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Meaning Formation

Gail F. Czukar
Wilfrid Laurier University

MEANING FORMATION

By

GAIL F. CZUKAR

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Examining Committee

Dr. Vernon Schaefer, Chair
Dr. Robert St. Claire-Smith, Member
Dr. Hymie Anisman, Member

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Abstract

An attempt was made to demonstrate laboratory conditions in which experiential components of meaning (i.e. perceptual and emotional correlates of observable stimuli and responses) pattern to form a gestalt. Semantic differential scales were used to measure the meaning of simple visual figures in two phases of the experiment. The first phase consisted of a pre- and post-exposure measurement of meaning with an intervening exposure to a compound visual display. In the second phase, subjects were exposed to an altered visual display and then rated the stimuli again.

Results do not support the predictions that (1) the meaning of the central stimulus would change as a function of being presented in the context of other stimuli, or that (2) if the context is altered, then the meaning of the central stimulus would change again. Methodological problems and alternative theoretical notions are considered in the Discussion.

Acknowledgements

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Introduction

The study of meaning is characterized by ambiguity, controversy and inadequacy. There is widespread disagreement about what constitutes an adequate definition of meaning, about how the study should proceed, and about what should be included in a theory of meaning. With the exception of some behaviourists, most psychologists have at least agreed that it is an important and unavoidable problem. Concerned only with the objective determining conditions of behaviour, the behaviourists have said in the past that meaning has no relevance to their strict stimulus-response (S-R) model. However, some members of this group are beginning to accept and study verbal behaviour as legitimate subject matter for psychology, and are consequently finding themselves confronted with the problems of understanding and meaning.

Although many psychologists have acknowledged the broad scope and importance of meaning in the explanation of behaviour, very little research has been done which deals directly with meaning as a psychological variable. This lack of relevant research is at once a consequence of, and a contributing factor to, the confusion and uncertainty which surrounds the problem of definition. Early theorists (e.g. James, Titchener, McDougall, Barrett, etc.) stayed on

conceptual-theoretical ground in their discussions of meaning, providing little material that was useful to the experimentalists. Efforts at the conceptual type of definition virtually disappeared from the literature as the behaviourist influence on North American psychology became strong and that which was not operationally defined or easily adapted to the hypothetico-deductive method was declared "off limits".

Interest in the problem was re-awakened by the observation of phenomena in experiments focused in other directions which could not be explained in terms of the simple S-R models that had been proposed for the explanation of animal behaviour. The combined effect of this origin, and the strong behaviourist influence in general, was to limit experimental work on meaning to observable behaviour, with major emphasis on verbal phenomena. This work, however, has not brought consensus on any particular definition of meaning; in fact, controversy over the broad issue of whether meaning belongs to the behavioural or phenomenological realm is still alive.

> ...the meaning of meaning, in general and as a psychological variable in particular, is so equivocal. The term may refer to anything from a simple act (the meaning of an object is the response it evokes) or a simple connection, to a 'philosophy of life'... Meaning can refer to

> designation, denotation, connotation, signification, causation, intention, purpose, interpretation, evaluation, emotion, action, or all of these. When the term is used, it is sometimes unclear in just which sense it is being used. Furthermore, these various meanings of meaning themselves need explication with respect to the psychological processes involved in them.
>
> (Creelman, 1966, p. 14)

Thus, ambiguity and confusion continue to characterize the search for the meaning of meaning.

Literature Review and Theoretical Background

Early definitions of meaning were static and descriptive, with their focus on the content of experience. When behaviourists (e.g. Staats and Staats, 1959) began to conceptualize meaning as a response, learned according to the principles of operant and classical conditioning and maintained by reinforcement, it was brought into the fold of learning theory and began to be defined in terms of a process. The single-stage S-R model proved inadequate for even some of the strictest operant conditioners to account for the phenomenon of semantic generalization, and the transition was made to a mediational model (S-O-R). Based on the Hullian notion of "implicit" responses, this model was adopted by Cofer and Foley (1942), Mowrer (1954), Osgood (1956), and to some extent by Staats and Staats (1963), although the latter subsequently reverted to the strict S-R formulation. Both single-stage (S-R) models and two- (or more) stage (S-O-R) models are still the most prevalent and popular theories of meaning in North American psychology.

Creelman (1966) has made a comprehensive critical review of the experimental literature on meaning, including both American and Russian experimentation, and her summary of

four major hypotheses about meaning is helpful:

1. The meaning of anything (stimulus) can be defined in terms of the response to it;
2. Meaning can be understood in terms of simple associative (direct) connections between stimulus and response;
3. Meaning can best be conceptualized as a hypothetical construct or as an intervening variable -- a mediating process which is essentially unobserved and unobservable and consists of scaled-down versions of previously overt responses which, when elicited, serve as stimuli for other overt responses;
4. Meaning might be regarded as a complex interconnected response system, including visceral, sensory and cognitive elements.

(Creelman, 1966, p. 207-208)

While it is generally accepted that hypotheses one and two are inadequate (see Creelman, 1966), the third one -- the mediation model -- still has strong support in many quarters. However, a number of criticisms have also been levelled against it. Fodor (1965), for example, articulates the following argument: In order for the mediation theorist to make his theory coherent, he must adopt the postulate that each r_m, or fractional mediating response, must be identified with one and only one gross response. Two serious criticisms follow from this point. One is that the response components that are scaled-down versions of gross responses, and which are thus candidates for the position of r_m, are not of a type likely to be associated with R's on a one to one basis. Secondly, once

this postulate is adopted, the only distinction between single-stage and mediation theories is the observability of the responses they invoke, or the types of theoretical terms used in the explanation.

As long as r_m is conceptualized as a hypothetical construct which is an entity, a static "part", these criticisms are valid and damaging to the mediation theory. It is true that many mediation theorists would accept this conceptualization and therefore their theory is vulnerable to Fodor's attack. Although Creelman calls it a "mediating process", she goes on to say that this process "consists of scaled-down versions of previously overt responses which, when elicited, serve as stimuli for other overt responses". It is difficult to see how this collection of responses is a process. Fodor also discusses a conception of mediation theory (based on Mowrer, 1960) which sees a series of overt and covert responses as single links in a chain.

However, it may be possible to think of r_m as a complex whole composed of interconnected parts, or "scaled-down versions of previously overt responses", as well as the relationships between the parts and the processes which establish those relationships. This view corresponds more closely to that expressed in Creelman's

fourth hypothesis. She advocates an enlarged view of stimulus and response which involves the context and patterning of internal and external events, i.e. the subjective as well as the objective determining conditions of the psychological situation. She suggests two ways of defining the meaning of a particular stimulus or event. One is in terms of the response to it, where the term "response" is understood to refer to the pattern of changes within a context. If the context is included as an integral part of the stimulus situation, "... the meaning of a particular event would be a patterned function of both stimulus and response elements, rather than single links in a chain" (p. 214). Both of these definitions are based on an identification of meaning with the phenomenology of the experiencing organism where experience is viewed as the totality of the organism's responsiveness which includes the patterning of changes brought about by a specific stimulus, but also considering that these changes take place in a context of on-going processes and in turn alter that context.

It must be acknowledged that these are general theoretical statements without detailed operational definitions and a solid empirical basis, but there are three major advantages to this conceptual model of meaning.

One is that it allows for a dynamic, process definition and approach to the problem. Second, it includes the importance of patterning, i.e. the relationships between the parts. Finally, it also takes into account the context in which meaning occurs and which may also be a determining factor of the meaning that is formed.

Since Creelman wrote her book in 1966, much work has been done in information-processing which relates to the concept of patterning-within-a-context. Sayre (1969) describes information-processing theory as a general model for the specific feature of patterned perceptual response in humans as follows. When a person perceives a configuration (any grouping of objects) in his or her environment, he or she makes certain demands on it and these demands determine the pattern of the response that is made. A configuration takes on a pattern according to the significance, or meaning, it has for the organism. Sayre contends that this significance is determined, in turn, by the needs or interests that are salient for the organism at any given time. He does not go beyond this point to say what determines the needs or interests of the organism, but it may be that he is referring to the context, or internal stimulus conditions. The ongoing processes within the individual respondent -- the continual

organization and re-organization of the organism's perceptions and emotions which are associated with his environment -- lend meaning to each new S-R situation and are, in turn, altered by them.

Muijen (1972) says about information-processing models of visual pattern apprehension that the human information processor does not only process information but also transforms that information into interacting experiential units. In other words, living organisms do not merely register physical information but also perceive, i.e. experience, their environment. These ideas and some of the research which has been done on perceptual patterning and information-processing seem to generally lend some support to Creelman's suggestion.

Researchers have come to study, and deem important, both the context and the patterning of the occurring S-R situation. Both Sayre and Muijen talk about the necessity of including experiential correlates of physical stimuli or events and the dynamic interrelationships between them in complete psychological theories. Yet neither theorists of meaning and perceptual patterning, nor information-processing theorists attempt to deal with these components in any depth. For example, Sayre says:

> An essential feature of the visual patterned response in man and in other organisms with comparably complex visual processes is that patterns appear as wholes with parts, but that the parts when viewed independently of the whole take on different characteristics ... Of course patterns are composed of parts that taken separately do not possess the characteristics of the whole.
>
> (Sayre, 1969, p. 142)

But this is merely stated, with no attempt at an explanation of how it comes about. Gestalt psychologists long ago identified this unique characteristic of complex organisms as an important one. They went a little further, however, attempting to formulate laws about how our perceptual fields are organized, but they did not go beyond the molar, descriptive level. Furthermore, there is no indication of how complete the listing of Gestalt laws is, nor of how they themselves combine to determine meanings.

If it is true that the whole is greater than the sum of the parts taken separately, then the processes or relationships between the parts must be among the determining conditions. But if internal stimulus conditions, including the patterning of covert responses, are to be included in a complete theory of meaning, then experiential correlates of physical stimuli and responses must be studied. Evidence for experiential patterning and/or

gestalt formation is needed at a systematic, molecular, predictive level.

In an extensive search of the literature (see the Bibliography) it has proven difficult to find research which relates directly to these issues. The literature on meaning, perceptual patterning, information-processing, and concept formation was expected to be relevant. However, it is not possible to draw from this literature a solid theoretical or empirical basis for the present study. A detailed discussion of this research would constitute a critical review which is beyond the scope of this paper, but a brief overview of each of these areas as it relates to the present problem will be given.

The inadequacies of the experimental research on meaning (e.g. Creelman, 1966) have already been pointed out earlier in this section. The work of Osgood and his associates (e.g. Osgood, Suci and Tannenbaum, 1957; Osgood, 1962, 1969; Snider and Osgood, 1969) deserves more attention at this point. Osgood's semantic differential technique is the only measure of meaning which attempts, or purports, to tap internal processes. However, it is not clear that this method taps those processes which are operative in the formation of meaning. The theoretical

basis of the semantic differential is the mediation model which is not a dynamic process model. While the factor structures and conceptual models which are constructed on the basis of factor analytic work do attempt to take into account the interrelationships between some experiential components of meaning, they do not attempt to measure the processes by which those relationships are formed. Presumably this occurs within the framework of learning theory according to the principles of operant and classical conditioning. However, these principles have not been applied to situations in which more than two stimuli are "conditioned", or associated, to one another, at least where the question of meaning of those stimuli is concerned.

Research on perceptual patterning and perceptual learning (e.g. Gibson and Gibson, 1955; Gibson and Walk, 1956; Gibson, 1969) has centered around the perceptual processing of specific observable dimensions of stimuli, particularly visual and auditory. The interaction of the incoming stimulus array with organismic variables has not been addressed in the Gibsons' work. Perceptual processing has increasingly come to be studied by information-processing researchers. Those who have dealt with the processing of visual stimuli, particularly nonsense shapes, include

Arnoult, 1956, 1960; Attneave, 1955; Attneave and Arnoult, 1956; Egeth, 1967; Grill, 1971; and Egeth, Jonides and Wall, 1972. These studies also deal primarily with physical characteristics of stimuli and methodological variables such as exposure time, latency of response, serial vs. simultaneous presentation, etc. Explanations are not offered in terms of representation of stimulus patterns by an organized set of internal relations which would require the operation of different processes than those which are typically postulated to explain pattern recognition and perceptual learning. In short, the meaning of stimulus patterns is rarely studied from an experiential viewpoint by information-processing theorists.

Another large body of literature which was expected to be potentially relevant to the problem of meaning formation is the work on concept formation. Studies in this area (e.g. Bruner and Postman, 1949; Bruner et al, 1966; Bruner, Goodnow and Austin, 1956; Bourne, 1963; Bourne and Parker, 1964; Trabasso, 1960) involve the analysis of the roles of particular information variables, cues and strategies in the solution of problems. Information is selected and deliberately manipulated by the subject who is working towards a goal using particular cues and strategies. In experiential meaning formation,

at least as it is studied in this paper, there is no such goal which serves to organize and focus the subject's attention. It is not clear how knowledge of the cognitive processes which are involved in concept formation relates to the understanding of perceptual processes by which information is associated and organized in the absence of a guiding purpose or conscious selection.

In summary, then, there does not seem to be experimental evidence which relates to a conceptualization of meaning as a process which includes the context in which meaning occurs and the dynamic interrelationships between internal stimulus and response elements. More specifically, conditions have not been manipulated at the formation of meaning in a way that would allow us to determine how experiential components of meaning are related to one another.

Statement of Purpose

This study was an attempt to demonstrate one laboratory situation in which experiential components of meaning pattern to form a gestalt. The question addressed was: Must the patterns of relationships between experiential components of meaning (i.e. perceptual and emotional correlates of observable stimuli and responses) be included as determing conditions of the meaning of a stimulus, or are they only organizational conveniences, such that the components can be re-organized in other patterns with no significant effect on the meaning of the stimulus? An alternative formulation of the problem is as follows: Do images and affects which are associated with observable stimuli exist in independent molecular units or do they become associated to one another in some manner to form a pattern or gestalt?

It is also possible, and probably more likely, that one process is operative under specific stimulus and/or organismic and/or environmental conditions, and the alternate process under other conditions. In the same vein, an interaction of processes under certain combinations of conditions may also be a reality.

The general purpose of the present study was to discover whether changes in meaning would occur when two or more stimuli first occurred together, then one of those stimuli occurred again alone. Simple visual figures were used as stimuli. One figure was chosen to be the central stimulus figure and four other figures formed the context.

The meaning of a stimulus was operationally defined as the set of ratings on semantic differential scales of simple visual figures. The context was operationally defined as the spatial pattern of four simple visual figures arranged around the central stimulus.

The first experimental prediction was that if the central stimulus is presented in the context, then the meaning of that stimulus is altered.

Alteration of the context was operationally defined as the removal of one of the four context stimuli from the primary visual display to an adjacent visual display. This adjacent display consisted of only the central stimulus in the preceding experimental stage.

The second experimental prediction was that if the context of the central stimulus is altered, then the meaning of that stimulus is altered further.

Method

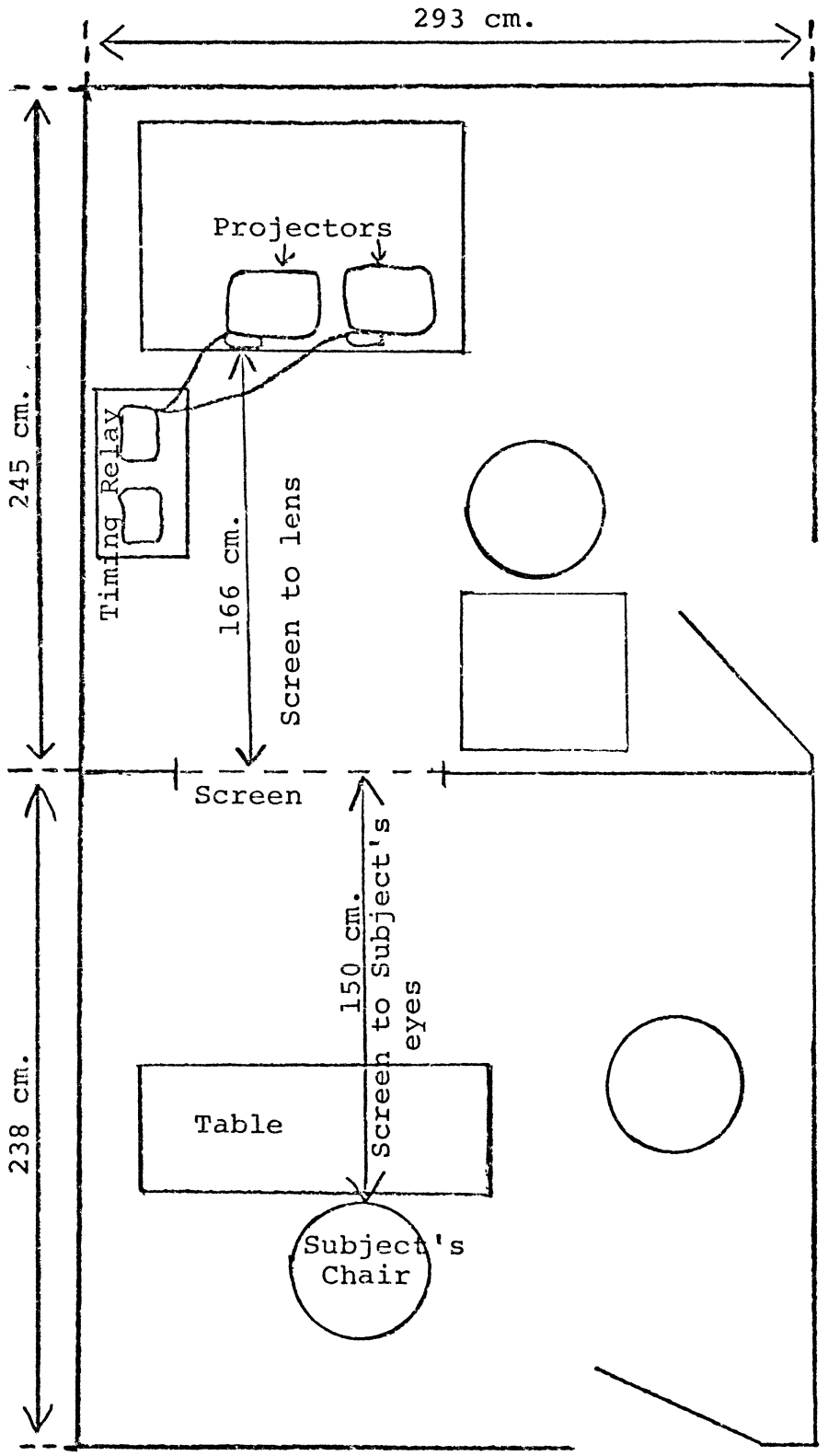
Subjects

Thirteen males and 40 females, ages 17 to 48, from undergraduate psychology courses at Wilfrid Laurier University served as volunteer subjects. The modal age was 22. In the first phase, there were 32 subjects in the experimental group (8 males, 24 females) and 21 subjects in the control group (5 males, 16 females). Thirty subjects in the experimental group and 14 subjects in the control group returned for Phase II.

Apparatus

Two adjoining research rooms were used. The subject was seated at a table in one room facing a frosted screen upon which the stimuli were back projected by slide projectors in the adjoining room. Figure 1 shows the layout and distances in the research rooms. Two Kodak Carousel 850 projectors were used to present the 2"X2" slides. They were fitted with tachistoscopic lenses which were attached to a timing device so that the slides could be presented with an exposure time of 4 seconds and an inter-trial interval of 2 seconds. During the pre- and post-exposure periods, the experimenter advanced the slides manually by use of a remote switch.

Figure 1: Research Rooms and Apparatus



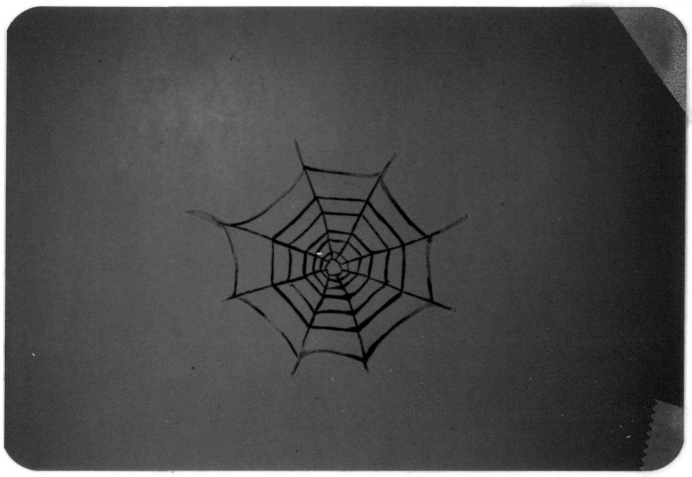
Stimulus Materials and Scales

The visual stimuli were chosen on the basis of pilot work as outlined in Appendix A and prepared on 2"X2" slides. Five slides showed each of the central stimulus (A) and the four context stimuli (B1, B2, B3, B4) alone. For the exposure stage of Phase I a compound slide of A surrounded by the four context stimuli was constructed. Effects of location were controlled by systematic incomplete counterbalancing; thus, there were 4 compound slides for the experimental condition, with 4 corresponding sub-groups. In the experimental group, the adjacent visual displays consisted of the compound slide which appeared directly in front of the subject and a slide with A only on the display to the left. For the control group, A only appeared on both displays. Figure 2a is a reproduction of each of the single stimuli. Figure 2b shows the four compound slides. Figures 3a and 3b are examples of the visual display for the Control Group and for the Experimental Group, Phase I.

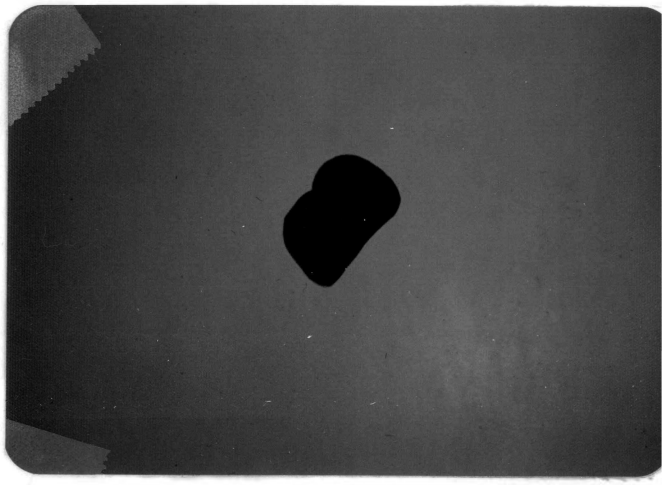
The same set of 20 semantic differential scales which were used in pilot work were used in the experiment (see Appendix B). They were arranged in different random orders for each stimulus, and the position of the bi-polar opposites of each word pair were determined randomly

FIGURE 2: Stimulus Figures

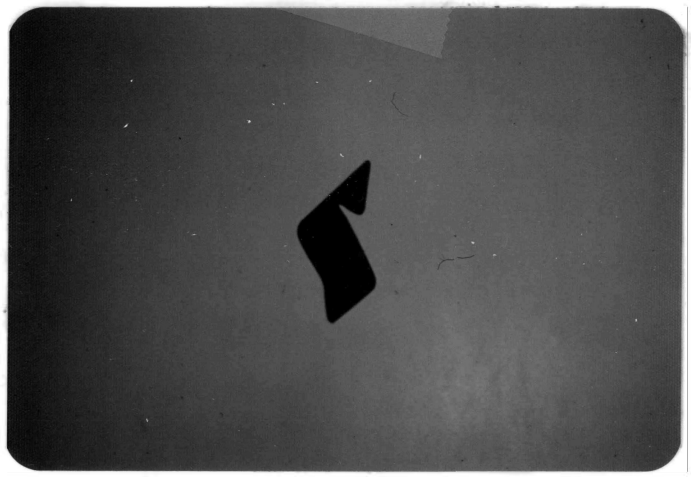
a. Individual Stimuli:



B1

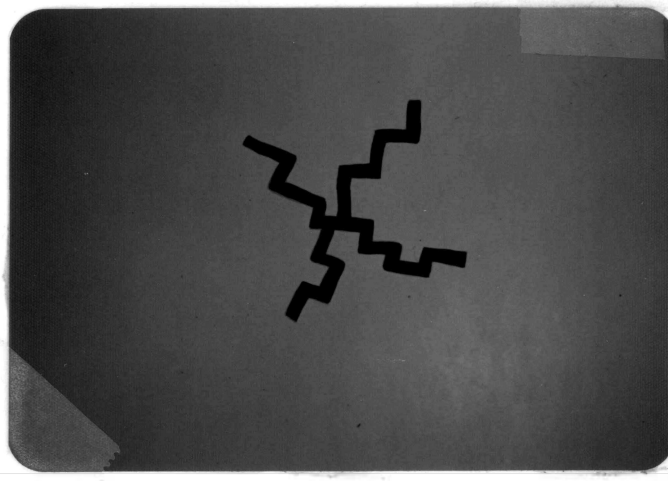


B2



A

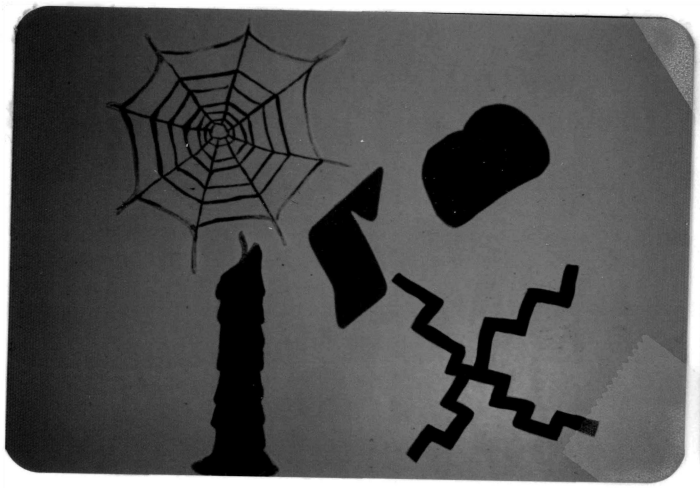
B3



B4

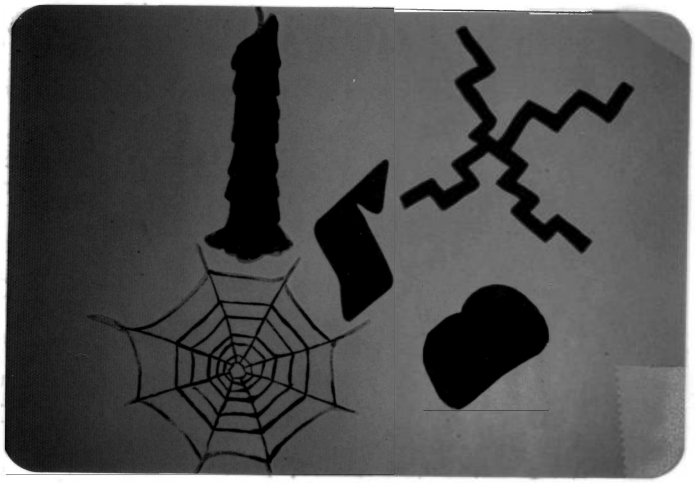
FIGURE 2: Stimulus Figures

b. Compound Stimuli:

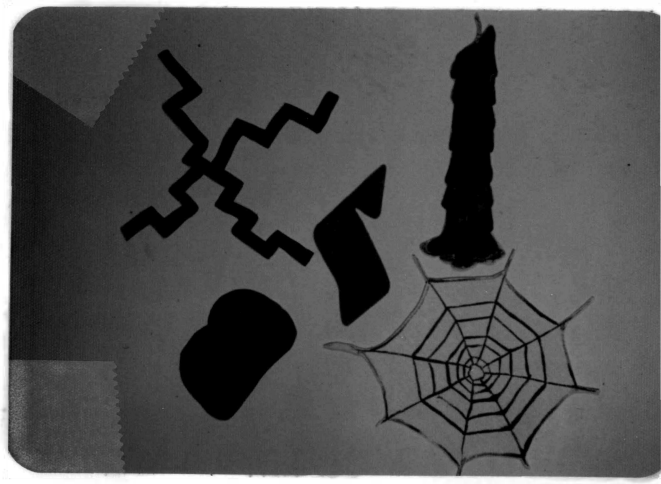


W

X



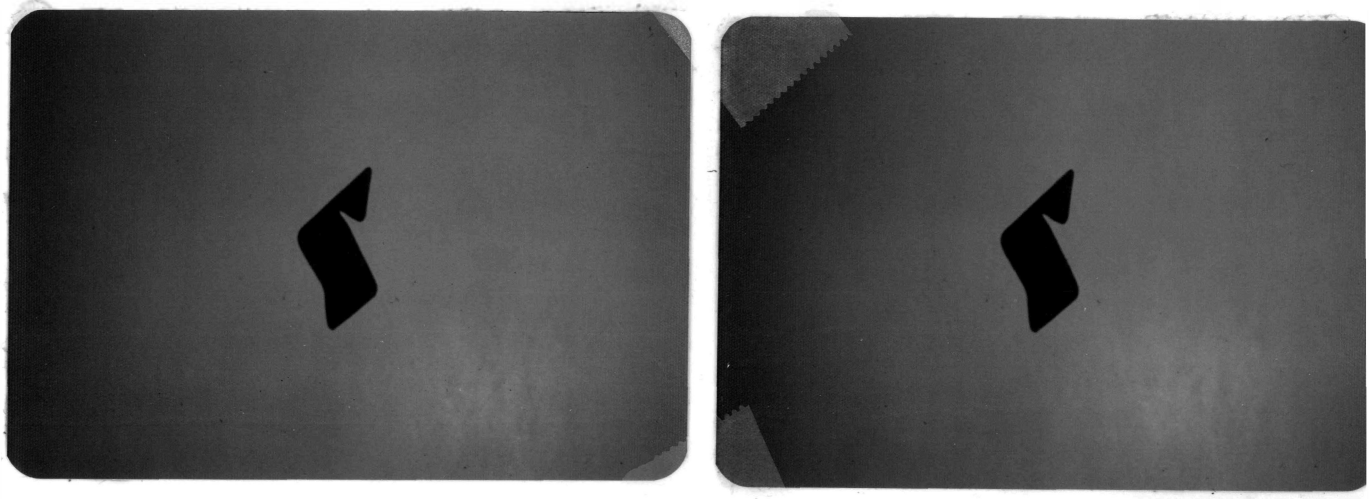
Y



Z

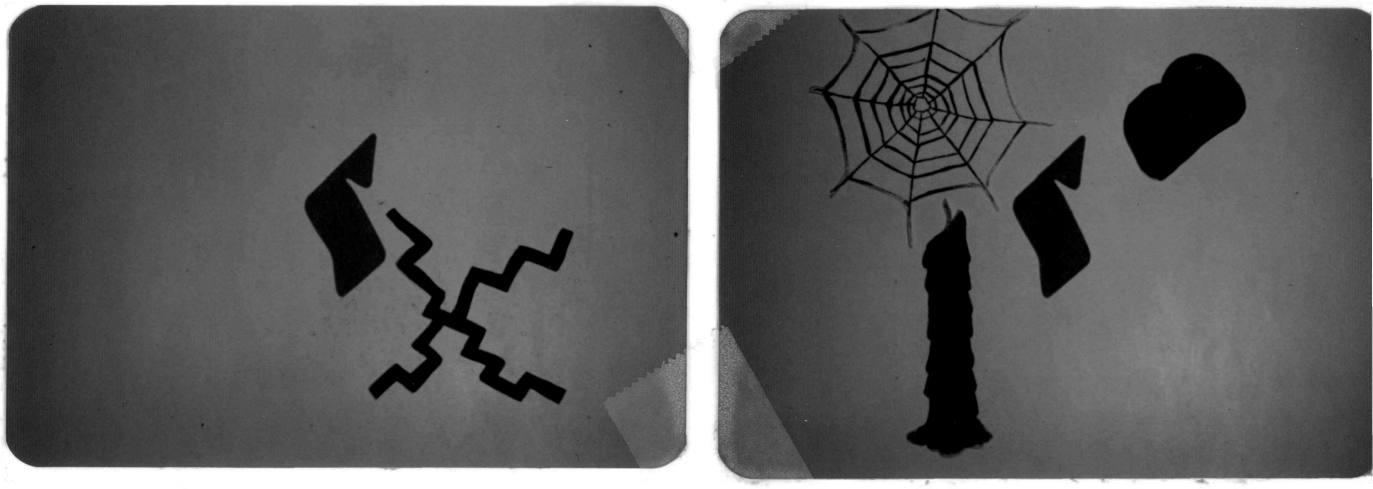
FIGURE 3: Sample Visual Displays

a. Control Group, both Phases:



b. Experimental Group, Phase I:

c. Experimental Group, Phase II:



(by the flip of a coin) in each case.

Procedure

Phase I: The first phase consisted of a pre-exposure measurement of meaning, exposure to a visual display, and a post-exposure measurement.

In the pre-exposure stage, A and each of the four context figures were presented separately in succession and subjects in both groups completed semantic differential scales for each one. All subjects rated A first on all scales. Order effects in presentation of the remaining four context figures were controlled by complete counterbalancing. The subject was seated in front of the right-hand side of the projection screen and instructions were given as follows:

The purpose of this experiment is to discover how meaning is formed. I am not talking about meaning in the sense of dictionary definitions or values, but in terms of experience -- perceptions, emotions, thoughts, etc. Very little research has been done on meaning at all, and none that I know of on experiential components of meaning, so this is really an exploratory study. I will explain more about what I am trying to do and what I hope to find when we have finished both phases of the experiment. Do you have any questions about the general nature of the research that I can perhaps answer now?

What I am going to ask you to do is very simple. First I'll show you some slides one at a time and ask you to fill out these scales. Then I'm going to present two slides together a number of times. For this part, I'd like you to sit back and watch, but pay attention to the

slides. Then I'll show you some more slides one at a time again and ask you to fill out some more scales. O.K.?

Here are the instructions for the scales. If you will read them over, I'll return in a couple of minutes to answer any questions you have about them and explain exactly what to do with these scales. (Leave room to set up slides in equipment room and return in 2 to 3 minutes.)

Do you understand the instructions?

When I go back in the other room, I'll put up a slide immediately. Fill out the entire first page for that slide. Then when you are ready to turn the page, say "O.K." and I'll put up the next slide. Fill out the whole page for that slide and then go on as before. In other words, there are five pages and five slides -- one page per slide -- and you have as long as you need to complete the scales, but move fairly quickly through them as the instructions indicate. O.K.?

When you have completed the last page, just put the scales aside. I'll turn out the light from the other room and present two slides together a number of times. Please sit back and pay attention to the presentation. Then I'll come back with another set of scales to fill out.

In the exposure stage, the visual display consisting of two adjacent slides was presented 15 times with an exposure time of 4 seconds and an inter-trial interval of 2 seconds for both groups. For the control group, the two slides showed only A. For the experimental group, the right-hand slide was a compound and the left-hand slide showed only A. When the presentation was over, the experimenter switched the subject's desk light on from the equipment room.

For the post-exposure stage the experimenter re-entered the research room, removed the completed scales and handed the subject the second set of scales with the following brief instructions:

Now I'm going to show you some slides one at a time again as in the first part. Fill out the scales in the same way -- one page per slide -- and let me know when to go on to the next one. O.K.?

A and each of the context figures were presented separately in succession with A being rated first on all scales and the order of the context figures counterbalanced as in the pre-exposure stage. For the experimental group, the compound slide to which the particular subject had been exposed was presented last in the series and rated on all scales.

Analysis: A comparison of each experimental subject's pre-exposure and post-exposure ratings of A was performed in the following manner. A difference of 2 or more scale points was arbitrarily chosen as the criterion for a change in meaning. The pre-exposure scale ratings of each context figure for those scales on which these differences occurred for A were examined. An assumption was made that if, for example, the rating of A on scale 17 had changed from "3" to "5", then the context figure which had been rated "5" or higher on scale 17 in the pre-

exposure stage had influenced the post-exposure rating of A by being associated with it during exposure. The context figure which was rated most often (i.e. on the greatest number of scales) in the direction of change observed in A was removed from the right-hand display in Phase II. An example of this analysis is given in Table 1.

Phase II: The second phase consisted of an exposure stage followed by a final measurement of meaning of the stimuli.

The subject was seated in front of the right-hand side of the display and given the following instructions:

> This time I am going to show you two slides together as I did in the middle last time. So for this part, I just want you to watch and pay attention to the screen. When that is over, I'll turn the light on from the other room and show you one slide at a time. You can take these scales yourself and fill them out as before -- one page for each slide -- let me know when to go on to the next one -- O.K.?

In the exposure stage the control group saw only A on both slides again. Each subject in the experimental group saw three of the context figures together with A on the right-hand slide and the fourth figure together with A on the left-hand slide. The figure to be removed was determined by the analysis described in the preceding section. It appeared on the left-hand slide in the same

TABLE 1

SEMANTIC DIFFERENTIAL SCALE RATINGS, FIGURE A

Sample Comparison of Pre-exposure and Post-exposure Ratings

Scales:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pre-exp.	4	3	6	4	3	5	6	3	6	6	2	1	7	6	3	5	5	5	3	4
Post-exp.	5	2	5	5	5	5	5	4	3	6	4	3	6	6	2	5	4	2	4	2
Differences	1	1	1	1	2	0	1	1	3	0	2	2	1	0	1	0	1	3	1	2
					+				−		+	+						−		−

Scales on which Differences were Observed:	5	9	11	12	18	20
Differences:	+2	−3	+2	+2	−3	−2

Context figure ratings in pre-exposure stage:						
B1:	1	7	4	1	4	1
B2:	4	1	3	5	5	4
B3:	2	6	4	5	2	4
B4:	5	5	4	6	5	6

Figure B4 has made the greatest difference (3 scales)

Conclusion: Remove B4 from display in Phase II.

location as it had previously been present on the right-hand display and the three remaining figures were present in their same locations. Figure 3c shows an example of this altered visual display. The number and length of presentations was the same as in Phase I.

The post-exposure stage was the same as in Phase I except that the experimental group ratings were not obtained on the compound slide.

Results

A. Analysis of Group Data

1. Factor Analysis:

For each group there were 10 sets of 20 scale ratings, i.e. one set for each of the five stimulus figures in the pre-exposure stage and one set for each stimulus in the post-exposure stage. Thus, 20 separate 20X20 intercorrelation matrices were generated by summing across subjects. They were factored by the Varimax technique. Factor loadings and variance percentages for the first four factors for each stimulus figure are given in Appendix C.

While some general patterns among the factor loadings can be identified, a broad range of scales load high on each factor and there is considerable overlap of scales among the factors. This is particularly true for the control group when the factors for all figures are considered. In the experimental group, results are somewhat clearer. Table 2 gives a summary of the scales which load over .70 on each of the first three factors for two or more stimuli.

Generally it can be stated that the factors are not independent dimensions. There are a few exceptions:

TABLE 2

SUMMARY OF HIGH SCALE LOADINGS* FOR FIRST THREE FACTORS

All Figures

Scales	Experimental Group 1	2	3	Control Group 1	2	3
ugly-beautiful	XO			XO	O	XO
good-bad	XO			XO		
unpleasant-plst	XO			XO	X	O
passive-active		XO		XO	XO	
calm-excitable	X	XO		XO	XO	
slow-fast		XO		XO	XO	
fancy-plain	X	O	O	XO	X	O
simple-complex	X		XO		X	O
meaningful-mngless		O	XO			O
unusual-usual		O	XO			
unstable-stable		X			X	
careful-careless					X	
cool-warm				XO	O	
masculine-feminine		O			O	X
horizontal-vertical			O			X
sober-drunk			O		O	O
hard-soft	X	O	XO		O	X
rounded-angular			X		O	
large-small		X			O	
heavy-light		X				X

*High Scale Loadings = Over +.70 or Below -.70

X: Loads high in pre-exposure only
O: Loads high in post-exposure only
XO: Loads high in both pre-exposure and post-exposure

the evaluative dimension is clearly identifiable in the experimental group and the activity factor is also relatively independent for this group. However, in the control group almost every scale loads high on at least two factors in both pre-exposure and post-exposure stages.

Closer examination of the results for the central stimulus figure (A) alone does not lend a great deal of clarity to the situation. Table 3 gives the factors and the amount of variance accounted for by each for both groups.

TABLE 3

FACTOR LABELS AND AMOUNT OF VARIANCE FOR FIGURE A

	Experimental Group		Control Group	
Factors	Pre-Exposure	Post-Exposure	Pre-Exposure	Post-Exposure
1	Evaluative 21%	Complexity 42%	Complexity-Activity 26%	Complexity-Activity 34%
2	Activity 20%	Activity 17%	Evaluative 21%	Potency or Masculinity 32%
3	Complexity 15%	Hardness or Potency 13%	Potency(?) 15%	(?) 12%
4	Stability 11%	Evaluative 12%	Potency(?) 11%	Stability(?) 11

While these results indicate a change in the factor structure for the experimental group, it is important to recognize that the labels applied to the factors are very loose, e.g. not all scales which load high on the factor labelled "activity" in the pre-exposure stage are the same as those which load high on the "activity" factor in the post-exposure stage. For the control group, the factor structures are much more difficult to define, and the labels are even more tenuous. In some cases, it is virtually impossible to make sense empirically of the group of scales which loads high on a particular factor. These are indicated by a question mark in parentheses (?) in Table 3.

2. Differences between pre-exposure and post-exposure, Phase I:

Sandler's A was used to test for differences in mean ratings of the central stimulus between pre-exposure and post-exposure. Results are given in Table 15, Appendix D. In the experimental group, two scales differed significantly at the .05 level. They were "meaningful-meaningless" and "passive-active". The control group showed significant differences on four scales: "large-small", "careful-careless", "unusual-usual", and "feminine-masculine".

3. Differences between experimental and control groups, Phase I:

The t-test was computed on mean scale ratings in the pre-exposure and post-exposure stages to test for differences between the groups. Results are given in Table 16, Appendix D. There were no significant differences on any scales in the pre-exposure stage. In the post-exposure stage mean ratings were significantly different at p=.05 on two scales: "heavy-light" and "feminine-masculine".

B. Analysis of Individual Data

Individual subjects' data were analysed for two reasons: to detect any changes in meaning which may have occurred on an individual level but which cancel each other out in group analyses, and to assess changes in meaning in Phase II. Since the experimental conditions in the exposure stage of Phase II were determined individually from each subject's scale ratings in Phase I, group analysis is inappropriate.

However, there are few statistical tests for individual data. Osgood, Suci and Tannenbaum (1957) described the D Score which gives the linear distance between two points in semantic space which can represent

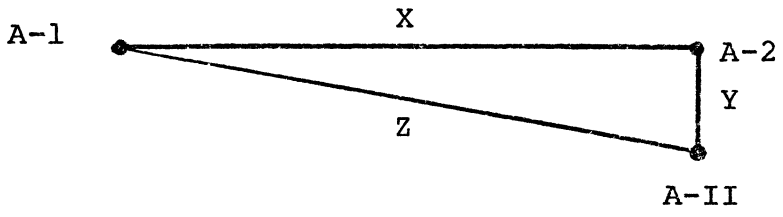
either two concepts (figures, in this study) or the same figure measured over time. The D Score is obtained by squaring the difference between each scale value for any two measurements of a figure, summing these differences and then taking the square root. D refers to "assumed dissimilarity"; therefore, the higher the D Score, the less is the similarity between the two measurements of a figure. Results of D Score calculations are given in Tables 17 and 18, Appendix D.

The sign test was used to test for significant differences between the distances for each group, since significance estimates are not available for individual data. If X represents the distance between ratings of A in the pre-exposure stage and ratings of A in the post-exposure stage, and Y represents the distance between ratings of A in the post-exposure stage and ratings of A in Phase II, and Z represents the distance between ratings of A in the pre-exposure stage and ratings of A in Phase II, then the following significant differences are obtained. For both groups, X is greater than Y and Z is also greater than Y. There are no significant differences between X and Z for either group. These results are shown diagramatically in Figure 4.

To summarize these results, it appears that

FIGURE 4

Distances between Ratings of Figure A



A-1: Ratings of A in pre-exposure stage, Phase I

A-2: Ratings of A in post-exposure stage, Phase I

A-II: Ratings of A in Phase II

whatever distance was created between A in the pre-exposure stage and post-exposure stage in Phase I was the greatest distance created; it was greater than that which was later created between A in the post-exposure stage and Phase II, and it was about the same as the distance between A in the pre-exposure and A in Phase II.

Because there is no way of estimating the significance of individual D Scores, individual subjects' rating score profiles were inspected. This examination did not reveal any systematic patterns or striking differences which might lend support to the predictions.

Discussion

The first experimental prediction was that if a stimulus is presented in the context of other stimuli, then the meaning of that stimulus will be altered. The results of the Sandler's A test do not confirm this prediction. More scale means were significantly different for the control group from pre-exposure to post-exposure than for the experimental group, which is in the opposite direction to that which would be expected for the prediction to be borne out.

The factor analysis of Figure A seems to indicate that for the experimental group there was a dramatic change in the factor structure from pre-exposure to post-exposure. Upon close examination, however, it can be seen that the factors which are labelled similarly are defined by different scales in the two situations. For example, the factor labelled "complexity" accounts for almost three times as much variance in the post-exposure stage as it did in the pre-exposure stage. But only one scale loads high on this factor in both cases; the other two scales which define it are different.

This suggests at least two possibilities. One is that two different dimensions may actually have been measured here, one of which may be "complexity" and

another which might more properly be called "plainness", or both may be re-labelled in some other way. Another possibility is that neither factor is an independent dimension and the factor loadings are chance occurrences. The superficially clear-cut shift in the evaluative factor presents a similar dilemma; the same scales do not load high in both cases. Taken in this context, the factor analysis is not conclusive evidence of a change in meaning from pre-exposure to post-exposure.

Similarly, there is a discrepancy between the results of the t-tests of differences between the groups and the factor analysis. The results of the t-tests do not confirm the first prediction; significant differences between the groups in the post-exposure stage would be expected to occur on more than two scales to consider the results positive. Yet the factor analysis indicates a distinct difference in factor structure between the experimental and control groups in both pre-exposure and post-exposure. Given that the factors are poorly defined and not independent, it seems most reasonable to put less weight on the factor analysis as an accurate representation of the situation.

It was also predicted that if the context of the stimulus is altered, then the meaning of that stimulus

will again be altered. Since the context was altered by re-locating the stimulus figure which seemed to have made the greatest difference in the post-exposure ratings of A, it would be expected that the rating of A in Phase II would move in the direction of the rating of A in the pre-exposure stage. In terms of the available measures and the previously described representations, this means that the distance X should be greater than the distance Z. While the other combinations of distances were significantly different from one another, X and Z were not. This does not necessarily disconfirm the prediction. If, in reality, a gestalt was formed in the post-exposure stage of Phase I, then alteration of the context which supposedly helped form that pattern may create an entirely new and different gestalt which is not related to either of the former patterns. It is difficult to ascertain whether the D Score or the sign test of differences between the D Scores would reveal this process.

These results must be considered negative or at least inconclusive. There are a number of reasons why the predictions may not be supported by the data even if the theoretical basis for the predictions is sound. These reasons relate to the method of presentation of the stimuli, the nature of the particular stimuli used in this

experiment, the measuring instrument, and the lack of appropriate statistical tools for analysis of the data. Some comments will be made on each of these methodological problems before the theoretical notions behind the predictions are considered.

The unexpected changes in meaning which occurred in the control group may be partially accounted for by the method of presentation of the stimuli. The initial presentation of all stimulus figures separately in succession may have created a context formed by temporal patterning, in which A could be rated in the post-exposure stage and in Phase II. Associations and meanings which may have been formed in the prolonged exposure to each stimulus in the pre-exposure rating session may have overridden those formed in the relatively brief exposure stage for both groups, but especially for the control group where the presentation could have been particularly boring and/or confusing. This problem was anticipated in the design, but it was felt that the time required for the detailed ratings was a "necessary evil" if real and subtle changes in meaning were to be detected. Perhaps the effect of this circumstance was greater than anticipated; so great, in fact, that it not only obscured measurement of the meaning but it also affected the meaning of

the stimuli.

A problem may also have been introduced by the use of novel visual stimuli. Simple figures were chosen in an attempt to avoid the problem of accurately measuring and manipulating complex, pre-established meaning of familiar linguistic material. Even the meaning of complex visual material is difficult to measure. Bokander (1966) analysed semantic differential judgments of a collection of photographic portraits and found two dimensions which might be labelled evaluative and dynamism, but he could not further define any of the other factors. Although the problems of measuring complex meaning in the present study may have been avoided by the use of simple visual stimuli, it is possible that observed changes in meaning occurred partially as a result of subjects becoming familiar with novel stimuli rather than as a function of the experimental manipulation or patterning.

Physical characteristics of visual stimuli, e.g. size, colour, angularity, orientation, density, number, etc., may affect the extent to which combinations of stimuli are perceived as integrated wholes which are different from the sum of their parts. A choice was made in designing the experiment between varying these specific

characteristics and choosing stimuli on the basis of more broadly defined criteria. To construct stimuli of even a moderate degree of complexity which would also allow all of the physical characteristics and their interrelationships to be controlled and deliberately varied would create an unmanageable factorial study. (This was considered at one point.) In fact, the results of such a study might be just as confusing and inconclusive as in this study. Consider, for example, the case where the only significant effect is the third-order interaction between four variables such as size, number, distance, and colour, where each of these variables is expressed at three levels. This does not give us any more insight into patterning or gestalt formation than do the present results.

There is some data available on semantic differential ratings of visual stimuli such as nonsense figures and Rorschach and Holtzman inkblots which tend to support the choice of stimuli for this experiment. Bruner (1948), in his study of perceptual theory and the Rorschach test, suggests that the less structured a stimulus is, the stronger is the role of directive, nonsensory factors in determining perceptual organization. Borelli (1961) interpreted the results of his investigation of meanings of Rorschach cards in a similar way. He found that both

the rejection of, and the response to, a card result from the interaction of the individual's personal reaction to the meaning of a card with that meaning. The central stimulus in the present study was chosen from a large group of "nonsense figures" for its lack of structure with the expectation that this would facilitate the association of experiential correlates of the more structured context figures with those of the central stimulus. The negative results may, in fact, confirm this expectation in the following way.

In studies of both Holtzman and Rorschach inkblots, Otten and Vande Castle (1963) and Daw (1965) found that chromatic cards were considered more pleasing than achromatic or mixed cards, and they were usually judged in a more extreme manner. Rabin (1959) also reports that coloured Rorschach cards were rated as being positive and pleasing. In the present experiment, three of the context figures were coloured and one was black. The results may reflect conflicting meanings of the context figures which essentially cancel each other out when associated with the ambiguous central stimulus, rather than forming an integrated gestalt which is "projected onto" the central stimulus.

These are some of the stimulus variables which may

have affected the extent to which the combination of these particular stimuli could be perceived as an integrated gestalt. Suggestions for overcoming some of these problems will be made in the Implications section. Perhaps the single most important lesson that can be learned from this study with respect to stimuli is that careful attention must be paid not only to the dimensions of the stimuli but also to the interrelationship of those dimensions, i.e. how responses to individual stimuli will interact with one another. Appropriate choice of stimuli will come only with continued experimentation since very little data exists at the present time to integrate the results of diverse studies which have dealt with the meaning of various types of stimulus materials.

I turn now to the remaining methodological considerations -- the measuring instrument and statistical analysis.

The appropriateness of the semantic differential as the measuring instrument for this study can certainly be questioned on the basis of the concerns expressed about it in the Literature Review and Theoretical Background section. However, only when the dynamic process conceptualization of meaning, including the patterning of experiential elements within a context, is more fully explored and understood, will it be possible to construct

an instrument to measure meaning based on these theoretical considerations. But even if we accept that the semantic differential measures processes which are operative in the formation of experiential meaning, there is an additional problem with how the results of it can be analysed and interpreted. The data which arises from semantic differential ratings is descriptive in nature. It is the lack of appropriate inferential statistics for this data which makes it difficult to make affirmative statements about changes in meaning based on factor analyses and D Scores. The use of A tests and t tests is not a very satisfactory alternative because of the high probability of alpha error involved. The results of the present study are not seriously jeopardized by the use of these tests since very few significant differences were found, but this does not solve the problem.

This outline of the methodological problems which may help to account for the inconclusive results of the study points out the need for more data on complex stimulus materials and for refinement of measuring instruments and statistical tools for analysis. However, the fact remains that the results generally did not support the predictions and the implications of this for the validity of the predictions must be considered.

The predictions are in error to the extent that

the particular combination of conditions relating to subjects, the environment and stimuli used in this experiment are conducive to the independence notion rather than the patterning process. The purpose of this study, to demonstrate a laboratory situation in which patterning occurs, was not fulfilled. However, the task remains to specify stimulus, organismic and environmental conditions within which patterning may or may not occur. The inconclusive results may be an indication that the process of association of experiential components in meaning formation is not as general or as easily demonstrated as was originally thought. A major outcome of this study, then, is not necessarily that the theoretical notions are unsound, but that the predictions made from them must be made more specifically to allow conclusions to be made about the particular conditions within which gestalt formation may occur.

In the following section, the major findings of the study are summarized and the implications for further research are considered.

Summary and Implications

In terms of the experimental predictions, methodological considerations give rise to the following doubts about the results of the study:

1. Did systematic and significant changes in meaning of the central stimulus actually occur which were not measured by the semantic differential, or which were not discernible by the statistical analyses used?
2. Did the method of presentation of stimuli affect the meaning of those stimuli, particularly with respect to the control group?
3. Did the observed unpredicted changes in meaning occur as a function of subjects becoming familiar with novel stimuli?
4. Did this particular combination of context figures have conflicting meanings which were antithetical to the formation of gestalt?

Future research might incorporate some of the following changes in an effort to overcome these problems. A procedure for familiarizing subjects with stimuli before experimental manipulations are made may eliminate the possibility of spurious meaning changes due to adaptation to novel stimuli. If fewer scales were used and only the meaning of the central stimulus were measured, the reduction in time spent on pre-exposure and post-exposure measurement

might increase the effectiveness of the exposure stage. The effect of stimulus characteristics such as colour and structure might be investigated in a factorial study where coloured, ambiguous context figures are compared to achromatic, highly structured figures. A more complex experimental design which would allow for better control of stimulus variables might eliminate the necessity of using the semantic differential to measure meaning. This would also help solve the problem of finding appropriate statistics to analyse semantic differential data.

The larger theoretical considerations in designing future experiments must be the specification of stimulus, organismic and environmental conditions. The results of this study, together with the results of some other research, point out some ways in which stimulus conditions may affect gestalt formation and how they can be further specified and controlled. More research in which the results of isolated studies of experiential meaning are integrated with one another may begin to shed some light on the particular processes which are operative in meaning formation and the relative amounts of variance accounted for by each in the total picture.

This study did not succeed in demonstrating a laboratory situation in which the patterning of relationships

between experiential components of meaning occurred. Further research is needed to specify subject, organismic and environmental conditions within which this process of meaning formation is operative. Creativity and imagination will be required to formulate alternative approaches to the problem in light of the lack of a solid theoretical and empirical basis for studying this conceptualization of meaning formation.

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APPENDIX A

Pilot Study No. 1

Pilot Study No. 2

Pilot Study No. 1

Purpose

1. To select a meaningless, ambiguous random shape to be the central stimulus (A) in the experiment.
2. To select four (4) colourful, meaningful stimuli to form a context for A in the experiment.

Method

Subjects

Eight undergraduate university students at Wilfrid Laurier University served as volunteer subjects.

Apparatus

A flip-chart stand was built out of a 24"X11½" piece of pressboard with two 3" metal binder rings attached to the top, and a 2"X4" board attached as a base at the back. A heavy weight (wooden box full of metal parts painted flat black) was placed on the 2"X4" to hold the apparatus firmly on a square wooden table. The random shape stimulus figures were cut out of black Letra-Colour with a design knife and pasted onto white bristol board, 8½"X11", in which two holes were punched to fit them onto the binder rings.

The context stimuli were painted with acrylics on white canvasette, 8½"X11", in which holes were punched

similar to the random shapes.

The subject sat at a square metal table 4 feet away from the flip-chart, with the stimuli at approximately eye level. The experimenter used a Heuer stop-watch to time exposure of the random stimuli. The stimulus figures were flipped over manually by the experimenter.

Stimulus Materials and Scales

Six random shapes were chosen from a group of 180 shapes used in a study by Vanderplas and Garvin (1959) on the basis of low association values and low content values. They were photographed from the journal, enlarged onto 8¼"X11" paper, traced onto black Letracolour and cut out with a design knife, then cemented to 8¼"X11" pieces of white bristol board.

The nine context stimuli were designed by the author and painted in acrylics on canvasette by a fellow student. An attempt was made to create four simple and four more complex coloured figures intuitively incorporating the three dimensions cited by Osgood, Suci and Tannenbaum (1957) as the main experiential components of meaning -- evaluative, potency and activity. The four simple stimuli were various colours and shapes; five more complex stimuli were created which consisted of the basic dimensions (i.e. colour, similar shape) of the four simple ones, but they had some structure which was considered more commonly "meaningful".

The set of 20 semantic differential scales (see Appendix B) were taken from a study by Elliott and Tannenbaum (1963), with the exception that "colourful-colourless" was replaced by "meaningful-meaningless". All 20 scales were printed on one page, but arranged in different random orders for each stimulus, and the positions of the bi-polar word pairs were determined randomly by the flip of a coin. The instructions for completing the scales were adapted from Osgood, Suci and Tannenbaum (1957) and printed on separate pages (see Appendix B).

Procedure

The six random shapes were presented twice each in different random orders for each subject with the restriction that the same figure was not presented twice in a row. They were flipped over manually by the experimenter every 30 seconds while the subject wrote associative responses on a sheet of 8"X11" white lined lecture paper.

The nine stimulus figures were presented once each on the same flip-chart. They were also arranged in different random orders for each subject. Subjects were given a page of 20 semantic differential scales for each figure on which they rated the stimulus at their own speed.

Results

Random Shapes

Three measures were computed on the responses to the random shapes:

1. Consistency - Number of subjects identifying the shape as "same" or repeated the initial response on the second presentation of it. Results show that most subjects were aware of the double presentation -- scores ranged from 5 (out of 8) to 8 on the 6 shapes, with 3 shapes being identified as "same" by 7 out of 8 subjects.
2. Meaninglessness - Number of responses of "nothing", "nonsense", "nil", etc. Here, all 16 responses were considered (2 for each subject) as there were a few discrepancies in responses to the same shape. Scores were generally low for this category, ranging from 0 to 10 out of 16.
3. Homogeneity of meaning - Number of similar content responses to each shape, i.e. besides "nonsense", "nothing", etc. Content responses to three of the six shapes were completely heterogeneous, i.e. there were no similar content responses. One shape looked like a jaw to two people; three subjects felt that one shape resembled a face or human figure, while two others responded to the same shape with "chunk of ice". The sixth shape looked like a building of some kind to 4 out of 8 subjects.

Context Figures

Mean scores were computed on scale ratings for each figure. Frequencies of mean scores falling between 1.0 and 3.0 at one end of the scale, and 5.0 and 7.0 at the other end were tallied for each figure. Thus, the "scores" for each figure consisted of number of means out of 20 of 1.0 to 3.0 and 5.0 to 7.0. Scores thus computed ranged from 7 to 15.

Conclusions

One purpose of this pilot was to select a random shape to be the central stimulus figure in the visual stimuli for the experiment. The main criteria for selecting the shape were meaninglessness and ambiguity, i.e. heterogeneity of meaning. The shape which was selected had a meaninglessness score of 10 and a homogeneity of meaning score of 0, i.e. no similar content responses. In addition, 7 out of 8 subjects identified this shape as being the same on its second presentation.

The second purpose of the pilot was to select four figures to form the context for the random shape in the experiment. The criterion for selection was richness of meaning, defined in operational terms to be the frequency of extreme mean scores on the semantic differential scales. Thus, four figures with the highest scores (as described in the Results section) were selected. Two figures had

a score of 15 and one was 13. Three figures had 10 means which fell into this range. In order to select one of these stimuli, "borderline" means of 3.0 and 5.0 were eliminated. When this was done, two figures had nine means which fell between 1.0 and 2.875 at one end and 5.125 and 7.0 at the other. The third figure still had 10 means in this range and so was selected as the fourth context stimulus.

Pilot Study No. 2

Introduction

The shape which was selected as meaningless and ambiguous in Pilot Study No. 1 was a black, angular shape. Pollio (1974) suggested that sharp edges and corners evoke negative associations (p.358). The implications for this study were that the random shape might be more meaningful than was originally found in the pilot study, and that it was overloaded on negative meaning. This would work against the experiment in that it would be more difficult for a negative stimulus to "pick up" meaning from the context stimuli. In order to determine the extent to which this might be true, several shapes were drawn up and semantic differential ratings obtained on tham.

Purpose

The purpose of this pilot study was to select a random shape to be the central stimulus in the experiment.

Method

Subjects

Five undergraduate students at Wilfrid Laurier University served as volunteer subjects.

Apparatus

The apparatus and experimental room were the same as those used in Pilot Study No. 1.

Stimulus Materials and Scales

Five shapes were used as stimuli:

1. The black angular shape which was selected in Pilot Study No.1.
2. The same shape was cut out of grey Letrafilm and applied to an 8¼"X11" piece of white bristol board.
3. The angular corners of the black shape were rounded off to create a similar shape, but "softer".
4. The rounded off shape was also cut out of grey Letrafilm and applied to 8¼"X11" white bristol board.
5. A circle, 5" in diameter, was cut out of the same grey Letrafilm and applied to 8¼"X11" white bristol board.

The same set of 20 semantic differential scales as were used for the context stimuli in Pilot No. 1 were used to measure the meaning of the shapes.

Procedure

The five stimuli were arranged in different random orders for each subject and presented on the flip-chart manually. Subjects completed a page of 20 semantic differential scales for each shape.

Results

Mean scores were computed on scale ratings for each shape. The initial measure was frequency of extreme mean scores (1.0 to 3.0, and 5.0 to 7.0). Secondly, content of the scales with extreme mean scores was examined. A summary of the data is given in Table 4.

Conclusions

The purpose of this pilot was to select a random shape for the experiment. Criteria for selection were (a) meaninglessness and (b) neutral or a balance of positive and negative meaning on semantic differential scales which had extreme mean scores.

The grey circle and grey angular shape were most meaningful, with frequencies of 13 and 11 extreme mean scores respectively. Thus they were eliminated. The black angular shape and the black rounded shape had frequencies of 10 each and the grey rounded shape had 8 extreme mean scores. Thus, on the criterion of meaninglessness alone the grey rounded shape would heve been selected. However, when borderline means. i.e. 3.0 and 5.0, were eliminated, all three of these shapes had frequencies of 6. The content of the scales with extreme scores was examined. The black angular shape was described as "unpleasant", "masculine", "hard", and "angular, in contrast to the

TABLE 4

PILOT STUDY NO. 2

Mean Scale Ratings for Five Stimulus Figures

Scales (1.0 to 7.0)	Grey Angular	Circle	Black Angular	Black Rounded	Grey Rounded
1. small-large	3.0	3.4	4.2	3.6	3.2
2. excitable-calm	4.0	6.0	3.8	5.2	5.4
3. light-heavy	2.8	3.6	5.0	5.0	3.0
4. cool-warm	2.4	5.6	3.8	3.0	3.8
5. meaningful-meaningless	5.2	3.2	5.0	4.2	4.2
6. unpleasant-pleasant	4.6	5.6	2.8	5.4	4.8
7. horizontal-vertical	6.8	3.4	6.8	6.0	6.6
8. bad-good	4.2	4.8	3.0	4.6	4.0
9. simple-complex	2.4	1.6	3.2	3.2	2.8
10. usual-unusual	5.6	1.6	5.8	5.6	5.6
11. masculine-feminine	3.2	5.4	2.8	5.0	5.0
12. careful-careless	3.6	2.8	3.8	3.4	3.4
13. stable-unstable	3.8	1.2	3.2	3.6	4.8
14. fancy-plain	5.2	6.8	5.0	4.4	3.8
15. drunk-sober	3.0	5.8	3.8	3.6	3.8
16. ugly-beautiful	3.8	5.4	3.4	5.0	4.8
17. soft-hard	5.6	1.8	6.4	2.6	2.4
18. passive-active	4.8	4.6	4.4	4.2	4.4
19. angular-rounded	1.0	7.0	1.2	5.6	5.8
20. slow-fast	4.8	3.4	4.8	3.8	4.0
Frequency*:	11	13	10	10	8
When borderline means are eliminated:	(9)	(13)	(6)	(6)	(6)

*Frequency: number of extreme mean scores, i.e. those falling between 1.0 and 3.0, and between 5.0 and 7.0

rounded shapes which were described on these same scales as "pleasant" (black rounded only), "feminine" (borderline scores of 5.0), "soft", and "rounded". The black angular shape was eliminated because of its overloading on negative scales.

When the content of scales with extreme scores for the black rounded and grey rounded shapes were compared, there was very little difference in meaning. The grey rounded shape was chosen by the flip of a coin.

APPENDIX B

Semantic Differential Scales

Sample Scale Sheet

Instructions for Completion of Scales

Semantic Differential Scales*

pleasant-unpleasant

hard-soft

active-passive

careful- careless

warm-cool

usual-unusual

ugly-beautiful

light-heavy

slow-fast

sober-drunk

fancy--plain

large-small

good-bad

masculine-feminine

excitable-calm

stable-unstable

horizontal-vertical

simple-complex

rounded-angular

meaningful-meaningless**

* From Elliott and Tannenbaum (1963)

** Changed from "colourful-colourless"

ugly :____:____:____:____:____:____:____: beautiful

heavy :____:____:____:____:____:____:____: light

unpleasant :____:____:____:____:____:____:____: pleasant

warm :____:____:____:____:____:____:____: cool

fancy :____:____:____:____:____:____:____: plain

hard :____:____:____:____:____:____:____: soft

meaningful :____:____:____:____:____:____:____: meaningless

calm :____:____:____:____:____:____:____: excitable

small :____:____:____:____:____:____:____: large

good :____:____:____:____:____:____:____: bad

vertical :____:____:____:____:____:____:____: horizontal

simple :____:____:____:____:____:____:____: complex

fast :____:____:____:____:____:____:____: slow

feminine :____:____:____:____:____:____:____: masculine

active :____:____:____:____:____:____:____: passive

unusual :____:____:____:____:____:____:____: usual

careless :____:____:____:____:____:____:____: careful

rounded :____:____:____:____:____:____:____: angular

sober :____:____:____:____:____:____:____: drunk

stable :____:____:____:____:____:____:____: unstable

These scales are designed to measure the meaning of certain figures to various people by having them judge them on a series of descriptive scales. Please make your judgments on the basis of what the figures mean to you. On each page you will find a set of scales. You are to rate the figure on each of these scales in order. Here is how to use them:

There are seven (7) positions on each scale. If you feel that the figure is very closely related to one end of the scale, place your check mark next to the appropriate word:

Sweet :X :__:__:__:__:__:__: Sour

OR

Sweet :__:__:__:__:__:__:X : Sour

If you feel that the figure is quite closely related to one end of the scale or the other (but not extremely), place your check mark as follows:

Sweet :___: X :___:___:___:___:___: Sour

OR

Sweet :___:___:___:___:___: X :___: Sour

If the figure seems only slightly related to one side as opposed to the other (but is not really neutral), then you should check as follows:

Sweet :___:___: X :___:___:___:___: Sour

OR

Sweet :___:___:___:___: X :___:___: Sour

The direction towards which you check, of course, depends upon

which of the two ends of the scale seems most characteristic of the thing you are judging.

If you consider the figure to be neutral on the scale, or if the scale is completely irrelevant, unrelated to the figure, place your check mark in the middle space:

Sweet :___:___:___:_X_:___:___:___: Sour

IMPORTANT:

1. Place your check marks in the middle of spaces, not on the boundaries.

	This			Not This	
:___:	___:	_X_:	___:	___:	___X___:

2. Be sure you check every scale for every figure -- do not omit any.

3. Never put more than one (1) check mark on a single scale.

Do not try to remember how you checked similar items for earlier figures when you encounter the same item twice. Make each item a separate and independent judgment. Work at fairly high speed through the scales. Do not puzzle over individual items. It is your first impressions, the immediate "feelings" about the items that I am interested in. On the other hand, please do not be careless, because I want your true impressions.

APPENDIX C

Results of Factor Analysis

TABLE 5

Factor Loadings for First Four Factors - Figure A

Experimental Group

Scales	Factor 1		Factor 2		Factor 3		Factor 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1. large-small	-.02	-.46	.21	-.05	.09	.08	-.03	-.10
2. calm-excitable	-.06	.41	.79	.53	-.01	-.29	-.03	.30
3. heavy-light	-.00	-.04	.14	.02	.16	.29	-.09	-.20
4. cool-warm	-.16	-.04	.05	.20	.37	.49	.09	-.03
5. meaningful-meaningless	.72	-.50	-.18	-.03	-.19	.45	.29	.07
6. unpleasant-pleasant	.04	.01	-.12	.06	-.10	.02	.21	-.77
7. horizontal-vertical	-.04	.05	.02	-.04	.06	.35	.09	.09
8. good-bad	.91	.41	.11	.15	.07	-.18	-.26	.64
9. simple complex	-.07	.78	.08	.14	.83	-.09	-.13	.22
10. unusual-usual	.23	.04	-.02	-.04	.74	.16	-.01	.07
11. feminine-masculine	.33	.33	.20	.17	.14	-.24	.37	.46
12. careful-careless	.02	-.01	.06	.64	.03	.06	-.01	.12
13. unstable-stable	-.09	-.14	-.14	-.22	-.09	-.19	.94	-.14
14. fancy-plain	.06	-.82	-.52	-.19	.02	.05	.05	-.04
15. sober-drunk	.00	-.27	-.06	.60	-.40	-.25	-.34	.22
16. ugly-beautiful	-.57	-.25	.30	-.26	-.21	.18	.14	-.46
17. hard-soft	-.31	-.17	.16	-.14	-.06	.84	.34	-.17
18. passive-active	.05	.38	.30	.70	.16	-.06	.31	.10
19. rounded-angular	.08	.20	.43	.29	-.18	-.52	.05	.28
20. slow-fast	-.09	.25	.61	.74	.28	.08	-.06	-.09
% Variance	21.5	42.5	20.2	16.8	15.4	13.1	11.8	12.0
Cumulative % Variance			41.7	59.3	57.1	72.4	68.9	84.4

TABLE 6

Factor Loadings for First Four Factors - Figure A

Control Group

Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1. large-small	.01	.22	-.29	.83	.05	.12	.83	-.12
2. calm-excitable	.35	.85	.02	-.25	-.18	-.15	-.23	-.04
3. heavy-light	.12	.75	-.03	.32	.65	.22	.03	-.15
4. cool-warm	-.06	-.09	-.06	.48	.05	-.45	-.01	.53
5. meaningful-meaningless	.09	.08	-.04	-.04	.04	.72	-.13	.02
6. unpleasant-pleasant	.12	-.09	.88	.11	-.05	.10	-.01	.01
7. horizontal-vertical	.22	-.14	-.08	-.22	.27	-.15	.16	-.70
8. good-bad	-.03	.45	-.34	-.38	-.21	.35	.00	.07
9. simple complex	.66	.59	-.06	.12	.10	.42	-.28	.18
10. unusual-usual	-.37	-.36	.41	-.23	.03	-.38	-.12	.39
11. feminine-masculine	.31	.02	.12	-.70	.43	-.11	-.21	-.38
12. careful-careless	-.04	-.05	-.22	.28	-.50	.46	.08	.43
13. unstable-stable	-.41	-.04	.78	-.03	.26	-.28	-.04	-.80
14. fancy-plain	-.85	-.18	.03	-.15	.07	-.75	.00	-.18
15. sober-drunk	.50	.22	-.15	.29	-.65	.73	.07	.37
16. ugly-beautiful	.29	-.27	.66	.73	.13	.13	-.19	.34
17. hard-soft	-.06	-.23	.22	.75	-.53	-.04	.76	.04
18. passive-active	.82	.80	.08	-.21	.11	.13	.12	.31
19. rounded-angular	-.09	.35	-.13	-.51	-.03	-.31	-.09	-.16
20. slow-fast	.82	.84	.01	-.23	.13	.25	-.11	-.02
% Variance	25.7	33.9	21.2	32.3	15.2	12.3	11.4	10.8
Cumulative % Variance			46.9	66.2	62.1	78.5	73.5	89.3

TABLE 7

Factor Loadings for First Four Factors - Figure B-1

Experimental Group

Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1. large-small	.03	.14	.96	.01	.12	.02	.08	-.02
2. calm-excitable	.58	-.20	-.24	.16	.17	-.01	.01	.22
3. heavy-light	-.41	.13	.28	-.04	.30	-.08	-.11	-.10
4. cool-warm	-.04	.14	-.03	.15	.00	.11	-.02	.42
5. meaningful-meaningless	.06	-.05	-.04	-.08	-.81	.93	.05	.18
6. unpleasant-pleasant	.88	.86	.04	.08	.10	.00	.15	-.20
7. horizontal-vertical	-.07	-.20	-.05	.20	.10	-.21	.62	.60
8. good-bad	.88	-.81	.61	-.09	-.09	.15	.01	.19
9. simple complex	.09	-.04	-.13	-.46	.13	.14	-.56	-.30
10. unusual-usual	-.08	.02	.16	-.04	.87	-.60	.00	.16
11. feminine-masculine	.21	-.54	.09	.35	-.04	-.10	-.01	-.16
12. careful-careless	.32	-.23	-.33	.15	-.07	.34	-.02	.10
13. unstable-stable	-.19	.23	-.04	-.05	-.07	-.06	-.10	-.64
14. fancy-plain	-.10	.03	.07	.89	-.18	.08	.60	.07
15. sober-drunk	.51	-.07	-.06	-.26	-.05	.24	.17	.51
16. ugly-beautiful	-.86	.78	.03	-.01	-.01	-.06	.24	-.06
17. hard-soft	-.18	.16	.40	-.50	-.09	-.03	-.34	.17
18. passive-active	.17	-.22	.50	-.07	.16	-.00	-.38	.12
19. rounded-angular	-.01	-.05	-.37	.10	.06	-.17	-.18	.02
20. slow-fast	.35	-.01	-.44	.16	-.21	.24	.07	.07
% Variance	36.7	37.2	17.8	18.4	13.0	14.1	11.7	10.5
Cumulative % Variance			54.5	55.6	67.5	69.7	78.2	80.2

TABLE 8

Factor Loadings for First Four Factors - Figure B-1

Control Group

Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1. large-small	.21	.40	.07	.75	.01	-.09	.01	.11
2. calm-excitable	-.05	.04	.44	-.03	.24	-.38	.24	.54
3. heavy-light	.22	.10	-.44	-.43	.02	.58	.02	.11
4. cool-warm	.74	.82	.12	.19	-.22	-.15	-.22	-.01
5. meaningful-meaningless	.06	.14	.56	.67	-.40	.10	-.41	.03
6. unpleasant-pleasant	.92	.64	-.12	-.25	.23	.04	.25	-.09
7. horizontal-vertical	.02	-.07	-.16	.08	.77	.03	.77	.03
8. good-bad	-.67	-.14	-.01	.26	-.08	-.11	-.08	.30
9. simple complex	.17	-.18	-.37	-.18	-.37	.86	-.37	-.04
10. unusual-usual	-.09	-.35	-.02	-.00	-.12	.24	-.12	-.34
11. feminine-masculine	.02	-.23	.31	.08	.21	.02	.21	.75
12. careful-careless	.21	-.09	.80	.15	-.06	-.04	-.06	.11
13. unstable-stable	.44	.13	-.08	-.66	-.12	.12	-.12	-.22
14. fancy-plain	-.17	-.06	.79	-.01	.02	-.68	.02	.26
15. sober-drunk	.00	-.15	.02	.86	.11	-.17	.11	.09
16. ugly-beautiful	.88	.59	.01	-.20	.31	.30	.31	-.10
17. hard-soft	.56	.33	-.46	-.35	.18	.19	.19	-.65
18. passive-active	-.24	-.76	.03	-.31	-.61	.19	-.61	-.03
19. rounded-angular	.07	.19	-.14	.24	.26	.04	.26	.51
20. slow-fast	.12	-.67	.28	.19	.45	-.07	.45	.22
% Variance	32.3	33.8	24.5	23.7	15.6	12.9	8.8	10.1
Cumulative % Variance			56.8	57.5	72.4	70.4	81.2	80.5

TABLE 9

Factor Loadings for First Four Factors - Figure B-2

Experimental Group

Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1. large-small	.06	(.59)	-.22	-.08	-.23	.11	.34	.10
2. calm-excitable	.09	-.34	.43	(.61)	.26	.21	-.10	.16
3. heavy-light	-.07	.36	-.10	-.18	.03	-.03	(.82)	.04
4. cool-warm	(-.77)	.23	-.06	-.35	-.13	.00	.20	-.20
5. meaningful-meaningless	(.52)	-.06	.01	.14	-.08	.24	.19	(.85)
6. unpleasant-pleasant	(.80)	.44	.06	.02	.10	-.23	-.21	-.04
7. horizontal-vertical	.25	.33	-.39	-.23	-.46	-.23	-.23	(.53)
8. good-bad	(.70)	(-.74)	.09	.22	.23	.20	-.09	-.13
9. simple complex	.18	-.05	.11	.24	.02	(.92)	-.04	-.02
10. unusual-usual	-.07	.12	-.09	-.37	-.00	-.46	.21	-.42
11. feminine-masculine	.19	-.11	.09	(.83)	.22	.10	(-.61)	.09
12. careful-careless	.12	(-.55)	(.66)	.14	-.13	.26	.05	.11
13. unstable-stable	-.26	.18	(-.79)	(-.59)	.03	-.30	.05	.13
14. fancy-plain	-.05	.01	.09	-.01	.35	(-.81)	.28	.12
15. sober-drunk	.44	-.31	.29	.38	.17	(.60)	-.21	.01
16. ugly-beautiful	(-.90)	(.60)	-.26	-.11	-.25	-.17	.02	.17
17. hard-soft	-.37	(.87)	.07	-.09	(-.75)	-.03	.18	-.11
18. passive-active	-.05	.01	(.85)	(.68)	.10	.08	-.41	-.07
19. rounded-angular	.26	-.16	.00	-.05	(.71)	-.33	-.13	-.21
20. slow-fast	.07	-.13	(.54)	(.72)	.14	.10	-.03	.16
% Variance	39.8	46.6	17.3	21.0	13.4	11.3	10.6	9.0
Cumulative % Variance			57.1	67.6	70.5	78.9	81.1	87.9

TABLE 10

Factor Loadings for First Four Factors - Figure B-2

Control Group

	Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1.	large-small	-.22	-.07	-.11	-.09	-.06	-.16	-.11	.37
2.	calm-excitable	.22	.53	.10	.29	.14	.04	.03	.19
3.	heavy-light	.10	.19	.60	.09	-.27	.07	.17	-.08
4.	cool-warm	-.37	-.01	.10	-.82	-.25	.22	-.11	-.16
5.	meaningful-meaningless	.59	.24	-.01	.25	.01	-.36	-.55	.43
6.	unpleasant-pleasant	.85	.09	.16	-.12	.04	.96	.15	-.04
7.	horizontal-vertical	.24	.47	.20	.51	.08	-.07	.77	-.49
8.	good-bad	.67	.42	.02	.39	.11	-.61	.22	.35
9.	simple complex	-.05	.67	.80	-.03	-.01	.20	.28	-.05
10.	unusual-usual	.05	-.12	-.23	.45	.01	-.29	-.15	-.54
11.	feminine-masculine	.22	-.12	-.35	.06	.77	-.04	.12	.76
12.	careful-careless	.23	.26	.27	.14	-.03	.03	.51	-.16
13.	unstable-stable	-.34	-.52	-.73	-.10	-.17	.28	-.10	-.07
14.	fancy-plain	-.03	-.83	-.73	.12	.18	-.31	-.15	-.14
15.	sober-drunk	.15	.90	.24	.03	-.15	-.11	.73	-.09
16.	ugly-beautiful	-.85	.12	-.13	-.04	-.22	.87	-.06	.04
17.	hard-soft	-.24	.13	-.04	-.87	-.53	-.12	-.16	-.01
18.	passive-active	-.52	.38	.09	.48	.56	.10	-.15	.01
19.	rounded-angular	.04	.09	-.00	.72	.64	-.22	-.02	.00
20.	slow-fast	.12	.33	.34	.36	.67	-.20	-.43	.61
	% Variance	29.8	36.4	25.0	22.2	12.9	15.5	11.3	11.8
	Cumulative % Variance			54.8	58.6	67.7	74.1	79.0	85.9

TABLE 11

Factor Loadings for First Four Factors - Figure B-3

Experimental Group

Scales	Factor 1		Factor 2		Factor 3		Factor 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1. large-small	.22	.28	-.49	.38	-.10	.17	.16	.22
2. calm-excitable	.03	.22	.74	-.17	.28	-.06	.14	.37
3. heavy-light	-.10	-.11	-.72	.69	-.14	.33	.27	-.01
4. cool-warm	-.05	-.26	.24	-.06	-.13	.28	.01	-.09
5. meaningful-meaningless	.11	.09	.16	.05	-.01	-.53	.06	-.09
6. unpleasant-pleasant	-.74	-.74	-.18	.21	.04	.08	.03	-.26
7. horizontal-vertical	.06	.06	.02	.11	.07	.72	.02	-.29
8. good-bad	.84	.71	.06	-.12	.16	-.10	.11	-.07
9. simple complex	-.02	-.12	.31	.00	-.13	-.08	-.69	.05
10. unusual-usual	-.11	.02	-.33	.09	.34	-.01	.10	-.39
11. feminine-masculine	.29	.69	-.04	.01	.07	.02	-.04	.11
12. careful-careless	.69	.52	-.11	-.01	-.08	.05	-.14	.21
13. unstable-stable	-.25	-.21	-.18	-.04	-.04	.02	.08	-.82
14. fancy-plain	.06	.12	.05	-.02	.01	-.12	.83	-.20
15. sober-drunk	.41	.22	.00	-.10	-.02	-.03	-.40	.78
16. ugly-beautiful	-.72	-.87	.18	.08	-.10	.17	-.11	-.18
17. hard-soft	-.02	-.23	-.17	.74	-.73	-.08	-.03	.13
18. passive-active	-.10	-.35	.62	-.55	-.25	.48	-.05	.34
19. rounded-angular	.10	.28	-.01	-.51	.84	-.33	.09	.21
20. slow-fast	.07	.08	.56	-.55	-.00	.13	-.12	.20
% Variance	28.1	32.1	20.8	21.0	14.7	14.6	11.4	12.5
Cumulative % Variance			48.9	53.0	63.6	67.6	75.0	80.1

TABLE 12

Factor Loadings for First Four Factors - Figure B-3

Control Group

Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1. large-small	-.23	.55	-.01	-.19	.04	-.21	.19	.15
2. calm-excitable	.75	.15	.04	.14	.27	-.15	.38	.71
3. heavy-light	-.19	.69	-.05	-.09	.30	-.14	-.08	.20
4. cool-warm	.00	.12	.24	-.22	.09	.02	-.76	-.26
5. meaningful-meaningless	.24	-.22	-.65	-.01	-.22	.14	.22	.08
6. unpleasant-pleasant	.00	.94	.64	-.07	.21	.25	.18	-.14
7. horizontal-vertical	-.03	.29	.03	.16	.04	-.20	-.04	-.39
8. good-bad	.39	-.25	-.20	.46	-.48	.08	.61	-.06
9. simple complex	.23	.03	.74	.12	-.06	.94	-.23	.26
10. unusual-usual	-.74	.08	-.09	-.10	.18	-.23	.11	-.38
11. feminine-masculine	.20	-.21	-.13	.75	-.03	-.43	.15	-.05
12. careful-careless	-.21	-.36	.16	-.07	-.67	.07	.33	.09
13. unstable-stable	-.49	.04	-.32	-.05	.36	-.25	.27	-.75
14. fancy-plain	-.24	-.26	-.94	.14	.06	-.72	.09	-.13
15. sober-drunk	.51	.01	.14	.02	-.39	.21	.09	.11
16. ugly-beautiful	-.11	.80	.23	-.12	.87	.43	.06	-.20
17. hard-soft	-.26	.67	-.07	-.54	.04	.01	-.23	.13
18. passive-active	.90	-.07	.15	.11	.10	.28	-.01	.77
19. rounded-angular	-.26	-.14	.25	.74	-.14	-.04	.34	.15
20. slow-fast	.09	-.04	.03	.76	.18	.21	-.01	.26
% Variance	25.5	30.7	22.9	25.0	17.9	12.2	14.0	11.9
Cumulative % Variance			48.4	55.7	66.3	67.9	77.3	79.8

TABLE 13

Factor Loadings for First Four Factors - Figure B-4

Experimental Group

Scales	Factor 1		Factor 2		Factor 3		Factor 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1. large-small	-.03	-.39	.18	.12	.76	-.06	.21	.26
2. calm-excitable	.07	.75	-.56	.06	-.02	-.30	.24	-.21
3. heavy-light	.08	-.00	-.01	.10	.82	-.32	.03	.85
4. cool-warm	-.23	-.28	-.04	.00	.13	.06	-.11	.65
5. meaningful-meaningless	.19	-.25	.04	.72	.05	.19	-.01	.02
6. unpleasant-pleasant	-.29	-.78	.64	.06	.09	-.02	.15	.20
7. horizontal-vertical	-.03	-.08	.23	.33	-.21	.44	-.83	-.20
8. good-bad	.10	.92	-.80	-.15	.11	-.01	.03	-.12
9. simple complex	.61	.57	.34	.01	.27	-.39	.08	-.11
10. unusual-usual	-.47	-.02	.22	-.88	-.14	-.00	.46	-.08
11. feminine-masculine	-.15	.46	-.27	-.20	-.27	.46	-.35	-.14
12. careful-careless	.47	.04	-.22	.32	-.12	.16	.44	-.07
13. unstable-stable	-.44	-.08	.58	.08	-.20	.04	.08	-.07
14. fancy-plain	-.61	-.00	.27	-.00	-.07	.89	-.53	-.08
15. sober-drunk	.75	.08	-.21	.26	-.22	-.02	.05	-.04
16. ugly-beautiful	.03	-.78	.73	-.09	.27	-.26	-.17	.15
17. hard-soft	-.44	-.44	.10	-.10	.26	.05	.07	.68
18. passive-active	.19	.63	-.63	.07	-.29	-.05	.28	.04
19. rounded-angular	.62	.22	-.18	.58	-.01	-.22	-.02	-.04
20. slow-fast	.66	.32	-.16	-.32	.18	-.37	.06	.13
% Variance	37.4	37.9	21.9	19.8	17.3	18.0	10.3	10.1
Cumulative % Variance			59.3	57.7	76.6	75.7	86.9	85.8

TABLE 14

Factor Loadings for First Four Factors - Figure B-4

Control Group

Scales	Factor 1 Pre	Factor 1 Post	Factor 2 Pre	Factor 2 Post	Factor 3 Pre	Factor 3 Post	Factor 4 Pre	Factor 4 Post
1. large-small	-.03	.03	-.00	-.08	.05	.65	.83	.25
2. calm-excitable	-.04	.06	.89	.61	-.09	-.27	.05	-.03
3. heavy-light	.00	-.07	.02	.14	.79	.65	.12	.18
4. cool-warm	.91	.34	-.07	-.10	.14	.09	.24	-.06
5. meaningful-meaningless	-.23	-.34	-.55	-.40	.10	.03	.20	-.29
6. unpleasant-pleasant	.67	.94	.21	.08	.07	-.13	-.24	.21
7. horizontal-vertical	-.23	.27	.35	-.17	.09	.13	.22	-.06
8. good-bad	-.76	-.67	-.07	-.06	-.04	.11	-.13	-.30
9. simple complex	-.12	.02	.16	.10	-.17	-.20	-.08	-.30
10. unusual-usual	.12	.20	-.14	-.06	.33	.03	-.29	.79
11. feminine-masculine	-.22	.05	.49	.47	-.57	-.24	.12	-.33
12. careful-careless	-.05	-.07	.15	-.04	-.02	-.10	.11	-.01
13. unstable-stable	.24	.40	.01	-.11	-.07	.01	-.01	.65
14. fancy-plain	-.29	-.05	-.08	-.15	.05	-.05	-.01	.17
15. sober-drunk	-.12	-.03	-.09	.15	-.20	.02	.21	-.23
16. ugly-beautiful	.70	.91	-.24	.13	.26	.13	-.44	.03
17. hard-soft	.20	.08	-.21	-.33	.86	.61	.10	-.19
18. passive-active	.30	.04	.72	.80	-.15	-.14	-.28	-.03
19. rounded-angular	-.30	.06	.28	.18	-.24	-.70	.18	.13
20. slow-fast	-.14	.13	.48	.78	-.13	.02	-.61	-.12
% Variance	32.4	29.0	20.4	26.8	16.5	14.0	11.4	10.3
Cumulative % Variance			52.8	55.8	69.3	69.8	80.7	80.1

APPENDIX D

Sandler's A

t-Tests

D Scores

TABLE 15

SANDLER'S A

Comparison of Pre-Exposure and Post-Exposure Ratings of Figure A

Scales	Experimental Group (N=32)	Control Group (N=21)
1	1.247	0.111*
2	1.347	1.025
3	16.333	1.296
4	0.527	1.272
5	0.111*	83.000
6	0.527	3.500
7	0.849	0.307
8	11.000	2.110
9	2.111	2.500
10	0.851	0.227*
11	57.000	0.235*
12	0.500	0.208*
13	0.846	0.720
14	66.000	3.500
15	2.500	0.344
16	0.704	0.440
17	0.435	4.110
18	0.215*	23.000
19	0.315	0.454
20	22.500	2.520
	df= 31	df= 20
	*α=.05, A≤0.264	*α=.05, A≤0.267

TABLE 16

t-TESTS

Comparison of Experimental and Control Group Ratings of Figure A

Scales	Pre-Exposure	Post-Exposure
1	1.194	1.355
2	ns*	ns*
3	1.918	2.647**
4	ns	ns
5	1.504	1.707
6	1.049	1.186
7	1.653	ns
8	ns	ns
9	ns	1.687
10	ns	1.284
11	ns	2.322**
12	ns	ns
13	ns	ns
14	ns	ns
15	ns	ns
16	ns	ns
17	ns	ns
18	1.724	ns
19	ns	ns
20	ns	ns

*ns: not significant by inspection; no calculation made

**Significant at p=.05 level

TABLE 17

D SCORES -- EXPERIMENTAL GROUP

Subjects	X*	Y**	Z***
17	6.557	5.385	7.071
18	6.633	7.000	6.633
19	9.592	9.849	10.344
20	5.568	4.899	5.385
21	8.000	7.680	8.426
22	7.681	3.740	7.550
23	8.367	11.400	13.565
24	7.681	3.460	7.681
25	5.745	7.810	8.000
26	6.403	6.000	6.708
27	9.274	6.164	6.245
28	7.141	5.196	8.000
29	10.198	5.568	7.937
30	5.292	4.123	5.745
31	11.576	8.718	6.325
32	6.633	6.403	5.745
33	7.000	7.810	9.381
34	4.243	4.243	3.742
35	9.695	5.568	9.747
36	8.124	7.141	8.544
37	9.849	10.536	11.136
38	9.000	4.899	9.747
39	10.000	8.246	6.708
40	7.810	6.782	7.141
41	9.849	-----**	-----
42	4.690	5.916	4.359
43	7.141	8.775	7.211
44	9.950	9.165	7.280
45	8.185	5.477	7.000
46	7.616	-----	-----
47	5.568	10.344	9.055
48	8.246	5.099	7.483

* X: Distance between ratings of A in pre-exposure and post-exposure

** Y: Distance between ratings of A in post-exposure and A in Phase II

***Z: Distance between ratings of A in pre-exposure and A in Phase II

** Subject did not return for Phase II; these distances not available

TABLE 18

D SCORES -- CONTROL GROUP

Subjects	X*	Y**	Z***
9	7.874	-----**	-----
10	3.742	-----	-----
11	6.245	-----	-----
12	5.196	-----	-----
13	9.950	-----	-----
14	5.099	4.899	4.000
15	7.348	4.690	6.324
16	8.718	7.211	8.944
49	6.557	6.083	8.367
50	7.000	6.083	8.367
51	5.385	3.605	4.899
52	10.488	-----	-----
53	6.000	3.742	6.324
54	8.888	7.746	7.416
55	8.062	-----	-----
56	6.856	3.464	7.141
57	11.090	5.291	11.958
58	8.888	6.324	6.557
59	4.796	5.000	7.071
60	7.483	4.796	8.307
61	4.359	4.243	5.000

* X: Distance between ratings of A in pre-exposure and post-exposure

** Y: Distance between ratings of A in post-exposure and A in Phase II

*** Z: Distance between ratings of A in pre-exposure and A in Phase II

** Subject did not return for Phase II; these distances not available