child) (any of your children) in Sunday School?

NO YES
- a. Where? (name of Sunday School and city)
- b. Altogether about how long have you had him/ anyone in Sunday School?

Many doctors and psychologists feel that the early years in a child's life are especially important, but there is sometimes disagreement about what actually goes on during those early years. So we thought we would ask mothers about this, too. We are asking each mother about the early development of one child to get a cross-section of normal children. So I want to ask you a few questions about _____.

10. First let me be sure that I have his age and birthdate correctly here.

    a. He/she is _____ years old?

    b. His/her birthdate is _____ ?

    c. He/she is the _____ of _____children?

    OR

    d. He/she has no brothers or sisters?

    (Mark each correct statement with a check. Cross out incorrect information and enter correction.)

11. Has _____been with you all his/her life, or have you been separated from him/her at any time for more than a month, or so?

    Never Separated — If Separated:

    a. How long were you apart?
    b. How old was he/she at the beginning of the separation?
    c. Why were you separated?

	Right at that time	Range, Between	D.K.
12. About how old was he/she when his first tooth came in? _____ (age)	_____	_____ & _____	_____
13. About how old was _____ when he first started:			
(ask only marked questions and specify years or months!)			
a. pulling himself along on his stomach? _____ (age)	_____	_____ & _____	_____
b. crawling on his hands and knees	_____	_____ & _____	_____
c. moving from one place to another at all _____	_____	_____ & _____	_____
d. standing holding on to something _____	_____	_____ & _____	_____
e. standing without holding on to something _____	_____	_____ & _____	_____

	Right at that time	Range, Between	D.K.
f. walking holding on to something ___	____	____ & ____	____
g. walking alone without holding on to anything ____	____	____ & ____	____

14. About how old was he when he:
(ask only marked questions)

a. started making sounds like "nanananana"? ____ (age)	____	____ & ____	____
b. started saying "mama or dadda"? ___	____	____ & ____	____
c. started speaking words other than "mama" or "dadda"? ____	____	____ & ____	____
d. started putting words together two at a time? ____	____	____ & ____	____
e. started speaking sentences -- putting 3 or more words together? ___	____	____ & ____	____

15. About how old was he when he first started:
(Ask only marked questions)

a. holding a bottle? ____	____	____ & ____	____
b. holding a glass? ____	____	____ & ____	____
c. holding a cup? ____	____	____ & ____	____
d. eating with a spoon? ____	____	____ & ____	____
e. trying to feed self or drink by self ____	____	____ & ____	____
f. using fork? ____	____	____ & ____	____

16. Now I want to ask you a little about how _____learned to use the toilet. Does he always use the toilet for bowel movements?

NO

a. Does he use the toilet for bowel movements most of the time, some of the time, or what?

MOST SOME OTHER

b. About how old was he when he first started using the toilet for bowel movements at all?

____ ____ ____&____ ____

c. (if answer to "a" is MOST) About how old was he when he got to the stage of using the toilet for bowel movements most of the time?

____ ____ ____&____ ____

YES

x. About how old was he when he got to where you could depend on him to use the toilet for bowel movements all the time?

____ ____ ____&____ ____
(age)

y. About how old was he when he first started using the toilet for bowel movements at all?

____ ____ ____&____ ____

z. About how old was he when he got to the stage of using the toilet for bowel movements most of the time?

____ ____ ____&____ ____

17. Does _____always use the toilet for urinating?

NO

a. Does he use the toilet for urinating most of the time, or some of the time, or what?

MOST SOME OTHER

b. About how old was he when he first started using the toilet for urinating at all?

____ ____ ____&____ ____

c. (if answer to "a" is MOST) About how old was he when he got to the stage of using the toilet most of the time?

____ ____ ____&____ ____

YES

x. About how old was he when he got to where you could depend on him to use the toilet for urinating all the time?

____ ____ ____&____ ____

y. About how old was he when he first started using the toilet for urinating?

____ ____ ____&____ ____

z. About how old was he when he got to the stage of using the toilet for urinating most of the time?

____ ____ ____&____ ____

18. (Ask only marked questions)

a. About how old was he when he first started going to the toilet by himself without help, for bowel movements? ____ (age) ___ ____&____ ___

b. About how old was he when he first started going to the toilet by himself, without help, for urinating? ____ ___ ____&____ ___

19. Does he ever go through the night without wetting the bed?

NO YES

a. How regularly is he dry through the night?

ALWAYS USUALLY OCCASIONALLY

b. At about what age did he get to the stage of staying dry?

OCCASIONALLY ____ (age) ___ ____&____ ___

USUALLY ____ ___ ____&____ ___

ALWAYS ____ ___ ____&____ ___

(question up to the child's present level)

20. How much did he weigh when he was born?

Most mothers tell us they remember some of these things pretty exactly, and some things only roughly, and some things they don't remember at all and have to take a guess at.

We are interested in knowing which sorts of things mothers remember most clearly, and which things they just naturally forget.

So, let's take a minute to go back over these questions about _____, and you can tell me how you feel about each one.

For example, the first thing I asked you was:

"About how old was _____ when his first tooth came in?" -- and you said _____ months.

Now, would you try to tell me how close that answer probably is?

--

Do you remember it as happening right at that time?
Or could it have been a month or two earlier or later, or what?

(If not right at that time, probe for range. If mother is completely at a loss for a range because the memory is too vague to express in a range, check "D.K.")

Now, how about this one?

He first started to _____ at _____ months.

Was it exactly then? or could he have been a bit younger or older, or what?

(If not exact)

As you remember it, what is the youngest he could have been?
What is the oldest he could have been?

(continue through question #19)

21. Another thing we want to find out is how much children learn things by themselves, and how much they need help, or training, or teaching.

a. Let's take walking first -- would you say a child needs a lot of help or teaching to learn to walk, or a little help, or none at all?

A LOT A LITTLE NONE AT ALL

b. How about talking? Do they need a lot or a little or no help at all to learn to talk? (Especially first words, first sentences).

A LOT A LITTLE NONE AT ALL

c. How about using the toilet? Do they need a lot, a little or no help in learning to use the toilet?

A LOT A LITTLE NONE AT ALL

d. How about eating? Do they need a lot or a little or no help in learning to feed themselves?

A LOT A LITTLE NONE AT ALL

Now I want to ask you some more questions about children in general.

22. (Ask only marked questions)

a. When do you think most mothers should start trying to toilet train their children? (Child's age)

At what age should most children be able to:

(ask only marked questions)

b. start using the toilet for bowel movements?

c. use the toilet for bowel movements most of the time?

d. use the toilet for bowel movements all the time?

e. start using the toilet for urinating?

f. use the toilet for urinating most of the time?

g. use the toilet for urinating all of the time?

h. start going to the toilet for bowel movements by himself, without help?

i. start going to the toilet for urinating by himself, without help?

j. start going through the night occasionally without wetting the bed?

k. go through the night regularly without wetting the bed?

23. About how old should a child be when his first tooth comes in?

24. At about what age do you think a child should first be able to:

(Ask only marked questions)

a. pull himself along on his stomach?

b. crawl on his hands and knees?

c. move from one place to another at all?

d. stand, holding on to something?

e. stand without holding on to anything?

f. walk, holding on to something?

g. walk alone, without holding on?

h. walk about half the time, but still crawl the rest of the time?

25. At what age should most children begin to:

(Ask only marked questions)

a. make sounds?

b. say words?

c. start speaking words other than "mama" and "dadda"?

d. start putting words together 2 at a time?

e. start speaking sentences -- 3 or more words at a time?

26. At what age should most children begin

(ask only marked questions)

a. holding a bottle?

b. holding a glass?

c. holding a cup?

d. eating with fingers?

e. eating with spoon?

f. trying to eat or drink without help?

g. using a fork?

27. Have you held a job outside the home at any time since (child) was born?

NO YES

a. What sort of job?

b. Was this something you did regularly, or just once in a while?

Regularly Once in a while

c. How much time did you spend on this work each week?

d. How old was (child) when you first did this work?

e. For how long a period did you do this?

28. Have you attended school at any time since (child) was born?

NO YES

a. What sort of school? (level, night, extension, etc.)

b. How much time (class and study) did you spend on this work each week?

c. How old was (child) when you first started school?

d. For how long a period did you do this?

29. What would you say is the hardest thing about being a mother?

30. What would you say is the best thing about being a mother?

NOTES AND COMMENTS:

1960 INTERVIEWERS' MANUAL

INSTRUCTIONS TO INTERVIEWERS

In this interview we want to treat the mothers we interview as experts whom we are consulting for information on child development and training. To save the mother's time, and to make all the mothers alike in terms of the number of child development interviews they participate in, we are interviewing each mother about only one child. In order to get the right number of children of each age and sex and position in the family (first-born, etc.) for our analysis, we have selected a certain particular child to be asked about in each case, and no substitutions will do . This may have to be explained to some mothers who might want to give information about a different child (if, for example, she felt she could remember more about a different one of her children than the one we want to ask about). We want the mothers to answer from memory, and not to use baby books or other records. If a mother wants to get out records of this sort, it can be explained that not all mothers have such records, and that for scientific purposes all the mothers have to be interviewed under the same conditions, so we have to ask those with records not to use them. (If a mother is really upset about this, the interviewer can offer to spend a little time after the official interview is over going over the records with her. Corrections could be written in beside the original responses, but under no circumstances should the original responses be changed, and it must be made clear on the interview schedule which are the original responses, and which are done from records, if this is ever done.)

Question no. 1 has two purposes. The first is to establish rapport with the mother, to get her talking, and make her feel that what she has to say about this business of being a mother is extremely important to us. Listening to her intently and respectfully is more important, at this point in the interview, than getting down what she says verbatim. The second purpose is to find out what mothers feel are the most important things about being a mother. Try to write down the key phrases she uses verbatim, and in the order she has mentioned them, as much as possible.

In questions 2 & 3 we are actually trying to find out the same things we ask in questions 4, 5 and 6, but without suggesting any possible answers to the mother. We want to know what she spontaneously thinks of as her sources of the knowledge and moral support needed in rearing children. She may feel that a mother knows these things by instinct, or from her own experiences growing up. Or, she may turn to her mother or mother-in-law for guidance. Or, she may rely on religious precepts, or Dr. Spock, etc. She may be inconsistent, answering #2 "a woman's instinct," and in #3 tell us she reads everything she can get her hands on. The main thing is to list all the things she spontaneously mentions, in the order she mentions them. (Number them, if it will help make the order clear). If she refers to general areas like "reading" or "other people," ask what she reads, or which people she means (husband, inlaws, friends, doctor, etc. ---names are not needed). In question #3, the probe written in parenthesis can be used or not, as necessary. On both #2 and #3 it is essential not to be suggestive or leading in any way, even if the mother simply can not give any answer at

all. We want all the answers here to represent her own spontaneous thoughts.

In questions 4, 5, & 6 we are trying to extend and complete the information gotten in #2 and #3. Here we are deliberately suggesting possible sources of child rearing info, and want to know how much use each mother makes of each source. If the mother has already mentioned a source (as "talking with other mothers") it is alright to say on question #6 "you mentioned talking with other mothers. Would you say you get advice or ideas on raising children from other mothers sometimes, or often, or what?

The background information for question #10 will be filled out for each child in advance, from our census records. Be sure to enter any corrections necessary.

In question #11 we are mainly interested in the period of the child's life that he was not with the mother, and whether he may be a stepchild, or adopted. If the mother is reticent or vague about giving a reason for the separation, do not probe or urge much, as it is more important to keep her at ease for later questions than to get a detailed answer for this particular question. On questions 12 through 19. ask only the sub-questions (a,b,etc.) which have been marked with a circle around the letter of the question. Different sub-questions will be marked for different mothers, and it is essential to the design of the study that exactly the right sub-questions be asked in each case. After completing questions 12 through 19, it will be necessary to go back over precisely the same sub-questions, to find out how exactly the mother remembers each answer. Most mothers seem to answer developmental questions of the sort asked here by saying something like "well, it was sometime between Christmas and Jimmie's birthday, so I guess he must have been around 11 or 12 months old," or "I'm sure it was sometime in the spring," or "He was already walking by then so I guess he started talking around 14 months." In going through the questions the first time, the problem is to get the mother to specify a particular month. If she says "He was 7 or 8 months old" on the first run through, it will be necessary to ask her to choose one age, ---that is, one month during which she thinks it most probably happened. If she says "7 or 8 months old," ask "which do you think is probably the closest, or the most likely? 7 months or 8 months?" "What is your best guess --- 7 or 8 months?" On the second run through, then, we must ask "How close do you think that probably is? What is the earliest it could possibly have happened and what is the latest it could possibly have happened?" When the mother says "it was within a couple of months of then," it will be necessary to find out whether she means it could be two months off in either direction, two months off in one direction but not the other, or one month off in either direction. That is, if she says "7 months. That's within a couple of months, anyway," we need to know whether she is thinking in terms of a 5 to 9 month interval, a 7 to 9 month interval, a 5 to 7 months interval, or a 6 to 8 months interval. So, it will always be necessary to ask for the earliest and latest she feels it could possibly have been. The ages she gives for a sub-question should then be entered in the last two spaces after that sub-question. Throughout the sections asking for age of child, be sure to record all answers in months. If the mother says the child was 1½ years, write 18 months or write in "years" clearly. If the mother is ambiguous as to whether she means years or months (she may say her child was toilet trained at 1½, and actually mean months -- this has been reported in other studies); be sure to find out which she means. Beware of assuming she must mean one or the other because it makes more sense. (Mothers may not always be sensible).

On question number 22 some mothers will reject the idea that a child "should" develop in certain ways at certain times. They may say, for example "He should do it whenever he's ready," or "That all depends on the child. Some do it early and some late." In this case, the mother will have to be asked the question again with an emphasis on the word "MOST." If this still bothers her, ask her "about when would you expect the average child would probably ...." If she wants to give a range, (between 6 & 8 months) write it down, but then press for a single month by which most children would do the thing in question. Use the words "roughly," or "about when" if necessary. The question is deliberately ambiguous as originally stated, because some mothers do feel children really should show certain stages of development by certain ages. We want, first and foremost, to know about this. Then, for those mothers who do not feel this way, we want to know how they think "most" children or "the average child" would develop. It is extremely important not to suggest to the mother that either one or the other way of looking at things is the right way. Each time a mother balks at the "should" and the question has to be re-phrased, star the question, so that we can know which mothers are interpreting each question which way. Always try the original word first, as she may reject the "should" in some situations but accept it in others.

The last two questions should be handled much the same as no. 1. They are partly for the purpose of giving the mother a chance to say things she has had no chance to say during the more structural part of the interview, and partly aimed at getting content. Write down her key phrases, and indicate the order in which the ideas appear.

APPENDIX III

TABLES SUPPLEMENTARY TO

CHAPTER III

TABLE 20

OCCUPATIONAL GROUPS USED IN ANALYSES

Levels used in analyses of variance	Categories referred to in X^2 tables	Occupational Title*
I	1	Professional
	2	Semi-professional
	3	Managerial and official
	4	Clerical and kindred
	5	Sales and kindred
II	6	Domestic service
	7	Personal service
	8	Protective service
	9	Building service and porters
	10	Agricultural, horticultural and kindred occupations
	11	Skilled in manufacturing, mining, construction, transportation, communications, trade and service, public service and other occupations not elsewhere classified
III	12	Semi-skilled in occupations mentioned in code 11
	13	Unskilled in occupations mentioned in code 11
	14	Never worked

*Coded according to classifications from the Dictionary of Occupational Titles, Part II.

TABLE 21

EDUCATIONAL GROUPS USED IN ANALYSES

Categories referred to in X^2 tables	Educational Group
1	Less than 8th grade
2	8th grade completed
3	9th, 10th, or 11th grade completed
4	12th grade completed
5	12th grade plus 1 year college, 1 year business school, 2 years nursing or any technical training such as T.V. repair
6	12th grade plus 2 or 3 years college, 2 years or more business, or 3 years nursing training
7	4 years college
8	4 years college, 1-2 years graduate work
9	3 or more years graduate work

TABLE 22

RELATION OF FATHER-VARIABLES TO FREQUENCY OF NEGATIVE, ZERO, AND POSITIVE AGE-AGE DISCREPANCIES, BY FUNCTION

FATHER'S OCCUPATIONAL LEVEL

URINE

Occup. Level	-	0	+	
1-5	3 3.65	10 2.03	18 .25	31
6-11	11 1.13	3 1.50	15 .00	29
12,13	10 .83	5 .06	12 .29	27
	24	45	18	87

$\chi^2 = 9.74$

L $< .05$

FATHER'S EDUCATIONAL LEVEL

TOOTH

Educ. Level	-	0	+	
1	4 .00	1 2.53	6 3.43	11
2	9 .30	5 1.25	7 .47	21
3	18 .25	14 .70	13 .20	45
4	31 .25	50 2.98	20 1.30	101
5	7 3.21	2 .93	1 .98	10
6	5 .31	3 .39	3 .01	11
7,8,9	4 1.35	10 .62	6 .16	20
	78	85	56	219

$\chi^2 = 21.62$

L $< .05$

Note: The upper number in each cell is the observed frequency and the lower number is the $(\text{observed freq.} - \text{expected freq.})^2 / \text{expected freq.}$

TABLE 23

RELATION OF MOTHER-VARIABLES TO FREQUENCY OF NEGATIVE, ZERO, AND POSITIVE AGE-AGE DISCREPANCIES, BY FUNCTION

MOTHER'S OCCUPATIONAL LEVEL

WALK

Occup. Level	-	0	+	
1,2,3	5 .06	13 2.13	0 3.05	18
4,5	37 .32	52 .00	19 .43	108
7,10,11	6 1.60	17 .15	9 .87	32
6,9,12,13	5 1.38	14 .08	8 1.14	27
14	11 3.72	3 4.63	6 .88	20
	64	99	42	205

$\chi^2 = 20.44$
L $< .01$

TOOTH

Occup. Level	-	0	+	
1,2,3	6 .30	10 .19	6 .01	22
4,5	34 .40	55 2.75	22 1.78	111
7,10,11	16 1.11	8 2.78	12 .66	36
6,9,12,13	9 .03	11 .00	8 .05	28
14	9 .71	2 4.41	9 2.58	20
	74	86	57	217

$\chi^2 = 17.76$
L $< .025$

MOTHER'S EDUCATIONAL LEVEL

WALK

Educ. Level	-	0	+	
1,2	1 6.49	8 .00	8 5.38	17
3	15 .00	21 .16	12 1.00	48
4,5	39 .17	55 .00	22 .22	116
6,7,8	11 .40	16 .35	2 2.76	29
	66	100	44	210

$\chi^2 = 13.93$
L $< .05$

TOOTH

Educ. Level	-	0	+	
1,2	6 .14	4 1.78	10 4.43	20
3	18 .00	15 1.16	18 1.66	51
4	43 .50	49 .96	18 3.99	110
5	2 1.15	7 1.25	3 .00	12
6	6 .03	4 .78	6 .77	16
7,8,9	3 .56	7 .80	3 .05	13
	78	86	58	222

$\chi^2 = 20.01$
L $< .05$

Note: The upper number in each cell is the observed frequency, and the lower number is the (observed freq.-expected freq.)^2/expected freq.

TABLE 24

RELATION OF INTERVIEWER-VARIABLES TO FREQUENCY OF NEGATIVE, ZERO, AND POSITIVE AGE-AGE DISCREPANCIES, BY FUNCTION

BIRTHWEIGHT

SEX	-	0	+	
M	12 2.40	78 .10	20 .94	110
F	25 2.45	71 .11	12 .96	108
	37	149	32	218

$\chi^2 = 6.93$
p $< .05$

WORD

SEX	-	0	+	
M	22 1.56	15 .00	28 1.97	65
F	38 1.43	16 .00	17 1.80	71
	60	31	45	136

$\chi^2 = 6.76$
p $< .05$

Note: The upper number in each cell is the observed frequency, and the lower number is the (observed freq. - expected freq.)^2/expected freq.

TABLE 25

RELATION OF CHILD-VARIABLES TO FREQUENCY OF NEGATIVE, ZERO, AND POSITIVE AGE-AGE DISCREPANCIES, BY FUNCTION

POSITION IN FAMILY

BIRTHWEIGHT

Position	-	0	+	
Older	4	27	2	33
	.41	.77	1.55	
Younger	4	24	4	32
	.32	.16	.06	
Oldest	2	20	1	23
	.85	1.06	1.60	
Middle	13	47	9	69
	.20	.01	.07	
Youngest	11	23	13	47
	1.31	2.78	5.92	
	34	141	29	204

$\chi^2 = 17.07$
L $< .05$

CRAWL

Position	-	0	+	
Older	2	12	3	17
	2.40	5.71	.93	
Younger	5	4	6	15
	.00	.36	.43	
Oldest	8	5	4	17
	.93	.20	.12	
Middle	19	10	17	46
	.79	2.62	.64	
Youngest	8	14	8	30
	.44	.95	.13	
	42	45	38	125

$\chi^2 = 16.65$
L $< .05$

SEX OF CHILD

DRINK

SEX	-	0	+	
M	30	16	17	63
	1.36	2.63	.19	
F	50	7	16	73
	1.18	2.28	.16	
	80	23	33	136

$\chi^2 = 7.80$
L $< .025$

Note: The upper number in each cell is the observed frequency, and the lower number is the (observed freq.-expected freq.)^2/ expected freq.

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