

## THE PSYCHOLOGICAL ASPECTS OF AGEING AND SENILITY.\*

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PERHAPS the earliest adumbration of modern interest in problems of old age was Quetelet's important two-volume work on *Man and the Development of his Faculties* in 1835 (55). In this book appeared for the first time data of a kind since become very familiar: ages when various crimes are committed, when literary masterpieces are written, ages of admission to hospitals for the insane, and so on.

A decade later, in 1846, a physician by the name of Caldwell (10) wrote a book on the effects of age on human constitution. He contrasted mind and body, saying of the former: "There is reason to believe . . . that, in the same individual, the mind or spirit of the infant, the mature adult, and the centenarian is identical. No doctrine other than this is compatible with the creed of mental immortality." As Bird, who quotes this passage in his excellent chapter on the "Social Significance of Age," remarks, "We recognize in this exposition the influence of wishful thinking. A desire for mental immortality seems to have handicapped a recognition of mental life as the functioning of physical structures" (3).

Little was added to our knowledge during the next 90 years, but in the last dozen years or so interest in the psychological problems of age has revived and some 250 research papers and articles of varying quality have now appeared. In addition several symposia (35, 37, 42) have been held, and the publication of Cowdry's (12) volume on *The Problems of Ageing*, as well as of the books by Bühler (8), Lawton (36) and Pressey (54), indicate the general interest in the subject. These studies have been reviewed by several writers (7, 29, 33, 41, 45, 57, 58, 75), and no attempt will be made in this short paper to duplicate their efforts.

I shall attempt here merely to set out the conclusions most securely established, and to point out some of the methodological difficulties which make generalizations in this field particularly hazardous.

The first part of the paper will deal with the differential decline of intellectual ability in old age, and the methods suggested for studying and measuring deterioration. The second part will deal with changes in the orectic field, that is with respect to instincts, emotions and derivatives of these, such as interests, hobbies, adjustment, aspirations and so forth. In conclusion, some principles underlying the studies hitherto conducted in this field will be critically considered.

There is by now little doubt that the average performance on general tests of intelligence of old people is considerably lower than that found for younger adults.

Apart from a few isolated earlier small-scale inquiries, the results of the extended testing of American Army Officers (76, 77) in the last war provided

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the first quantitative estimate of this loss, a 30 per cent. decline in scores being observed from the early 20's to the late 50's. In general, the peak performance on the Army Alpha Test (30) was reached at about 18 years, followed by a slight deterioration until about the 40-year-old period, after which deterioration became more rapid. This conclusion has been reduplicated by other investigators with surprising regularity. In the Stanford Later Maturity Studies, summarized in Cowdry (12), in which the Otis Test rather than the Army Alpha was used, ability was found to be maximal at 18, remain fairly level to 45, declining most rapidly after 70. The loss over the whole range averaged about six or seven months per decade. The correlation between age and intelligence for about 2,000 adults, aged 20 to 95, was found to be approximately  $-0.5$ . This rate of loss based on comparisons of different age-groups was confirmed by retesting a small sample after two years' interval, when the decline theoretically expected was found to have taken place (43, 44).

The first test of adult intelligence to take into account this decline of mental ability was Wechsler's Bellevue Scale (74). He found that ability declined at the rate of about one year of mental age per decade, and standardized his test on that basis. At the age of 60 scores are only 85 per cent. of what they are at 30.

The decline of mental ability found in these and other tests is a differential decline in two senses of the word. In the first place different abilities decline at different rates, and in the second place, the same abilities decline at different rates in different persons. To take the latter point first, Gilbert (22) has shown that decline, both on the total battery of tests and on nearly all the 33 separate tests she used, was less at the upper levels of intelligence than at the lower and average levels. Thus, it would appear that rate of decline of intelligence is correlated with actual amount of intelligence originally present; or, in other words, the greater an individual's intellectual endowment, the less he deteriorates, or the longer he retains his full mental ability. This conclusion is a fitting counterpart to the fact that intelligence continues to increase for a longer time in the bright than in the dull child, the dull reaching his maximum early, the bright reaching it relatively late.

As regards the fact that different abilities decline at different rates, it has been found by many investigators that in marked contrast to most other types of intelligence tests, scores on vocabulary tests show little decline with increasing age, and may, in fact, increase up to the age of 50 or 60, to remain relatively stationary thereafter. Correlations between the Army Alpha or the Otis type of intelligence test and age are universally negative, whereas small positive correlations are often found between vocabulary and age. Vernon (70) has shown that after the age of 12 mental age on the Binet Test falls progressively behind vocabulary age. This tendency towards divergence after the age of 12 is reached indicates that while total test ability slows down and presently comes to a standstill, vocabulary ability goes on growing long beyond the age of 12. Vocabulary is not the only test to be relatively unaffected by old age. Other tests depending largely on retention and learning, such as general information tests, for instance, spelling tests, etc., also fail to show any decline. In opposition, we find the most rapid decline with age in those tests which are

comparatively pure measures of Spearman's "g," that is, the ability to deduce relations and correlates.

Two points of interest arise in connection with the intelligence test findings : (1) Are there qualitative changes—that is, is the performance of old subjects, in addition to being lower in quantity, different in character to that of younger subjects? Piaget suggested that a difference of a qualitative kind occurred at about the age of 8 in children, and it seems reasonable to investigate whether a similar change occurs in old age. (2) Does the organization of mental capacities change with advancing age? We have seen that changes take place in the organization of mental capacity as the child grows into adulthood. It seems possible that similar changes take place as adulthood changes into senility.

On both points some evidence is available from my own studies on the mental reactions of senile dementia cases. These present, as is well known, an exaggerated picture of the usual psychological developments due to old age, although it must not be assumed necessarily that they do not also show certain reactions peculiar to their particular disorder.

With respect to the possibility that there are qualitative changes in intelligence in the older subjects as compared with the younger ones, it was found that with regard to the type of error made, the reasons for these errors and the order of difficulty of the problems, the senile dementia patients agreed so closely with normals that the conclusion would appear to be justified that qualitatively identical ability was being tested throughout (19).

With respect to the organization of mental capacity, 20 psychological tests were given individually to these senile dementia patients and repeated after four months. Test-retest reliabilities were established, intercorrelations run between the tests, and a factorial analysis carried out on the resulting matrix. The factorial analysis showed the existence of a general factor and three group factors, concerned respectively with speed tests, memory tests, and tests of physical strength and agility. The general factor presented a picture of mental organization of the patients differing greatly from that found in normal adults. The detailed findings could best be interpreted in terms of the theory of fluid and crystallized ability, which will be discussed presently. Altogether, the results left little doubt that mental organization is profoundly changed by advancing age (20).

The desire of older adults to learn and their ability to do so are points of interest in a consideration of the psychological implications of mental deterioration in old age. It was reported in 1926 (31) that in the United States there were at least five times as many adults engaged in formal educational study as there were candidates for degrees in all the colleges and universities in the country. Any tutor of adult classes will at once comment that such classes include a larger number of young adults than old. One reason for this is very simple : There are more young adults in the population. Bird (3) gives a table indicating that for the students enrolled in Adult Education Classes in Minneapolis, their ages approximate very closely to the proportion of the same ages in the population as a whole—surely a surprising and interesting fact, showing that the older person retains a *desire* to learn.

Starting from the fundamental fact of adult willingness to learn, Thorndike

and his co-workers (68, 69) have made extensive investigations into adult ability to learn. To summarize their findings: "Ability of adults to learn within the age range of 20 to 45 years shows a slow but steady decline. The decrement at the close of this period is approximately 15 per cent." Thorndike also found that older people, average age 47, did not learn as well when the materials seemed useless or devoid of intrinsic interest.

Superiority in learning abilities lies with young adults as a group; but, as in all such comparisons, the importance of individual differences must be borne in mind; adults around 50 years of age may frequently succeed better than the average young adult, and even adults 60 to 70 years of age may be expected to learn as well as the average 12 or 13-year-old child.

Another important finding is that by Sorenson (60), who gives experimental support to Thorndike's contention "that learning itself may prevent decreased learning ability," for he found adults who had continued their studies able to learn well, up to the age of 50, although often the older adults had compensated for a decrement in learning ability by spending more time in study.

Bird (3) supplies an excellent conclusion on the subject of the learning capacity of older adults: "Older people develop false notions about age. They confuse inability to achieve at the pinnacle of success with an assumed inability to perform satisfactorily at a level perhaps only slightly lower. Thus feelings of inadequacy arise, to be followed by the more outright feelings of inferiority. Too frequently there follow open expression of condolence and the consequent fixing of the false notion that adults cannot learn very much."

After this brief consideration of higher mental abilities we may next turn to what are called "motor abilities." Possibly the most frequent test of these is reaction time, which can be given under varying conditions of complexity. Simple reaction time studies reveal slower responses, beginning at about the age of 20 and continuing to lengthen through the life span. In these tests, too, as in those of mental ability, although an individual has slowed down, he may excel at the relatively advanced age of 70 the average of the population. Miles found approximately 25 per cent. of people of 70 years to be as quick in reaction time as the average of his total group. Among Miles' numerous experiments on reaction speed was one which showed maximum performance for the age-group 18 to 29; decline in reaction speed was relatively small in middle maturity, but for the age-group 70 to 89 it had fallen nearly 30 per cent. (46). "Generally the loss seems greatest when movement is reduced to its purest form, and least when perception and comprehension must precede the moment of making the reaction" (3).

Other types of tests have validated the general belief that young people as a group show greater strength, swiftness, precision of movement and steadiness of motor control than is generally characteristic of old people. Curves showing the development and decline of these abilities indicate fairly rapid improvement up to the age of 20, then a slow decline to the age of 50, after which age the decline becomes much more marked. In fact these curves duplicate almost exactly the growth and decline of general intelligence, showing a correlation of  $-0.5$  between age and psycho-motor activity (46).

It might be assumed that lengthening of reaction times and slowing down

of psycho-motor responses would be likely to increase the accident rate of older workers ; however, it has been shown that disabling injuries were only about two-thirds as high for workers at 50 as they were for workers under 30. Even for workers over 60 the rate was still lower than for workers under 20 (32). These observations indicate the difficulty inherent in much theorizing on the basis of results on rather simple tests of ability ; before deductions can be made from such tests to real life situations the relative influence of test-ability on the one hand and social learning and experience on the other must be known.

Perceptive ability has been studied extensively, particularly with relation to the diminution of acuity in old age. Sensations of pain (13), so-called vibratory sensibility (51), taste sensations (1), as well as the higher senses, that is, hearing (23) and vision (21), all show decreases with age similar to those observed in the psycho-motor field. In addition to experiments on simple sensations and perceptions, it has also been shown that perception is not as prompt in the old as in the young and that its span is shorter (46). Again, it must be emphasized that in actual life-situations, for example, in industry, such defects of old age are often compensated by experience and persistence.

In the correlational study, mentioned earlier, on the results of the tests given to senile patients, the motor tests correlated far more highly with intellectual performance than they do in children and younger adults, indicating the presence of a factor of general deterioration.

The fact that various mental, motor and perceptual abilities deteriorate at different rates has been used in attempts to measure the amount of intellectual deterioration, on the principle that the abilities least deteriorated, such as, for instance, old skills either with words or handling of materials, will give some idea of a person's original standard, whereas a mental test involving novel material will give a measure of his present ability. The difference, therefore, between the score on the old materials and the score on the new will roughly indicate a person's deterioration. In the main the tests used have been vocabulary for the old skills and speeded tests of mental ability for the new (2, 22).

Several criticisms must be made :

(1) Vocabulary tests standardized in terms of our present-day average knowledge of certain words almost certainly fail to do justice to the word knowledge of people whose vocabulary was laid down at least a generation ago.

(2) It is generally accepted that one's vocabulary is an index of education rather than of original mental endowment, and, therefore, a precarious touchstone to apply.

(3) Speeded tests may not give an accurate idea of the old person's intellectual power. Gilbert (22) recognized the fairness of this criticism of the use of the Babcock Scale, and rescored some of the tests, omitting the timing factor ; she did, indeed, still find that the older subjects did worse than the younger, but their performance was considerably better in comparison when speed was disregarded. It seems somewhat more practical to give unspeeded tests to the older subject, as in most tasks confronting him in his profession and in ordinary life speed is not of such paramount importance, particularly



as in his work he will be dealing with familiar material. While it has been shown in children, adolescents and younger adults that there is no separate speed factor in intelligence, my own Factor Analysis shows that one cannot extrapolate from such studies that no such speed factor is active at other ages, and unless that point is experimentally settled one can ascribe little scientific validity to these deterioration scores.

Lorge goes so far in his criticism of the use of speeded tests on older adults as to say, "Contaminating power with speed measurements among older adults obscures the true relationship of intellectual power to age. Reported facts of mental decline as a concomitant of age are, at the least, exaggerated" (40).

The view that speed and ability are relatively separate concepts, at least in more mature subjects, has given rise to the practice of abolishing time limits for intelligence tests given to adult subjects, as is done for instance by Thorndike in his C.A.V.D. Test and by Raven in the original form of the Matrix Test. The emergence of this speed factor in older subjects has been used by Cattell (11) in conjunction with two other experimental findings as the basis of his theory of fluid and crystallized ability.

These two other facts are, first, Spearman's principle of diminishing returns (61), that is, the general finding that the saturation of almost any performance with the general factor of intelligence becomes less as higher levels of general ability are reached. Sub-tests of a type which correlate from 0.6 to 0.8 among children correlate to the extent of only 0.3 to 0.4 among adults. The second series of facts derives from data on mental capacities and brain injury, and has been summarized by Hebb (28), to the effect that a localized brain lesion produces in children a generalized impairment more noticeable than any specific functional loss, whereas in adults a corresponding injury produces more specific loss of powers and less obvious loss of "g."

Taking together these data, that is, the emergency of a speed factor in adult life, the diminished "g" saturation of adult intellectual performances, and the differential effect of brain lesions in children and adults, we arrive at Cattell's hypothesis which he has set out in the following manner :

"Adult mental capacity is of two kinds, the chief characteristics of which may be best connoted by the use of the terms 'fluid' and 'crystallized.'

"Fluid ability has the character of a purely general ability to discriminate and perceive relations between any fundam, new or old. It increases until adolescence and then slowly declines. It is associated with the action of the whole cortex. It is responsible for the intercorrelations, or general factor, found among children's tests and among the speeded or adaptation-requiring tests of adults.

"Crystallized ability consists of discriminatory habits long established in a particular field, originally through the operation of fluid ability, but no longer requiring insightful perception for their successful operation.

"Intelligence tests test at all ages the combined resultants of fluid and crystallized ability, but in childhood the first is predominant, whereas in adult life, owing to the recession of fluid ability, the peaks of performance are determined more by the crystallized abilities" (11).

I believe that this hypothesis has considerable heuristic value, and that it accounts adequately for the great majority of experimental results in this field.\*

As the cognitive aspects of ageing can best be understood with reference to Cattell's scheme of fluid and crystallized ability, so orectic changes can best be summarized by reference to Bühler's (9) concept of life pattern. Through an analysis of 300 biographies of people of various ages and professions, she reached the conclusion that the life pattern of her subjects showed a period of expansion, of stability and of restriction which paralleled the biological curve of growth and decay, though lagging somewhat behind. She noted five main phases in this life pattern: the first in early life showed non-specific activities, that is activities which have a preparatory or provisional character predominating; the second phase is one of "specification and definiteness in work when abilities are applied to real tasks"; the third phase is one of testing results and accomplishments, followed by the fourth phase, wherein striving for the desired success dominates the life pattern; and the fifth phase is one of looking back on life. It may be doubted whether this list represents any great improvement on Shakespeare's Seven Ages of Man; however, what is important is Bühler's recognition on the basis of empirical evidence of a certain consistency of life patterns, enabling us to test her conclusions by suitable experiments.

Direct studies of instinctual changes with age are comparatively rare, those of the sex drive being the only ones available (14, 15, 26, 50, 67). These bear out the popular impression of a gradual decrease in sexual activity from the late teens and early 20's to middle age and beyond. However, indirect studies of other drives, as mirrored in the aspirations and activities of people, are more plentiful. Studies of personal problems and wishes show an increased concern with spiritual and philosophical values in the aged, concomitant with the waning of sexual and social interests (64, 66, 66).

Studies of vocational accomplishments (made most frequently in connection with the lives of famous scientists, musicians, soldiers, statesmen, writers and so forth) suggest that the drive for vocational accomplishment is strong in the 30's and 40's, when quantity as well as quality of work is most outstanding. Several investigators have found the average age of maximum achievement, that is production of masterpieces, to be close to 40, while others place it nearer to 30 years (16, 39, 56).

These results are paralleled in studies of more humble folk, in whom the desire for vocational advancement gives way to desire for security as age increases, and generally in later maturity concern over job and materialistic matters seems to lessen and interest shifts to matters of philosophy, religion and culture (4, 59, 62). Many detailed studies of such shifts in interest have been carried out, showing frequently an almost circular change in interests. Thus Strong summarizes his large-scale studies in vocational interests by pointing out that "interests change rapidly from those held at 15 years to

\* A similar distinction has been suggested by Brody, who contrasted ability to acquire knowledge in early life with "the products of ability which are the keys to success in later life." (7)

those held at about 25, and then shift in the reverse direction much more slowly from about 25 years to about 55 years" (63). However, similarity of interests among adult age-groups is much more marked than one might have expected; age differences are much less pronounced than occupational or sex differences, correlations between 20 and 60-year-olds running around + 0.8 or higher (63, 72).

One general conclusion, however, can be drawn, namely, that increased age brings with it a general withdrawal from most types of activity (6). This has been shown in several studies by means of questionnaires, personal interviews, time budgets and similar methods. In a representative study made in the United States for the National Recreation Association (78), those between 46 and 60 years of age checked about 42 per cent. fewer activities than those from 21 to 26; with the exception of musical and educational activities, all types of activity decreased in frequency of participation. Age trends in reading activity are not striking; it seems probable that reading, especially non-fiction reading, is liked slightly more by older people (25). On the other hand older groups tend to visit the cinema less frequently (73), and Lazarsfeld (38) has shown that on the whole people under 40 listen to the radio more than those over 40.

With respect to political and moral attitudes and opinions, age appears to be less influential than has hitherto been assumed (24, 27, 49). Although on the usual type of questionnaire older people are usually found to be more conservative than younger ones, showing more disapproval of communism, birth control, free love, extra-marital sex relations, and other modern tendencies, it should be remembered that a direct comparison of a group of young people with a group of old people may easily mislead the incautious investigator to ascribing to the age factor results properly due to changes in social environment (17, 18, 48). This difficulty will be discussed in greater detail later.

Closely connected with studies, direct or indirect, of instincts and emotions is work on adjustment and neuroticism (5, 52, 53, 71). Much of this has been carried out by the use of questionnaires, and the conclusions drawn must be viewed rather critically. Results seem to indicate early maturity and old age as the periods of greatest stress. This conclusion is borne out by an analysis of the years designated in retrospect as the happiest by a number of people, 50 per cent. approximately giving the age from 25 to 45 years as the happiest period (34, 47).

In conclusion we may discuss briefly certain principles underlying the investigations summarized earlier. Strictly speaking, to say that a certain change is due to age, or takes place with advancing age, would make it incumbent upon us to show, first, that the quality we are studying is present in the same individual at an early age and absent at a later age, or vice versa; and secondly, that this change cannot be accounted for by any other cause except advancing age. Not a single one of the 250 or so studies hitherto conducted fulfils these conditions. The procedure commonly adopted has been that of comparing a group of young people with a group of old people with respect to the incidence of the variables under consideration, assuming that such differences as were statistically significant between the two groups were due



to the difference in age, and arguing from that that similar changes could be observed in the ageing individual. The fallacy of thus confounding age differences with age changes hardly needs elaboration, and has indeed been remarked upon by several writers.

One particular aspect of the foregoing is the problem of education. When a comparison is attempted between two widely differing age-groups, it is next to impossible to equate their educational attainments; first, because teaching methods and matter taught have altered radically in the generation or so dividing the groups; and secondly, and even more important, is the fact that some form of higher education is being given to an ever-increasing proportion of the population, with the result that in a random sample of the two age-groups, University or Secondary School education would be possessed by far fewer of the old group than of the young.

A further difficulty which arises is the selective factor of survival. If we assume, as is indeed quite probable, that the more intelligent tend to live longer than the less intelligent, then a comparison from the point of view of intellectual ability between an old and a young group, even if carefully matched on the basis of social class, education and other factors, would still give a very misleading picture of the actual intellectual differences due to age. Intelligence, of course, is not the only selective factor in survival; the same problem becomes apparent in all other spheres. In our present state of ignorance of the exact correlation between these factors, and survival in our society, little more can be said here than to indicate the problem. Its solution must await considerable expansion of psychological research.

In brief, we may conclude that such studies as are available are merely exploratory; further advance will be possible only when large-scale longitudinal follow-up studies are conducted in a manner designed to reveal the intellectual, emotional, physiological, temperamental and attitudinal changes occurring during an individual's life, thus giving us a detailed picture of his life pattern.

In spite of these criticisms, it is probable that such extensive studies will confirm the main facts which emerge in the literature, namely, the differential decline at a positively accelerated rate of mental, perceptual and motor abilities, from a peak period in the early 20's, and a general withdrawal of libido from the outer world concomitant with this mental decline.

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