Transient Aphasia and Some Methods of Controlling The Transient Aphasia Cycle

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TRANSIENT APHASIA AND SOME METHODS OF CONTROLLING THE TRANSIENT APHASIA CYCLE

being

A Thesis presented to the Graduate Faculty

Of Fort Hays Kansas State College

In partial fulfillment of the requirements

For the degree of Master of Science

by

James H. Wright, A. B., 1936

Fort Hays Kansas State College

Date: May 1, 1939

Approved
Major Professor

Acting
Chmn. Grad. Council
TABLE OF CONTENTS

Body of thesis ........................................... 1

Figure 1 ............................................. 11

Table 1 ............................................. 12

Bibliography ........................................... 18
The Concept of Aphasia

A high incidence of transient aphasia among its cases has been recognized for some time by the Fort Hays Kansas State College Psychological Clinic. Clinical tests of transient aphasia are a routine part of the Clinic's psychometric procedure, especially with children showing speech and reading disabilities. Abnormally long eye fixations where the word is known to the subject, momentary binocular divergence, periodic eye tremors, blocks in phonation either with or without the usual symptoms of stuttering, superficial appearance of transitory deafness, and various motor blocks have been suspected as being evidence of transient aphasic conditions.

Typical Clinic recommendations in such cases have been generally based upon a program designed to integrate the disturbed gradient into more comprehensive and more stable gradients. Teachers, especially, have been warned to make due allowance for the aphasic cycle.

Kelly\(^7\) advances the hypothesis that transient aphasia may be considered a symptom of neurological disintegration such as that found in stuttering. He found some indication that the aphasic interval was associated
with transient vaso-motor disturbances. Later\textsuperscript{8} he advanced the view that the neural disintegration might, in some cases, be due to a lack of cerebral dominance.

The term aphasia has been in use since 1864 when Trousseau\textsuperscript{14} applied it to pathological impairment of the use or ability to understand language. Writers such as Morgan\textsuperscript{9} have defined the phenomenon as a more or less permanent organic deficiency.

Head\textsuperscript{14}, in his classic work, while still adhering to the view that the underlying pathology of aphasia was organic, attempted to describe and classify aphasias psychologically. He criticized the work of his predecessors for their attempts to analyze normal speech strictly in terms of motion or sensation, and he insisted that most acts depend on both of these factors for perfect execution. The use of language, he maintained, is based on integrated functions, standing higher in the neural hierarchy than motion or sensation, and, when it is disturbed, the clinical manifestations appear in terms of complex psychical processes. Continuing this line of thought he postulated the classification of language disintegration into four forms: the verbal, the syntactical, the nominal, and the semantic. The American medical profession, however, does not accept this classification, preferring usually to classify the aphasias in terms of a location of the brain lesions.
Travis'\textsuperscript{13} description of aphasia as a disorder of symbolic formulation and expression represents a functional rather than a pathological point of view. Orton\textsuperscript{10} makes an attempt to bridge the gap between the pathological and psychological points of view when he points out that a lesion in the area surrounding the arrival platform for a certain sense mode may cause a disturbance at the third functional level—the level of symbolism. This disturbance he calls "strephosymbolia." Kelly\textsuperscript{8}, however, reports that the tendency to reversed perception, supposed to be characteristic of strephosymbolia, is less marked at the symbolic levels of perception than when the objects are perceived in their own identity.

While the term aphasia originally referred to a speech or language disorder, its meaning has, certainly, come to include other types of symbolic disturbance.

One of the earliest students of the problem of speech disturbance was Gall\textsuperscript{14}. In 1819 he described two cases and tried to localize the speech functions in the anterior parts of the brain. This attempt at cerebral localization soon gained many supporters, among whom were Fritsch, Hertzig, Bastian, Wernicke, and Jackson\textsuperscript{14}. Little attention was paid to clinical manifestations by these investigators.

Hughlings Jackson\textsuperscript{14}, who made some of the most outstanding contributions to knowledge of aphasia, is of
interest because of his dynamic conception of the problem as contrasted with the structural conception which had been held by earlier investigators. His papers received little credit for they were so peppered with explanatory phrases and footnotes that students were discouraged. It was not until the time of Pick and Head that the true value of his work was recognized.

Jackson distinguished two main groups of patients: those who were speechless or whose speech was badly damaged, and those whose speech was plentiful but disturbed by many errors. Among patients of the first group the understanding of spoken language was relatively satisfactory; among patients of the second group it was relatively disturbed.

Outstanding contributions to cortical locations of brain lesions were made by Broca and Wernicke. In recognition of their work the cortical area of oral speech is known as Broca's center, and the cortical area of perception of auditory speech is frequently known as Wernicke's area.

Transient Aphasia

In introducing the term transient aphasia, Kelly was considering the phenomenon from a clinical rather than a pathological viewpoint. He believed that he had observed disintegrations of the thought process while
investigating silent reading disabilities. The aphasias due to brain lesions as investigated by Broca, Wernicke, Jackson, Head, et al. are, therefore, not necessarily included in this transient phenomenon.

Transient aphasia more nearly resembles the lapses which are found in studies of attention, and it may be distinguished by oscillations of output in mental work diverging slightly from the constant level at which the work as a whole tends to run. Spearman\textsuperscript{12} recognizes the existence of these oscillations as a fundamental factor in mental life and includes a factor "o" for oscillation along with his factor "p" in his "G"-factor theory.

While studying the problem of decrement in mental work, Robinson and Hills\textsuperscript{11} observed a periodic lapse of attention which they termed "mental block." Feeling that these periodic blocks might explain the failure of students to find a relationship between the decrement in mental work, Hills\textsuperscript{2} continued his investigations in work decrement.

He defined "blocks" as those periods experienced by mental workers, when they seem unable to respond, and cannot, even by an effort, continue until a short time has elapsed. From this it would seem to resemble the refractory phase phenomenon. In an effort to determine something of the nature of these blocks and their effect upon
ment al work, he had a group of subjects perform five homogeneous tasks over an extended period of time. The responses of these subjects were recorded upon a kymograph as were the records of their blocks and errors as noted by the experimenter and his assistant. From a careful study of the results Bills concluded that: (1) In mental work involving considerable homogeneity and continuity, there occur, with almost rhythmic regularity, blocks during which no responses occur. These blocks have an average frequency of about three per minute although individuals differ. (2) Practice tends to reduce the frequency and duration of the blocks. (3) The frequency and length of blocks tends to increase with fatigue, although the number of responses does not appear to lessen appreciably. (4) The responses between blocks tend to bunch, giving a wave-like effect, and fatigue tends to exaggerate this bunching. (5) Frequency and length of blocks varies inversely with speed of response. (6) There is a tendency for errors to occur in conjunction with blocks which he attributes to the recurrent condition of neural functioning which the blocks reveal.

In a later experiment Hills attempted to study the effect of fatigue under self-controlled rates of work and automatically controlled rates of work. He found that the frequency of blocks and errors is proportional to the speed of work, with a positive acceleration toward
the point of breakdown, but that subjects can attain a rate nearly twice their voluntary maximum when the rate is automatically determined without increasing either blocks or errors over the voluntary rate.

**Method**

The apparatus used in the present investigation consisted of an improvised serial tachistoscope. Seventy-five letter groups of five letters were typewritten on a sheet of paper one group to a line. Each letter group contained one or more significant letters. Presentations were timed with a metronome and were made at the rate of one a second.

The fourteen subjects used in this experiment were members of a class in genetic and applied psychology. Each subject was seen individually and a quiet room in which to work was provided so that outside disturbances might be kept at a minimum. The subject was instructed to punch with a stylus the significant letter _o_ or _x_ as it appeared in a letter group. In case that both _o_ and _x_ appeared in the same group, the _o_ was to be considered as the more significant. No work group contained more than one _o_ or one _x_, and each group contained at least one significant letter. Each subject took the test under seven different conditions, each condition on a different day. Since the presentations were made with a serial tachistoscope the subjects could not work at their own rate, that is to say, the rate of work was predetermined.
The different test situations were as follows:

(1) **Normal Unfamiliar** Presentation of a list of seventy-five letter groups containing the significant letters o and x which were to be punched with the stylus.

(2) **Focal Unfamiliar** Simple presentation of the test as described. Before taking the test the subject was given a short story to read and instructed that he would be expected to be able to retell the story. After the subject felt sufficiently familiar with the story he was instructed to tell the story while taking the test, but to attempt to keep the letter marking as the focal task. By this means of filling underlying areas of attention the investigator hoped to sharpen the attention to the focal task.

(3) **Focal Familiar** Situation Three was a repetition of Situation Two one day later, with this difference: the subject was not allowed to review the story before commencing the test.

(4) **Normal Familiar** This situation was an exact repetition of Situation One and was given in order that the subject’s frequency and duration of errors might be computed after he had become sufficiently familiar with the test to have offset the practice element.

(5) **Distributed** The test in this situation was arranged individually for each subject according to his apparent frequency and duration of errors. The subject
was instructed to rest during the interpolated rest periods.

(6) Tension In this situation the subject was instructed to stand on tiptoe, grasp the side of the work table with the free hand, and tense the body as much as possible, keeping this state of tension throughout the experiment. This was an attempt to simulate the usual concomitants of increased attention. The test used in this situation was a duplication of that used in Situation One.

(7) Accented In this situation the subject was asked to work to an assigned rhythm, such as that used in a musical signature; a rhythm appropriate to the estimated frequency and length of blocks as found in his reaction to Situation Four. Accentuation of effort is generally supposed to force the natural work rhythm. The test used was a repetition of that used in Situation One.

Findings

In checking the results of the tests, an error was considered as constituting a block. Bills counted two periods in which there were no responses as a block. He did not consider errors as blocks, but, instead, checked them separately in a part of his tests. The present investigator felt that an error constituted a block inasmuch as an error shows a definite mental deficiency (the
nature of the experiment prevented motor blocks). Since this was considered to be the case, any one error would in itself constitute a block.

The data obtained in all of the situations were graphed in histogram curves and smoothed by the method of moving averages of five. See Figure 1.

A superficial examination of the graphs shows that each individual has a rhythm which tends to be characteristic in that it carries over to some degree in each of the test situations. It may also be noticed that no two people's rhythms are exactly the same.

As the subject becomes more familiar with the situation his waves tend to level out, i.e., the peaks become less prominent although they do not disappear entirely except in one case in one test situation. This may be interpreted that with familiarity with a task the subject seems to attain what may be his characteristic rhythm.

A fuller interpretation of the results of the experiment demanded a more objective compilation of the data. See Table 1. In order to achieve this, the average number of errors per minute and the average length of each cycle in seconds (a cycle constituting the number of seconds between one modal point of errors and the next modal point) was computed for each subject in each test situation.
Figure I
Table 1

The Average Number of Errors Made per Minute and the Average Length of Cycles in Seconds for 14 Individuals in 7 Different Test Situations, also Total Group Averages.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Sit. I</th>
<th>Sit. II</th>
<th>Sit. III</th>
<th>Sit. IV</th>
<th>Sit. V</th>
<th>Sit. VI</th>
<th>Sit. VII</th>
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<tr>
<td>Helen</td>
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<td>23.2</td>
<td>22.5</td>
<td>17.6</td>
<td>19.6</td>
<td>17.6</td>
<td>11.2</td>
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<td>8.0</td>
<td>9.6</td>
<td>2.4</td>
<td>2.4</td>
<td>1.8</td>
<td>4.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Mildred</td>
<td>12.8</td>
<td>12.8</td>
<td>9.6</td>
<td>2.4</td>
<td>9.0</td>
<td>4.8</td>
<td>2.4</td>
</tr>
<tr>
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<td>12.0</td>
<td>9.6</td>
<td>4.0</td>
<td>5.6</td>
<td>1.1</td>
<td>6.4</td>
<td>15.2</td>
</tr>
<tr>
<td>Henry</td>
<td>16.0</td>
<td>11.2</td>
<td>18.4</td>
<td>3.2</td>
<td>2.3</td>
<td>1.6*</td>
<td>11.2</td>
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<tr>
<td>Ruth</td>
<td>8.8</td>
<td>7.2</td>
<td>3.2</td>
<td>6.4</td>
<td>3.4</td>
<td>5.6</td>
<td>3.2*</td>
</tr>
<tr>
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<td>29.6</td>
<td>13.6</td>
<td>6.4</td>
<td>3.3</td>
<td>4.8</td>
<td>3.2*</td>
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<td>4.0</td>
<td>2.4</td>
<td>0.8</td>
<td>0.0*</td>
<td>4.0</td>
</tr>
<tr>
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<td>24.0</td>
<td>8.0</td>
<td>10.3</td>
<td>5.6*</td>
<td>5.6*</td>
</tr>
<tr>
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<td>15.2</td>
<td>6.4</td>
<td>4.0</td>
<td>1.1</td>
<td>5.6</td>
<td>4.8</td>
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<tr>
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<td>6.4</td>
<td>7.2</td>
<td>5.4</td>
<td>10.4</td>
<td>4.0*</td>
</tr>
<tr>
<td>Josephine</td>
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<td>10.4</td>
<td>5.6</td>
<td>12.0</td>
<td>5.4*</td>
<td>8.0</td>
<td>7.2</td>
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<tr>
<td>Anna</td>
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<td>27.2</td>
<td>15.2</td>
<td>8.0*</td>
<td>12.6</td>
<td>13.6</td>
<td>25.4</td>
</tr>
<tr>
<td>Shirley</td>
<td>9.7</td>
<td>7.7</td>
<td>10.8</td>
<td>16.7*</td>
<td>7.1</td>
<td>9.5</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Errors per min: 8.8 10.0 10.3 12.4 7.5 9.7 15.7* Ave. cycle in sec. 4.3 9.6 2.4 2.4 1.8* 4.3 3.2 Errors per min. 10.6 8.7 31.0*14.6 14.6 16.6 24.3 Ave. cycle in sec. 17.3 15.0 14.2 16.3 10.3 11.2 24.0* Ave. cycle in sec. 12.0 9.6 4.0 5.6 1.1* 6.4 15.2 Errors per min. 11.1 20.5 12.3 19.6 20.0 27.0*13.0 Ave. cycle in sec. 11.8 9.1 9.1 13.2 14.6 26.3*10.3 Ave. cycle in sec. 8.8 7.2 3.2* 6.4 3.4 5.6 3.2* Errors per min. 12.3 13.0 17.5 14.0 20.0 17.3 27.3* Ave. cycle in sec. 12.0 29.6 13.6 6.4 3.3 4.8 3.2* Errors per min. 8.6 5.7 8.2 14.7 15.6 23.2*17.0 Ave. cycle in sec. 15.7 14.7 8.0 20.5 20.0 -----*14.0 Ave. cycle in sec. 24.0 15.2 6.4 4.0 1.1* 5.6 4.8 Errors per min. 9.8 8.1 12.5 16.5 19.0 9.0 26.0* Ave. cycle in sec. 16.0 20.8 24.0 8.0 10.3 5.6* 5.6* Errors per min. 11.8 7.5 7.2 16.6 12.7 16.0 21.6* Ave. cycle in sec. 15.2 2.4 8.0 4.0 3.4 5.6 4.0* Errors per min. 6.5 11.0 10.2 12.5 9.3 11.8 40.0* Ave. cycle in sec. 13.6 17.6 6.4 7.2 5.4 10.4 4.0* Errors per min. 10.1 12.8 11.8 12.4 13.7 14.2 15.0* Ave. cycle in sec. 10.4 10.4 5.6 12.0 5.4* 8.0 7.2 Errors per min. 8.8 13.5 15.7 22.0 11.6 27.0*13.8 Ave. cycle in sec. 19.2 27.2 15.2 8.0*12.6 13.6 25.4 Errors per min. 9.7 7.7 10.8 16.7* 7.1 9.5 11.8 Ave. cycle in sec. 14.2 14.6 10.2 6.4 5.6* 6.9 7.2 Errors per min. 10.9 11.2 12.7 15.8 14.2 15.5 19.5* Ave. cycle in sec.

* Indicates highest efficiency in errors per minute.

Note: This table shows the average number of errors per minute and the length of the average cycle in seconds for each individual and the averages for the group as a whole in each test situation. Test situations are given on the vertical line, individuals on the perpendicular.
An examination of the average number of errors per minute and of the average length of the cycles in seconds for the entire group of subjects shows: (1) Comparison of Situation One with Situation Two indicates the device used for keeping the task on a constantly high level of consciousness made no significant change in the rhythm. (2) A comparison of Situation One with Situation Four and Situation Two with Situation Three shows a slight tendency for practice to lengthen the aphasic cycle. It also appears that practice is associated with a decrease in the number of errors made. This observation, however, is merely an observation of the learning and does not immediately affect this investigation. (3) For the average of the group, Situation Five, which was arranged in work periods adjusted to aphasic rhythm of the subject, did not appear to be very effective as, both in the number of errors per minute and in the average length of the cycles, there is little variation from the results in Situation Four. (4) Similarly the physical tension in Situation Six made no appreciable change in efficiency or aphasic rhythm. (5) The most interesting finding, however, is that revealed by comparing the results in Test Situation Seven with those obtained in the other situations. This was the situation in which an accented rhythm was attempted. While for the group as a whole the efficiency of mental work as measured
by errors per minute did not improve markedly, for seven of the fourteen subjects this situation was the best of all the situations tried from the standpoint of efficiency. This would indicate the effectiveness of the rhythmic device in a significant number of individual cases.

For the group as a whole, the length of the aphasic cycle under Situation Seven was markedly increased. For seven of the fourteen subjects the aphasic cycle was the longest for all the situations. Six of these seven people were among the group mentioned above as finding Situation Seven most satisfactory from the standpoint of accuracy. It might be concluded from this that an added emphasis given to the task at the point of recurrence of an aphasic interval tends to carry the subject through the interval.

The findings in Situation Five are at divergence with the findings of Hills in a somewhat similar situation. He found that adjusting the work period to the apparent aphasic rhythm of the subject tends to cause the blocks entirely or nearly to disappear. This difference in findings should probably not be taken too seriously without further experimentation.

From an examination of individual performances it was seen that the efficiency of the subjects varied. However, most of them found one of two methods the best in
controlling their transient aphasias: either (1) distributed work periods or (2) rhythmic work. In only two cases were other periods more effective: that of Florence who worked best while in a state of tension, and that of Anna who worked best when very familiar with the task. Anna was judged clinically to have a very poorly integrated personality. Seven subjects worked best while doing work in a rhythmic pattern and four worked best while doing work in distributed work periods.

Summary

1. In each individual there are marked periods of transient aphasia which occur in a cyclic order. Each person's work pattern appears to be unique and tends to be similar from situation to another.

2. Familiarity resulting from practice levels these periods of transient aphasia to what may be termed the individual's natural rhythm. However, familiarity with a task does not erase them entirely.

3. Certain methods of work such as distributed work periods and work which is done in a definite rhythmic pattern are highly effective in aiding certain subjects to bridge their aphasic periods--the former by adjusting the work to the periods, the latter by forcing the work during periods. On the whole, distributed work appears to be most effective in reducing errors while rhythmic work
appears to be most effective in lengthening the interval between aphasic periods. Bills' investigation of the value of distributed work periods is in agreement with this conclusion. However, it appears that rhythmic work is the more effective in reducing blocking; a control method which he had not investigated.

4. Individuals differ in the methods which are most effective in reducing transient aphasia. The observation that some people may work most effectively while under tension is substantiated in one case. The data suggest that poorly integrated persons may not do really effective work under any situation which might have a distracting element, but are at their peak of efficiency when the task is reduced to somewhat of an automatic level.

5. Transient aphasia can be controlled to a large degree. Further studies are in order to determine the value of the different methods of control in mental work extended over longer periods.

6. The normal aphasic cycle appears to vary from 10.90 seconds to 19.55 seconds. Since the cycle was measured between peaks of errors rather than between individual errors there is no way of comparing this conclusion with that of Bills where he reports a normal error frequency of three per minute. Furthermore, Bills allowed his subjects to work at their own rate which would enable
them to retard the rate of work at the approach of an aphasic period, thus tending to cover up their blocks.

Certainly the problem of the effective control of transient aphasia justifies further investigation and the hope that out of it may come a practical method for adjusting human mental labor to this natural phenomenon. Particularly for school children who present marked transient aphasias such an investigation holds the promise of better personal adjustment.

A block in a period of mental activity may be seen in the worker's daily routine. He is an actor, until a short time has passed, when almost sense per se.

[In Journal of Experimental Psychology, Vol. 18, 1933, p. 272-73.]

More blocking occurs in unconscious and competitive mental labor.

[In Journal of Experimental Psychology, Vol. 18, 1933, p. 272-73.]

The block cycle appears to be recurrent.
Bibliography


   A study of the length of the attention span.


   A block is a period in the mental work when the worker cannot respond, even by an effort, until a short time has elapsed. Occur about three per minute.


   More blocking occurs in homogeneous and competitive mental tasks.


   The block cycle appears to be rather long.
5. __________. Some additional principles of mental fatigue. (In Psychological Bulletin, XXXI, 1934, p. 671-672.)

The frequency of blocks and errors is proportional to the speed of work.


There is a striking resemblance between the fatigue effect and the effect from oxygen deprivation.


Disintegrations of the thought processes during silent reading termed transient aphasia.


Hypothesizes that transient aphasias are symptoms of neurological disintegration such as that found in stuttering.

Organic aphasia is a pathological impairment of the ability to use or understand language.


Attempts to bridge the gap between the pathological and functional point of view in organic aphasia.


Mental blocks appear as a hitherto unnoticed phenomenon in mental work.


Spearman recognizes the existence of oscillation as a fundamental factor in mental life.


A dynamic neurological treatment of normal speech and speech deviations.

History of studies of organic aphasia.