VII. Race Relations

1. HUMAN STUDIES IN HAWAI1

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In 1926, the provision of a grant from the Rockefeller Foundation to the University of Hawaii for a five year program of research made possible the continuance of studies of the biological significance of race. Investigations previously undertaken here were almost wholly psychological in character and were confined mainly to mental test comparisons, together with some estimates of the social characteristics of races and brain capacity measurements of Oriental children. The results of these studies were published the same year in a book entitled Temperament and Race.2

The fact that funds were now made available resulted in an extension of the program of research to a degree not hitherto contemplated. The object of our studies was to collect and analyze data that would help to make possible a scientific answer to a question of universal interest—what is race? These studies were classified in three main divisions, physical anthropology, psychology, and sociology, the intention being to carry out observations independently in each field but in coordination with one generalized program of research. It was early recognized that the sociological observations must be founded on different methods and, indeed, involved a different approach to the problem, being concerned chiefly with cultural changes in the group, racial attitudes, and the like, in all of which environmental factors played the principal part. Anthropology and psychology, however, were both concerned with individuals as biological units making up a race, and cooperation in these fields of research could be more easily arranged. The sociological program, therefore, proceeded under a special grant, raising the amount of the Rockefeller contribution in all to $125,000.

The object of the present paper is to report in brief outline the results of the anthropological and psychological studies carried out during the five year period for which funds were allotted from the Rockefeller Foundation, a period which ended in December, 1931.

Early in 1926, Dr. Frederic Wood-Jones, Professor of Anatomy at the University of Adelaide, South Australia, who is so widely known for his work in anthropology and comparative anatomy, arrived in Honolulu to direct the work of the division of physical anthropology. After three years' work at the University of Hawaii, he returned to Australia. The fact of his departure is the excuse for the present writer's attempt to give an account of Wood-Jones's work in conjunction with a report of his own. In the following description, the chronological order of the studies has been followed rather than their natural sequence.

While our ultimate object was to institute various comparisons of the racial groups represented in Hawaii, there seemed to be a great need, as preliminary work, for fundamental studies of man, involving an outline of the probable pathways of his emergence from lower evolutionary levels. With a clearer understanding of the differences between man and his most closely related anthropoid contemporaries in the animal kingdom, we should be better prepared to discover and understand the importance of the differences that exist between members of the divisions of mankind itself. Particularly was this preliminary work necessary before racial differences in cranial morphology could be properly investigated. Such a fundamental study is contained in Man's Place Among the Mammals, published in 1929.3

In this important book, Wood-Jones traces the development of biological thought, as regards the evolution of man, from the pre-Darwinian down to the latest post-Darwinian period. It constitutes what the author calls a stock-taking of theories regarding man's origin—a stock-taking which, for the ordered progress of scientific thought, should be made periodically. He formulates his own orientation to the whole problem in a striking pronouncement. "An animal," he says, "regarded from the point of view of structure, is a complex of the basic plan of heritage and the adaptation of habitus. It should always be our endeavor to sort out these two factors in the makeup of an animal. . . . One fundamental structural difference begot of heritage outweighs many structural resemblances begot of habitus." The problem in racial studies is fundamentally the same—the discovery of the important hereditary differences and their assessment in terms of human functioning.

In applying this principle, Wood-Jones finds that there are decidedly important differences "begot of heritage" between the anthropoid ape and man, and adduces the evidence that goes to show that man's divergence from the anthropoid stock must have taken place at an extremely early period.

He shows that the phylogenetic trends of the anthropoids have proceeded in specialized directions and thus are distinct from the evolutionary tendency of man, who has developed along somewhat divergent lines. Consequently the conclusion is warranted that the

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1Report of an investigation on Race Relations, conducted at the University of Hawaii under a grant from the Rockefeller Foundation, and included here at the request of the Editors.
earliest human ancestors did not arise from an anthropoid stock.
Wood-Jones believes that the evolutionist must go back as far as a
primitive Tarsioid stock to find a sufficiently generalized form that
would be the common ancestor of man and the anthropoid apes. This
is also the position taken up by Elliot Smith, who is in turn quoted
by Yerkes and Yerkes in their most recent book, The Great Apes.
These conclusions, important as they are for the comparative
anatomist and students of evolution in general, may not, at first
sight, seem to have such an immediate bearing on our problem of
discovering and evaluating racial differences, but in pointing to the
fact that some differences may be the result of habitat while others
are more fundamental and begotten of heritage, Wood-Jones has laid
down an excellent guiding principle for our racial studies. In our
psychological investigations, for example, it is our endeavor to sep-
arate the factors which are purely environmental, such as restricted
opportunities for education, limited social inheritance, etc., from those
more fundamental factors of native intelligence, which have as surely
set the bounds of progress for a race. We are indebted to Wood-Jones
for this clear statement of the conflict between the structural and
functionalist school. In our psychological studies, the hereditary
and the environmentalist are at similar odds. The first insists that
a race is inferior because of its inherent inability to control its en-
vironment. The environmentalist says that the race appears inferior
only because it lacks the opportunity for functioning to the extent
of its inherent ability. In this conflict of views it is necessary for us
to take the middle ground. Changes in environmental pressure on a
race may work wonders as regards its progress, provided it has re-
tained its plasticity. Just as certain phyla in the animal world have
lost their plasticity and are unable to respond to environmental
change, so, too, certain racial groups may remain unresponsive to
cultural stimulation. The lack of intellectual plasticity may mean
that they are unable to assimilate the social inheritance gained by
other groups, so that when faced with rapid changes in environmental
conditions they tend to fall behind. Progressive adaptability has, in
fact, been made the basis of a definition of racial intelligence. Though
the methods of study are totally dissimilar, it is clear that the ap-
proach of the physical anthropologists and the psychologists to the
problems of racial differences is fundamentally the same.
Structural and functional aspects are conjointly treated in another
book, the publication of which is the direct outcome of the Rocke-
feller Fund program. Considering that neurology and psychology
are sciences having for subject matter the same basic physical struc-
tures, Dr. Wood-Jones and the writer decided to collaborate in the
writing of a book on these subjects. This volume deals with the
building up of the central nervous system and sets forth the archi-

dectoral additions that came about in response to the demand for
higher functioning. The steps in development are traced one by one,
the false steps and mistakes in brain building being set forth till
the ultimate triumph, the evolution of the cortex, came about.
In the more strictly psychological portion of the book, the present
writer attempted to trace the parallel between neurological develop-
ment and behavior from amoeba to man, paying particular attention
to the greater complexity of functioning that went hand in hand
with the greater complexity of brain structure. The function of the
cortex as an organ of choice was specially stressed, and various
changes and advances in bodily function were described as being
necessary before it was biologically safe to substitute reasoned be-


2See Temperament and Race, pp. 256 ff.
Arnold, 1929.

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more relevancy than movements of people around the bowl have for the goldfish. These minute organisms are not, from the standpoint of the biological advantage of this untutored observer, worthy attending to. Education is the process of increasing the number of relevant stimuli and is, therefore, an essential part of the process of an increase of intelligence. However, that kind of education is unintelligent and belongs to which we attend without respect to their relevancy.

Immediately we enter the field of racial differences the value of the new concept of intelligence is at once apparent. It combines the structural and the functional, the hereditary and the environmental viewpoints. Obviously the number of relevant stimuli attended to will depend on two things: first, how many stimuli a given environment contains and, second, the ability of the individual or the race to respond to them. An inappropriate response is as good as none. If, for example, we bring a race to a new environment or bring a new environment to a race, and both things are possible, we can judge of the intelligence of the response. Western civilization, for example, was brought to the Japanese. It was also brought to the aboriginal Australians. How much did each race find in the way of relevant stimuli in the changed environment? For one group of people, having lost plasticity, the change was too great. The ability to see the relevancy of the new stimuli was lacking and so education and invention and progress passed them by. The Japanese, Chinese, Portuguese, Filipinos, and Porto Ricans were brought to a new environment in Hawaii. How much of an increase in the number of relevant stimuli has each found in the new place of abode? Through the methods of racial psychology, we hope that it will not be necessary to await the ultimate adjustment, but may be possible to predict the degree of intelligent adaptation. So, too, with the individual. If we know the number of biologically relevant stimuli a child can respond to at a given age, we have the means of predicting his future progress. Unfortunately, the tests chosen for examining individual reactions are not themselves always relevant to this purpose.

Having cleared the ground and reached a common basis in the way of working principles, the work of the divisions of anthropology and racial psychology naturally became more specific and divergent, each employing its own special methods. Dr. Wood-Jones turned his attention to the science of human measurements and brought out a hand book of anthropometry, which included a description of the chief landmarks used in measurement, the instruments available, and the methods of using them. The precise definition and localization of the points of measurement is, of course, a necessity in anthropological work and the confusion of methods at present in vogue renders a great deal of work in this field valueless. Uniformity of procedure should be possible by the use of this hand book."

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From this point on, Wood-Jones's studies have a more direct and specific bearing on racial problems. One particularly interesting study dealt with the anthropometric characteristics of the skull of the extinct Tasmanians. The method used was laborious but extremely valuable in its outcome. Using as a basis for measurement the standard radiographs published by Berry in Melbourne, Wood-Jones drew radii from the central point of the upper border of the external auditory meatus, not only to the main anatomical points on the skull (glabella, lambds, etc.) but also at 10 degree intervals, extending them from this center to the periphery of the skull. The length of these radii were then recorded, also the distance of all intersections of sutures or other named points along these radii. Similar methods of measurement were recorded for each of the three normac of the skull. On a series of 50 drawings of skulls, 24,000 of these measurements were taken. By averaging the distances and angles of the radii extending to certain anatomical landmarks, all the nasal contours of the average or composite skull of the series could be accurately reconstructed. In this way, for the first time, instead of considering a few average measurements, the student may obtain a definite picture of what the composite skull of a racial series would actually look like. If two racial series are to be compared, the method gives infinitely more satisfactory results than the mere citation and comparison of several measurements and cranial indices, as is the common practice. By superimposing the drawing of the composite skull of one series upon another, comparisons may be made immediately at any number of points on the contour, and the anthropological importance of the sum of the differences may then be realized. The division of psychology participated in this work to the extent of statistically summarizing the measurements.

As an immediate result of this work, Wood-Jones determined that the Tasmanian cranial capacity is considerably larger than had been previously estimated. His figures agree very closely with those Hrdlicka obtained from an entirely different series of skulls, a difference of only about 1 mm. separating the two sets of averages of length, breadth, and bregmatic height. The result called forth from the author the statement that "it is probably correct to say that the commonly accepted low average cranial capacity of the two sexes of this race, like the reputed humanly low class features of their crania, have been wrongly emphasized with the result that the Tasmanians have been ascribed a lower place in the human scale than the examination of the cranium warrants."³⁴

Pursuing the same methods, Wood-Jones next measured a series of Australian aboriginal skulls.⁴ A comparison with the Tasmanians showed again that, as far as cranial capacity and cranial form go, the Tasmanians showed marked superiority over the Australians. Here again the value of the comparative method is demonstrated. Wood-Jones's conclusion served to throw doubt on the commonly accepted theory that the Tasmanians represent the original primitive, less highly developed inhabitants of the Australian continent, driven south by the present Australians and finding an ultimate refuge across Bass Strait.

Several occasional papers were contributed by Wood-Jones to scientific magazines during his stay in Honolulu. One of these dealt with the distinction between the human halluc and the great toe of anthropoids.⁴ His contention was that opposability is never a feature of the movement of the human great toe, and he cites the case of an armless Japanese boy in Honolulu who drew and wrote with the aid of his toe and who, therefore, exhibited an optimal amount of great toe movement. While there was a high degree of flexion and extension, there was no trace of opposibility of the big toe, this emphasizing the characteristic human distinction of the big toe movements as compared with those of the anthropoid apes.

Another paper was based on embryological material gathered in Hawaii and dealt particularly with the disposition of the hair tracts in man. Wood-Jones records the appearance of a mid-dorsal hair whorl in four embryos (three part Hawaiian, one Japanese) a condition which, he says, "has not so far been recorded in the human subject. It has not even been encountered in any of the white races represented in Hawaii."⁵ The sharing of an anomaly by the Oriental and Hawaiian racial groups may have some bearing on the problem of Polynesian origin, or, at least, on the Asiatic affinities of the Hawaiian.

Another short paper deals with cranial architecture as regards the formation of the pterion and is intended to emphasize the human distinction from the simian form of this anatomical character.⁶

Of somewhat similar character is the paper describing distinctive human developments in cranial architecture, particularly referring to the formation of the postorbital bar and its various articulations in man and the rest of the primates. On these differences Wood-Jones lays particular stress and, on the basis of his observations, believes that the progenitor of Homo sapiens developed frontal lobes in the brain before the bones of the cranium in the region of the interorbital constriction had become phylogenetically stereotyped in their modes of articulation, or, in other words, while the skull was still in its primitive tragioid condition. The author, of course, recognizes the need for further careful comparisons and winds up his
paper thus: "Not only does much work need to be done on the skulls of large numbers of monkeys and apes, but we require a great deal more information concerning the skulls of some of the races of Man-kind. In particular there is needed an extended study of the negro skull, particularly of the negro foetus, for it is impossible to regard as unimportant the fact that some 16 per cent or more of African negroes show the frontal temporal articulation, which is such a definite specialization of the African anthropoids."

The finding in a burial cave of a skull of an ancient Hawaiian dog, during an expedition by Dr. Wood-Jones and the writer to the island of Kauai, occasioned another paper. The Hawaiian dog was undoubtedly brought into the Pacific area by the Polynesians in their early migrations and hence a careful comparison of its characters with those of the dogs of Melanesia and Asia might be useful in helping to trace the course of Polynesian wanderings.

Wood-Jones points out the peculiar cranial contour of the Hawaiian dog and relates this to the habit of giving it a vegetable diet and thus causing modifications of its skull growth. Along with these "pet dog" features is associated the possession of carnassial teeth of primitively large size. These observations may be made the basis of comparisons with other native dogs such as the dingo of Australia or the red dog of the Deccan.

At this point, Professor Wood-Jones turned his attention to the Polynesian skull, using the methods of careful inter-racial comparisons of the characters that seemed to be of essential significance. In this work Wood-Jones follows the principles already laid down in Man's Place Among the Mammals and the Matrix of the Mind. The outcome of this work has been the publication of two papers on the non-metrical morphological characters of the Hawaiian skull, both issued since his departure from Hawaii but founded on work done and on material collected here.

In the first of these papers, Wood-Jones sets out on a general discussion of the morphological characters employed in racial diagnosis. Following the principle laid down in Man's Place Among the Mammals, Wood-Jones proposes to limit the racial comparisons of cranial features to those that are non-adaptive. He says, "Probably one of the greatest needs of physical anthropology at the present time is some definite attempt to employ more fully such non-adaptive features as are incapable of precise measurement or even of standardization by existing methods, but which yet have a high value in diagnosis and assessment of different types of human crania. Only in this way may the study of the human skull be rendered in any way comparable to the system by which zoologists are accustomed to


assess the zoological position and affinity of the lower mammals by regard to their cranial characters." He then takes 23 cranial characters in turn and points out how each may be used in racial comparisons. These are the features which he considers most important in assisting in the diagnosis of racial or tribal characteristics. It will be recognized that this descriptive method, taken in conjunction with the graphic reconstruction method described in Wood-Jones's papers on the Tasmanian and Australian skulls will give a more complete picture of racial cranial characteristics than has yet been provided.

Part II deals with the non-metrical morphological characters of the Hawaiian skull. The material of this study consisted of 100 skulls, the majority sexed from association of the skull with the pelvic bones, the rest from cranial characters. Most of these skulls were retrieved from cave burials and therefore represent ancient unmixed Hawaiians. Though they came from different islands of the group, they were of uniform cranial type, thus opposing Dixon's conclusion as to distinctions of type between skulls from Kauai and skulls from the other islands. Notes were made of 26 characters of the skulls according to the system previously laid down in Part I of this paper. In each case the percentages of Hawaiian skulls which possess the character described are given. For example, obliquity of the orbit was found in 76 per cent of the cases. It is obvious that this method is very useful for the purposes of discovering racial affinities and differences.

We now come to the psychological division of our studies. The preliminary work contained in Temperament and Race consisted of social judgments of the various races as given by 25 selected observers and, in addition, brain capacity measurements of Japanese and Chinese and also mental test comparisons of the various races represented here. The results, on the whole, were favorable to the Japanese, who excelled in ratings of planning capacity, determination, and stability, were equal to the Chinese in self control and prudence, but inferior to them in dependability and tact. It was noteworthy that the Hawaiians obtained the highest rating in tact or ability to get on with other people. In brain capacity measurements the Japanese exceeded the Chinese at every age. In the mental test comparisons the Japanese held an advantage in Maze test records, which indicates the possession of prudence and planning capacity. In tests of general intelligence or school learning capacity, the Chinese had a slight advantage over the Japanese. Results of these tests were also given for part Hawaiians and Filipinos.

Following this work, the writer began an extensive study of racial mental alertness by means of a test called the Form and Assembling

The results of this investigation have been published as a genetic psychology monograph. 1

This study, considering that it was founded on individual examinations, was perhaps noteworthy as regards the number of subjects, over 5,000 being included. The reason for extending this investigation to such large numbers was in the hope that sufficient cases would be obtained to enable us to segregate results by race, age, and sex in sufficient numbers to render the comparisons of statistical significance. When it is considered that the races dealt with included three groups of whites, two in Hawaii and one on the mainland, and in addition Japanese, Chinese, Portuguese, Hawaiians, Chinese-Hawaiians, Portuguese-Hawaiians, North European-Hawaiians, Chinese-white-Hawaiians, and Koreans, and that these were severally grouped by sexes and classified by age from 5 to 20 years of age, it will be recognized that 5,000 cases were not too many.

As regards order of success in performance, the study revealed the effect of geographical or cultural selection, in that the two groups of whites in Hawaii considerably excelled another group of whites of similar educational standing examined in schools in a town in eastern United States and these, in turn, were ahead of the Portuguese. These differences showed the importance of natro-racial differences, the highest and lowest place in the array of results being held by the two branches of the white race.

After the whites in Hawaii, second place was taken by the Japanese, followed hard by the Koreans, third and fourth places being filled by the white-Hawaiians, with the Chinese several points below. However, expressed in terms of intelligence quotient levels, only a few points separated the various racial groups. At the lower end of the scale came the Chinese-Hawaiians and then the mainland whites. This study proved that in mental alertness the children of Oriental immigrants in Hawaii excelled white children of a manufacturing and agricultural town in New Jersey. Their excellent performance on the other hand throws in sharper relief the lack of success of the Portuguese. Here cultural differences cannot be invoked to explain the differences in intelligence levels. The Portuguese and Hawaiians are taught in the same schools by the medium of the same language, and their social status is no lower than that of the Oriental children, yet in the tests applied they were considerably inferior.

Taking next into consideration the question of racial hybridism, we find that an excellent showing was made by a group of 65 Chinese-white-Hawaiians, the white mixture in this group being born European. Their average I.Q. was 108, exceeding even that of the Japanese group. There seems to be no other explanation for this excellent record save superior ability in the traits measured by this test.


If the cases are divided into three age levels, 7 to 11, 12 to 15, and 16 years and over, the relative position of the white-Hawaiians and the Chinese-Hawaiians is still the same, the former being somewhat ahead of the latter. As far as this test is concerned, there is no support for the view commonly held in this Territory that the Chinese-Hawaiian is a better racial mixture than the white-Hawaiian. Nor, as regards the position of Hawaiian crosses in general, is there justification for the view that the mixtures are either better or worse than the parent group. Apparently they tend to occupy an intermediate position in each case. With regard to the Chinese-white-Hawaiian mixtures, however, there seems to be a distinct tendency for this tri-cross to approach more closely the white performance and to excel the performance of the other racial hybrid groups. Apparently mixture of blood in a racial group is not per se a disadvantage; notwithstanding assertions frequently made to the contrary.

As regards the intermediate position of the other crosses, this is very close to an actual mid-point between the scores of the original or parental groups.

For example, the average I.Q. in the white group in Hawaii is about 112; that of the pure Hawaiians, 93.4. The average of these two scores is 102.7, which is exactly that of the white-Hawaiian mixture. The average of the Chinese and Hawaiian scores is 97.45 and the actual I.Q. score of the Chinese-Hawaiian crosses was 98.5. This intermediate position of the Hawaiian crosses is also demonstrable in physical measurements. Studies by Dr. Clark Wissler,2 using data collected prior to his death by Dr. Louis R. Sullivan, show that in stature, span of arm, head length, minimum frontal diameter, bicipital width, face height, nose height, transverse frontal-parietal index, and ear height, the crosses occupy an intermediate position whenever differences between the parent stocks occur. In such instances, however, where the two parental stocks approach equality in a measurement, as, for example, in face width of Hawaiian and Chinese, then the Hawaiian-Chinese cross tends to have the same average measurements as the parent stocks. Thus the blending of physical traits in the hybrid seems exemplified on every hand, and there seems every reason to suppose that in mental traits the same thing occurs. Hence if there is any biological basis for the superficially observed differences in temperaments between the races, as, for example, the easy going nature of the Hawaiian, the patient and persistent efforts of the Chinese, and the aggressiveness and initiative of the whites, then the blending of these temperaments should result in an excellent cross.

Under my direction, Dr. C. M. Lottit carried out a study of Hawaiian mixtures at Kamehameha School, using the Binet, Porteus Maze, and Healy Completion tests. His results with this educationally selected group of part Hawaiians bear out practically the conclu-

sions previously obtained. This study was published in the Journal of Applied Psychology. 9

For the purposes of this study, the Binet Test results may be taken as reflecting, in the main, school learning capacity, the Porteus Maze Test, mental alertness, prudence, and planning capacity, and the Healy Completion Test, the ability to analyze correctly certain simple social situations. After noting the excellence of the all around response of the part Hawaiians to the tests, Louttit proceeds to the analysis of the scores by racial groups and finds that, in the case of boys, the Chinese-white-Hawaiians take first place in all three tests, again demonstrating the superiority of the tri-cross. The white-Hawaiians take second place in all three tests, while the Chinese are last in the Binet and Porteus Maze but excel the Hawaiian group in one test, the Healy. In the case of girls, the Hawaiian-white-Chinese again take first place in both the Binet and Maze tests, providing further evidence of the superiority of this group. The pure Hawaiians are lowest in each of the test records. As regards this last named group, there is, of course, doubt in a considerable number of cases as to the purity of the blood, and accurate genealogies are now unobtainable. At any rate, the children thus classified are predominantly Hawaiian.

Another study in connection with our program was that made by Dr. T. M. Livesay and Dr. C. M. Louttit on the reaction time of students of different races. 10 The results were mainly of negative value, indicating, as might be expected, that responses of this nature are likely to be at about the same level in all races. Apparently a certain quickness of reaction time is essential to survival and consequently differences tend to be equalized as between groups. However, what advantages there were in visual reaction time were in favor of the Caucasian students, whether male or female, as against the Chinese, Japanese, and part Hawaiians. As regards an auditory stimulus, the Caucasian males excelled the part Hawaiian and excelled the other two racial groups. The female Caucasian students also came first in auditory reaction time. As figures stand, the differences are too small to be considered constant or statistically significant. It would require repeated experiments with large numbers of cases to reach a definite conclusion in this matter. As regards correlation with intelligence as determined by Thorndike Examination scores, the coefficients were highest for the Caucasian group but, even at best, were somewhat low. This study, though it points towards a Caucasian advantage in speed of reaction to a sensory stimulus, must be greatly amplified if valid results are to be expected. The investigators also used a visual choice reaction time test, but this measured something more than mere speed of reaction and its results are difficult to interpret. It must be remembered also that


this study was carried out with an educationally selected group, viz., university students, and that in their case, if there is a relation between reaction times and intelligence, this selection would tend to conceal the racial differences, if any.

Some racial comparisons in intelligence are also included by Dr. Marjorie E. Babeck, Assistant Director of the Psychological Clinic, in a monograph dealing with clinical psychology in Hawaii. 11 As a basis for this study, the test records of 700 cases of different races, who were referred to the Clinic for mental examination, were analyzed. These cases were all problems either from the standpoint of the home, the school, or the community at large. As the period of study extended over several years, there were sufficient cases to enable the author to gauge the social adjustment of the various racial groups by considering the number of each in proportion to the school population.

The results of this analysis were extremely interesting. The Porto Rican group constituted the most serious problem in social adjustment, no fewer than 107 for every 1,000 of the school population of that racial group being referred to the Clinic for examination. The Portuguese, with 79 per 1,000, were second, followed by the Filipinos with 68 per 1,000. The Hawaiian and part Hawaiian groups had 54 cases per 1,000 referred, the Spanish came fifth with 36, the Koreans next with 31, while the Chinese with 17 and the Japanese with 15 per 1,000 occupied the most favorable positions. From these figures it is apparent that the Oriental groups in the Hawaiian population are making considerably the best social adjustment in the community. In attempting to assess the racial progress of a group, we must take these matters of social adjustment into consideration, as well as the intelligence level.

However, Dr. Babeck was able to show that there is probably a connection between social adjustment and intelligence because the order of cases in intelligence levels by the Binet test was practically the same as the order of races in social adjustment. She included in her studies an analysis of the records of a large number of cases by both the Binet and Porteus Maze tests. In the performance test the differences between the groups were less marked than in the Binet.

An extension of this study of Dr. Babeck's is at present being undertaken, the results being as yet unpublished. 12 This consists of a tabulation by race of the intelligence quotients of 4,819 cases examined by the Binet and 4,130 cases examined by the Porteus Maze test. These are all clinic cases and have been referred for examination for a variety of reasons, behavior difficulties and educational retardation being the most common. As in Dr. Babeck's study, these


cases cannot be considered as other than representing a selected group and are, therefore, not adequate samples of the racial groups as a whole. However, since the numbers are so large, it may be taken for granted that these cases represent a certain grade or level of the population. It is as if we drew a certain line of division through the mental distribution of the races and examined all cases falling below that line. Hence our results may be taken to indicate the comparative mental status of each racial group below this level. It should be supplemented by other studies at average levels of adjustment and, in order to give the whole picture, it should be paralleled with an examination of children of each race above a certain level. In short, before we can complete our comparisons of racial groups, we require the data of variability so as to know to what degree the upper levels of ability are represented in each race.

The order or standing in average intelligence in these referred or clinical cases corresponds extremely well with that obtained in other racial comparisons, using an entirely different selection of subjects. (See Table I.) The average Binet I.Q. of the North European group was ten points higher than that of the next racial group, the Koreans.

### Table I.

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<td>Hawaiian</td>
<td>419</td>
</tr>
<tr>
<td>Porto Rican</td>
<td>376</td>
</tr>
</tbody>
</table>

This superior performance is to be expected, as the group included a number of bright children and others brought to the Clinic for the purpose of educational classification or for merely minor adjustments. Hence it is probable that the whites should be excluded from the comparisons. The Chinese occupied third place, followed by three groups, equal in performance, namely, the North European-Hawaiian mixtures, or white-Hawaiians, the Chinese-white-Hawaiians, and the Japanese. The Chinese-Hawaiians and the Portuguese-Hawaiians occupied seventh and eighth places respectively, being four and five points lower in I.Q. levels. Then follow in order the Portuguese, the Filipinos, the Hawaiians, and the Porto Ricans. Twenty-seven points in I.Q. level separate the North Europeans from the Porto Ricans.

It would be noted that, as regards the Hawaiian crosses, the Chinese-Hawaiian and the Portuguese-Hawaiian are below the other two groups of mixed racial origin, the white-Hawaiian and the Chinese-white-Hawaiian. The Chinese-Hawaiian group is exactly intermediate between the Chinese and Hawaiian levels. The white-Hawaiians are also intermediate between the parental group, but a little below the halfway point. The Portuguese-Hawaiians, as in the Form and Assembling Test, do not occupy an intermediate position but are equal to the Portuguese group and slightly above the Hawaiians. However, the performance of these two parental or original groups differ only slightly.

That it is probable that these results reflect the racial order of intelligence is shown by the fact that if the Binet results are segregated in the two age periods, that is, cases from 6 to 12 years and cases above 12 years, the order of the racial group is practically the same, the correlation of the two sets of rank orders being .98. (See Table II.)

Again, if the data are divided into two series according to date of examination, that is, those examined before 1926 and those examined after, the rank order of the racial groups again is in extremely close agreement with the previous results, the correlation being .98. In the older group a similar division of the data gives for each set practically the same rank order, the correlation being .98. Thus, we have divided the data in four ways, those above and below a certain chronological age level and those examined before and after a certain date, and, have obtained practically the same rank order in intelligence quotient. To arrive at such harmonious results with the four sets of data surely indicates a high degree of significance in these racial differences, even though they may, in some cases, be small in extent.

With the Maze Test, the rank order of the races is not quite the same as with the Binet. (See Table I.) The Portuguese move down the list, the Hawaiians move up. As the Maze Test examines certain temperamental traits as well as intelligence to a certain degree, a change in rank order is to be expected. The temperament of the Hawaiian is, on the whole, a good deal more stable than that of the Portuguese, and the test results reflect this commonly observed difference. With the improvement in score of the Hawaiian group, the tri-cross (Chinese-white-Hawaiian) also improves its rating, as do the North European-Hawaiian mixtures. The latter occupy a position almost midway between the two parent groups. The Chinese in Maze score equal the Hawaiian, and the Chinese-Hawaiian hybrids have just about the same I.Q. level. The Portuguese-Hawaiian group occupies a position intermediate to the two parent groups.

These results, both with the Binet and Maze tests, provide additional disproof of the theory that crosses are either inferior or
cases cannot be considered as other than representing a selected group and are, therefore, not adequate samples of the racial groups as a whole. However, since the numbers are so large, it may be taken for granted that these cases represent a certain grade or level of the population. It is as if we drew a certain line of division through the mental distribution of the races and examined all cases falling below that line. Hence our results may be taken to indicate the comparative mental status of each racial group below this level. It should be supplemented by other studies at average levels of adjustment and, in order to give the whole picture, it should be paralleled with an examination of children of each race above a certain level. In short, before we can complete our comparisons of racial groups, we require the data of variability so as to know to what degree the upper levels of ability are represented in each race.

The order or standing in average intelligence in these referred or clinical cases corresponds extremely well with that obtained in other racial comparisons, using an entirely different selection of subjects. (See Table I.) The average Binet I.Q. of the North European group was ten points higher than that of the next racial group, the Koreans.

<table>
<thead>
<tr>
<th>ORDER OF RACIAL GROUPS</th>
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<tbody>
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<tr>
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<tr>
<td>Nor. Eur.</td>
</tr>
<tr>
<td>Korean</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Nor. Eur.-Haw.</td>
</tr>
<tr>
<td>Chi.-Cau.-Haw.</td>
</tr>
<tr>
<td>Japanese</td>
</tr>
<tr>
<td>Chi.-Haw.</td>
</tr>
<tr>
<td>Port.-Haw.</td>
</tr>
<tr>
<td>Portuguese</td>
</tr>
<tr>
<td>Filipino</td>
</tr>
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96

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### TABLE II

<table>
<thead>
<tr>
<th>Race</th>
<th>No.</th>
<th>I.Q. Rank</th>
<th>Race</th>
<th>No.</th>
<th>I.Q. Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korean</td>
<td>180</td>
<td>101</td>
<td>Korean</td>
<td>66</td>
<td>89</td>
</tr>
<tr>
<td>Chinese</td>
<td>145</td>
<td>107</td>
<td>Chinese</td>
<td>96</td>
<td>89</td>
</tr>
<tr>
<td>Chi.-Eur.-Haw.</td>
<td>142</td>
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<td>Chi.-Eur.-Haw.</td>
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</tr>
<tr>
<td>Chi.-Can.-Haw.</td>
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<td>Chi.-Can.-Haw.</td>
<td>98</td>
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<tr>
<td>Japanese</td>
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</tr>
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<td>Hawaiian</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>Porto-Rican</td>
<td>141</td>
<td>103</td>
<td>Porto-Rican</td>
<td>98</td>
<td>96</td>
</tr>
</tbody>
</table>

**ORDER OF RACIAL PERFORMANCE—CLINIC CASES IN TWO AGE GROUPS.**

**PORTeus MAZE.**

6 to 12 yrs. and over

<table>
<thead>
<tr>
<th>Race</th>
<th>No.</th>
<th>I.Q. Rank</th>
<th>Race</th>
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<th>I.Q. Rank</th>
</tr>
</thead>
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**superior to the parent group. In mental, as in physical measurements, they appear to be intermediate.**

How do these results accord with others previously obtained? In Porteus and Babcock's studies in Temperament and Race, the order of the races in Binet performance was Chinese, Japanese, Portuguese, Hawaiian. Although the differences were larger in our later investigation, the order of races was the same. In the Maze Test performance, the earlier study placed the races as follows: Japanese, Hawaiian, Chinese, Portuguese. With the exception of the fact that the Chinese are equal to the Hawaiians, the order in the later study is the same. In our last study the correlation between the rank order of the races in the Binet and the rank order in the Maze was .88.

We next turned our attention to what are sometimes called psycho-physical differences, and these were studied by Dr. R. G. Bernreuter, research assistant in the Psychological Clinic, in the races represented in Hawaii. Measurements of left and right grip, vital capacity, back strength, back and leg strength, arm shoulder squeeze and pull, height, and weight were taken, the subjects being 12 year old boys. The result of these comparisons will be published in a forthcoming study. It was our object to discover, if possible, what the physical differences in bodily development found by Sullivan were worth in terms of muscular efficiency.

Extremely interesting results were obtained by Dr. Bernreuter, and these are shown in the accompanying chart. It will be seen that one or other of the two hybrid groups included, the Chinese-Hawaiian and the white-Hawaiian, or Caucasian-Hawaiian, occupied first place in five of the six psycho-physical tests. In four of the six measures the Chinese-Hawaiians were superior to the other cross. As far as muscular efficiency is concerned, the results of the mixture of races have been excellent.

When we consider the inferior performance of the Chinese in these tests, the score of the Chinese-Hawaiian hybrid is remarkably good. In grip, in vital capacity, in leg strength and chest pull, this cross excels the Hawaiians also. For the first time in any of these comparisons we find evidence supporting the view that the cross between two races is superior to both parental groups.

Attention should be called to the consistently inferior performance of the two Oriental racial groups, particularly the Japanese. In four of the measures, grip, vital capacity, leg strength, and back strength, they are at the bottom of the list. Only in the strength of the arm-shoulder muscles, as shown by the dynamometer test, called in the chart "Chest Pull" and "Chest Push," are they superior to the Chinese. Moreover, they are decidedly below the record of the Filipino boys, who, in weight and height, are close to their level.

Considering the well known industrial efficiency of the Japanese

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and Chinese in Hawaii, these results seem extraordinary. Much of the labor in the Islands, skilled and unskilled, is carried on by Japanese, yet these tests show that the individuals belonging to this race are not physically as well endowed as the Filipinos and are greatly inferior in this respect to the Hawaiians.

Probably this discrepancy in test performance and efficiency in every day occupations may be best explained on the basis of differences in racial temperament. The Japanese, poorly endowed as he is from the physical standpoint, brings determination and industriousness to the task of earning a living, while the more easy going Hawaiian takes life so easily that he is ousted by his weaker competitors. Then, too, we may find in these figures a possible explanation for the Japanese quest after the white collar jobs. He seeks them partly because manual labor is, relative to his bodily strength and development, harder for him than it is for the men of other races in Hawaii.

Another possible explanation of this low position of the Japanese and Chinese in these tests may lie in the matter of precocity of physical development. The Hawaiian boy at 12 years is probably much more mature for his age than are the boys of the Oriental races. If the latter are late in development, they may improve their relative position at a subsequent age level. This question requires further investigation which, it is hoped, may be undertaken shortly.

Some additional work on the subject of psycho-physical efficiency was carried out by Dr. Bernreuter and the writer, using as subjects Filipinos recently arrived in Hawaii. We examined one group who had been resident in the Islands for about one year and compared with them a group of Ilocanos who came from the northeasternmost end of the Island of Luzon and who were examined at the Immigration Station immediately on arrival in Hawaii. The differences were in favor of the group who had been resident for a year on a plantation in the Islands, but because the proportions of Ilocanos in each group were not the same no definite conclusion as to the environmental effect of living in Hawaii could be drawn. It is hoped, however, to include this question in a larger study of psycho-physical efficiency to be undertaken later. The results with the Ilocanos, however, were very useful as a basis of comparison with the records of Australian aborigines to be referred to later.

Memory abilities in the various races in Hawaii have been investigated by Dr. C. M. Louttit and the results published in an article in the Journal of Social Psychology. He used as subjects 12 year old boys and girls of white, Japanese, Chinese, and Hawaiian or part Hawaiian ancestry who were attending certain public schools in Honolulu. He also included in the comparisons a group of university students of different races. There were four memory tests employed. In the first, a story containing 67 logically related ideas

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<table>
<thead>
<tr>
<th>Race</th>
<th>Weight</th>
<th>Height</th>
<th>Chest Pull</th>
<th>Back Pull</th>
<th>Calf Girth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese</td>
<td>154.4</td>
<td>146.1</td>
<td>106</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>Chinese</td>
<td>154.0</td>
<td>146.1</td>
<td>106</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>Portuguese</td>
<td>154.0</td>
<td>146.1</td>
<td>106</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>Filipino</td>
<td>154.0</td>
<td>146.1</td>
<td>106</td>
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(The Marble Statue) was read to the subjects and they were required to write as much of the story as they could remember. The test was then scored on the number of related ideas reproduced. The whites, both boys and girls, came first in these comparisons, possibly on account of greater familiarity with English. The Japanese boys practically equaled the white boys' score, but the Japanese girls were below the white girls. Last place in the comparisons was held by the part Hawaiian group.

The second test used is called a Letter Square Test, in which 12 letters of the alphabet are exposed in a certain order and position for 25 seconds, the subjects being required to reproduce the letters in right order and position. In this test, the whites, both boys and girls, occupy last place instead of first place in the comparison, and the Japanese slightly excel the Chinese. The next test applied was one for auditory span for digits, i.e., the number of digits that can be reproduced when given orally to the subject. Japanese are supposed, on the basis of previous studies here and elsewhere, to be somewhat inferior in this kind of memory. Louttit's study, however, discovered little evidence for this view. Japanese boys were slightly superior to both whites and Chinese boys, while Japanese girls were lowest in the comparison. Hawaiian boys and girls came in first in average performance.

While the differences in auditory memory seem small, it should be pointed out that rote memory improves very slowly in individuals. We may express this otherwise by saying that the units of measurement are very large. The ability to repeat five digits in order has been found to be average for seven year children, according to Binet standardization. The ability to repeat six digits in order is, however, average for 10 year old children. In other words, it takes three years of chronological age to bring about a difference in ability represented by seven digit performance as against six digit performance. Hence the differences in average span may appear small and yet be of considerable psychological significance. For example, between the Japanese and Hawaiian girls' performance there is a difference of .41 of a digit, and this may represent between one and two years of mental age.

The Japanese have, in other studies on these lines, evinced some superiority in visual memory, and this is confirmed by Louttit's results. Boys of this racial group excel the whites by .56 in average score, equivalent to about two years in mental age performance at this level. The Chinese of both sexes were somewhat inferior to the Japanese in this test, while the lowest position was occupied by the part Hawaiian.

As Louttit points out, few of the differences brought to light in this study may be considered statistically significant according to the accepted formula. This does not mean, however, as the reader might infer from Louttit's conclusions, that the differences are not real. No formula can, of course, say whether a difference in average performance is or is not real. By application of the formula, however, it can be shown that, because of the smallness of the average difference, more extensive investigation involving many more cases will be necessary before it is possible to say whether or not a difference is constant or due to chance selection. Hence, Louttit's results must be regarded as tentative only, and further study will be required before the differences can be regarded as established.

A further inadequacy, involving the procedure rather than the selection of cases, is that in this investigation of auditory and visual rote memory the range of testing was too narrow. The examination began with the presentation of five digit series and only two trials were allowed on each series. It is true that the conditions were the same for all subjects, but a modification of this method might have resulted in a greater spread of the racial scores. In our further studies on this subject the methods will be modified.

Wide as is the range of racial representation in Hawaii, the investigation of mental differences here is somewhat handicapped because those differences are, in the nature of things, rather limited. The mental and social status of the various groups tend to be more equivalent because we have no primitive races represented here. Neither the Polynesians in general nor the aboriginal Hawaiian group is by any means primitive. Though the Polynesians were limited, by the dearth of metals, to the use of stone adzes as cutting tools, their material culture was in other respects highly developed. Their houses, canoes, weapons, ornaments, and clothing were, ethnographically speaking, well advanced in comparison with many other native races. Then, too, their rapid assimilation of western education and manner of living indicates an adaptability that is proof of good natural intelligence. The Oriental racial groups, Chinese, Koreans, and Japanese, came from highly developed and long established civilizations. It is true that these individuals were brought to Hawaii as contract laborers and as such were drawn from the lower industrial and social levels. Experience has, however, shown that emigration to Hawaii has opened up, for many of these people, much more favorable opportunities for intelligent functioning, so that ability which must have remained undiscovered or repressed in their home conditions has had here a chance to come to light. The average level of intelligence of these emigrant groups is certainly not low. The Filipinos cannot be regarded as being properly classified with primitive people. As a matter of fact, the lowest group in Hawaii is the Porto Rican, which does not represent a race at all but is of very mixed racial origin.

The student of racial differences is handicapped by the fact that the intellectual status of the groups here has tended towards equalization.

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He may discover differences by applying tests and measurements, but because he has no racial scale graduated low enough in the order of intelligence he cannot judge accurately of the importance of the differences when found. It would certainly be advantageous to apply the tests and measurements to a group of people for whom the advantages of nurture have been held at a minimum. The performance of such a primitive race would constitute a kind of measuring or zero point with which other observed performances could be compared. The deficiencies of performance of this primitive race might be so marked as to set at rest all doubt regarding the realities of racial inequality.

No such primitive people being available for study in Hawaii, we had to look across the Pacific to the continent of Australia, which is still peopled in its vast and lonely interior by a race which is popularly supposed to be one of the lowest in the scale of human kind. The Australian National Research Council sponsored this project, the plans for which were worked out in conjunction with Professor Radcliffe Brown of Sydney University. For seven months of 1929 the writer was engaged in these studies, visiting Dampier Land and the Kimberley District in the extreme northwest of the continent, Moore River Native Settlement in the Southwest, and finally the center of Australia. The results of this expedition have been included in a book published simultaneously in England and America during November, 1931.

The first two-thirds of the book deals with the physical environment of the natives and their responses to its peculiar demands. It also provides a survey of the customs and social expedients adopted by these people to conserve their social existence, and attempts, by means of a psychological analysis, to set forth the basis of these customs. It is shown that many of the social habits and observances of this people that may seem unreasonable to the civilized onlooker have a definite purpose and value. Interpreted in the light of adaptation to a peculiar environmental condition, they are seen to have a great deal of common sense psychology at the back of them. New explanations are given for the establishment of such customs as initiatory rites, exogamy, totemism, and tribal government by the elders and, at the same time, a picture is given of the daily life adjustments of these savages. The last third of the book contains the actual results of the application of the tests and measurements to the aborigines encountered on these expeditions.

The center of Australia has the typically Australian environment but differs from the northwest in the fact that in the former area the struggle for existence is accentuated by the occurrence of very prolonged and severe droughts. The effect on the natives of the varying environmental stress constitutes an interesting secondary problem to the determination of the mental status of the aborigines as a whole.

Summarizing only the experimental part of this work, we can say that the response of the aborigines to such tests as the Porteus Maze was not so markedly inferior. Even the most untutored and savage of our subjects took great interest in the test and in some cases made very good records. This was particularly noticeable in the case of several Luritcha, a group of tribes which inhabit the vast desert area of west central Australia, an area which has been crossed several times but never adequately explored by white men. This part of Australia is generally regarded as the most inhospitable region of the continent and its people as the lowest and most degraded of the Australian tribes. The fact that these Luritcha, who knew no more than a word or two of English, could make an excellent record in the Maze showed, in the first place, the applicability of the test and, in the second place, that there is considerable overlapping in the traits examined by the test, since many whites do not make as good a score as several of these individuals succeeded in doing. The capacities necessary to success in the test appear to be predominantly foresight, prudence in planning, and visual alertness. That the feebleminded make such inferior responses in the Maze Test indicates also essential differences between racial backwardness and deficient mentality.

Contrary to all expectations, particularly the assumption of cultural anthropologists, the central Australians, the vicesititudes of whose life in the more arid regions are so much increased, decidedly excelled the natives of the more fertile, well watered, northwest area. The natives of the latter district scored only 1½ years, while the Arunta, in the center, scored a little over 12 years in mental age, an advantage of one and a half years. Hence the sharpening of the struggle for existence does not apparently have the effect necessarily of lowering the mental status of a people. Thus the explanation for any intellectual backwardness of this race as a whole cannot be laid entirely at the door of environmental stress. This is in direct opposition to the idea that, given leisure, refinement in culture and progressive adaptability will necessarily follow in a race. Nature is at least as important or even more important than nurture.

It was a noteworthy fact that in almost every test used the central natives excelled the northwestern group. The Form and Assembling Test (Porteus), though unsatisfactory for general ethnological use, being scored on speed of reaction, brought to light a superiority in ability in one of the aboriginal groups, a year of mental age score separating the central from the northwestern natives. Here again visual mental alertness is apparently better developed in the desert dwellers. The low average score, (8.67 years for the northwestern, 9.64 for the central natives) may be in large part attributed to the
fact that the aborigine, in attacking any of his own problems, never
hurries and cannot entertain the idea of working against time. To
him accuracy is much more important and, hence, his comparative
failure in speed tests is easily understandable.

To Form Board tests, such as the Goddard, the same objection
applies. The scores of the Australian were low in comparison with
white norms, yet they exceeded the performance of most of the
groups of primitive peoples examined by Woodworth in 1905. Again,
the central, or Arunta, group, excelled by almost a year of mental
age the northeastern native.

However, it was in auditory rote memory that the greatest defi-
ciency of the natives was brought to light. The memory span of the
aborigines for numbers was less than that of a six year old white
child. When syllables, as found in aboriginal place names, were
used as a memory test, the span of rote memory was no better. These
results could only be matched by the performance of mentally def-
cicient children of our own race. The central group again exceeded
the northeastern by a half year of mental age score. This deficiency
of rote memory indicates an inability on the part of the aborigine to
assimilate more than the rudiments of white education.

Mr. Russell Leiter, Research Assistant in our program of racial
studies in Hawaii, has collected data on rote memory for Caucasian,
Chinese, and Japanese children.26

Taking only one of his age groups as a sample, we find that 12
year old white boys have a memory span of 6.7, Chinese of 6.4, and
Japanese of 5.55 digits. These records may be compared with the
Australian span of about 2.8 digits. Aboriginal adults have only half
the rote memory mental age span of whites at nine years of age. In
auditory memory, then, we are forced to conclude that the Australians
are markedly deficient and that their mental evolution has taken a
different course from ours.

This is indicated more fully when the differences in rote memory
are examined. Relatively to white standards, the aborigines have
very much better visual memory than auditory. They remember
things they see relatively much better than things they hear. Their
mental age score was from two to two and a half years better in a
test in which visual memory played a predominant part in success.
Since both the visual and the auditory rote memory tests were stan-
ardized by age, a similar score could be expected in each test. If a
racial group has an advantage in an adequately standardized test,
the only conclusion possible is that they have a relative superiority
in this test.

A parallel investigation of visual memory in racial groups was
also carried out by Mr. Russell Leiter in Hawaii.27 The Japanese in

26Leiter, R. G., Auditory Rote Memory of Racial Groups in Hawaii. An un-
published study.

this test excelled both the white and Chinese groups, reversing the
situation that was found in auditory memory tests. Notwithstanding
all that has been said to the effect that there are no qualitative men-
tal differences, the variation in memory development in different races
to the degree indicated by these results is surely not adequately
stated by saying that differences are only quantitative. The state-
ment that there are no qualitative racial differences is one that is
frequently repeated but apparently with little understanding of its
meaning. The writer is frank in confessing that to him it conveys
very little significance, if it means that the mental traits of all
races can be subsumed under the same categories, such as memory,
observation, attention, and the like, then the statement is self-evident.
If it involves a denial that the manner of mental functioning can
vary in racial groups, that would be going far beyond the available
evidence on the subject. It is true that all individuals of whatever
race memorize, but if it can be shown that relative inferiority in one
kind of memory is accompanied by relative superiority in another
kind of memory in a particular racial group, then it seems reasonable
to say that the quality of memory differs in the two races. This
seems to be the actual situation.

We have previously noted the marked inferiority of the Aus-
tralians in auditory rote memory in comparison with the races rep-
resented in Hawaii. In visual memory, however, the Australians
are by no means as markedly deficient. While their auditory memory
record was only at about a 5.8 year mental level, in visual memory
they averaged over 8 years. According to Mr. Leiter's results,
there is not a marked increase in performance in this test from 9
years onward.

The Thurstone Hand Test with the Australian aborigines was also
used but with rather unsatisfactory results, due to the fact it did
not hold the attention of any subjects sufficiently well and towards
the end of the examination a random response was shown. Unfortu-
nately, little comparative data from other sources on this test were
available. The central group again excelled the northeastern natives
in average score. Another test was one of visual estimation of the
number of dots in an inch square, when these increased by fives from
5 to 85. It is really a judgment of mass, as it is impossible to count
the dots. Some excellent records were made by aborigines, showing
that judgment of this kind may be well developed in people with
much idea of numbers. Most Australian languages have no terms
for numerals beyond five or six.

In Hawaii, according to tests given by Dr. C. M. Louttit, a group
of Chinese students made on the average of 5.9 errors and part
Hawaiians 4.9 errors.28 This may be compared with the central
Australian average of 13 errors and the northeastern of 14.4 errors.

28Louttit, C. M., Student's Performance in Dot Estimation Test. An unpublished
study.
Under my direction, Miss Alice Webb examined 699 children of different races in Hawaii by this test and found a steady decrease in errors from 15.65 at 9 years to 8.91 at 14 years. The Australian performance was, according to these results, at about a 10 year white level. The fact that university students, according to Dr. Loutit's results, had so much better records than the 14 year old children would show either that the test is correlated with intelligence or else that ability increases quite significantly beyond the level of 14.

In my testing program, I determined to include at least one special test in which, because of its nature, the aborigines would have an equal chance with whites. In other words, I determined to select a test from the aboriginal cultural environment instead of the white. Within the range of mental testing should be some problem discoverable in which the aborigine would be on equal or even better terms with the white. Bearing in mind the well known skill of the natives in tracking, I took photographs of eight individual aboriginal footprints in sand and made a test by printing a series of photographic prints of the footmarks, the problem being to match the duplicate prints with the original photographs. Mr. Ralph Piddington, Research Fellow in the psychology division at the University of Hawaii, who was sent over by the Australian National Research Council for training in the field of mental testing, applied this test to 128 school students, all white, who were in attendance at high school in Hawaii. He found their average number of correct responses in matching 20 pictures of the footprints to be 15.57 as against the aboriginal record of 15.47. Here was at least one test in which the native equaled the performance of educated whites. They might, perhaps, have been expected to excel the whites' performance, but it must be remembered that they were quite unfamiliar with photographs and the photographs may be much more difficult to match than the actual footprints.

The Goodenough Drawing Test was also applied to three groups of aboriginal children in widely separated localities in Australia. Here again the central natives demonstrated their superiority over the children of the more northern tribes and also over the children in the well settled southwest, where contacts with civilization were much more numerous. The full bloods in one group excelled the half-castes, indicating the fairness of the test for all classes of subjects. This test proved to be one of the most interesting of the whole series. The child is asked to draw a man, without any further suggestion or instruction from the examiner. Marks are then allotted for the details included in the drawing, proportion of limbs, articles of clothing, etc. Notwithstanding the fact that some of the children examined had never seen a white man until three months prior to the examination, the results were surprisingly good, indicating the comparative freedom of the test from cultural influences.

In addition to these mental measurements, tests of grip, vital capacity, back strength, back and leg strength, and arm shoulder strength were given. The results of these, while interesting, can hardly be summarized here. It will suffice to say that in leg strength the aborigines were considerably better than whites but were particularly low in arm shoulder strength. Apparently racial habitus has had marked effect in developing muscular efficiency of different kinds in different races. Noteworthy also was the fact that the index of sitting height is lower for the Australians than for any other race for which I have records. Either the cumulative effects of natural selection or acquired characteristics have played a part in making the Australians particularly long-legged in proportion to their body length.

With regard to the psycho-physical measurements, interesting comparisons were made with the group of Ilocanos previously measured by Mr. R. G. Bernreuter. Though greatly inferior to the Australian aborigine in point of general physique, the Ilocanos had relatively much better back strength and strength of grip than the aborigine, again showing the cumulative effect of environmental habitus, since the Ilocanos are an agricultural people while the Australians are entirely a race of hunters and gatherers. Details of these comparisons cannot be presented here but are to be found in the book, The Psychology of a Primitive People, by the writer.

Space will not permit of an account of brain capacity and other measurements taken of the aborigines, and for information regarding these recourse must be had to the volume just mentioned. We may, however, note the interesting fact that in brain volume the Australian aborigines were markedly low, somewhat higher than the Veddas of Ceylon, but in comparison with the Caucasians about the level of 13 year old boys. The averages obtained in this study approached very closely those recorded by the writer and Dr. R. J. A. Berry in a monograph on brain capacity and its relation to intelligence.

The number of aboriginal subjects included in my Australian study ranged around 100 for most of the tests and measurements. This may seem a small number, but to get into contact with 100 Australian aborigines necessitated on my part more than 16,000 miles of travel in Australia, to say nothing of an additional 9,000 miles to and from Honolulu. Train, coastal steamer, motor truck, lugger, and camel at one time or another comprised the means of transportation, and in some parts of the country travel was by no means easy. This may explain in large part the dearth of subjects and the limited range of the testing program.

The 30 studies summarized above complete the full list of work.

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accomplished in the Department of Psychology and Physical Anthropology, carried out during the five year period for which money was provided by the Rockefeller Foundation Fund for the University of Hawaii. The studies are, in many cases, necessarily inconclusive, since the problems involved are too far reaching to be dealt with finally in a five, or even a 10 year program. At the same time appreciable progress has been achieved and already the amount of information on the problems of racial differences has been measurably increased.

In addition to a large number of minor studies, there are two major projects as yet uncompleted. In the field of physical anthropology, Mr. Lessa, under the direction of Dr. H. L. Shapiro, is carrying out a territory-wide survey, particularly of the part Hawaiian mixtures, using a comprehensive series of physical measurements and anthropological observations. Some thousands of cases have already been recorded and the work is still in progress. In cooperation with the Division of Psychology, Seashore tests of musical ability are also being applied to these cases. There are still several years of work in prospect before this anthropological survey will approach completion.

Mr. Russell Leiter is engaged in the other major project, that of developing a series of performance tests which shall be entirely independent of written or spoken instructions. The object is to evolve a series of tests which will be self-explanatory. Forty tests of this nature have been assembled and are being tried out for inclusion in a scale. Some entirely new principles in test procedure are involved and when the work is completed a new instrument of anthropological research will be available. Owing to its independence of the language factor, it should be possible to apply this series of tests to a number of racial groups. Results on a large number of Chinese children have already been collected, and if our program continues over another period similar results will be obtained for Japanese, part Hawaiians, and whites. In this way a double object will be achieved. The scale itself will be developed, and, at the same time, comparisons of inter-racial status will be made by its means.

In addition to these larger studies, further work is contemplated with the Dot Estimation Test, the Footprint Matching Test, and the memory tests. In connection with the last named, a comprehensive plan of examining memory abilities of the various races is projected. The writer is at work on a test which will, it is hoped, form a valuable addition to the list of character tests. It is intended to gather comparative data on the races in Hawaii with this test when completed.

In the collection of the psychological and psycho-physical data of these studies, the total number of cases individually examined reached the respectable total of 15,206. The number given does not include any group mental tests and is also exclusive of an additional 3,000,