THE RELATION OF INTELLIGENCE AND PERSONALITY TO SPEECH DEFECTS

RAYMOND H. BARNARD
Fellow in Education, University of Wisconsin

INTRODUCTION

The incidence of speech defects among the population, especially the school population, is great enough to constitute a serious problem. Although early studies estimated that from 2 to 3 per cent of the pupils in school were speech defectives, later and more careful studies give from 5 to 8 per cent as a conservative estimate. Studies of the incidence of stuttering among school children give estimates varying from .7 per cent to .9 per cent. Seven surveys of the speech of school children reported by Wallin (31: 214) gave an average percentage of stutterers of .9. In 1904 Conradi (12: 365) reported an investigation of the incidence of speech defects among 87,440 school children in six American cities: Albany, New York; Cleveland, Ohio; Kansas City, Missouri; Louisville, Kentucky; Milwaukee, Wisconsin; and Springfield, Massachusetts. He found that .87 per cent of the children stuttered and that the total percentage of speech defectives was 2.46. In a study reported in 1916 Wallin (31: 214) used the questionnaire method in studying 89,057 children in the public schools of St. Louis and found that 2.8 per cent were speech defectives; .7 per cent of the children were stutterers, and 1.6 per cent were lispers (those with defects of articulation). Smiley Blanton made a study of school children in Madison, Wisconsin (8), and another of Freshmen at the University of Wisconsin (7). In the former study (8: 583), reported in 1916, he found that 5.69 per cent of 4,862 children were defective in speech. Seventy-two hundredths per cent were stutterers; 3.27 per cent were lispers; and 1.71 per cent suffered from miscellaneous defects. The percentage of children with speech defects is more than twice as large as the 2.46 per cent found

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1 The first number in parentheses refers to the numbered bibliography at the end of this article; the second number is the page reference.
by Conradi and the 2.8 per cent found by Wallin. The percentage of lispers found by Blanton is more than twice that found by Wallin. This discrepancy may perhaps be accounted for by Wallin's use of the questionnaire. Blanton feels that his estimate is conservative. In 1921 Blanton (7: 822) reported that he had examined 1,400 of the 2,240 Freshmen at the University of Wisconsin and estimated that 409 students in the whole class, or 18.3 per cent, were unable to meet the necessities of English speech. The majority of these students were stutterers and lispers.

Root (22: 257-58) summarizes several studies made in the United States. He found that the report of the State Department of Public Instruction of Wisconsin for 1922-24 gave the percentage of pupils with speech defects as 5 to 7. A later study (1923-24) in Madison, Wisconsin, showed that 5.4 per cent of 5,717 pupils were defective in speech. In 1925 in Kenosha, Wisconsin, 5 per cent of 6,051 pupils were said to be speech defectives. "On the basis of examinations given in a survey of about seventy schools in 1925, the supervisor of speech improvement of the public schools of Philadelphia stated that from 10 to 12 per cent of the school population suffered from defects of speech" (22: 258). In 1925 Reading, Pennsylvania, reported that 5.6 per cent of the 11,198 pupils in the grade schools were speech defectives.

In 1926 Root (23: 533) reported his own study of 14,072 pupils in the public elementary schools in South Dakota. He found that 6.3 per cent of the children were speech defectives. One and two-tenths per cent of the pupils were stutterers. In 1928 McDowell (19: 6) reported a study of 7,138 children in seven elementary schools in New York City and found that .87 per cent stuttered. Both Root and Blanton found the percentage of speech defectives to be greater in the first two or three grades than in the higher grades. In Grade I, Blanton (8: 586) found 11.05 per cent; in Grade VIII, 2.65 per cent. Root (23: 534) agrees closely, having found 9.3 per cent in Grade I and 4.0 per cent in Grade VIII.

What is the relation of intelligence and personality traits to speech defects? These two factors have often been regarded either as causing defective speech or as being symptomatic of it. What is the experimental evidence with regard to the two views?
Intelligence is measured by a host of mental tests with varying merits. "Intelligence" is generally assumed to mean the individual's skill in adapting himself to a new situation. Freeman gives the following definition of personality. "Personality is not a technical, psychological term, but it may serve for convenience to include a number of varieties of mental traits which are not intellectual and yet which depend, in some measure at least, upon the individual's native or inherited make-up" (16: 191). By "personality" is meant the whole organism acting as a unit, and a trait means the consistency of reaction to situations.

In assembling the data for this article, the writer has used Fletcher's classification of speech defects (15): (1) Aphemia—aphasia and anarthria—caused by abnormalities of the brain. (2) Paraphemia—defects of articulation or mispronunciation. There are two kinds of paraphemia: (a) organic, caused by nasal stenosis or by any injury to, or variation in the structure of, the tongue, the lip, the hard or soft palates, the nasal, pharyngeal, or buccal cavities, such as harelip, tongue-tie, and teeth out of line or missing; (b) developmental (functional), such as baby talk and difficulties caused by faulty hearing. (3) Dysphemia—stuttering.

Fletcher's statement of the differentiae of stuttering may serve as a definition:

In the first place, stuttering is not referable to any central or peripheral cause. . . . . In the second place, it is intermittent in its appearance. . . . . In the third place, the appearance of stuttering is closely associated with certain characteristic mental attitudes, the excitants of which are social situations in which the stutterer finds it necessary to respond in spoken language to other persons. This relation of the stutterer's inability to talk to the conditions of his social milieu is the outstanding characteristic of his disorder [15: 43].

EXPERIMENTAL DATA ON THE RELATION OF INTELLIGENCE TO SPEECH DEFECTS

Stinchfield (29) mentions several investigations of the relation of intelligence to speech defects. Two of these studies deal with speech in mentally deficient children. H. Ashby found that slurring, lalling, and lisping in a child five or six years old are frequently associated with defective or subnormal mentality (29: 68). Dr. Lapage states that feeble-minded children have consonantal defects (29: 68-70). The Belchertown State School for the Feeble-minded, Belchertown,
Massachusetts, reported in June, 1927, that ten out of eleven children of the upper mental level who had poor speech could profit by instruction (29: 69). Stinchfield (29: 39–41) gave speech tests to the Freshmen at Mt. Holyoke College and found as many girls of good intelligence in the groups needing corrective speech instruction as in the superior-speech groups. Stinchfield makes this impressive statement: "Every stutterer found at Mt. Holyoke during a period of six years has been well above average in intelligence" (29: 47). Stinchfield (29: 40) says that stuttering is not related to intelligence but is caused by emotional instability, faulty home training, organic or functional disturbances, personal peculiarities, over-stimulation, or imitation. Stinchfield (29: 41) states that the median score on the college-entrance examinations for the group of students in need of corrective speech instruction was 71.8 as compared with 77.3 for the group with superior speech. The former group of students made a median of 543 points on the scholastic-aptitude tests as compared with 544 points for the latter group. It will be noticed that there is no significant difference between the two groups.

Fletcher (15) mentions several investigations among mentally defective children. "Wallin found that in St. Louis more than one-fourth of the pupils in the special schools [for mentally defective children] were reported as having some form of speech defect. The speech defects of all kinds in these special schools were more than ten times as prevalent as they were among the normal children in the white elementary schools. The ratio of severe to mild disorders of speech is greater among the special classes than among the normals" (15: 76). Fletcher (15: 77) cites a study made by Cassel in Berlin, in which it was reported that 33.5 per cent of defective children spoke imperfectly. Dr. Eichholz, a London school inspector, found speech defects in 75 per cent of the defective children (15: 77). However, Fletcher does not believe that stuttering is a pathognomonic symptom of mental defect but that many stutterers are mentally alert. He refers to the study of British genius made by Have-lock Ellis in which it was found that thirteen eminent persons stammered.

In a study of stuttering children in New York City, McDowell (19: 6–12) used four tests: Stanford revision of the Binet intelligence test; the Pintner-Patterson Shorter Performance Scale; and
two Binet tests dealing largely with language abilities selected for special comparison, namely, the free-association test at the ten-year level and the vocabulary test.

McDowell tested sixty-one stutterers by means of the Stanford revision of the Binet intelligence test and found scores ranging from 63 to 156. The mean score was 99.14 with a standard deviation of 20.3. The group was typical as judged by the norms. McDowell does not consider this study comparable to other studies because the latter did not limit the diagnosis and because 7,138 school children (the number in McDowell's study) is not a large enough number to give a representative sampling. From children varying widely as to race and occupation of the parents, two groups were equated to eliminate racial and language backgrounds. When she had equated the groups, McDowell used fifty of the original sixty-one stutterers for an experimental group and the same number for a control group. The experimental group had a mean intelligence quotient of 101 with a standard deviation of 19.87; the control group, a mean intelligence quotient of 102 with a standard deviation of 20.26. There is no significant difference here.

On the Pintner-Patterson Shorter Performance Scale the stutterers had a mean intelligence quotient of 104.2 with a standard deviation of 26.73; the control group, a mean intelligence quotient of 99.8 with a standard deviation of 23.0. There is a difference of 4.4 in favor of the experimental group, but the experimental coefficient is low (.317).

The free-association test at the ten-year level requires the subject to name as many words as he can think of in three minutes. In spite of blocking, the stutterers had a mean score of 69.1665 as compared with the mean score of 69.7220 for the control group. The standard deviation for the stutterers was 26.77; for the control group, 20.56. The experimental coefficient is low (.04).

On the vocabulary test, the stutterers had a mean score of 31.2448 with a standard deviation of 12.08; the control group had a mean score of 30.551 with a standard deviation of 13.43. The experimental coefficient is again low (.097).

The McDowell study, therefore, did not discover any significant differences in the mean intelligence quotients of stutterers and nor-
mal children. This fact means that the distribution of intelligence is the same in both cases.

May Kirk Scripture and Winifred Boyd Kittredge proposed three questions in their study: "What is the mental level of the stutterer? What is the nature of his mental development, i.e., do his responses show an even or scattered development? And finally, has he a special word disability?" (28: 166)

They found a median intelligence quotient of 92, with a range from 56 to 130, for a group of sixty-two stutterers in the speech department of the Vanderbilt Clinic during 1921. The median age was twelve years and eight months. The subjects were distributed into eight groups on the basis of their intelligence quotients. The largest number of individuals in any one group appeared in the group with intelligence quotients from 85 to 95, which comprised thirteen individuals. Of the entire group, eight were feeble-minded, eight borderline cases, eight very low normal, thirteen low normal, eight normal, six above normal, six superior, and five very superior. Scripture and Kittredge make the comment in this study that the cases were few and selected because "individuals who seek help from charitable institutions tend to have low normal median intelligence quotients. Terman through objective measurements on different social classes proved this (Measurement of Intelligence, page 72)" (28: 167).

With regard to scattered mental development, Scripture and Kittredge state "an uneven development (i.e., markedly above one's norm in certain measurements and markedly below in others) is symptomatic" (28: 168). For example, an eight-year-old child who has the height of a twelve-year-old child is uneven in development. In the mental sphere, they cite a case of a fourteen-year-old boy who was in the fifth grade. "He failed on some of the tests at the third-year level and had scattering successes up to the fourteenth year" (28: 168). This was regarded as being symptomatic, and it was found that he had juvenile paresis. If there is no organic basis (as in this case), the uneven development is functional and requires educational therapy. "An individual with an uneven mental development, and consequently a poorly integrated nervous mechanism, is liable to emotional 'upsets'; he is unstable, and his responses to the
situations of the environment are liable to be of a bizarre nature. . . . Such an individual often develops character defects of an anti-social nature” (28: 168). In their investigation with regard to uneven development, Scripture and Kittredge found first the difference between the basal age and the upper limit for each stutterer. “The basal age is that point at which the subject passes all the tests, and the upper limit is the point where he fails in all of the tests. . . . Although an uneven intellectual development of three or four years above the basal age is a natural condition, a matter of five, six, seven, or more years above the basal age is . . . symptomatic” (28: 169–70). The authors accepted three years as normal; four, as a borderline condition; five or more, as an indication of abnormal mental development. Of the sixty-two stutterers, Scripture and Kittredge found ten with normal uneven development, fifteen with uneven development of four years, and thirty-seven with abnormal uneven development.

In their study Scripture and Kittredge also undertook to determine whether the stutterer has a special word disability. They used the vocabulary test of the Stanford Revision of the Binet-Simon Test, which begins at the eighth year. Therefore, the children under eight years of age who were not superior in intelligence could not be examined. This limitation left fifty cases out of the original sixty-two. The median chronological age of these fifty children was thirteen years and six months; the median mental age was eleven years and nine months, a difference of one year and nine months. The difference between the median chronological age and the median vocabulary age is two years and seven months, or nearly twice as great as the difference between the chronological age and the mental age. Clearly, then, the stutterer has a word disability. Forty-two had vocabulary ages below both their chronological ages and their mental ages; five had vocabulary ages above their chronological ages but below their mental ages. The five were of very superior intelligence, and “we may assume from this that the word disability was so severe that it could not be overcome in spite of the superior intelligence” (28: 171).

Scripture and Kittredge believe that this study throws light on the etiology of stuttering. “These stutterers in forming speech habits
were first handicapped by intelligence” (28: 172). This handicap is accompanied by an unstable emotional condition, and stutterers are further handicapped in making a response by a word disability. The formation of a speech bond is therefore difficult.

The following conclusions may be drawn from the studies of intelligence as related to the different kinds of speech defect.

1. Low intelligence frequently accompanies delayed speech and language difficulties. In some cases low intelligence accompanies stuttering. The studies by Ashby (29: 68), Lapage (29: 68–70), Wallin (15: 76), Cassel (15: 77), and Eichholz (15: 77) show these statements to be true.

2. A study of stutterers shows them to possess every degree of intelligence. McDowell (19: 9–10) says that the distribution is the same as for normal individuals; Stinchfield (29: 38–43) found high intelligence among stutterers; Scripture and Kittredge (28: 167) found low mean intelligence quotients, but they admit that their sampling might very easily give low scores.

3. The studies show a wide range of intelligence from low to high with no uniform rating. This conclusion applies to persons suffering from all classes of speech defects and is the same as the conclusion for stutterers alone.

4. The use of intelligence tests may be helpful in indicating symptoms of speech defects but not in locating their causes.

EXPERIMENTAL DATA ON THE RELATION OF PERSONALITY TRAITS TO SPEECH DEFECTS

There have been but few experimental studies of the relation of personality traits to speech defects. Hundreds of personality tests exist, but many of them have not been validated for diagnosing difficulties of speech.

McDowell (19: 13–23) used three tests of personality traits: (1) a combination of the Woodworth-Mathews questionnaire and the Woodworth-Cady questionnaire for identifying individuals with psychotic tendencies; (2) the Kent-Rosanoff Free Association Test; and (3) a teacher’s rating made on the basis of the trait inventory used by Terman in his study of gifted children. In administering the questionnaire test, McDowell used individual interviews in place of
a group test. In none of these tests did McDowell find startling differences between stutterers and normal children.

In the first test the stutterers had a mean score of 22.6522 with a standard deviation of 9.616; the control group, a mean score of 20.1304 with a standard deviation of 0.9532. There is, then, a difference of 2.5218 and a large variability. The experimental coefficient is .44, indicating less than half certainty. In the individual questions, the stutterers admitted more often than did the normal children that they lost their breath quickly when they ran, but on other questions there was little difference between the two groups. For this one difference (2.4), there is an experimental coefficient of .907.

In the second test, the Kent-Rosanoff Free Association Test, "the time reactions for each child were made into a distribution, and the mid-score and limits of the upper quartile were determined" (19: 16). The mean of the mid-scores for stutterers is 2.8951 with a standard deviation of 1.164; for the control group, 2.6951 with a standard deviation of .9228. The experimental coefficient of .310 indicates less than half certainty. The reaction time of 9 per cent of the stutterers and 7 per cent of the control group was excessive (eight seconds or more) with an experimental coefficient of 1.3. On common responses the mean for stutterers is 69.2075 with a standard deviation of 22.13; for the control group, 70.427 with a standard deviation of 21.415, a difference of 1.2195. The experimental coefficient is .091. On individual responses there is a difference of .3655 in favor of the stutterers, but the experimental coefficient is only .028. On doubtful responses the mean for stutterers is 5.2317 with a standard deviation of 4.6606; for the control group, 4.256 with a standard deviation of 3.707. The experimental coefficient is .028. McDowell concludes that the Kent-Rosanoff Free Association Test does not reveal any distinctive traits which lie in the stutterer's emotional adaptations. For key words there is no appreciable difference between the mid-score and the upper quartile. The key words, supposed to be suggestive of particular emotional inadequacies of stutterers, revealed no important differences in reaction time.

In the third test—trait ratings—one rating by the teacher of each child was used (19: 22). The traits rated were the twenty-four selected by Terman in his study of gifted children—popularity with
other children, self-confidence, cheerfulness, etc. In the case of each child the teacher indicated his judgment of the amount of each trait possessed by the child by means of a scale of seven points representing gradations from one extreme to the other. The differences between stutterers and normal children were very small except for two traits. For self-confidence, there is a difference of .7482 with a standard deviation of .2339 in favor of the control group and an experimental coefficient of 1.15, indicating certainty. In sensitiveness to approval there is a difference of .4220 with a standard deviation of .2629 and an experimental coefficient of .58. These two differences support the popular belief that the stutterer is backward and shy.

Fletcher (14) made an experimental study of psychophysical symptoms in stuttering. He studied changes in blood distribution and in pulse rate and galvanic changes. In studying the changes in blood distribution, Fletcher used the plethysmograph (14: 225–26). He found that in the majority of stutterers any sudden concentration of attention, as in reading, resulted in an attention drop, which marks the movement of the blood toward the central blood vessels. In the return of the blood from the central vessels, the peripheral system showed dilatation, which lasted until the end of the stuttering period. The amount of general rise of the plethysmograms corresponded with the degree of stuttering. Fletcher regards changes in blood distribution not as causal, but as accompanying, symptoms. In studying the pulse rate, Fletcher (14: 226) took three readings: the first, prior to the speaking interval (average, 88.9); the second, at the beginning of the speaking interval (average, 99.1); and the third, after the speaking interval (average, 97.2). When these averages are compared with the normal pulse rate of 72, it can be seen how the stutterer is affected by the speaking situation. With regard to galvanic changes, Fletcher found "that the stutterer is subject to a period of galvanic disturbance prior to the speaking interval; that this condition continues in varying degree throughout the interval of stuttering; that . . . . the degree of galvanic deflection varies approximately with the severity of the stuttering" (14: 228). These studies made by Fletcher are important contributions to the etiology of stuttering and confirm his thesis that stuttering is the result of an emotional difficulty.

A test which has become prominent in the last ten years is the
Downey Will-Temperament Test, which uses handwriting as a means of diagnosis. This test deals with overt reactions and is based on two fundamental factors: "the amount of nervous energy at the disposal of the individual" and "the tendency of such nervous energy to discharge immediately into the motor areas and innervate the muscles and glands or, on the contrary, to find a way out by a roundabout path of discharge" (16: 193). The profiles resulting from the tests indicate three general patterns of 'will' traits: (1) the wilful and aggressive type; (2) the slow, accurate, and tenacious type; and (3) the explosive or 'hair-trigger' type (1: 132).

An application of the Downey test to speech has been made by Downey in collaboration with Lovisa Wagoner (30). They attacked the problem from two different angles: "(1) Do different varieties of speech defectives, when given the Downey Will-Temperament Test, show any characteristic profiles?" (30: 291) That is, are there temperamental and volitional qualities which underlie individual variations in the timbre and volume of the voice and in rate of speaking? "(2) Is the graphic will-temperament test, in which writing exercises are used to determine the dynamic or activity level of the individual, translatable into a vocal test in which vocal exercises are used? If so, do the two profiles obtained by these different methods of procedure resemble one another in any way?" (30: 291)

The remedies usually applied in cases of speech defects, say Wagoner and Downey (30: 292), are correction of anatomical and physiological defects and the formation of new habits. That the corrector of speech defects recognizes the fundamental nature of the temperamental difficulty underlying the symptom is shown by the fact that he stimulates self-confidence and reduces self-consciousness largely by means of a trial-and-error method and by the influence of his personality. Emotional disturbances—such as dependence on parents, feeling of inferiority, and repression—have long been recognized, but the temperamental traits have been ignored.

Wagoner and Downey (30) cite Anderson's study (3) to prove that what have been regarded as causes are really symptoms of a more deeply seated maladjustment. "There are [Anderson's study indicates] innate traits and combinations of traits which are conducive to the development of speech disorders. . . . . Speech defects
are the outward manifestation of temperamental and volitional traits. . . . Complexes, blocking, and repression are only symptoms" (30: 294). Anderson says: "Stutterers differ from certain other people not merely in speech reactions but in other types of reactions which have no apparent connection with speech. Thus, there is objective evidence that stuttering and allied disorders are something more than defects of speech" (4: 70).

Anderson's study was experimental. He used control groups and separated his cases into groups of improved stutterers, unimproved stutterers, excitable persons, and normal persons. He studied the mental and physiological factors common to vocal and non-vocal functions. "The results of a foot-tapping test showed no characteristic difference between stutterers and normals but much greater regularity and greater rapidity on the part of ex-stutterers" (30: 293). In following the metronome, the rhythm and the co-ordinated arm movements of stutterers were better. In memory span for movement, the stutterer was inferior to the normal person, showing an inability to hold several things in mind at once, a kinaesthetic lack of co-ordination. With regard to imagery, the stutterer's difficulty was not with imagery itself but with its co-ordination. This fact showed more relation to intelligence than to stuttering. Anderson gave an inhibition test, which required the raising of the arm whenever the number "three" was read after an odd number. The stutterer could not check the response after it had been started.

Wagoner and Downey consider the Anderson study similar to theirs in general purpose. At least, the two are similar in that they measure physical reactions and co-ordinations as the basis of a study of temperamental traits. Wagoner and Downey found several types of speech defectives when the will profiles were plotted: "The individual who speaks with great deliberation or hesitancy gives a will-temperament profile running low on speed of movement and of decision, low on motor impulsion and finality of judgment, and high on interest in detail. . . . Conflicts in temperamental traits might well cause speech blocking, which in extreme cases would lead to stammering or stuttering. Our profiles of occasional stammerers . . . frequently suggest possibilities of conflict, for example, high speed of decision with low speed of movement and low motor im-
pulsion. The common features seem to be low motor co-ordination, low motor impulsion, and low motor inhibition. In these respects our findings agree with Anderson's. . . . Public speakers . . . run very high on motor impulsion" (30: 295). They maintain handwriting under distraction, showing large writing whereas the inhibited show a tiny scrawl. There is another possibility. “Deficient co-ordination and motor inhibition may give the speaker who ‘stumbles over himself’ . . . or the speaker of the piercing voice or disagreeable nasality of tone” (30: 296).

Wagoner and Downey (30: 297) believe that the handwriting test can, therefore, be easily converted into a vocal test by using speed of vocalization, pitch, and volume as criteria in measuring the following traits: (1) speed of movement, measured by the speed of vocalization and normal pitch and volume under normal conditions as compared with the results of a speeded recitation; (2) flexibility, measured by “the ability to shift pitch and volume”; (3) interest in detail, measured by the “precision of enunciation in reading test phrases”; (4) co-ordination of impulses, measured by “the speed of vocalization”; (5) freedom from load, measured by “the length of time required to readjust after interruption together with the ratio of normal to speeded recitation”; (6) motor impulsion, measured by “the ability to maintain rate and quality of vocalization while maintaining other activities, such as reading silently”; (7) motor inhibition, measured by “the degree of retardation in recitation”; (8) reaction to contradiction, measured by “the response to the statement that a given letter has been omitted in recitation”; (9) emotional stability, or volitional perseveration, measured by “the vocal reaction when a shrill whistle is blown during the recitation.”

Wagoner and Downey believe that the preliminary experience with the vocal test has been encouraging. They state:

As norms have not yet been established for this test, it is possible to give only an estimate of the correspondence between the two forms of the will-temperament test in terms of coefficients of correlation. . . .

Twenty-three subjects were ranked according to their scores on the graphic and vocal form of the will-temperament test for the nine traits for which parallel tests had been determined. The correlation coefficients by the rank method were positive and high for motor impulsion (rated on time only), motor inhibition, and reaction to contradiction; positive and mediumly high for flexibility
and interest in detail (scored in vocal test on flat number of errors); and positive but low on co-ordination of impulses and volitional perseveration. For freedom from load and speed of movement, there was no indication of relationship. In the graphic test the scored records are preceded by preliminary practice in order to overcome self-consciousness, and it is proposed to give such preliminary practice in the vocal test and determine the effect of this upon the correlation for speed. . . . .

Revision . . . . and the establishment of norms are now in progress [30: 297].

Further evidence of the emotional difficulty of the speech defective is afforded by studies of retardation in school. Stinchfield (29: 38–39) found that at Mt. Holyoke the girls needing corrective speech instruction, though as high in intelligence, failed in their work and were not leaders. In a study in Hamburg, Germany, it was found that the higher the grade, the greater the retardation (13: 36). "In their fourth school year about 50 per cent [of the speech defectives] are below the fourth grade; in their fifth school year 65 per cent are below the fifth grade; in their sixth school year about 77 per cent are below the sixth grade; and in their seventh school year about 80 per cent are below the seventh grade" (13: 36). Westergaard in Denmark found that speech defectives are over-age (13: 36). H. Gutzmann in Germany found "that 10 per cent of the parents of eight hundred stuttering children admitted without being asked that the speech defect caused their children to be behind in school. He says that he has often found that children will remain two or three years in the first grade on account of stuttering, but, when speech was cured, they developed rapidly and not only kept pace with their class at the time of cure, but caught up what they had lost" (13: 35–36). Conradi (13) in his studies of six American cities found that in every grade the age of the stutterers is higher than that of normal children. He says: "We should remember that such children are behind, probably not on account of any mental inferiority, but either because they are neglected by their teachers or because they are discouraged on account of a sensitiveness with regard to their trouble or on account of the jeering of their classmates. Whichever of these causes may be operative, however, the fundamental condition is the defect of speech, and, with the removal of that, normal intellectual development becomes possible" (13: 37).
Blanton (8: 585) found that the increased percentage of speech difficulty in the first grade is partly attributable to the breaking of home associations and the study of reading, that stuttering increases retardation grade by grade, and that many drop out at the end of the fifth grade. He says: "Many children are so retarded in their school work by their speech defect that they drop out as soon as they reach the age when the law allows them to stop school. . . . . In the case of stutterers, even though the symptom be recovered from, there remains in many cases the original mental conflict, the lack of adjustment that causes other neurotic symptoms beside stuttering" (8: 585).

Root measured retardation by over-ageness and found that "speech defectives are, as a general rule, a half-year older than the average pupils of the same grade" (23: 538). Retardation according to school progress shows an average retardation of 10.49 months. "The amount of retardation in actual school progress of all speech defectives shows a general increase from Grade I to Grade IV, after which there is a tendency toward uniformity" (23: 541).

Retardation in school and speech defect are, then, closely connected. Much of this retardation, not being the result of poor intelligence, is probably due to difficulties of personality.

The following paragraphs summarize the studies of personality traits as related to speech defects.

1. McDowell (19) found surprisingly little correlation between stuttering and specific personality traits, except for one or two traits which indicated emotional difficulty.

2. Fletcher's study (14) of psychophysical symptoms in stuttering showed an emotional difficulty underlying the stutterer's attempt to speak.

3. The vocal form of the Downey Will-Temperament Test is promising, but it needs standardization and the establishment of norms (30).

4. In general, Anderson's experimental study (4) of stuttering as related to voluntary movements, supports the findings of McDowell and Fletcher.

5. These four studies show that the stutterer and, it may be inferred, many speech defectives of other types suffer from a feeling of inadequacy in emotional situations.
GENERAL CONCLUSIONS

1. Varying levels of intelligence are found in various kinds of speech defects. Low intelligence is a symptom, rather than a cause, of speech defects.

2. Personality traits are more enlightening than intelligence in the study of speech defects, since they point to emotional difficulties as the source of stuttering and kindred speech defects. Retardation in school in the case of speech defectives is not caused by lack of intelligence but is an emotional maladjustment, which may be remedied by an understanding of the personality of the individual.

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