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Amount of Information Retained as a Function of Visual Presentation and Value

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AMOUNT OF INFORMATION RETAINED AS A FUNCTION
OF VISUAL PRESENTATION AND VALUE

by

Félix A. Ortega, O.A.R.

A Dissertation Submitted to the Faculty of the Graduate School
of Loyola University in Partial Fulfillment of
the Requirements for the Degree of
Doctor of Philosophy

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Life

Father Félix Ortega, O.A.R. was born in Cervera del Río Alhama, Logrono, Spain in 1937. After attending High School and College at the places of the PP. Agustinos Recoletos in Lodosa (Navarra) and Fuenterrabia (Guipúzcoa), and finishing four years of theology at Marcilla (Navarra), he was ordained priest in 1960. He obtained the M.S. in clinical psychology at Villanova University, Pa., in 1965. He began post-graduate work at Loyola University, Chicago, in 1964.

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Chapter I

Statement of the Problem

Since Bruner and Goodman's (1947) distinction between "behavioral" and "Autochthonous" determinants of perception, there has been a large number of experiments investigating the effects of values on perception. One of the three original hypotheses made in the mentioned article, however, has not received the attention of the researchers as much as the others. They wrote, "Perceptual equivocality will facilitate the operation of behavioral determinants." It is the main interest of this experiment to study this possible interaction between the "ambiguity" or difficulty of the experimental condition and value.

The experiment, however, does not follow a perceptual design, rather, its arrangement will be very similar to the setting of the studies of Broadbent (1952) on the capacity of the brain. As a consequence, relevant data will also be obtained regarding the problem of the existence of limitations of central nature in the amount of information handled by S.

Two main effects have been attributed to value by the workers in the field of perception: (1) the accentuation effect--the greater the value of an object the greater the overestimation of its size; and (2) the selectivity effect--there is a tendency for a valued object to be

perceived sooner (or in preference to) other less valued objects. It is in relation to these effects that the interaction between value and ambiguity will be summarily discussed.

A number of investigators have studied the interaction between values and levels of difficulty of the experimental situation in relation to the accentuation hypothesis (Bruner and Goodman, 1947; Carter and Schooler, 1949; Ashley, Harper, and Runyon, 1951; Klein, Schlesinger, and Meister, 1951; Lysak and Gilchrist, 1955).

The procedure used by Bruner and Goodman (1947) was to have S judge the size of the value objects--in this case coins ranging from a penny to a half-dollar-- (1) from memory, and (2) with the coins actually present in his hands. The memory condition was called the more equivocal situation. The same procedure has been followed by all the other writers with the exception of Klein et al. (1951).

The results obtained have been contradictory. While Lysak and Gilchrist (1955) report that valued objects--here bills of different value--were more overestimated when present, Ashley et al. (1951) found values to be more effective in the memory situation. Bruner and Goodman (1947) report that poor children overestimated the size of the coins more than rich children when the coins were present but not in the memory situation; Carter and Schooler's (1949) findings are just the opposite of those of Bruner and Goodman.

It seems, then, that the procedure of "calling" the memory situation more difficult than the value-object-present condition does not promise to shed much light on the problem of interaction. Actually,

Bruner and Goodman's design does not seem to be very appropriate, as after all it involves two processes, memory and perception, and there are reasons to believe that values affect memory and perception differently (Beams and Thompson, 1952; Allport, 1955, p.329). If we are interested in finding whether there is an interaction between value and ambiguity, it would seem better to test the hypothesis in a perceptual or in a memory setting. An arrangement where the more equivocal situation involves memory and the easiest condition perceptual processes is likely to add unnecessary and inconvenient complications.

A better methodology would seem to be the one used by Klein et al. (1951). The task of S was, as in three of the four experiments previously reported, to match the size of a variable circle of light with the size of valued and non-valued stimuli. In one of the conditions, S sat in a darkened room facing two circles of white light, one containing the valued stimulus, the other being the adjustable circle; S directed E, who adjusted the variable circle to match the standard in size. In the more difficult condition, the room was fully illuminated and S himself had to adjust the variable disc to match a pink disc, containing the value stimulus; S held the pink disc in his left hand approximately one inch forward of the variable disc and at a somewhat different height. While the swastika sign (and the control disc used in the experiment) was not overestimated in either condition, the dollar sign was overestimated by all groups in the second condition and only in the second condition.

The Klein et al. findings, then, would seem to give some support to the equivocality hypothesis. It is perhaps unfortunate that no more ex-

periments of this type have been reported. On the other hand, it may very well be that the accentuation hypothesis is faulty. The findings in this area have not been clear. Some studies have reported a positive linear relationship between value and size overestimation (Bruner and Goodman, 1947; Lambert, Solomon, and Watson, 1949). Other studies have not reported any relation between the two variables (Bevan and Bevan, 1954; Lysak and Gilchrist, 1955). Still other studies have reported similar or different effects for positively and negatively valued objects (Bruner and Postman, 1948; Klein, Schlesinger, and Meister, 1951).

These seemingly contradictory results seem to be reasonably explained by Tajfel (1957). He notices that the experiments on accentuation fall into two classes. In one group, there is a consistent relationship between the sizes and the values of objects--e.g., in general the larger the coin the greater its value; in the second group, there is no relationship between sizes of objects and their values--the value of dollar bills do not vary according to their size. Most of the positive findings are found in the first group; almost all the negative findings are found in the second group. For Tajfel, all the results can be explained in terms of what he calls an "interserial" and an "intraserial" effect. The intraserial effect produces overestimation of the larger stimuli and underestimation of the smaller stimuli in a series of related objects, such as a series of value objects, so as to achieve better discrimination. The interserial effect postulates that differences of magnitude between a series of value and another of neutral stimuli would be larger than differences between two sets of neutral stimuli as the presence or absence of value contributes

an additional distinctive feature between the sets of stimuli. The accentuation of differences due to the interserial effect will tend consistently towards an overestimation of value objects only when there exist a series of valued objects where size and value of objects are related. If Tajfel's theory holds, there is no necessity for attributing to values qua values any special accentuation effect.

As a consequence, if we are trying to test the probability of an interaction between difficulty of the presentation and value, it would seem advisable not to test the hypothesis under an accentuation setting. The natural choice is to examine the possibilities of the experimental schemes of those studies on values as selective factors.

A good number of studies on the selective effects of values have followed the experimental setting of Postman, Bruner and McGinnies (1948). A number of words, some of which are more consonant than others to the value orientation of \underline{S} , are presented in a tachistoscope. The recognition thresholds of words related to high value areas are compared with those of words representing other value categories.

There is only one study using this experimental design in which the claim is made that the interaction hypothesis has been tested. This is the article by Postman and Schneider (1951). The first part of their experiment follows the procedure described for the determination of recognition thresholds. Immediately after the assessment of thresholds, \underline{S} s were instructed to write down all the words that they could remember as having been presented in the tachistoscope. The authors say that the recall condition can be considered as more ambiguous than the recognition

situation, as in the latter situation the words were actually present. Their results indicated that values are more influential in the recall situation.

At face value, it seems that the preceding findings afford some evidence in favor of the interaction hypothesis. On the other hand, Postman and Schneider are following here the scheme of Bruner and Goodman (1947). The same type of criticism may be made: Since there are indications that values affect memory and perception in different ways, it would seem better not to test the interaction hypothesis in a setting where memory and perception are confused.

It is very probable that the tachistoscopic procedure could be arranged so as to test the hypothesis of interaction while remaining always in the field of perception. We do not need, however, to stick to recognition thresholds, whether visual or auditory (Vanderplas and Blake, 1949), in order to test whether values will influence the selection of stimuli more in the difficult than in the easy arrangements. The selective effect of values has been shown to be working also in the areas of free-association (Cantril, 1932; McGinnies, 1950), and recall (Postman and Schneider, 1951). Similarly, a more recent study using a specially revised form of the Study of Values, has shown that scores of S in such a test can be used as indicators of the type of magazines a person will read (Engstrom and Powers, 1959). It seems, then, probable that the selective effect of values might be found working in other fields, for example, in reading.

But before we proceed, it would be wise to consider the evidence

for thinking about values as selective factors. In the experiment already mentioned, Postman et al. (1948) found that there is a positive relationship between S's values and speed of recognition of words presented tachistoscopically. To explain the findings they postulated, among others, a mechanism of "selective sensitization." Vanderplas and Blake (1949) also found selective sensitization working in the auditory field.

On the other hand, Howes and Solomon (1951) report that the duration threshold of words presented tachistoscopically is approximately a linear function of the logarithm of the relative frequency with which the words appear in the English language. When controlling for frequency, Solomon and Howes (1951) found the effect of frequency to be more pronounced than the effect of value. However, while the difference in duration threshold for high and low value words was almost trivial when using high frequency words, it was much more pronounced when using low frequency words. The effect of values was, then, considerably reduced. In the interpretation of their results, Solomon and Howes attempt to reduce the remaining differences for high and low words to "idiosyncratic frequencies." For example, the person with high social value is probably a person who reads more often social material and hence he will have a higher frequency for social words, especially if they are unfrequent words (other Ss might not even know them).

Postman and Schneider (1951) repeated Solomon and Howes experiment and found essentially the same results. However, they ask, why

do we read more things that we value more? For them, both word frequency and duration thresholds are dependent variables of more fundamental psychological properties, such as habits, hypotheses, or personal values.

To complicate more the interpretation, Postman (1953) and Johnson, Thomson, and Frincke (1960) present evidence showing that sheer number of pleasant words is much greater than that of unpleasant words in English. Frequency and value, then, are correlated not only in an idiosyncratic way but in a very general sense, for all words used by all individuals.

In one of their experiments, Johnson et al. (1960) try to see whether both frequency and word value are important predictors of duration threshold. Their experiment consisted in presenting tachistoscopically to different groups of Ss 17 pairs of words varying in frequency but not in goodness. The results show that positively valued words are perceived sooner than less positively valued words of the same frequency ($p < .01$), and that frequent words are perceived sooner than infrequent words of the same goodness ($p < .01$). Values, then, are found to influence threshold when word frequency is controlled as much as word frequency when values are controlled. To be noted is that this is the first study where special care has been taken to study the effect of frequency upon threshold using words that have been matched for value.

Carter and Schooler (1951) report that in the memory situation values alone, and not frequency, were found to influence significantly

the number of words recalled.

We have, then, two interpretations which have been given consistently to the results obtained: (a) that they are due to the relative frequency of the words used, and (b) that they are due to the value properties of the words. Secord and Backman (1964) speak of "response disposition" and "response salience." "The probability of occurrence of a response due solely to previous experience is referred to as the response disposition. Response salience applies to contemporary factors that facilitate or interfere with perceptual responses" (Secord and Backman, p. 46). As frequency and value of words are positively correlated, any obtained results can be interpreted in terms of either mechanism depending on the liking of the writer. It seems to the present writer, however, that we remain closer to the findings if we conclude that both response disposition and response salience are working in the lowering of perceptual thresholds.

It seems that the evidence for considering values as selective factors, while not conclusive, is at least encouraging. We may, then, reasonably proceed to test whether or not values will be more or less influential in situations varying in difficulty. Our data will give us a check of the main effects of values, too.

In general, experimenters studying values as selective factors have reported a linear relationship between values and its operational measure (Postman et al., 1948; Vanderplas and Blake, 1949; McGinnies, 1950; Solomon and Howes, 1951; Johnson et al., 1960). Postman and Schneider (1951), however, while reporting a linear relationship for the threshold

condition, speak of a U-relationship in the memory situation high and low values being favored over other value areas. As the present experimental procedure uses as a measure the retention of differentially valued material, some additional information regarding the relation between value and memory should be given. However, it cannot be said that the present experimental conditions are equivalent to those of Postman and Schneider. The latter used as a measure of memory unaided recall of the words previously presented; whereas the measure of memory here will be the recognition of the ideas presented in a previous reading.

It may be good to notice that there is a difference between the study of Postman and Schneider and all the other studies on values reported in the literature. The subjects of Postman and Schneider did not purposely try to memorize. They were instructed only to report the words presented tachistoscopically as soon as they could perceive them. When E told them to recall, Ss were being tested in something on which, according to the instructions, they were not supposed to be tested. In all the other experiments, the set of S, as a result of the instructions, was relevant to the measure used in analyzing the effect of values. Postman and Schneider failed to notice this difference but perhaps it could be important.

The present experimental procedure will be an accommodation of the alternate-word technique or "interweaving" technique used by Broadbent (1952). Broadbent proposed to show among other things that there are central limitations that have to be considered when dealing with the

amount of information that can be successfully handled by S. The procedure consisted in presenting S with a piece of paper divided into numbered sections, each bearing some familiar geometrical figure as a triangle or a cross. In one experimental condition, S heard two successive questions of the type "Is there a triangle in section number eight?" and "Do you see a cross in section two?" The questions were previously recorded on a magnetic tape by two men of clearly distinguishable voices. Ss heard the sounds coming from the tape recorder, E kept record of their answers. The Ss were not allowed to answer until both questions were finished.

In the other experimental condition, the words of the questions were interwoven. What S heard was a jumble of the kind "is do there you a see triangle a in cross section in number section eight? two?" corresponding to the two previous questions. The same two men were used in the recording of the tapes. In both conditions the questions were asked in the same amount of time. All Ss received both conditions. Ss were told before the start of the experiment of the peculiar conditions of the experimental situation. Ss did much better in the first condition than in the second in term of percentage of errors made ($p < .001$).

Broadbent interpreted these differences as due to the inability of the brain to handle adequately two verbal messages at the same time. To appreciate his reasoning, it is good to look at the properties of the design. In both conditions the same amount of information was presented to the listener, as in both conditions Ss heard the same words in the same amount of time and they knew that the words belonged to two dif-

ferent sentences. In both situations Ss had to answer only after the two questions were finished. The only factor that varies from condition to condition is the manner of presentation of the questions: interweaving of sentences vs. interweaving of words. The effect of degrees of interweaving, then, is to make more difficult the handling of information. It cannot be due to limitations of the sense organs as S heard the same sounds in both occasions. It must, then, be due to limitations of a central nature. The brain does have an upper limit, or a limited capacity.

Broadbent considers the experiments on capacity as one of the most important contributions of information theory to psychology: "Perhaps the point of permanent value which will remain in psychology if the fashion for communication theory wanes, will be the emphasis on problems of capacity." (Broadbent, 1958, p. 5). A number of other experiments have shown that central processes set an upper limit to the information that S can successfully handle (Miller, Heise, and Lichten, 1951; Foulton, 1953; Cherry, 1953). All of these investigators, as have most workers in the area of information theory, have been working in the auditory field.

E thinks that the "interweaving" technique of Broadbent, slightly modified, would be useful in testing the hypothesis of interaction between value and levels of difficulty. Evidently the level of difficulty of the presentation varies according to the level of interweaving. If the information transmitted is consonant with value areas which are of high, average, and low value, then we have the situation we are looking

for. It will not be necessary to use auditory stimuli, interweaving can easily be obtained in written material. Again, it is not necessary to use independent sentences; paragraphs or short articles may be used. To help the S somewhat under the most difficult conditions, underlining the words of one of the small articles might be used. Underlining, when used, will serve functionally the purposes of the two types of voices used by Broadbent in the recording of the stimuli.

The hypothesis formulated, then, are: (1) With increasing degree of interweaving, S will gather more information from the article related to his high than from the article related to his low value orientation--values might not have any visible effect under the most clear presentation; (2) Ss will get more information from an article related to a high value area than from articles related to neutral or low value areas, and more from the article or articles related to a neutral value area than from the one related to a low value area; therefore, a positive monotonic relationship between values and information gathered is predicted; (3) as degree of interweaving is increased, efficient processing of information will decrease.

We can get also some information regarding the effects of underlining. No particular prediction is made in this instance. However, from the common practice of the students of underlining the most relevant sentences of the textbooks, it would seem that underlining would have an advantage over non-underlining.

Chapter II

Method

Material. The Allport-Vernon-Lindzey Study of Values (1960), two paragraphs or small articles, two preliminary comprehension tests, and two final comprehension tests were used.

One of the small articles was related to the economic, and the other to the social value area. The two articles, were selected by the experimenter using as a criterion the definition of the different value categories given in the Manual of the Study of Values (1960) and the questions asked in the Study of Values. The paragraphs have the same number of sentences and words.

The two preliminary comprehension tests, one for each article had 29 multiple-choice questions each. From the preliminary tests two final comprehension tests, one for each article and each composed of 15 multiple-choice questions, were formed. Each multiple-choice questions has four alternatives.

A preliminary tryout was carried out for the purpose of constructing the final comprehension tests. In it S was presented with a booklet

of seven pages: on page 1 were the instructions for reading the articles; on page 2 the articles, always presented in the most clear presentation or under the first degree of interweaving to be defined later; on page 3 instructions for answering the questions; the remaining four pages contained the preliminary comprehension tests with 14 or 15 questions for each page. (The preliminary tryout is shown in Appendix B).

The actual testing session had a similar format to that of the preliminary tryout, but on page 2 the articles were arranged according to three different degrees of interweaving to be defined later; in the same way, the instructions on page 1 varied according to the degree of interweaving under which the articles are presented. (The instructions and the arrangement of the articles with the questions are shown in Appendix C). Again, as the final comprehension tests had only 15 questions for each article, only two pages of questions were used. One characteristic of the final comprehension tests was that the mean number of correct responses in the preliminary tryout was the same for each article--an average of 11 correct answers per subject. (See Table 9 in Appendix B).

It seems convenient to state at this point that the experimenter expected that the average number of right answers given by Ss receiving in the testing session the most clear presentation--the one used in the preliminary tryout--would also be approximately 11 for each article. As the scores on the Study of Values of those Ss taking the preliminary tryout were unknown, the experimenter is making the assumption that values will not be visibly effective in selecting information when the presentation of the articles is clear. The assumption is not necessarily

against the hypothesis of a monotonic relationship between values and amount of information gathered. In the worst of the cases, it would imply only a limitation in the generality of the hypothesis which would be confined only to those cases in which the information is not presented in a clear way. However, this restriction is not completely necessary: we may still have a small, practically negligible, effect of values in the expected direction. The present assumption is consonant with the assumption made by those investigators working with the influence of value in perception: the effect of value is supposed to be detectable not under ideal but under marginal conditions of perceiving (Allport, 1955, p. 308).

Subjects. All Ss were taking the first courses of experimental psychology at Loyola University. In age, they ranged from 20 to 28 years.

Twenty Ss were used for the preliminary tryout. These subjects were different from those used in the experimental situation and their profiles in the Study of Values was unknown. (Their scores are shown in Table 9 of Appendix B).

The Study of Values was administered to 162 Ss. Out of these, 54 were selected for the actual test. According to their value preferences the subjects can be divided into three groups: (A) 18 Ss were high--or outstandingly high--on the social value and at the same time low--or outstandingly low--on the economic value; (B) 18 Ss were low--or outstandingly low--on the social value and at the same time high--or outstandingly high--on the economic value; and (C) 18 Ss were average in both economic and social values. Subjects in Group C were selected in such a

way that the total scores for the group on the economic and social categories of the Study of Values were the same. High, average, and low scores are defined as in the Study of Values. High and low scores are those which, according to Allport's norms, fall respectively above the 75th and below the 25th percentiles of all male or female scores on that particular value; those Ss who remain between the 25th and 75th percentiles are said to have an average or neutral score. The economic, and the social values were chosen for the simple reason that it was easier to find Ss with the desired characteristics using these two values than using any other pair of value areas.

Out of the 54 Ss, 21 were women. There were only three women in Group B, the rest of the groups were formed half and half by men and women. A further analysis revealed that 18 Ss were students in the Art School, 13 in the University College, 7 in the Business School. The remaining 16 Ss were Summer School students and their major was unknown.

Design and Procedure. The men and women in Group A, B, and C were randomly assigned to the three levels of interweaving separately. Each S was measured in both the economic and the social articles. In this way, we have a 3 x 3 x 2 factorial design with six measurements per cell. There are three levels for the difficulty of the presentation or three levels of interweaving, three levels in regard to the intensity of the value orientation of S, and two articles with their questionnaires related to two different value areas.

In the first degree of interweaving or most clear presentation each article is presented successively as an intact unit; in the second degree

of interweaving the sentences of one article alternate with the sentences of the second article; and in the third degree of interweaving or most difficult presentation a word of one article is followed by a word of the second article.

Regarding the value variable, it is composed of the intensity of the value orientation of Ss as shown in the Study of Values and the content of the small articles or paragraphs used. The Ss of Groups A and B, as indicated, are high either in the social or in the economic value and low in the other value category, while the Ss in Group C are average in both value areas. The two articles are related one to the social and the other to the economic value areas. In this way, we have the three levels of the intensity of the value orientation of S, and the two value areas in which S is being tested, respectively.

In testing the effect of interweaving we are comparing different groups of Ss. Differences in level of reading comprehension among groups of Ss would no doubt influence the amount of information gathered from the articles. While the subjects or groups of subjects were randomly assigned to the levels of interweaving, still the number of subjects in the groups--18--might not be enough to guarantee that the groups are equal in reading comprehension ability. As a consequence, a test on differences among groups was thought convenient. Scores on the level of comprehension in the Cooperative English Reading Test, 1B were available in Loyola records for 35 out of the 54 subjects. Eleven of these happened to have received the first level of interweaving, another 11 the second, and 13 the third level of interweaving. It was thought that if

no differences were found among Ss whose scores were known--approximately 65 per cent of all the Ss--it could be reasonably concluded that there were no differences in level of reading comprehension among the groups. A simple analysis of variance showed that there were no differences between the scores of level of comprehension of the three groups ($F = 0.16$, $df = 2$ and 32). The summary of analysis of variance is shown in Table 7, Appendix A.

Ss were told to read carefully the articles presented because at the end a number of questions concerning the content of the articles was going to be asked. They were told that this is not a test of intelligence, not a test of anxiety, that this is an experiment regarding how people read particular kinds of material. The experimenter emphasized that if the Ss don't try to do as well as they can, their data will not be useful and all the effort would be lost.

Ss were asked to read the words in the order presented, even if confusing and frustrating. For example, if S receiving the third degree of interweaving jumps the odd words and reads first the even words then the odd ones, he is being tested under the first degree of interweaving and not under the most difficult presentation. As a control S was told to slide down an 8 x 5 cardboard as soon as they read a line. The use of the cardboard was demonstrated by the experimenter before S began to read. Again, S were instructed to read each selection only once; if S reads twice some words in some treatments, the amount of information will no longer be the same in all the treatments. The sliding down of the cardboard serves also as a control for this variable.

Ss were told in advance of the characteristics of their particular presentation. In the second and third levels of interweaving one of the articles was underlined. E took care in emphasizing that underlining does not mean that one of the articles is more or less important than the other, that the purpose of underlining is exclusively to help the reader know that this word or this sentence belongs to one of the articles and not to the other. As in the most clear presentation S evidently knows which word belongs to which article, no underlining was used in the first level of interweaving.

It might very well happen that some Ss would have more knowledge of the content of the articles than others or that they would know more about the content of one of the articles. This would affect the number of right responses given. To control for this possible source of variation Ss were instructed to answer not according to what they know but according to what they have read. For example, questions of this kind were asked: Is Chicago a City? (a) Yes; (b) I don't know; (c) No; (d) It cannot be said. If nothing was said about Chicago in the articles, the only acceptable answer would be (d). The alternative "it cannot be said" is the (d) alternative for all the questions; in some of them, it is the acceptable answer.

Ss were tested in small groups ranging from 3 to 8 subjects. In this way, the experimenter was able to see that S did follow the instructions.

The difficulty of the articles was controlled by (1) taking both articles from popular magazines, and (2) by the sort of the questions

that were asked. As noted earlier in the most clear presentation the average score in a preliminary tryout was 11 correct answers for each article. There were no significant differences among the variances of the questions selected ($t = 0.002$, $df = 13$). See Table 9 in Appendix B.

For half of the subjects one of the articles appeared first; for the other half of the subjects in a given cell this same article appeared in second place. To control for the effects of underlining, in a given cell both articles were underlined the same number of times. The order of presentation of questions was also randomized to eliminate any possibility of order effects.

First the Study of Values was administered for the selection of Ss. According to the value orientation of the Ss two small articles were prepared by the experimenter. Then, the preliminary tryout was administered for the selection of the desired questions. Finally the actual test was carried out. Ss were sitting in a quiet room, and there was no time limit for reading the articles and answering the questionnaires--Ss, however, were asked to read at their ordinary pace. The instruction for the questions and the questions used were the same for all the subjects in all the treatment combinations. The instructions for reading the articles did vary for the three levels of interweaving. The major difference lies in the fact that Ss receiving the second and third degree of interweaving were told of the way the information would appear in their presentation. Subjects receiving the first degree of interweaving were not told of the way the articles would appear as this is the pre-

sentation that is expected once S knows that there are two small articles.

Data. The basic data are the number of correct answers on the two comprehension tests. For each right answer the score is 1, and 0 for each wrong answer.

As indicated, it is basically a 3 x 3 x 2 factorial design where degrees of interweaving, intensity of the value orientation of Ss, and the two articles, with their questionnaires, related to two different value areas are the factors. In analyzing the data we have to have in mind in relation to the value orientation that we are taking two measures from each S: Subjects in Groups A and B are used as samples from a population of high values and a population of low values; similarly, we take from each S in Group C two measures from a population of average values. Finally, each S is being tested in the two articles or value areas. Consequently, we have independent measures for the value intensity and the interweaving variables, and dependent measures for the article variable.

The main effects of the value intensity and the interweaving variables will provide a test for the second and third hypotheses, respectively. The interaction between Groups A, B, and C and articles at the three levels of interweaving will give us an adequate test of the main hypotheses: as interweaving increases there should be an increase in the difference between the number of right answers given to the article related to the high value area--the Economic for Group A and the Social for Group B--and the number of right answers gathered from the article related to the low value area--the Social for Group A and the Economic

for Group B; on the other hand, if value orientation is the source of the expected interaction between Groups A and B and articles, those Se in Group C should get about the same amount of information from both articles at the three levels of interweaving.

If we are interested, in testing the effects of underlining, a 2×2 factorial design would give us an adequate answer. The two factors are degree of interweaving and the presence or absence of underlining. Only two levels of interweaving can be used in this design as there was no underlining in the most clear presentation. There are 18 entries per cell. Repeated measures are used for the underlining and independent measures for the interweaving.

Chapter III

Results

From an arm-chair consideration it would seem very difficult to gather any information at all when the articles are presented in the third level of interweaving. Before proceeding to analyze the data it seems, then, necessary to test whether the number of correct answers given by Ss in the third level of interweaving was greater than chance or not. There are six treatment combinations in which the third level of interweaving is a component. The treatment combination with the smallest total of right answers, 44,--mean of 7.33--was chosen. The probability of one S to get 7 right answers out of 15 questions with four alternatives each is $\binom{15}{7} (1/4)^7 (3/4)^8 = 0.0655$; the probability of six Ss obtaining 7 right answers is $(0.0655)^6 = 0.00000008$. Once it has been shown that Ss receiving the most difficult presentation did get some information we can meaningfully proceed to analyze the data. (The raw data are shown in Table 8, Appendix A).

The result of the analysis of variance for degrees of interweaving, intensity of the value orientation of S, and articles or value areas is

Table 1

Summary of Analysis of Variance for
Modes of Presentation, Value-
Intensity, and Articles

Source of Variation	SS	df	MS	F
<u>Between subjects</u>	<u>420.42</u>	<u>53</u>		
Interweaving	141.56	2	70.78	13.63***
Value-Intensity	30.72	2	15.36	2.96
Inter. X Va.-In.	14.56	4	3.64	0.70
Subj w. groups	233.58	45	5.19	
<u>Within subjects</u>	<u>128.50</u>	<u>54</u>		
Articles	0.09	1	0.09	0.03
Inter. X Art.	4.21	2	2.10	0.80
Va.-In. X Art.	1.72	2	0.86	0.33
Inter. X Va.-In. X Art.	4.89	4	1.22	0.47
Art. X Subj w. groups	117.59	45	2.61	
$F_{.999} (2, 45) = 8.08$		$F_{.95} (2, 45) = 3.20$		

shown in Table 1. Statistically significant differences are found only for the levels of difficulty of the presentation or degrees of interweaving ($F = 13.63$, $df = 2$ and 45 , $p < .001$). However, it has been predicted on the basis of the theory that a trend should be found: more right answers are expected for the most clear presentation, less right answers for the second level of interweaving, and the least right answers for the most difficult presentation. Looking at the mean values in Table 2 it can be seen that this is precisely what happened. ($M = 10.92$, $M = 9.80$, $M = 8.14$, for the first, second, and third levels of interweaving). Testing the significance of the trend step by step, it is found that Ss who received the clearest presentation gathered more information than those in which the sentences of the two articles were interwoven ($p < .05$), and than those in which the words of the articles were interwoven ($p < .01$). In the same way, Ss who received the second degree of interweaving gathered more information than those who received the most difficult presentation ($p < .01$).

The effect of the intensity of the value orientation was close to statistical significance ($F = 2.96$, $df = 2$ and 45 , $p < .10$). Looking at Table 3 we can see that Ss in the high value group gathered more information than those in the two other groups ($M = 10.38$ versus $M = 9.19$ for the average group and $M = 9.33$ for the low group): the difference between the mean of the high value group and the two other value-intensity groups approach conventional significance figures. While the possibility that these differences are due to chance factors cannot be excluded, it seems to the present writer that they are to be attributed to

Table 2

Significance of the Difference between Means
 Number of Right Answers for Levels of
 Interweaving (Newman-Keuls Method)

Interweaving	3	2	1
Ordered means	8.14	9.80	10.92
	3	2	1
Differences between pairs	3	1.66	2.78
	2		1.12
$\alpha = .37$		$r = 2$	3
$q_{.99}(r, 45):$		3.81	4.35
$q_{.95}(r, 45):$		2.86	3.44
$q_{.99}(r, 45):$		1.40	1.61
$q_{.95}(r, 45):$		1.06	1.27
	3	2	1
	3	**	**
	2		*

the value intensity variable; this is especially the case for the difference between the high and low value groups which are derived from the same set of Ss, those in Groups A and B. Table 3 also shows that Ss in the average intensity group had about the same number of correct answers as those in the low value group ($M = 9.19$ versus $M = 9.33$).

The variation due to the interaction between value intensity and difficulty of the presentation is negligible ($F = 0.70$, $df = 4$ and 45).

While constructing the articles and the questionnaires E tried to equate them in such a way that it would not be easier to answer correctly more questions from one article than from the other. If this aim was successfully achieved it would follow that the main effect of the articles--together with the questionnaires--and their interactions with the interweaving and value intensity variables will not be the source of any important variation. This is what happened ($F = 0.03$, $df = 1$ and 45 for the main effect; $F = 0.80$, $df = 2$ and 45 for the interaction between interweaving and articles; $F = 0.33$, $df = 2$ and 45 for the interaction between value intensity and articles; and $F = 0.47$, $df = 4$ and 45 for the interaction of the three factors).

The profiles for the simple interaction effects of articles or value areas and Groups of Ss at each of the three levels of interweaving are shown in Figures 1, 2, and 3.

The profiles for Groups A and B at the first level of interweaving are very different from the profiles of the same Groups at the other two levels. At the first level of interweaving, value intensity did not seem to influence the scores obtained, both groups of Ss favored slightly

Table 3

Significance of the Difference between Means
 Number of Right Answers for Levels of Val-
 ue-Intensity (Newman-Keuls Method)

Value-Intensity	Average	Low	High
Ordered means	9.19	9.33	10.38
	Average	Low	High
Differences between pairs	Av.	0.14	1.19
	Low		1.05
$\alpha_p \neq .37$		$r = 2$	3
$\alpha_{.95}(r, 45)$		2.86	3.44
$\alpha_{.95}(r, 45)$		1.06	1.27

the social article ($M = 10.33$ for the economic and $M = 11.33$ for the social for Group A; and for Group B, $M = 11.00$ and $M = 11.67$ for the economic and social articles respectively--Table 4). On the other hand, an interaction effect between Groups A and B and articles is indicated at the second and third levels of interweaving. Both Groups of Ss answered correctly more questions from the article, whether economic or social, related to their high value orientation (as shown in Table 4, the means of Group A at the second level of interweaving were 11.33 for the economic and 9.50 for the social, and 9.50 for the economic and 7.50 for the social at the third level of interweaving; likewise, for Group B the means for the economic article were 9.33 at the second level and 7.33 at the third level of interweaving, while for the social article the means were respectively 10.33 and 9.17).

Tests on the differences--Table 5--between means number of right answers between the two value-intensity levels of Groups A and B yield an F-ratio of 0.04, df = 1 and 45 for the first level of interweaving; F = 3.09, df = 1 and 45, p < .10 for the second level of interweaving; and F = 5.65, df = 1 and 45, p < .05 for the third level of interweaving. While the Groups X articles interaction at the second level of interweaving did not reach conventional significance figures, it would seem difficult to attribute the obtained data to mere chance factors, much more so if a consideration is given to the similarity of the profiles of the second and third levels of interweaving. It seems, then, safe to conclude that Ss did not choose according to their values when the presentation of the information was clear, but as interweaving increased

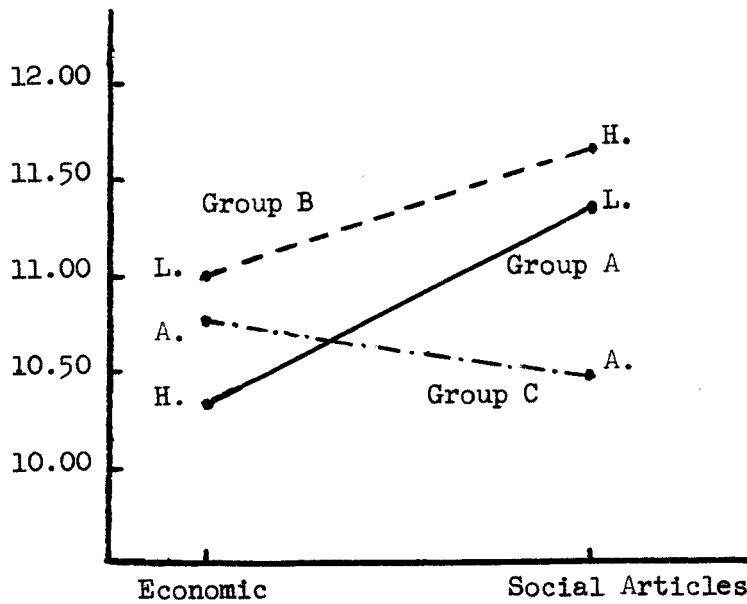


Figure 1. Simple interaction effects for articles and Groups at level 1 of interweaving.

H., L., and A. stand for high, low, and average value orientation. In this way, Groups A, B, and C are described.

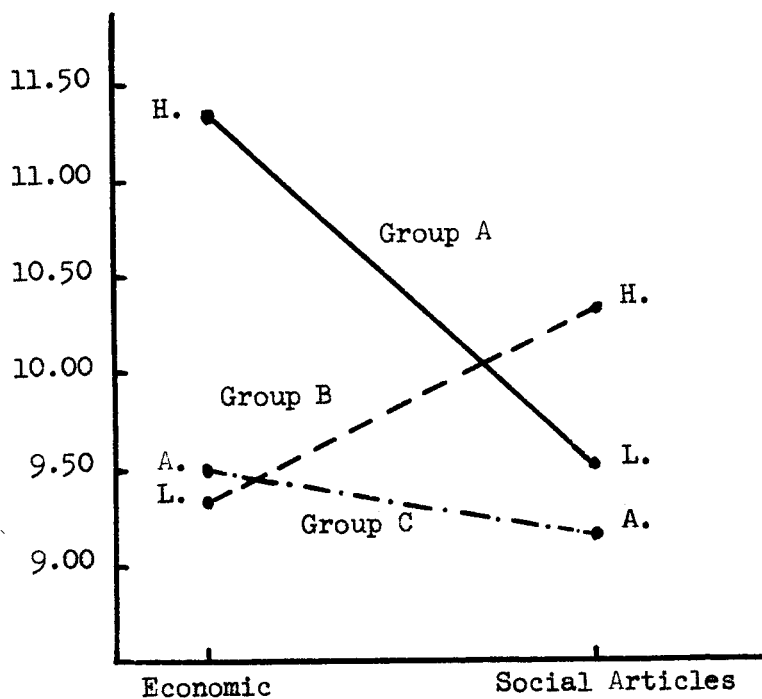


Figure 2. Simple interaction effects for articles and Groups at level 2 of interweaving.

See footnote of Figure 1.

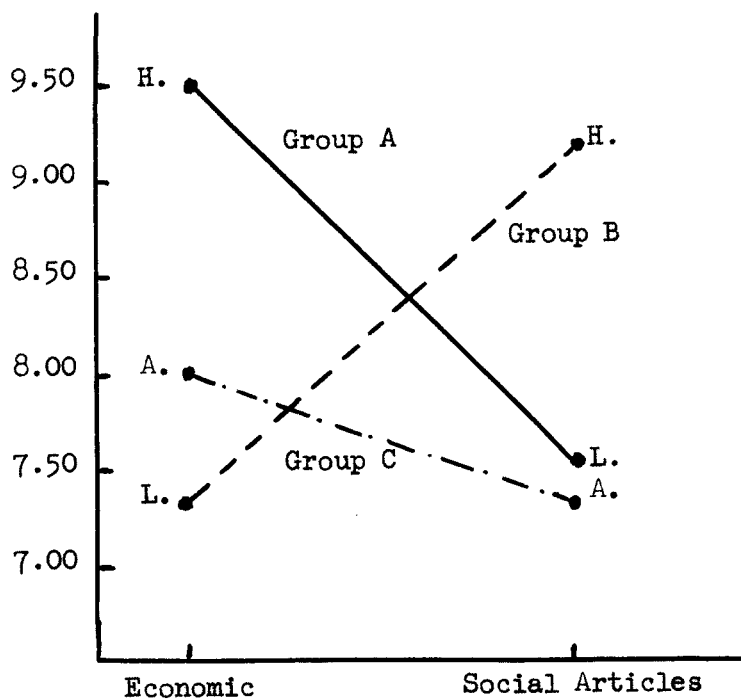
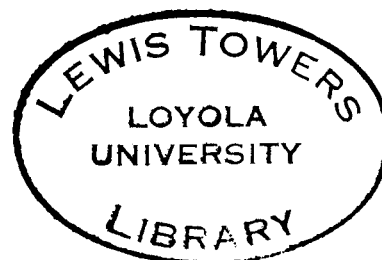


Figure 3. Simple interaction effects for articles and Groups at level 3 of interweaving.

See footnote of Figure 1.



value orientation became more and more effective in the selection of information.

Ss in Group C with average value orientation towards the two value areas gathered about the same amount of information from both articles at each of the three levels of interweaving ($M = 10.67$ for the economic and 10.50 for the social at level 1 of interweaving; $M = 9.50$ for the economic and 9.17 for the social at level 2 of interweaving; and means of 8.00 and 7.33 for the economic and the social articles respectively at the third level of interweaving). Looking at Table 5 we can see that the F-ratios for the difference of correct answers between the two articles are negligible at each of the three levels of interweaving: F = 0.03 , F = 0.13 , F = 0.51 at levels 1, 2, and 3 of interweaving respectively; in each instance df = 1 and 45).

Table 6 indicates that the effects of underlining were negligible (F = 0.28 , df = 1 and 34 for main effects; F = 0.02 , df = 1 and 34 for the interaction between underlining and interweaving). Table 6 also shows that Ss, as already reported, gathered more information from the second than from the third level of interweaving (F = 8.08 , df = 1 and 34, $p < .01$).

Table 4
Means Number of Right Answers for Groups
and Articles at the Three Levels
of Interweaving

Interweaving	Groups of <u>Es</u>	Articles	
		Economic	Social
1	A	10.33	11.33
	B	11.00	11.67
	C	10.67	10.50
2	A	11.33	9.50
	B	9.33	10.33
	C	9.50	9.17
3	A	9.50	7.50
	B	7.33	9.17
	C	8.00	7.33

Group A is composed of those Es with a high score in the economic category and a low score in the social value category; Group B, of those Es with a high score in the economic and a low score in the social categories; Group C, of those Es with average scores on both value areas.

Table 5
 Comparisons between Means Groups and
 Articles at the Three Levels
 of Interweaving

Source of Variation	SS	df	MS	F
Gr. A&B X Art. at Int. 1	0.17	1	0.17	0.04
Gr. A&B X Art. at Int. 2	12.04	1	12.04	3.09
Gr. A&B X Art. at Int. 3	22.04	1	22.04	5.65*
Subj w. groups + Art. X Subj. w. groups / 2	175.86	45	3.90	
Gr. C X Art. at Int. 1	0.08	1	0.08	0.03
Gr. C X Art. at Int. 2	0.33	1	0.33	0.13
Gr. C X Art. at Int. 3	1.33	1	1.33	0.51
Art. X Subj w. groups	117.59	45	2.61	
<hr/>				
$F_{.95} (1,45) = 4.04$				

Table 6

Summary of Analysis of Variance for Modes
of Presentation and Underlining

Source of Variation	SS	df	MS	F
<u>Between subjects</u>	<u>278.00</u>	<u>35</u>		
Interweaving	53.39	1	53.39	8.08**
Subj w. groups	224.61	34	6.61	
<u>Within subjects</u>	<u>108.00</u>	<u>36</u>		
Underlining	0.89	1	0.89	0.28
Inter. X Und.	0.05	1	0.05	0.02
Und. X Subj w. groups	107.06	34	3.15	
<hr/>				
$F_{.99} (1, 34) = 7.44$				

Chapter IV

Discussion

Personal value preferences as a factor in the selection of information were found to be more effective as the complexity of the experimental situation increases. The results fitted the hypothesis of interaction between value orientation of S and the equivocality of the situation. As indicated in the literature, the experimenter believes that this is the first direct experimental evidence adduced in favor of this hypothesis when values are considered as selective factors.

When Bruner and Goodman (1947) formulated the hypothesis of interaction, they were concerned with the effect of values on perception. Whether the present findings can be interpreted or not in terms of perception is left to the judgment of the reader. Evidently, Ss receiving levels 2 and 3 of interweaving had the opportunity of seeing the same letters and the same words as those under level 1 of interweaving. What Ss under the more difficult conditions cannot do as well as those to whom the articles were presented as an intact unit is to understand the meaning of the articles. To the extent to which we want to make the com-

prehension of meaning a part of perception to that extent the present data are relevant to the field of perception. The experimenter confesses that he is undecided and prefers to leave the reader free in making his judgment. As a kind of marginal note, it might be added that perhaps it is not the same to understand the meaning of an object--that what S is seeing is a "table" and not a conglomeration of colors--as to understand the meaning of a sentence or an article.

The present data could probably be interpreted as giving some support to the "hypothesis theory" of Bruner and Postman (Allport, 1955, pp. 375-406). The present writer, however, prefers to interpret the findings in terms of attention. Attention is construed as a narrowing down of consciousness to a specific object or topic.

When there is too much information passing through the senses attention cannot be given to all of it (Mowbray, 1954; Broadbent, 1952 and 1958). In some situations the incoming information can be identified as coming from two or more sources. When the amount of information reaching S is such that it cannot be adequately handled in its totality and it belongs to different sources, then there are two possibilities: all types of information will be equally damaged, or one type of information will be more damaged than the other. In our present experimental situation two types of information can be identified as there are two articles. The difference between the articles of interest for the present experiment is that one of them is related to the social value and the other to the economic value area. In the same way, the intensity of the value orientation of S to the social and

economic values also varied.

The results have shown that in the more complex situations the subjects gathered more information from the article related to their high value area than from the article related to their low value area. The interpretation given is simply that value orientation of S is one of the factors influencing attention. However, it was found that S did not choose according to his values when the two articles were presented consecutively. The effect of value orientation may not be shown in those situations where S can handle adequately the information received; it is when the incoming information is above the upper limits of S's abilities that values are more clearly shown as factors influencing the type of material to which attention will be paid.

At any moment of a man's life there are many possibilities opened for action, only one or a few of which can be carried out into practice. It is believed that values influence actual choices. Suppose that a given evening we have the opportunity of going to the movies, or visit friends, play cards, watch television, or read. It is believed that the decision of doing one of these things with the exclusion of the other four will in part be dependent on the likings and dislikings of the agent, on whether he "values" one of these things over the others or not. Again, suppose that we decide to watch television, what channel will be turned on will also partially depend on our differential evaluation of the programs being telecast. In this sense, values are considered as important factors influencing not only decisions of the moment--e.g., whether we go to the movies or stay home watching television--but also shaping our

whole style of life, the career we choose, the selection of a partner in matrimony, or our religion, etc...

In this last context, the present data can be interpreted in the following way. S wants to pay attention to all the information presented to him. When the information is presented in a clear way, S is able to pay reasonable attention to both articles. When the sentences of the articles are interwoven, even more clearly when the words are interwoven, S cannot handle all the information, and so he pays more attention to the content area he values more. Whether this selective process is conscious or unconscious cannot be said by the present data. After more than half of the data have been collected, E decided to ask individually two questions to each S once they have finished the tests: (1) Do you think that you were paying more attention to one article than to the other?, and (2) Could you tell me why? The second question was not asked in the case that a negative answer was given to the first question. It seems to the present writer that this procedure can give us an answer as to the consciousness or unconsciousness of S's choices in terms of value intensities.

The hypothesis of a positive monotonic relationship between intensity of S's value orientation and amount of information gathered was not supported by the data. While it seems reasonable to conclude that Ss gathered more information from the article related to their high value area than from the articles related to their neutral or low areas, Ss with average value orientation did not answer correctly more questions than those with low value orientation.

As indicated in the literature, most studies on values as selec-

tive factors have found a linear relationship between values and its operational measure. It seemed, then, reasonable to expect a positive monotonic relationship between value and amount of information gathered. On the other hand, the only experiment dealing with the selective effect of value upon memory reported a U-relationship between number of words recalled and values. The present data did not confirm either hypothesis; neither is it thought that they pose any special problems to either one.

At first sight the fact that there were no differences between low and average value groups would seem hard to explain. However, all the experiments reported in the literature deal with intrapersonal differences in value intensity. It is the same S the one who has differences in his value intensity toward the value areas in which he is being tested. When comparing the average group with the other two groups in the present design we are comparing two sets of Ss. In intrapersonal comparisons such factors as capacity of attention, motivation, intelligence, etc. might blur the effectiveness of the value variable. More important, the Study of Values is a measure of the intrapersonal relative strength of values. A high score in the economic area and a low score in the social area for a given S means that he prefers economic over social values, but it does not mean that a S with a low score in the social value has less esteem for social things than another S who had a high score in the social area. It is possible that the absolute value strength of the lowest score of a given S is greater than that of the highest score of another S. Intergroup comparisons would seem not to have much meaning when the Study of Values is used as a measure of value strength.

The fact that Ss in Groups A and B gathered more information from the article related to their high value area than from the one consonant to their low value area--here we are dealing with intrapersonal differences--does not necessarily speak against an U-relationship. The possibility that Ss would gather more information from their low value area than from an average value is not excluded.

When considering carefully the effect of values, it seems that the selectivity found has to be explained in terms of the interaction hypothesis rather than by chance factors, or any possible linear or U-relationships: Ss receiving the most clear presentation did not choose according to their values while Ss under the two other levels of interweaving did choose according to their value preferences.

It would be difficult to separate the effects here attributed to value intensity from the effects of a possible differential familiarity of Ss with the general area, if not the special content, of the articles. As noted, there were only seven subjects known to attend the Business School. Six of them were high in the economic and low in the social value, the remaining one forming part of the average group. It is reasonable to assume that these Ss were more familiar with the article of economic content, at least certainly with the general economic area, than with the article of social content. To what extent this factor influenced the results remains unknown.

When using college students as Ss, an improvement over the present design would be a more careful selection of Ss in terms of their field of studies. We don't know what those students in the College of Arts

and Sciences are majoring in, nor what is the specialization of students in the University College, much less of those taking classes in Summer School. In selecting Ss it seems that care should be taken to avoid an excess of Ss with a high value intensity in the same area in which they are specializing. For example, if we have six students majoring in Economics in the high-economic, low-social group, then there should be another six Ss majoring in Economics in the group formed by Ss who are high in the social and low in the economic areas. In this way, there will be less confusion between the value and the frequency variables.

The results clearly confirmed the third hypothesis, the information processed by Ss decreased with the increasing of interweaving. The eyes did pass all the information, the same in levels 2 and 3 of interweaving as in the most clear presentation. Evidently the results are not due to peripheral but to central limitations. According to information theory, the information that is transmitted by a signal is related to the size of its ensemble and to the probability of the given signal. Ensemble is used to designate the set of k alternatives that are possible at a given time in a given circumstance. After a word has been said or read there are many other words that can follow it. The information transmitted by a sentence, then, is very high, and continued attention needs to be paid in order to respond adequately to it--usually we cannot understand the meaning of a sentence by just listening to the first word. An article is composed of related sentences: a more adequate answer will be made at the end of the whole article. When sentences are presented interwoven, even more clearly when words are interwoven, attention is being paid to

two articles or to two sentences at the same time. It looks as if the information that passes through the eyes is too much for attention being paid to all of it. Limitations of attention, then, are thought to influence the capacity of S for the handling of information.

Chapter V

Summary

Subjects who were high and at the same time low in the social and economic categories of the Study of Values were selected. Ss who had average scores in these two value categories were also used. Two small articles, one related to the social and the other to the economic areas, were prepared. Similarly two questionnaires one for each article were constructed in order to obtain an index of the information gathered by S. The difficulty of the presentation of the articles was varied: in the most clear presentation the articles were presented consecutively, but in the second and third modes of presentation they were combined through interweaving of sentences or words respectively. The results showed that there is an interaction effect between intensity of S's values and difficulty of the experimental arrangement: Ss gathered more information from the articles related to their high values only in the more difficult presentations. Similarly, it was found that the modes of presentation influence the amount of information gathered. Values are conceived as factors influencing attention.

Appendix A

Table 7

Summary of Analysis of Variance for
Reading Comprehension Ability

Source of Variation	SS	df	MS	F
Level of comprehension	14.78	2	7.39	0.16
Experimental error	1490.55	32	46.58	
Total	<u>1505.33</u>	<u>34</u>		

Table 8

Number of Right Answers Given by Ss to the
Final Comprehension Tests (Raw Data)

Articles	Economic			Social		
	High	Aver.	Low	High	Aver.	Low
Value Intensity						
Degrees of Interweaving	12	13	10	10	12	11
	9	12	14	14	10	10
	8	9	10	10	10	11
1	11	9	9	12	11	12
	11	11	13	12	11	11
	11	10	10	12	9	13
	11	9	8*	7	10*	11*
	12*	9*	10	11*	11	10
	12*	14	10	12*	13*	8
2	11*	4*	10	10*	5	9
	9	9*	10	11*	6	9*
	13*	12	8*	11	10*	10
	9*	6*	8*	11	5	8
	9*	8*	9*	8	10	6
	12	10	10	11*	3*	12*
3	10	10*	5*	7	8	10*
	9	6	7	9*	9*	4*
	8*	8	5	9*	9*	5

Entries in columns 1 and 6, 2 and 5, 3 and 4 are taken from the same S.

Entries with the asterisk (*) are taken from the article that was underlined.

Appendix B

Preliminary Tryout Tests

Appendix B shows the preliminary tests. The presentation that appears was not the only one used. The order of presentation of the articles was counterbalanced; for half of the subjects the first article was the economic. The order of presentation of the questions was randomized. Again, the two articles were presented on one single page, and the questions on four pages with 14 or 15 questions per page.

Table 9

Responses of Ss in the Preliminary Tryout to
the Questions that were Selected for the
Final Comprehension Tests

Social Questions			Economic Questions		
Order in Final Tests	Order in Preliminary Tests	<u>Ss</u>	Order in Final Tests	Order in Preliminary Tests	<u>Ss</u>
1	1	13	1	4	13
2	20	20	2	19	14
3	5	19	3	10	20
4	8	18	4	12	18
5	14	16	5	16	16
6	15	15	6	17	16
7	9	10	7	14	13
8	29	6	8	25	7
9	27	14	9	23	14
10	11	17	10	15	12
11	25	20	11	9	17
12	16	13	12	18	10
13	23	18	13	21	20
14	7	11	14	11	11
15	2	10	15	7	19
Xanswers per question		14.67			14.67
s ²		16.22			13.56
Xanswers per <u>S</u>		11.00			11.00

Entries in Ss columns indicate the number of subjects out of 20 who answered correctly the questions.

INSTRUCTIONS

You have been given a booklet and a cardboard. Read the pages in the order that they are presented. When you have read one page, turn it over and do not look back at it, unless you want to reread the instructions.

In the booklet you will find two short passages to be read, followed by a series of multiple choice questions. In reading the passages, do not read any line or sentence more than once. This is important. When you begin to read, place the cardboard guide at the top of the page. As you read each line, slide the guide down over the line. Do not move the guide upward.

This is not a test of reading ability, not a test of intelligence. It is an experiment regarding how people read particular kinds of material. Please, do the best you can. Otherwise the results of the experiment will not be usable. Thank you for your cooperation.

Remember the guide must cover each line as you finish it, and must not be moved upwards.

NEW METHOD TO CURE THE DUMB. Congenital deaf-mutism is a misnomer. The defect is exclusively auditory; if a baby cannot hear ordinary tones he cannot imitate speech. The deaf child, however, has a vestige of hearing. Dr. Johnson has been able to develop this minimal capacity so that the deaf children can learn normal speech. A child in Dr. Johnson's school is fitted with earphones into which a bass tone is fed at a volume ear-shattering to a normal person. At first the sensation means nothing to the child. But the teacher shows that he has heard; soon the child reacts to the sound. Next he learns that sounds may be long or short, high or low, and he tells the teacher which is which. Finally the child is fitted with a microphone. When he makes a noise, the teacher signals receipt of it. Many children begin by pitching their vocal efforts too high or too low. Dr. Johnson and his 12 teachers are implacable about correcting a pupil's pitch until it is acceptable. A child may need only a year to learn to pronounce concrete names; words for abstract ideas take longer. Slowly the kids build up a practical vocabulary and around 10 they start going to ordinary schools. The children are still deaf but, equipped with powerful hearing aids, they make use of their small auditory sense; their speech is normal. Dr. Johnson's method has been adopted by many European schools.

ECONOMICS AND INVESTMENT. Business activity continues to expand in a brisk fashion. The gross national product is expected to post a substantial gain for the fifth consecutive year. People in the field of economics cite as the principal element of business expansion the increment in business investment. Business investment is expected to rise through-

out the present year and will top 50 billion dollars for the first time in the history. Economists view investment as seed money that determines the general course of business. A dollar invested is expected to yield much more than a dollar's worth of total output. Ohio is an example of an economically fast growing state. In a single year Ohio industry totaled a record-setting new capital investment of one billion. Most of Ohio's companies are prospering and expanding. New and former out of state companies are coming to do business in Ohio. The reasons are many. The lowest state and local taxes of any comparable industrial state is to be found in Ohio, and there is no prospect of increased taxes in the years to come. Ohio's labor force ranks among the most productive in the nation. But perhaps Ohio's biggest asset is its geographical situation. From Ohio the products reach more markets faster than from any other state. Within 500 miles of Ohio are two thirds of the nation's population and its retail sales, and three fourths of the nation's manufacturing and its new plant and equipment.

INSTRUCTIONS

Do not answer the questions according to what you know but according to what you have read. For example, to the question, Is Chicago a city? (a) yes; (b) no; (c) I don't know; (d) it cannot be said, the right answer is (d) and not (a), since nothing was said about Chicago.

After you have answered the questions of one page turn it over and do not look back at them.

Do not care for the other instructions given above.

You don't have to use the cardboard any longer.

1. Dr. Johnson has been working in: a) United States, b) Italy, c) France, d) it cannot be said. _____
2. Most children who never learn to talk: a) have exclusively auditory defects, b) have dumb parents, c) experience a trauma at birth, d) it cannot be said. _____
3. Dr. Johnson's pupils: a) like their teachers, b) dislike their teachers, c) some like their teachers, some don't, d) it cannot be said. _____
4. When the deaf-mute child finishes his special training: a) his hearing is near normal, b) he is still deaf but thanks to his ability in lip reading can understand other persons, c) he is still deaf but with powerful hearing aids can understand other persons, d) it cannot be said. _____
5. Teachers in Dr. Johnson's school: a) indicate to the child that sounds are important, b) sit in the classroom and do very little, c) frequently let the children alone in the classroom, d) it cannot be said. _____
6. From every thousand babies that are born there are: a) two deaf-dumb children, b) three, c) six, d) it cannot be said. _____
7. Congenital deaf children: a) can hear with difficulty but without aid ordinary sounds, b) cannot hear anything even with hearing aids, c) can hear some sounds with hearing aids, d) it cannot be said. _____
8. Deaf-dumb children are trained: a) in ordinary schools, b) at their own homes, c) first in special schools and, then, they go to ordinary schools, d) it cannot be said. _____
9. Dr. Johnson: a) was born in Italy, b) has developed a new method to cure the dumb, c) was born in France, d) it cannot be said. _____
10. Dr. Johnson's sons are: a) seven, b) three, c) dumb, d) it cannot be said. _____
11. Schools for mutes have put emphasis on lip reading and sign language: a) frequently, b) rarely, c) never, d) it cannot be said. _____
12. When so-called deaf-dumb children begin to talk, they: a) use a microphone, b) are startled, c) laugh, d) it cannot be said. _____
13. When the deaf child hears for the first time the sounds made by his teacher: a) he laughs, b) the sounds mean nothing to him, c) he is startled, d) it cannot be said. _____
14. A child born deaf: a) doesn't have any capacity at all for hearing, b) has a small capacity for hearing, c) comes from a family defective in hearing, d) it cannot be said. _____

15. Deaf-dumb children learn first to pronounce: a) abstract words, b) concrete words, c) none of these, d) it cannot be said. _____
16. The title of one of the articles was: a) Challenging the Leader, b) New Man for the Club, c) New Method to Cure the Dumb, d) it cannot be said. _____
17. The greatest proportion of deaf-dumb children is found in: a) Africa, b) America, c) Asia, d) it cannot be said. _____
18. Most children in Dr. Johnson's school begin by pitching their vocal efforts: a) very accurately, b) too high or too low, c) they never speak, d) it cannot be said. _____
19. When a deaf child begins to hear, he: a) knows from the beginning how to discriminate between long and short sounds, b) knows from the beginning how to discriminate between high and low sounds, c) has to undergo treatment before he is able to discriminate different kinds of sounds, d) it cannot be said. _____
20. The Gemini program: a) is an astronomical enterprise, b) has been very successful, c) is used in testing astronauts, d) it cannot be said. _____
21. Earphones: a) were developed in the middle of the 19th century, b) are helpful in the treatment of congenital mutes, c) are of no use in helping the dumb, d) it cannot be said. _____
22. Dr. Johnson's pupils start their classes when they are: a) one year old, b) two years old, c) approximately three years old, d) it cannot be said. _____
23. Most of the money spent by American schools for deaf and dumb children comes from: a) grants of the U.S. Government, b) private donations, c) grants of private States, d) it cannot be said. _____
24. Children who are dumb from birth are: a) a disgrace, b) numerous, c) not truly defective in the mechanism of speech, d) it cannot be said. _____
25. When Dr. Johnson's pupils are around 10 years old, they: a) go to ordinary schools, b) have not yet made any tangible progress, c) begin a period of rapid improvement, d) it cannot be said. _____
26. Teachers in Dr. Johnson's school: a) do not pay much attention about the quality of a pupil's pitch, b) are all women, c) are implacable in correcting a pupil's pitch, d) it cannot be said. _____
27. When the deaf-mutes finish their special training: a) their speech is near normal or normal, b) their speech is very awkward but understandable, c) their training doesn't have anything to do with speaking, _____

- d) it cannot be said. _____
28. The official U.S. Government policy on birth control: a) was not to say anything about it, b) has changed recently, c) is more permissive than that of most countries, d) it cannot be said. _____
29. Dr. Johnson's method has been adopted by many: a) American schools, b) European schools, c) African schools, d) it cannot be said. _____

1. Going into business takes know how to avoid mistakes in: a) buying, b) advertising, c) accounting, d) it cannot be said. _____
2. An important element in business expansion is: a) business investment, b) better salaries, c) marketing facilities, d) it cannot be said. _____
3. During 1964 sales gains were largest in: a) February, b) December, c) August, d) it cannot be said. _____
4. Within 500 miles of Ohio there is more than half of the national: a) population, b) farm production, c) forest richness, d) it cannot be said. _____
5. Taxes in Ohio during the next few years are going to: a) remain about the same, b) increase, c) decrease, d) it cannot be said. _____
6. Ohio offers an impressive program for the expansion of: a) airport facilities, b) education, c) recreational facilities, d) it cannot be said. _____
7. The title of one of the articles was: a) Crime in U.S. out of Hand?, b) Economics and Investment, c) Civil Rights, d) it cannot be said. _____
8. Ohio's biggest asset: a) is its abundance of labor force, b) is its geographical position, c) are its natural resources, d) it cannot be said. _____
9. Investment is: a) more productive if employed in big industries, b) viewed as seed money by economists, c) a product of the twentieth century, d) it cannot be said. _____
10. Queen Elizabeth of England recently visited: a) Burundi, b) Egypt, c) Ethiopia, d) it cannot be said. _____
11. The Government is particularly pleased by: a) prospects of increment in business investment, b) the surging of new industries, c) amelioration of industrial plants, d) it cannot be said. _____
12. A record-setting new captial investment for a year is held by: a) Ohio, b) Arizona, c) California, d) it cannot be said. _____
13. The expansion in Ohio's industry is due in part to: a) the coming of new industries into the State, b) the expansion of former industries, c) both things, d) it cannot be said. _____
14. The gross national product: a) has remained about the same in the last year, b) is greater than the consumer's capacity, c) is expected to post a substantial gain during this year, d) it cannot be said. _____
15. The majority of the new plants and equipments of the nation are found:

- a) in Ohio, b) within 500 miles of Ohio, c) within 500 miles of Texas, d) it cannot be said. _____
16. Ohio: a) is situated in the Mid-West, b) is an economically fast growing State, c) has promising fishing industries, d) it cannot be said. _____
17. There are in Ohio: a) Thirty-four railroad lines, b) thirteen regularly scheduled airlines services, c) 441 airfields, d) it cannot be said. _____
18. Ohio's bad point for industrial expansion is that its labor force is: a) unprepared, b) unproductive, c) none of these is true, d) it cannot be said. _____
19. Ohio has: a) high mountains, b) the lowest state and local taxes of any highly industrial State, c) prosperous mines, d) it cannot be said. _____
20. Employer-employee relationships in Ohio are: a) excellent, b) very poor, c) as in most of the other States, d) it cannot be said. _____
21. For the first time in history: a) investment will top 50 billion dollars, b) small industries will increase by four percent, c) many Europeans are worried by the flood of dollars into their continent, d) it cannot be said. _____
22. The upsurge in production that is now going on is paced by: a) car industries, b) steel industries, c) chemical industries, d) it cannot be said. _____
23. In energy production Ohio ranks: a) first, b) second, c) third, in the nation, d) it cannot be said. _____
24. Business activity is: a) greater in America than in Europe, b) greater in America than in Africa, c) expanding in a brisk fashion, d) it cannot be said. _____
25. Not too far from Ohio there are: a) three fourths, b) one fourth, c) two fifths of the nation's manufacturing, d) it cannot be said. _____
26. More markets in less time are reached from: a) Ohio, b) New Mexico, c) Kansas, Missouri, Ohio, in that order, d) it cannot be said. _____
27. The general course of business is determined by: a) good employer-employee relationship, b) low utility rates, c) the amount of investment, d) it cannot be said. _____
28. The theory of aggression most accepted today is that of: a) Freud, b) Miller and Dollard, c) Bandura, d) it cannot be said. _____

29. A dollar invested is: a) a dollar lost, b) expected to produce much more than its value, c) appreciated by the government, d) it cannot be said. _____

Appendix C

Final Tests for the Three Levels of Interweaving

Appendix C shows the final tests. The presentations that appear were not the only ones used. The order of presentation of the articles, the underlining, and the order of the questions was counterbalanced for each treatment. The two articles were presented on one single page, and the questions on two pages: the 15 social questions on one page, and the 15 economic questions on the other. The instructions for the second and third levels of interweaving were contained on one page.

First Level of Interweaving

INSTRUCTIONS

You have been given a booklet and a cardboard. Read the pages in the order that they are presented. When you have read one page, turn it over and do not look back at it unless you want to reread the instructions.

In the booklet you will find two short passages to be read, followed by a series of multiple choice questions. In reading the passages, do not read any line or sentence more than once. This is important. When you begin to read, place the cardboard guide at the top of the page. As you read each line, slide the guide down over the line. Do not move the guide upward.

This is not a test of reading ability, not a test of intelligence. It is an experiment regarding how people read particular kinds of material. Please, do the best you can. Otherwise the results of the experiment will not be usable. Thank you for your cooperation.

Remember the guide must cover each line as you finish it, and must not be moved upwards.

ECONOMICS AND INVESTMENT. Business activity continues to expand in a brisk fashion. The gross national product is expected to post a substantial gain for the fifth consecutive year. People in the field of economics cite as the principal element of business expansion the increment in business investment. Business investment is expected to rise throughout the present year and will top 50 billion dollars for the first time in history. Economists view investment as seed money that determines the general course of business. A dollar invested is expected to yield much more than a dollar's worth of total output. Ohio is an example of an economically fast growing state. In a single year Ohio industry totaled a record-setting new capital investment of one billion. Most of Ohio's companies are prospering and expanding. New and former out of state companies are coming to do business in Ohio. The reasons are many. The lowest state and local taxes of any comparable industrial state is to be found in Ohio, and there is no prospect of increased taxes in the years to come. Ohio's labor force ranks among the most productive in the nation. But perhaps Ohio's biggest asset is its geographical situation. From Ohio the products reach more markets faster than from any other state. Within 500 miles of Ohio are two thirds of the nation's population and its retail sales, and three fourths of the nation's manufacturing and its new plant and equipment.

NEW METHOD TO CURE THE DUMB. Congenital deaf-mutism is a misnomer. The defect is exclusively auditory; if a baby cannot hear ordinary tones he cannot imitate speech. The deaf child, however, has a vestige of hearing. Dr. Johnson has been able to develop this minimal capacity so that deaf

children can learn normal speech. A child in Dr. Johnson's school is fitted with earphones into which a bass tone is fed at a volume ear-shattering to a normal person. At first the sensation means nothing to the child. But the teacher shows that he has heard; soon the child reacts to the sound. Next he learns that sounds may be long or short, high or low, and he tells the teacher which is which. Finally the child is fitted with a microphone. When he makes a noise, the teacher signals receipt of it. Many children begin by pitching their vocal efforts too high or too low. Dr. Johnson and his 12 teachers are implacable about correcting a pupil's pitch until it is acceptable. A child may need only a year to learn to pronounce concrete names; words for abstract ideas take longer. Slowly the kids build up a practical vocabulary and around 10 they start going to ordinary schools. The children are still deaf but, equipped with powerful hearing aids, they make use of their small auditory sense; their speech is normal. Dr. Johnson's method has been adopted by many European schools.

INSTRUCTIONS

Do not answer the questions according to what you know but according to what you have read. For example, to the question, Is Chicago a city?: (a) yes; (b) no; (c) I don't know; (d) it cannot be said, the right answer is (d) and not (a), since nothing was said about Chicago.

After you have answered the questions of one page turn it over and do not look back at them. Do not care for the other instructions given above. You don't have to use the cardboard any longer.

1. Dr. Johnson has been working in: a) United States, b) Italy, c) France, d) it cannot be said. _____
2. The Gemini program: a) is an astronomical enterprise, b) has been very successful, c) is used in testing astronauts, d) it cannot be said. _____
3. Teachers in Dr. Johnson's school: a) indicate to the child that sounds are important, b) sit in the classroom and do very little, c) frequently let the children alone in the classroom, d) it cannot be said. _____
4. Deaf-dumb children are trained: a) in ordinary schools, b) at their own homes, c) first in special schools and, then, they go to ordinary schools, d) it cannot be said. _____
5. A child born deaf: a) doesn't have any capacity at all for hearing, b) has a small capacity for hearing, c) comes from a family defective in hearing, d) it cannot be said. _____
6. Deaf-dumb children learn first to pronounce: a) abstract words, b) concrete words, c) none of these, d) it cannot be said. _____
7. Dr. Johnson: a) was born in Italy, b) has developed a new method to cure the dumb, c) was born in France, d) it cannot be said. _____
8. Dr. Johnson's method has been adopted by many: a) American schools, b) European schools, c) African schools, d) it cannot be said. _____
9. When the deaf-mutes finish their special training: a) their speech is near normal or normal, b) their speech is very awkward but understandable, c) their training doesn't have anything to do with speaking, d) it cannot be said. _____
10. Schools for mutes have put emphasis on lip reading and sign learning: a) frequently, b) rarely, c) never, d) it cannot be said. _____
11. When Dr. Johnson's pupils are around 10 years old, they: a) go to ordinary schools, b) have not yet made any tangible progress, c) begin a period of rapid improvement, d) it cannot be said. _____
12. The title of one of the articles was: a) Challenging the Leader, b) New Man for the Club, c) New Method to Cure the Dumb, d) it cannot be said. _____
13. Most of the money spent by American schools for deaf and dumb children comes from: a) grants of the U.S. Government, b) private donations, c) grants of private States, d) it cannot be said. _____
14. Congenital deaf children: a) can hear with difficulty but without aid ordinary sounds, b) cannot hear anything even with hearing aids,

c) can hear some sounds with hearing aids, d) it cannot be said. _____

15. Most children who never learn to talk: a) have exclusively auditory defects, b) have dumb parents, c) experience a trauma at birth, d) it cannot be said. _____

1. Within 500 miles of Ohio there is more than half of the national: a) population, b) farm production, c) forest richness, d) it cannot be said. _____
2. Ohio has: a) high mountains, b) the lowest state and local taxes of any highly industrial State, c) prosperous mines, d) it cannot be said. _____
3. Queen Elizabeth of England recently visited: a) Burundi, b) Egypt, c) Ethiopia, d) it cannot be said. _____
4. A record-setting new capital investment for a year is held by: a) Ohio, b) Arizona, c) California, d) it cannot be said. _____
5. Ohio: a) is situated in the Mid-West, b) is an economically fast growing State, c) has promising fishing industries, d) it cannot be said. _____
6. There are in Ohio: a) Thirty-four railroad lines, b) thirteen regularly scheduled airlines services, c) 441 airfields, d) it cannot be said. _____
7. The gross national product: a) has remained about the same in the last year, b) is greater than the consumer's capacity, c) is expected to post a substantial gain during this year, d) it cannot be said. _____
8. Not too far from Ohio there are: a) three fourths, b) one fourth, c) two fifths of the nations manufacturing, d) it cannot be said. _____
9. In energy production Ohio ranks: a) first, b) second, c) third, in the nation, d) it cannot be said. _____
10. The majority of the new plants and equipments of the nation are found: a) in Ohio, b) within 500 miles of Ohio, c) within 500 miles of Texas, d) it cannot be said. _____
11. Investment is: a) more productive if employed in big industries, b) viewed as seed money by economists, c) a product of the twentieth century, d) it cannot be said. _____
12. Ohio's bad point for industrial expansion is that its labor force is: a) unprepared, b) unproductive, c) none of these is true, d) it cannot be said. _____
13. For the first time in the history: a) investment will top 50 billion dollars, b) small industries will increase by four percent, c) many Europeans are worried by the flood of dollars into their continent, d) it cannot be said. _____
14. The Government is particularly pleased by: a) prospects of increment

in business investment, b) the surging of new industries, c) amelioration of industrial plants, d) it cannot be said. _____

15. The title of one of the articles was: a) Crime in U.S. out of Hand?, b) Economics and Investment, c) Civil Rights, d) it cannot be said. _____

Second Level of Interweaving

INSTRUCTIONS

You have been given a booklet and a cardboard. Read the pages in the order that they are presented. When you have read one page, turn it over and do not look back at it, unless you want to reread the instructions.

In the booklet you will find two short passages to be read, followed by a series of multiple choice questions. In reading the passages, do not read any line or sentence more than once. This is important. When you begin to read, place the cardboard guide at the top of the page. As you read each line, slide the guide down over the line. Do not move the guide upward. The manner of the presentation of the articles is unusual. You will find first one sentence of an article, then one of the other, and so until both articles are finished. The sentences of one of the articles will be underlined, while the sentences of the other will not be underlined. For example, if we have four sentences related to two different topics: "New York is a city." "Certainly a big one." and: "My home has seven rooms." "I was sitting in the smallest one." Then the manner of presentation will be: New York is a city. My

home has seven rooms. Certainly a big one. I was sitting
in the smallest one.

Read each sentence just once and in the order that the sentences appear. Do not skip either the underlined sentences or the sentences not underlined.

Don't be disturbed if the material is hard to understand.

This is not a test of reading ability, nor a test of intelligence. It is an experiment regarding how people read particular kinds of material.

Please, do the best you can. Otherwise the results of the experiment will not be usable.

Remember the guide must cover each line as you finish it, and must not be moved upwards. Thank you for your cooperation.

ECONOMICS AND INVESTMENT. NEW METHOD TO CURE THE DUMB. Business activity continues to expand in a brisk fashion. Congenital deaf-mutism is a misnomer. The gross national product is expected to post a substantial gain for the fifth consecutive year. The defect is exclusively auditory; if a baby cannot hear ordinary tones he cannot imitate speech. People in the field of economics cite as the principal element of business expansion the increment in business investment. The deaf child, however, has a vestige of hearing. Business investment is expected to rise throughout the present year and will top 50 billion dollars for the first time in the history. Dr. Johnson has been able to develop this minimal capacity so that deaf children can learn normal speech. Economists view investment as seed money that determines the general course of business. A child in Dr. Johnson's school is fitted with earphones into which a bass tone is fed at a volume ear-shattering to a normal person. A dollar invested is expected to yield much more than a dollar's worth of total output. At first the sensation means nothing to the child. Ohio is an example of an economically fast growing state. But the teacher shows that he has heard; soon the child reacts to the sound. In a single year Ohio industry totaled a record-setting new capital investment of one billion. Next he learns that sounds may be long or short, high or low, and he tells the teacher which is which. Most of Ohio's companies are prospering and expanding. Finally the child is fitted with a microphone. New and former out of state companies are coming to do business in Ohio. When he makes a noise, the teacher signals receipt of it. The reasons are many. Many children begin by pitching their vocal efforts too high or too low. The lowest state and local taxes

of any comparable industrial state is to be found in Ohio, and there is no prospect of increased taxes in the years to come. Dr. Johnson and his 12 teachers are implacable about correcting a pupil's pitch until it is acceptable. Ohio labor force ranks among the most productive in the nation. A child may need only a year to learn to pronounce concrete names; words for abstract ideas take longer. But perhaps Ohio's biggest asset is its geographical situation. Slowly the kids build up a practical vocabulary and around 10 they start going to ordinary schools. From Ohio the products reach more markets faster than from any other state. The children are still deaf but, equipped with powerful hearing aids, they make use of their small auditory sense; their speech is normal. Within 500 miles of Ohio are two thirds of the nation's population and its retail sales, and three fourths of the nation's manufacturing and its new plant and equipment. Dr. Johnson's method has been adopted by many European schools.

INSTRUCTIONS

Do not answer the questions according to what you know but according to what you have read. For example, to the question, Is Chicago a city?: (a) yes; (b) no; c) I don't know; (d) it cannot be said, the right answer is (d) and not (a), since nothing was said about Chicago. After you have answered the questions of one page turn it over and do not look back at them. Do not care for the other instructions given above. You don't have to use the cardboard any longer.

1. Within 500 miles of Ohio there is more than half of the national: a) population, b) farm production, c) forest richness, d) it cannot be said. _____
2. Ohio has: a) high mountains, b) the lowest state and local taxes of any highly industrial State, c) prosperous mines, d) it cannot be said. _____
3. Queen Elizabeth of England recently visited: a) Burundi, b) Egypt, c) Ethiopia, d) it cannot be said. _____
4. A record-setting new capital investment for a year is held by: a) Ohio; b) Arizona, c) California, d) it cannot be said. _____
5. Ohio: a) is situated in the Mid-West, b) is an economically fast growing State, c) has promising fishing industries, d) it cannot be said. _____
6. There are in Ohio: a) Thirty-four railroad lines, b) thirteen regularly scheduled airlines services, c) 441 airfields, d) it cannot be said. _____
7. The gross national product: a) has remained about the same in the last year, b) is greater than the consumer's capacity, c) is expected to post a substantial gain during this year, d) it cannot be said. _____
8. Not too far from Ohio there are: a) three fourths, b) one fourth, c) two fifths of the nation's manufacturing, d) it cannot be said. _____
9. In energy production Ohio ranks: a) first, b) second, c) third, in the nation, d) it cannot be said. _____
10. The majority of the new plants and equipments of the nation are found: a) in Ohio, b) within 500 miles of Ohio, c) within 500 miles of Texas, d) it cannot be said. _____
11. Investment is: a) more productive if employed in big industries, b) viewed as seed money by economists, c) a product of the twentieth century, d) it cannot be said. _____
12. Ohio's bad point for industrial expansion is that its labor force is: a) unprepared, b) unproductive, c) none of these is true, d) it cannot be said. _____
13. For the first time in the history: a) investment will top 50 billion dollars, b) small industries will increase by four percent, c) many Europeans are worried by the flood of dollars into their continent, d) it cannot be said. _____
14. The Government is particularly pleased by: a) prospects of increment in business investment, b) the surging of new industries, c) amelioration of industrial plants, d) it cannot be said. _____

15. The title of one of the articles was: a) Crime in U.S. out of Hand?,
b) Economics and Investment, c) Civil Rights, d) it cannot be said. _____

1. Dr. Johnson has been working in: a) United States, b) Italy, c) France, d) it cannot be said. _____
2. The Gemini program: a) is an astronomical enterprise, b) has been very successful, c) is used in testing astronauts, d) it cannot be said. _____
3. Teachers in Dr. Johnson's school: a) indicate to the child that sounds are important, b) sit in the classroom and do very little, c) frequently let the children alone in the classroom, d) it cannot be said. _____
4. Deaf-dumb children are trained: a) in ordinary schools, b) at their own homes, c) first in special schools and, then, they go to ordinary schools, d) it cannot be said. _____
5. A child born deaf: a) doesn't have any capacity at all for hearing, b) has a small capacity for hearing, c) comes from a family defective in hearing, d) it cannot be said. _____
6. Deaf-dumb children learn first to pronounce: a) abstract words, b) concrete words, c) none of these, d) it cannot be said. _____
7. Dr. Johnson: a) was born in Italy, b) has developed a new method to cure the dumb, c) was born in France, d) it cannot be said. _____
8. Dr. Johnson's method has been adopted by many: a) American schools, b) European schools, c) African schools, d) it cannot be said. _____
9. When the deaf-mutes finish their special training: a) their speech is near normal or normal, b) their speech is very awkward but understandable, c) their training doesn't have anything to do with speaking, d) it cannot be said. _____
10. Schools for mutes have put emphasis on lip reading and sign learning: a) frequently, b) rarely, c) never, d) it cannot be said. _____
11. When Dr. Johnson's pupils are around 10 years old, they: a) go to ordinary schools, b) have not yet made any tangible progress, c) begin a period of rapid improvement, d) it cannot be said. _____
12. The title of one of the articles was: a) Challenging the Leader, b) New Man for the Club, c) New Method to Cure the Dumb, d) it cannot be said. _____
13. Most of the money spent by American schools for deaf and dumb children comes from: a) grants of the U.S. Government, b) private donations, c) grants of private States, d) it cannot be said. _____
14. Congenital deaf children: a) can hear with difficulty but without aid ordinary sounds, b) cannot hear anything even with hearing aids,

c) can hear some sounds with hearing aids, d) it cannot be said. _____

15. Most children who never learn to talk: a) have exclusively auditory defects, b) have dumb parents, c) experience a trauma at birth, d) it cannot be said. _____

Third Level of Interweaving

INSTRUCTIONS

You have been given a booklet and a cardboard. Read the pages in the order that they are presented. When you have read one page, turn it over and do not look back at it, unless you want to reread the instructions.

In the booklet you will find two short passages to be read, followed by a series of multiple choice questions. In reading the passages, do not read any word or line more than once. This is important. When you begin to read, place the cardboard guide at the top of the page. As you read each line, slide the guide down over the line. Do not move the guide upward.

The manner of the presentation of the articles is unusual. You will find first one word of an article, then one of the other, and so on until both articles are finished. For example, if we have two sentences related to two different topics: "New York is a city." "My home has seven rooms." Then the manner of the presentation will be: New My York home is has a seven city. rooms. Notice that the words of one of the sentences are underlined, while the words of

the other are not.

Read each word just once and in the order that the words appear. Do not skip either the underlined words or the words not underlined.

Don't be disturbed if the material is hard to understand. This is not a test of reading ability, nor a test of intelligence. It is an experiment regarding how people read particular kinds of material.

Please, do the best you can. Otherwise the results of the experiment will not be usable. Thank you for your cooperation.

Remember the guide must cover each line as you finish it, and must not be moved upwards.

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INSTRUCTIONS

Do not answer the questions according to what you know but according to what you have read. For example, to the question, Is Chicago a city?: (a) yes; (b) no; (c) I don't know; (d) it cannot be said, the right answer is (d) and not (a), since nothing was said about Chicago. After you have answered the questions of one page turn it over and do not look back at them. Do not care for the other instructions given above. You don't have to use the cardboard any longer.

1. Dr. Johnson has been working in: a) United States, b) Italy, c) France, d) it cannot be said. _____
2. The Gemini program: a) is an astronomical enterprise, b) has been very successful, c) is used in testing astronauts, d) it cannot be said. _____
3. Teachers in Dr. Johnson's school: a) indicate to the child that sounds are important, b) sit in the classroom and do very little, c) frequently let the children alone in the classroom, d) it cannot be said. _____
4. Deaf-dumb children are trained: a) in ordinary schools, b) at their own homes, c) first in special schools and, then, they go to ordinary schools, d) it cannot be said. _____
5. A child born deaf: a) doesn't have any capacity at all for hearing, b) has a small capacity for hearing, c) comes from a family defective in hearing, d) it cannot be said. _____
6. Deaf-dumb children learn first to pronounce: a) abstract words, b) concrete words, c) none of these, d) it cannot be said. _____
7. Dr. Johnson: a) was born in Italy, b) has developed a new method to cure the dumb, c) was born in France, d) it cannot be said. _____
8. Dr. Johnson's method has been adopted by many: a) American schools, b) European schools, c) African schools, d) it cannot be said. _____
9. When the deaf-mutes finish their special training: a) their speech is near normal or normal, b) their speech is very awkward but understandable, c) their training doesn't have anything to do with speaking, d) it cannot be said. _____
10. Schools for mutes have put emphasis on lip reading and sign learning: a) frequently, b) rarely, c) never, d) it cannot be said. _____
11. When Dr. Johnson's pupils are around 10 years old, they: a) go to ordinary schools, b) have not yet made any tangible progress, c) begin a period of rapid improvement, d) it cannot be said. _____
12. The title of one of the articles was: a) Challenging the Leader, b) New Man for the Club, c) New Method to Cure the Dumb, d) it cannot be said. _____
13. Most of the money spent by American schools for deaf and dumb children comes from: a) grants of the U.S. Government, b) private donations, c) grants of private States, d) it cannot be said. _____
14. Congenital deaf children: a) can hear with difficulty but without aid ordinary sounds, b) cannot hear anything even with hearing aids,

c) can hear some sounds with hearing aids, d) it cannot be said. _____

15. Most children who never learn to talk: a) have exclusively auditory defects, b) have dumb parents, c) experience traumas at birth, d) it cannot be said. _____

1. Within 500 miles of Ohio there is more than half of the national: a) population, b) farm production, c) forest richness, d) it cannot be said. _____
2. Ohio has: a) high mountains, b) the lowest state and local taxes of any highly industrial State, c) prosperous mines, d) it cannot be said. _____
3. Queen Elizabeth of England recently visited: a) Burundi, b) Egypt, c) Ethiopia, d) it cannot be said. _____
4. A record-setting new capital investment for a year is held by: a) Ohio, b) Arizona, c) California, d) it cannot be said. _____
5. Ohio: a) is situated in the Mid-West, b) is an economically fast growing State, c) has promising fishing industries, d) it cannot be said. _____
6. There are in Ohio: a) Thirty-four railroad lines, b) thirteen regularly scheduled airlines services, c) 441 airfields, d) it cannot be said. _____
7. The gross national product: a) has remained about the same in the last year, b) is greater than the consumer's capacity, c) is expected to post a substantial gain during this year, d) it cannot be said. _____
8. Not too far from Ohio there are: a) three fourths, b) one fourth, c) two fifths of the nations' manufacturing, d) it cannot be said. _____
9. In energy production Ohio ranks: a) first, b) second, c) third, in the nation, d) it cannot be said. _____
10. The majority of the new plants and equipments of the nation are found: a) in Ohio, b) within 500 miles of Ohio, c) within 500 miles of Texas, d) it cannot be said. _____
11. Investment is: a) more productive if employed in big industries, b) viewed as seed money by economists, c) a product of the twentieth century, d) it cannot be said. _____
12. Ohio's bad point for industrial expansion is that its labor force is: a) unprepared, b) unproductive, c) none of these is true, d) it cannot be said. _____
13. For the first time in the history: a) investment will top 50 billion dollars, b) small industries will increase by four percent, c) many Europeans are worried by the flood of dollars into their continent, d) it cannot be said. _____
14. The Government is particularly pleased by: a) prospects of increment in business investment, b) the surging of new industries, c) smelioration of industrial plants, d) it cannot be said. _____

15. The title of one of the articles was: a) Crime in U.S. out of Hand?,
b) Economics and Investment, c) Civil Rights, d) it cannot be said. _____

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APPROVAL SHEET

The dissertation submitted by Reverend Felix A. Ortega, O.A.R. has been read and approved by members of the Department of Psychology.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June 8, 1967
Date

Paul J. von Ebers
Signature of Adviser