CHAPTER X

THE RELATIVE INFLUENCE OF NATURE AND NURTURE UPON MENTAL DEVELOPMENT; A COMPARATIVE STUDY OF FOSTER PARENT-FOSTER CHILD RESEMBLANCE AND TRUE PARENT-TRUE CHILD RESEMBLANCE [1]

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I. INTRODUCTORY

To what extent are ordinary differences in mental level due to nature and to what extent are they due to nurture?

Few scientific problems have been the subject of so much speculation and controversy as the specific one with which this study deals. This is probably attributable to two facts: the practical and theoretical significance of the problem itself, and the extreme difficulty of gathering evidence which cannot be applied with more or less plausability to the support of either the nature or the nurture hypothesis.

The result has been that, since the appearance in 1869 of Galton's *Hereditary Genius*, nearly every study published in the field

has been seized upon by both the hereditarians and the environmentalists and interpreted as favorable to the point of view of their own school. The high incidence of genius in certain strains and of feeble-mindedness in others; the consistent decrease in familial correlation coefficients for psychical traits as more and more remote degrees of relationship are considered; the stronger resemblance found between twins than that between ordinary siblings; the approximate constancy of intelligence level when measured in the same individuals over intervals of time; the marked differences in average intelligence which have never failed to appear in studies of groups who were dissimilar in racial, occupational, educational, or social status—all these phenomena might conceivably be due either to hereditary or to environmental forces or to both at once. Hence, none of them offers evidence which can be regarded as crucial.

However, the fact that no experiment has yet served to uncover in unambiguous terms the relative contributions of ordinary nature and nurture differences to differences in mental level does not invalidate the experimental data which have been accumulating for nearly sixty years. In revealing tendencies, suggesting profitable

avenues of approach, and in actually indicating the existence of the problem itself, their contribution has been very great. Furthermore, they provide a substantial structure of fact which requires merely the impact of one additional experimental step to become invested with definite meaning. This additional step, by some means not yet employed, must isolate the effects of heredity and environment; then, in the light of our new knowledge, the wide factual background of previous data will assume its proper scientific perspective.

This step might be accomplished in one of two ways. The first would require the experimental control of either nature or nurture so that the effects of one or the other could be singly observed. The second would require the application of mathematical techniques to data collected in the ordinary way.

The second method offers us more than the first, ultimately, for in addition to isolating nature-nurture effects, it promises to yield an explanation of the actual mechanics underlying mental heredity. A start has been made towards developing such a scheme of mathematical analysis in the work of R. A. Fisher (3),[2] who has already applied his techniques to the study of inherited physical traits with extremely interesting results. However, the method he employed will probably be inapplicable to the study of mental traits without important modifications, and is consequently at present out of question for students of mental heredity. This leaves the first, or empirical, method as the only possible attack at present.

The investigation in hand approaches the aspect of the problem which concerns heredity and *home environment* through a comparison of mental test resemblances obtaining between parents and their children on the one hand, with those obtaining between foster parents and their foster children on the other. Thus, it seeks to evaluate the effects of nature and of home nurture through a study of two kinds of familial resemblance, one of which is dependent upon nurture influence alone, and the other upon a combination of both nature and nurture influences. Through its use of foster parents and their foster children as subjects, it applies to its purpose the end results of the social experimentation which is going on in many homes all about us.

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[2] Numbers in parentheses following mention of contributors refer to the numbered bibliography at the end of this chapter.

It should be emphasized at this point that whatever tendencies and conclusions can be found in this study are valid only for populations as homogeneous in racial extraction, social standards, and educational opportunities as that from which our subjects are drawn. The distribution of homes of the children studied in this investigation was probably nearly as variable in essential features[3] as homes of the general American white population (though somewhat skewed toward a superior level). It was not as variable, however, as if the homes of southern negroes, poor mountain whites, or Philippine Negritoes had been included; and consequently, home environment cannot be expected to have as large a proportional effect upon the mental differences of the children we studied as though they were being reared in families unselected as to race or geographical location throughout the world.

Reference should also be made to the educational opportunities of the children examined, which were good. (All children were living in California communities.) If the children had varied considerably in educational opportunity, so that a number of them had as limited amount of schooling as that, for example, of Gordon's English canal-boat children, and if, in addition, home environment and educational opportunity had been correlated, it would have been quite difficult to separate the effects of the two upon the mental variability of our children. In this study, not only is the possible complication of differences in educational opportunity averted, but the confusing issue of possible cumulative effects of schooling is averted as well, since the measuring instrument used—the Stanford-Binet test of intelligence—was standardized upon California school children covering the same age range as our children, who themselves had undergone a cumulative educational process.

Other factors causing real or apparent impairment in mental ability, such as language handicap, deafness, pathological trauma (as from spastic birth paralysis, lethargic encephalitis or other diseases leaving permanent mental deficiency) were also ruled out.

Thus, the study is based upon children homogeneous as to race and educational opportunity; sufficiently homogeneous in health

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[3] This seems probable because the variability in intelligence of both the control and foster children coming from these homes is as large as that of unselected children.

and physique to avoid confusion; and about as variable in hereditary endowment and in home environment (including kindred social mores) as white children of ordinary communities.

The study does not purport to demonstrate what proportions of the *total* mental development of an individual are due to heredity and to environment. Biologists have frequently pointed out the futility of attempting such a demonstration, since *any development whatever would be impossible without the contributions of both nature and nurture.* But if we direct our attention to the contributions of ordinary differences in heredity and ordinary differences in environment to *mental differences (i. e.,* I. Q. variance), it is possible to draw some significant conclusions. The causes which affect human differences, rather than the causes which condition the absolute developmental level of the human species have, after all, the more vital bearing upon social and educational problems.

Given a group of school children such as our subjects (which surely are representative of the largest single element in the American juvenile population), it will later be seen that the data gathered in this investigation lead to the conclusion that *about 17 percent of the variability of intelligence is due to differences in home environment.* It will further appear that the best estimate the data afford of the extreme degree to which the most favorable home environment may enhance the I. Q., or the least favorable environment depress it, is about 20 I. Q. points. This amount is larger, no doubt, than some of the firmest believers in heredity would have anticipated, but smaller than the effects often attributed to nurture by holders of an extreme environmentalist's view. To the writer, these results constitute an important vindication of the potency of home environment. But even more significant appear to be the implications of these basic results, *e. g.,* that *not far from 70 percent of ordinary white school children have intelligence that deviates less than 6 I. Q. points up or down from what they would have if all children were raised in a standard (average) home environment;* that, while home environment in rare, extreme cases may account for as much as 20 points of increment above the expected, or congenital, level, heredity (in conjunction with environment) may account in some instances for increments above the level of the generality which are five times as large (100 points).

The methods by which such conclusions as these are reached are set forth in detail in VI (Main Results) and VIII (Interpretation and Conclusions). The reader who wishes to bear in mind a general picture of the type of treatment to which the data were subjected as he reads the preliminary chapters upon selection of subjects, methods devised, field work schedules, etc., is invited to turn to VI and VIII at once, reserving the preliminary sections till afterward.

II. HISTORICAL

1. Previous Studies

In addition to the present study, there are several investigations in this field which have attempted to go beyond the limits of ordinary biometry. Besides a few reports of the effect of environmental changes upon single individuals, there are at least three comprehensive studies which should be mentioned in this connection. The first is Dr. Gordon's investigation of orphanage siblings (4). It would appear to be significant that the siblings in a standardized institutional atmosphere which she tested on the Stanford-Binet showed an average correlation similar to that usually found among sibling pairs reared under ordinary home influence (about .50). But unfortunately, the study is rendered somewhat ambiguous by the racial heterogeneity of the children and by the fact that the sib pairs had lived together for unknown, varying lengths of time before being admitted to an orphanage.

Miss Theis' report, "How Foster Children Turn Out" (17), completed for the State Charities Aid Association of New York in 1924, yields facts some of which have a bearing on our problem. The report deals with 910 children who were placed in foster homes by the State Charities Aid, and who were eighteen years old or over at the time of the investigation. The data, collected by well-conceived family-study schedules, include much valuable information concerning the outcome of foster home care and are naturally of intense interest to child-placement agencies. No test data were reported, but Miss Theis and her staff of field workers secured information for each former ward upon his "capability to manage himself and his affairs with ordinary prudence," and his "ability to take formal education." These two criteria showed no significant

relationship to the cultural level of the homes in which the children had been placed, but classifying the homes as to the *type of care* that had been given the children, the author is led to the following significant conclusion: ''Of the children who had excellent care, approximately 87 percent developed into 'capable' subjects; of those who had average care, 80 percent are 'capable'; and of those who had poor care, 66 percent are 'capable.' ''

Miss Theis' definition of ''capability'' implies moral as well as intellectual stamina, and consequently these results cannot be carried over directly to the problem with which we are engaged. Moreover, her subjects varied greatly in age at time of foster-home placement—the average age was eight, and not more than 35 percent were under five. This fact greatly complicates interpretation from the nature-nurture standpoint. As the report frankly states in the introduction (by Homer Folks): ''We cannot disentangle the factor of inheritance from that of early life with the children's own parents and the environment provided by them.''

The third investigation is that by Gertrude Hildreth on ''Resemblances of Siblings in Intelligence and Achievement'' (7), published in 1925. Miss Hildreth compared the resemblances found in several groups of siblings who had been tested by the Stanford-Binet. She found that siblings who were being reared in a large New York Hebrew orphanage (which admits children at the age of five or over), and that siblings who had been separated from each other for an average interval of four years, resembled each other to about the same degree as siblings being reared in their own homes.

These data strongly suggest an interpretation of resemblance based upon inheritance, but are admitted by their compiler to be inconclusive. The selective influences at work were unsusceptible of measurement, and the possibility that home and parental influences during the early formative life of the orphanage siblings may have accounted for at least part of their later resemblance was not ruled out.

Evidently, an investigation in which all possible disturbing factors have been eliminated, or recognized and allowed for, has been a pressing need. As far back as 1913, Richardson (13) criticized Pearson for his unproved assumption that the correlations

found in his biometric studies represented uncontaminated heredi-
tary coefficients. He suggested the desirability of making a study
of poor children adopted into rich homes to measure the potency
of environment. Poyer, in his book on *Problèmes Généreaux de
l Hérédité Psychologique* (12) made the suggestion that, to sepa-
rate the influence of heredity and environment, it would be neces-
sary that, for a long series of generations, every child in a family
should be separated from his relatives and placed in an entirely
different environment, without contact with his parents. . . .
This sort of experiment never has been made and never will be
made.''

It is not easy to see why Poyer thought that to study one family
over a number of generations would be preferable to the study of
two generations of many families, but his statement of the necessity
for the type of approach used in the present investigation is clear
and compelling. Doubtless, our type of study would have been
undertaken long ago by some one of the many who must have sensed
its need if the practical difficulties connected with it had not ap-
peared prohibitive.

2. Formulation of the Project

The practical difficulties just referred to were of such a nature
that it seemed desirable to proceed cautiously, and indeed to stand
ready to abandon the entire project if it promised not to be feasible.
It was necessary to gain the consent of child-placement organiza-
tions to select from their files cases that would meet the require-
ments laid down for the investigation. Such consent could be ob-
tained only after convincing the executive committees of the need
for the kind of data we proposed to gather, and after assuring them
that the identity of the families visited would be held strictly con-
fidential, and would be quite submerged in the statistical treatment
of results.

Once permission had been secured to visit the foster children
with the approval of the organizations that had placed them, each
family case still remained an unknown term, which might react
favorably or unfavorably to the request we planned to make. As
all our cases were *adopted* foster children, and hence had passed
outside the supervision of the placement agencies, there was no

pressure that could serve to encourage coöperation from the foster parents except an appeal (through a letter from the agencies which was carried by the field visitors) to whatever friendly gratitude they might feel toward the organization that had given them their child, and an effort to arouse a broad humanitarian interest in a study designed to give us a "better understanding of children's development." Usually, too, there was a fear on the part of the foster parents to overcome, because in at least 65 percent of our cases the child had never been told that he was a foster child. In these cases the foster parents nearly always hesitated about co-operating until they were fully assured that nothing in the field visitor's program could possibly cause the child to suspect the fact of his adoption.

During the first months of field work it was also necessary to recognize that the program was on trial with the child-placement agencies, that permission to proceed had been granted only pro-visionally and would have to be withdrawn if any considerable num-ber of the foster parents were found to resent what might appear to them an intrusion.

Accordingly, in the fall of 1923, only a small, tentative begin-ning was made. Results accumulated slowly, as the center of our foster child population was several hours journey from Stanford and I was able to give only occasional week-ends to field work. How-ever, by the end of the summer of 1924 data from approximately twenty cases had been gathered, and not more than one or two families visited had declined to coöperate. The feasibility of the method seemed well established, and the child placement agencies definitely committed themselves to the program. The time ap-peared to be ripe to seek funds for securing two or three full-time field assistants who would make it possible to carry out the study on a wider scale and to gather data for a control group of true parents and true children.

In the fall of 1924 Professor Terman applied for, and received, a subvention from the Commonwealth Fund, which was supple-mented by a gift from Mr. Max Rosenberg of San Francisco, and by considerable financial assistance from Stanford University.

Immediate steps were then taken to obtain the services of two trained field workers. We were fortunate in securing Miss Zena C. O'Connor, a candidate for the doctorate at Teachers College, Columbia;

and Miss Florence Bathgate, who had completed two years of graduate work in psychology at the University of California. Both assistants had had practice in the use of the Stanford-Binet scale, both had specialized in the field of educational psychology, and both demonstrated a rare tact and skill in meeting the exacting human demands of the field visiting. Miss O'Connor was engaged in field work for fifteen months, and Miss Bathgate for twelve months. The writer also, working part time, spent the approximate equivalent of nine months in the field. The data from about thirty percent of the foster cases, and fifteen percent of the control cases, were collected by her.

III. METHODS EMPLOYED

1. Approach

The program for family study required four to eight hours of a field worker's time per family. Much of the testing and interviewing had to be done at night to suit the hours when the fathers of the children could be at home.

It was our invariable rule to make no first approaches by telephone, as it seemed probable that our chances of gaining the interest and coöperation of families would be far better by personal interview. Consequently, much time was lost in attempted calls when the family were out, away from town, moved, etc. This condition, linked with the wide areas it was necessary to travel, and the difficulty of dove-tailing appointments at unusual hours with any degree of efficiency, resulted in slower progress than we had at first contemplated. From two to three completed cases weekly was the ordinary average per field worker.

2. Schedule

The items of our family case schedule were these:

1. Stanford Binet Test, administered to parents and children.

2. A home-information blank, containing an adaptation of the Whittier Scale for Home Grading and a culture scale of our own, filled out by field assistants.

3. Rating of the child on ten character and temperament traits made independently by the two parents.

4. Personal information blank filled out by each parent.

5. Woodworth-Cady questionnaire (to test emotional stability) filled out by children ten years old or over.

6. Information was also obtained from the files of the placement agenices, in the case of the foster group. This included heredity (if known), age at placement, age at adoption, national descent, etc.

The Stanford Binet Test and record booklet are so well known as to require no description here.

The nature of the Whittier Scale and the culture scale are made evident in the section later on wherein the scoring standards for these scales are described.

The ten traits upon which the parents rated their children were: (1) will power and perseverance; (2) cheerfulness and optimism; (3) musical appreciation; (4) sense of humor; (5) permanency of moods; (6) leadership; (7) sympathy and tenderness; (8) conscientiousness; (9) originality; (10) general intelligence. The traits were selected from a large number of traits used in connection with the Stanford study of gifted children; and ratings were made upon a seven-category graphic rating scale, as reproduced in *Genetic Studies of Genius,* I (15).

The personal information blank filled out by each parent called for data upon the following points: birthplace; occupation; highest school grade reached; special interests, hobbies or accomplishments; positions of honor, trust, or recognition which have been held; distribution of time during the day (at home or away from home); children's hobbies or interests; occupations which parents think may be suitable for child in future; where child spends his leisure time; discipline of child. In addition, the blank filled out by the mother asked for information upon the kind and amount of home reading done by the child at various ages; the home instruction or attention received by the child in such matters as reading or writing, story-telling to child, number work, or nature study; and the private tutoring received by the child (in music, dancing, or other subjects).

The Woodworth-Cady questionnaire—reproduced in full in *Genetic Studies of Genius,* I, pp. 500 ff. (15)—is a questionnaire of 85 questions designed to sift out psychotic tendencies. A number of questions are inserted as 'padding' to lull the suspicions of the subject as to the purpose of the test. Samples of the questions are:

"Do your teachers generally treat you right?"
"Did you ever have a nickname you didn't like very well?"
"Are you happy most of the time?"

3. Administration and Scoring

The Stanford Binet Test was administered in the standard way, with two exceptions as to procedure.

The testing was carried down only to a level at which all tests but one were passed, and up to a level at which all tests but one were failed. This modification, known as the "lopped Binet," often saves fifteen to thirty minutes testing time, but has the effect of slightly lowering the reliability. The lowered reliability was later allowed for in correcting coefficients of correlation for attenuation.

The other exception consisted of slight changes in the wording of the directions of some of the tests on the lower levels when the test was administered to adults (but not when it was administered to children). These were accomplished, we believe, in such a way as to retain the psychological significance of the test intact. They were made only because a small proportion of the parents proved to have intellectual pretentions beyond their mental level, and occasionally showed irritation when it was necessary to carry the test down to items specifically framed for children of immature experience. Asking a man or woman, for example, who had earned and expended money for years: "If I were to buy 4 cents worth of candy and should give the storekeeper 10 cents, how much money would I get back?" was likely to cause a little self-consciousness in the subject. Instead, we asked: "If you bought 4 cents worth of something and gave the storekeeper 10 cents, how much money would you get back?" Slight though our changes were, they can be defended only on a policy of expediency in the absence of a test of the Binet type standardized upon adults.

In scoring the Binet Test, allowance was made for the fact that a few of the brightest adults exceeded the limits of the test, by applying a correction worked out in connection with the Stanford study of gifted children (15). As described in *Genetic Studies of Genius,* I, p. 42, the method represents an attempt to correct the scores "to correspond to what they would have been had the scale been more nearly adequate in the upper range." It is based upon the average scatter of successes in levels above the basal mental age, and involves "the following additions of months to the mental age score for those passing various numbers of tests out of the total of twelve tests in year-groups 16 and 18:"

Tests passed in 16 and 18.. 5   6   7   8   9   10   11   12
Number of months to add.. 3   6   9   12   15   18   21   24

The scoring of the Whittier Scale for Home Grading was based upon the standards published in the Whittier Manual (18). The items of the scale were rated from 1 to 5 with the exception of *Necessities, Parental Conditions,* and *Parental Supervision,* which were rated from 1 to 6 because the Whittier standard of 5 did not seem adequate for a number of our cases. The total Whittier index is the sum of the ratings on the five individual items. In the case of our culture scale, all five items were rated from 1 to 5. The total culture index is again the sum of the individual ratings.

Brief descriptions of the types of conditions which were assigned the different numerical ratings are presented herewith. In the case of the Whittier items, the descriptions are taken verbatim out of the Whittier Manual (18). The scoring descriptions represent the standards agreed upon by the field workers at the time their visiting began.

SCORING OF WHITTIER HOME SCALE

1. Necessities.

1 point. Wages of driver of small express and transfer wagon. Old ragged dirty clothes. Little food, very plain. Three small rooms in basement of cheap tenement house. Hardly bare necessities. Old, cheap, broken, wooden chairs and tables. No pictures or decorations. Bare floors. No comforts or improvements.

2 points. Income of painter, work somewhat irregular. Cheap, plain clothing, small frame bungalow, bare necessities, plain wooden furniture, no pictures, cheapest fixtures for light and cooking.

3 points. Wages of pressman in tile factory. Sufficient food and clothing. Small frame house poorly finished both outside and inside. Furnishings sufficient in quantity, plain, serviceable, cheap. Cheap pictures, calendars, and family photographs for ornaments. No carpets or rugs. Oil stove. Electric lights, no ornamental fixtures.

4 points. Income, salary and tips of head waiter in a large hotel. Clothing neat, well-kept, apparently made to last. Good table set. Half modern bungalow. Furniture good quality, plentiful. Wicker and reed chairs, piano, rugs, good pictures. Rather poor lighting from windows, but modern electric fixtures. Running water, modern sanitary conveniences. Rear porch bedroom, couch in living room.

5 points. Architect, well-to-do. Well-dressed. Table ware indicates abundant food. Large modern bungalow, frame construction, well finished. Furniture fine quality, plentiful. Fine carpets, rugs and

pictures.   Modern conveniences, built-in cupboards, electric fixtures, plumbing.

6 points.   Conspicuously superior to the level receiving 5 points. Seldom given to any home.   Denotes unusually luxurious living conditions.

2. Neatness.

1 point.   Everything filthy dirty.   Empty cans and trash in rooms. Absolutely no order or arrangement.   Food, dirty dishes, etc., piled any old way on table and chairs, falling on floor.   Small, crowded area way, dirty and bare.   No lawns or flowers.   Buildings bare and need paint. No attention to home.

2 points.   Rooms and furniture dirty.   Part of furniture stacked in corner.   No arrangement for the rest.   Yard rather disorderly.   Lawn grown up and poorly cared for.   Few evidences of attention to the home.

3 points.   Rooms fairly clean.   Little or no order.   Yard bare and dirty with a few tumble down sheds.   House in need of paint, steps and porch need repairing.   Lawn not kept clean, little attention given to external appearances.

4 points.   Rooms clean, but dark, closed and stuffy most of the time. Furniture neatly arranged and kept in good order.   Exterior cleanliness good.   House somewhat in need of paint.   Lawn well-kept.   Considerable attention given to home when possible.

5 points.   Interior clean and sanitary.   Furniture neatly arranged, good order.   Yard and grounds clean, no outbuildings.   House well-kept.   Yard clipped close, small, neat garden.   General neatness good. Considerable attention apparently given to care of home.

3. Size.

1 point.   Two very small rooms in basement of three-story tenement.   Cook, eat and 'live' in one room.   Propositus, two other children and parents.   No yard, only a small area way.

2 points.   Five-room bungalow.   Medium sized rooms.   Tent in backyard.   Convenient, but not sufficient for so large a family.   Propositus, five brothers and sisters, ages 2 to 16, mother and father.

3 points.   Small three-room house.   Medium sized rooms.   Rather close quarters.   Propositus, mother and step father.   Very small unkept yard.

4 points.   Seven rooms, all rather small.   Two-story house.   Rooms convenient, although small.   Propositus, three younger children, mother and step father.

5 points.   Seven rooms, two-story house.   Good sized rooms. Plenty of room conveniently arranged.   Two adults, father and mother, propositus and younger sister.   Rather small front yard, good open porch.   Large back yard as city yards go.

4. Parental Conditions

1 point. Mother makes small living by housework and washing. Parents separated, father away with another woman, mother not remarried. Mother at home evenings and some days.

2 points. Parents both probably normal. Father blacksmith for a large ranch. Continual trouble when parents together. Parents separated, alleged immoral conduct on each side. Boy officially with father, who was at work all day. Boy left much alone.

3 points. Father planing mill hand, fairly successful when working, but an invalid from excessive drinking. Mother probably normal. Harmony most of time except when father's drinking interferes. Either father or mother work out during day, mother when she can get work, father when in good enough condition.

4 points. Father a painter, in good health. Mother probably normal. Harmonious most of the time. Mother nags father some on account of irregular work. No separation. Father away at work during day.

5 points. Father normal, has average success as carpenter. Mother keeps home in fair condition. So far as known, there is harmony between the parents. Mother at home all of the time, father away at work most of day. (In practice we never assigned a rating as high as 5 to this item if either parent tested with a mental age below 12-0).

6 points. Conspicuously superior to the level receiving 5 points. Both parents superior on the mental test, and *exceptionally* harmonious in their relations.

5. Parental Supervision

1 point. Little interest from either parent. Practically no supervision. Father a consumptive, drives an old wagon. Mother epileptic. Boy left to run streets day and night.

2 points. Lack of discipline because parents away large proportion of time. No partiality (in dealing with children) as far as known. Parents good, hard-working people. Spent evenings on streets.

3 points. Mother not well. Father interested but lazy. Discipline lax. Evidence of favoritism and better treatment of girls. Father lazy and easy going, but of good habits.

4 points. Father apparently interested in welfare of boys. Fairly good control. Equally fair treatment as far as known. Father a colored preacher. Good habits and reputation.

5 points. Parents interested in health, education and welfare of children. Kind and intelligent discipline. Complete fairness as far as known. Parents of good reputation and character, good example to children. Children kept at home evenings as a general rule.

6 points. Care given the children and provision made for their welfare very exceptional.

Scoring of Culture Scale

1. Speech

1 point. Average vocabulary level of parents less than twenty-five (on Binet vocabulary test); or average level of parents less than fifty *and* a less-than-average mean rating of parents on the other items of 'speech.'

2 points. Average vocabulary level of parents less than sixty and most of other items of 'speech' not above average. Or average vocabulary level of parents higher than sixty but lower than seventy, and most of other items below average.

3 points. Average level of parents' vocabulary between sixty and seventy and most of other items average. Or average vocabulary level of parents somewhat above seventy, but other items chiefly below average.

4 points. Average level of parents' vocabulary above seventy and other items average or above. Or average level of parents' vocabulary far above seventy, but other items average and below.

5 points. Average level of parents' vocabulary eighty or above and practically all the other items above average.

2. Education of Parents

1 point. Average of parents' schooling is 1, 2, or 3 grades.
2 points. Average of parents' schooling is 4, 5, or 6 grades.
3 points. Average of parents' schooling is 7, 8, or 9 grades.
4 points. Average of parents' schooling is 10, 11, or 12 grades.
5 points. Average of parents' schooling is above 12th grade.

Schooling, as used above, refers only to academic schooling. Business college and nurses' training, etc., are not counted in computing average grade completed, but are given weight in border-line cases (where the parental average lies between two of the class groups above). When the schooling for only one parent is known, this item is not rated.

3. Interests of Parents

There are five steps to describe the level of both father's and mother's interests. The classes underlined on the culture scale are determined by reference to the parents' information blanks, which ask for special interests and hobbies, and for positions of honor and trust which have been held by the parents. In general, we try to assign a numerical rating to "interests of parents" which would correspond to an average of the ratings which we assign to each parent. When only one parent has filled out an information blank, we use the field worker's estimate of the other parent. When the field worker has not rated the parent who filled out no information blank, we assign a rating to the item as a whole based upon just one parent.

1 point.   No interests are noted for either parent.

2 points.   Interests are few and of an unintellectual sort—reading the funny paper, going to movies.

3 points.   Ordinary pursuits, sewing, gardening, etc.

4 points.   More intellectual pursuits, administrative positions of a minor sort such as president of a lodge or P.T.A., a moderate interest in literature or art, etc.

5 points.   Very high type of interests.   Important contributions of time to public welfare, some intellectual pursuit or study (aside from mere gaining of a livelihood).

4. Home Library

These ratings are based chiefly upon the number of books in the home library (exclusive of number of books in child's library, quality of books, number and kind of magazines).   But in cases lying near the borderline of the classes described, number of books in child's library, quality of books, and number and quality of magazines are decisive factors in determining the rating.   As a general guide:

1 point.   Less than 10 books.

2 points.   Less than 50 books.

3 points.   Less than 150 books.

4 points.   Less than 500 books.

5 points.   500 books or over.

5. Artistic Taste

1 point.   No musical instrument, no pictures or only those of the most inartistic type, no taste in furnishing of house.

2 points.   Possibly a musical instrument, but furnishings and pictures distinctly inharmonious, and trashy ornaments, such as kewpies and gaudy bric-a-brac scattered about.

3 points.   Rather nondescript, nothing offensive to the eye, usually some kind of musical instrument, though the Victrola records and piano music are not of a high type.   Pictures are cheap prints poorly framed.   Photographs of the family are usually abundant.

4 points.   Noticeable effort to make home somewhat beautiful. Rugs and hangings blend well.   Nearly always a musical instrument provided with fairly good music.   Furniture and pictures do not clash, no trashy ornaments about, and family 'photos' are absent or present in very moderate numbers.

5 points.   Effect of interior is beautiful.   Fine taste used in blending the colors of rugs, hangings, furnishings, and pictures (though these things are not necessarily of the more expensive sort).   Musical selections for piano or Victrola are from standard composers (though a little popular music or jazz may be included as well).   Ornaments selected with discrimination and well arranged.

IV. Selection, Location, and Coöperation of Cases

1. Foster Group

a. Criteria of selection. The following criteria were satisfied in selecting cases for the study from the files of the Native Sons and Native Daughters of the Golden West Central Committee on Homeless Children, and the Children's Home Society of California:

1. Children were placed in their foster homes before the age of 12 months. (The average age of placement of our group proved to be 3 months, 2 days.)

2. Children were legally adopted—not merely cared for in free or boarding homes.

3. Children were between 5 and 14 years, inclusive, at the time of the investigation.

4. Foster parents were white, non-Jewish, English-speaking, and American, British, or north-European-born.

5. True parents (so far as was definitely known) were white, non-Jewish, Americans, British, or north-Europeans.

6. Children were placed in the home of a married couple, both members of which were alive and living together at the time of the investigation.

7. Cases must be accessible to the three centers—San Francisco Bay region, Los Angeles, and San Diego.

These criteria require little discussion. The first one was laid down (1) to insure that each child had lived in the environment of a single home from early infancy, and (2) to avoid the type of selective placement that might easily have been exercised if the children had been old enough at the time of their adoption to give clear evidence of their mental potentiality.

The second criterion confined the study to children who were being reared as though they were the actual offspring of the foster parents.

The third confined it to children within a range for which the I. Q. is fairly comparable at all ages.

The fourth and fifth criteria enabled us to avoid the confusion in results that would ensue from a foreign language handicap in any of the subjects who were tested, and precluded the possibility of an adventitious resemblance between foster parents and children

due to the practice by placement societies of matching foster parents and children for racial descent.

The sixth insured that all the children should be homogeneous in having both a paternal and a maternal influence; and the seventh merely made the study administratively feasible.

The criteria were met practically to the letter. When returns for the field work were in, several case records were found which failed to meet all the criteria and had to be eliminated. Such failure could always be accounted for in one of three ways:

1. Incompleteness of the abbreviated file from while the prospective cases were noted (*i.e.,* omission of some essential item regarding nationality, age of placement, etc.)

2. Overlooking on the part of the field workers of some item of information which should have ruled out the case in question from the start.

3. Change of condition described by the sixth criterion since the Society's record of the case was closed.

Cases of the following types were omitted from the calculations and summaries which are presented:

Case a—Foreign language spoken in the home.

Case b—Child was over a year old when placed.

Case c—Foster father deserted several years previously.

Case d—Child whose true father was Mexican was placed with a couple of which the wife was Spanish-American.

Case e—Child was only 4-9 when tested.

Three cases were kept, however, in which the age of placement of the child was afterward found to be in excess of 12 months, but to such a small extent that their inclusion did not seem detrimental to the study. These were:

Case f—Child was 14 mos. 20 days, when placed.

Case g—Child was 13 mos. 30 days, when placed.

Case h—Child was probably 15 mos. 17 days, when placed (record vague).

Since, in case h, we have no tests of the foster parents or supplementary environmental data, the I.Q. of this child has been used only in the I.Q. distribution and nowhere else.

In addition to cases a to e, it was necessary to delete:

Cases i and j because the Binet tests of the children concerned were below our standard of completeness;

Case k because the child concerned had had infantile paralysis which, according to the foster parents, had left her with a secondary feeble-mindedness;

Case l—only the test of the foster father discarded, because he was French Canadian and had a distinct language handicap despite years of residence in this country;

Case m—only the test of the foster father discarded because he was too deaf to take it under standard conditions;

Cases n and o—only the tests of the foster fathers discarded because they fell below our standard of completeness;

Cases p and q—only the tests of the foster mothers discarded for the same reason as that in cases n and o.

A few cases were kept, however, in which tests did not fully meet our standard of completeness, but fell below the standard by such a small amount that it did not seem expedient to deplete our material by eliminating them. Our testing procedure, it will be recalled, employed the complete Stanford-Binet Scale, but required that the testing be carried down only to an age level at which all items but one were passed, and up to an age level at which all items but one were failed. In a few instances it happened that, owing to limitations upon the time that the individuals tested were able or willing to give, the field visitors resorted to the expedient of administering only the abbreviated form of the test (*i.e.,* the starred items) or to carrying the testing only to the levels at which *two* items were failed or passed. Such abbreviations were unauthorized, but were made in situations in which it appeared to be a choice between obtaining an incomplete test or none at all. In no case did we retain in the study tests employing the starred items which did not extend down to a level at which *all* items were passed and up to a level at which *all* items were failed. In no case did we retain tests in which the 'lopping' of required passes or failures was so severe as to provide a basic level having more than two failures or an upper level having more than two passes, nor tests which had been lopped to this degree at both the upper and the lower level. However, the following tests were retained which were incomplete, but to an extent *less* than that described immediately above: two Binet tests of foster fathers, seven Binet tests of foster mothers, two Binet tests of foster children.

In scoring these tests, credit was given each test element on a basis of total credit allowed for a given mental-age level, divided by the number of elements administered at that level. In the few cases of tests retained which were lopped slightly more than our standard permitted, levels below the lowest level administered were counted as passed; levels above the highest level administered were counted as failed, and no effort was made to apply a correction. This no doubt introduced slight errors into the scores in question, but as it is very rare for a subject to gain or penalize himself by as much as 6 or even 4 months on levels beyond the boundaries of such lopping, the errors on these few tests can hardly have disturbed our results for the entire group to an appreciable degree.

In addition to the cases mentioned above, a case was also retained in which the foster child was found afterward to be a few days below our age standard, *i.e.,* 4 years, 11 months, 8 days; and one case was

retained in which the foster parents had separated, but had done so only a few months before the tests were made of the foster mother and child.

The foster parents in all cases for whom we have accurate data met the criterion regarding nationality, but the data regarding the true parents of the foster children are sometimes less clear upon this point. The records of the societies, as a rule, noted in connection with the case histories, not the true parents' birthplace, but only their *descent,* which referred sometimes to their native country, sometimes to the nationality of one or both of their parents, and occasionally to the nationality of one or more of their more remote progenitors. Which of these possibilities happened to be the case was seldom stated. Of the 140 true fathers and 146 true mothers for whom we could obtain a record of "descent," 64 percent and 66 percent, respectively, were indexed as of "American" descent; but 5 percent and 7 percent, respectively, were recorded as descended from national stocks which we sought to eliminate through our criterion of selection. In the group of true fathers and mothers combined 2 were of Greek descent, 6 of Italian, 2 of Mexican, 1 of Portugese, and 7 of Spanish.

It would have meant a serious loss if it had been necessary to discard each of these cases which were inadvertently included either because of an oversight on the part of the field workers or because of an ambiguity in the records from which cases were listed. Since the purpose of the nationality criterion was to avoid selective placement based upon racial descent, and since it was probable that a number of the cases above were born of diluted, rather than of pure, racial strains, it was decided to retain them if it could be shown that their inclusion had no significant tendency to alter the results.

Accordingly, we computed correlations between the children's I.Q.'s and the mental ages of the foster parents with the cases in question left in the group (with the exception of case d, deleted for the reason previously given), and again with the cases in question taken out. Taking out 12 foster-father and foster-child pairs reduced the correlation by .034; taking out 14 foster-mother and foster-child pairs increased the correlation by .006. As these amounts were slight and in opposite directions, the cases in question were retained. In view of the fact that the group contained no

south-European or non-Caucasian foster parents, even though the true parents of a few of the children were south-Europeans; and that only the placement of a child of a given nationality or race with foster parents of the same nationality or race could give rise to the ambiguous results against which we were guarding in this connection, the retention of these cases seems quite justified.

b. Location and coöperation. To secure figures on proportion of total cases listed which were located, which gave full coöperation, which refused to coöperate, etc., the original lists were consulted and each case assigned to one of the categories in the table below. 'Outside' cases not located through the organizations (of which we had 12) were, of course, not included. A small group of cases listed after the study was under way, of which the original work sheets could not later be found, was not included either. Nevertheless, the following figures are undoubtedly representative for the group as a whole and are based upon the majority of the cases listed.

TABLE I.—LOCATION AND COÖPERATION OF CASES

	Listed	Not Located	Located	Full Coöper-ation	Partial Coöper-ation	Refusals	Unavail-able
Northern California .	265	127	138	80	10	15	33
Southern California .	372	249	123	78	6	8	31
Total.	637	376	261	158	16	23	64

Of 637 cases, 261, or 41 percent, were located; of 261 located cases, 64, or 24 percent, proved to be unavailable for reasons listed below; of 195 available cases, 158, or 80 percent, gave full coöperation, and 16, or 8 percent, gave partial coöperation, yielding 174, or 88 percent, who coöperated to the extent of giving us tests on at least one parent and child. (In our entire group we had 204 cases which coöperated to that degree.)

The 12 'outside' cases previously mentioned were, in the main, foster siblings of our cases, and had been secured by the foster parents through sources other than the two placement agencies with which we worked. They included one or two 'volunteer' cases as well.

TABLE II.—REASONS FOR UNAVAILABILITY

	Number of cases
One foster parent dead	15
Foster parents separated or divorced	10
"No time"	10
Foster child died	8
Sickness in family	4
Home in inaccessible region	3
Field workers told by organization secretaries not to visit case	3
Part of family away	2
Mother works	2
Deafness of foster parent	2
Child had been returned to organization because of feeble-mindedness	1
Possible secondary feeble-mindedness of foster child	1
Child was feeble-minded and in an institution	1
Test of child was invalidated by having foster parents come in and talk during test	1
Case was known by field visitor to be too confidential to approach	1
Total	64

2. Control Group

a. Function of Control Group. The function of the array of families comprising parents and their true offspring which we have termed the 'Control Group' should be clearly defined at this point. The group serves two significant ends. It permits an estimate of the strength of mental *heredity,* after the strength of environment has been evaluated in the foster group; and it furnishes a most important check upon the validity of methods used.

Regarding the first end, more will be said in the final section. With regard to the second end, it is easy to see how indispensable the Control Group really is. If our test data and environmental data had been obtained only for the Foster Group alone, the low 'environmental' correlations reported in a subsequent section of this study could not have been said with any assurance to represent the actual limits of the type of influence we sought to measure. The unanswerable criticism could have been made that our methods might simply be unadapted to measuring the force of environment, and that better methods in the future might contravert our findings. But here we have a control group for which data were gathered by the same field workers and by the same procedure as that employed for the Foster Group. In marked contrast to the results for

the Foster Group, we shall find in the Control Group that parent-child mental resemblances are of about the same magnitude as those ordinarily found in the case of hereditary *physical* traits. Such results will offer a solid basis upon which to interpret results.

The point was made in an earlier section that our conclusions are valid (at least in numerical terms) only for populations resembling in important respects the ones tested. It follows that if the results from the Foster Group and the Control Group are to furnish a valid comparison, the two groups must be 'matched' in a very rigid sense with respect to all the factors that could directly or even remotely influence the results. The effort which we made to secure such matching is manifest in the criteria that follow for selecting the Control Group.   That the criteria were successful in attaining good matching will be seen in fifth section, headed "Composition of Groups."

b. Criteria of selection. Control cases were chosen by the following criteria:

1. Children of the Control Group were matched with those of the Foster Group for age, sex, and number of five-year-olds who had had no kindergarten attendance.

2. Control families were matched with foster families for locality, type of neighborhood, and occupational field of the father.

3. Non-Jewish, white American, British, or north-European families who spoke English were taken.

4. Both parents were alive and living together at the time of the investigation.

5. Only one child per family was tested (though families were not selected with respect to size).

Only 50 percent as many control cases as foster cases were selected, since our resources and time were becoming limited. As it turned out, the correlations in the Control Group, despite smaller numbers, had no greater probable errors for the most part than the corresponding correlations for the Foster Group, because the control correlations were in general so much larger.

As a possible source of cases, we considered the advisability of seeking the coöperation of parents who had an application for a foster child pending with one of the California child-placement agencies, and at the same time had a true child. Several such

cases were looked up, who gave coöperation readily, but it soon became evident that to secure enough cases through this source would require the field visitors to travel prohibitive distances. Accordingly, it was arranged to select cases from the files of the public schools in the general localities represented by the Foster Group. The listing of subjects was as impartial as we were able to make it. At each school coöperating, the procedure was:

1. Select two or three names under each letter in the alphabet to avoid siblings.

2. Take about twelve cases for each age group.

3. Ask principal to check list for divorces, step children, race, etc.

4. Ascertain occupations of fathers from the children.

5. Locate a few children who have five-year-old siblings who have never attended kindergarten.

6. Check list with teachers.

7. Get letter of introduction from principal to parents.

This scheme gave us a working list far greater than the total number of cases we intended to gather, and allowed us sufficient leeway to insure good matching of controls with fosters in all the criteria laid down.

The Control Group, as finally completed, consisted of:

Cases selected through public schools...................... 93
Cases of 'true children' in our foster families who were
    tested while our foster records were being compiled.... 6
Cases of 'true children' of parents with applications pending
    for a foster child................................... 3
Other cases of families interested in project.............. 3
                                         105

In the Foster Group all the tests were made by the three field workers mentioned, with the exception of one 'outside' case contributed by Miss Elizabeth Briggs, who was doing field work on another Stanford project, and a test of one foster child contributed by a Berkeley school. In the Control Group tests which were not made by one of the three field workers were administered as follows:

Tests of children in Palo Alto, by students trained by Dr.
    Merrill, of Stanford University....................... 4
Test of child contributed by a school..................... 1
                                         5

It will be recalled that several cases of the Foster Group for which we had considerable data had to be dropped because of failing to meet our criteria. Only one such case had to be discarded in the Control Group (a case in which the test of the child was too incomplete to keep). The Control Group, however, had a larger quota than the Foster Group of tests which fell below our standard of completeness, but were retained nevertheless because they fell below to so slight a degree. Of these there were 11 tests of fathers, 12 tests of mothers, and 9 tests of children.

c. Location and coöperation. With the Control Group, in which certain delicate factors peculiar to the Foster Group were absent, the computed figures for full and partial coöperation were 94 percent and 98 percent. These figures, while undoubtedly representing a greater readiness to coöperate than was found in the Foster Group, are probably a little high, since in the control field work the visitors sometimes abandoned a case on the list if, after a call or two, it promised to consume an unusual amount of time to find the family at home, arrange for an appointment to give tests, etc. It is likely that some of the cases which were thus discarded might have proved to be 'refusals' if they had been pressed.

TABLE III.—COMPARISON OF NUMBERS AND LOCALITIES IN BOTH GROUPS

	Foster	Control
Los Angeles (including Glendale and Pasadena)	83	46
San Francisco	43	37
Oakland	29	—
Berkeley	15	2
Rural (in Southern California)	11	3
San Francisco Bay cities	10	13
Alameda	9	3
San Diego	8	1
Southern California beach towns	6	—
	214	105

The failure of the Control Group to meet its 50 percent quota in some of the localities is accounted for by the fact that we selected in certain large centers, as Los Angeles and San Francisco, not only school districts which would match the districts in which we had located foster children in those cities, but also districts which would match those in nearby towns from which some of our foster

cases had been drawn. Thus, we matched most of our San Diego and 'beach towns' quota in similar Los Angeles districts, our Oakland quota in similar San Francisco districts, and our Berkeley and 'bay cities' quota in Palo Alto (itself a 'bay city').

A final count of Binet tests given in the entire study (aside from those deleted for reasons explained) gives the figures shown in Table IV.

TABLE IV.—TOTAL NUMBER OF SUBJECTS TESTED BY STANFORD-BINET

	Foster	Control
Children..	214	105
Parents (counting only once the foster parents of 22 pairs of foster sibs).................................	342	206
Total..	556	311
Foster Group plus Control Group (minus 12 parent tests appearing in both groups).....................	855	

V. VALIDITY OF RESULTS

The extent to which the results of this investigation can be considered valid and conclusive is dependent upon two aspects of the study which should now be discussed. The first aspect concerns the soundness of the data themselves; the second aspect concerns the possible presence or absence of disturbing factors that would tend to render the results ambiguous or cover up relationships which we sought to evaluate.

1. Soundness of the Data

An attempt has been made to apply objective criteria to an appraisal of this point.

(1) One check involved the comparison of tests made by the different field workers. Although each of the three workers was trained in Binet procedure, each had had her training at a different institution, and it was conceivable that a personal equation might have entered to distort the results. The following comparisons were therefore made of average I.Q.'s of children tested in the Bay region and in Los Angeles county. The slight differences found do not appear to be significant.

	Bay Region Mean I.Q.	N	Los Angeles County Mean I.Q.	N
Bathgate	———	—	109.2	39
Burks	103.4	65	———	—
O'Connor	106.7	33	109.4	50
Difference	3.3		0.2	
Difference divided by P.E. of difference	1.6		0.1	

(2) Careful precautions were taken in gathering data, in scoring blanks, and in working up the results statistically, to insure accuracy. The most important scatter diagrams and correlation coefficients were checked by having them repeated independently.[4] The writer checked for errors in the scoring of the Binet tests made by all three field workers from the verbatim responses noted in the record booklets. Dr. Maud A. Merrill of Stanford kindly triple-checked twelve of the Binet blanks, so that we might have further assurance that the scoring was standard. In no case did any suggestion of hers regarding scoring amount to an appreciable change in mental age for the test in question. The chronological age and the I.Q. (M.A./C.A. ratio) were checked for the test of every child. (M.A.'s, not I.Q.'s, were used in the case of the adults.) The writer also rescored the Whittier and culture items on each home information blank in order that all the cases might have ratings made by a single standard.

(3) Finally, the test scores were considered from the standpoint of chronological age. It has been shown by Willoughby (19) and by others that in group tests of the Alpha or Beta type there is a negative correlation between performance and chronological age after an age of approximately thirty. Willoughby's data do not indicate whether this relationship is due to the selection of his subjects, to decreased speed of reaction, or to a decline in the actual functions tested. Material of the Binet type would not seem *a priori* to be so subject to age decline as material used in

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[4] In the Foster Group the following correlation scatters and computations were checked: child's I.Q. with M.A. of foster father, with M.A. of foster mother, and with mid-parent M.A. In the Control Group the following correlation scatters and computations were checked: child's I.Q. with M.A. of father, with mid-parent M.A., with Whittier index, with culture index, and with family income. These were found to have been computed correctly the first time.

group tests.   However, this point was investigated by computing the correlations between chronological age and mental age for our present groups, and then partialling out the chronological age from the correlations between parents' and children's intelligence.   The correlation between the children's I.Q.'s and chronological age was also computed, because inverse relations have been found by some investigators.   The following correlations were found between intelligence and chronological age (intelligence measured as M.A. in adults and as I.Q. in children):

TABLE V.—CORRELATIONS OF INTELLIGENCE WITH CHRONOLOGICAL AGE

	Foster		Control	
	r	P. E.	r	P. E.
Fathers	− .23	.05	− .03	.07
Mothers	− .00	.05	.18	.07
Children	− .10	.05	.09	.07

Applying the partial correlation technique to free the parent-child correlations from the effect of age did not affect the correlations beyond one point in the second decimal place.   Accordingly, the factor of age was not considered in the subsequent correlations involving intelligence.

2.   Possible Disturbing Factors

There are three types of disturbing factors which might enter in to cloud the significance of the results.   The first is possible selective placement of the foster children, which, if practiced to any considerable extent, would result in adventitious resemblances between foster parents and children.   The resemblances would then be no less ambiguous than those between true parents and children which have been reported in various investigations.

The second type would result in a distorted distribution of the I.Q.'s of foster children, and might come about through a possible 'weeding out' of undesirable children, or through some unknown selective influence with respect to the type of child who comes under the guardianship of the two placement agencies coöperating with us.   If such were the case, then any positive deviation of the aver-

age I.Q. of the Foster Group as a group from normal might be due both to good environment and to selection, in unknown proportions.

The third type is a possible failure upon our part to secure conditions in the Control Group which are truly comparable to those in the Foster Group. Only if the two groups are comparable in essential respects does the Control Group provide an adequate check upon the Foster Group.

3. Selective Placement

It is natural to suppose that an effort would be made by the child-placement agencies to fit the home to the child. Through interviews with the placement secretaries, we found this to be the case. A number of factors seem to have operated. Racial boundaries were sharply drawn; and the religious faith (whether Protestant, Catholic, or Jewish) of the child's true parents was always observed in selecting a foster home. National descent also figured to a considerable degree, and an attempt was usually made to have the child's general physique and coloring match those in the family of which he was to become a member. Finally, the agencies made an attempt to place the children with foster parents whose cultural background was somewhat similar to that of the true parents.

Through our criteria for listing prospective cases, we succeeded in eliminating some of the phases of selective placement mentioned above. By taking only children who had been placed before twelve months of age, we barred those in whom a clear prognosis of future development could have been made, and who could therefore be 'fitted' to homes directly upon such a basis. This criterion also insured an ordinarily constant environment for the children almost from the dawn of their intelligence, thus avoiding the confusion which would have been introduced if a significant part of their care and training had been given by their true parents. (It will be recalled that the average age of placement for our group was only three months.)

Our specifications regarding the true parents and foster parents of the children eliminated selective mental resemblance due to race or nationality, since only white subjects were used, and the only nationalities included were those which in other investigations have

been shown to differ little in average level when measured on a large scale by mental tests.

The placement of children according to religious faith, physique, or coloring could scarcely give rise to spurious mental resemblance (especially since children of south-European or Jewish descent were excluded). That leaves us only the possibility of selection based upon cultural status to consider.

Investigation of the degree to which this factor was operative was approached in several ways.

First, the occupations of all the true fathers of our foster children for whom we had adequate information were assigned Barr[5] ratings by Mr. Kurtz and myself. Similar ratings were also assigned to the occupations of the foster fathers as listed *at the time application for a child was filed* with the placement agencies. Not all the occupations of fathers and foster fathers in our group were represented by the 100 occupations listed on the Barr Scale, but estimated Barr Scale values were assigned to the occupations not represented on the scale. The objectivity of the ratings was good; 29 random pairs of independent ratings of true fathers by Mr. Kurtz and myself correlated .92 ±.02, and 47 random pairs of our independent ratings of foster fathers' occupations (at time of applying for foster child) correlated .91 ± .02. But the correlations that were found between Barr ratings of the children's true fathers and certain other variables were exceedingly low. They may be summarized thus:

BARR RATINGS OF TRUE FATHERS	r	P.E.	N
With Barr ratings of foster father	—.02	.07	86
With Whittier rating of foster home (at time of our investigation)	.01	.07	91
With culture rating of foster home (at time of our investigation)	—.04	.07	83
With child's I.Q. (at time of our investigation)	.07	.07	91

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[5] The Barr Scale, described fully in *Genetic Studies of Genius*, I, pp. 66ff., comprises the combined judgments of thirty raters upon the grade of intelligence which each of 100 representative occupations demands on the average. Scores on the Barr Scale are expressed in point values, and vary from the occupation "hobo," which is arbitrarily given a rating of 0, through average occupations such as metal finisher or plasterer (8.02 and 8.04), to that of inventive genius (20.71).

These results were negative in so far as evidence for selective placement was concerned. However, this approach had taken account only of the slight information we had regarding the children's fathers and left their mothers out of the picture. We next attempted to get a better estimate of each child's prognosis as an infant by utilizing all the information we had upon the heredity of each. Utilizing the data copied from the files of the placement agencies, two raters, Mrs. Dortha Jensen and I, made independent estimates of the probable future I.Q. of a child having given each hereditary background. There were 158 cases for whom such estimates were made. Information regarding the remainder of our 214 cases (which included a number of foundlings and abandoned children) was too meagre to justify any estimate whatever. According to the fullness or paucity of data, the two raters indicated that their estimates of the expected I.Q.'s were based upon data that offered "certain," "fairly certain," "rather uncertain," or "very uncertain" grounds for estimate. The estimates were made without knowledge of which children were being judged and were consequently based solely upon our information regarding their parentage. Estimates recorded as "certain" were based upon data that gave the occupational or social status and sometimes the educational status of both parents. Estimates recorded as "very uncertain" were based upon information usually regarding only one parent and that only suggestive to a slight degree. Separating the children into groups for whom the estimates were certain, fairly certain, rather uncertain, and very uncertain, we obtained the correlations with the children's actual I.Q.'s, foster fathers' mental ages, and foster mothers' mental ages shown in Table VI.

The 158 pairs of ratings by the two raters correlated to the extent of .64 ±.03. This measure of reliability does not indicate, of course, how close to the actual I.Q.'s lie the estimates of fallible judges based upon fallible data; but rather how closely two fallible judges can agree as to the significance to be attached to the limited data available upon the children's true parentage. While the figure, .64, is high enough to show that the two raters approached the problem of estimating the I.Q.'s with something like the same point of view, it is not high enough to have much value for predic-

tion (its alienation coefficient is .77). The average correlation of
I.Q.'s estimated by the two judges with the mental ages of the
foster fathers was only .01, with the mental ages of the foster
mothers only .14, and with the actual I.Q.'s of the children only .18.
The correlation between foster parents' intelligence and children's
I.Q. to be expected from selection alone would be the product of

TABLE VI.—ESTIMATED I. Q. OF FOSTER CHILDREN CORRELATED WITH
OTHER VARIABLES

Variable	Certainty of I. Q. Estimate				Total Ratings	Rater
	Certain	Fairly Certain	Rather Uncertain	Very Uncertain		
Actual I. Q.						
r.................	.36	.24	−.03	.23	.19	B
P. E.r	.12	.09	.08	.14	.05	
N...............	24	47	65	22	158	
Actual I. Q.						
r.................	−.04	.14	.23	.75	.18	J.
P. E.r..........	.19	.08	.08	.11	.05	
N...............	13	69	69	7	158	
Foster Father's M. A.						
r.................	−.02	−.22	−.03	−.29	−.01	B.
P. E.r..........	.15	.11	.09	.14	.06	
N...............	21	36	57	20	134	
r.................	.14	.01	.11	−.15	.03	J.
P. E.r..........	.18	.09	.09	.29	.06	
N...............	13	60	56	5	134	
Foster Mother's M. A.						
r.................	.47	.05	....	.48	.16	B.
P. E.r..........	.11	.10	.08	.11	.05	
N...............	22	46	64	21	153	
r.................	.27	−.02	.10	.73	.11	J.
P. E.r..........	.17	.08	.08	.12	.05	
N...............	13	67	66	7	153	

the correlation of estimated I.Q. with actual I.Q., times the corre-
lation of estimated I.Q. with foster parents' mental age; namely,
.00 in the case of the foster fathers and .02 in the case of the
foster mothers. (Sewall Wright method; see reference 20.) Con-
sequently, any correlations actually found in the study between

foster parents and foster children can probably be considered as due to environment.[*]

When one considers the steps of judgment necessary in the routine of 'fitting a child to a home,' it is little wonder that the correlation coefficients of selective placement are negligible. A placement secretary, on the basis of rather meager information furnished by a mother who relinquishes her infant, estimates a child's mental potentiality. Our medium-high coefficient of reliability of estimate suggests that, if another placement secretary should make such an estimate, it would tend to vary somewhat from that of the first placement secretary. And our low correlations between estimated I.Q.'s and children's actual I.Q.'s suggest that the data available on the child's heredity are not adequate for any valid prognosis of his future mental development.

In choosing a suitable foster home for the child, the placement secretary has, to aid her, the report of a field agent who visits the homes of applicants for children, and usually one or two personal interviews with one or both of the prospective foster parents. From these she forms her estimate of their financial, moral, religious, and mental status. Our results indicate that her estimate of financial and moral status of the foster parents is probably more valid than that of their mental status.

With no means of accurately gauging the infant's mental potentiality, and with a fallible estimate of the mental status of the foster parents, the placement secretary now does her best to match the foster parents and child from as many angles as possible, including that of mental level. The result, as our data show, is an almost total lack of systematic correspondence between the child's mental potentiality and the mental level of his foster parents.

[*] It is possible, of course, that in some of the cases more information was obtained by the placement societies regarding the child's true parents than appeared in the case records on file. Through personal interviews with mothers relinquishing their children, the society representatives may have reached a better appraisal of the mother's capacity than was possible for us with the limited number of data recorded in the organization files. But it should be noted (Table VI) that even the cases for which the estimates seemed to be based upon reliable data tend to show low correlations between estimated I.Q. and foster parent intelligence. Also, the considerable number of children for whom the hereditary background is almost unknown would diminish still further the possible effects of selective placement throughout the total group.

Through the course of the investigation it became more and more apparent that *intellectual promise carries little weight with either the placement societies or prospective foster parents.* This implies that what knowledge the organizations possessed regarding the children's mental heredity was of little avail in making the placements. The following tabulations suggest, at least, that the foster parents themselves made little attempt to choose their foster children for their mental potentialities. The application blanks of both societies request the applicants to state the age, sex, and appearance of child desired, and leave ample space for description. It is true that the wording of the blank does not specifically include the item of mentality, and that this matter may later be

TABLE VII.—KIND OF CHILD DESIRED, AS SPECIFIED ON APPLICATION BLANKS

Trait or Quality Specified	Frequencies		
	N. S. N. D.* (108)	C. H. S.† (58)	Total (166)
Age...........................	105	55	160
Sex...........................	88	49	137
Complexion.....................	33	19	52
Eye color......................	23	13	36
Hair color.....................	22	10	32
Health.........................	21	2	23
Nationality....................	6	2	8
Parentage......................	7	....	7
Mentality......................	3	1	4
"Normal".......................	3	....	3
"Good features"................	2	1	3
Race...........................	2	1	3
Legitimate orphan..............	2	....	2
Size...........................	2	....	2
Refinement.....................	1	1	2
"Attractive"..................	....	2	2
"Large eyes"..................	1	....	1
Curly hair.....................	1	....	1
Twins..........................	1	....	1
Number of Items Specified—			
1.............................	9	7	16
2.............................	35	22	57
3.............................	38	17	55
4.............................	18	7	25
5.............................	3	4	7
6.............................	4	....	4
7.............................	1	1	2

*Native Sons and Native Daughters Central Committee on Homeless Children.   †Children's Home Society.

taken up by applicants in personal interviews with the child-placing agents. Nevertheless, it seems significant that so few applicants made any mention of qualities other than the objective ones suggested on the blanks.

4. Possible Distortion of Intelligence Distributions

One's immediate observation on scanning the data upon the true parents of the foster children is: "This group seems to represent a fair cross-section of the population at large." Among the true mothers we find clerks, high-school girls, domestics, teachers, college girls, nurses; among the true fathers we find mechanics, lawyers, truck-drivers, students, salesmen, army and navy men. The classification in Table VIII is an attempt to give the clearest possible picture, consistent with brevity, of the vocational fields from which the true parents were drawn (in cases for which such information was available). The average age of the fathers was 29 years, of the mothers 23 years.

TABLE VIII.—OCCUPATIONAL DISTRIBUTION OF TRUE PARENTS OF .FOSTER CHILDREN

	True Fathers		True Mothers	
	N	Percent	N	Percent
I. Professional (lawyers, engineers, etc.) ..	8	6.7	....	....
II. Teachers..........................	....	....	2	2.6
III. Business owners or managers..........	8	6.7	....	....
IV. Commercial employees (clerks, book-keepers, stenographers, etc.)........	18	15.1	22	28.6
V. Sales work.........................	9	7.6	....	....
VI. Rancher or farmer..................	6	5.0	....	....
VII. Skilled labor (carpenters, mechanics, etc.)............................	31	26.1		
VIII. Semi-skilled (truck drivers, barbers, etc.)............................	6	5.0	38	49.4
IX. Unskilled labor.....................	8	6.7		
X. Students (college, high school, grammar school).....................	9	7.6	15	19.5
XI. Army and navy (probably not officers)	16	13.4	....	....
Total.........................	119	99.9	77	100.1

Although the parents entering this tabulation represent only about half of the total number, they possibly offer a fair indication of the social level of the entire group. It will be recalled that almost no average difference was found between the I.Q.'s of foster

children who were foundlings and of those whose ancestry was known. Fathers who do not enter the table were generally listed as "unknown," or "occupation unknown." Mothers who do not enter were more often listed as "at home."

In the case of the fathers, the proper class to assign to each occupation is generally clear, but in the case of the mothers, the three classes—skilled, semi-skilled, and unskilled labor—have been combined because of the difficulty of deciding to which one a given occupation belongs. Domestics are outstanding in this grouping—there were 16. Others there included are four factory workers, four telephone operators, six nurses, and two laundry workers.

The mean of the Barr ratings of 91 true fathers[7] for whom we had sufficient data to make a rating was 9.6 ± 0.3. The standard deviation was 3.1 ± 0.2. This mean value is slightly higher, and the standard deviation slightly less than the corresponding values for the adult male population at large in the localities from which the fathers were chiefly drawn (approximately 7.9 and 3.4).[8]

It is possible that true fathers whose occupational level could not be estimated would have either raised or depressed the average and standard deviation of the Barr ratings; but this seems unlikely, because the average I.Q. of children for whose fathers we have Barr ratings is within 1 point of the average for the entire Foster Group. It seems probable that the congenital level of offspring of the group of fathers and mothers that are represented in our study would not be far from average (or 100 I.Q.).

Other evidence, more or less indirect, was brought to bear upon this general question. The possibility was considered that whatever heterogeneity was present with respect to the source of foster children might, in spite of the apparently unselected distribution of occupations, introduce factors that would load the average level of the children to one side or the other. Are legitimate children,

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[7] Many fathers for whom we had the general occupational class, such as "sales work," could not be rated on the Barr scale because there was no way of knowing whether their type of work ranked fairly high, as insurance salesmanship, or fairly low, as selling over the counter in a small shop. We made no attempt, either, to assign Barr ratings to students or to army and navy men.

[8] The latter values were computed in connection with the Stanford study of gifted children to compare with similar statistics upon the fathers of gifted children. See *Genetic Studies of Genius,* Vol. I, p. 71.

who because of the death or desertion of one or both parents, and because no relatives step forward to care for them, more likely or less likely to be subnormal than illegitimate children?

In our group (exclusive of 'outside' cases,) causes of dependency were found as shown in Table IX.

TABLE IX.—CAUSES OF DEPENDENCY

	N	Percent
Illegitimate...	145	71.8
Foundlings (probably illegitimate)....................	14	6.9
	159	78.7
Legitimate, one of parents dead......................	10	4.9
Legitimate, parents separated or divorced.............	9	4.4
Legitimate, parents could not or would not provide for child...	11	5.4
	30	14.7
Unknown or doubtful................................	13	6.4
Total..	202	99.8

The discussion farther on of the significance of the average I.Q. level found in the entire group of foster children will not be anticipated by reporting at this point the mean I.Q.'s of children from these sub-groups. It is sufficient here to note that the only sub-group showing a significant departure in mean level from the mean of the entire group was the sixth (unknown or doubtful). This sub-group is small and is classified 'unknown or doubtful' because of incompleteness in the records of the placement organizations. It seems safe to assume that, for our purposes, the entire group of foster children can be treated as a homogeneous one.

Our next line of approach considered the possibility of intellectual differences among mothers of illegitimate children with respect to the type of young woman who relinquishes and the type who keeps her child. This approach was made through the coöperation of the matrons of two large 'rescue' homes in San Francisco which give assistance to pregnant girls. First, the plan was to consult the files of these homes for the years in which children in our foster group were born; but each home had recently come under new management, and the files prior to this (1921 in one

home, and 1923 in the other home) were too incomplete to be of service. Accordingly, the 1921 files for the first home and the 1923 files for the second home were used to compile short case histories of the girls in these homes who had given birth to infants. These histories usually contained information upon the age, occupation, and education of each girl, and occasionally provided data upon her family background and comments upon her mental status. The disposition of the infant (whether adopted, relinquished, kept by mother, or deceased) was also noted. Fifty-seven such histories were compiled. The fifty-seven mothers were then ranked independently by Mrs. Jensen and by me in order of the probable intelligence level. The two series of rankings correlated (Spearman rank-order method) .92 ± .01. The average rankings of *both* judges were then used to determine the percent of illegitimate mothers placing children for adoption who equalled or exceeded mothers of the entire group in estimated intelligence. This proved to be 59 percent, or 16 of 27, of mothers whose children were relinquished and placed for adoption.[9] This proportion suggests a slightly stronger tendency in the brighter than in the duller mothers to relinquish their illegitimate children, but, in the light of the small numbers and the unknown degree of validity of our rankings of the mothers, it is inconclusive.

Next, the files of the County Clerk's office in San Francisco were consulted with a view to estimating the likelihood that children received and placed by our two coöperating agencies were 'unselected' dependents. Adoption papers for one representative year (1922) were examined with respect to the age and source of the children adopted. Of 117 adoptions, 37 had been adoptions of children under two years of age.[10] Of these, only twelve had been relinquished through our two placement agencies; 11 had been obtained through other organizations (chiefly the Associated

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[9] The mothers whose children were placed for adoption do not represent all the mothers who relinquished their children, for of course children who died or who became permanent wards of the state because of disease or obvious subnormality were not included in the group placed for adoption.

[10] While our study deals only with children placed under one year, most of the children were not legally adopted for six months to a year later. Accordingly, children were considered who were recorded as adopted under two years of age.

Charities); and 14 had been relinquished to the adoptive parents directly or through private individuals. For these 14, the following sources and causes of dependency were noted:

Mother died, father relinquished..................... 5
Relinquished or abandoned by parents................ 5
Illegitimate, relinquished by mother................... 2
Father deserted, relinquished by mother.............. 1
Received through a physician........................ 1
                                                    ——
                                                    14

Since the causes for dependency in this group are similar to those found for our cases, and since (as was previously mentioned) no significant difference could be found in our group between the average I.Q. level developed by groups of children coming through such sources, there is little reason to believe that in intelligence they represent any more selection or any less selection than our cases.

Still another possibility of distortion considered is the veto sometimes exercised by the placement agencies with respect to the infants considered unplaceable for one reason or another. If an infant shows a positive Wasserman test or presents symptoms of any congenital disease, if either of his parents is known to be feeble-minded, or if the infant himself exhibits identifiable stigmata or symptoms of under-par development, he is not placed for adoption—at least not until he is cured or is old enough to be given diagnostic tests. Such a policy doubtless raises the average level of children who are placed in adoptive homes.

In San Francisco, the agency which makes provision for dependent children who are unplaceable is the Associated Charities. Miss Moriarity of this agency kindly coöperated with me in making an analysis of the illegitimate children under one year of age who met in all respects our criteria for the selection of foster cases and who had been helped by the Associated Charities during a one-year period (1921). There were 134 such children, 78 of whom were placed for adoption before they were twelve months old (generally through the Native Sons and Native Daughters Committee). Of the remaining 56, 6 died, and 50 were either not placed for adoption at all or were not placed until after reaching twelve months of age. Sufficient information was available upon 30 of the 50 who were not placed to provide some basis for esti-

mating their probable I.Q. development. A sample case, for example, yielded the following data: "Mother feeble-minded, committed to Eldridge (state institution). Child lived in a boarding home until age of four, when she was pronounced normal by a psychologist (I.Q. 91) and placed for adoption." Information for this case is a little more complete than for most of the others, and it was only rarely that test data upon the children were available. Nevertheless, the conclusion is probably justified that the 30 children whose potential I.Q.'s were rated by me were on the average somewhat inferior in mental endowment. The average estimated I.Q. for these cases was 91.

Obviously, if from a fairly normal distribution of I.Q.'s, a number of cases are removed chiefly from the lower half, the effect is to raise the average level of cases remaining. It is likely that a distortion in this direction has occurred in our Foster Group. This possibility gains support from the fact that the distribution of I.Q.'s actually found in the Foster Group is somewhat skewed toward the upper end. It is impossible to estimate the precise effect upon I.Q. level that this factor has. There is at least the possibility that the *total* group of parents whose children become eligible for foster homes or for custodial care are themselves skewed toward the lower end of the intelligence range, but that through judicious elimination of unpromising candidates for adoption, such skewness fails to appear in the group of parents of our cases. Support for this view is found in the apparently representative distribution of the occupations of the true parents of our cases.

Finally, the possibility was investigated that selective coöperation of the foster parents approached might have introduced a source of error. Beside the cases refusing any coöperation whatever, there were cases in which (1) the foster parents permitted a test of the child but would not coöperate themselves; (2) the foster mother and foster child coöperated, but not the foster father; and (3) the foster father and foster child coöperated, but not the foster mother.

In order to apply our data upon these cases to the question of selective coöperation, it is necessary to assume that whatever selection as to mental level resulted from the total refusals of some families to coöperate is revealed at least to some extent in the cases which partially refused to coöperate.

(1) In five cases for which we have a test of the child, but not for either foster parent, the average I.Q. of the foster child was 109.

(2) In 24 cases in which the foster mother and child coöperated, but not the foster father, the average mental age of the foster mother was 15 – 8, and the average I.Q. of the foster child was 101.

(3) In two cases for which we have tests from the foster father and child, but not from the foster mother, the average mental age of foster father was 17 – 2, and the average I.Q. of the foster child was 92.

The mental levels of the foster parents and foster children in the main study are expressed by the mean values M.A. of foster fathers 17 − 0, M.A. of foster mothers 15 − 8, and I.Q. of foster children 107.

Since these values are close to the mean values just cited for groups (1) to (3), there seems to be little evidence that our refusals (approximately 15 percent) materially influenced the final results in so far as mean intelligence of cases is concerned.

An additional source of speculation, of course, is that there may have been a selective influence present in refusals that would actually alter the coefficients of resemblance between foster parents and children, even though it did not affect the mean levels of the tested groups. Such a disturbance would result, for example, if bright foster parents whose children happened to have turned out dull showed a stronger tendency than other foster parents to refuse to coöperate. We do not have data through which this possibility can be objectively ruled out, but we do have the subjective judgment of the field workers that refusals were more often connected with a sensitivity about the fact of the child's adoption than with any other sentiment. The judgment that refusals were not closely associated with discrepancies between parent and child intelligence is rather borne out if we recall that in the Control Group, in which certainly there were a number of cases of fairly wide discrepancy between parent and child intelligence, the number of refusals was almost nil.

As a matter of interest, to find out whether the group of foster parents serving as subjects were representative of the entire group of foster parents (meeting our criteria of selection) with whom children have been placed by our two agencies, the mean and

standard deviation of Barr ratings of foster fathers were computed for four groups as shown in Table X.

According to these ratings, the families who were located represent a slightly superior selection.

TABLE X.—BARR RATINGS OF FOSTER FATHERS AT TIME OF APPLICATION

	Mean	S. D.	P. E. of mean	N
Cases coöperating.............	11.5	2.60	.13	195
Cases located*................	10.6	2.65	.11	245
Cases unavailable.............	10.8	3.09	.30	51
Cases refusing to coöperate.....	11.6	2.36	.46	12

*Certain occupations are more migratory than others. For example, we have only one chauffeur located on the list of seven whom we attempted to locate. We located none of the three ministers on our list.

The interpretation to be drawn from the preceding pages must take the form of a judgment, rather than of an objective conclusion. A variety of evidence, suggestive rather than conclusive, has been presented with the hope that a reasonable assumption regarding the potential I.Q. distribution of the foster children may be indicated from the composite. The reader, on the basis of his own judgment, will doubtless infer, as I do, that the average I.Q. of our

TABLE XI.*—INTELLIGENCE DISTRIBUTION OF CHILDREN, IN I. Q.

	Foster	Control		Foster	Control
175–179...........	....	....	105–109.........	32	15
170–174...........	....	....	100–104.........	32	13
165–169...........	....	....	95– 99.........	27	5
160–164...........	1	....	90– 94.........	16	5
155–159...........	1	1	85– 89.........	7	....
150–154...........	1	2	80– 84.........	2	....
145–149...........	1	1	75– 79.........	3	2
140–144...........	....	2	70– 74.........	2	....
135–139...........	3	7	65– 69.........	1	....
130–134...........	7	3	60– 64.........	....	....
125–129...........	8	10	55– 59.........	....	....
120–124...........	16	13	50– 54.........	1	....
115–119...........	24	18	45– 49.........	....	....
110–114...........	28	8	40– 44.........	1	....

	Foster	Control
Mean.................................	107.4	115.4
S. D.................................	15.09	15.13
N...................................	214	105

*See also Figure I.
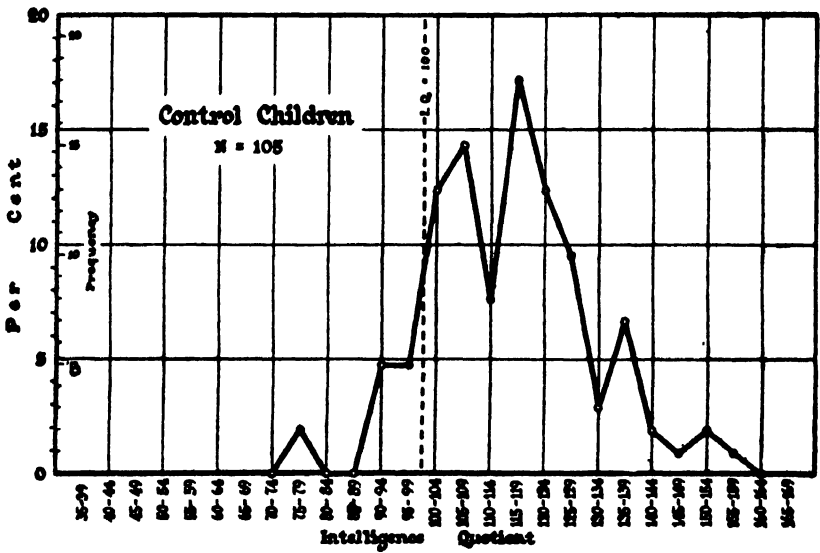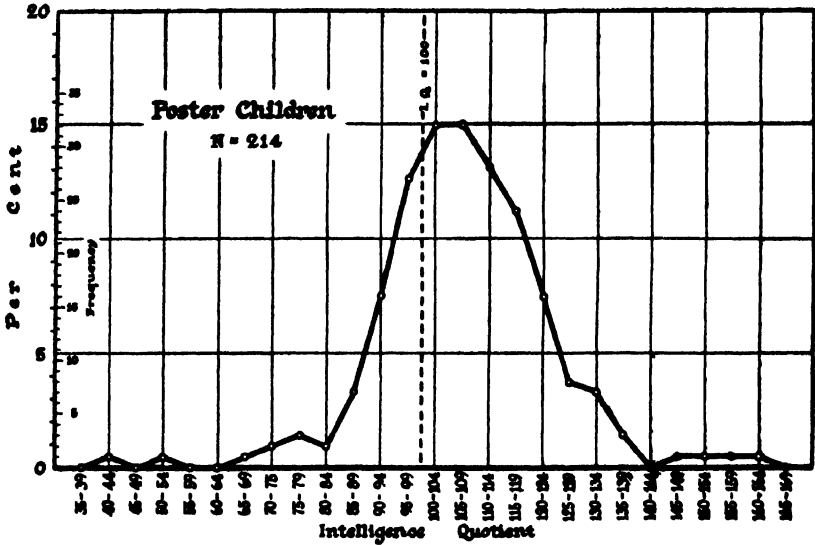
FIG. I.—I.Q. DISTRIBUTIONS OF FOSTER CHILDREN AND CONTROL CHILDREN
PRESENTED IN TABLE XI.

children, if they had been reared in homes corresponding to the social level from which their true parents were drawn, would not have been far from 100, more probably a few points over than under 100.

5. Composition of the Groups

This very important phase of the investigation will be presented chiefly by the tabular comparisons of the Foster and Control Groups shown in Tables XI to XXVI.

TABLE XII.—AGE DISTRIBUTION OF CHILDREN BY SEXES

Age	Sex	Foster	Control
5	Boys....................................	28	14
	Girls....................................	36	16
6	Boys....................................	9	8
	Girls....................................	16	7
7	Boys....................................	10	7
	Girls....................................	9	4
8	Boys....................................	15	7
	Girls....................................	14	7
9	Boys....................................	6	3
	Girls....................................	17	4
10	Boys....................................	7	1
	Girls.	11	7
11	Boys....................................	....	2
	Girls....................................	12	5
12	Boys....................................	7	2
	Girls....................................	4	5
13	Boys....................................	3	2
	Girls.	5	3
14	Boys....................................	2	....
	Girls....................................	3	1
Mean...		8.2 yrs.	8.2 yrs.
S. D...		2.6 yrs.	2.6 yrs.
N...		214	105
Boys			
N...		87	46
Percent..		41	44
Girls			
N...		127	59
Percent..		59	56

TABLE XIII.—INTELLIGENCE DISTRIBUTION OF PARENTS, IN M. A.

Mental Age	Foster		Control	
	Fathers	Mothers	Fathers	Mothers
21–0 to 21–6.................	5	5	9	3
20–0 to 20–11.................	26	19	12	8
19–0 to 19–11.................	15	5	8	10
18–0 to 18–11.................	25	20	8	8
17–0 to 17–11.................	31	35	16	25
16–0 to 16–11.................	12	23	6	6
15–0 to 15–11.................	13	15	10	10
14–0 to 14–11.................	26	21	15	15
13–0 to 13–11.................	11	21	6	6
12–0 to 12–11.................	7	16	6	10
11–0 to 11–11.................	3	14	2	5
10–0 to 10–11.................	4	8	2	....
9–0 to 9–11.................	....	2	....	1
Mean......................	17.0	15.8	16.9	16.3
S. D......................	2.6	3.0	3.0	2.8
N......................	178	204	100	105

*See also Figures II and III.

TABLE XIV.—AGE DISTRIBUTION OF PARENTS

Chronological Age	Foster		Control	
	Fathers	Mothers	Fathers	Mothers
26–28.........................	....	2	2	5
29–31.........................	2	7	4	18
32–34.........................	6	15	11	14
35–37.........................	11	33	19	19
38–40.........................	26	37	19	27
41–43.........................	37	36	15	8
44–46.........................	4	35	11	7
47–49.........................	5	17	4	1
50–52.........................	1	8	8	1
53–55.........................	15	11	2	....
56–58.........................	10	1	....	....
59–61.........................	5	1	3	....
62–64.........................	....	....	....	....
65–67.........................	....	....	1	....
68–70.........................	1	....	....	....
Mean......................	45.9	41.4	41.0	36.1
S. D......................	7.1	6.1	7.2	5.3
N......................	206	203	99	100
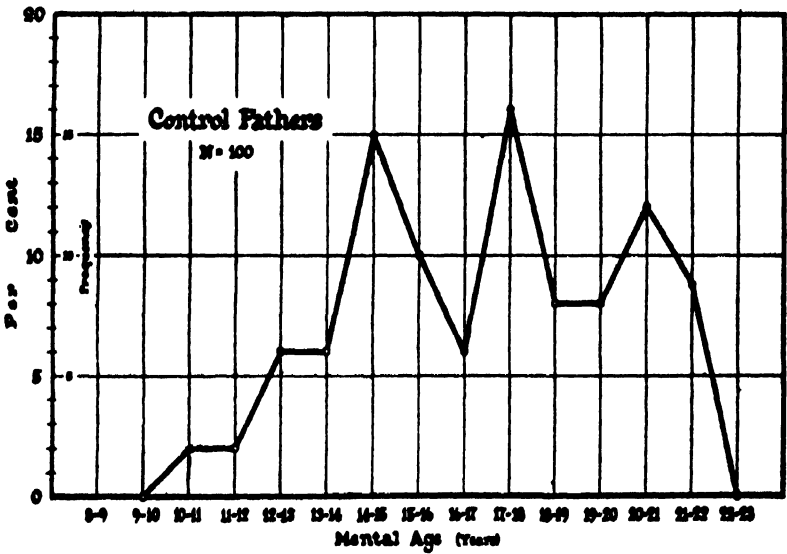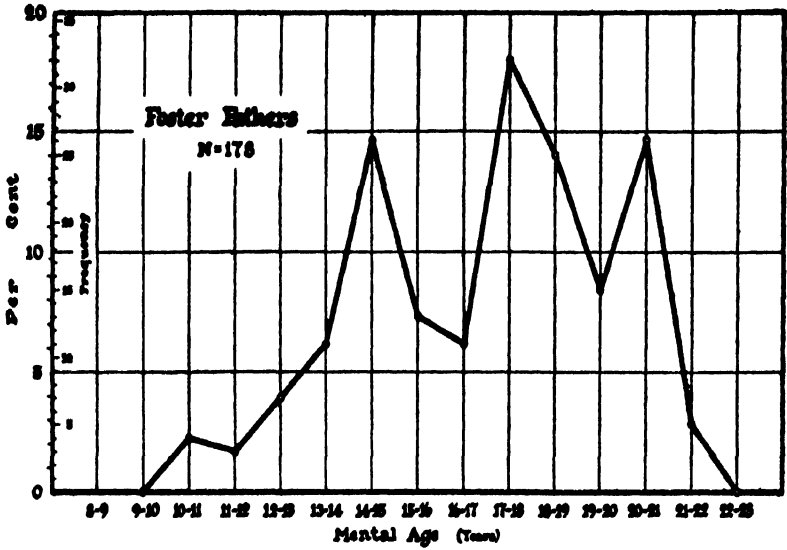
FIG. II.—MENTAL AGE DISTRIBUTIONS OF FOSTER FATHERS AND
CONTROL FATHERS
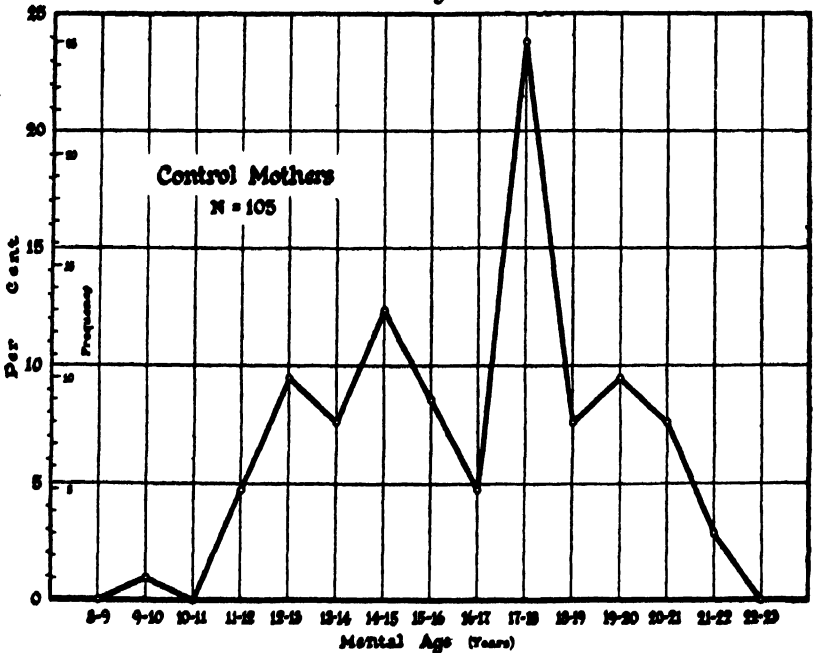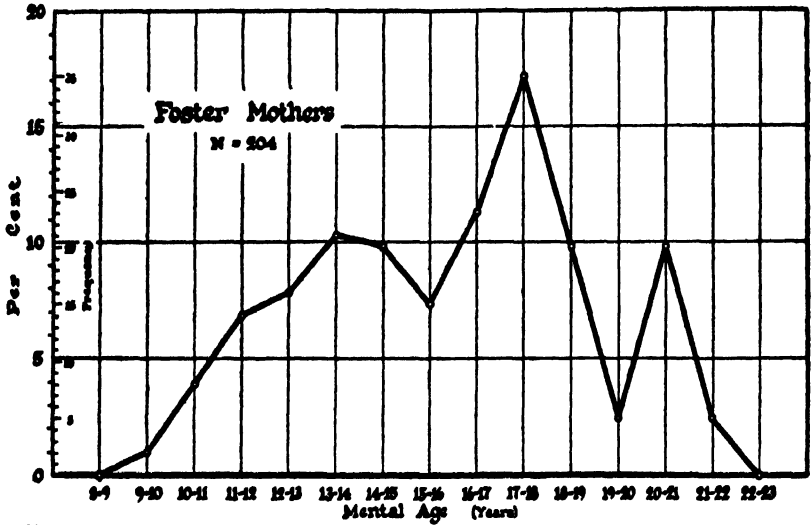
FIG. III.—MENTAL AGE DISTRIBUTIONS OF FOSTER MOTHERS AND
CONTROL MOTHERS

TABLE XV.—OCCUPATIONAL CLASSIFICATION OF FATHERS

	Foster		Control	
	N	Percent	N	Percent
1. Professional (exclusive of teachers)	32	15.7	16	15.5
2. Teaching	5	2.5	5	4.9
3. Business owners and managers	80	39.2	33	32.0
4. Commercial employees	21	10.3	14	13.6
5. Salesmen	17	8.3	12	11.7
6. Ranchers	10	4.9	4	3.9
7. Skilled labor	31	15.2	11	10.7
8. Semi-skilled labor	2	1.0	5	4.9
9. Unskilled labor	4	2.0	2	1.9
10. Retired	2	1.0	1	1.0
Total	204	100.1	103	100.1

1. Professional includes architect, attorney, chiropractor, clergyman, commercial artist, dentist, engineer, musician, physician and surgeon, pharmacist.

2. Teaching includes professors and teachers.

3. Business owner and manager includes banker, business owner, (both large and small), contractor, labor organizer, manager, manufacturer, merchant, publisher, superintendent, undertaker.

4. Commercial employee includes auditor and accountant, bookkeeper, cashier, clerk, movie actor, postman, statistician, tax collector.

5. Salesman includes advertising agent, promoter, real estate agent, salesman.

6. Rancher includes both ranch owner and tenant farmer.

7. Skilled labor includes captain in fire department, carpenter, chef, lineman, locomotive engineer, mason, machinist, mechanic, pressman, ship caulker, traffic policeman.

8. Semi-skilled labor includes barber, conductor, delivery man, janitor, smelter.

9. Unskilled labor includes laborer, nightwatchman, switchman, teamster.

The classification of certain of these occupations in Table XV may be open to question, and the scheme of rubrics itself is not a conventional one. The scheme was devised merely to provide a basis for selecting control cases that should match the foster families in cultural status. As such a basis it was quite successful, and it can perhaps be justified on that account. In the Control Group the deviations in some of the rubrics from the fifty percent quotas which we intended to locate are due to insufficient coördination between the three field workers when carrying out the matching

process. Fortunately, these deviations did not defeat the purpose of our occupational selection of controls, which was to insure comparability between the Foster and Control Groups in other respects, especially intelligence of parents.

TABLE XVI.—EDUCATION OF PARENTS (AVERAGE SCHOOL GRADE COMPLETED)

	Foster		Control	
	Fathers	Mothers	Fathers	Mothers
Mean........................	10.7	9.8	10.8	10.7
S. D........................	3.9	3.2	4.0	2.9
N...........................	173	194	102	103

TABLE XVII.—FAMILY INCOME (INCLUDING SALARIES AND OTHER SOURCES)

	Foster (N = 183)	Control (N = 99)
Mean..	$6,200	$4,100
Median......................................	3,600	3,000
S. D..	7,400	3,100

TABLE XVIII.—HOME OWNERSHIP AND VALUE OF HOME*

	Foster	Control
Number of homes owned........................	150	61
Number rented................................	30	42
Percent owned................................	83	58
Mean value of homes owned....................	$13,200	$9,500
S. D. of value...............................	12,000	5,300

*Ranch homes and other homes that were part of income property were omitted from computations of home values. Hence, N for mean value and S. D. of value is only 165 in the Foster Group and 53 in the Control Group.

TABLE XIX.—RATINGS BY FIELD WORKERS OF THE TWO PARENTS IN SYMPATHY, KINDLINESS, AND TACT*

	Foster	Control
Average 'mid-parental rating'................	3.1	2.9
S. D..	1.2	1.2
N...	198	101

*Ratings are by a seven-point scale, on which 1 is highest rank, and 4 is average. (See Whittier scale, Item IV).

TABLE XX.—WHITTIER RATINGS OF HOMES*

| | On Standard Scale | | | | On Extended Scale | | | |
| | Foster (N = 206) | | Control (N = 104) | | Foster (N = 206) | | Control (N = 104) | |
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Total Whittier index.	23.3	1.9	23.0	2.3	23.9	2.4	23.5	2.6
Necessities..	4.7	0.4	4.6	0.6	4.9	0.6	4.7	0.7
Neatness ...	4.5	0.6	4.4	0.6	4.5	0.6	4.4	0.6
Size........	4.7	0.5	4.4	0.7	4.7	0.5	4.4	0.7
Parental conditions	4.8	0.4	4.8	0.3	4.9	0.6	5.0	0.5
Parental supervision....	4.7	0.4	4.8	0.4	4.9	0.7	5.0	0.7

*For explanation of 'standard' and 'extended' scales, see page 231.

TABLE XXI.—CULTURAL RATINGS OF HOMES

| | Foster | | | Control | | |
	Mean	S. D.	N	Mean	S. D.	N
Total culture index.....	16.9	4.2	186	16.3	4.3	101
Speech...............	3.5	0.9	199	3.4	0.8	103
Education............	3.7	0.9	187	3.8	0.9	101
Interest..............	3.2	0.9	198	3.1	0.8	103
Library..............	3.1	1.1	201	3.0	0.9	103
Artistic taste.........	3.2	1.0	203	3.0	0.9	103

TABLE XXII.—HOME INSTRUCTION OF CHILDREN BY MEMBERS OF THE HOUSEHOLD IN HOURS WEEKLY*

(As reading or telling stories, number work, etc.)

| Age of Child When Instructed | Foster | | | Control | | |
	Mean	S. D.	N	Mean	S. D.	N
2 and 3...............	3.7	4.4	179	5.0	5.2	101
4 and 5...............	4.8	5.1	179	5.2	5.2	101
6 and 7...............	3.8	4.7	127	2.1	3.2	71

*The information blanks of some mothers, we found, had not been filled out on the side providing space for the item on home instruction. When this particular item was not answered, it was entered in the computation as zero—providing the blanks met the criterion for inclusion in the tabulation. The criterion demanded that blanks should be filled out at least in part on the side containing this item.

TABLE XXIII.—PROPORTION OF CHILDREN WHO HAVE HAD PRIVATE TUTORING
OUT OF SCHOOL
(Music, dancing, drawing, etc.)

Age	Foster Boys		Control Boys		Foster Girls		Control Girls	
	N	Percent	N	Percent	N	Percent	N	Percent
5.............	2	8	2	14	13	39	6	38
6.............	...	....	1	12	6	38	2	33
7.............	3	30	4	57	4	44	1	25
8.............	8	53	2	29	8	73	4	67
9.............	2	40	3	100	13	87	1	33
10.............	6	100	1	100	4	40	5	71
11.............	...	....	2	100	9	100	.4	80
12.............	4	67	1	50	4	100	5	100
13.............	1	33	1	50	3	75	2	67
14.............	1	50	...	....	3	100	1	100
Total........	27	34	17	37	67	58	31	55

TABLE XXIV.—HOUSEHOLD SIZE, NUMBER OF ADULTS, AND NUMBER OF
CHILDREN IN HOUSEHOLD*

	Foster	Control
Mean number in household.........................	3.9	4.7
Mean number of adults.............................	2.4	2.3
Mean number of children...........................	1.5	2.3

*Based upon 203 families in the Foster Group and 104 families in the Control
Group.

In addition to the comparisons between the Foster Group and
Control Group shown in Tables XI to XXVI, there are data per-
taining only to the Foster Group which will be of assistance in
the final interpretation of results. These are shown in Tables
XXVII to XXX.

The conclusions to be drawn from this tabular material may
be stated briefly:

1. The parents in the two groups appear to be remarkably
similar in intelligence (Table XIII), occupational status (Table
XV), kindliness or harmoniousness of temperament (Table XIX),
education (Table XVI), early background (Table XXVI), and
supervision given the children (Table XX). They are rather
similar in attitude towards their children in so far as this is ex-
pressed in their ratings of the children upon ten traits (Table
XXIV). However, there is a slight tendency for the foster parents

TABLE XXV.—TRAIT RATINGS OF CHILDREN BY PARENTS*

	By Foster Fathers			By Foster Mothers			By Control Fathers			By Control Mothers		
	M	S.D.	N	M	S.D.	N	M	S.D.	N	M	S.D.	N
1. Will power and perseverance.......	4.38	2.25	162	4.47	2.29	174	4.71	2.18	98	4.99	2.19	102
2. Cheerfulness and optimism........	3.84	1.97	163	4.03	2.13	179	3.96	1.99	98	4.09	2.21	101
3. Musical appreciation.............	4.92	2.24	163	4.73	2.23	179	5.04	2.16	97	5.04	2.19	101
4. Sense of humor	4.22	2.04	158	4.39	2.09	175	4.00	1.78	98	4.81	2.13	102
5. Permanency of moods............	5.66	2.68	159	5.78	2.70	174	5.72	2.84	97	5.79	2.58	101
6. Leadership.....................	4.71	2.15	157	5.10	2.41	175	5.17	2.16	98	5.88	2.46	101
7. Sympathy and tenderness........	3.85	2.30	163	3.86	2.27	180	4.31	2.25	98	4.03	2.20	101
8. Conscientiousness	5.10	2.25	163	5.17	2.24	176	4.93	2.15	97	4.90	2.13	101
9. Originality....................	4.72	2.16	160	5.01	2.24	175	5.22	2.09	97	5.63	2.20	100
10. General intelligence.............	4.39	2.01	164	4.93	1.91	181	4.87	1.71	98	5.29	1.54	101
Mean of ratings on all 10 traits..	4.58			4.75			4.79			5.04		

*These ratings were made on a 13-point scale, in which 1 was highest, and 7 supposedly average. The mean rating by foster and control parents for all ten traits was computed only for what it might show regarding the attitude of the parents toward the children. Fathers seem to be slightly more lenient in their ratings than mothers and foster parents slightly more lenient than true parents.

TABLE XXVI.—BIRTHPLACE OF PARENTS

	Foster Fathers	Foster Mothers	Control Fathers	Control Mothers
Alabama.............	....	....	1	....
Arkansas.............	1	....	....	....
Arizona.............	1	1	....	....
California.............	42	57	30	35
Colorado.............	5	1	....	2
Florida...............	....	2	....	....
Idaho................	....	....	1	....
Illinois..............	8	17	7	5
Indiana..............	7	3	4	2
Iowa................	15	11	2	2
Kansas..............	4	11	3	1
Kentucky............	1	1	....	1
Louisiana............	....	....	1	....
Maine...............	1	1	....	....
Maryland............	1	....	....	1
Massachusetts........	4	3	2	1
Michigan............	5	6	1	1
Minnesota............	2	2	1	3
Missouri.............	6	6	7	5
Mississippi...........	1	....	....	....
Montana.............	....	....	....	1
Nebraska............	3	5	4	2
Nevada..............	2	....	....	1
New Jersey..........	3	1	....	1
New York............	12	14	6	3
North Carolina.......	1	....	....	....
North Dakota........	....	2	1	....
Ohio.................	12	8	3	4
Oregon..............	3	3	....	2
Pennsylvania.........	7	8	3	5
South Dakota........	....	2	2	1
Tennessee............	....	....	3	1
Texas................	2	3	1	1
Utah................	3	....	2	4
Vermont.............	....	....	1	....
Washington..........	....	1	....	1
West Virginia........	2	....	....	....
Wisconsin............	5	5	1	2
Wyoming............	1	....	....	....
Australia.............	1	....	1	2
Canada..............	2	1	4	5
Caroline Islands......	....	....	1	....
Denmark.............	....	2	....	1
England.............	8	5	4	....
France...............	....	1	....	....

TABLE XXVI—*Cont.*
BIRTHPLACE OF PARENTS

	Foster Fathers	Foster Mothers	Control Fathers	Control Mothers
Germany.............	4	1	....	1
Holland..............	....	1	....	....
Italy................	....	....	....	1
Ireland..............	1	1	1	1
Jugo Slavia..........	....	....	1	....
Russia...............	....	....	1	....
Scotland.............	1	1	2	4
Sweden..............	....	....	....	1
Switzerland..........	1	....	....	....
Trinidad Islands......	....	1	....	....
Total United States...	160	174	87	88
Total foreign........	19	15	15	16
Percent United States	89	92	85	85
Grand total........	179	189	102	104

TABLE XXVII.—AGE OF PLACEMENT AND AGE OF ADOPTION OF 200 FOSTER CHILDREN

	Age When Placed	Age When Adopted
Mean.........................	3 mos. 2 days	14.3 mos.
S. D.........................	3 mos. 1 day	9.1 mos.

TABLE XXVIII.—NUMBER AND PERCENT OF FOSTER CHILDREN WHO HAVE BEEN TOLD OF THEIR ADOPTION

Age	Number Told	Number Not Told	Percent Told
5................................	12	44	21
6................................	6	14	30
7................................	4	12	25
8................................	8	18	31
9................................	9	11	45
10...............................	10	7	59
11...............................	5	7	42
12...............................	6	5	55
13...............................	5	2	71
14...............................	1	4	20
Total.........................	66	124	35

TABLE XXIX.—LENGTH OF TIME FOSTER PARENTS HAVE BEEN MARRIED AT THE TIME THEY APPLY FOR FOSTER CHILDREN*

Years Married	Number of Couples	Years Married	Number of Couples
Less than 1	1	14	3
1	4	15	3
2	5	16	1
3	12	17	1
4	8	18	6
5	11	19	1
6	10	20	2
7	11	21	2
8	8	22	.....
9	5	23	1
10	9	24	.....
11	9	25	.....
12	6	26	1
13	4		

Mean.. 8.7 yrs.
S. D... 5.36 yrs.
N...124

*Data complete upon this point only for the Native Sons and Daughters cases. Figures above are based only upon these.

TABLE XXX.—INCOME AND BARR RATINGS OF FOSTER PARENTS AT TIME OF APPLYING FOR CHILD*

	Income	Barr Rating of Father
Mean	$2,700	11.6
S. D.	2,000	2.6
N	146	195

*About 50 percent of the Barr ratings represent the combined judgment of Mr. Kurtz and myself.

to assign higher ratings. They are reasonably similar in amount of time spent in reading to the children, teaching them, etc., when the children are very young (Table XXII). The slight apparent excess of time spent by control parents over that spent by foster parents when the children were two and three, or four and five, may be due to the fact that the field workers took greater pains to get all blanks completely filled out for every case in the Control Group than in the Foster Group. In the Control Group there would consequently be less likelihood of this item being overlooked through carelessness, and of thus being entered as zero in

our tabulation. Certainly, the foster parents showed fully as much affection for their foster children and devotion to their welfare as did the true parents encountered in the Control Group.

2. In age the foster parents show a significant, though not very large, excess over the control parents (Table XIV). This would certainly be expected, in as much as the foster parents seldom applied for foster children until it seemed probable that they could not have children of their own (see Table XXIX on length of time foster parents were married at time of application). It seems extremely unlikely that the four or five years average excess age of foster parents over control parents could introduce disturbing factors of any importance, because no significant change in the parent-child correlations occurred when the chronological age of the parents was partialled out, and no decided correlation was found between the chronological age of the parents and the I.Q.'s of the children.

3. As to the other specifically measured environmental influences the Whittier and culture ratings agree noticeably well in the two groups, item for item (Tables XX and XXI). However, the means and standard deviations of the family incomes correspond poorly in the two groups (Table XVII). But an investigation of the distribution of incomes in the Foster Group showed that the rather high average income can be accounted for chiefly by a few extremely high incomes. The median incomes for the two groups, it is seen, fall much closer together. Reference to Table XXV shows that at the time the foster parents applied for children, the mean income was *less* than the present mean in the Control Group. On an average, the foster parents applied for children eight or nine years before the time of this investigation. The foster fathers average five years older than the control fathers, and most of them are at a period of life at which the income for professional and business men often increases rather rapidly. As a consequence, the difference in income level between the two groups probably does not represent any real difference in the kind of surrounding in which the children have been reared, though it does reduce the significance of the correlations between family income and child's I.Q.

The percent of families owning their homes and the valuation of the homes are distinctly different in the two groups (Table XVIII).   The excess of home valuation in the Foster Group over that in the Control Group can be explained in the same way as the similar discrepancy in average income.   In so far as the environmental standards of the children are concerned, the difference in proportion of home owners found in the two groups is probably not significant, since homes were matched for locality and type of district, and the measures of material and cultural surroundings found in the two groups were practically indistinguishable.   But the difference under discussion does render the biserial correlations which were computed between the child's I.Q. and family ownership of home unsusceptible of precise interpretation.

4. In proportion of children of different ages who have been given private tutoring (such as music, dancing, etc.) the Control Group shows an eighteen percent excess (Table XXIII).   To the writer, the most probable explanation of this fact is that, other things being equal, brighter children are more likely to desire such tutoring.   Eight points I.Q. difference in average level in favor of the Control Group may possibly be sufficient to account for the moderate excess of private tutoring received by that group.

5. The average size of the household is greater in the Control Group than in the Foster Group (Table XIV), and if association with siblings might conceivably influence the development of the I.Q., this difference would introduce disturbing factors.   To test this hypothesis, the average I.Q's of foster children having older and younger foster sibs were computed, with the following results:

STATUS OF OUR CASE	Average I.Q.	N	Percent
Is an only child.....................	107.8	127	59
Has older foster sib or sibs.........	105.4	36	17
Has younger foster sib or sibs.......	106.4	38	18

Such slight differences as appear are obviously not significant.

6. Finally, certain facts regarding the placement and adoption of the foster children support the idea that the family relationship between foster parents and children is a perfectly normal one. Tables XXVII and XXVIII show that most of these children·have lived in their foster homes from very early infancy, and that the majority of them have never been told that they are foster children.

7. As to the children themselves, we are not much concerned at this point about how closely those in the two groups correspond in mental development, since it is the effect of the factors already considered *upon* such mental development which this study seeks to evaluate. While the average mental levels of the two groups are disparate, it is important to mention that the variabilities of the two groups are nearly identical. In chronological age, the means and variabilities correspond exactly, and in proportions of children of the two sexes, the agreement appears to be sufficiently good.

From the foregoing evidence, the conclusion seems justified that, with the few relatively unimportant exceptions noted, the correlations reported in the next section for the two groups are fully comparable.

VI. Main Results of the Study

As this investigation was conceived, the chief emphasis was laid upon intelligence and the factors conditioning its development. It was decided to touch upon traits other than intelligence only to the extent that this was possible without undue expenditure of time. A consideration of the factors influencing vocabulary was possible, since a vocabulary test is one element of the Stanford-Binet Scale for mental levels beyond the seventh year. The Woodworth-Cady questionnaire was administered to children of ten or over in the hope that trends might appear that would suggest the factors underlying emotional instability. Unfortunately, the number of children eligible to answer this questionnaire was smaller than we had anticipated, and the results are consequently not very significant. Rough measures of several other mental and character traits of the children were secured through ratings and estimates by their parents (or foster parents), and a crude index of the children's school achievement was obtained by noting their grade placement. The results from our statistical treatment of all these aspects of the problem will be presented, but the data for other traits than intelligence can not be regarded as very reliable.

1. Factors Underlying Differences in Intelligence

Table **XXXI** presents corresponding correlation coefficients for the Foster and Control Groups between child's I.Q. and the environmental and hereditary factors for which we obtained measures.

TABLE XXXI.—CHILD'S I. Q. CORRELATED WITH ENVIRONMENTAL AND HEREDITARY FACTORS*

Factor	Type of r	Foster			Control		
		r	P.E.	N	r	P.E.	N
Father's M. A..............	P.M.	.07	.05	178	.45	.05	100
Mother's M. A.............	P.M.	.19	.05	204	.46	.05	105
Mid-parent M. A..........	P.M.	.20	.05	174	.52	.05	100
Father's vocabulary........	P.M.	.13	.05	181	.47	.05	101
Mother's vocabulary.......	P.M.	.23	.04	202	.43	.05	104
Whittier index............	P.M.	.21	.04	206	.42	.05	104
Whittier index (using 5-yr.-olds only)...............	P.M.	.29	.08	63	....	....	....
Culture index.............	P.M.	.25	.05	186	.44	.05	101
Culture index (using 5-yr.-olds only)...............	P.M.	.23	.08	60	....	....	....
Grade reached by father....	P.M.	.01	.05	173	.27	.06	102
Grade reached by mother...	P.M.	.17	.05	194	.27	.06	103
Parental supervision rating 3 or 4 *vs.* 5 or 6..........	B.	.12	.05	206	.40	.09	104
Income....................	P.M.,K.	.23	.05	181	.24	.06	99
No. of books in home library....................	P.M.,K.	.16	.05	194	.34	.06	100
Owning or renting home....	B.	.25	.07	149	.32	.10	100
....	.....	.....	.....	.....	.....	.....	.....
No. of books in child's library....................	P.M.,K.	.32	.04	191	.32	.06	101
Private tutoring (in music, dancing, etc.)	B.						
Boys....................		.06	.10	77	.43	.11	46
Girls...................		.31	.08	108	.52	.09	56
Five-year-girls only......		.50	.12	31	....	....	....
Home instruction by members of household (hrs. weekly)	P.M.						
Ages 2 and 3.............		.34	.04	181	−.05	.07	101
Ages 4 and 5 (children over 5)...............		.15	.06	129	−.03	.08	71
Ages 6 and 7 (children over 7)...............		.03	.07	88	.24	.09	46
Ages 2 and 3 (5-yr.-olds only).................		.18	.09	51	....	....	....
Ages 4 and 5 (5-yr.-olds only).................		.13	.09	52	....	....	....
Father's rating of child's intelligence................	P.M.	.49	.04	164	.32	.06	98
Mother's rating of child's intelligence................	P.M.	.39	.04	181	.52	.05	101

*The following abbreviations are used in this table: M.A. for mental age. P.M. for product-moment correlation. B. for biserial correlation. K. for Professor Kelley's auxiliary score method.

See also the tables of correlation arrays for child's I. Q. with Father's M. A. and Mother's M.A., from which the corresponding r's in this table were computed. (Appendix, II).

The significance of the division of the table by the dotted line is explained in the text, p. 281.

In the field work it proved to be impossible to obtain full supplementary information upon all the cases tested, but correlations are given which utilize all the information we have with respect to each item. The number of cases entering into each correlation consequently varies somewhat.

Kelley's auxiliary score method, described in full in his text on *Statistical Method* (9), pp. 185 ff., is a device for straightening curvilinear regression lines empirically in such a way as not to capitalize chance. It was employed in the correlations with income and books in library.

Sheppard's correction was applied to all standard deviations used in the study—those published in tabular form as well as those entering correlation computations.

A word should be inserted at this point regarding the probable errors of the correlations reported. They have all been computed by standard formulae. Now, it can be shown that if, in two correlated series, some of the items in one variable enter the correlation array in more than one pair of measures, the effective N to use in computing the probable error of the coefficient is less than the total number of pairs. The effective N lies at some value intermediate between the total number of pairs and the total number minus the number of items entering the correlation more than once. We have such a situation in the Foster Group, for it contains 21 pairs of *double cases, i.e.,* foster siblings being reared in the same home. Correlations of various factors with measures of the children consequently have about 21 items which enter the correlations twice. We have ascertained, however, that within the limits that the effective N must lie in our Foster Group, no change occurs in the first or second decimal place of the P.E.'s in most of the correlations, nor greater than 1 point in the second decimal place in the remaining correlations. This difficulty can therefore be neglected, and was mentioned only to avert possible criticism of the P.E.'s that are published. There is no such difficulty in the Control Group, of course, since only one child was considered from any one family.

In addition to the correlations of Table XXXI, a few coefficients were computed for the Foster Group only. These (Tables XXXII and XXXIII) were based upon specially selected groups of subjects.

As a matter of interest, a biserial correlation was computed between the child's I.Q. and his knowledge or lack of knowledge that he was an adopted child. With 189 cases for which we had data upon this point, the biserial correlation was .10 $\pm$ .06, to which we can attach no significance. Telling or not telling a child of his

TABLE XXXII.—CORRELATIONS BETWEEN I. Q.'s OF CHILDREN AND FACTORS
INFLUENCING THESE I. Q.'s IN THE CASE OF CHILDREN WHO WERE LESS
THAN ONE MONTH OLD WHEN TAKEN BY FOSTER PARENTS

Factor	r	P.E.	N
Foster father's M.A.	.02	.09	60
Foster mother's M.A.	.15	.08	66
Mid-foster parent M.A.	.08	.09	58

TABLE XXXIII.—CORRELATIONS BETWEEN THE I.Q.'s OF FOUNDLINGS* AND
FACTORS INFLUENCING THESE I.Q.'s

Factor	r	P. E.	N
Foster father's M.A.	.15	.21	10
Foster mother's M.A.	.14	.18	13
Mid-foster parent M.A.	.24	.20	10

*"Foundling" defined as a child picked up on a doorstep, in an automobile, etc., without any means of identification.

adoption is related much more to the age of the child and the intelligence of his foster parents than to his I.Q., as is evident in the following correlations:

	Biserial r	P.E.	N
Foster father's M.A. and whether or not child was told	.21	.07	156
Foster mother's M.A. and whether or not child was told	.43	.06	156
Age of child and whether or not he was told	.25	.07	156

When age of child is partialled out from the correlations with father's and mother's mental age, the first two correlations above are .21 and .42, respectively.

Correlations between the I.Q's of the pairs of unrelated foster siblings which are encountered are also of interest. Pairs were correlated against one another using chance arrangement.

	r	P.E.	N
Two unrelated foster children reared in same home	.23	.14	21
Same cases plus 7 in which a foster child and a true child were reared in same home	.11	.13	28

The first (which is also the higher) of these correlations is probably the more valid, since the seven true children in the second correlation introduce a sample from a non-comparable population

of children having a higher central tendency than that of the foster group.

Another point of interest lies in the possible effect of schooling upon intelligence. The five-year-olds provide the only group in which this point can be considered, since practically all the older children had attended school. In the Foster Group our records show that 30 five-year-olds had attended kindergarten or first grade, and that 30 five-year-olds had not. The mean I.Q. of those who had attended kindergarten or school was 111, and of those who had not attended, 107. The difference of 4 points in favor of the first group is quite possibly due to schooling, but since the probable error of the difference is 2.8 points, it cannot be considered as reliably established. Moreover, even if the difference were a reliable one, nothing in our data could show that part of the difference was not due to a tendency on the part of parents to enter bright children in school at an earlier age than dull ones.

The following correlations were found between the mental ages of fathers and mothers in the two groups:

	r	P.E.	N
Foster	.42	.04	174
Control	.55	.05	100

Let us now return to the data of Table XXXI. A dotted line was there inserted to separate from the more important coefficients certain coefficients that are ambiguous because they represent relationships between variables that might conceivably have reciprocal effects upon one another. For example, do the books in a child's library stimulate the growth of his I.Q. or does the child of high intelligence tend to collect more books around him? Does reading the Burgess bedtime stories to a two-year-old enhance his mental potentiality or does the child with high mental potentiality clamor loudest for the bedtime stories? Such considerations relegate these correlations to the realm of speculation; they are presented only for what interest they possess.

However, the first correlations of the table offer a clearer picture. The variables listed there could scarcely be thought of as influenced to any appreciable degree by the intelligence of the children in a home (at least by the intelligence of children as young as ours). Consequently, these correlations, when significantly

greater than their own probable errors, can be taken as actual measures of the effect of environment in the Foster Group, and as measures of the combined effects of heredity and environment in the Control Group. The point is emphasized in this section—where results are first presented which are to serve as a basis for subsequent statistical treatment and final conclusions—that *the differences between corresponding correlation coefficients in the Foster Group and Control Group are striking and consistent.*

2. Corrections for Attenuation

While the raw correlations of Table **XXXI** show the drift of the evidence, they do not tell the complete story. In Spearman's nomenclature they are "attenuated," owing to the unreliability of the measures upon which they are based. Spearman's formula of correction for attenuation was applied to some of the most important correlations to yield the best available estimate of what the relationships would have been if perfectly reliable, *i. e.,* 'true' measures, could have been used. Coefficients so computed represent more accurately than raw coefficients the actual contributions of various factors to variability in a criterion.

In computing coefficients corrected for attenuation, the problem of ascertaining sound reliabilities to be used in the Spearman formula was a perplexing one.

To find the reliability of the Stanford Binet Test for children and for adults, the Spearman-Brown formula[11] was applied to 'split halves.' This formula, which is based upon an assumption that the 'split halves' are fully comparable with respect to the function that both halves purport to measure, does not provide an entirely satisfactory measure of reliability for a battery as variegated as the Stanford Binet. Unless we may make the additional (as yet unproved and possibly untrue) assumption that the function we call intelligence is due to a general factor plus no specific factors, the measures of Stanford Binet reliability which are reached by methods described below may probably be considered as too low. Possibly, the high correlations reported by Herring (6)

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[11] The formula is:

$$r_{11} = \frac{2r_{\frac{1}{2} \text{ I/II}}}{1 + r_{\frac{1}{2} \text{ I/II}}}$$

between I.Q's measured on the Herring and on the Stanford revisions of the Binet Test (.97 to .99) provide a better estimate of the true reliability of the Binet Scale, although these reliabilities, too, seem open to question. The material in the two versions is so similar as possibly to capitalize chance skills, techniques or information that an individual has happened to acquire during the course of his life.[12]

Fortunately, the indeterminate error in the reliability coefficients for the Stanford Binet does not seriously affect the results based upon the reliabilities. This is because the total corrections (by the formula for correcting attenuation) amount to only a few points in the second decimal place when reliabilities are even approximately as high as those found and when the raw correlations to which the corrections are applied are not high themselves.

The specific procedure employed to determine the reliabilities was as follows:

a. Children. From the test files of the Stanford Psychology Department, a distribution of fifty complete tests was built up. The subjects represented by the tests matched the Foster Group in age and I.Q. The reliability of half the test was computed by correlating I.Q.'s based upon halves split by the alternate item method, and then the Spearman-Brown formula was applied to find the reliability of the test as a whole.

Next the correlation between the complete form and the 'lopped' form (see explanation of 'lopped' form p. 230) was computed for this group. The reliability of the lopped form was then inferred by a formula derived for this purpose by Professor Kelley,

$$r_{2\,II} = r_{12}^2 \, r_{1\,I} \text{ where}$$

$r_{2\,II}$ is the reliability of the lopped form
$r_{1\,I}$ is the reliability or the complete form
r_{12} is the correlation between the composite and the lopped form.

The following coefficients were found in using the successive steps:

$r_{\frac{1}{2}I\,/\,II} = .79$
$r_{1\,I} \quad = .88$ (correction by Spearman-Brown formula)
$r_{12} \quad = .97$
$r_{2\,II} \quad = .83$, the value of reliability used in this study.

The same reliability coefficient was used for the tests of the control children as for the foster children, since the variabilities in I.Q. of the two groups were exactly the same.

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[12] In this connection, see Professor Kelley's *Note on the Reliability of a Test* (8) in which the conditions tending to raise or lower reliabilities spuriously are set forth.

By way of interest it may be noted that the above values for $r_{1\ 1}$ and r_{12} agree quite well with similar values found by James DeVoss (2) and by Floyd Ruch (14), respectively. The former found I.Q. reliabilities clustering around .92 for single age groups; the latter found a correlation of .98 between the complete and lopped Binet forms, using an adult population.

b. Adults. One third (59) of the tests of foster fathers were selected in such a way that the numbers from each mental age level would be proportional to the corresponding numbers in the entire group. These were split by the alternate item method; the halves were correlated, and the correlation corrected by the Spearman-Brown formula, yielding .86. But this 'reliability,' based upon lopped tests, is spuriously high, since the lopped test assumes perfect performance on all tests below the lowest level given, and consistent failure on all tests above the highest level given. Now in the built-up distribution of tests of children, the complete tests had a Spearman-Brown corrected reliability of .88, and a similar procedure yielded .90 for the lopped version—a value only .02 points higher. The empirical assumption was made that the 'reliability' .86 found for the lopped adult tests was .02 higher than a real reliability based upon complete tests would have been. Letting

$$r_{1\ 1} = .84$$
$$r_{12} = .97$$

then, by Kelley's formula, $r_{2\ 11} = .79$, the value of reliability used in this study.

The reliabilities of adult and children's vocabularies were easily determined by correlating one list of the vocabulary test against the other list, and inferring the reliability for the complete test by the Spearman-Brown formula. This was done for fathers, mothers, and children in the Foster Group, and the reliabilities thus determined were used also in the Control Group.

Reliabilities for the Whittier Scale and the Culture Scale were taken to be the correlations between independent ratings by Mrs. Jensen and myself upon all the Whittier and Culture blanks in the Control Group. Strictly speaking, these correlations are not reliabilities, for they are almost certainly somewhat higher than two series of ratings based upon data gathered twice from the same homes with a month or a year intervening would have been. They represent rather the upper limit of reliability.

The reliability of family income was assumed to be unity, which, of course, is too high, although our impression was that the parents attempted to give us accurate information upon this point.

While fully realizing that the determination of reliabilities of these variables is not without flaws, I think it probable that the correlations forthwith presented represent a closer approximation to the truth than the raw correlations. It is possible for reliabilities to vary several points in the second decimal from their proper value without seriously distorting the correlations corrected for attenuation. Moreover, it is probable that some reliabilities estimated too high are compensated for by others estimated too low; so that in the multiple correlations which have been computed very reasonable values may be obtained.

Summarizing this discussion, the following reliabilities were used:

Stanford Binet, children's I.Q.	.83
Stanford Binet, adult mental age	.79
Vocabulary, fathers	.96
Vocabulary, mothers	.96
Vocabulary, children (age 8-14)	.93
Whittier index	.92
Culture index	.95
Income	1.00

TABLE XXXIV.—CHILD'S I. Q. CORRELATED WITH ENVIRONMENTAL AND HEREDITARY FACTORS AND CORRECTED FOR ATTENUATION*

	Foster		Control	
	r	N	r	N
Father's M.A.	.09	178	.55	100
Mother's M.A.	.23	204	.57	105
Father's vocabulary	.14	181	.52	101
Mother's vocabulary	.25	202	.48	104
Whittier index	.24	206	.48	104
Culture index	.29	186	.49	101
Income	.26	181	.26	99

*The P.E.'s are all in the neighborhood of .06.

It is obvious that the fairly high correlations between I.Q. and environmental factors in the Control Group are due to a large extent to the high association between parental intelligence and environmental factors. Such association can be shown by the correlations of Table XXXV.

It is perhaps surprising that income correlates somewhat less with parents' mental level than do the other environmental measures. Nevertheless, the income correlations probably approximate

their true values, in as much as the correlation of foster father's mental age and income, .31, agrees with the corresponding value in the Control Group fairly well.

In interpreting all the foregoing correlation comparisons between the Foster Group and the ·Control Group, it should be borne in mind that the *squares* of the correlations, rather than the corre-

TABLE XXXV.—PARENTAL CORRELATIONS IN CONTROL GROUP

Factor	Father's Mental Age		Mother's Mental Age	
	Raw	Corr. for atten.	Raw	Corr. for atten.
Whittier index.................	.60	.70	.60	.70
Culture index..................	.67	.77	.71	.82
Income (by aux. score meth.)....	..8	.43	.40	.51
Father's education.............	.46	....	....	....
Mother's education.............	....	....	.62	....

lations themselves, represent the portion of the variance of children's I.Q.'s that can be accounted for by reference to the respective variables [I.e $\sigma_{1.2} = \sigma_1{}^2 (1 - r_{12}{}^2)$]. This consideration emphasizes the differences in strength of relationship found in the two groups.

3. Multiple Correlations

It should also be pointed out that the foregoing correlations do not provide an absolute basis for evaluating the relative influence of various environmental factors. The intercorrelations between these factors are so complex, and the status of the factors as possible causes and effects of one another is so uncertain, that their unique contributions to the variance of the children's I.Q's are impossible to extricate. Because of the difficulties just mentioned, partial correlation technique is obviously unadapted to the problem (1). It is possible, however, to arrive at an estimate of the *total* effect of our measured environmental factors through multiple correlation technique.

Accordingly, we determined the multiple correlation of the following factors with child's I.Q. in the foster and control groups:

Father's mental age   Father's education
Mother's mental age   Mother's education
Father's vocabulary   Whittier index
Mother's vocabulary   Culture index
                             Family income

To have gone through the operation of computing multiple correlations that utilized all nine of the variables in question would have been enormously time-consuming. To save labor, certain variables were eliminated, after first demonstrating, through multiples using three of four variables, that they contributed practically nothing to an estimate of the child's I.Q. not already contributed by variables retained for the final multiple. For example, in the foster multiple, income was retained, but Whittier and Culture indices were dropped out, because the multiple of I.Q. with all three together (.34) was only .01 higher than the correlation (.33) between I.Q. and income alone; again, mother's vocabulary was retained, but mother's mental age and mother's education were dropped out because the multiple of I.Q. with all three together (.254) was only .005 higher than the correlation (.249) between I.Q. and mother's vocabulary alone. Similarly, in the Control Group, certain variables were not used. The variables finally employed no doubt yield values for the multiple correlations that attain, within one or two points in the second decimal, to what the values would have been had we used all nine variables.

The factors retained for the foster multiple were: father's mental age, father's vocabulary, mother's vocabulary, income. Those retained for the control multiple were: father's mental age, father's vocabulary, mother's mental age, Whittier index. The unexpected predictive prepotency of parental vocabulary over parental mental age is probably an adventitious fact, due to the higher reliability of the vocabulary test.

The multiple correlations of Table XXXVI summarize the chief statistical results of the study in two clear-cut comparisons. They

TABLE XXXVI.—MULTIPLE CORRELATIONS OF HEREDITARY AND ENVIRONMENTAL FACTORS WITH CHILD'S I. Q.

	Foster			Control		
	r	P.E.	N	r	P.E.	N
Raw multiple..............	.35	.05	164	.53	.05	95
Multiple using r's corrected for attenuation*...........	.42	...	164	.61	...	95

*The P.E.'s of the multiples using correlations corrected for attenuation are not subject to calculation by any methods at present available, but they are, of course, somewhat higher than the P.E.'s for the raw multiples.

show more distinctly than do any of the results from previous sections the significant differences between the outcomes for the Foster Group and those for the Control Group. They will comprise the basis for the fundamental evaluation and interpretation of results which is offered in the eighth, or concluding section.

VII. MINOR OR COLLATERAL RESULTS

1. Factors Underlying Differences in Other Traits

Only a small proportion of the total space apportioned to this study can be devoted to a discussion of traits other than intelligence. With the exception of vocabulary, the measures or ratings used for the special traits other than intelligence are not sufficiently reliable to make the results of notable significance; and in many situations the possibility of interaction between the trait measured and the influence we seek to evaluate is so markedly present that the relationships uncovered can be interpreted only in a tentative way. Hence, the results reported in the next few pages are presented with little discussion, and only for what interest or suggestive value they may have.

2. Vocabulary

In dealing with vocabulary scores, we were confronted with a test for which no age norms in terms of means or sigmas were available. It seemed inadvisable to use raw scores in the correlations and then try to correct the results by partialling out the chronological age of the children, since tests such as the vocabulary lists tend to show a fan-shaped distribution when plotted against chronological age (owing to increasing standard deviation with age).

The treatment decided upon was to use raw vocabulary scores in the parent groups, and to derive scores in terms of age for the groups of children separately as follows:

(1) Plot the scores of children from eight to twelve in the two groups separately, and draw empirically a straight regression line as nearly as possible through the mean scores of the successive age groups. (This proved to be unexpectedly easy to do, as the line through the actual means in both groups was almost straight.)

(2) Take as each child's score his deviation from the mean for his age (interpolated for his exact age in years and months).

Correlations were then computed for the different age groups, and the results averaged for a measure of probable relationships.

The numbers are so small in each age group that the separate correlations fluctuate considerably, but the averages are probably about as stable as correlations would be based upon a number of cases equal to the total number entering the age-group correlations.

TABLE XXXVII.—CORRELATIONS WITH CHILDREN'S VOCABULARY

Age	8		9		10		11		12		Weighted average	
	r	N	r	N	r	N	r	N	r	N	r	N
Foster Group												
Father's vocabulary...	.38	23	.25	16	.03	17	.45	8	.44	8	.28	72
Mother's vocabulary..	.24	29	.53	19	.13	16	.49	10	.42	11	.34	85
Whittier index........	.03	29	.24	20	.35	15	.39	12	.62	10	.25	86
Culture index.........	.17	25	.51	16	.17	15	.27	8	.64	10	.32	74
Books in home library.	.08	28	.39	17	.05	15	.32	11	.41	11	.22	82
Books in child's library	.39	27	.42	16	.25	16	-.18	11	.41	10	.29	80
Hours of home instruction at ages 4 and 5	-.13	25	.59	17	.49	13	.34	9	.43	10	.28	74
Child's I. Q...........	.82	29	.77	19	.75	17	.91	11	.95	11	.82	87
Control Group												
Father's vocabulary...	.61	13	.28	7	.12	8	.77	7	.73	7	.51	42
Mother's vocabulary..	.42	12	-.23	7	.30	8	.22	7	-.36	7	.12	41
Whittier index........	.24	13	.62	7	-.14	8	.22	7	.46	7	.26	42
Culture index.........	.40	12	.84	7	.20	8	.23	7	.04	7	.34	41
Books in home library.	.37	13	.01	7	.17	7	.14	7	.01	7	.17	41
Books in child's library	.31	13	.51	7	.49	8	.23	7	-.02	7	.31	42
Hours of home instruction at ages 4 and 5.	-.01	12	.34	6	-.69	8	-.61	7	-.27	7	-'.24	40

The figures of Table XXXVII suggest, at least, that vocabulary is more susceptible to the influence of environment than is intelligence (measured by the Stanford Binet as a whole). It should be pointed out that in the age columns for each group there is a significant correlation of *errors*. For example, in the twelve-year column of the Control Group, nearly all the correlations are low or negative, owing to one low-testing child who happens to be in a very superior environment, and one high-testing child situated in a less favorable environment.

To secure reliability coefficients for vocabulary so that some of these correlations might be corrected for attenuation, the following procedure was employed. In the case of the children, derived scores for one list of the vocabulary test were correlated against derived scores for the other list, separately by ages for both the

Foster and Control Groups; the results were averaged for all ages within the two groups and, since the two determinations differed by only a few hundredths, the final results for the two groups were averaged. In the case of the adults, one vocabulary list was correlated against the other list separately for fathers and mothers in the Foster Group, and as the results were the same to two decimal places, it was assumed that the same reliabilities would hold for the control parents, who matched the foster parents closely in intelligence. In both cases the Spearman-Brown correction was used, yielding final reliabilities of .93 for the children and .96 for the adults.

TABLE XXXVIII.—CORRELATIONS WITH CHILDREN'S VOCABULARY, CORRECTED
FOR ATTENUATION

	Foster	Control
Father's vocabulary	.30	.54
Mother's vocabulary	.35	.13
Whittier index	.27	.29
Culture index	.34	:36
Child's I.Q.	.93	....

The raw correlations upon which Table XXXVIII is based are the weighted averages given in Table XXXVII; consequently, the probable errors are indeterminate.

3. Home Reading Done by Child

The following correlations are among the hardest to interpret in the entire study. They are consistent only in showing a significant relationship between the child's I.Q. and the amount of reading he does. The source of the measures used was the mother's information blank.

4. Moral and Personality Traits

With the exception of the results from the Woodworth-Cady questionnaire, which was administered only to the older children, the results reported here are based upon subjective judgments of the parents and of the field workers. Limitations upon time and funds made a thorough study of moral development out of the question.

TABLE XXXIX.—CORRELATIONS WITH HOME READING DONE BY CHILD

	Home reading done before nine by seven- and eight-year-old children					
	Foster			Control		
	r	P.E.	N	r	P.E.	N
I.Q. of child................	.20	.11	38	.15	.14	22
Hours of home instruction at ages 6 and 7..............	.03	.11	38	−.28	.13	22
Number of books in home library.....................	.06	.11	36	−.18	.14	22
Number of books in child's library.....................	.24	.12	34	−.23	.14	21
	Home reading at nine and ten by children nine and ten					
	Foster			Control		
	r	P.E.	N	r	P.E.	N
I.Q. of child................	.58	.13	12	.64	.14	8
Hours of home instruction at ages 6 and 7..............	.76	.08	12	−.27	.20	10
Number of books in home library.....................	.16	.19	12	.83	.07	9
Number of books in child's library.....................	.34	.18	11	.29	.20	10
	Home reading at nine to twelve by children eleven and twelve					
	Foster			Control		
	r	P.E.	N	r	P.E.	N
I.Q. of child	.41	.14	15	.39	.17	12
Hours of home instruction at ages 6 and 7..............	.52	.13	15	.14	.19	12
Number of books in home library.....................	.65	.10	15	.13	.19	12
Number of books in child's library.....................	.44	.14	15	−.08	.19	12

It will be recalled that in every family the two parents were asked to rate the child independently upon ten traits. To give an approximate idea of the reliability of such ratings, the correlations between independent ratings by fathers and by mothers are reported in Table XL. Ratings for which there was any reason to suspect collusion between the parents were thrown out of this set of correlations. As a rule, the parents filled the blanks out alone,

or with the help of the field visitor, at the time they took the Stanford Binet Test. When it was necessary for the field visitor to give assistance in the use of the rating scales, care was taken not to suggest in any way the ratings which the child in question might probably merit.

TABLE XL.—CORRELATIONS BETWEEN PARENTAL TRAIT RATINGS OF CHILD
(Father's rating vs. mother's rating)

	Foster			Control		
	r	P.E.	N	r	P.E.	N
1. Will power and persever- ance..................	.25	.06	121	.23	.07	96
2. Cheerfulness and optimism	.34	.05	120	.30	.06	95
3. Musical appreciation......	.55	.04	121	.52	.05	94
4. Sense of humor..........	.20	.06	121	.27	.06	96
5. Permanency of moods....	.21	.06	121	.34	.06	94
6. Leadership..............	.55	.04	117	.39	.06	95
7. Sympathy and tenderness	.44	.05	122	.49	.05	95
8. Conscientiousness........	.42	.05	118	.43	.06	94
9. Originality..............	.32	.06	121	.41	.06	93
10. General intelligence......	.43	.05	121	.54	.05	95

These ratings cannot, of course, be taken as real reliability coefficients, since it is possible that the correlations are partly accounted for by 'collusion' over many years of child-rearing, even though collusion in actually making the ratings for this study was not present. 'Halo' effect is another possible influence that renders the interpretation of these ratings ambiguous.

The traits 'cheerfulness and optimism,' 'sympathy and tenderness,' and 'conscientiousness' showed a fair agreement for parental rating, and accordingly these three traits were chosen as variables on which to compute correlations with the mid-parental rating of the parents by the *field visitors* on the trait 'kindliness, sympathy, and tact.' Only those cases were used in which both parents had been rated by the field workers and in which collusion between parents in making their ratings was improbable. Table XLI summarizes these correlations and indicates results of no measurable significance.

The trait 'musical appreciation' was next considered. In the space provided for 'interests or hobbies' of the parents on the parents' information blanks, music is one of the hobbies suggested as an example. Music was often mentioned by parents as an interest

or hobby, and occasionally such occupation as 'church organist' was noted in the space calling for 'positions of honor or trust' held by parents. Using information gained from the information blanks, biserial correlations were computed between the average rating of children by their parents in musical appreciation and the presence or absence of music as a hobby or interest of the parents.

TABLE XLI.—CORRELATIONS OF MID-PARENTAL 'KINDLINESS, SYMPATHY, AND TACT,' AS RATED BY FIELD WORKERS WITH CERTAIN TRAITS OF CHILD

Trait	Foster			Control		
	r	P.E.	N	r	P.E.	N
Cheerfulness and optimism....	−.11	.06	122	.02	.07	94
Sympathy and tenderness....	−.04	.06	122	.09	.07	94
Conscientiousness............	.11	.06	125	.24	.07	93

Whether these slight correlations should be accounted for through environment or through bias in the parents' ratings is difficult to say.

Scores for the Woodworth-Cady questionnaire are available upon only 27 foster and 14 control children. In consequence, the

TABLE XLII.—CHILD'S MUSICAL APPRECIATION CORRELATED WITH MUSICAL INTERESTS OF PARENTS

(Biserial r's)

	Foster			Control		
	r	P.E.	N	r	P.E.	N
Either father *or* mother gives music as interest: blanks from both parents were secured, but neither mentions music	.19	.06	164	.17	.09	99
Father's blank mentions music: father's blank does not mention it....................	.24	.08	121	.12	.08	101
Mother's blank mentions music: mother's blank does not......................	.21	.07	156	.12	.08	101

correlations using Woodworth-Cady score as a variable are not very reliable, but it seems significant that in Table XLIII the co-efficients for the Foster Group and the Control Group agree perfectly as to sign, and approximately as to magnitude.

As a low score on the Woodworth-Cady questionnaire signifies high emotional stability and a high score signifies emotional instability, negative correlations in this table imply a favorable influence of the factors in question, and positive correlations imply an unfavorable influence. The correlations of Table XLIII suggest, at least, that from the point of view of a child's emotional stability, it is desirable to have kindly, sympathetic parents who give him little supervision.

TABLE XLIII.—WOODWORTH-CADY SCORES (IN TERMS OF AGE NORMS) CORRE-LATED WITH VARIOUS HEREDITARY AND ENVIRONMENTAL FACTORS
(Children t n or over)

Factor	Foster			Control		
	r	P.E.	N	r	P.E.	N
I. Q. of child.	−.12	.13	27	−.17	.18	14
Whittier index...............	.15	.13	26	.46	.14	14
Culture index................	.11	.14	24	.37	.16	14
Mid-rating of parents by field visitors on 'kindliness, sympathy, and tact'	−.29	.12	26	−.30	.16	14
Parental supervision (biserial using ratings below 5 vs. ratings of 5 or 6)	.34	.16	26	.24	.23	14
Telling child of his adoption (biserial).................	.18	.16	27	....	....	....

It may also be of interest to compare the mean scores of the foster and control children to the Woodworth-Cady norms, based upon tests of unselected children of 10 to 14 years.[13] Only 4 of the Foster Group of 27 have scores (in standard units) which deviate positively from the mean for their age and sex (i. e., only 4 show more than average instability on this test). The mean standard score for the foster children is − .48. Only one of the Control Group of 14 has a positive standard score, and the mean of their standard scores is − .68. May these results possibly mean that the superior mental level and the unusually kindly and sympathetic parents of these groups have more than offset the unstabilizing effect which a maximal amount of care and supervision might otherwise have induced?

These figures complete the statistical treatment that has been given to the special traits which have been discussed in this sec-

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[13] (See *Genetic Studies of Genius*, I, p. 511. (Ref. 15).

tion. However, since most of the questions here taken up have been based upon subjective material, and since this section offers suggestions rather than conclusions, a few additional comments may be pertinent as well as interesting.

I was much impressed by the fine spirit of rapport between parents and children which was nearly always to be found in both foster and control families, and apparently to about the same degree in both. The foster parents were perhaps more demonstrative toward their children. Time after time, they told the field visitors that taking a child to rear had transformed their lives and that they were perfectly sure that they could have felt no greater love for children of their own.

Hence, here we have two groups of parents, both of which exceed, on the average, the parents of unselected offspring in intelligence, education, culture, and character. One group of parents is rearing children conceived of its own germplasm; the other group is rearing the children chiefly of parents who, in their parenthood itself, showed a lack of inhibition or disregard of consequences. Yet the foster children, quite as noticeably as the control children, are strikingly free from serious behavior problems. Only two of sixty-five foster children visited and tested by the writer appeared to present such problems. It may be, of course, that the 'company manners' of many of the families tended to cover up such problems if they existed, but the internal evidence of several hundred hours of interviews with foster mothers and fathers made me morally positive that in the great majority of cases the family ties, marital and parental, were rather ideal.

The two cases mentioned were both five-year-old girls who were disobedient and subject to tantrums. One of these children was shy, entirely unresponsive to strangers, and easily moved to tears at kindergarten as well as at home. She was apparently somewhat neurotic, and it seems questionable whether environment will ever be able to compensate for an apparently congenital instability. The other was sunny, friendly in disposition, and seemed thoroughly normal in her behavior toward strangers. A few months after testing her, I learned that she had apparently begun to overcome her temperamental difficulties, probably as the result of some gentle, but effective, aids to self-control that her parents were using with her at the time.

In addition to these two cases there were two others who seemed to lack an entirely harmonious relation with their foster mothers. They

did not present specific behavior problems, but the bond between mother and child fell far short of perfection. In both instances the fault seemed to rest in part with the mother and in part with the child. One child was a boy of seven whose foster mother found him "exasperating." Probably most boys of seven do have exasperating traits, and this child perhaps had more than most, though he was normal with respect to intelligence (I.Q. 109). But this mother had allowed the child to "get on her nerves." The situation may have been partly accounted for by the fact that she was harassed by the duties connected with several boarders whom she provided for in her small home to help eke out the family income. The other child was a bright girl of fourteen (I.Q. 113) who possibly tended a little more toward selfishness and 'headiness' than the average girl of her age, but the situation was undoubtedly aggravated by a foster mother who utterly failed to understand her. Small wonder, for the mental age of this foster mother was less than eleven. The mental age of the daughter actually exceeded that of the mother by more than five years![24]

On the whole, the paucity of maladjustments in the Foster Group seems significant, especially when it is remembered that there is only slightly more tendency than chance alone for the foster parents and children to resemble one another in mental quality. It indicates that there are many points of happy human contact other than those based upon congeniality of intellect.

Perhaps it is only natural that, given a home in which harmony and affection prevail, and given a child who is not suffering from some form of actual mental pathology, a fine and sound growth of the parent-child affection should result.

The comments of the last few paragraphs apply, obviously, only to a group of children under fifteen years of age. As the children reach adolescence and adulthood, problems not appearing in the younger group may arise. What will be the attitude of parents of unusual education and culture who find that the foster child whom they have adored since babyhood is unable to take a college education? Will rising young professional men and women remain loyal to foster parents whose mental level is many degrees below their own—to good, honest, unimaginative foster parents who can admire and applaud, perhaps, but never fully appreciate the ambitions and achievements of the young people they have reared? On these questions, our investigation throws no light. The possibility of such questions arising suggests that in child-placement work of the

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[24] This case is reported in more detail in the appendix of case studies.

future every aid that science can offer should be brought to bear on each placement.

5. School Progress

All figures upon age-grade placement were computed for mid-term,[15] *i. e.*, in every case the age and mental age of any given child were projected forward or backward from the date of his test so as to give the age and mental age he would have at mid-term, and thus insure comparability in the data on grade placement of each child. The ages of children tested in the summer were projected ahead to the mid-term of the fall semester. In the figures upon acceleration and retardation, Ayres-Strayer norms were used. By these norms a child is considered at age for grade if he is six or seven in the first grade, seven or eight in the second grade, eight or nine in the third grade, etc.

TABLE XLIV.—SCHOOL ACCELERATION AND RETARDATION IN FOSTER AND CONTROL GROUPS*

Group	Comparison	Accelerated		Correctly placed		Retarded	
		N	Percent	N	Percent	N	Percent
Foster..	With respect to C.A.	23	17	109	80	5	4
	With respect to M.A.	16	12	93	68	28	20
Control	With respect to C.A.	18	26	51	73	1	1
	With respect to M.A.	5	7	34	49	31	44

*Ayres-Strayer norms of grade placement used and children aged 6 to 14, inclusive.

The higher percentage of acceleration by chronological age in the Control Group, and the smaller percentage by mental age, are undoubtedly accounted for by the superior mental level of the control (115 I.Q. as against 107 I.Q. in the Foster Group). The correlation between school grade and chronological age (in half-year intervals) is .95 in the Foster Group and .96 in the Control Group, with the P.E. in both cases .01.

We also tried to find out whether or not any environmental factors appeared to have affected the grade placement of the foster children. Allowing only a six months span as 'normal' for each half grade and assigning such 'normal' placement a score of zero, the amount of acceleration and retardation in terms of half grades for foster children six or over was correlated with the mental age

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[15] "Term" as here used refers to half a school year.

of foster fathers and of foster mothers. The correlations turned out to be virtually zero; accordingly, the conclusion seemed justified that this phase of environment has little to do with speed of progress through the grades.

VIII. INTERPRETATION AND CONCLUSIONS

The way has now been cleared to answer, if possible, the questions regarding the relative contributions to intelligence of nature and nurture which were raised in the beginning of the study. The interpretation of results to be presented will embrace the following aspects of the problem of factors conditioning children's intelligence:

1. Proportional contribution of total home environment to variance.

2. Unique contribution of parental intelligence to variance.

3. Estimate of total contribution of heredity to variance.

4. Numerical estimate of the potency of home environment to raise or depress the I.Q.

1. Proportional Contribution of Total Home Environment

Considering the correlations which have been reported, we have logical ground for believing that the multiple correlation corrected for attenuation (.42) is a measure in the Foster Group of the effect of home environment upon differences in children's intelligence. More precisely, the *square* of this multiple (.17) represents the portion of the variance of children in ordinary communities that is due to home environment.[16]

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[16] In discussing the portion of the *variance* of the children due to this factor and that one, I follow Fisher (3). The justifications for dealing with contribution to variance (*i. e.*, squares of the S. D.) rather than with contributions to the first power of the standard deviation or to any other power are: (a) that such contributions to variance combine additively to give the total variance of the criterion, but contributions to any other power of the S. D. do not; and (b) contributions to variance, but not to other measures of variability, can readily be interpreted by a concept of the proportional number of *common factors* underlying the influences and the criterion. For example, a criterion composed of four equally variable factors, a, b, c, and d, correlates $1/\sqrt{4}$, or ½ with any of the 'influences'—a, b, c, or d. The square of the correlation ½, or ¼, gives the contribution of each factor to the variance of the criterion, and expresses the proportion of factors in the criterion contributed by each factor.

In this connection may be cited a paper by Pearson, "On Certain Errors with Regard to Multiple Correlation Occasionally Made by Those Who Have Not Adequately Studied this Subject" (11). In this article Pearson demonstrates that nearly the maximal predictivity, with respect to a criterion, of a large group of variables all showing considerable correlation among themselves is attained when only a few of such variables are used in a multiple correlation. It follows that the square of our multiple probably represents nearly the maximal effect of home environment, especially since various factors of home environment that were not used in the final multiple could be legitimately dropped out because they were found to contribute to I.Q. variance practically nothing in addition to the contribution of the variables retained.

## 2. Unique Contribution of Parental Intelligence

In the Control Group, the square (.37) of the multiple correlation corrected for attenuation (.61) represents the *combined* effect of home environment and parental mental level upon the variance of children's intelligence. Neglecting the variable 'father's vocabulary,' which contributes only an insignificant amount in addition to father's mental age, it is extremely interesting to apply the Wright path coefficient technique to the correlations for the Control Group, to find out how much of the children's I.Q. variance can be accounted for by reference to parental intelligence alone.[17]

This situation is a particularly favorable one for using the Wright technique, for the assumptions regarding casual relation-

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[17] The path coefficient method, to quote Sewall Wright (20) "depends on the combination of knowledge of the degrees of correlation among variables in a system with such knowledge as may be possessed of the causal relations." The method is limited by the rarity with which we have actual knowledge of causal relations; but it provides a tool of the nicest precision in such situations as do offer an adequate basis for postulating causation. It cannot, itself, uncover what is cause and what is effect, though in the absence of definite knowledge regarding causal relationships between variables, the method "can be used to find out the logical consequences of any particular hypothesis in regard to them." Conservatively stated, in any situation in which we feel justified in drawing conclusions regarding the effects of certain phenomena upon others, the Wright method provides a numerical expression of such conclusions. For a detailed explanation of its application, the reader is referred to two articles by Wright (20) (21).

ships are here at a minimum. It is only necessary to assume that parental intelligence and home environment affect the child's I.Q., but that the child's I.Q. does not contribute to these. It is not necessary to make any assumption at all regarding a possible casual or interacting relationship between parental intelligence and environment; merely the known correlation between the two is sufficient. The relation between the variables is represented in the 'set-up' shown herewith, in which
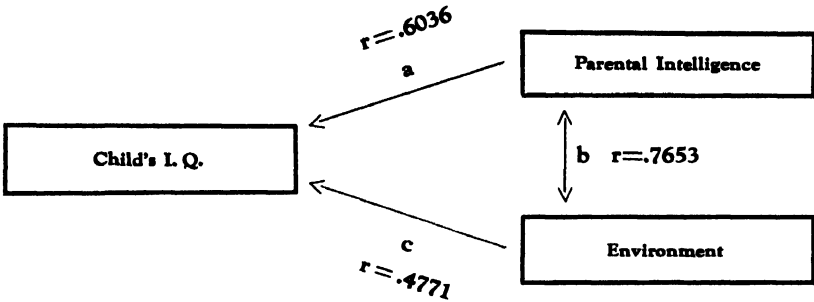
r (parental intelligence) (I.Q.) is the multiple, corrected for attenuation, between the I.Q. of the child and the mental ages of the two parents;

r (parental intelligence) (environment) is the multiple, corrected for attenuation, between the Whittier index and the mental ages of the two parents; and

r (I.Q.) (environment) is the correlation, corrected for attenuation, between the child's I.Q. and the Whittier index.

a represents the direct path of influence between parental intelligence and child's I.Q. and a^2 the percentage of I.Q. variance attributable to parental intelligence. The coefficients c and c^2 represent corresponding coefficients of environmental influence other than that reflected in a and a^2. The coefficient b represents the known correlation between parental intelligence and environment.

The directions of the arrows indicate the relationship of the variables with respect to cause, effect, and possible reciprocal action.

By Wright's formulas:

r (I.Q.) (parental intelligence) $= .6036 = a + bc$

r (I.Q.) (environment) $= .4771 = c + ab$

r (parental intelligence) (environment) $= .7653 = b$

Solving these three equations for the two unknowns,

$$a = .5757 \qquad\qquad a^2 = .3314$$
$$c = .0367 \qquad\qquad c^2 = .0013$$

In addition to a and b, there is an effect upon the child's I.Q. due to the *combined* working of the two correlated variables, parental intelligence and environment. This effect is equal to 2abc, or .0322, and expresses the minute increment of variance, over and above what each variable contributes by itself, that results from the fact that the two variables are correlated and reënforce one another to some extent.

$a^2 = .3314$ (parental contribution)

$c^2 = .0013$ (contribution of environment *other* than parental intelligence)

$2abc = .0322$ (joint parental and environmental contribution over and above separate contribution of each)

$\overline{}$

.3649

The sum of a^2, c^2, and 2abc is equal to the square of the multiple correlation of I.Q. with parental intelligence and environment.

A question of great interest concerns the difference between the contribution (.17) of total environment in the Foster Group and the contribution (.0013) of environmental influence (other than the direct influence of parental intelligence) in the Control Group. This difference is probably due to several facts, viz:

(1) The environmental as well as the hereditary contribution of parental intelligence is contained in a^2, and is consequently lacking in the value, .0013, of c^2. We should not expect this *environmental* contribution of parental intelligence to be over four or five percent, however, because the correlations (even when corrected for attenuation) between child's I.Q. and foster parents' M.A. are so very low (see Table XXXIV). The correlation squared is .0081 with foster father, and .0529 with foster mother; and both these values represent more than the unique foster parent contri-

butions, because they are increased by the relationship of parental M.A. to other influences of environment.

(2)   Part of the joint parental and environmental contribution (.0322) should be properly attributed to environment when a comparison is made of environmental influences in our two groups.

(3)   The probable errors of our determinations of degrees of influence could well account for the remaining discrepancy. It is not known exactly what the magnitude of these probable errors is; however, we do know that the P.E. of the multiple correlation (corrected) of child's I.Q. with environment in the Foster Group is greater than .05; and that the P.E. of path coefficients based upon corrected correlations of the size of the ones entering our calculations is fully as large as that.

3.   Estimate of Total Contribution of Heredity

As has been noted above, a^2, or 33 percent, represents the proportion of I.Q. variance that is attributable to parental intelligence alone.   Now, 37 percent is the proportion of I.Q. variance that we have already found attributable to parental intelligence and environment, alone and in combination.   It follows that, if we could, without at the same time narrowing the range of parental intelligence, level all other aspects of home environment to a standard or average, the variance of children's intelligence would be reduced by 37 minus 33, or 4 percent.   The contribution of parental intelligence to variance would then be equal to .33/.96, or 34 percent.

Such a contribution corresponds to a multiple correlation of $\sqrt{.34}$, or .58,—the multiple correlation (corrected for attenuation) which would be found between child's I.Q. and parental intelligence if the home environment of all families were made constant, but *parental intelligence continued to vary as much as before.*   In this latter respect the coefficient differs radically in theory from the partial correlation coefficient, which in comparable situations has sometimes been interpreted erroneously (1).   The partial correlation of I.Q. and parental intelligence with environment constant is here only .42, as contrasted with .58.

The value .58 probably represents fairly closely the actual degree of resemblance between children and their two parents based upon heredity alone.   The undoubted fact that a small amount of

parent-child resemblance due to environment, but not measured by the Whittier Scale, is still concealed in the coefficient probably enhances its value slightly. But the fact that parents were themselves molded in part by environment, and in consequence vary somewhat from their congenital mental level, and the further likelihood of slight random *environmental* effects (such as those from pre- and post-natal nutrition), suggest that the intrinsic genetic resemblance between parents and offspring is somewhat depressed thereby. The elevating and depressing effects undoubtedly cancel one another to some extent. The coefficient .58 can consequently be taken as a tentative approximation to the true genetic relation. Its probable error could in this case be computed similarly to the probable error of a regression coefficient if the coefficient .58 were not based upon correlations corrected for attenuation. It can only be observed that its probable error must be somewhat greater than the probable error (.06) of an ordinary regression coefficient based upon raw intercorrelations equivalent to the corrected ones used here.

We have now seen that the total contribution of systematic (or measurable) home environment is close to 17 percent, and that the contribution of home environment and parental intelligence together is represented by a multiple correlation coefficient (corrected) of .61, or by a percentage of .37. If not more than 35 or 40 percent of the variance of children's I.Q.'s is accounted for by reference to these factors, what contributes the other 60 or 65 percent?

Possibly a portion of this residual variance is due to the "random somatic effects of environment," to quote Fisher (3). But it seems reasonable to suppose that not a great deal is due to this effect, since numerous studies have shown a marked tendency for the I.Q. to remain constant over a period of years, while other studies have shown that identical twins correlate in intelligence about as closely as the reliability of the tests employed will permit (10). Probably the major share of the residual variance is due to congenital endowment, since in known modes of hereditary transmission the influence of heredity is *always* far stronger than parental correlations alone would indicate. This is necessarily the case because only half the chromosomes of each parent are passed on to the offspring. Hence, the parental deviation for any trait in ques-

tion is determined by a number of factors other than the ones trans-
mitted to the child. In hereditary traits such as stature, which are
known to be influenced relatively little by ordinary differences in
environment, the multiple correlation of child with parents is .64,
but the contribution of heredity to variance approaches 100 percent.
The closeness of our estimated value of the "genetic" multiple cor-
relation for intelligence to this value of the multiple correlation for
stature is striking. *Probably, then, close to 75 or 80 percent of
I.Q. variance is due to innate and heritable causes.*

This estimate makes allowance for the 17 percent which the
data of this study show is due to measurable home environment,
plus an additional 5 or 10 percent due to the possible "random
somatic effects of environment." In the opinion of the writer, the
estimate is the most reasonable one that can be made from avail-
able data with available methods. But a determination of the total
contribution of heredity can probably never be made beyond cavil
until the genetic mechanics of mental heredity are first established
by methods analogous to those used by Fisher in the study of physi-
cal traits (3).

4. A Numerical Estimate of the Potency of Home Environment to Raise or Depress the I.Q.

One further angle of interpretation will be especially pertinent
to the general problem of the possibilities and limitations of train-
ing. From a practical outlook the point to be raised is undoubtedly
of even greater significance than the more general problem of the
proportional contributions of nature and nurture to mental varia-
bility. It is concerned with the question: "How far, in terms of
measurable I.Q., is environment potent to increase or inhibit the
development of innate intelligence?"

Let us turn to the data of Section V. It was there seen that
empirical considerations, based upon facts given, strongly suggested
that the 'congenital mental level' of the foster children was not
more than two or three points above 100 I.Q. But the average I.Q.
level actually found in this group was 107. Can this discrepancy
be accounted for through superior environmental advantages?

Probably it can be. The average mental age level of the foster
fathers is 16 years, 11 months, and of the foster mothers is 16 years,

3 months. The average *mid-parent* level, 16-7, is about one standard deviation above that of parents in general.

The army intelligence data (22) strongly imply that the average adult mental level of Americans is closer to 14 years than to the 16-year level which had been tentatively established previously. But the Army Alpha group test was different in many respects from individual tests, and psychologists have hesitated to assume without further evidence that the same outcome would necessarily hold for tests of the Binet type. However, our control data rather bear out the army conclusions when treated in the following manner: Summary cards for the cases were arranged from lowest to highest in order of father's mental age. Starting with the first case, the children's I.Q.'s were added and averaged as each additional case was inserted. When a point was reached at which the children's I.Q.'s averaged as close to 100 as our limited number of cases permitted (within three points of 100), the fathers' and mothers' mental ages for those cases were averaged separately and together with the following result:

		N
Fathers' mental age	12.9	21
Mothers' mental age	14.5	21
Average	13.7	

The same procedure was repeated with cases in which mothers' mental age was arranged from lowest to highest, with the result:

		N
Fathers' mental age	14.6	20
Mothers' mental age	12.4	20
Average	13.5	

Finally, first with the fathers and then with the mothers, and starting with 13.5 as a median, paired cases in which parent scores showed equal positive and negative deviations from 13.5 were selected until all possible pairs had been used. The average of fathers and mothers was 13.8 in the first instance and 14.1 in the second instance. The corresponding average I.Q.'s of children were 105 and 104, respectively, suggesting that 14 years may be a little high to represent the average adult level. But it seems justifiable on the basis of the foregoing to use 14 for an approximation to the truth. As the standard deviation of our mid-parent mental age is close to two years, the average level of the control parents (and similarly of the foster parents) is about one standard deviation superior.

It is difficult to say just how high above the mean of the generality are the other environmental measures (culture index, Whittier index, income, etc.) because no satisfactory norms for unselected populations are available upon them. Since most of the correlations between the measures of environment and the measures

of parental intelligence are quite high, a safe estimate would be that the total complex of environment (including parental intelligence) is between one half and one standard deviation above average.

The multiple correlation (corrected for attenuation), .42, can now be used as a regression coefficient for predicting the average standard score of the Foster Group. A positive increment of .42 times one standard deviation (or 15 I.Q. points) would equal 6 I.Q. points; or times one half a standard deviation would equal 3 I.Q. points. An increment of 3 to 6 I.Q. points would bring the I.Q. level of our foster children very close to that actually found (107), provided my judgment is correct that their average innate intelligence is about 102 or 103.

We may now go through some of the variables which were correlated with the I.Q's of the foster children and ascertain, when various factors of environment are, say, one standard unit above or below the mean of American communities, how much the I.Q's of the children have been shifted from their "congenital" value in consequence. The column in the following table headed "Measured" is based upon raw correlations, and the column headed "Actual" is based upon correlations corrected for attenuation. Correlations used for the computations are those reported in Tables XXXI, XXXIV, and XXXVI. The values of Table XLV are

TABLE XLV.—AVERAGE SHIFT, DUE TO ENVIRONMENT, IN POINTS OF I.Q., OF FOSTER CHILDREN, WHEN VARIOUS FACTORS ARE ONE S. D. ABOVE OR BELOW THE POPULATION MEAN

Factor	Measured	Actual
Foster father's mental age..........................	1.0	1.4
Foster mother's mental age.........................	2.9	3.5
Foster mid-parent mental age	3.0	....
Whittier rating of foster home......................	3.1	3.6
Culture rating of foster home.......................	3.7	4.4
Total environment.................................	5.3	6.3

found merely by multiplying the correlations of foster children's I.Q.'s with the factors in question by the S.D., 15, of the children's I.Q.'s

The implications of this table seem to the writer of more profound significance than those of any other part of the study. While the intercorrelations between these environmental factors are so

complex that the relative influences of the separate factors are prob-
ably not represented linearly by the differences in the correspond-
ing I.Q. "shifts," the *order* of their influence is probably so indi-
cated. From this argument two outstanding conclusions emerge:

*1. The total effect of environmental factors one standard de-
viation up or down the scale is only about 6 points, or, allowing
for a maximal oscillation in the corrected multiple correlation
(.42) of as much as .20, the maximal effect almost certainly lies
between 3 and 9 points.*

*2. Assuming the best possible environment to be three standard
deviations above the mean of the population (which, if "environ-
ments" are distributed approximately according to the normal law,
would only occur about once in a thousand cases,) the excess in such
a situation of a child's I.Q. over his inherited level would lie be-
tween 9 and 27 points—or less if the relation of culture to I.Q. is
curvilinear on the upper levels, as it well may be.*

An influence of this magnitude, although significant, is emphati-
cally not sufficient to account for genius upon a theory of environ-
ment. Francis Galton, whose I.Q. in childhood Professor Terman
has estimated to have been close to 200 (16), was reared in a home
of exceptional cultural advantages. Yet even without the possible
9 to 27 points contributed by his environment, he would still have
ranked as a genius such as occurs in unselected populations only
once in many thousands of individuals. Whether or not he would
have succeeded in using his gifts with such telling effect if he had
not had the training, education, and inspiring associates that were
his, is of course another question. While many men and women
have surmounted unbelievable obstacles to achieve eminence, there
is no telling how many others, of weaker stamina, have crumpled
by the way.

It is of further interest to note that, while the environmental
conditions of gifted men, women, and children indisputably show
a somewhat superior tendency, they are not, as a rule, so exceptional
as those to which the fortunate young Galton was born. · The average
Barr rating of fathers of the California gifted children studied by
Professor Terman is 12.77—a value close to that of the foster
fathers and of the control fathers. Thus, the superiority of the
gifted group must be due preponderantly to endowment and, on

an average, less than 10 points of I.Q. must be due to environment. *Home environment in the most favorable circumstances may suffice to bring a child just under the borderline of dullness up over the threshhold of normality, and to make a slightly superior child out of a normal one; but it cannot account for the enormous mental differences to be found among human beings.*

If environment cannot account for men, like Galton, who far and away outstrip the majority of their fellows coming even from such a favorable environment as theirs, still less can it account for an impressive number of eminent men whose early conditions of life have been of the kind that depress rather than enhance the I.Q.: men like Lincoln of the backwoods; Carlyle, whose simple peasant mother learned writing while he was at college so that she might correspond with him; Dickens, whose nursery was a London slum; or Canning, a neglected little boy who "longed for bread and butter" as he followed the ragged fortunes of a band of strolling players in eighteenth century England.

5. Summary of Conclusions

By methods which have permitted the effects of environment to be studied separately from those of heredity in conjunction with environment, this study has sought to evaluate the factors conditioning the intelligence of a group of white American school children living in ordinarily variable circumstances.   The main conclusions thereby reached are as follows:

1. Home environment contributes about 17 percent of the variance in I.Q.: parental intelligence alone accounts for about 33 percent.

2. The total contribution of heredity (i. e., of innate and heritable factors) is probably not far from 75 or 80 percent.

3. Measurable environment one standard deviation above or below the mean of the population does not shift the I. Q. by more than 6 to 9 points above or below the value it would have had under normal environmental conditions.   In other words, nearly 70 percent of school children have an actual I.Q. within 6 to 9 points of that represented by their innate intelligence.

4. The maximal contribution of the best home environment to intelligence is apparently about 20 I.Q. points, or less, and almost surely lies between 10 and 30 points. Conversely, the least cultured, least stimulating kind of American home environment may depress the I.Q. as much as 20 I.Q. points. But situations as extreme as either of these probably occur only once or twice in a thousand times in American communities.

5. With regard to character and personality traits, upon which the data presented are less reliable and less objective than those upon intelligence, the indications are that environment is at least as potent as in the case of intellectual traits—possibly much more potent.

A more comprehensive study of such traits, however, must await the future. Whatever clear contribution is made to the general nature-nurture problem by this investigation must rest only upon the data which deal with intelligence. On this point, it is believed that the study finds support for the conclusion reached by the first pioneer to study mental heredity by statistical methods—that heredity is a force in the determination of mental ability by the side of which all other forces are "dwarfed in comparison."

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APPENDIX

I. BRIEF CASE STUDIES

A few brief case studies from the Foster and Control Groups are presented to give the reader an impression of the kinds of data that were available for all the cases of our groups, and to illustrate some typical situations. The names used in these notes are fictitious.

1. Foster Cases

1. One of our prize double cases. Nancy, age five, has an I.Q. of 118; Teddy, her six-year-old foster sibling has an I.Q. of 113. Both children are exceptionally friendly, well mannered and responsive, and no case was found in which the spirit of the entire family was more harmonious and delightful. The foster father is a successful professional man, mental age 17-1, and is proud of his family and devoted to it in a rare degree. The mother can be described only as fairy-like. She is gay, winsome, sympathetic, and bright. Her mental age is 18-6, and her *maternal* age surpasses all known scales. "Do the children know that they are adopted children?" the writer asked her. "They

were told as early as they could talk," the mother answered. "Some foster mothers dread to tell their children of the adoption, but personally I wouldn't miss for anything in the world the joy of having my children run up to me sometimes when they are at play and tell me how glad they are that I turned out to be their mother!" There is nothing in the heredity of these children that would forecast superior intelligence. It seems probable that what superior intelligence they show can be attributed to their very exceptional environment.

2. This family is struggling along happily on the meager income of a laborer. The foster father's mental age is 10-2, and the foster mother's mental age is 9-9, but neither parent seems to feel any sense of deficiency, and apparently they are well-adapted to the simple life they lead. Their great common interest is their love for their eleven-year-old foster daughter, who was adopted, without the knowledge of their friends, to take the place of a baby who died at birth. There are no frills in the home of these plain people, but they are doing the best they can for their little girl, and are even, at real sacrifice, providing her with piano lessons. The girl, who was the illegitimate child of a laundress, is quite normal (I.Q. 97).

3. This case is perhaps the most picturesque one found by the writer. Elaine, nine and with an I.Q. of 123, is growing up in one of the drabbest little homes of one of the shabbiest little towns imaginable. Her foster father and foster mother have mental ages of 9-10 and 12-11, respectively. Neither parent had had any education beyond the grades, nor any cultural advantages, but it must be said to their credit that they are both tremendously fond and proud of Elaine, and will probably try to help her secure the education that her mental caliber warrants. They think she would make a good musician, but the child's own vocational ambition is to be a teacher. She is a charming, poised, and friendly little person, and is outstandingly the most popular girl in her class at school. Her true mother was an eighteen-year-old factory girl. Possibly it is her true father, whose walk of life is not known, who accounts for her rare mental and temperamental endowment.

4. Billy, aged five, is feeble-minded (I.Q. 53). His foster parents, hard-working people of average intelligence and education do not yet realize the extent of the boy's deficiency, but are sure to have a bitter disappointment when they do. Nothing that is known of the boy's heredity augurs such a poor prognosis. His true father was an 'educated man,' and his true mother an 'attractive' girl who was divorced from her husband and got into an intrigue with the father of her child. The child himself is vigorous and healthy and shows no outward stigmata. Such a case as this would seem to be a strong argument for developing the use of infant mental scales as soon as it can possibly be done.

5. Mildred, age fourteen, with an I.Q. of 113, and her foster mother with a mental age of 10-11, are not very well adjusted. This is partly

because Mildred is selfish and headstrong, and partly because the mother, a nervous, complaining 'tired' woman, tries to 'run' her daughter without being able to understand her. "Mother never understands my jokes," the little girl told the writer. On the material and cultural side, the home conditions are about average. The father, a mechanic, declined to take the test.

2. Control Cases

1. The highest testing child of the Control Group is an eight-year-old girl with an I.Q. of 157. Her father is a chiropractor with mental age 19-3, and has an "exceptionally pleasing personality," according to the field visitor. The mother has a mental age of 17-1, and is also a chiropractor. The cultural conditions of the home are somewhat above average, though not exceptionally so.

2. The lowest testing child of the Control Group is a six-year-old boy with an I.Q. of 75. His father, with a mental age of 14-1, is a prosperous real estate salesman. The mother has a mental age of 11-11, but is able to add to the family income by selling lots herself. The combined income of the family is about $5000. The cultural level of the home is somewhat below average, and the only book in the family library is the Bible.

3. High intelligence in the parents does not always augur exceptional intelligence in the children. In this case a university professor and his wife exceed the limit of the Stanford Binet Scale, but their little five-year-old daughter has an I.Q. of only 102. As might be imagined, the cultural conditions in this home are decidedly superior.

II. Typical Correlation Arrays

In order to exhibit to the reader characteristic samples of the material on which the correlation coefficients discussed at length in the preceding pages have been based, and in order also to supply, as it were, a pictorial presentation of some of this material, four scatter diagrams are presented (pp. 314-317). These diagrams show the nature of the correspondence (1) between the I.Q. of the foster child and the M.A. of the foster father (2) between the I.Q. of the true child and the M.A. of its father (3) between the I.Q. of the foster child and the M.A. of the foster mother, and (4) between the I.Q. of the true child and the M.A. of its mother.

TABLE XLVI.—CORRELATION ARRAY: I.Q. OF FOSTER CHILD vs. M.A. OF FOSTER FATHER

M.A. of Foster Father	50–54	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
21–6										1	1		1	1		1							
21–0																							
20–6								1	4	2	2	4	3	4	4	3	1						
20–0										1	2	2											
19–6																				1			
19–0																							
18–6					1	1	1	1		3	3	8	8	2	3	1		1					
18–0						1	1				1	8	8	2	3	1							
17–6										2	2	2	2	4	2		1						
17–0										4	3	3	3	1	2								
16–6	1						1		2	1	1	1	3									1	
16–0																							
15–6								1	1	1	3	1	1	1		1		1					
15–0													1	1									
14–6							1	1	2	2	1	1	1	1	1	1	1						
14–0								2	3	2	1	4	1	2			2						
13–6										1	1	1	3		2	1	1	1					
13–0												2				1							
12–6										1	1	1	1	1							1		
12–0							1		3	1	1		1	1									
11–6																							
11–0																							
10–6										1	1	1											
10–0 to 10–5										1	1												

$r = .07 \pm .05$
$N = 178$

TABLE XLVII.—CORRELATION ARRAY: I.Q. OF TRUE CHILD
vs. M.A. OF FATHER

M.A. OF FATHER	75-79	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
21–6					1	2		2	2	·	1		1					
21–0																		
20–6				1		1		2	1	1		2	1					
20–0						2	1											
19–6																		
19–0					1					1		3		1	1	1		
18–6					1				1	1	4				1			
18–0																		
17–6					1		2	1	4			2						
17–0					1	2			1	1	1							
16–6																		
16–0					2	2		2										
15–6					1		1	1	1	1								
15–0	1		1			1	1				1							
14–6				1	2				3	1		1						
14–0	1		1			2			1	1		1						
13–6			1		1			1	1									
13–0						2												
12–6						1		1										
12–0			1	2				1										
11–6																		
11–0			1	1														
10–6					1		1											

r = .45 ± .05
N = 100

TABLE XLVIII.—CORRELATION ARRAY: I Q. OF FOSTER CHILD vs. M. A. OF FOSTER MOTHER

I.Q. OF FOSTER CHILD

M.A. of Foster Mother	40–44	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
21-6 21-0																1	1	1							
20-6 20-0						1					1	2 / 2	4	1	1 / 1	1	4	1					1		
19-6 19-0											1		1	2	2						1				
18-6 18-0										1	1	2	2	3	5	6			2		1				
17-6 17-0									1	1 / 1	1 / 2	2 / 2	3 / 3	3 / 2	4	2	2	1	2						
16-6 16-0											2 / 3	2 / 3	1 / 2	2 / 4	2	1 / 1	1 / 2	1	2					1	1
15-6 15-0							1	1	1	1		2	3	1 / 2	1	1 / 1	1	1	1						
14-6 14-0										1 / 1	1	2	1 / 2	1 / 1	1	1	1	2 / 2	2	2					
13-6 13-0							1	1		1	1 / 1	1	4	2 / 1	2 / 2	1 / 1	1	1	1	1					
12-6 12-0			1								2	4 / 2	2	1	1	2 / 1									
11-6 11-0	1									1	2	2 / 1	2 / 1	3	1 / 2		1								
10-6 10-0 9-6										1	2 / 1	1 / 1	1	1	1		1		1						

r = .19 ± .05
N = 204

TABLE XLIX.—Correlation Array: I.Q. of True Child
vs. M.A. of Mother

M.A. of Mother	75–79	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
21–6							1					1			1			
21–0																		
20–6									2	1		1						
20–0								1		2				1				
19–6																		
19–0				1	2				4	2			1					
18–6						1			1	1		1	1		1			
18–0							1				1							
17–6					1	1	3	3	2	3		2						
17–0							3		1	1	2	1	1				1	
16–6											1							
16–0							1	2	1									
15–6				1					2	1								
15–0					1	2	1	1										
14–6								1				2		1				
14–0			2	1	1	1	1			2		1						
13–6			1	1	1	1				1						1		
13–0					2													
12–6	.				1			2										
12–0			1	1	2	2					1							
11–6	2		1		1				1									
11–0																		
10–6																		
10–0																		
9–6																		
9–0						1												

r = .46 + .05