the way of effective treatment, and, indeed, the value of the medical treatment of peptic ulcer has recently been sharply questioned. Martin and Lewis (1949), in a study of 185 patients undergoing medical treatment for peptic ulcer, found that only 20% remained free from dyspeptic symptoms, that 40% endured recurrent ulcer symptoms, and that the remaining 40% required operative treatment. Evans (1954) has reported a failure rate greater than 50% in the medical treatment of peptic ulcer in a series of 111 patients. It is in the light of such studies that we can best appreciate the results of surgical treatment.

A complacent satisfaction with surgical results cannot, however, be accepted, and the lessons to be learned from a study such as this are clear. Any operation which leaves the antrum of the stomach intact is a dangerous measure. This has long been appreciated. A limited gastric resection with gastro-duodenal re-anastomosis is apt to lead to recurrent ulcer. A more extensive gastric resection in the Billroth I manner would avoid this trouble, but the technical problem of the anastomosis becomes difficult with penetrating duodenal ulcer. If vagotomy is combined with such an operation, recurrent ulcer may be avoided, and we believe this is probably the best form of treatment for peptic ulcer, and it is the principle we now follow and recommend in all cases. The Billroth I operation appears less likely to cause anaemia over the course of years, and, because there is no afferent loop, true bilious regurgitation and the prodromal symptoms associated with it are avoided. The vomiting of food mixed with bile does, however, occur, but it is not common.

The Polya type of gastrectomy is still that favoured by most surgeons. As might be expected, it seems from our study that the higher the resection the greater the freedom from recurrent ulcer but the more probable the development of serious post-gastrectomy syndromes. The very high subtotal resection is a grave offender in this respect, and is not the surgical answer to the problem of peptic ulcer treatment. A more limited resection accompanied by vagotomy may achieve the same freedom from ulcer, and lead to less serious post-gastrectomy syndromes. We have been impressed with a small series of 25 cases treated by us in this way three years ago, but it is yet too early to talk of their end-results.

Whatever the surgical method of treatment for peptic ulcer employed, a careful examination of the results must be undertaken at regular intervals. Only in this way is it possible to achieve effective treatment and satisfaction for the patient.

Finally, we may fairly claim to be gaining some understanding of the causes of disability after surgery for simple peptic ulcer. On the basis of this understanding we can see more promising initial operations developing, and, so far as concerns those who have had their operations and are still not well, we can predict with some accuracy the likelihood of response to drugs and diet, and we can recognize with some certainly those who need to face yet another surgical ordeal. To them we are beginning to be able to offer a reasonable promise of lasting relief based upon our better understanding.

Summary

In a series of 119 patients treated for peptic ulcer by partial gastrectomy 10 or more years ago, 75 patients have been regularly examined and their progress studied. The following conclusions were drawn.

1. With any type of anastomosis, the incidence of recurrent ulcer varies inversely with the extent of the gastric resection.

2. With the Polya type of anastomosis, the incidence of bilious vomiting and associated symptoms varies directly with the extent of the gastric resection.

3. Serious post-gastrectomy symptoms may not develop until many years after the operation.

4. If direct gastro-duodenal continuity is not re-established at the time of operation, hypochromic anaemia is apt to occur.

5. A more limited gastric resection combined with vagotomy and a gastro-duodenal anastomosis may represent the Aristotelian mean in the surgery of peptic ulcer.

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A LONGITUDINAL RESEARCH IN CHILD DEVELOPMENT AND SOME OF ITS PROBLEMS

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Expression is not infrequently given to the need for studies of child development in which the growth of a number of individuals could be watched and recorded as it takes place, through the years of infancy and childhood to maturity.

Another need sometimes expressed is for an integration of knowledge on the physical, intellectual, and emotional aspects of personality through the collaboration of specialists in the relevant disciplines. The present research was initiated to meet these requirements.

Previously in this country studies have been made of children at particular ages or over certain periods of development, but it is recognized that many problems can be adequately investigated only by longitudinal methods. Furthermore, in this study account is taken of some of the many environmental factors affecting mental and physical development, and in particular of the influence of the changing family background. Several longitudinal studies are in progress in the United States (see Tanner, 1948), but this is the first study of its kind to be started in Britain, and differs from any of the American studies in various respects.

Aims

The main aims may be summarized as follows:

General.—(*a*) To study some of the relationships between development and health, mental and physical. (*b*) To use our data on normal children, for comparison

*The Child Study Research Project was started in 1949 under the general direction of Professor Alan Moncrieff, Director of the Institute of Child Health, and Miss D. E. M. Gardner, University Reader in Child Development and Head of the Institute of Education Department of Child Development, with the assistance of an Academic Advisory Committee.

with groups of abnormal children, in conjunction with other workers. We are at present recording the physical growth of children with special growth problems who are under the care of some members of the staff of the Hospital for Sick Children, Great Ormond Street. We are also in close touch with workers studying the development of mentally abnormal children. (*c*) To compare the development of our sample of London children with that of children in other countries. This aim is facilitated by the fact that one of us (F. F.) is liaison officer for those growth studies sponsored by the Centre International de l'Enfance, Paris. Those in Paris and Zurich are successfully running at the present, while one is planned to start this year in Stockholm. These studies, on the physical side, will run exactly parallel to our study, on which they were founded. We have also had the benefit of personal contact, through a member of our Academic Advisory Committee, with several of the American centres which are working along similar lines, and with two studies in Africa primarily concerned with the effects of nutrition on growth, one of which is directed by Dr. R. F. A. Deane, of the Medical Research Council.

Psychological Development.—(*a*) At various age levels to assess, so far as is possible, the child's developmental level, including cognitive abilities and, more particularly, certain personality characteristics which have been the subject of less research than the foregoing. (*b*) To study the effects on mental development of such factors as socio-economic level, overcrowding, family structure, parental methods of handling the child, and parental attitudes to it. (*c*) To relate the personality development of children to their experiences. (*d*) To throw some light on the extent to which later personality characteristics may be predicted from a knowledge of the child in earlier years.

Physical Development.—(*a*) To obtain growth curves of different bodily dimensions, showing rates of growth at different ages, and individual variations in patterns of growth. (*b*) To classify the children according to body type, using the Sheldon method (Sheldon, 1940). This is designed to study the emergence of such body types, the extent to which they change, and to relate body type to growth and health. (*c*) To study the correlation of physical growth with health, socio-economic factors, nutrition, and certain genetic influences.

Material

This consists of a small "pilot group" and a "main sample." In 1949 a pilot study was begun on 23 children. The mothers, a predominantly working-class sample, were contacted at the antenatal clinics in the same way as the main sample later.

Main Sample

(a) Characteristics

The main sample consists of the children of those parents who, at the time of contact through the antenatal clinics, and at the date of birth, were resident in the postal area of London in which the centre is situated, and had no definite prospects of moving out of that area within six months after the birth of the baby; who were expecting babies in certain selected months; whose confinements were booked at one of seven hospitals or with one of three midwives' associations; and who were willing to co-operate in the study.

Because the most intensive study was to take place in the first year of life, it was necessary to spread the intake so as to maintain a manageable load. Four groups of babies were recruited, each group covering births expected in a three-months period separated from the next group by an interval of six months, so that all months of the year were covered.

(b) Numbers and Losses

From the lists of mothers registered at the antenatal clinics serving the district 364 names were found that satisfied the sampling conditions. Of these, 92 were rejected as unsuitable on the following grounds: definite prospects of moving out of the district (59), miscarriages (13), stillbirths (4), mother died (1), mother deaf (1), mothers did not speak English (5), mothers could not be traced (7), uncooperative (2). No child was excluded from the sample after birth because of abnormality or for any other reason. In 50 cases (13.7%) the parents declined to participate in the study. Reasons given were: objections on principle (5), too many worries (15), not interested (6), "father disagrees" (15), no reason given (9).

It will be seen from Table I that 224 children were in the sample at birth and that 27 children have been lost from the sample since birth. Of these, 14 moved away out of reach, 11 parents withdrew co-operation, 1 died, and 1 was placed with foster parents, who were unwilling to participate. Withdrawal of co-operation seldom occurs after the first year, so that a limit can be predicted to the probable losses on this account; removals, however, can occur at any time, and will constitute a continuous source of loss.

TABLE I.—*Original and Present Size of Sample*

Group	Expected Delivery Dates	No. at Birth	No. at Present
A	November, December, 1951, January, 1952 ..	44	30
B	August, September, October, 1952	57	51
C	May, June, July, 1953	61	54
D	February, March, April, 1954	62*	62*
	Total ..	224	197

* Co-operation promised. Births not yet complete.

(c) Factors Affecting Co-operation

It is our experience that most parents are glad to co-operate once the purposes of the research have been fully explained to them. Their attitudes on this matter are interesting. We have found it profitable to stress the following points:

Non-interference with parents' methods of bringing up their children. This is particularly appreciated by those people who feel that with the increasing scope of public services "you can't call your child your own."

Non-experimentation.—There is a real and fairly widespread fear that research involves using children as "guinea-pigs" for some vaguely sinister end. This can usually be set at rest by a full explanation of the procedure and its main objects.

Contact with the Hospital for Sick Children.—Although it is stressed that no advice or treatment can be given at the centre, many parents welcome the prospect of a regular medical examination of the child distinct from that to be had at the welfare clinic. The specialist in the background is very reassuring to this type of parent.

An appointment system involving a separate reserved time for each child, a pre-paid reply card for mother's confirmation of the appointment, and an absolute minimum of waiting. This feature is welcomed enthusiastically by all parents, and agreement is readily secured to the spending of up to two hours at the centre (at not too frequent intervals) when it is realized that the time will be used and not wasted.

Personal photographs, taken of the child on each visit to the centre and presented to the mother on the subsequent visit, act as a strong incentive with some mothers.

Other factors carrying some weight, but usually less than those mentioned above, include the confidential nature of the records, the fact that little personal information concerning the parents is required, emphasis on the study of healthy normal children, length of time that the study including the pilot work has proceeded, its ultimate value to parents and others, and the sheer interest of watching the children develop and of taking part in a scheme of this kind.

Considerable effort is being made to encourage *continued co-operation.* Missed appointments are followed up by a psychological worker.

When families move within the greater London area they are not necessarily lost, since they are asked to continue their visits to the centre, expenses being met, and in some cases mothers have agreed quite readily to do this.

(d) Representativeness of the Sample

The sample is expected to be fairly representative of the population of the area, and probably of other large city populations, since (i) the only mothers who do not register at the antenatal clinics are the very small percentage who use private nursing-homes; (ii) the hospitals and midwives' associations co-operating account for probably more than 95% of the eligible children; (iii) the district itself is very mixed from the point of view of housing conditions and socio-economic level, containing some very old and dilapidated houses, some in better condition, some flats of medium age, and some newly erected blocks. Private gardens are almost unknown in the area, but there are a number of green squares and a large public playground. Occupations of fathers, which are given in Table II, embrace all five classes of the Registrar-General's classification. The great majority of the children are of British parentage, with some Irish, there are a few other nationalities, and a sprinkling are children of mixed marriages.

TABLE II.—*Occupation of Fathers (as analysed to date) According to the Registrar-General's (1951) Classification of Social Class*

Class	Description	No.	%
I	Professional, etc., occupations	4	2·5
II	Intermediate occupations	24	15·3
III	Skilled ,,	89	56·7
IV	Partly skilled ,,	24	15·3
V	Unskilled ,,	16	10·2
	Total	157	100

It is hoped at a later stage to compare the noncooperators with the co-operators on a number of variables. This should help us to estimate the extent of bias in the sample. It will also be possible to compare our sample with the general population, at least so far as the Registrar-General's classification is concerned.

Procedure and Methods: Pilot Study

The 23 children were visited by the psychologist at frequent intervals during the first year, and were given psychological tests and physical examinations by the research staff at welfare clinic premises. After the first year they were interviewed less frequently, but 18 of them are still seen annually at the centre for physical examination, including somatotyping, for photography, and on occasion for the trying out of techniques such as problem-solving tests, observational play sessions, projective testing, or a new physical measurement. Fourteen of them have at various times received into their homes advanced students of the Institute of Education, who assist the research team by making detailed studies of three or four families over a six-months period. Thus they have become a source of material for intensive observation, which is an integral part of the research programme. It is planned to follow up this group parallel with the larger sample, both because the very detailed case studies may prove to have value in the light of the children's later development, and because the experience gained with them at each age level is of great use in planning the wider study.

Procedure and Methods: Main Sample

TABLE III.—*Procedure*

Mother 6 to 7 months pregnant	Home visit for recruitment purposes
,, 8 ,, ,,	Interview with both parents at home
Delivery and puerperium	Information supplied by hospitals or midwife
8 days (±2 days)	Interview of mother by psychological worker
4 weeks (±2 ,,)	Physical examination and photograph of child
6 ,, (±4 ,,)	Interview at home by psychological worker
3, 6, 9, 12, 18 months (±7 days), and 24 months (±14 days) and annually thereafter	Physical examination, photograph, psychological observations on child at centre, and interview with mother

A. The Early Weeks

Recruitment Interview.—The recruitment visit is made without appointment, and is kept free and informal. Its objects are to inform the mother of the general purpose of the study, and what it involves for her; to ascertain whether the parents expect to remain in the district; to obtain consent to a second visit, when further discussion will take place with the father present, and to ascertain when he is likely to be at home for this purpose.

Antenatal Interview.—This is done by the psychologist who will continue to be responsible for maintaining contact with the case in question. Cases are divided equally between the two research psychologists. It is arranged at a time (usually the evening) when both parents are at home and free for a discussion lasting from half to one hour. The tone of the interview is kept quite informal, although certain topics are routinely covered. The objects are to explain the purposes and procedure of the study in detail, answering any queries, and enlisting the co-operation of father and mother. The questions asked at this interview include details of living accommodation and number of persons in the home, present and past occupations of both parents, their nationality, age, education, mother's prior experience of children, the names and ages of any siblings, and, if the child's grandparents are alive, how often they see the family. These questions are kept as brief as possible, and certain important information such as income is dispensed with lest inquiries should prejudice co-operation. A more general discussion follows, concerning how the parents feel about the prospect of the coming child, and its implications for them.

Information Obtained from Hospital or Midwife.—It is recognized that considerable influences upon growth may occur antenatally, obstetrically, and post-natally from a physical point of view. Comprehensive notes are made of these three periods from the notes available—from hospital, clinic, doctor, or midwife—to obtain a general overall picture with special reference to pathological processes detected in the mother or baby. On the psychological side the midwife reports on the mother's reaction to labour, and the ward sister or visiting nurse supplies details of the establishment of breast-feeding, and the mutual adjustment of mother and child in the early days.

Lying-in Interview.—This interview with the mother, done by the psychologist concerned, or psychological assistant, at eight days, lasts only about 15 to 20 minutes. Its objects are to obtain details of the feeding situation as the mother observes it, to confirm rapport, and to explore her attitudes to certain aspects of child care.

Four-weeks Physical Examination.—On this their first visit to the centre, the mother and baby are fetched and returned home by the research medical officer in his car. The visit lasts 25 to 35 minutes and a certain routine is followed, which is repeated at each subsequent visit. It differs from later visits in two respects: the baby is seen only by the physical side of the research team, and a detailed history is taken from the mother. This is particularly concerned with: (*a*) the health of the mother during this and past pregnancies; (*b*) her obstetrical history; (*c*) leading questions on illnesses, diet, medicines taken, etc., during the pregnancy; (*d*) the family history; and (*e*) the health of the baby since birth, with an account of the feeding. The routine physical investigations are described later.

Six-weeks Home Visit.—This visit, which is made by the psychologist concerned, or the assistant, consists of an interview with the mother lasting 30 to 40 minutes along the lines indicated below. Particular attention is paid to the adjustment of mother and baby to each other in the early weeks.

B. Sessions at the Centre

At 3, 6, 9, 12, 18, and 24 months, and annually thereafter, the mother brings the child to the centre for a session lasting from one and a quarter to two and a quarter hours. Both are seen first by the psychologist, who conducts an interview with the mother and makes observations on the

child, and, secondly, by the paediatrician, who photographs the child, interviews the mother regarding its health, and conducts a physical examination.

(*a*) *Psychological Session.*—During the course of the interview, observations and/or testing of the child are worked in at a convenient time. The situation varies from age to age but is standardized (within the practical limits implied by that word) for all children at a given age. An exception to this occurs when the first analysis of the data on one group reveals a weakness in the procedure, which is then rectified for subsequent groups. This applies both to interview questions and to observation of the child.

The Interview.—This is carried out at every session. It opens with a few general questions, such as "How is baby?" "Any difficulties?" "How are you managing?"—designed to allow the mother to ventilate any matters that are on her mind. There follow a number of questions the details of which vary from one age to another, covering feeding, sleep, elimination, habits, activities, speech, social behaviour, and emotional characteristics. Under all these headings questions are asked both about parental methods and about the child's behaviour. The inquiry is not confined to a search for difficulties, since exactly similar information is required by way of control on those children who seldom show any problems.

Developmental Tests.—At 6 months and 18 months, and with certain groups at other ages, the Griffiths mental development scale is used (Griffiths, 1954). This is a new scale of baby tests and inquiries regarding development, standardized on British children and used by courtesy of the author in advance of publication. It yields a quotient analogous to the development quotient employed by Charlotte Bühler (Bühler and Hetzer, 1935), and includes complete subscales for assessing locomotion, personal–social development, hearing and speech, eye–hand co-ordination and performance. For our purposes, besides providing a yardstick of the children's mental development, it provides a variety of situations in which to observe their behaviour, including tasks requiring concentration and effort, physical activity, and co-operation.

Standard Situations.—At 9 and 12 months a series of standard situations are employed to reveal the baby's responses to a (comparatively strange) examiner, his dependence on his mother, his self-sufficiency when placed in a play-pen with some toys, and his reactions when unable to reach a toy. At 2 years the only test employed is taken from the Griffiths speech scale, and consists of naming or identifying pictures and small toys. Throughout the two-year interview, however, which commonly takes one and a half hours, the child is allowed to play in the interviewing room with certain standard play apparatus. Note is taken of his main forms of play, of the length of time he plays without seeking attention, of the manner in which he seeks it, and of his utterances.

Rating Scales.—The child's behaviour during the interview, test, and/or standard situations is used as a basis for rating a number of personality variables, selected on the basis of experience in the pilot study. This permits the comparison of one child, or group of children, with others of the same age in a roughly quantitative fashion. The repeated ratings will also be of value in estimating the constancy or otherwise of particular personality traits, and the extent to which personality patterns are affected by the family background and general environment. Seven of the variables are also rated during the physical examination by the assistant, who also notes the frequency of the child's smiling and crying. This permits of a comparison of the behaviour of the same child in two very different types of situation. For each variable, five categories are defined as concretely as possible so as to maximize approximation to a common standard on the part of several raters.

Check Lists.—These consist of a list of characteristics of the child and factors in the life of the family which may occasion the mother pleasure, anxiety, or displeasure. Any such feelings clearly demonstrated by the mother are noted on the list after each interview. It is thus possible on the basis of repeated interviews to pick out her consistent and changing preoccupations. An identical list is filled in by the assistant, who is present at all the physical examinations, where particular anxieties about the health and welfare of the child may be expressed.

(*b*) *Physical Session.*—The duration of this is from 25 to 35 minutes, and includes a number of aspects.

(i) A personal *photograph* is taken of the mother and child. An enlarged copy of this is given to the mother at her next visit.

(ii) A *history* is taken of the child's health since the last visit, including feeding and appetite details, together with a note of injuries and inoculations. Should the child have been admitted to hospital, details are requested from the hospital concerned.

(iii) A comprehensive *clinical examination* is carried out by the paediatrician (usually the same one). Results are recorded on a detailed form so that personal bias and interest for one body-system over another is unlikely to affect the result should another paediatrician carry out the examination.

(iv) The child is *measured anthropometrically* by one of two practised measurers. It is hoped that to keep errors at a minimum the number of different anthropometrists over the years will be very small. So far four trained persons have been involved. To check on the extent of such errors, reliability tests are carried out from time to time. The routine measurements themselves number 13. These are height (or lying height), sitting height (or occiput–coccyx length), weight, hip width, biacromial width in older children, two measures between rigid bony points, two circumferences of limbs, and four subcutaneous tissue measurements. These measurements are designed to show the growth of the body as a whole, the general body type, and the growth of muscle, fat, and bone proportionately.

(v) A *radiograph* of the *left wrist* is taken and the skeletal age estimated from an atlas of standards (Greulich and Pyle, 1950).

(vi) A special *radiograph* is taken of the *calf*. From this may be calculated mathematically the tissue proportions of the limb—that is, muscle, fat, and bone (Falkner and Wisdom, 1952).

(vii) *Colour of hair and eye* are assessed by comparison with standards. Actual specimens of hair are obtained from the older children for the Department of Anthropology, University College, London, who are making a detailed study of this factor, using an accurate spectroscopic technique.

(viii) *Future Methods.*—Placing an individual in certain categories of body type is known as *somatotyping*. This is a photographic method of body measurement which determines body type by ascertaining the degree of endomorphy, mesomorphy, and ectomorphy present (Sheldon, 1940). Accurate posing of a co-operative individual in three standard standing positions is needed, and, naturally, this is not possible with infants and younger children. Work is in progress to try to devise a method of placing these groups into some form of body-type classification. This is being attempted by research into methods of finding the volume and surface area of these children by stereophotographic and physical means. As a part of this research, routine measurements of the *volumes of hands and feet* are carried out on all children in the sample.

Somatotyping itself is in progress on a small longitudinal growth study of volunteer healthy pre-adolescent and adolescent boys from the City of London School, and on the pilot group. The children from the main sample will be somatotyped at an age when they are co-operative enough.

Some Problems of Investigating Physical Growth

The *nutritional status* of a child can be assessed in three major ways. We are employing (*a*) the history, which may reveal extremes of nutritional background, coupled with a paediatric clinical assessment; and (*b*) an assessment derived from the socio-economic background. The third method, that of recording the food intake and its calorie value, has immense practical difficulties. Mere questioning of the mother fails to ascertain amounts of food, or the effects of cooking, while completion of diet charts by the mother is likely to influence her choice of foods.

Genetic influences are also of cardinal importance. It would be ideal to somatotype the parents, but it might well be impossible to obtain the consent of a representative sample to this proposal. It is planned, however, to measure the parents and any mature siblings at a later date, when the families are better known.

Physiology.—For practical reasons we are not able to carry out detailed physiological or endocrine-function investigations, the main difficulties being lack of personnel and laboratory facilities, and the obvious likelihood of parental objection to the taking of specimens from the children.

Interpretation of Physical Data.—It is recognized that the measuring of "abnormal" and "normal" with regard to physical growth is an unsettled problem and difficult indeed

to define. Together with others engaged on this type of work, we are attempting to simplify this problem by continuing the search for a satisfactory basis on which to record and interpret our data.

Some Problems of Investigating Personality Development

The first problem on the psychological side of the research was to decide on the scope of the inquiry. Which of the many facets of personality should we study, and which of the environmental influences upon it?

"Mental development" is often taken to imply the complex of growth processes measured by the developmental tests of Gesell (Gesell and Amatruda, 1947), Bühler (Bühler and Hetzer, 1935), and others, centring on the maturation of various skills, and having, therefore, a strong cognitive bias. Since this aspect of development has already been studied in considerable detail in many other places (see Maurer, 1946, pp. 13–18 for list of references) it was decided to concentrate rather on the orectic side of personality—the emotional characteristics, social behaviour, and personal relationships, which differentiate children in another dimension, though they, too, are subject to developmental principles. Developmental tests are used in this research as a yardstick of general maturity, viewed as one important dimension of the child's individuality at a given age, to be related to other, less well charted, dimensions.

For example, the development of such skills as locomotion, speech, and manipulative abilities depends to an important extent on such personality characteristics as strength of drive and attitude. It also depends on opportunities for learning. Both opportunity for learning and personality development are partly determined by the relationship the child makes with his parents and siblings in a particular social context. The development of skills in its turn modifies the child's environment, bringing fresh activities within his reach, and calling out new responses from those around him. In the same way, a child's responses to feeding, toileting, and going to bed can be seen, on the one hand, as a product of his maturity, health, temperament, and earlier experiences, and, on the other hand, as a condition of his subsequent health and personal adjustment, affecting his relationships with his parents in important ways.

In order to study the interconnexions between these factors, for most of which no standard method of assessment exists, we have had to forge our own research tools. In designing the interviews and observational techniques described in the foregoing sections we have sought to include as many as possible of those aspects of experience and behaviour which are easily observed, fairly objectively described, and generally thought to be of importance for later personality. In this process of selecting the questions to be asked, two of us, the research psychologists, have drawn extensively on the literature of developmental psychology, psycho-analysis, and learning theory; on our personal experience as fathers; and on the experience gained in the pilot study. As the children attain each fresh stage of development, the search for hypotheses linking that stage with later life is taken up anew, and fresh interviews and situations are designed to investigate them.

Owing to the great number of variables involved in human behaviour, the testing of hypotheses in psychology often presents a complicated problem. In this research the experimental control of variables was renounced in line with the policy of non-interference. This leaves us with two possible ways of testing a hypothesis: (*a*) the statistical study of groups, and (*b*) the intensive study of individuals. By the former approach we can establish the mathematical probabilities of a connexion between variables, but the dynamics of the connexion tend to remain obscure. By the case-study approach we can gain added insight into the dynamic processes at work, and can see the operation of many factors in their context, but can never generalize beyond the one case, since the pattern of variables is never reduplicated.

Suppose, for example, that 60 out of 100 children who were frequently spanked were found to be spiteful to younger siblings or pets, whereas only 20 out of 100 unspanked children showed spite, we might safely infer a significant connexion. But in how many cases did spanking lead to spite, and in how many vice versa? Why were the 20 unspanked children spiteful, and why not the remaining 40 of those spanked? More light on these questions can be gained by examining the individual case records, and more still if there is an opportunity to watch a few of the children in the actual situation. Even then the answers will be partial and qualified; but they will be in terms of the concrete actions of real children. Moreover, in the process, other hypotheses may well have been thrown up for further statistical investigation.

Our programme therefore envisages intensive observation of a limited number of individual children, running concurrently with the larger sample study in a complementary relationship, each continually feeding the other with new ideas. To what extent this will prove feasible depends on funds available.

Of course the methods appropriate to the two types of approach differ in many important respects. It was not fully realized at the outset of this research that the two main functions of the pilot study were to some extent incompatible. On the one hand, it had to be used for clarifying basic concepts, and for suggesting hypotheses to be tested on the larger sample; for this purpose it had to be an intensive study of a few individual children in their family settings—as vivid, concrete, and personal as possible. On the other hand, it was intended for use in trying out the methods to be employed on the larger investigation; but here, although much was learnt about techniques of interviewing, testing, rating, etc., there was much more that could be discovered only through the actual experience of a large sample study.

In general, whereas freer methods are appropriate to the individual case, a more standardized approach is essential for larger numbers. In interviewing mothers, for example, it was desirable, for exploratory purposes, to allow them to talk spontaneously, with few set questions, provided only that the main headings were covered. For statistical purposes, however, it was quite essential that exactly comparable information should be obtained on each child so far as was possible, and this necessitated an oral questionary at each age, which, it was found, had to be constantly amended in the direction of greater exactness to ensure that different interviewers would obtain equivalent information. Again, in the pilot study, relatively free play situations were used in order to explore the variety of children's play and social behaviour at each age. With the larger numbers, however, any neglect to standardize the situation (within practicable limits) would have led to spurious comparisons between children, and to faulty conclusions. In short, the more children one studies, man-power being constant, the less frequently one can see them. The less frequently one sees them, the fewer the chances of correcting errors in the data, and the more important it becomes to ensure that one's methods have maximum reliability.

Since much of our information must necessarily be derived from mothers' testimony, and since the behaviour of children is notoriously variable, it is of particular importance to estimate the amount of error involved in our methods. Attempts are therefore being made to assess the accuracy of mothers' testimony, and the consistency of our observational techniques. This will be the subject of a later report.

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SIX CASES OF CARCINOMA OF THE OESOPHAGUS OCCURRING IN ONE FAMILY

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The great majority of cases of cancer met with in routine practice seem to occur sporadically and to have no obvious environmental or hereditary basis. This is true of carcinoma of the oesophagus, because, although factors such as sex, occupation, habits, and economic status may predispose to the neoplasm, the fundamental causes are unknown and all that can be said is that the disease is likely to be the result of a complex interaction between inherited and environmental factors. In the family to be described, in which there were six deaths in two generations from carcinoma of the oesophagus, it seems probable that a genetic factor was primarily responsible. The pedigree is reported in the hope that an investigation of similar families may throw light on the circumstances in which the disease may be inherited.

It is appreciated that data such as this may be very misleading, because a high familial incidence of cancer can be due to chance and will occur in any large series (Gorer, 1953). Nevertheless, it seems worth while investigating fully a family such as this, particularly as the oesophagus is a relatively rare site for carcinoma. The Registrar-General gives the following figures for 1952:

	Male	Female
All malignant neoplasms ..	45,429	42,213
Digestive organs and peritoneum	20,175	18,403
Oesophagus	1,475	850

The family concentration is thus the more remarkable, and, as the evidence is in favour of an inherited rather than a fortuitous or environmental origin, it seems relevant to try to find out why particular members were affected and others remained free. Linkage studies may be of use for this purpose, and an investigation of the ABO blood groups has been carried out in as many as possible of the patients and their relatives. In this we were prompted by the recent finding of the statistically significant association between blood group A and carcinoma of the stomach (Aird *et al.,* 1953). In any future study involving a forward survey of similar families a complete investigation of the blood groups and other inherited traits would be well worth carrying out. This matter is referred to again later.

Comments

1. It will be seen from the pedigree that in generation II, three out of six, and in III, three out of eight siblings were affected by the disease. These figures are not significantly different from the 1:1 ratio that would be expected if the carcinoma were due to a single dominant gene present in the heterozygous state in I 1 or I 2 but failing to find expression in that generation. An alternative explanation is that the gene arose as a mutation early in the development of the gonads of I 1 or I 2. The fact that three individuals (II 7, III 1, and III 7) died at a rather early age does not materially affect the above hypothesis.

2. The pedigree also shows that in each generation those who were affected died at approximately the same age: in addition, those in the second cancer generation (III) contracted the disease much earlier.

3. In three of the cases (II 11, III 8, and III 13) the site of the cancer is known with certainty to have been at the lower end of the oesophagus. In one (III 10) the growth was in the upper third (but did not originate in the hypopharynx). In one (II 5), the symptoms suggest that it was in the mid- or lower zone, and in one (II 1) the site is not known. In the three cases (II 11, III 10, and III 13) in which the histology is known the growth was a squamous-cell carcinoma.

Cancer of the mid- and lower oesophagus is much more prevalent in men than in women (8:1, Price, 1950) and the disease is commoner among commercial travellers, barmen, and waiters than among those engaged in other trades: to explain this it has been suggested that the oesophagitis produced by alcohol and tobacco in association with a poor diet may be a predisposing factor.

An attempt has been made to assess the habits and environment of the present family. None of them was engaged in any alcoholic trade and in none was there any history of excessive smoking or alcoholism. An idea of the circumstances in which generation II lived has been obtained by visiting the house in which they were brought up and which is still occupied by II 12, III 28, and III 29, and IV 18. No adverse features were noted, the food being good, the house clean, and the economic status of the family very satisfactory. Thus the usually stressed exogenous factors are not apparent in the first cancer generation. It will be seen that this consisted entirely of women, and the proportion affected is explained on the genetic theory.

The transmitter (II 1) of the disease to the next generation married a man who died of pulmonary tuberculosis, and their environment and social status were very poor and the house in which they lived and reared their family is condemned. Their two affected daughters (III 10 and 13) continued to live there after they were married and until they died. Whether the decline in economic status of this branch of the family had anything to do with the continuance of the cancer is speculative, but it is known that the poorer classes show a greater proportionate death rate from oesophageal cancer than do the higher-income groups (Clemmesen, 1951). The offspring (III 16) of the