

EXPERIMENTS IN ACTIVE AUTISM

by

Robert Sommer
B.A., Hobart College, 1950
M.S., University of Oklahoma, 1952

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Advisory Committee:

Redacted Signature

Redacted Signature

Redacted Signature

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To G. M.

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Chapter I

Introduction

A. General statement of the problem

Adjustment of the individual to a complex world is a creative synthesis of many processes. Blood-sugar level, body temperature, and even neurosis are all considered processes which aid the organism to maintain its integrity amidst a continually changing world. It is not surprising that perception is included in the roster of those processes participating in the dynamic adjustment of the organism to a sometimes threatening environment. When an inimical stimulus approaches, perception is in the vanguard of the organism's defensive array. Sharpening or levelling, focussing or overlooking, all of these can be considered as coping mechanisms. The functionalism of the Darwinian period and the theories of the organismic school have strongly influenced contemporary theories of perception.

Although some years ago the statement would have been hotly disputed, to say now that needs may influence perception seems almost platitudinous. Contemporary novels abound with insights far beyond the scope of present laboratory investigations. To the psychologist of the 1950's these latter have attained roughly the status of classics. Little did the subjects in the Bruner and Goodman (3) study realize that generations of beginning psychology students would forever remember them as "rich boys" and "poor boys." Several obscene words have been indelibly etched into the literature of psychology by Elliot McGinnies (26). Yet there seems no necessity to adumbrate the list further. The number of experiments linking needs with

perception seems exceeded only by the number of bibliographies and reviews of these studies found in the journals. Helson (13), Allport (1), and Postman (42) provide relatively complete summaries of the work to date.

Yet it is patently obvious that the mechanisms underlying the results are not at all clearly understood. There does seem almost unanimity on the point that needs influence perception but "how" and "why" remain largely unknown. Ad hoc mechanisms and descriptions masquerading as explanations have become distinctly unpopular. The reification that was prevalent has been replaced by a rather pale parsimony.

The present study hopes to examine two views on the influence of affect on perception. The first is the theory of autism or the movement of the cognitive processes in the direction of need satisfaction. This theory as developed by Murphy (35) and other workers has served as a bridge between laboratory investigations and some of the rich insights of psychoanalysis. It stresses that the molding of perception in the drive-satisfying direction follows directly from the satisfying or frustrating quality of past perception. "One learns to perceive, think, or remember in this way or that because such a habit is satisfying, just as one learns to behave this way or that because such behavior is satisfying" (35, p. 364). There is stress also upon the satisfaction associated with perceiving objects that have previously been associated with reward or pleasantness.

Postman (42), on the other hand, sees no need for a principle of autism. He feels that the already established principles of frequency and emphasis can account for the observed facts of motivational selectivity in perception. In particular he raises the question as to whether

rewards exercise their effects through need-reduction or because they are emphasizers in Tolman's (58) sense.

As used in the present paper, the term "emphasis" represents the enhancement of a stimulus pattern. It can become brighter, larger, more vivid, denser, better remembered, or more resistant to change. When used in connection with figure-ground organization, emphasis would imply a trend towards making one aspect serve as figure more often than another aspect does. As most ambiguous figures ordinarily do not allow simultaneous perception of both alternatives, emphasis could thus concern the alternative first reported, or reported more often if reversals are frequent.

By the term "autism," we accept Chein's (5) definition as "the movement of cognitive processes in the direction of need-satisfaction." This can signify seeing rewarded figures more frequently than non-rewarded, seeing them as larger, brighter, or possessing any of the characteristics included under the rubric of perceptual emphasis. When the concept of autism is used in connection with figure-ground organization, it would imply that the rewarding aspect of a stimulus configuration would tend to become figure while the non-rewarding would become ground.

Tolman (59), among others, speaks of shock as a "need arouser" in contrast to money which is a "need-satisfier." For most purposes, this is a valuable distinction. It implies that the individual at any moment possesses many needs that are in effect and directing his behavior. In our culture, the need for money falls in this category. When coins are presented to the subject, they would somewhat gratify this need, although they might very well arouse stronger needs for larger coins. Here money

would be said to function as a need-arouser, which bespeaks the difficulty of making this particular distinction hold at all times.

With electric shock, the task of classification is somewhat easier. Few individuals possess a need for shock; rather they possess a dormant need to avoid shock whenever it appears. Hence, when applied, shock arouses these latent needs. This contrasts with money which initially gratifies needs. The distinction is based on the needs directing behavior at any given moment. Need-arousers function so as to awaken dormant needs while need-satisfiers work to reduce tensions operative at the time of their appearance.

Postman cites a study by Cohn (6) in which there was suggestive evidence that both rewards and punishments tended to influence recall and recognition of nonsense syllables. There are also the Bruner and Goodman (3) results in which coins appeared larger to subjects from underprivileged homes. Gilchrist and Nesberg (11) were able to demonstrate that positive goal objects were perceived as brighter than neutral control stimuli. In these studies we see evidence of an enhancement or emphasis of rewarded objects. However Postman feels that this would also be the case with punished objects. That is, both rewarded and punished objects will attain figural characteristics when paired with neutral objects in an equivocal stimulus field. He feels that the important variable is motivational relevance rather than reward or pleasantness.

B. Plan of the study

The purpose of the present study is to investigate the effects of a reward on perception as contrasted to the effects of a relatively comparable punishment. Small amounts of money given and taken away in a game

situation will constitute the rewards and punishments. Monetary reinforcements were found to be effective in influencing perception in studies by Schafer and Murphy (48), Jackson (15), Proshansky and Murphy (43), Snyder and Snyder (53), etc. Utilizing ambiguous perceptual situations permitting the perception of only one alternative, we are interested in which aspect is perceived:

- a) when a rewarding aspect is paired with a neutral aspect.
- b) when a punishing aspect is paired with a neutral aspect.
- c) when a rewarding aspect is paired with a punishing aspect.

The first section of the paper describes some of the background of the study. Some attempt will be made to place the study in perspective alongside two particular lines of thought; first, the "New Look" perception studies, and secondly, the emphasis or punishment studies of the Tolman approach. To review the entire literature in both of these areas, would require more time and space than we are able to devote to the task and appears to be unnecessary since there are some very excellent and complete summaries already available. Hence, we will attempt to describe only the most pertinent investigation in each group. In the area of perceptual defense, for example, the literature is so voluminous as to be overwhelming. To spell out these studies in detail would serve mainly to confuse issues rather than point towards the implications of the research. A final group of studies, which are to be reported at somewhat greater length, are those completed or yet in progress at The Menninger Foundation as part of the Perceptual Learning Project.

The next section will be devoted to several relevant methodological issues. If nothing else, the present study remains an investigation

based on some particular methodological departures from most need-perception studies. While this may restrict generalization to other such investigations, the decisions made were all carefully considered judgments rather than matters of expediency. Whenever possible, the alternative methods were run as separate experiments so that the results might be compared with those from the main study. In sum then, the defense of the particular procedures used, especially those that depart from usual practice, will be found in the second section.

C. New Look Research and Its Antecedents

Luchins (23) referred to much of present-day need-perception research as "new look studies." By this he intended to trace the roots of the approach back to the work of the Wurzburg school. Here Marbe, Ach, Kulpe and others had stressed the role of the set or prevailing state of the perceiver. Stimuli do not impinge upon naive and undirected subjects. More often than not, the perceiver possesses pre-established attitudes that determine what aspects of a situation he perceives and how he will react to them. Motives and goals not only follow from percepts; they may also precede them. The subject may be unaware of the directing force of these sets, but their influence was easily demonstrated in the "Wurzburg laboratory.

These workers stressed the will or directiveness of the perceiving organism. Kulpe maintained that thought-connections are activities of the self, referring to them as acts of consciousness. This was in contrast to the passive spectator type of associationist approaches. Watt, in investigating thinking using specific tasks, talked of a period of a "search for answers" in which there is a direction of selection. This

direction is not manifest in terms of imagery. Ach had called this direction the "determining tendency." The Wurzburg school described the task as first being set by the instructions of the experimenter (Aufgabe). When the subject consciously accepts these instructions, he develops task attitudes (Einstellungen).

The next period of European perception research was dominated by the Gestalt psychologists. The experimental work was ingenious, with the phenomenological method given its widest scope. The demonstration seemed to outshine the experiment as a means of imparting information and establishing principles. Perception was shown to be a matter of organization, of field forces tending towards equilibria rather than a static unity of and-sums. Terms such as associationist or connectionist became rather invidious labels. The new word was "dynamic," the new unit the "gestalt," and the new perceiver, the locus of these forces.

The views of Wallach (62) have especial relevance for the present paper. Following Koffka, he believes that figure-ground organization occurs prior to communication of trace with central factors. His is a two-stage theory of association; a process of recall by similarity by which the present perceptual process makes contact with the trace of a similar process of the past; and secondly recall of a content associated with this trace. He notes that the results from the Schafer-Murphy experiment are not compatible with this position and suggests that a replication with solid-color figures would not confirm their results. Smith and Hochberg (52), investigating this question but using electric shock as the reinforcing agent, obtained results which they felt supported the Schafer position and indicated that central factors influence the

perception of even solid-color figures.

Another influence on present-day need perception theory stems from America of the 1890's where the functionalists were entrenched at the University of Chicago. They were strongly influenced by the work of Darwin and stressed the adaptive nature of behavior, man's constant struggle for survival. Processes were examined in terms of their utility. In place of a simple structural analysis of parts and their operation, questions of teleology and purpose pervaded the literature.

Later the influence of Freudian theory began to affect thinking about perception. Phrases such as "unconscious motivation" and "basic instincts" crept into the literature. The psychology of perception was influenced accordingly. In the same sense in which slips of the tongue or parapraxes were considered manifestations of unconscious impulses, so the same principle could hold for auditory or visual misperceptions. One began to talk in terms of the person's seeing what he wanted to see. Some later workers spoke of perceptual distortions as ego defenses, or as methods by which the individual provided himself with some modicum of substitute gratification.

In Europe, work with the Rorschach blots underscored the role that personality factors played in organizing ambiguous stimuli. Even innocuous sounding responses, hardly misinterpretations due to the lack of structure of the stimulus material, told the experienced worker a great deal about the individual.

One of the first series of experimental studies set along these lines was that carried out at the Harvard Psychological Clinic. Murray (37), in a small-sample investigation, showed that children's ratings of

aggressiveness of faces were strongly influenced by playing "murder in the dark." Sanford (47) worked with the hunger drive and used a variety of experimental techniques. He found that in filling in incompletely words or interpreting ambiguous pictures, hungry subjects would give more food responses than non-hungry subjects. This study was later extended by McClelland and his co-workers (25) (whose results differed somewhat from Sanford's) in their work with n-ach (need-for-achievement). The rationale of the Thematic Apperception Test was derived largely from psychoanalytic thinking of the relationship between need, perception, and cognition.

In the early 1940's, a series of studies was undertaken at The City Colleges of New York that was to change the tack of perception research, even up to the present time. This group of papers, under the aegis of Gardner Murphy, underscored the point that learning to perceive was a process similar to learning other forms of behavior, and that such learning proceeds in a goal-reaching, drive-satisfying manner.

A group of small-sample investigations showed that even such matters as perceiving the length of lines, the weight of objects, or a figure-ground configuration, were influenced by the individual's need-structure. Like all pioneer investigations, there were raw edges but recent years have produced further experiments with elaborate controls. One of these by Bruner and Rodriguez (4), a replication of the Bruner and Goodman classic, involved such delicate counterbalancing of conditions that the authors were unable to interpret the results they secured.

The Schafer-Murphy (48) study was later repeated by Rock and Fleck (45) using different stimulus conditions. They substituted a projector

for the Whipple type tachistoscope used by Schafer. Their results failed to support those found by Schafer but both sets of investigators used too few subjects to warrant any generalization from their data. Schafer used only five, while Rock and Fleck, with good intentions, had ended up with only six (as several of their experimental group had failed to learn the names of the faces.)

Jackson (15) later repeated both experiments and concluded that the difference in results could be attributed to the changes in procedure. He felt that a small stimulus field was more conducive to autistic organization than the larger field of a projector screen. Jackson, used 12 subjects in repeating the Schafer study and found nine moving in the rewarded direction.

Studies dealing with perceptual defense figure prominently among need-perception studies. Although these studies seem to have declined in popularity, as measured by journal space, the basic issues do not seem to have been resolved. The first important paper in the group was that by Postman, Bruner, and McGinnies (39) who demonstrated that value-congruent words (i.e., in areas corresponding to S's interests as measured by the Allport-Vernon scale) had lower thresholds than value-negative words. They referred to the former process as sensitization and the latter as perceptual defense. McGinnies (27) has since done a series of studies in the hope of clarifying the results from the original study. Solomon and Howes (54) joined the battle under the banner of association theory. They hoped to prove that any effect could be attributed to a frequency or familiarity variable. Lazarus entered on the side of McGinnies as did Erikson and many ego-psychologists. Postman and Crutchfield (41)

hoped that the concept of "set" might rout the defenders, yet finally conceded that some residual variance remained that "set" could not explain.

One important series of investigations not too relevant to the present study, but deserving mention in even a cursory survey of need-perception research, is that carried out by Witkin (63) and his associates. The authors related the findings from a variety of perceptual tasks to projective test protocols. The results were remarkable in terms of the consistencies in performance they found.

Another group of need-perception studies is that inspired by the thinking of Rapaport (44) and carried out by George Klein and his associates. This approach is based on a distinction between energy charge and discharge, between need and channel for need-gratification. Needs are seen as accumulations of tension or energy seeking outlets. The organism in its course of life has built up certain delay mechanisms, structures by which it is able to regulate the expression of needs in behavior. The system of controls is also known as the ego. Klein feels that this conception of ego has none of the connotations of a homunculus, nor is it synonymous with personality. "It is only a short-cut reference to the array and functions of energy distributions deployed in disposal and discharge of tensions" (17, p. 2).

This model extends Freud's distinction between primary and secondary processes, where the primary processes are "the activities of the psychic system aiming at a free outflow of the quantities of excitation (pleasure principle). The second system, by means of cathexes emanating from it, effects an inhibition of this outflow (delay), a transformation into

dormant cathexes, probably with the rise of potential" (17, p. 2). Klein holds that these concepts of primary and secondary processes provide a broad setting for a variety of forms of control. The defense mechanisms are seen as but one type rather than the prototype of all forms of control.

Again, this conception provides a basis for expecting and explaining intra-individual consistencies in cognitive behavior. It takes for granted that all forms of cognitive process answer to laws of more general system-principles. The model gives the concept of ego a central place in behavior. It holds that needs are not expressed directly in behavior, but only with the permission and direction of this ego. Need is held to be essentially blind, merely a claim upon the organism disposing it to some direction of discharge. The function of cognitive controls is modulation. Various predictions are made regarding the effects of accumulations of energy and the building up of "counter-cathected" organizations with their own energy supplies, independent of their parent sources. This parallels the models of contemporary ego psychology in which the ego becomes autonomous of the id and super-ego, possessing its own libidinal charges.

Our concern is with the type of predictions in the area of perception made by this approach. The point that needs are not expressed directly in behavior has some relevance for our work. Klein rejects the view that perceptual effects are inevitable consequences of the stimulus qualities of the need. He holds that a major consideration should be given to "inner consistencies in a person's responses which transcend circumstances of need-arousal." These have also been called styles or modes of behavior.

Without question, these styles are of crucial importance in many studies. The work of Gardner (10) or more recently of Marrs (24), show the high reliability of various sorting behaviors, regardless of the type of object sorted. It would be possible, although difficult, to overlook these consistencies in performance if one were to design an experiment testing the effects of need on sorting, e.g., the effects of hunger on categorizing food and non-food objects. (One might predict fewer food categories for hungry subjects.) Yet the point must be made that there is a number of ways in which an experimenter can control for individual consistencies in such an experiment. For one thing, as such behaviors correlate highly with one another, he might match experimental and control group in terms of sorting performance on another task. Again, he might test each subject before and after need-arousal and use difference scores to measure the effects of need.

Klein would not deny that this can be done, but holds that such matching or individual control gives us very little information about the individual differences themselves. Though we might discover that Group A differs from Group B, or individuals-after from individuals-before, we are still in the dark as to why one S used 11 and 10 categories while another used 18 and 17. He feels the performance difference between the two individuals is of greater psychological importance than the difference produced by the food-need.

This is a valid point, and it is regrettable that more attention is not paid to intra-group variation, rather than simply to inter-group variation. The former is usually called "variable error" and one hopes that it is roughly the same in both experimental and control groups.

However, the point remains that many workers see value in examining group differences and group trends, while leaving intra-group differences to randomization or matching.

The examination of inter-group differences is the approach of the present study. Our choice was not dictated by an antipathy to the Rapaport and Klein formulations. Had we been working in another area, we would have been more than delighted to pre-select our Ss on the basis of prior performance. The results of Klein and Salomon (18) eloquently testify to the merits of such a procedure. Yet our situation was that we knew of no task that might separate autistic from non-autistic Ss. We repeat that this does not mean that such a procedure would not be successful in another study. We only maintain that since no procedure enabling us to predict present performance is now available, we have seen fit to study group rather than individual differences.

D. Perceptual Learning Research at The Menninger Foundation

In one sense, these investigations could have been described in the preceding section. They are not divorced from the mainstream of New Look research. Yet due to their especial relevance for the present study, it seems in order to discuss them in detail. These studies provided the matrix for the present investigation.

Several of these were undertaken jointly by the writer and Aylion. The first of these, carried out in the tactal modality, employed a set of three-dimensional reversible profiles similar in structure to the Schafer profiles. The faces were painted on plaster-of-Paris plaques with the center groove identical for both the right-pointing and the left-pointing face. The plaques are shown elsewhere (2).

First, electric shock was associated with a particular color of light and this light was later associated with one of the profile plaques. On the whole the results were uninformative except for a definite trend ($12 v. 3$, $p < .05$) for Ss rating the shock as "moderately unpleasant" or "very unpleasant" to report the punished face on their first response. Ss who rated the shock as "slightly unpleasant" evidenced a slight preference for the non-punished face.

As these results would be of considerable theoretical interest if confirmed, the design was repeated except that a direct association of shock with profile was employed, replacing the secondary association via the colored light. The results confirmed the first prediction, that Ss who rate the shock as moderately or very unpleasant would perceive the punished face in the post-test series. The results indicated a non-significant although suggestive trend by Ss who rated the shock as "slightly unpleasant" to perceive the non-punished face.

The next phase (55) was to determine whether these results would be supported if another reinforcing agent were used. Possibly it would have been wiser to repeat the shock study a third time. On the face of it, there should be no definite reason why the failure of a replication with another reinforcing agent should infirm the results obtained using shock. The study was carried out using an unpleasant warble tone as punishment which turned out to be quite different qualitatively from the shock. Few Ss exhibited the anxiety reactions that were found in the previous study.

The results were not very informative until the matter of association between tone and faces was analyzed. Of the 58 subjects used in the study, 19 had not been aware that a particular face had been followed by a tone

in the training series. For these Ss, there could be found no effect, either in one direction or the other. However, for those Ss aware of a connection between face and tone, the alerting reaction was again found for Ss rating the sound "moderately" or "very unpleasant." No preference for the non-punished face was evidenced by Ss rating the tone "slightly unpleasant."

In summary then, these results suggested to the emphasizing effect of negative reinforcement. The punishment, however, would have to be of great enough intensity to be effective (and, as was found in the last study, only when S is aware of the affect-associated stimulus). These results supported the position of Tolman (58) who stressed that any stimulus capable of arousing affect, whether positive or negative, would tend to emphasize stimuli that it is associated with. Yet the results conflicted with those of Smith and Hochberg (52) who found that associating the Schafer profiles with shock resulted in a preference for the non-punished face. However, Ss in this study were shocked during the presentation of a particular face while in the Ayylon-Sommer studies, they were shocked three seconds after the presentation of the face. Ayylon and Sommer had felt that shock administered during the tracing process might interfere with the learning of the profile. Hence if the non-punished profile had been reported, one might maintain simply that it was learned better than the punished face.

The writer's work with Ayylon brought forth a belief in a relationship between pattern of action and intensity of affect. When discomfiture is minor, it is least effort for the individual to ignore or overlook it. However when discomfiture becomes strong, it is in the individual's interest

to focus on it. One cannot adequately cope with an inimical stimulus without first knowing its locus or nature. Further pilot work also suggested that when unpleasantness is so intense that the individual cannot bring himself to focus on it, we would find withdrawal or utter disorganization of action. The organism must flee the field at any cost.

This is a functional theory of the effects of degrees of affect on perception. It does not overlook or degrade the integrity of the individual; for the autism or emphasis does not follow directly from presenting the organism with an affect-charged stimulus. The individual assays the stimulus, judges its value or threat to him and his goals, and accepts or rejects the stimulus on this basis. The approach predicts that minor unpleasantness is overlooked, strong unpleasantness is attended to, and intense unpleasantness may be strong enough to disorganize the ego structure or put it to rout into fantasy or other forms of withdrawal.

Sommer and Aylon (56) later ran the same design used in the shock and sound studies, but presented quarter-dollars whenever a negative reinforcement had been used previously. The results disclosed that the group rewarded for a particular face gave more responses to that face in the post-test series. This result was hardly surprising in view of our past studies, and leaves unanswered the question of whether it was the money as a need-satisfier or the money as a source of affect (emphasizer) that produced the effect.

Researches by other members of the Menninger staff are also pertinent. Snyder and Snyder (53) clearly demonstrated that small monetary rewards were able to affect the perception of words presented simultaneously. There was a significant preference for words spoken by the rewarded voice.

Although there is no doubt that the effect reported is genuine, the factor responsible for it remains unspecified. One is not sure whether it is the rewarding of the voice or the rewarding of a particular content (or both) that produces the effect, as the experimental situation involved a rewarding of both content and voice during the training series. This is not a serious criticism, or even a criticism, but simply a heuristic note that a further study disentangling voice and content is necessary.

A study by Simpson (51) showed that some aspects of performance in an aniseikonic lense situation were affected by pleasant or unpleasant music.

Sommer and Ayllon also undertook some minor studies, cues from which provided the impetus for the present studies. The findings were chiefly of methodological value, but are listed in the hope that they can assist other workers.

Phonograph records were used as rewards with the three-dimensional faces. Despite continual reassurances that they would be allowed to keep them, the subjects remained dubious to the end. Six of the nine Ss discovered the identity of the profile lines.

Candy was used as reward with the three-dimensional plaques and children as subjects. Four of the seven Ss discovered the identity of the profile lines and only one or two seemed interested in the candy.

It would seem that the sole reason the quarters were effective in the last study with the plaques was that this session had always been preceded by a procedure reported in the main part of this thesis, namely, that all Ss had now learned that they were going to win and actually keep the money. Also, the present procedure made the winning of money seem a

reward for a skillful performance, and undoubtedly possessed this secondary reward value in the Ayllon study where no skill of any sort was required.

E. Emphasis Approach

The present study has been strongly influenced by some early work of Tolman's (58). In 1932, along with Bretnall and Hall he published a memorable paper, "A disproof of the law of effect and a substitution of the laws of emphasis, motivation, and disruption." At the time the results seemed as controversial as the title. He argued that according to the law of effect, as then understood, shocking for wrong responses in a stylus maze should result in better learning than shocking for right responses. He did not find this. Instead, the shock-right group learned more rapidly than the shock-wrong group. The same result was apparent when only a bell was used (and also for another group with whom the bell was used in conjunction with the shock). Tolman explained this on the basis of the shock and bell working as emphasizers of wrong responses. This would tend to counteract their effects as things to be avoided. The shocked items "stood out" for the subjects.

This is the essence of the emphasis thesis. To use a homely example, let us assume that a man in a green suit rushes up and strikes Mr. A. while Mr. A. is strolling leisurely along. This happens on three separate occasions. Some time later, Mr. A. approaches the boulevard and, in the crowd, we find the man in the green suit. Would not Mr. A's eyes focus on this figure almost immediately? We seriously doubt that there would be an autistic overlooking of this significant figure. One does not have to assume masochistic motivation to explain such behavior. How is one to avoid unpleasantness, to protect himself from danger, if he does not attend

to where it might be present? Hence in the Tolman experiment we find Ss learning the location of the sources of shock. Following this line of thought, when these shocked portions happen to be correct turns on the maze, the learning of the maze is more rapid than when they are wrong turns. The shocked portions stand out for the subject. The S finds that learning in line with emphasized portions of a maze is easier than learning in line with non-emphasized portions. In the shock-right condition he can simply attend to the most vivid portions of the field. (That punished aspects are more vivid than non-punished was found in (2) and (55). In both studies, Ss rating the punishment as moderately or very unpleasant remembered the punished face most vividly.)

Tolman's investigation was followed-up by a series of studies by Muenzinger and his co-workers at the University of Colorado. Factor after factor was varied in an attempt to partial out the relevant variables. With one exception, the studies used rats as Ss and the results from each study were used as base lines for comparison with the data from succeeding studies.

The first two studies (27, 28) established that electric shock functioned so as to accelerate learning. The next study (29) substituted an electric buzzer for the shock. This was thought to possess the same disturbing quality as the shock but without any pain to the animal. The results indicated that the buzzer signal was not as effective as the shock in accelerating learning. It also made very little difference whether the buzzer accompanied the right response or whether it accompanied the wrong response.

In the next study (30), using the same T-shaped discrimination box,

one group of rats was shocked before they reached the point of choice while another group was shocked after they reached it. The results indicated that as compared with no shock at all, the administration of shock before the point of choice does not accelerate learning, whereas shock following learning does so. The amount of acceleration was similar when both right and wrong responses were shocked as when either one alone was shocked.

Muenzinger concluded that the question of whether or not the accelerating function of shock is due to a startling, disturbing, or shaking-up effect seems to be definitely answered in the negative (since shock administered before choice did not decrease errors or trials.) This conclusion was also supported by the results from the buzzer experiment described above.

The rationale of the next study attempted by Muenzinger seems a trifle vague but his results more than justified undertaking it. In place of the electric grid that had been used, or the buzzer, the animal was forced to jump across a gap in the floor to run the maze. He found that "the effect of making the animals jump across a gap in the floor in the right and wrong alleys is the same as giving them a moderate electric shock in either alley or both. In other words, a gap in the floor after the point of choice is an accelerating factor as strong as electric shock given after choice. On the other hand, a gap in the floor before the point of choice has as little effect upon learning efficiency as shock before choice." (31, p. 101, Italics mine.)

The next study (32) is chiefly of interest because of a very cogent analysis of the theoretical implications of studying "the relative value

of reward and punishment." This does not concern us at the moment, and we hope to treat it in detail in a later section. The results of the particular study indicated that shock-escape tension produces a higher learning efficiency than hunger-food tension. When the two motivating conditions were combined, no summation of effect was found. The effect proved to be equal to that of the stronger factor in the combination.

The next study (33) seems to be the most imaginative and ingenious of the group. Muenzinger reasoned that the gap in the floor and the shock had in common that both produced situations where the animal would pause at the point of choice. Both were characterized by an obstacle (the electric grid and the gap, respectively) in the choice alleys which was not present in either of the studies (buzzer and hunger alone) where no accelerating effect upon learning was found. This led Muenzinger to inquire whether a mechanically enforced pause at the point of choice might not produce the accelerating effect. The results confirmed his expectation and he concluded that the relevant factor was the pause before the point of choice, which is responsible for increased learning efficiency.

However, in regards to the disruptive effects from electric shock, a recent study by Kohn (19) showed that ability to learn a detailed picture varied inversely with the amount of stress. Perception was least efficient when a picture was studied in a situation involving threat of electric shock. Perception was most efficient when the picture was studied in an environment involving low emotional intensity. Kohn was also interested in the particular type of item attended to under stress conditions. His orientation, based heavily on the work of Muenzinger, holds that in

threat situations:

"the individual seems to focus most of his available attention upon the relevant, important, or threatening aspects of the situation. Rather than dissipate attention over the entire behavioral field, the most realistic method of dealing with the situation is to concentrate upon the important aspects. In driving under difficult conditions, for example, the span of attention tends to be restricted to the road and to the traffic upon it. Under conditions of stress, a process which might be termed experimentally induced "tunnel vision" seems to occur, such that the perceptual field is constricted or narrowed, and the scope or span of behavior tends to be restricted to those elements which contribute most to the direction of behavior, or to those elements which appear to be the most threatening." (19, p. 290).

This thesis is supported both by Kohn's data and also the results of the Ayllon-Sommer study where Ss reporting the shock as moderately or very unpleasant reported the punished face in the post-training series.

However, Verville (66) did not find that prior success or failure significantly influenced the perception of figures similar to the Street Gestalt Completion Test. Her results do not conflict with those of Kohn and other workers if it is noted that they had shocked or threatened to shock Ss during the particular performance while her reinforcements had occurred prior to it. (It is interesting to note the lack of effect in this and other studies when reinforcements are given before the performance.)

Vaughn and Diserens (65) noted that particular changes in reaction patterns accompanied increases in intensity of punishment. This parallels the findings of the Ayllon-Sommer study although Vaughn and Diserens defined intensity of punishment physically (in terms of voltage used) rather than phenomenally (in terms of S's report of experience). They felt:

An increase in the intensity of punishment created a readiness and an eagerness to react that was not typical for the

preceding intensity. This condition was especially noticeable under the severe punishment. The readiness and eagerness to react, however, was followed by different procedures. The subjects who responded more quickly as the punishment was increased apparently directed their efforts toward the method of escape from prolonged punishment. Their attention was directed toward withdrawing the stylus as soon as the shock was felt. Other subjects reported that although they wanted to avoid the punishment, they were so concerned with the physical pain and the anticipation of it that they forgot what to do (65, p. 61).

Later they conclude that "increases in intensity of punishment are accompanied in general by increases in the number of entrances into blind alleys." And later "the averages show that the subjects require more time to run the mazes as the intensity of the punishment is increased." Taken at face value, one might infer that these results support the position that shock inhibits learning. However, one would thereby neglect the increment in readiness and eagerness to react in the shock situation. Attention was found to be vastly increased in this condition.

Most present-day authors see no essential contradiction between Tolman's experiment and Thorndike's law of effect. Woodworth and Schlosberg (64) point out that a better example of information given by a painful stimulus occurs in Pavlovian classical conditioning. In one such experiment, a strong electric current applied to a dog's skin became an effective signal of meat powder to come. The usual defensive reaction to the shock dropped out and instead the dog turned toward the food and began to salivate. The authors point out that if we consider that the shock began to "mean" food to the dog, this study is similar to that by Tolman, et al. Although it would seem more precise to speak in terms of the shock as a signal for food rather than "meaning" food, which implies it functions as a symbol, the following analysis seems quite

sound:

In their (Tolman et al) punchboard maze the subject needs information as to whether he has made a correct or incorrect response at each choice point. He may be told "Right" or "Wrong" after each choice, or he may be instructed in advance that a bell will ring after each choice to signify "Right"—or that it will mean "Wrong." The shock was made as strong as the individual was willing to take. According to the law of effect, as then understood, this punishment for Wrong should hasten learning, while punishment for Right should retard it. But the results of the experimenters cited, and also of Muenzinger and others, show that it makes little difference whether the shock means right or wrong. The subject gets equal information in both cases, and his behavior is dominated by the desire to succeed and get through with the task (64, p. 689).

Jones (16) in a similar experiment showed that the use of (pleasant) lights and (unpleasant) vibrations as cues to indicate correct responses, did not reliably decrease the number of errors in learning a stylus maze. He concluded that "the degree to which the cue stimuli were 'liked' or 'disliked' was found to bear no relation to average time, average errors, or to the course of the learning curve. No gain can be expected from 'sugar coating' a correct response, by providing a supplementary pleasant experience to accompany the response."

This conclusion may well be valid when the pleasantness or unpleasantness is so minor as to be even trivial, but Jones' experiment has little relevance for cases in which the rewards or punishments are meaningful and important to the subject. This is not to belittle the effect of cognitive satisfaction that may result from solving a task or puzzle. Bridge, for example, is too popular a game to maintain that such pastimes are not pleasurable unless accompanied by monetary incentives.

In referring to the Tolman experiment, Dashiell (9) commented that "we have let ourselves be surprised at this 'shock right' phenomenon; but

the surprise is due to our having emphasized the word 'shock' and not the word 'right.' Osgood (38) points out that all of the powerful motives in the phrase "doing what was expected of us" were on the side of learning the "right" path and these would appear to be of greater strength than the temporary discomfiture from the shock.

Osgood also supplies a Hullian explanation, that it is the cessation of punishment that is reinforcing. To the question of what the pain reduction strengthens most, he replies "the responses immediately preceding the pain reduction, which in this case were the 'right' responses." To the further question of why people usually learn to refrain from doing things that are punished, he answers that "stimuli that antedate the punishing state of affairs become conditioned to anticipating punishment reactions (anxiety), and avoidant responses which escape punishment are then reinforced by anxiety reduction."

In essence then, one of the roots of the present study can be traced to Tolman's concept of emphasis. There have been many allusions in the literature to the use of punishment to enhance stimuli, but there have been few published studies that have attempted it in the area of perception. Postman (42) cites an inconclusive study by Cohn, but this is one of the few the writer is acquainted with. In many of the perceptual defense studies, the shock, obscene words, or other negative reinforcement were associated with stimuli in such a fashion as to produce a disruption effect. This has been something the present writer has always strived to avoid. The Ayllon-Sommer investigation used only five administrations of the shock in the series of trials and these were given three seconds after S had traced the plaque. The present study used monetary rewards which,

for better or for worse, did not produce terribly strong states of motivation. The Ss were involved in the procedure, to be sure, but few evidenced anything that might be called an anxiety reaction.

It would be difficult to predict in what ways our results would differ from a study using dollar bills as rewards or painful shocks as punishments. Our guess, on the basis of pilot and other studies, would be that Ss given dollar bills would not believe they were actually to keep them. The Ss receiving electric shock would probably show the emphasis effect found with the three-dimensional profile plaques.

The relevance of S's motivation to our discussion of emphasis theory should be evident. Enhancement of a stimulus should only be proportionate to Ss' involvement with the reinforcement. A trivial need should not be expected to enhance a stimulus as much as a strong need. This seems platitudinous but its significance for our results will be apparent later. The point is clear that emphasis is not an all-or-none affair. There are degrees of enhancement; an emphasis approach should predict that enhancement varies positively with amount of affect aroused by the reinforcing agent.

Chapter II

Methodological and Conceptual Issues

A. Concepts of figure and ground

The concepts of figure-ground and perceptual organization are of theoretical and practical importance for the present paper. We are measuring the effects of a reinforcing agent on certain stimulus patterns in terms of emphasizing designated areas. Whether one considers this perceptual change is of course a function of one's definition of the term. The writer is inclined to go along with either Coutu (7) in his characterization of perception as "giving a stimulus a meaning" or Murphy (34) with perception representing "the interpretation of a stimulus."

In the present study, S is tachistoscopically confronted with a line drawing and must organize it into the head of one of the figures he has previously seen (Ma or Louise, Sailor or Devil). The drawing, unknown to S, had previously been an integral part of two distinct figures, so there are alternative correct organizations. "Correct" in this sense refers to the part having actually been included in a particular figure during previous trials.

The use of this type of figure raises several methodological problems that will be treated in more detail later. The one we will briefly mention at this point concerns the stability of the particular organization S chooses to make. His percept (as measured by his report) may remain the same even throughout an extended series of trials. That this phenomenon is not confined to the present investigation can be made clear by noting

that almost all published investigations using such figures have alluded to it. Rubin himself pointed out that a region previously seen as figure will tend to be seen as figure again upon subsequent trials. Leeper's (22) data clearly demonstrated that those Ss who had perceived Boring's wife figure in one session, overwhelmingly perceived it during a later session; while those who perceived Boring's mother-in-law also reacted in the same fashion. Schafer (48) made reference to a consolidation phenomenon in which, after approximately 16 exposures to the ambiguous two-profile set, S would invariably respond with one particular name. Schafer felt that this consolidation cast doubt on the relevance of later responses for his hypothesis. Rock and Fleck (45) also reported this stabilization and suggested, in place of giving each S 32 post-test trials, that "a better, though practically infeasible, procedure would be to give, say, 100 Ss each one trial with each ambiguous situation in order to avoid the contaminating effect of early presentations of ambiguous figures upon subsequent ones" (45, p. 775). This point of the greater relevance of the first response will be treated extensively later. Our point now concerns the stability of the organization that S makes during his first response. Some data that will give an idea of the extent of the phenomenon were obtained in two studies, one prior to the present investigation, one following it. The studies used five and three post-test trials, respectively. The distribution of scores showed that the majority of Ss, once attaining a particular organization, refused to abandon it. This performance should not be described in invidious terms as their organization is certainly objectively "correct," and not maladaptive in any sense. There are those who might feel that

such a performance can be considered "rigid" and that it would be far healthier if S shifted, during repeated trials, from Sailor to Devil and back several times. We cannot accept this position which can be considered similar to the labeling of Ss employing the "long solution" on the Luchins "water-jar problems" as "rigid." Leavitt and Zelen (20) in fact found no decrease in solution time for Ss employing the "long method" against those employing the "short method" of solution. Scheerer (49) has pointed out that Ss who employ the "long solution" were those who had abstracted a principle from the set problems and then utilized it in solving the other problems. The "short solution" Ss in many cases were those who were unable to find a principle for solving this particular class of problems.

It should also be noted that the figures used in the present study differ structurally from those employed by many other investigators. For one thing, they are deliberately personalized by being endowed with names (possessing stereotypes and a multiplicity of prior associations) and are presented tachistoscopically. The latter point requires us to mention that the electronic tachistoscope illuminated the stimulus field in a bright light at a duration that was more than adequate for Ss to get a clear view of the stimulus field. The use of tachistoscopic exposures almost precludes the spontaneous involuntary reversals that occur with the Necker cube, Shroeder staircase, or even the Schafer-Murphy profiles. On the other hand, there are many Ss unable to fashion the alternate organization from the ambiguous Sailor-Devil, even with indefinite exposure of the figures. The use of proper names, especially when they are so stylized and affectively charged, undoubtedly contributes to the

stability of the original percept.

It also becomes apparent that "reversal" is not altogether the best term to describe a change in percept. When one does change with these figures, he makes a mouth out of a line that he had previously used as a moustache, a nose out of an area that had previously served as an eye, or a beard from an area that had been a neckerchief. The process might more aptly be termed one of "reorganization" than of "reversal."

The type of performance used by S is probably similar to that found with the Rorschach blots; i.e., S integrates a stimulus pattern into his repertoire of past percepts. Both sharpening and leveling of differences can occur, in addition to the Gestalt laws of organization. If one asks an introspective and sophisticated S whether he actually "sees" a bat on Card I, he might receive the reply "I see an inkblot that has the general shape of a bat, and more nearly resembles a bat than anything else I can think of at the moment. You asked me to tell you what it might look like, and it looks to me more like a bat than a duck, a house, people, or books."

As the present study concerns itself entirely with a particular type of change in perceptual organization it may be in order to devote some space to the classical concept and literature of figure-ground. It would seem fruitful to place performance in the present study in its proper perspective alongside that found in other tasks, e.g., Street figures, Rubin drawings, Kohler cross, etc.

Rubin listed the phenomenal differences between figure and ground as follows:

The figure has form, the ground is relatively formless,

or if the ground has form it is due to some other figuration upon it and not to the contour separating it from the figure; the ground seems to extend continuously behind the figure and not to be interrupted by the figure; thus the figure has some of the character of a thing, whereas the ground appears like unformed material; the figure tends to appear in front, the ground behind; the figure is more impressive, better remembered and more apt to suggest meaning (46, p. 630).

Gestalt psychologists developed his concept more fully and added some further properties of figure and ground. In appearance the figure has form, contour, more organization, more color, more compactness. Contour has a different function for figure than it does for ground; i.e. "one-sided function of contour." In terms of functional differences, the figure has more density of energy, is more stable, more resistent to change. Difference threshold is higher for the figure. The figure will be seen as more homogeneous (e.g. a shadow on the figure will be less easily noticed than a shadow on the ground.) Critical flicker fusion frequency will be less for figure than for ground. Parts of the figure are more easily assimilated, more likely to be seen as of equal color, and the parts tend to be seen as the same.

In a Kohler cross figure, the vertical-horizontal cross will be favored, and if the crosses are of unequal size, the one with narrower arms will tend to be seen as figure. Some other factors determining figure: closure- enclosed regions tend to be seen as figure; articulation- more differentiated regions likely to be seen as figure; regularity- symmetrical regions tend to be seen as figure, assymetrical as ground, experiential factor- if a region has previously been seen as figure, it will tend again to be seen as figure.

Goldstein (12) maintains that every process in the nervous system has

the character of a figure-ground process. Any given process presents, in a circumscribed area, a form and intensity differing from the state prevailing in the rest of the nervous system. Processes in the given area, he designates "figure," processes and states in the rest of the body, he terms "ground" for this performance. Goldstein feels that we habitually commit the error of attending to the figure and ignoring the ground of a performance. He feels that the two are interrelated, "neither can be properly evaluated without the other." Every change in background produces some effect on the figure.

In cases of brain-damage, the ability of the individual to separate figure from ground is often impaired. Goldstein has listed some of the forms this disturbance can take:

Defective figure-ground formation can manifest itself in various ways: in the leveling of the difference between figure and ground; in an impaired preciseness of the figure; in the appearance of performances which correspond to so-called "general" reactions; in a preponderant effect of the environmental stimuli on the figure formation; in the lack of stability and of closed configuration of the internal processes; in the formation of simpler figures which show impoverishment in content; in the instability of the figure, and therefore in a tendency to inversion of figure and ground; and finally in the uncertainty as to which is figure and which is ground (12, p. 151).

In terms of figure-ground research with normals, there have been several different approaches. Some Gestalt psychologists have varied the stimulus patterns themselves; e.g., increasing the luminosity of the ground, coloring the arms of the Kohler cross, etc. Another line of research emphasizes a change in the set of the subject rather than of the stimulus pattern. A remarkably conclusive study by Leeper (22) is probably the best example of this approach. He found for a large group of Ss that previous experience with only one alternative of the Boring

figure resulted in almost unanimous perception of this alternative when the ambiguous version was presented. He also demonstrated that verbal sets were effective (telling Ss "You will now be shown a picture of a young woman looking to the left...") but the results were not as striking. He later found that the effect persisted over a two-week period by suddenly interrupting a class period and showing the ambiguous figure. He found that those who previously saw the Mother, saw her again, as those who had seen the wife saw the wife again. On this basis, he concluded that what was operating was not "set," but rather sensory organization.

Hochberg (14) has worked with the Kohler cross in terms of Kohler's satiation theory. He found that fixating on a black or a white cross can satiate the figure in a reversible perspective (i.e. it will be seen less frequently than a non-fixated figure. This follows the predictions made from Kohler's theory of polarization of neural traces in the brain field.)

Finally there is the research of the "New Look" investigators involved in assessing the influence of motivation of figure-ground perception. Owing to the especial relevance of this research for the present study, an entire section was devoted to it.

In summary then, the perceptual task used in the present study involves the organization of a set of lines into one of two previously seen figures. From introspective reports, there seem several types of performances used. One entails seeing a dark area, calling it a beard, and easily fashioning a devil's head from the remainder of the figure. A second involves an immediate impression of Devil and then "defending" the percept by noting the goatee, the grin, the hair, etc. One wonders if

this second performance is not also a constructed, inferential percept (i.e., without S realizing it, he constructs his devil from particular cues). In any event, we must still ask why S interprets a particular black patch as a beard and not as a sailor's neckerchief. And at this point, we must reluctantly postpone the discussion until later pages. The purpose of the preceding section was the understanding in some degree of the type of performance involved in calling the figure "Devil" rather than "Sailor," "Ma" rather than "Louise." The answer we hope to give will be couched in terms of motivation theory and affect rather than the structure of the stimulus configuration. This is not to say that the characteristics of the stimulus field are of no importance. Had the ambiguous figures been strongly biased toward one of the alternative (Ma or Louise, Sailor or Devil), no results of any importance would have accrued from the study. E devoted considerable attention to deliberately setting up a marginal (ambiguous) perceptual situation in order to give the needs he engendered a greater chance to evidence themselves. The practical implications of such a procedure will be treated later.

Let it suffice to say that we do not believe that generalization from this study must be limited to other studies using ambiguous figures presented tachistoscopically. We feel the principles will also apply to "real life" perceptual situations, which in many cases are most ambiguous; e.g., seeing a girl walking at a distance, estimating the time one has waited at the dentist's office, or reading a letter in dim light. Surely the motivational elements in these situations are far stronger than those we were able to develop in our laboratory setting. Hence we should expect "real life" distortions to be even more pronounced than those we find with

our "trivial" needs.

It should be pointed out that we do not work with ambiguous figures in darkened rooms because we fear people or despise sunlight. Rather, it was our desire for controlled conditions and counterbalancing of rewards and punishments that drove us underground. Some day we hope to operate in daylight, but at the moment, we are not able to.

One final point that merits treatment concerns the value of the concepts of figure and ground themselves. We are not altogether convinced of their worth, at least in regards the present investigation. What is to follow represents a brief attempt to examine the use of the concept "focus of attention." The section can be considered as a sketch or working pattern rather than a full portrait. For this reason and for intelligibility, the remainder of the paper is still couched in the terminology of shifts in figure-ground organization. The ensuing paragraphs are an attempt to register protest, rather than to embark on a determined campaign to substitute one term for another.

We may start by noting that certain aspects of the perceptual field are attended to; other aspects are not. This can be a matter of volition depending upon the state of the perceiver. Aspects in the focus of attention are brighter, sharper, less readily submerged if a similar color is thrown on the field, etc. These are of course the properties usually associated with the figure in the concept of figure-ground articulation. Yet if one substitutes the concept of "focus of attention," the emphasis is on degrees of attention, which harmonizes far more with the experience of perception than does talking in terms of degrees of figuredness or degrees of groundness. Emphasis is placed on the volitional nature of

the process. No longer do we speak of aspects which "become figure" but rather in terms of aspects which the person attends to. Phrasing one's thesis in terms of the influence of needs on figure-ground organization bypasses the individual perceiver. It creates the impression that structural or autochthonous components of the field play the greatest role in the individual's perception. On the basis of everyday experience, this is obviously not so. Laws of proximity, similarity, contiguity, etc. may be satisfactory for explaining the perception of a row of dots on a blackboard but do not do justice to one's actual everyday behavior. When one enters a living room he may first see his wife, a dear friend, or a chance acquaintance. He may notice a new suit a friend is wearing or a hairdo that he would not have expected on his wife. None of these can be adduced via the principles of similarity, contrast and the like. Perception is a matter of volition, a continual process of choosing and rejecting by the individual in line with his needs, hopes, fears, and desires. Talking in terms of figure-ground tends to obscure the essence of the process behind a veil of speciously-precise terminology. Objects and persons don't become figure, they are made figure.

B. Active and passive autism

The present study hopes to return to what might be called the "popular" concept of autism, to which many present-day investigations fail to correspond. By this is meant that in these studies little in the way of reward accrues to the subject when he perceives in a particular way. In the Schafer-Murphy experiment, for example, S was rewarded in the training series and then tested after being informed that the rewards would be discontinued. Rather than testing the hypothesis that S sees what will bring

him rewards, most investigators are concerned with whether an individual sees what has been rewarded in the past and no longer brings objective rewards. Some writers would maintain that the subject derives definite satisfaction upon seeing items that have been rewarding in the past; e.g., Christmas ornaments, a crushed gardenia, or a high school sweater. No doubt this exists but we feel this is a motivational state of a different sort from one involving a desire to see objects that will bring satisfaction now. The writer prefers to call the latter type of set "active autism" while calling the latter "passive autism." The dividing line may be tenuous, but there does seem need for a distinction based on the latency of the particular desires involved. We would expect on the whole, active autisms to be more amenable to laboratory demonstration than passive autisms.

In the present study the rewards and punishments are in effect during the presentation of the ambiguous figure, the exposure of which is not expected by the subject. The ambiguous figure is flashed when S is expecting one of the usual figures. For most Ss, this comes as quite a surprise, despite E's comment at the beginning of the series that "from time to time, some parts of some of the figures will be shown." Many Ss paused after presentation of the ambiguous figure. Some inquired, "That was Ma, wasn't it?" or "Was that Sailor?" Whichever figure S mentioned spontaneously, E agreed that this indeed was correct. If S asked, "Which was that?" E would answer "Which did you think it was?" or "Which did it look like?" The data from Ss inquiring the identity of the figure are analyzed in the Results section.

It can be noted that the terminology of the study, except through

oversights on E's part, is phrased in terms of "punishing" and "rewarding" figures rather than the past tense used in most autism studies. In the present investigation, it is true that the figures were rewarded in the past, but they are also rewarding or punishing at the moment when S sees them. We believe this is not primarily a study of emphasized memory traces. Rather, it is a study of operating motivational states. Hence we feel our results are not a direct function of the number of past reinforcements of the particular figures. As can be seen in the procedure section, only three reinforcement trials are used with the Sailor and Devil figures, and five are used with the Ma and Louise figures. As the results turned out, the effect was stronger for the Sailor-Devil figure than for the Ma-Louise figure. As there was no counterbalancing of length of trials, this effect may be simply a function of the particular order used, appearance as the second ambiguous trial, or an imbalance in figural goodness. This belief that an operating motivational state is our variable, lay behind the short series of reinforcement trials. It was felt that a longer series might lower Ss interest in the guessing of numbers. The vast majority of Ss believed that there actually was a system or order to the numbers and strived diligently to discover it. A longer series of trials might infirm so many of Ss "number hypotheses," that he might become discouraged and disaffected with both experiment and experimenter.

C. Use of only one test response per subject

The study differs from previous work relating need and perception in that only one response is given to each ambiguous figure. This suggestion was explicitly made by Rock and Fleck in 1950. Later research in the

Menninger laboratory gave eloquent testimony to its worth. The issue is not one of a larger N versus a small N, of brass instruments versus clinical intuition. Nor is it even one of large scale sampling versus case studies with a few individuals. Our reasons for using only one response to each figure are many and are primarily matters of validity or relevance to our hypotheses rather than reliability.

Our first defense will employ some data previously secured using the Sailor-Devil figure with the same tachistoscope (although with a slightly different post-test figure. The previous figure tended to favor the Sailor so one end of his neckerchief was removed. This seems to have been effective, at least to the extent that the present post-test responses tend to favor the Devil.) These data clearly show that for the majority of Ss, gathering more than one response adds little in the way of information. These Ss persisted in giving the one response regardless of number of post-test trials. In a few cases, seven and even ten trials were used and no shift in percept was found.

A more serious problem is that in the main study to be described, the pseudo-task given to the subject is that he is to guess the correct number. Almost all Ss believe that the purpose of the experiment is to see if they are able to find a system for the numbers. There were only a handful of Ss who felt that the one ambiguous trial had any significance for the investigation. It is true that Ss were not specifically asked what they felt the purpose of the experiment to be, as E saw no reason to arouse their suspicions after telling them several times that it was a study of "game playing and probabilities." However it was common to find some minor questions asked after the session, usually "was there

really a system to it or was it just guess work?" and there were only one or two Ss who mentioned the one ambiguous presentation of each figure as anything extraordinary. It is felt that this would not be the case if more than one ambiguous trial were used with each figure. We may cite the results from two of three Ss who were tested using three responses to each ambiguous figure. They were tested under slightly different reinforcement conditions in that they had been told that they would neither win nor lose on the "part" figures. The first S, upon each exposure of test figures, lamented: "Why are you putting on parts?" She later exclaimed, "Oh how wierd." After the session was over, E inquired, "Did you enjoy it?" and received the reply, "I still feel frustrated." The next S following the series of exposures, directly inquired "What were the part figures for? To see if you see what you want to see?" Rather than ascribing this to precocity, it seems more apt to lay it at the doorstep of the "barrage" of part trials. In the customary series, the part figures appear only twice and are "lost" in the series. When six test trials are used, they assume a position of importance.

The difficulties in treating such skewed data as derive from continued presentation of the ambiguous figure should be evident. In a study with Aylion, three post-test trials were used with each figure. This had been a design involving counterbalanced rewards and two treatments per reward condition. Treatment of the design was a "natural" for analysis of variance. However when examination of the results revealed 75% of the subjects had given exclusively all Sailor or all Devil responses, any hope of using analysis of variance had to be abandoned. Non-parametric techniques were not of much value as there were 7 Ss with tied scores at

one end of the distribution and 8 tied scores at the other in a sample of 20 Ss. The only practical solution was to employ a sign test which of course served to reduce an individual to either a plus category or a minus category, the same-type data yielded when only one response for each subject is used.

However for the Ma-Louise figure, another type of reaction is evident. Apparently it is easier for a subject to reorganize this figure, so we see the "guessing game" type of response. First he calls it Ma then, to be liberal, he switches to Louise and finally, he gallantly returns to Ma. This type of subject "feels lost" if he does not report all of the alternatives of the training session. He feels Louise and the Sailor "must be somewhere" if he has reported Ma and Devil as his first responses. For some reason, Sailor-Devil organization proves too difficult for him to change, but he can alter his Ma-Louise percept readily.

It is apparent that the preceding discussion can be considered first as a lament that Ss give the same response and later as a lament that they change from one response to the other. This is not a paradox although it may seem we are arguing against any responses the subject gives ("if he stays the same, you complain; if he changes you complain; what else can he do?").

In answer, we reply that it is not so much that we object to what he does, but rather to his reasons for doing it. In both the above reaction patterns, his second responses are largely determined by his first responses rather than the variables that we are interested in. Hence the second response is a contaminated response, of little value in examining

a need-perception hypothesis.

No serious Rorschach worker would think of administering Card I a second time with only a five minute interval intervening between administrations and then considering that the second group of responses were comparable to the first. The usual reaction of S would be to either give the same response as he did before (similar to reaction one described above) or to search intently for new percepts (similar to reaction two). It seems S can either remain the same or change, what is there to complain about?

Lest we seem too dogmatic, a section from Rock and Fleck is pertinent. It reveals that other workers have encountered a similar situation:

Once decisions are reached as to how each figure is to be identified, the S usually sticks to them for quite a number of trials, or, in some cases, for the remainder of the series even though he realizes he may be wrong throughout. There is, in other words, a certain consistency which develops in responding to a situation where there is no check on correctness or incorrectness after each trial. The writers suggest that this explanation accounts for the development of what Schafer and Murphy called a "set." If this explanation is correct, then one must be cautious about statistical interpretations of the quantitative results of the post-training series. Differential total scores would then not necessarily imply so and so many recognitions of one face vs. another, but rather consistent application of decisions as to which previously learned face most resembles which new global presentation. For this reason, a better, though practically infeasible, procedure would be to give, say, 100 Ss each one trial with each ambiguous situation in order to avoid the contaminating effect of early presentations of ambiguous figures upon subsequent ones. Of course such a procedure would not eliminate the other difficulties with this experiment (45, p. 775).

The question is not one of practice effect or improvement over time. It is a matter of stabilization and consolidation of percept on the first trial. It is as if one had requested a subject, once he had seen a dog in the Street Gestalt figures, to try to see it once again as a meaningless

pattern of dots.

It would be interesting indeed to set up a situation in which the first perceptual organization proved maladaptive. In such an instance the use of subsequent trials would be quite justified. One could then determine how long it took to abandon a maladaptive percept. However, in the present situation, to continue to organize the figure as either Sailor or Devil is certainly not maladaptive. To term such a performance "rigid" is hardly fruitful. When S has no motivation to change his percept and his original percept is adequate to the situation (and also "correct" in his eyes), we should hardly consider a repetition of the original response to be indicative of pathology. Lecky's (21) thesis of the individual's desire to appear consistent in his own eyes applies to this performance. If one feels he is correct in calling a stimulus "Ma" one time, is there any great motivation to call it something else on the next exposure? Indeed it would seem more a sign of pathology if an individual continually went out of his way to prove himself wrong.

In summary then, the reasons for using only one response per S rather than several are as follows:

Subsequent responses are contaminated and largely determined by the first response.

The majority of Ss would not alter their original response, thus making subsequent responses of little practical importance.

Results with several responses show markedly skewed distributions, piled up at the two extreme ends of the scale. Hence the precision of a factorial design would not be gained even if several responses were secured.

Several post-test trials might give S insight into the hypothesis

tested, in addition to affecting his later responses. This would ruin the excellent rapport of the game atmosphere. If any disaffected S were to tell his classmates the purpose of the design, another source of Ss would have to be secured.

In essence, subsequent responses are of little practical importance, of dubious validity due to contamination, and would serve to increase the transparency of the design. For these reasons, the greatest part of the study was conducted with only one post-test trial for each figure.

D. Predictions made by each approach

As the design of the study stands, the two approaches would make specific predictions in each of the three conditions. The emphasis approach should predict, in the R-N, that the rewarding aspect would be perceived; in the P-N condition, that the punishing aspect would be perceived; and in the R-P condition, that no significant results in either direction would be obtained.

A strict need-satisfaction theory would predict (other things being equal), in the R-N condition, that the rewarding aspect would be perceived; in the P-N condition, that the neutral would be perceived; and in the R-P condition, that the rewarding aspect would be perceived.

It should be noted that these would be predictions by "ideal-type members" of each approach. Probably most adherents of one orientation would recognize at least the partial soundness of the other approach and temper their predictions accordingly. Also when examining the data from the last condition, R-P, there is an implicit assumption of some degree of relative comparability of the rewarding value of the reward with the punishing value of the punishment. Unfortunately, there is no way to

measure this directly. Our attempts centered mainly on using equal amounts of money for losing and winning, and later having S rate his reaction to both winning and losing. There is the very legitimate point that it is more pleasant to win someone else's quarter than to lose a quarter that really never did come into one's possession. It is hardly a reply to cite the equally subjective statement that there is more loss of face in losing than there is a gain in prestige in winning. However, as we hope to make clear later in the paper, our feeling is that the amount of reward or punishment in itself has very little to do with the character of the results. The important factor is S's experience of winning or losing when a particular figure is presented in the tachistoscope.

In any event, we find a bifurcation of predictions when we come to the P-N condition. Emphasis theory would predict that the punishing aspect would be perceived. Need-satisfaction theory would predict that the non-punished aspect would be perceived. However, it is felt that an adherent of this theory would be distinctly unhappy to make such a prediction, although in the end he might be forced into it. If he accepts the design of the Smith and Hochberg study as a valid testing ground for the autism approach, there is little reason why he should not predict, at bare minimum, at least a trend in the non-punished direction.

The issues involved in the R-P condition are somewhat clouded by the lack of knowledge regarding the comparability of affect-arousal in each case. Nonetheless, emphasis theory should predict that the ratio of rewarding to punishing responses given in this condition, should be approximately equal to the ratio of the rewarding responses in the R-N condition to the number of punishing responses given in the P-N condition. In other

words the relative amount of emphasis value of a quarter as a reward and a quarter as punishment can be discerned from the first two conditions. When these are pitted against each other in Condition R-P, the one that was perceived with greater frequency in the first two conditions, should again tend to receive the greater number of responses.

A pure need-satisfaction theory would tend to predict that in the R-P condition, the rewarding aspect would be perceived in even greater degree than in the R-N condition, as the need to perceive the rewarding aspect should be even greater when the alternative percept is punishing rather than merely neutral.

In the light of these predictions, we intend to employ a one-tailed statistical test in Condition R-N where both theories predict a predominance of rewarding responses. In Conditions P-N and R-P, where the two theories make divergent predictions, two-tailed tests of significance will be employed.

Chapter III

Experiment One

A. Apparatus

The stimulus materials in the present investigation consisted of two ambiguous figures; Sailor-Devil and Ma-Louise. The latter is somewhat similar in structure to Boring's wife-mother-in-law figure (as the eye of Ma functions as the nose of Louise), while the Sailor-Devil is a new figure. Both were drawn on 4 x 6 cards in India ink. In addition to the equivocal test figures, there were also two "non-reversible" training figures for each pair. That is, there was a full picture of a devil amidst a maelstrom of flames, of a sailor beside his ship, of Louise looking at a school building, and of Ma in her kitchen. These settings were intended to give the figures stable anchorages so that S would be disinclined to search for alternative perceptual organizations. It was unfortunate, although possibly unavoidable that these proved to be emotionally-toned settings. Several Ss were visibly disconcerted when the Devil turned out to be the winning figure, and Louise, the losing figure. Some made remarks to the effect "I don't like winning on the Devil." Unfortunately, the structural characteristics of this figure dictated that the complement to the Sailor should have a goatee. A solution would have been to call the figure "the Count" and draw a castle in the background. This might have been a safer course but the writer's feeling was that "Devil" increased S's involvement and made the game more interesting.

Insert Figure 1 about here



Figure la

Devil - Sailor
Training Figures and Test Figure

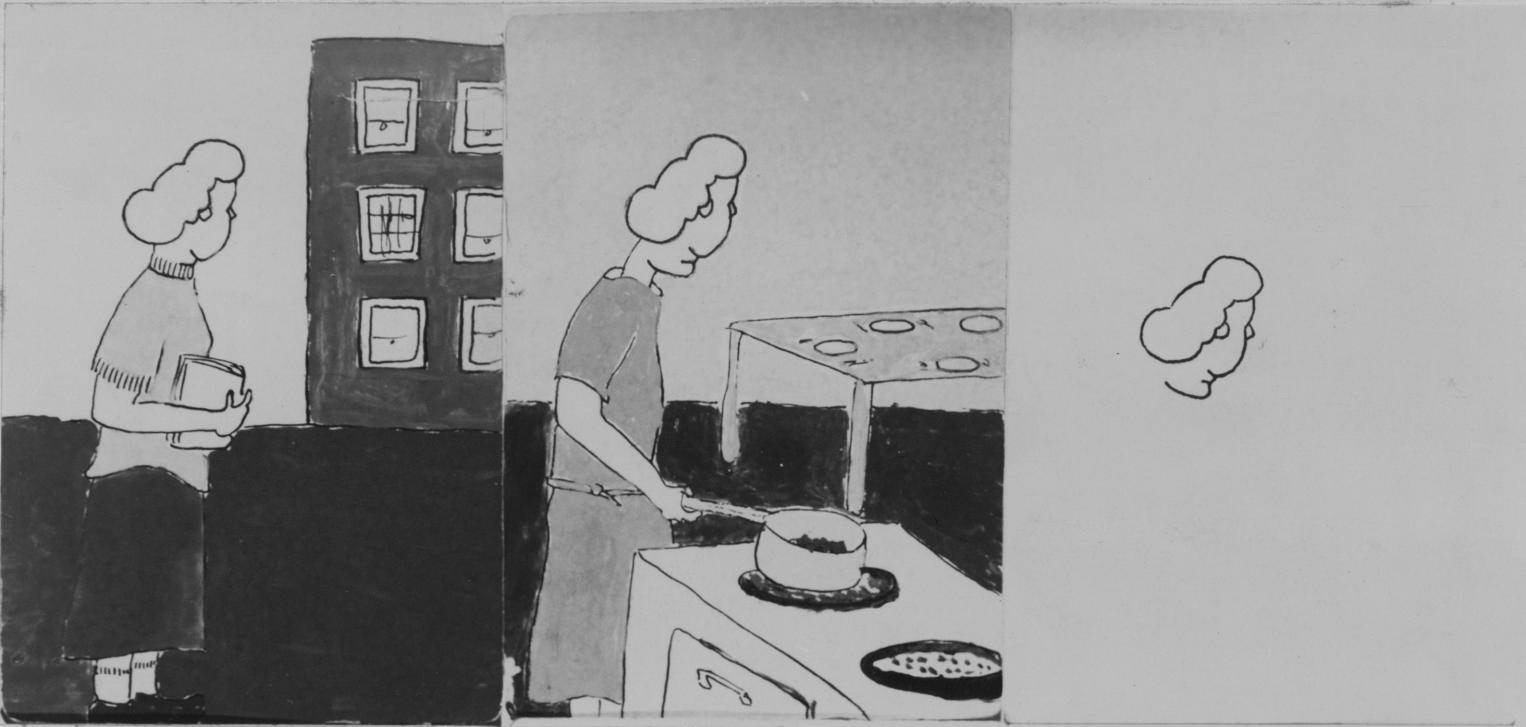


Figure 1b
Louise - Ma
Training Figures and Test Figure

The same difficulty arose with the Ma figure. Many Ss were affected even by the name used, and continually referred to her as "mother." Fortunately no Ss named Louise were tested and no males appeared at the sessions attired in naval R.O.T.C. garb. In any event, these are sources of variable error which would not operate in favor of any of the hypotheses. If anything, they would decrease the significance of the results by enlarging the error term.

These particular issues also came up in the Schafer-Murphy and Rock and Fleck studies, where the latter investigators used letters (Faces A, B, C, D) for the profiles rather than proper names (Nathan, Bertram, Clifford, and Duncan). The merits of such a procedure are apparent if one desires to set up a learning situation where the stimuli should be as free as possible from prior associations; but in a need-perception study where affect is the independent variable, the writer's preference is for as much involvement as possible.

Thus there were two test figures and four non-reversible training cards. (See Figure 1.) The latter were painted in bright enamel over the India ink. The colors seemed to enliven the game and distract S from noticing the similarity of the faces in each of the pairs. The particular test figures evolved from several years of experimentation with different sets and patterns. Literally several hundred Ss had been tested with previous versions of these test figures. The hope had been to achieve "balance," the point at which the test figure was as likely to be perceived as one alternative as the other. The criterion of balance used in the present study was the relative proportion of Ss perceiving each alternative in either counterbalanced reinforcement or neutral conditions.

On this basis, data from the present study showed that the Sailor-Devil figure was satisfactorily balanced while Ma-Louise was not.

The cards were shown in an electronic tachistoscope built by Fred Snyder. An exposure time of 200 mls. was used throughout the study. With this tachistoscope, this was more than ample for perceiving the cards. In some pilot testing, perfect recognition was found as low as 20 mls. The argon tubes permitted an exceptionally clear view of the field, with the white light reproducing the colors with almost perfect fidelity. This is a Dodge-type two field tachistoscope with exposures electronically timed. Special "Daylight Neon" tubes are used for exposure of both fields. The presentation box has an opening, with forehead rest, into which S looks. With the blank field exposed, S sees a homogeneous square field of "white" light. When E presses a lever on the electronic timer (separately housed and shielded from S's view), the stimulus field appears for the pre-set interval. The colored stimulus card is seen at the same distance and intensity of "white" light as in the blank field. It should be noted that there are several features of this tachistoscope which are advantageous to the kind of research reported here:

1. The blank field serves two purposes: it provides orientation for the location at which the stimulus appears and prevents after images following stimulus exposure.
2. Use of "neon daylight" tubes provides reasonably accurate exposure with the effects of slight afterglow minimized by the blank field exposure. The use of "neon daylight" was dictated because the stimulus material colors would appear grotesque in a blue light (although a blue light does not have afterglow making it

superior for presenting black and white stimuli.)

3. There is no possibility of cues or distraction from any relay noise since the electronic timing circuit utilizes no relays and therefore the tachistoscope is silent in operation.
4. The electronic timing is highly reliable ($\pm 1\%$) and the actual interval used in the experiment was initially measured by a relay circuit (normally disabled) operating a mechanical chronoscope.

B. Procedure

There were two sources of Ss for the study. The first was students enrolled in introductory psychology sections at Kansas University. They were required to serve in three hours of experiments during the semester, and so did not have to be told anything of the nature of the study at the time when appointments were made. The other Ss were students lounging in the hallways of Strong Hall basement during class hours. Almost all of these were males and were approached in standard fashion: "Excuse me, would you care to be a subject in a psych experiment for ten or fifteen minutes. You'll win some money in it." If S appeared interested but skeptical, E continued "It's a lot of fun; it's a study of game playing and probabilities. It involves odds and winning and things like that. You'll really enjoy it and you'll be out of there in about fifteen minutes." Ss secured from the introductory psychology pool were not told the nature of the study until they were seated in the experimental room. The Ss were 72 males and 80 females, almost exclusively undergraduates at Kansas University.

All Ss were tested in a small experimental room near the Psychology

Department. The overhead lights were not used, the only illumination being supplied by a small shaded lamp in the corner of the room. (This was required by the particular tachistoscope. Overhead light would allow S to view the test field when E was changing the cards.) A wooden table stood between E's chair and S's. The viewer portion of the tachistoscope stood on the left portion of the table. The timing mechanisms and exposure switch were housed in a metal cabinet on the floor, alongside E, and out of Ss view. The right side of the table was empty except for four small folding metal cups and a pile of quarters.

An S would probably receive the following impression about the room: "Small, dimly lit, rather empty except for a table and a big wooden box that looks as if you're supposed to look into it. A few gadgets on the floor but I can't make out what they are. Wonder what those quarters are for?"

The design of the study allowed for a full rotation of reinforcements and figures. Each figure was used in all reinforcement conditions (R-N, R-P, P-N). Moreover, some Ss were rewarded for Devil and punished for Louise, others were rewarded for Devil and punished for Ma, while still others were rewarded for Sailor and punished for Louise, etc. This is illustrated in Table 1.

Insert Table 1 about here

The first group of 33 Ss was tested either in the "win on Sailor, lose on Louise" or "win on Devil, lose on Ma" schedule. This is responsible for the greater number of Ss tested in orders 1A and 1B. Later Ss were assigned to all the conditions. Such placement was random, any subject

Table 1
Reinforcement Schedules for All Ss

Symbols:	+ winning figure	S Sailor	R-N Reward vs. Neutral
	- losing figure	D Devil	P-N Punish vs. Neutral
	neutral figure	M Ma	R-P Reward vs. Punish
	S-D Sailor-Devil	L Louise	N-N Neutral vs. Neutral
	M-L Ma-Louise		

(Number Ss tested)	(9)	(24)*	(26)*	(9)
Orders 1a-1d:	S +	S +	S	S
R-N for S-D	D	D	D +	D +
P-N for M-L	M -	M	M -	M
	L	L -	L	L -

(i.e. Ss in first column win on Sailor, lose on Ma, neutral for D and L.)

(Number Ss tested)	(9)	(11)	(9)	(9)
Orders 2a-2d:	S -	S -	S	S
R-N for M-L	D	D	D -	D -
P-N for S-D	M +	M	M +	M
	L	L +	L	L +

(i.e. Ss in first column lose on Sailor, win on Ma, neutral for D and L.)

(Number Ss tested)	(12)	(12)	(11)	(12)
Orders 3a-3d:	S +	S -	S	S
R-P for S-D	D -	D +	D	D
R-P for M-L	M	M	M +	M -
N-N for S-D	L	L	L -	L +
N-N for M-L				

(i.e. Ss in first column win on Sailor, lose on Devil, neutral for M and L.)

*Contains Ss from both first and second group of Ss. Other orders contain only Ss from second group.

was as likely to receive one reinforcement schedule as another. The data are later tabulated for the first and second groups of Ss separately and the full table of data is presented in the Appendix.

After a few informal remarks to put S at ease, he was told:

This is a study of game-playing and probabilities. It involves winning, odds, choosing numbers, and things like that. The study is being financed by a research grant, so you can win some money in it. You won't win thirty dollars, or fifty dollars or anything like that, but you can win a dollar and a quarter, seventy five cents, or some amount like that. Whatever you win, is yours to keep. There are no strings attached. The money does not come out of my pocket. You needn't feel at all guilty about winning. You can use the money for coffee, Christmas presents, or whatever you want. OK?

Some Ss remained skeptical about the moral issues involved in keeping the money. Fortunately, this attitude was encountered less frequently as the weeks of testing proceeded. Word soon "got around" that there was a pleasant little game in the psychology department where you could win lunch money by guessing numbers. Skeptical Ss were continually reassured that the money did not come from E's pocket; and they were not taking money from a starving graduate student. If he so chose, he could give the money to the Red Cross, but whatever he won, he was going to leave with. Some Ss were told that the money was only used to make the game more interesting. E could just as easily have used red chips, or blue chips, but as E had this research grant, he thought it would make it more interesting for everyone, himself included, if he used quarters. The purpose of the game was for S to try to win as much as possible.

There was a good deal of discretion exercised in the length of this explanation, depending on the initial attitude of the subject. Anyone entering the room knowing that his room-mate had won seventy-five cents

and interested in exceeding this amount, would be given a rather brief introduction. On the other hand, an S who felt that winning quarters was immoral or degrading, was given quite a lengthy account of the "purpose" of the experiment and E's desire to make the session "as interesting as possible." The great majority of Ss ended the session with the feeling that they were to keep the money. Unfortunately there were some Ss who, throughout the entire session eagerly awaited E's request that they return the money. Some were rather disappointed when this was not forthcoming and, before leaving, inquired, "Are you sure it's all right if I keep the money?" The protocols of two Ss who appeared to be completely negative to the idea of winning, are not included in the final sample. It was decided to discard their results before their responses to the test figures were examined.

Following this introduction, E motioned toward four aluminum cups that were placed on cards numbered one through four. He told S:

All right, now we're going to play sort of a shell game. You see these four cups. Each time I'm going to place a quarter in one of them and washers (showing washer) in the other three. Each time I'd like you to call out a number from one to four, and I'll open the particular cup. If there's a quarter in it, it's yours. If a washer, nothing. OK? I'd also like you to keep score of how you're doing. (E gives S a score sheet, shown in Appendix.) If you get a quarter, just write a Q, if you get a washer, just write a W.

There were seven trials in which S would call out a number, E would open the cup, and give S the coin if he had won it. After every guess, E took the cups behind the tachistoscope (out of S's view) and gave the impression of opening the cups and moving coins and washers about. Following the first guess, E opened the one cup S chose (and gave him the quarter if he won it), and added "Now let me show you that you were

playing an honest game." E then opened the other three cups, letting S see that there had actually been one quarter and three washers in the four cups. While E was moving the cups behind the tachistoscope to refill them, he told S "After this, I'll only open the one cup you pick. Otherwise it would give away any system or pattern if I opened them all each time. Also, I move them around from trial to trial, so if you noticed any marks or scratches on the lids of the cups, they don't mean anything." (This latter was given to explain the sounds of coins being removed and inserted that emanated from behind the viewer.)

It can be seen that S's first guess as to the location of the quarter was "honest" in that there actually was one, and only one, quarter in the cups. This fact was demonstrated to him after the first judgment when all the cups were opened. However, for reasons which will soon be made clear, S's winnings on subsequent trials were controlled by E. This was managed by inserting either all quarters, or all washers in the four cups. S must necessarily win in the former and not win in the latter-type arrangement. The series was so designed that on Trial 1, the "honest" trial, the quarter was placed in the fourth cup. (Only for the last Ss was it changed. E received the impression that one or two Ss might have told their room-mates to guess "4" on the first trial. Hence the quarter was placed in the first cup for a few Ss.) All Ss were given six additional trials, in which all quarters were used in two trials and all washers in four. Unless he won on the first trial, S finished the series with fifty cents. The winning trials were the third and six, in the full series of seven trials.

Throughout the trials E continually tried to increase S's interest

in the game. Remarks such as "You came close," "Let's see if you can get this next one," "You're doing better than the odds" were given when needed. Throughout the series, nothing was done to discourage S's belief that there was a sequence or order to the placing of the quarters. If he directly asked whether such an order existed, E replied, "I'm not allowed to tell you that until after the game." S usually accepted this as confirmation of his feeling that there actually was a system and that it was his purpose to discover it.

To E's knowledge, not one S suspected that the amount of his winnings was regulated by E. There were several reasons for this. First, there was Trial 1, where S was shown that there actually was one, and only one, quarter in the cups. Also, S should see little reason why E would actually try to "cheat" him. The money was E's so anything that S won was profit. Why should E have any interest in placing all quarters in the cups? There are additional minor reasons ranging from the setting of the game (in a psychology department experimental room), E's assurances and blandishments, to S's own desire to feel that he had won the quarters honestly by being skillful in hitting upon "the system."

The actual reason for the manipulation of rewards was E's desire to avoid the negative attitude that might have been engendered had S not won on any of the seven trials. With the regulation, S was assured of winning at least fifty cents, although not more than seventy five. Thus Ss proceeded into the next game with some rough similarity in feelings about the preceding game.

The purposes of the cup game were only indirectly related to the hypotheses under consideration. In fact no data was secured from the

game and a replication could conceivably dispense with it.¹ The reasons for including it were as follows:

First, it served to convince S that he actually was going to win money, and keep it. It helped establish rapport as this sort of "shell game" seemed sensible and is found in carnivals, bazaars, etc. It undoubtedly helped develop and strengthen many incorrect hypotheses as to the actual purpose of the session. Almost all Ss believed that the purpose of the entire experiment, including the later parts, was to determine if they could find a system or pattern for the numbers. E did little or nothing to discourage any of these incorrect hypotheses. His customary reaction to S's query was "I'm not allowed to say that now. We'll go over it after the game, if you want." Finally, the game accustomed S to choosing numbers from one to four, and then writing on the score sheet the initials of what had appeared. This made the transition from the cup game into the ambiguous figure game quite smooth.

The game with the cups was a "warm-up" procedure. It is felt that it was quite successful in fulfilling its objectives. Ss usually embarked upon the next game with verve and a desire to increase their winnings. Previous testing without such a beginning, showed many Ss quite puzzled by the whole session.

After the game, E informally asked S how much he had won and requested him to put the money in his pocket (or handbag, for female Ss). After removing the cups from the table, but leaving the cards with numbers from

¹One interesting result from the game, although E did not collect the data, was that it seemed that over 90% of the Ss would select "2" or "3" on the first guess, with the majority selecting "3."

one through four, he told S:

All right, now we're going to play another game. Here are four cards (showing them to S by placing them one on top of the other in front of him. No two cards were visible at any one moment.) This is Louise...Sailor...Ma...Devil. (Going over them again) Devil, Ma, Sailor, Louise. All right, could you just now identify them? (Showing the cards to S, one at a time. S would call out the names. If he was wrong, which few Ss were, E corrected him, and the cards were shown to him again, until he identified them correctly.)

All right, I'll show you how we play this game. I'm going to place these numbers (one through four) behind the viewer here where you can't see them. Then, each time, I'm going to place these cards on them, one card on a number. It might be this order (placing Louise on 1, Sailor on 2, Ma on 3, Devil on 4)... or this order (placing Ma on 1, Devil on 2, Louise on 3, Sailor on 4), but each time there will be one card on a number. Then, just as you did before, I'd like you to call out a number from one through four, and I'll put the card, that's on the number you call, in the viewer. In other words, you'll pick a number each time, and I'll put the card that's on it in the viewer where you can see it.

Now, one of these is a winning card and one of these is a losing card. Every time that appears, you win 25 cents. However, every time appears, you lose 25 cents. Let me say one thing at this point. The purpose of this game is not for me to win back what you won on the last game. What you have won is your money and I can't touch it. In this game, it is possible for you to come out minus, by getting more losing cards than winning ones. However, you try to avoid that, but if it happens, we just call it zero. You can't lose your money in the game. OK?

Let me just go over it again. Each time, you call out a number from one to four, just as you did before. I'll put the card that's on the number in the viewer. Please write the initial of the figure on the paper in front of you: (See Score Sheet in Appendix) M for Ma, S for Sailor, D for Devil, and L for Louise. We'll settle up the financial aspects at the end of the game, rather than pushing quarters back and forth. OK? Can you move in front of the viewer then?

One last thing, from time to time I may flash some parts of some of these figures in the viewer. You'll easily recognize them, so just write those initials down as you did for the others. OK? And good luck! Can you pick a number from one to four now?

From this point on, S would call out numbers while E would place particular figures in the viewer and expose them for 200 mls. durations.

The S was made to feel that his choice of number determined the figure that was shown to him. The E used standard comments at choice points throughout the series. If the first exposure was a winning figure, E said, "That's your winning figure." A similar comment was made for the losing figure, with E's inflection altered accordingly. He attempted to sound genuinely happy when a winning figure was shown and sorry when a losing figure appeared. Nothing was said for neutral figures. For the second exposure of the winning figure, the comments "Good" or "Fine" were made; while "That wasn't good" or "Sorry" accompanied the losing figure. After the second exposure of each figure, no comments were used until after the ambiguous Sailor-Devil trial. Then, if either Ma or Louise was a winning or losing figure, one comment was given with the next exposure of each of them.

Unknown to S, the figures were exposed in a set order, regardless of his choice of number. This was done to keep frequency, position in series, and amount won, relatively constant for all Ss. The particular order used was as follows: Ma, Devil, Sailor, S, Louise, M, D, L, D, S, M, L, Ambiguous Sailor-Devil, M, L, L, M, S, Ambiguous Ma-Louise, D. After the series, E remarked "All right, now can you add up the number of _____ and _____ (winning and losing figures, respectively) and we'll see how much you won or lost." If a positive balance appeared, S was given his winnings. If the total was negative, E said "Well, we'll just call it zero." Then E handed S an interview form, and asked him to circle the appropriate answer to each question. The items, dealing with such matters as feeling when a winning figure appeared in the viewer, or feeling about winning the quarters, are shown in the Appendix. After this, E said,

"All right, let me ask you one last question and I'd appreciate the first answer that comes to mind. Of the four figures in the preceding game, which one do you remember most vividly....which next....which next....which last." The S was then thanked for participating in the study and E confirmed any hypotheses that S had about the purpose of the games. If S inquired whether there was a system to the numbers, E's reply was in the affirmative but that it was really too difficult to find in the short span of time allowed. The writer was not always happy about making this assertion, but it was thought necessary to minimize any ruminating about the actual purpose. In a study where 150 Ss were drawn from a pool of students attending the same classes and sharing common dormitory rooms, one could be too careful in preventing the actual purpose from spreading along the grapevine.

C. Data and analysis

a. Results from the R-N, P-N, and R-P conditions.

The first group of Ss was tested in two reinforcement schedules: Reward vs. Neutral (R-N) for the Sailor-Devil, and Punish vs. Neutral (P-N) for Ma-Louise. They were not given the prepared interview. Later Ss were tested with additional schedules (i.e., R-N for Ma-Louise, and P-N for Sailor-Devil) and were given a prepared interview as to interest in winning, etc. This provided a full rotation of reinforcements (positive or negative) for each of the ambiguous figures. The results from the first group of Ss using only two reinforcement schedules were similar to those obtained with full rotation; hence these data are combined in the final tabulation, although separate breakdowns within each condition are presented in Tables 2 and 3.

The results are examined first for the R-N condition; secondly for the P-N condition; and finally, for the R-P condition. The predictions made by both an emphasis and a need-satisfaction theory have already been outlined. Both approaches predict more rewarding than neutral responses in the R-N condition. Hence these results cannot in themselves be used to assay the relative predictive value of each approach. On the other hand, had no such effect appeared, serious doubt would have been cast upon either the efficacy of the reinforcements or the type of ambiguous figures (or upon both theories).

The results in Table 2 indicate that the rewarding figures were reported more frequently than neutral figures. The total of 66 rewarding responses to 38 neutral responses is significant at the .01 level. Unfortunately this table discloses a perceptual dominance of the Ma alternative of the Ma-Louise figure. This could not have been predicted from the first part of the study where no such trend was evident. In a counterbalanced design, where both alternatives are in turn rewarded and punished, a response preference serves mainly to lower the significance of any results obtained. It has little to do with questions of validity

Insert Table 2 about here

Table 3 presents the data from the P-N condition.² Again the results from the first group of Ss, using two reinforcement schedules, do not differ from those with the remaining schedules; and the groups are

²Although all the Ss tested in the R-N condition were also tested in the P-N condition, the tables reflect slightly different N's as several Ss had been unable to identify the ambiguous figure, insisted that it would be either figure, etc.

Table 2

Responses in Reward Vs. Neutral Condition

A. First group:

	Rewarding Figure	
	Sailor	Devil
S's Response	Sailor	11
	Devil	4

B. Second group:^{*}

	Rewarding Figure	
	Sailor	Devil
S's Response	Sailor	12
	Devil	5
		12
S's Response	Louise	5
		8
		13
		12

Total: 66 rewarding responses,
38 neutral responses.

$$\chi^2 = 7.50, p < .01.$$

*Procedure identical to that used with first group of Ss except that an interview and additional reinforcement schedules were used. The results from the second group of Ss are significant ($p < .05$) in themselves.

combined in the final tabulation. Separate breakdowns are also provided for each condition. The sub-tables all disclose a similar result, a slight but non-significant preference for the punishing figure. Pooling of the data is of little assistance as the difference between punishing and neutral responses still falls short of significance.

Insert Table 3 about here

Table 4 contains the results from the R-P condition. It had been decided, in view of the difference in predictions between the two approaches, to evaluate these data with a two-tailed test of significance. Both sub-tables show a preponderance of rewarding responses and the pooled data yields a Chi square of 4.79 ($p < .05$) for the 31 rewarding to 16 punishing responses.

Insert Table 4 about here

Table 5 presents the data from a Neutral vs. Neutral condition. This was a by-product of the R-P condition; for when one aspect of a figure was punishing and the other rewarding, the two aspects of the other ambiguous figure were neutral. Hence Table 5 presents the data when no reinforcements were used with the particular figure. The only noteworthy item is the perceptual dominance of the Ma alternative of the Ma-Louise figure.

Insert Table 5 about here

b. Sex differences

Another series of questions that can be asked concern whether or not

Table 3

Responses in Punish Vs. Neutral Condition

A. First group:

	Punishing Figure
Ma	Louise

Ma	9	4
----	---	---

S's Response

Louise	7	11
--------	---	----

B. Second group:^{*}

	Punishing Figure
Sailor	Devil

Sailor	9	7
--------	---	---

S's Response

Devil	11	11
-------	----	----

	Punishing Figure
Ma	Louise

Ma	12	9
----	----	---

S's Response

Louise	5	6
--------	---	---

Total: 58 punishing responses,
43 neutral responses.

$$\chi^2 = 2.23, p > .05.$$

*Procedure identical to that used with first group of Ss except that an interview to additional reinforcement schedules were used.

Table 4
Responses in Reward Vs. Punish Condition*

	<u>Rewarding Figure</u>	
	<u>Sailor</u>	<u>Devil</u>
S's Response	7	4
Devil	5	<u>8</u>
	<u>Rewarding Figure</u>	
	<u>Ma</u>	<u>Louise</u>
Ma	10	6
S's Response	1	<u>6</u>
Louise	1	<u>6</u>

Total: 31 rewarding responses,
16 punishing responses.

$$\chi^2 = 4.79, p < .05.$$

*Only Ss from the second group were tested in this condition.

Table 5
Responses when No Reinforcements Given

Figure	Number of Responses
Ma	15
Louise	8
Devil	13
Sailor	10

*Only Ss from the second group were tested in this condition.

there are any differences between male and female Ss in susceptibility to autism. Our samples of 72 males and 80 females are large enough to give such a question meaning. With but one or two exceptions, all Ss were undergraduate students at Kansas University and should be roughly similar in background. The one possible major source of bias was that a good proportion of the males were volunteers (had been secured in the hallways) while almost all female Ss had been secured from the pool of students enrolled in introductory psychology sections.

Tables 6 and 7 present the results of both males and females in each condition. It is evident that proneness to autism is not the exclusive property of either sex. It is difficult to imagine how the results could by any more similar. However, when the total responses to each figure are examined, one interesting fact emerges. Of the males, 63% perceived the Devil figure while only 45% of the females perceived it. In view of the large samples, this is quite reliable ($\chi^2 = 4.7$, $p < .05$). It further supports the point made earlier, that it would have been safer to use figures with less involvement and fewer prior associations, especially of a negative variety. These percentages confirm what had long been suspected; with certain Ss who were rewarded for Devil, we were waging an uphill battle.

Insert Tables 6 and 7 about here

c. Questionnaire responses

Following the game with Sailor-Devil-Ma-Louise, S was given a questionnaire asking him to circle phrases describing his feelings during the session. In the main, the answers obtained are uninformative. No

Table 6

Sex Differences in Three Reinforcement Conditions

	Rewarding Responses	Punishing Responses	Neutral Responses
Condition 1: Reward vs. Neutral			
Males	32		18
Females	34		20
Condition 2: Punish vs. Neutral			
Males		29	20
Females		29	23
Condition 3: Reward vs. Punish			
Males	16	6	
Females	15	10	

Table 7

Sex Difference in Preference for Particular Ambiguous Figures

	Males	Females
Total Sailor Responses	27	44
Total Devil Responses	45	36
Total Ma Responses	44	46
Total Louise Responses	26	31

striking relationships are found between self-ratings and performance. Possibly the questions were poorly phrased. Several Ss who were obviously involved in the procedure (guaged by spontaneous comments regarding winning and losing) reported only "moderate interest" on the questionnaire. On the other hand, several lethargic Ss circled items indicating extreme involvement. It is difficult to explain this. A similar lack of effect was found in the Snyder and Snyder (53) and Sommer and Aylon (56) investigations. It may be that the money produced so little involvement that S had only vague standards against which to rate his feelings. Or again, unpleasantness may be easier to guage than feelings of well-being or pleasure.

The results based on questionnaire responses are presented in Tables 8 through 11. Table 8 contrasts the responses to Item One with those to Item Two. Assuming comparability of the scales along a hypothetical affect continuum (i.e., "moderately pleased" indicates the same amount of affect as "moderately displeased"), it can be seen that the pleasure in perceiving the rewarding figure was greater than the displeasure in seeing the punishing figure. This difference is significant and can be used to support an emphasis interpretation of the present results. This point will be treated at greater length in the Discussion.

Insert Tables 8 through 11 about here

d. Vividness ranks

After S completed the questionnaire, E took it and turned it over. Then he told S, "Now I'm going to ask you one final question and I'd appreciate the first answer that comes to mind. OK? Of the figures in

Table 8

Responses to Interview Items One and Two

Feeling when winning Figure Appeared in Viewer	N	Feeling when losing Figure Appeared in Viewer	N
Extremely Pleased	7	Extremely Displeased	0
Very Pleased	35	Very Displeased	6
Moderately Pleased	56	Moderately Displeased	40
Slightly Pleased	20	Slightly Displeased	66
No feeling at all	1	No feeling at all	7

Table 9

Responses in R-N and R-P Conditions with Ss Classified
by Answers to Question One (Feeling when a Winning
Figure Appeared in the Viewer)

Responses to Ambiguous Figures:

Self-Rating	Rewarding Responses	Punishing Responses	Neutral Responses
Extremely Pleased	5	0	2
Very Pleased	22	4	8
Moderately Pleased	30	6	12
Slightly Pleased	12	0	7
No feeling at all	1	1	0

Table 9A

Dichotomization of Data from Table

Self-Rating	Rewarding Responses	Punishing and Neutral Responses	p
Extremely, Very Pleased	27	14	N.S.
Moderately, Slightly Pleased, No feeling	43	26	

Table 10

Responses in P-N Condition with Ss Classified by Answers
to Question Two (Feeling when a Losing Figure Appeared in
the Viewer)

Self-Rating	Responses to Ambiguous Figures	
	Punishing Responses	Neutral Responses
Very Displeased	2	2
Moderately Displeased	12	12
Slightly Displeased	21	18
No feeling at all	4	1

Table 10A

Dichotomization of Data from Table

Self-Rating	Punishing	Neutral	P.
	Responses	Responses	
Very and Moderately Displeased	13	14	N.S.
Slightly Displeased, No feeling at all	25	19	

Table 11

Percent of Ss' Responses in P-N and R-N Conditions with Ss Classified
by Answers to Question Three (Feeling when a Neutral
Figure Appeared in the Viewer)

Self-rating	Responses to Ambiguous Figures	
	Neutral Responses	Rewarding and Punishing Responses
Moderately Pleased	5	1
Slightly Pleased	10	11
No feeling at all	26	34
Slightly Displeased	19	31
Moderately Displeased	1	3

Table 11A

Dichotomization of Data from Table

Self-Rating	Rewarding and	
	Neutral Responses	Punishing Responses
Moderately, Slightly Pleased		
Moderately, Slightly Displeased	35	46
No feeling at all	26	34

p

N.S.

the preceding game, which one do you remember most vividly? Which next? ...Which next?...Which next?" This item had yielded meaningful results in the Ayllon studies and it was thought in order to try it again.

The S's responses were ranked one through four, depending on order of recall (the figure recalled most vividly was assigned a rank of one, the next figure of two, etc.) The data could then be tabulated by reinforcement condition and by figure. That is, it can be determined whether the rewarding figure is remembered more vividly than the punishing figure, or whether Ma is remembered more vividly than Sailor. Application of analysis of variance also permit assessment of interaction effects. Due to the unequal sizes of several of the cells, the method outlined by Walker and Lev (61) correcting with the mean square for error, was used. The results of such an analysis are presented in Table 12. The differences are highly significant both for reinforcement condition and for figure.

Insert Table 12 about here

Table 13 presents the mean rank of each figure for vividness in recall for all 119 Ss (the first group of Ss had not been asked the "vividness" interview item). Table 14 contrasts the t-ratios resulting from a comparison of these means, one with the other. This table discloses that the Devil was remembered with greatest vividness. Ma and Sailor were remembered more vividly than Louise; these differences are statistically significant but not of great magnitude. The comparisons support the conclusion previously reached, that the figures were imbalanced in affective value. The Devil is the most "loaded" of the four. This cannot be

Table 12
Analysis of Variance with Vividness Rankings

Source	SS	df	S^2	F	p
Ambiguous Figures	3.74	3	1.25	20.83	.01
Reinforcement Conditions	4.18	6	.70	11.67	.01
Figures x Conditions	1.06	18	.06	1.00	ins.
Error		460	.06		

explained solely on the basis of the color of the background (bright red) as the only other figure containing this red was Louise, who was remembered least vividly.

Insert Tables 13 and 14 about here

Table 15 contains the mean vividness ranks in each of the reinforcement conditions. Cursory inspection reveals that the rewarding figure was remembered more vividly than either punishing or neutral figures. A comparison of t-ratios for the differences is presented in Table 16.

Insert Tables 15 and 16 about here

Unfortunately the table is rather involved, due in large measure to our desire to make the comparisons as precise as possible. If we had contented ourselves with asking simply whether rewarding figures were remembered more vividly than punishing figures, the answer could have been given quite concisely. Yet much information is lost in such a procedure. We must remember that there were several varieties of punishing figures; there was a punishing figure paired with a rewarding figure; there was also a punishing figure paired with a neutral figure. One might inquire whether the one variety differs from the other. In Table 16 this question would be phrased in terms of asking whether Punishing (vs. Rewarding) differs significantly from Punishing (vs. Neutral). Table 18 shows that the difference, though small, is statistically significant, and indicates that the Punishing figure (vs. Rewarding) has a lower vividness rank than a Punishing figure (vs. Neutral).

It can be added that these comparisons are somewhat unfair to the

Table 13

Mean Vividness Rankings of the Four Figures

Figure	N	<u>M</u>
Devil	119	1.90
Ma	119	2.60
Sailor	119	2.61
Louise	119	2.89

Table 14

The t-Tests on Differences in Vividness Rankings

	Devil	Ma	Sailor	Louise
Devil	-	5.39**	5.39**	7.62**
Ma		-	.07	2.23**
Sailor			-	2.16**
Louise				-

Table 15

Mean Vividness Ranks in Each Condition

Condition	N	Mean of Ranks
Rewarding figure (v. neutral figure)	72	1.85
Rewarding figure (v. punishing figure)	47	2.00
Punishing figure (v. neutral figure)	72	2.43
Punishing figure (v. rewarding figure)	47	2.81
Neutral figure (v. rewarding figure)	72	2.91
Neutral figure (v. punishing figure)	72	2.90
Neutral figure (v. neutral figure)	94	2.62

Table 16

The t-Tests on Differences in Vividness Rankings for Each Condition

	Rewarding (v. Neutral)	Rewarding (v. Punishing)	Punishing (v. Neutral)	Punishing (v. Rewarding)	Neutral (v. Rewarding)	Neutral (v. Punishing)	Neutral (v. Neutral)
Rewarding figure (v. Neutral)	-						
Rewarding figure (v. Punishing)	.79	-					
Punishing figure (v. Neutral)	3.41**	2.26*	-				
Punishing figure (v. Rewarding)	5.05**	3.86**	2.00*	-			
Neutral figure (v. Rewarding)	5.65**	4.26**	2.23*	0	-		
Neutral figure (v. Punishing)	6.18**	4.74**	2.77**	.47	.53	-	
Neutral figure (v. Neutral)	4.81**	3.44**	1.19	1.06	1.19	1.75	-

neutral figures. Intervening between the game itself and the determination of the vividness of the figures were both the calculation by S of his winnings and the questionnaire items focussing on winning and losing. However, as about equal emphasis in both these tasks was placed on winning and losing, they cannot legitimately be used to explain why the winning figure was recalled more vividly than the losing figure.

One point that should be mentioned in regard to the vividness ratings is that the error term in the analysis of variance may be somewhat biased in that there is a correlation between measures that was not taken into account statistically. There appeared no practical way of doing this as the scores fell in different condition cells for each figure (i.e. a person might have had a rating of Ma in the R-N condition which made his Louise rating fall in the N-R condition). The most competent advice the writer could obtain was that the analysis should be carried out as if the correlation were not present. One is not able to say whether the correlation would inflate or decrease the error term. It seems unlikely that the F ratios which were significant beyond the .001 level would be reduced to non-significance if the correlation had been taken into account (which incidentally does not bias the results in favor of any particular figure or condition).

However, there is a way of checking the essential validity of these results in a mathematically correct fashion. This involves examining only data from the figure remembered most vividly (ranked "1" in the preceding analysis) and thus working with only uncorrelated scores (i.e. Ss receiving a score for Ma did not receive a score for Louise as only the highest vividness rank was used, etc.). Table 17 presents data based on

the one figure remembered most vividly. We find, as in the preceding analysis, that the Devil is definitely and significantly recalled by the greatest number of Ss.

Insert Table 17 about here

Table 18 contrasts several of the conditions containing uncorrelated measures. We find more high vividness rankings in the R-N condition than in the N-R condition, and also more high rankings in the R-P condition than in the P-R condition. There is no essential difference between the P-N condition and the N-P condition. These results are in line with those from the analysis of variance except for the last comparison. That is, the rewarding figure was remembered more vividly than punishing or neutral figures. The analysis does not indicate the small but significant difference between the punishing and neutral figures found previously. In other words, if we are to base our conclusions on these data (and this appears to be the more conservative analysis of the two) we would say that rewarding figures are recalled more vividly than punishing or neutral figures, while punishing figures do not differ reliably from neutral figures.

Insert Table 18 about here

e. Vividness ranks as indices of repression

While the test records were being sorted into piles on the basis of answers to the "remembered most vividly item," E became intrigued by protocols of Ss who remembered the rewarding figure least vividly. It seemed that this was an unusual performance, and warranted taking an expedition into personality-theory territory. It seemed likely that Ss who

Table 17

Figure Remembered Most Vividly

Figure	Number Ss recalling figure most vividly
Devil	66
Sailor	19
Ma	20
Louise	14

Table 18

Comparison of Conditions in Regards to Figure Remembered Most Vividly

Condition	Number Ss recalling a figure in this condition most vividly	p
Reward vs. Neutral	32	
Neutral vs. Reward	13	.01
Punish vs. Neutral	13	
Neutral vs. Punish	14	N.S.
Reward vs. Punish	19	
Punish vs. Reward	4	.01

would remember the rewarding figure least vividly might be "repressers" of affect, those who would deny their feelings access to consciousness. Klein might refer to them as "over-controlled," afraid of expressing their feelings openly.

After examining one or two such records, it was decided to sort them into piles on the basis of the vividness rank of the rewarding figure. Ss who would recall the rewarding figure least or next to least vividly, would be considered "repressers." Ss who would recall the rewarding figure most or next to most vividly, might be termed "non-repressers." Owing to the counterbalancing of reinforcement conditions with figures, we cannot hope for a perfect relationship as the Devil had been found to be the most vivid when its rankings were averaged throughout all reinforcement conditions. Hence even an ideal "non-repressor" who had been rewarded for Louise, might remember the Devil most vividly, but Louise next most vividly. The data were also tabulated using all four vividness categories. Our prediction was that repressers would perceive more neutral and punishing figures than rewarding figures; while non-repressers would perceive more rewarding than neutral or punishing figures. The results, presented in Table 19, are striking for Ss who recalled the winning figure least vividly. These Ss perceived 73% neutral or punishing figures to 27% rewarding figures; while Ss who recalled the rewarding figure most vividly, perceived 35% neutral or punishing figures to 65% rewarding figures. The only category of Ss slightly out of line with a prediction of a positive relationship between recall and perception, is that containing Ss recalling the rewarding figure second most vividly. These Ss have a somewhat higher percentage of rewarding responses than

Ss recalling the rewarding figure most vividly. However, if the contamination from such factors as preference for Devil or sex difference is considered, this slight discrepancy is not of paramount importance. The main trend in the table is a positive relationship between recall and perception of the rewarding figure. The tetrachoric correlation based on the dichotomized data from this table is .45 ($p < .01$).

Insert Table 19 about here

There remains however, a valid alternative to our "personality oriented" explanation of this relationship. It can be maintained that the increased frequency of vividness recall of the winning figure is a function of its having been perceived by S. The logic is that since the results disclosed a preponderance of rewarding responses, S had occasion to perceive and write the response to this figure one more time than he had for the complementary (non-rewarding) figure. One might then posit that the figure seen with greater frequency would be more vivid in recall.

It must be admitted that the data from the present study cannot answer this objection. Our feeling is that the explanation in terms of repression of feeling is the more logical. It would be surprising if increasing the frequency of exposures by one trial, for one of the figures, would result in a significant increase in its subsequent vividness recall. We would not question the assertion had the frequency differential been higher, to the order of five or six trials. Yet our feelings are of little practical importance. The point remains that until further evidence is put forth, either explanation of the relationship between perception and recall may be valid. The data from the present study

Table 19

Relationship Between Figure Remembered Most Vividly
and Figure Perceived

	Number rewarding figures reported	Number punishing & neutral figures reported
Ss recalling rewarding figure <u>most vividly</u> (non-repressors)	33	18
Ss recalling rewarding figure second most vividly (slight repressors)	29	10
Ss recalling rewarding figure third most vividly (moderate repressors)	9	9
Ss recalling rewarding figure least vividly (strong repressors)	3	8

cannot be used to judge the relative merits of these interpretations.

There remain then, two interesting questions awaiting empirical answers. The first involves the relationship between frequency of exposure and vividness of recall. We would envisage a positively inclined curve, yet with a long slope. We would posit that it would take a considerable difference in exposure (after a minimum of at least three exposures to each figure had been passed) to result in a sharp increase in vividness of recall.

The second question concerns the validity of our interpreting the performance of recalling-the-rewarding-figure-least-vividly as signifying a repression of affect, a reaction formation against the expression of one's feelings. This can be tested, bypassing the frequency criticism previously outlined, by taking these Ss and testing them in another need-perception task involving a R-N or R-P condition. It could then be determined if they were consistent in refusing to perceive the rewarding aspects of the field. It can be added that this "recall most vividly" performance can possibly serve as the basis for a successful Klein-type experiment in an R-N condition. Predictions of results would be made on the basis of S's prior recall of a rewarding figure. Opposite predictions would be made for S's recalling the rewarding figure most and those recalling it least vividly.

f. Ss for whom winning and losing were of equal affective value

The point is legitimate that to do justice to the emphasis approach in its predictions in the P-N condition, one would need cases where the unpleasantness of the punishment was comparable (along some imaginary affect scale) to the pleasantness of the reward. In other words,

emphasis predictions are made on the basis of intensity of affect, regardless of whether it is positive or negative. As the interview items disclosed greater feelings of pleasure upon winning quarters than feeling the displeasure upon losing quarters, the emphasis approach would hold that we cannot expect equal enhancement of the figures in the two conditions. The former, the rewarding figure, should be the more enhanced; which in fact was the way in which the results turned out.

However, there is a more precise method for assessing the merits of this interpretation of the data. One can examine the results from those Ss whose ratings of the pleasantness of winning in the R-N condition corresponded, in terms of degree, to the unpleasantness of losing in the P-N condition. Of course this assumes both the validity of the scale items and that e.g. "slightly pleased" corresponded to "slightly displeased" along some form of intensity of affect continuum. These data, based only on the responses of Ss whose response to Item 1 (feeling when a winning figure appeared in the viewer) corresponded in terms of degree of affect to their responses to Item 2 (feeling when a losing figure appeared in the viewer) are presented in Table 20. These data definitely suggest, although the differences are not significant, that Ss who experienced "equal intensities" of affect will manifest as great an emphasis on the punishing figure as on the rewarding figure. Yet even this tentative conclusion must be tempered by the results from the 9 Ss who rated the appearance of the losing figure as more unpleasant than appearance of the winning figure was pleasant. These data are summarized in Table 21. Although the N is small, we see no signs of emphasis on the punishing figure. In fact, there is a significant non-emphasis of it if we combine

the P-N and the R-P results. These data are in perfect accord with what our ideal need-satisfaction theory would have predicted; more rewarding than neutral responses in the R-N condition and more neutral than punishing responses in the P-N condition. Yet let us repeat the stricture that the N is too small for generalization (although large enough to infirm the hypothesis that Ss experiencing losing as more unpleasant than winning was pleasant will report more punishing than rewarding figures.)

Insert Tables 20 and 21 about here

The data from these Ss based on their responses to the "recall most vividly" questions, are also pertinent and are presented in Table 22. Due to the differences in sample sizes, it is difficult to interpret the results. If one were to accept the statistical tests at face value, he would conclude that only those Ss who rated winning-as-more-pleasant-than-losing-was-unpleasant remembered the rewarding figure significantly more vividly than the punishing figure. Yet this must be tempered by the fact that the results from both other groups of Ss (for whom losing was equally or more unpleasant than winning was pleasant) were in the same direction.

Insert Table 22 about here

g. Consistencies in Performance

There is also the question of consistencies of personality organization and their manifestations in behavior. Whether one studies rigidity, color preference, or social attitudes, there is interest in how "general" a factor this really is. Is it manifest in other performances of the individual?

Table 20

Results from Ss Rating Losing Equally as
Unpleasant as Winning was Pleasant*

Condition	Number Ss reporting:		
	Rewarding figure	Punishing figure	Neutral figure
R-N	11		9
P-N		13	6
R-P	4	6	

* e.g. rated losing as "slightly unpleasant" and winning as "slightly pleasant"; or losing as "very unpleasant" and winning as "very pleasant."

Table 21

Results from Ss Rating Losing as More Unpleasant
than Winning was Pleasant*

Condition	Number Ss reporting:		
	Rewarding figure	Punishing figure	Neutral figure
R-N	5	0	0
P-N	0	1	4
R-P	4	0	0

* e.g. rated losing as "very unpleasant" and winning as "slightly pleasant"; or rated losing as "extremely unpleasant" and winning as "very unpleasant."

Table 22

Vividness Ranks with Ss Classified by Responses

to Interview Items One and Two

	Number Ss recalling winning figure more vividly than losing figure	Number Ss recalling losing figure more vividly than winning figure	p
Ss rating losing <u>more unpleasant than</u> winning was pleasant	6	3	N.S.
Ss rating losing equally as unpleasant as winning was pleasant	19	11	N.S.
Ss rating losing <u>less</u> unpleasant than winning was pleasant	60	20	p<.01

This question, if not always crucial to one's particular hypotheses is usually of interest when comparison data is available. For the present study, this is found in some research that E did with Ayllon. During the period when E was testing Ss for his thesis research, Ayllon was working on a need-perception study in the tactal modality. Three dimensional reversible plaques (described earlier in this paper) were used that could be perceived as either right or left-pointing faces. Ss were aperiodically given quarters with one or the other face. They were then blindfolded and asked to report the identity of the profile line they were tracing. It was possible for S to organize it into either the rewarded or non-rewarded profile. He was also asked to report the face he remembered most vividly and his degree of interest in winning the quarters.

This design bears some resemblance to the R-N condition of the present study. It differs in these respects: a) It is of the "passive autism" genre, in that S receives no objective rewards for perceiving in a particular way. b) No game procedure is employed when S is given the quarters. Involvement is low as S does not feel he has earned the quarters. c) The procedure is carried out in a tactal-kinesthetic modality.

The similarities are as follows: a) Rewards are presented with one aspect of an ambiguous figure. b) Quarters are used as the reinforcing agents. c) All Ss were first tested by the writer.

For these last reasons, it was thought of interest to determine whether Ss reacting in one fashion in the writer's procedure, would react similarly in Ayllon's. We might ask whether Ss perceiving the rewarding aspect of the Sailor-Devil would also report the rewarded face of the Rufus-Clem (tactual) pair. The results are summarized in Table 23.

Insert Table 23 about here

It is evident that no such relationships were found. There was even a trend for Ss perceiving the rewarding aspect in the writer's procedure to report the non-rewarded aspect in Aylion's procedure. However, this was not statistically significant. The results are hardly better if only first response data are analysed. The same can be said for "face remembered most vividly" data. The only significant relationship was interest in winning quarters. This was asked in both sessions as parts of a questionnaire and the responses correlated .58 ($p < .01$) from one session to the next.

This lack of relationship from one performance to the other came as no surprise. Some of the Ss tested by Snyder and Snyder (53) were also tested by the writer in a visual ambiguous situation with monetary rewards associated with a particular aspect of the field. Comparison of S's scores on both tasks did not disclose that Ss hearing the rewarded voice in the Snyder situation tended to perceive the rewarded aspect in the writer's procedure.

Another case is the precursor to the present study. Here 22 Ss were tested in five equivocal visual situations, all with monetary rewards and of active autism variety. Unfortunately figural preferences were so overwhelming with three of the figures, that few meaningful trends could be discerned. Table 24 compares the results on the two (relatively) balanced figures: Ma-Louise (a previous version) and a man's face that could also be seen as a Chickadee. It can be seen that no consistency was found; Ss perceiving the rewarding aspect of one figure were as likely to perceive

Table 23

Performance of 20 Ss in Another Need-Perception Task

Total Responses

	Ayllon's Study		p
	Mean Number Rewarded Responses	Mean Number Non-Rewarded Responses	
Ss perceiving rewarding figure	7.67	6.37	N.S.
Ss perceiving punishing figure	9.22	4.78	

First Response

	Ayllon's Study		p
	Number Rewarded First Responses	Number Non-Rewarded First Responses	
Ss perceiving rewarding figure	5	6	N.S.
Ss perceiving punishing figure	5	4	

Figure Remembered Most Vividly

Ayllon's Study	N	Mean Vividness Rank of Rewarding Figure	p
Ss remembering rewarded face most vividly	12	1.83	N.S.
Ss remembering non-rewarded face most vividly	8	2.13	

the punishing aspect of the other as the rewarding.

Insert Table 24 about here

Finally we may introduce data secured when the 31 Ss tested in Experiment 3 (to be described shortly) were also tested in an almost identical procedure but with different figures (called "Vase-Twins" and "Julius Chickadee"). The results, summarized in Table 25, are quite clear. In brief, no consistency was found, either in the R-N or the P-N condition. These data leave no room for a "people who" interpretation of our results (i.e. speaking in terms of "autistic Ss" and "emphasis prone Ss"). We hope to devote more attention to this point in the Discussion.

Insert Table 25 about here

h. Comparison of Responses in Two Conditions

In an "active autism" design, where the ambiguous figure is presented during the reinforcement series, there is always the problem that Ss might report the winning figure simply because it is the winning figure, regardless of whether they see it or not. This would imply that the Ss were mercenary creatures, intent on reporting the winning and non-losing figures at all costs.

One method of determining the relevance of this stricture to our results, is to examine the P-N data of Ss who report the rewarding figure in the R-N condition. These Ss might be expected to be the more mercenary, and we should predict that they would report more non-losing (neutral) figures than losing figures in the P-N condition.

Table 24

Consistency in Performance in a Previous Study

	Ss Perceiving Rewarding Aspect of Ma-Louise	Ss Perceiving Punished Aspect of Ma-Louise
Perceived rewarded aspect in Julius-Chick figure	7	3
Perceived punished aspect in Julius-Chick figure	8	4

Table 25

Experiment Three Ss Tested with Other Figures
 (R-N Condition)

	Experiment Three Reported:	
	Rewarding figure	Neutral figure
Rewarding figure	3	10
Other task, reported:		
Neutral figure	9	9

(P-N Condition)

	Experiment Three Reported:	
	Punishing figure	Neutral figure
Punishing figure	8	8
Other task, reported:		
Neutral figure	8	3

Insert Table 26 about here

On the contrary, the results in Table 26 disclose that of the Ss who gave the rewarding response in the R-N condition, 61% reported the punishing figure in the P-N condition. Of those Ss who reported the neutral figure in the R-N condition, 53% reported the punishing figure in the P-N condition. These percentages do not support a view that many of our Ss were inclined to report the remunerative figure regardless of what they saw. We found Ss who gave winning responses in the R-N condition, giving more losing responses in the P-N condition than Ss who had given neutral responses in the R-N condition.

i. Ss changing their responses

Throughout the sessions it was noticed that some Ss lacked confidence in their initial percepts, especially if they had reported the rewarding figure. E received the impression, although he does not have the data to warrant such a conclusion, that in most cases where S had doubts as to whether the ambiguous figure was a rewarding, punishing, or neutral figure, these doubts were resolved in favor of the neutral or punishing alternative. Those cases in which S hesitatingly inquired of the identity of the ambiguous figure fortunately escape this category. Here E explicitly asks S "Which did you think it was?" or "Which did it look like?" and then concurred with whatever response S offered.

In examining the protocols of Ss who actually erased or altered their responses, we can determine whether the majority went from reward to punishment or neutral, or vice versa. It should be noted that the vast majority of conflict situations (where S was not certain of the

Table 26

Comparison of Subject's Performance in R-N Condition with his
Performance in P-N Condition

	Ss reporting <u>rewarding figure</u> in R-N condition	Ss reporting <u>neutral figure</u> in R-N condition
Ss reporting <u>punishing figure</u> in P-N condition	38	20
Ss reporting <u>neutral figure</u> in P-N condition	24	18

identity of the ambiguous figure) undoubtedly never reached the stage where one response was written, then changed to another. In most cases, S would resolve his doubts before writing his response.

From the few cases where S altered or erased his response, we find the following results: 11 Ss changed responses in the direction of a figure that would lose money (from rewarding to punishing, rewarding to neutral, neutral to punishing, etc.); 3 changed responses in the direction of winning figures; while 2 changed responses from one neutral figure to another. A Chi square test shows that this distribution would not be expected by chance ($P < .05$).

These data support the notion that S's initial percept is the rewarding figure but other factors come into play which vitiate the influence of his needs. To make these data somewhat more concrete, we may cite the comments of one S who, following trial 17, went back and erased his response to trial 13 (where he had previously written "Devil," the rewarding figure) and wrote "Sailor," the punishing figure. After the session when E inquired about his changing his response, he replied, "at first I thought it was the Devil, and then I thought back on it and then I felt it was the Sailor." It would appear that Justice Holmes' faith in the "sober second thought" is warranted, at least to the extent that we can generalize from these data. By this we mean that the second thought is influenced by a reality principle in contrast to a policy of utter subservience to needs.

j. Ss asking questions of identity

Related to the performance of Ss who actually changed their responses, there is the matter of the particular times when S would inquire of the

identity of the ambiguous figure. It was noted that some Ss would ask "Was that Ma?" or "It looked like the Sailor, but I'm not sure." These queries were examined to determine in which reinforcement condition they occurred (e.g. if Ma had been rewarding and Louise neutral, a question "Was that Louise?" would be said to arise in the R-N condition.) These results are presented in Table 27 along with the number of Ss that had been tested in each condition. On the basis of chance we would expect the number of questions concerning identity to be proportional to the number of Ss tested in each condition. The Chi square of 7.98 ($P < .05$) shows that this was not the case. Inspection of the table reveals that the differences are found largely in the N-N condition where proportionately the fewest questions were asked and the R-P condition where the greatest proportion of questions arose. Table 28 shows how the particular doubts were resolved after E asked S "Which did you think it was" or "Which did it look like." We see that in the R-N and the R-P condition the doubts were resolved in the direction of the rewarding face while in the P-N condition there is a slight trend to resolve doubt in the direction of the punishing face. These tables are interesting when compared with the previous data, where it was seen that Ss actually reaching the point of changing their responses on their own initiative tended to alter them in the direction of a losing figure. It would seem that the Ss who inquired of the identity from E rather than "working it through on their own" were reassured and supported by E's faith in their judgment (implied when E would ask them "which did it look like?" or "which did you think it was?") were less inclined to feel guilt-ridden about writing down the winning figure.

Insert Tables 27 and 28 about here

Table 27

Number of Ss Asking Questions of Identity in Each Condition

	R-N	P-N	R-P	N-N
Condition:				
Number of Ss asking questions of identity	18	17	14	2
Number of Ss tested in this condition	106	106	47	47

Table 28

Final Responses of Ss Asking Questions of Identity

	R-N	P-N	R-P	N-N
Condition:				
Rewarding responses	13	-	11	-
Punishing responses	-	10	3	-
Neutral responses	5	7	-	2

Chapter IV

Supplementary Experiments

A. Experiment Two

An adherent of an emphasis position such as Postman's might not feel his stand weakened by the present data if he were to maintain that the particular reward used was less of an emphaser than the particular punishment. In other words, to lose a quarter that wasn't yours in the first place is less of a punishment than winning a new quarter is a reward. S simply might not feel as involved with losing as with winning the quarters. The data from interview Items One and Two support this interpretation. Yet the fact of the matter is that almost all Ss were displeased to some degree when a losing figure appeared, and an emphasis position should predict a significant enhancement of the punished figure in the P-N condition on this basis.

To determine whether the punishing value of the losing figure might be enhanced if S were more involved when he lost, 11 additional Ss (all females, from the same subject population as the other Ss) were tested with modified instructions.

The game with the cups proceeded as usual. Afterwards, S was not told to put the money in her handbag. No mention of it was made during the preliminary instructions for the ambiguous figure game. When E reached the point where he would mention that there was a losing figure, he omitted the sentences "Let me say one thing. The purpose of this game is not to win back what you won before. What you have won is your money and I can't touch it. If you happen to come out minus in this game we'll

call it zero. You can't lose your money in this game." Instead, following the cup game, S was told "You can't lose more than the money you've won. However, try to win more, rather than lose what you have."

These last instructions considerably dampened S's enthusiasm for the game. E had the feeling that S interpreted the ambiguous figure game as merely a subterfuge whereby E would win back whatever money she had earned in the cup guessing. S appeared to give up hope of ever leaving the room with the fifty cents she had won.

A complete series of reinforcement schedules was used for the P-N condition. Originally E had intended to use 16 Ss, two with each of the schedules (S+L-, S+M-, etc.) but when the results from the first 11 disclosed no trends, it was decided to stop at that point. Pooling the results from all figures in the P-N condition, the data show 5 punishing responses to 6 neutral responses. This certainly does not support the idea that increasing S's involvement in losing will further enhance the punishing figure. Such a conclusion must be tempered by the responses to Interview Item Two, feeling when a losing figure appeared in the viewer. These answers disclose no marked increase in feelings of displeasure, despite the fact that S now had the possibility of losing "her own money."

B. Experiment Three

In research with human Ss, there are many who believe that the most potent reinforcing agents are praise and blame. These are usually considered to arouse ego-involving attitudes, related to the individual's self-concept, to his feelings of personal worth and self-esteem. With college students especially, aspersions on intelligence or mental

abilities should prove to be particularly effective. On this basis it was thought worthwhile to test some additional Ss with rather harsh negative comments associated with the losing figures. In Experiments 1 and 2, the positive and negative comments had been relatively balanced in terms of both number (three for each figure) and degree ("That's your winning figure" corresponding to "That's your losing figure," or "Good" corresponding to "That wasn't good"). In Experiment 3, E tested the hypothesis that the use of a greater number of negative than positive comments would produce a significant increase in the number of punished responses.

The Ss used in Experiment 3 were 30 female students enrolled in introductory psychology sections at the University of Kansas. The counter-balancing of reinforcement schedules applied in Experiments 1 and 2 was followed in Experiment 3 except that, to permit the use of a smaller sample, Sailor-Devil was used only in the R-N condition, while Ma-Louise was used only in the P-N condition. The Sailor-Devil figure was intended as a means of guaranteeing that there would be two neutral, one rewarding, and one punishing figure in the game. The raison d'etre for Experiment 3 relates to the analysis of the enhanced P-N condition, which in this case, involves only data from the Ma-Louise figure.

The procedure was identical with that of Experiment 1 except for the nature of the comments during the guessing. Specifically, the comments used in Experiment 3 were:

First appearance of losing figure: "that wasn't good at all" (in stern voice)
Second appearance of losing figure: "you're not very good at finding patterns"
Third appearance of losing figure: no comment
Fourth appearance of losing figure: "most people do better..."
Fifth appearance of losing figure: no comment

Ambiguous figure: no comment

First appearance of winning figure: "that's your winning figure"

Second appearance of winning figure: no comment

Third appearance of winning figure: no comment

Ambiguous figure: no comment

Most Ss were taken aback by E's negative comments. Ss would "laugh off" the statement "you're not very good at finding patterns" but after "most people do better..." there would usually be a period of silence.

The results from the P-N condition disclose 18 Ss reported the punishing figure while 12 reported the neutral figure. This difference, although in the expected direction, does not approach significance. The remainder of the data, presented in the Appendix, show few noteworthy trends except a further demonstration of the dominance of the Ma alternative (20 to 10) and the lack of effect in the R-N condition when the rewarding alternative is not emphasized by comments.

Chapter V

Discussion

A. Main Effects

The first point to be made concerns the confirmation or nonconfirmation of the several predictions outlined previously. It should be apparent that our hopes of finding one or the other approach, autism or emphasis, correct in all its predictions, was not fulfilled. This is not to say that neither or even both of the approaches cannot encompass the present results within their theoretical frameworks, only that the data do not unequivocally support either "model theory."

In one sense this is unfortunate. It would have been satisfying to have been able to state unhesitatingly that Theory A made predictions a and b while Theory C made predictions c and d and the results disclosed that the results were a and b. This could have been described in a straightforward and concise manner, without recourse to post-hoc rationalization.

Yet, sections of the present paper have alluded to "sources of variable error that did not bias the results in terms of the hypotheses investigated." Such items as the dominance of the Ma alternative and antipathy towards the Devil fall into this category. Probably a more important source is suggested by the data from Ss changing their responses to the ambiguous figure. We may only speculate on the number of Ss who first perceived the ambiguous card as a winning figure, but because of guilt feelings about winning, preferred to report the losing figure if they were at all unsure about its identity.

All these factors must be considered in evaluating the results. It might be added that their effect is largely that of increasing the likelihood of our committing a Type Two Error, i.e., speaking of "no effect" when an effect actually is present in the population. Unfortunately, the solution to this dilemma is not to accept lower levels of significance in the behavioral sciences. Anyone having worked with small samples is familiar with the tremendous variability of even successive random samples from the same finite population. The present study hoped to avoid some of these factors by employing a relatively large number of Ss in each condition. Nonetheless the reader can still legitimately inquire, e.g., whether the effect in the P-N condition would have been significant if we had doubled our sample. We hope to deal with this point later on.

The results from the R-N condition were significant and in the direction predicted by both approaches. It can be concluded that when one aspect of an equivocal figure is rewarding (one gains quarters, when he perceives it) and the other aspect is neutral, the rewarding aspect is more likely to be reported. There are several qualifications that must temper this conclusion. First, the aspects must be relatively "balanced" in terms of figural goodness, emotional loading, etc. In the Ma-Louise figure, for example, a greater proportion of Ss reported the figure as Ma in the R-N condition than reported the rewarding aspect.

Secondly, the "rewarding" nature of a figure derives from its context in a total situation of reinforcements, interpretations, and interpersonal relations. The results from Experiments II and III do not disclose a preponderance of rewarding responses and should indicate that S's involvement in the game procedure is of considerable importance in

determining whether or not a quarter will actually constitute a "reward."

The results from the P-N condition leave much to be desired. One point is clear: they were not statistically reliable with an N of over 100. It can be noted that E had not originally intended to test a sample as large as this. When 70 Ss had been tested, the data were analyzed and the results in this condition were found to be suggestive rather than significant. Hence it was thought proper to test 30 additional Ss to see whether the difference would either disappear or attain reliability. As matters turned out, neither of these possibilities occurred. The difference remained unreliable but intriguing. Yet an N of 100 did seem a logical place to stop if one did not want to devote his life to testing subjects in this condition. Nonetheless, the difference did seem large enough to warrant testing some additional Ss in what might be thought of as stronger reinforcement conditions. These culminated in Experiments II and III where, in the first case, S was faced with the possibility of losing the money she had previously won; and in the second case, where criticism was added to the monetary loss when a losing figure appeared. Neither change was successful in increasing the significance of the difference in the P-N condition.

We are compelled to conclude that the particular punishment used in the experiment did not produce a significant enhancement of the various associated perceptual alternatives. Because of time limitations it was impossible to sample the entire range of rewards and punishments. Experiments II and III were attempts in this direction. However, they were unsuccessful in increasing the punishments to the extent of producing a significant enhancement of the associated perceptual alternative.

The results are clear in demonstrating that in the particular P-N condition, S does not significantly perceive the non-punished (neutral) alternative. He does not "look away" from the unpleasant aspect in such a situation. This conclusion has value in its own right, whether or not there was a significant enhancement of the punishing figure. Our results (in the P-N condition) do not differ reliably from the hypothetical results that would indicate significant enhancement of the punishing figure. Yet they do differ significantly from the results that would be necessary to denote a significant enhancement of the neutral figure.

The results in the R-P condition are significant and at first glance support the predictions of the need-satisfaction theory. On the basis of the results from this condition, as well as those found in the Jackson (15) and Snyder and Snyder (53) experiments, it can be concluded that when a rewarding figure is paired with a punishing figure in an equivocal figure-ground situation, the rewarding aspect will more likely be perceived. This is quite a meaningful conclusion but one that must always be qualified in terms of the particular reinforcements used. Had our punishment been very strong and our reward very weak, we doubt whether these results would have been obtained. This point leads us to the explanation an adherent of the emphasis approach might use. It was mentioned previously that "emphasis" or "enhancement" are not all-or-none affairs. There are degrees of enhancement; a strong reinforcement will emphasize a stimulus more than will a weak reinforcement. Hence the intensity of the reinforcement is of great relevance. In the present study this dimension can be gauged from the relative effects of the reward and the punishment in the R-N and P-N conditions. That is, in Conditions 1 and 2, we

had found a significant enhancement resulting from the reward but not from the punishment. On the basis of only this knowledge an emphasis hypothesis would predict that, the reward being the greater emphaser of the two, the rewarding alternative would dominate in the R-P condition. To be even more precise, one would predict that the ratio of rewarding to punishing responses in the R-P condition should be equal of the proportion of rewarding to neutral responses in the R-N condition over the proportion of punishing to neutral responses in the P-N condition. This formula, and the way in which the results from Conditions 1, 2, and 3 fit the model, are shown below.

Ratio of rewarding to punishing responses in R-P condition

$$\frac{31}{16} = \frac{.65}{.58}$$

Proportion of rewarding to neutral responses in R-N condition
Proportion of punishing to neutral responses in P-N condition

It can be seen that the results in the R-P condition are in the direction predicted by the model although there is a large difference in the magnitude of the two ratios. Yet lest we become over-involved in the mechanics of a theory of functions, let it suffice to say that the above formula is chiefly or heuristic value and has no claims to empirical validation. Also, such formulae may serve to obscure some important theoretical considerations. The punishing value of a stimulus may be one intensity when paired with a neutral stimulus and another when paired with a rewarding stimulus (and, of course, a third intensity when paired with a more punishing stimulus). Or conversely, a reward may be more rewarding when paired with a punishing stimulus than with a neutral stimulus.

Considering the results from all three reinforcement conditions, our

results are consistent with an asymmetrical U-curve theory of pleasantness-unpleasantness. Many workers have used such a concept; Murphy's recent article (35) brings it into the area of perceptual learning. It has some of its roots in studies dealing with the recall of pleasant and unpleasant experiences. The curve shows that both pleasant and unpleasant experiences are recalled more frequently than neutral experiences, but pleasant predominate over unpleasant.

Our results fit this quite nicely. With positive reinforcement, we found a significant enhancement of the associated stimulus; with negative reinforcement we found enhancement, but not as marked as with the use of rewards. Our efforts to increase the severity of the unpleasantness were not successful. Examination of the relative influence of our rewards and punishments showed the greater efficacy of the rewards over the punishments.

Even more graphic support for this U-curve model comes from the tables showing the figure remembered most vividly. Here we saw a significant difference between the rewarding and the neutral figures, but only a slight difference between the punishing and the neutral figures.

B. Other Differences

It is our feeling that the data relating to the consistency of the effect from one performance to another are of the utmost importance for understanding the implications of the results in the various conditions. The consistency data were plentiful and consistent, gathered in at least four independent investigations. All disclosed a complete lack of any relationship between S's performance in one situation and his performance in another similar situation with similar reinforcements.

We prefer to be challenged by this result rather than discouraged. We feel that this tells us a great deal about the nature of the variables that we are dealing with. First, it definitely rules out a "people who" interpretation of the present data. This approach, speaking in terms of "people who are autistic" and "people who are non-autistic" was described previously. An adherent might posit that the 65% vs. 35% division in the R-N condition was a reflection of a population composed of 65% "autism prone Ss" and 35% "autism-negative Ss." This would certainly be a valid contention if the consistency data were not available. These tables reveal that Ss "autism prone" in one situation are equally likely to become "autism negative" in an almost identical situation. Hence, it is difficult to see how a characterological or trait approach can be used to explain the R-N, P-N, and R-P data. Logically, if one were to speak in terms of a personality typology, the typology should be of some predictive value in situations identical with those it is based on. If it has no predictive value in such cases; it adds nothing to the data to coin a special name for a specific behavior. It is more parsimonious simply to describe the performance and speak in terms of what Coutu (7) calls Tinsits (tendencies-in-situations) rather than general tendencies. Our results certainly do not support the notion of a general tendency of autistic perception that pervades all of the individual's activities. In fact our data would almost lead us to a view of statistical rather than individual prediction. On the basis of our results we are able to say that if 100 Ss are tested in a similar need-perception experiment, the odds are in favor of somewhere around 65% perceiving the rewarding alternative in an R-N condition. Our hope of predicting the performance of

any given individual would be rather low. The consistency tables indicate that knowing related performances is of little or no assistance. The only (albeit slight) suggestion of some covariation was the table comparing S's vividness rankings with his performance in the R-N condition. Yet, if Ss' performances in two R-N conditions are unrelated, the predictive value of the repressor-non-repressor typology cannot be overly high.

At this point it is necessary to cite the findings of at least two other investigators who have published data on this problem. Rock and Fleck (45), in their repetition of the Schafer-Murphy study, found no relationship between Ss' performance of the AB pair of faces and his performance on the CD pair. In fact, they felt they found a significant movement in the rewarded direction on one pair and a significant movement in the negative direction in the other pair. (However, they applied a Chi square test to the total number of responses in each direction which is statistically unjustifiable if one hopes to generalize to individuals. The responses of any one given individual are not independent of one another, especially in an experiment involving ambiguous figures.)

Jackson (15), in repeating the Schafer-Murphy study, did find a significant correlation between Ss' performance (reporting either the rewarded or the punished face) on the AB pair and his performance on the CD pair. Although the number of Ss tested was small, the reliability of his consistency finding is high. It should be added that Jackson also repeated the Rock and Fleck study (which had differed slightly from the original Schafer-Murphy study) but did not report any data relating to the consistency of S's performance.

In essence then, the problem of consistency of performance must await further clarification. Our data are rather conclusive that no such consistency is found when small monetary rewards are used with our particular ambiguous figures (or with Ayllon's tactful figures). This should not be taken to mean that we reject the view that there "are" autism-prone and punishment-prone Ss. It means only that we should not expect to find evidence of this in designs similar to the one we used. Very probably the answer is that our performances were peripheral to the S's ego, to his systems of personal and social values. We were dealing with unimportant or trivial reinforcing agents in rather esoteric stimulus situations. Coutu (8), in commenting on the Ayllon-Sommer study noted that "it was of the type that is, by design, as far removed from the behavioral fields of man's natural habitat as a bright investigator can make them." He also mentioned that "I have never once been in a situation or field even remotely comparable to that of your studies, and your subjects will never again be in such a field either." Although these comments relate primarily to the practical importance or predictive value of the study, they underscore the point that our situations may have been experienced as rather unusual and esoteric by our Ss. Under those circumstances, it is hardly surprising that our rewards were unable to arouse ego-attitudes. Even E's use of approbation as a negative reinforcement was ineffective. Had this been applied in a meaningful social situation which S would enter with ready-made social values, the results might have been quite different. To be criticized by a stranger in a dimly-lit room while looking into a wooden box at cartoon figures while one is given quarters, is probably experienced as more bizarre than unpleasant.

The essential point is not that such laboratory research is of little value, but a point that Sherif (50) had made repeatedly; if there is to be consistency in behavior, there must be ego-involvement. It is our feeling that our rewards were too trivial to arouse much ego involvement. Otherwise, we might have expected to find at least some relationship between S's rating of his interest in winning the quarters and his performance in the task. This paucity of relationships does have some important implications for us. First, it warns that it would not be fruitful to search for personality correlates of particular performances in our tasks. If the variable under consideration is so shy that, once seen, it makes no appearance ten minutes later in an almost identical situation, we can hope for few significant personality relationships. (It should be noted that this is in no sense antithetical to our belief in an approach favoring the use of only one response per stimulus figure. The performances involved in the consistency tables are independent of one another; i.e., reporting Rufus on the tactful faces is independent of reporting Sailor, etc. On the other hand, subsequent reports of perception of an ambiguous figure are overwhelmingly affected by the first report of perception.)

Secondly, this lack of consistency highlights the need for the use of more meaningful and important reinforcements. It would be surprising if no consistency in performance were found under these circumstances. On a heuristic note, the use of electric shock might not answer the call for a more meaningful reinforcement, but it certainly is capable of arousing many ego-attitudes. On a dynamic level one can think in terms of shock as a physical threat to the individual's person, as an intrusion

into his body, or as attributed to the sadistic impulses of the examiner. Tomkins (60) has described these experiential states graphically.

The lack of relationship between the interview items and Ss' performance is disappointing. We had hoped to demonstrate that S's motivation in the task is of primary importance in determining his percepts; i.e., Ss checking that they were "extremely interested" in winning quarters would perceive more winning figures than Ss who checked that they were only "slightly interested." No such relationships and even few trends or suggestions of trends could be discerned. Ss' self-ratings proved to be of no predictive value. It was E's impression that the same can be said for S's verbalizations or manifestations of involvement in the procedure. Many Ss whom he would have considered extremely motivated, from their spontaneous comments when a winning figure appeared in the tachistoscope, would report the losing figure during the ambiguous trial and also check "moderately pleased when a winning figure appeared in the viewer." It can be added that it would have been exceedingly difficult to rate the motivation of most Ss during the session. The original project outline had included provisions for such ratings, but after a few testing sessions with silent Ss, E found himself assigning the rating "moderately interested" whenever he felt unsure. Hence these ratings of motivation were abandoned early in the study.

This was also the course of action followed by Aylton when he used quarters as rewards. He found that it was inordinately difficult to gauge their importance to S, so he restricted himself to S's self-ratings which unfortunately were as of little predictive value as the ratings in the present study. Possibly these Ss were not sophisticated enough for

the interview items, or unwilling to admit that they were actually motivated to win the quarters. In any case, the tables summarizing the results from the interview items were included primarily to demonstrate that no relationships of any sort were obtained. Probably some of the items could have been improved. Wayne Holtzman, after the study was completed, suggested that Items I, 2, and 3 might better have been phrased in terms of how S felt when "Ma appeared in the viewer," or "Louise" rather than the definitely loaded items that inquired how S felt when "a winning figure appeared in the viewer." Especially in the cases of Ss who were negative towards the Devil despite its being a winning figure, the more specific question might have produced more accurate reflections of S's experience than simply using the general phrases "winning figure" and "losing figure." In the same way that no one would admit harboring a desire to shoot Santa Claus, no one should rate himself displeased when a winning figure appeared, or pleased when a losing figure was shown. Yet, because of our emotionally-toned figures, it is not at all unlikely that some Ss actually experienced these feelings.

In retrospect, our central problem was the investigation of the relative effects of three reinforcement conditions on the perception of certain ambiguous figures. Our results, which at first seemed to fit none of the approaches whose predictions we adumbrated, are most consistent with an asymmetrical U-curve theory of pleasantness-unpleasantness, which neither approach would have rejected. A paradox? Possibly, but it seems more a case of each approach being better suited for a particular range of data. Adherents of the autism approach would not deny the "stamping in" of traumatic events, nor can the emphasis workers deny the plethora

of studies demonstrating the superiority of rewards over punishments in terms of influencing learning, memory, etc. Postman (40) in his hypothesis theory speaks of the greater strength of hypotheses dealing with instrumental acts or events. Many years before this, Thorndike (57) had shown the superiority of giving money over taking it away in terms of influencing behavior. Our data then, should not displease too many people. Even those who hold that figure-ground perception is not influenced by reinforcements could claim that we were dealing with interpretation rather than perception. We are happy to leave them this alternative (aware that "interpretation of a stimulus" is our definition of perception).

Chapter VI

Summary and Conclusions

The present study was designed to assess the relative predictive value of two "model" theories in three reinforcement conditions. The first approach, bases its predictions mainly on the concept of autism, or in the movement of the cognitive processes in the direction of need-satisfaction. In "pure" form, it predicts perceptual enhancement of rewarded objects and de-emphasis of non-rewarded objects, or as some prefer to phrase it, movement of the perceptual processes toward pleasantness and away from unpleasantness.

The second approach, which has been termed the emphasis position, predicts the perceptual enhancement of items associated with any source of affect, regardless of whether the affect is positive or negative. Items associated with both pleasant and unpleasant stimuli will receive greater emphasis than items associated with neutral stimuli.

Utilizing two sets of visual ambiguous figures, each one permitting the immediate perception of only one of the two possible perceptual alternatives, the study was designed to investigate the aspects perceived when:

- a) One aspect is rewarding, the other neutral.
- b) One aspect is punishing, the other neutral.
- c) One aspect is rewarding, the other punishing.

Model autism theory would predict that in (a) the rewarding aspect will be perceived, in (b) the neutral, and in (c) the rewarding.

Emphasis theory would predict that in (a) the rewarding aspect will be perceived, in (b) the punishing, and in (c) approximately equal number

of responses to each alternative providing the relative strength of the positive and negative reinforcements are equal.

The study also hoped to return to the "traditional" concept of autism in that the ambiguous figures were presented during the reinforcement series. That is, they possessed objective reward and punishment value, rather than simply having been reinforced in the past. Hence the use of the terms "rewarding figure," "punishing figure" rather than the past tenses "rewarded figure," and "punished figure." Another methodological departure from most need-perception research was that S gave only one response to each ambiguous figure. Reasons for this were outlined in detail and were primarily matters of validity or relevance, e.g. the contamination of subsequent responses by the first response. Also the ambiguous figures were presented unexpectedly, when S was expecting the training (non-reversible) figures.

The reinforcements were quarters given and taken away in a somewhat ego-involving game situation. S was instructed to chose numbers in the hope of discovering the number on which a particular ambiguous figure (his winning figure) was placed. Also S understood that he was to try to avoid calling the number on which another ambiguous figure (his losing figure) was placed. A counterbalancing was employed so that each of the four ambiguous figures (two sets of two figures) was presented in every reinforcement condition with every other figure.

After the session, S was given a prepared interview covering his interest in winning the quarters, figure remembered most vividly, etc. There were 80 female and 72 male students tested (individually) in Experiment One. Some of these had also been used in other need-perception studies

so comparison data was available which permitted investigation of individual consistency in performance.

The principal results of the study were as follows:

When one aspect was rewarding and the other neutral, the rewarding aspect was significantly perceived.

When one aspect was punishing and the other neutral, there was a (non-significant) trend to perceive the punishing aspect.

When one aspect was rewarding and the other punishing, the rewarding aspect was significantly perceived.

These findings paralleled the results from the data secured when, after the session, Ss were asked "which figure do you remember most vividly...which next...which next...which next." The data disclosed that the rewarding aspect was remembered significantly more vividly than either the punishing or neutral aspects, but there was only a slight difference between the punishing and neutral aspects.

As the results in the punishing vs. neutral condition were suggestive but not significant, it was thought in order to test some additional Ss using stronger negative reinforcements. In Experiment Two, 11 additional Ss from the same general population were tested in the previous procedure but were told they might lose some of the money they had won in a "warm-up" procedure. The results showed no increase in the number of punishing responses. Later, in Experiment Three, 30 additional Ss from the same general population were tested adding approbation to the monetary loss when a losing figure was shown. The results again disclosed a trend towards emphasizing the punishing figure but it fell short of significance. The implications of these results for the two approaches were discussed in

detail. They seemed quite consistent with the view of an asymmetrical U-curve theory of pleasantness-unpleasantness, i.e. both pleasantness and unpleasantness can enhance stimuli, but with equal intensities of affect pleasantness will have the greater effect.

In terms of understanding both the nature of the above results and the particular performance involved, the data dealing with the consistency of the effect are quite relevant. In brief, no consistency was found when our data were compared with data secured in several investigations. This seems to infirm a "people who" interpretation of the present results, i.e. speaking in terms of "autism prone" and "autism negative" Ss. It also suggests that our reinforcements and stimulus situations were rather peripheral to S's ego-attitudes.

There were no significant relationships between perceptual performance and S's self-ratings of interest in winning, finding a system for the numbers, etc. There were no significant sex differences under any of the reinforcement conditions. However, female Ss reported significantly fewer Devil figures than male Ss.

When the data from Ss asking the identity of the ambiguous figure were analyzed, they disclosed proportionately fewest queries in the neutral vs. neutral condition and most in the reward vs. punishment condition.

When the data from Ss erasing or otherwise altering their responses to the ambiguous figure were examined, they showed that a significant proportion initially had written a more rewarding figure than the one they ultimately changed it to. This was taken to indicate the working of some form of reality-oriented process that compensated for S's desire to perceive in line with his wishes.

APPENDIX

Postscript

After the thesis had been written, the writer came across a paper by Rigby and Rigby¹ in which letters were associated with positive, negative, and neutral value (through use of a "dice game" in which the letters on the die were assigned +5, +2, 0, or -3 values). The authors were interested in the influence of these reinforcement conditions upon recognition thresholds of the letters. It was found that only the positive value exerted a significant effect (in lowering threshold) while the negative-value condition, although showing lower thresholds than the neutral-value condition, did not differ significantly from either the positive-value or neutral-value conditions. The authors concluded "The results indicate that positive reinforcement exerts an influence over and above that of frequency alone, but do not show that negative reinforcement has such an effect" (p.34).

Although the matrix of the study (thresholds), rewards (cognitive only), and type of set (passive autism) differ from those used in the present study, it is interesting to note that the results parallel ours. Positive value was found to produce a significant effect when compared with neutral value, while negative value produced a slight but insignificant effect when compared with neutral value.

¹Rigby, W. K. & Rigby, Marilyn K. Reinforcement and frequency as factors in tachistoscopic thresholds. Perceptual and Motor Skills, 1956, 6, 29-35.

Summary of Responses in Each Reinforcement Condition (Exp. I)

N	Rewarding figure	Punishing figure	Number of Ss reporting:			
	S	M	Sailor	Devil	Ma	Louise
9	S	M	6	3	6	3
24*	S	L	17	7	8	13
26*	D	M	8	18	15	9
9	D	L	5	4	5	4
9	M	S	4	5	6	3
11	L	S	5	6	8	3
9	M	D	4	5	7	2
9	L	D	3	6	4	5
12	S	D	7	5	8	4
12	D	S	4	8	7	4
11	M	L	4	7	10	1
12	L	M	6	6	6	6
—						
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*Contains data from both first and second group of Ss. Other conditions only contain data from second group of Ss.

Raw Data From Ss in Experiment Two

Figures Reinforced	Figures Reported	Responses to Vividness Items:		Responses to,* Questionnaire	
		Rank of Winning figure	Rank of Losing figure	Item 1	Item 2
S+ M-	D M	4	2	M	M
S+ L-	D L	1	2	V	M
D+ M-	D M	2	1	M	M
D+ L-	D M	1	3	M	S
M+ S-	D L	4	2	M	S
L+ S-	D L	1	2	M	S
M+ D-	S M	1	2	V	M
L+ D-	S M	2	4	M	N
S+ M-	S M	2	4	M	M
S+ L-	D M	4	3	M	V
D+ M-	M	4	1	V	S

*V - very, M - moderately, S - slightly, N - not at all (pleased or displeased).

Raw Data From Ss in Experiment Three

Figures Reinforced	Figures Reported	Responses to Vividness Items:		Responses to,* Questionnaire	
		Rank of Winning figure	Rank of Losing figure	Item 1	Item 2
D+ L-	S L	1	4	M	M
D+ M-	D M	2	1	S	S
S+ L-	D L	2	4	M	M
S+ L-	S M	2	4	M	M
S+ L-	D L	2	1	S	S
S+ L-	S M	4	3	S	S
D+ M-	D L	4	3	M	N
D+ M-	S L	1	4	M	M
D+ M-	D L	1	3	M	M
D+ M-	D M	1	2	M	S
S+ L-	S L	2	3	S	S
S+ L-	D L	1	3	S	M
S+ L-	D L	2	4	V	S
S+ L-	D M	2	3	M	M
S+ L-	D L	1	4	V	V
S+ L-	D M	1	2	V	V
D+ M-	S M	2	3	M	S
D+ M-	S M	1	2	S	M
D+ M-	D M	2	3	M	M
D+ M-	D M	2	1	E	E
S+ M-	D M	3	1	M	V
D+ L-	S M	1	3	V	M
D+ L-	S M	2	3	V	S
D+ L-	S M	1	3	S	N
S+ M-	D M	2	3	S	S
S+ M-	D M	2	1	V	M
S+ M-	D -	2	4	M	M
S+ M-	S M	1	2	M	S
D+ L-	D M	1	4	M	M
D+ L-	S M	1	2	V	S

*E - extremely, V - very, M - moderately, S - slightly, N - not at all
(pleased or displeased).

(Score Sheet for Game with the Cups)

Name _____

Q - Quarter
W - Washer

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

(Score Sheet for Ambiguous Figure Game)

M - Ma
S - Sailor
L - Louise
D - Devil

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.

(Interview Questionnaire)

Please circle the most appropriate answer to each question.

1. How did you feel when a winning figure appeared in the viewer?

Extremely Very Moderately Slightly No feeling
Pleased Pleased Pleased Pleased at all

2. How did you feel when a losing figure appeared in the viewer?

Extremely Very Moderately Slightly No feeling
Displeased Displeased Displeased Displeased at all

3. How did you feel when a figure that you neither won nor lost on appeared in the viewer?

Moderately Slightly No feeling Slightly Moderately
Displeased Displeased at all Pleased Pleased

4. How interested were you in winning the quarters in the game with the cards?

Extremely Very Moderately Slightly Not at all
Interested Interested Interested Interested Interested

5. How interested were you in trying to find a system for the numbers in the game with the cards?

Extremely Very Moderately Slightly Not at all
Interested Interested Interested Interested Interested

6. All in all, how strongly would you say you were trying to win in the game with the cards?

Extremely Very Moderately Slightly Not at all

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