NONRECIPROCITY AND THE THEORY OF COGNITIVE BALANCE

Dissertation for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY
RALPH E. COOPER

1973

ABSTRACT

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By

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In reviewing Heider's work on cognitive balance theory (1944, 1946, 1958, 1960), it was noted that Heider was working within the larger framework of Gestalt theory in proposing the balance model. An examination of the balance literature revealed several departures from this approach in the models proposed by Cartwright and Harary (1956) and by Newcomb (1968). The basic tenent of the original Heider theory appeared to be the notion of clusterability of the social-perceptual field.

Further examination of the literature indicated that one of the assumptions commonly made in the area of balance research, that of reciprocity in perceptions of interpersonal affect, was not as supported by other research literature as might have been surmised given its broad acceptance and use. Rather, the most cogent available evidence seems to indicate that reciprocity does not hold for perceptions of affect between the perceiver and a disliked other (Price, Harburg, and Newcomb, 1966).

Based on these two concepts, clusterability and the possible nonexistence of reciprocity in the one case, a revised model for cognitive balance was developed. This model involved two submodels for POX situations, one for reciprocal P/O relationships and one for nonreciprocity in negative P/O bonds. For the POQ situations, the existence of two possible loci for nonreciprocity led to the development of four submodels, one for each combination of reciprocity or nonreciprocity in negative P/O and P/Q relationships.

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Data were obtained from 120 subjects in each of two studies, one involving the POX situations and the other the POQ situations, in an examination of the reciprocity issue and a test of the proposed model in comparison with previously developed models. Subjects were asked to supply the names of same sex peers whom they liked and disliked, and for the POX study, two sides of an issue of their choice. They then inserted the appropriate initials in blanks on cards describing each situation and placed the cards in the appropriate rank order, according to their perceptions of the pleasantness and stability of the situations, with half of the subjects in each study doing the pleasantness ordering before the stability, and the other half using the reverse order. Finally, the subjects rated both their affect toward each of the individuals or sides of the issue they had supplied, and their perceptions of the others' affect toward themselves.

The data were analyzed to test three main hypotheses: I. That reciprocity does not hold for perceptions of affect from a disliked other; II. That the rank orderings of balance situations are functionally related to affect toward and from the persons and issues in the situations, particularly perceived affect from a disliked other; and III. That the cluster-reciprocity model is a better predictor than either of the two comparison models.

Support was obtained for Hypotheses I, in that a substantial number of subjects reported that a disliked other liked them, and affect from disliked others significantly exceeded affect toward disliked others. This result was interpreted as demonstrating the invalidity of

the assumption of reciprocity in the case of affective relations involving disliked individuals. Evidence relevant to Hypotheses II was interpreted as being equivocal, due to the small size and apparent inconsistencies in the correlations obtained, both between the affect measures and individual ranks and between the affect measures and the results of the unfolding procedure. Further research regarding both Hypotheses I and II was recommended.

Regarding Hypotheses III, it was observed that none of the three models accounted for more than twenty-five percent of the subjects' orderings on an individual basis, or more than one-fourth of the variability in those orderings when rank correlations were computed. Thus these results were interpreted as indicative of a general failure of models of this type to describe the psychological processes involved in evaluations of the traditional balance stimuli.

Additionally, some implications of the support observed for Hypothesis I were discussed, particularly with regard to the use of methods of research requiring an assumption of reciprocity, and the restrictions these results place upon researchers using such methods were outlined.

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

1973

ACKNOWLEDGMENTS

Most students who successfully pursue higher education owe a great deal to many sources of influence during the course of their lives. In my own, several stand out because they exceeded the normal expectations of their positions. Among these, a high school teacher, John Moore, conveyed the excitement of science and the enjoyment of teaching, providing the impetus to find a career requiring both. Two professors, Larry Messe and Jim Phillips, have been more than members of a student's committee, but have provided touchstones for the development of both academic and personal life-styles. Most credit must go to Bill Crano, who, by his willingness to work with and for his students, is a model for any advisor; he has been mentor, colleague and friend. Finally, a wife and two sets of parents deserve credit, for their expectations have ever been goals just at the edges of reach, goals without which this effort would not have been undertaken.

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INTRODUCTION

While in recent years much social psychological endeavor has focused on cognitive consistency theories (see, e.g., Abelson, Aronson, McGuire, Newcomb, Rosenberg, & Tannenbaum, 1968), relatively little attention has been devoted to Heider's principle of cognitive balance (Heider, 1946), the basic model from which these are, in essence, derived. Heider's primary interest as a cognitive psychologist was the perception and cognition of social objects and their interrelations (see Jordan, 1968). In an early paper with Simmel (Heider & Simmel, 1944), Heider reported the results of an experiment in which subjects watched two triangles and a disc move about a simply structured screen in an animated movie. When asked to describe what they had seen, almost all subjects analyzed the cartoon in terms of living beings and of events organized by the perceived motives of those beings. That this should lead to the connection of social perception with Gestalt principles is not surprising, nor is the drawing of that conclusion, expounded more fully by Heider in another paper that same year, unexpected (cf. Zajonc, 1968).

In this second paper, Heider (1944) proposed that social perception and cognition were influenced by configural forces in the same manner as the perception of physical stimuli, that social-perception "good-figures" and social-cognition pragnanz are tenable concepts (see

also Heider, 1960). In this paper, Heider discussed how this force toward simpler social perceptions arises and examined many examples drawn from diverse areas of human behavior. It is in this paper that Heider introduced the concept of the unit or unitizing relation--a tendency to see effect and cause, when these are social events, as being one social and psychological entity.

In his first formalization of the principle of cognitive balance, Heider (1946) set forth the conditions under which the configural or unit-forming forces would be in equilibrium, using only the valences of the relationships between people or between people and objects. In perceptions involving just two people (the self, P, and an other, O), Heider assumed that a positive relationship would tend to cause a unit to form, bonding the two "objects" into one cognition. Thus if both P/O and O/P[1] were positive, a stable cognition would result (much like two small objects close together on a large screen being perceived as a unit or group). If both P/O and O/P were negative, then there would be no unit-forming tendency--two separate objects would be perceived and this would be stable. Heider called these equilibrium states balance. However, if one relationship were positive and one negative, then the unit-forming tendency of the positive relation would be counteracted by a tendency to separate objects related by negatives. The resulting state of disequilibrium was called imbalance.

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[1]Throughout this paper, references to interpersonal affective relationships are to those existing in the perception of P, unless otherwise specified. This is consistent with the cognitive-perceptual basis of Heider's theory. Thus O/P indicates P's perception of O's affect toward P.

Heider similarly specified conditions for the situations involving three people (P, O, and Q) or two people and an object (POX). In discussing these situations, Heider assumed that each dyadic relationship was balanced. From Heider's Gestalt viewpoint, this assumption of balanced dyads, or reciprocity,[2] seems only logical: To talk of a "good-figure" when parts of it are inconsistent requires some special consideration. Thus Heider discussed the POX and POQ situations as if there were only one relationship between each pair of social objects and considered three different situations as balanced or in equilibrium. If all relations were positive, then the unit-forming forces would be in harmony if the three objects were treated as a group or a unit. (The perceptual equivalent is three small, fairly close objects on a large field.) If two relations were negative and one positive, then the two objects linked by a positive bond could be treated as a single entity in relation to the other. (Two objects close together and another one farther apart is the perceptual analog.) Finally, in contrast to later extensions (e.g., Cartwright & Harary, 1956), if all three relations were negative, the treatment of the three objects as separate entities seemed consistent with the other situations. However, in keeping with his Gestalt orientation, Heider noted, ". . . the case with three negative relations does not seem to constitute good psychological balance, since it is too indetermined (Heider, 1946, p. 110)." Rather than finding forces against balance, Heider noted that three psychologically dispersed elements lacked forces toward balance. (The argument on the three negative situations--that it is neither balanced, because it lacks

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[2]The reader is referred to footnote 1.

unitizing forces, nor imbalanced, because there is no conflict between unitizing and separating forces--is of special importance in this paper. That the argument of indeterminism could as well be applied to the negative-negative dyad seems to have escaped Heider and other balance theoriests as well. It should be noted that there is no cognitive or perceptual reduction in considering two objects as two objects or three objects as three objects.)

A similar type of analysis can be applied to the remaining triadic situation as well. With one negative and two positive relations, the force to unite objects with a positive bond contradicts the tendency to keep apart those with a negative relationship. If, for example, P/O and O/Q are positive, and P/Q is negative, there would be a tendency to treat P and O as an entity; this entity then has a conflicting relationship to Q, being in the one case positive and in the other, negative. There is no means by which the situation can come to perceptual equilibrium without changing at least one relationship.

Heider's model is notable for its essential conceptual simplicity. By knowing the signs of the relationships in a situation, we can classify it as balanced or imbalanced. Heider considered imbalance to lead to a lack of stability in the perceived relations or to tension: "If no balanced state exists, then forces towards this state will arise. Either the dynamic characters (attitudes or affective relations) will change, or the unit relations will be changed through action or cognitive reorganization. If a change is not possible, the state of imbalance will produce tension (1946, pp. 107-108)." Heider's emphasis is again upon the individual's perceptions and cognitions and not with the objective reality of interpersonal relations.

In several senses, the prototype for research testing the balance principle has been Jordan's dissertation (reported in Jordan, 1953). Though a student of Heider's, Jordan introduced two modifications which have been rarely challenged in the psychology literature. First, Jordan placed the three-negative triad definitely within the category of im-balance, even though Heider himself still had reservations about this case (see Heider, 1958, pp. 202-203, 206). This modification, however, permitted Cartwright and Harary (1956) to formalize balance in terms of a product rule--that a dyad or triad is balanced if the product of the signs of the relations is positive and imbalanced if it is negative. Second, Jordan operationalized balance and imbalance as the perceived pleasantness or unpleasantness of the situation. That almost all balance research has accepted this definition is historically understandable--psychologists, accustomed to thinking in terms of needs and the tensions produced by their unfulfillment, would be more comfortable with measures of tension or unpleasantness than with measures of the changeability or stability of relationships. The strength of this effect can be found in the emphasis that most reviews of the balance literature place on tension (see, e.g., Zajonc, 1968; Phillips, 1971; Taylor, 1970). As noted above, Heider believed that a change in a relationship, either through action or cognitive distortion, would be the primary effect of imbalance, with tension resulting only if change were not possible. The concept of unpleasantness is thus at least two transformations (change to tension, tension to unpleasantness) removed from the primary result of imbalance postulated by Heider. This choice of operationalization may have played a key role in the conflicting results obtained in much balance research.

In addition to these two modifications, Jordan's research raises

several other problems for balance theory, some of which are directly attributable to his methodology. Jordan raises subjects with situations like: "I dislike O; I like X; O has no sort of bond or relationship with X (Jordan, 1953, p. 271)." Subjects rated each situation in terms of pleasantness or unpleasantness they experienced by placing a mark on a line with end-points "best" and "worst" and a mid-point of "neutral." Jordan reported that his data did not seem to fit the balance model in two cases--when P was in a disliking relationship to O in otherwise balanced triads, and when there was a negative "unit" (as opposed to affective) relationship in the triad. The first of these is central to this thesis and will be discussed more fully in another context. The second has been a considerable problem for balance theorists in that Jordan found a qualitative difference between affective and other unit relations. This problem may be considered as a functional difference between the compliment and the opposite: Whereas "dislike" is the opposite of "like," "did not cause" is the compliment, not the opposite, of "caused." In this instance the effective opposite of "caused"--and the functional equivalent of "dislikes"--would be "prevented" (see Cartwright & Harary, 1956, and Harari, 1967, for discussions of this problem). Most balance researchers have concentrated on situations involving only affective relations and positive "unit" relations and effectively have thus avoided this controversy (see, e.g., Rodrigues, 1968). The solution, however, seems to lie in recognition of the logic of opposites and with the suggestion that affective relations are, in effect, only one class of unitizing relations (Jordan, 1968).

Thus Jordan's dissertation began a trend away from Heider's more systematic theoretical base, toward a conception of balance as simply a

model for predicting interpersonal relations and attitudes. The concern over issues raised by this research, together with the mathematical sophistication of the work of Cartwright and Harary (1956) led research and theory away from a deeper consideration of Heider's basic propositions. The research since 1953 has been progressively less directly related to Heider's theoretical orientation and more oriented to issues such as the abstractness of the stimuli, to positivity (e.g., Zajonc & Burnstein, 1965), agreement (Rodrigues, 1968), and quantification (Weist, 1965). Recently, some research has concerned itself with correcting some of Jordan's diversions, most notably the issue of the appropriate measurement variable for balance (Crano & Cooper, 1973; Gutman & Knox, 1972). The purpose of the present paper is to return to an examination of the original premises on which Heider's model is based, to examine certain critical assumptions made by Heider (and since then generally accepted), and to attempt an extension of the model with the goal of a more accurate prediction of the order of the triadic situations.

A Problem

Several writers, most notably Newcomb (1968), have noticed in balance research certain regularities within the two states in the Cartwright and Harary extension of Heider's theory and several instances of results contradicting this model. On the basis of some of these and the results of the Price, Harburg and Newcomb (1966) study, Newcomb proposed a three state model as a function of the sign of the P/O bond. Newcomb reasoned that when P/O is negative, P has difficulty in interpreting what the O/Q bond means, and it is likely that P will not care what O thinks if he is disliked. Thus Newcomb suggested that when P/O

is negative, the person is not engaged or involved in the situation and so is not concerned with balance. On the other hand, when P/O is positive, the individual, in Newcomb's model, is engaged by the stiuation and thus balance forces operate. The result is a three-state model of positive balance, non-balance, and positive imbalance, with the middle level consisting of all situations with a negative P/O bond. In reviewing the relevant data, Newcomb found evidence to support his model relative to the Cartwright and Harary two-state classification.

Crano and Cooper (1973) have tested this extension by means of a methodology which permitted a simultaneous check on the scaling properties of the dependent variables employed. They report that their data for stability evaluations tend to support the Newcomb extension, but that the pleasantness results were not scalable.[3] Yet Crano and Cooper note regularities in their data that are not accounted for by the Newcomb extension, some of which parallel results reported by studies using the disputed pleasantness variable. Table 1 shows the results of the Crano and Cooper research on both POO and POX situations. It can be seen, for

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[3]This result seems consistent with comments above regarding Jordan's research (1953). Crano and Cooper suggest that the nonscalability of pleasantness evaluations, consistent over three independent sets of subjects, may account for some of the inconsistencies in the literature, for example, the relatively different ratings of some situations in the Price, Harburg, and Newcomb (1966) paper and Jordan's original results. This non-scalability seems to arise from intransitivity in the use of pleasantness as a judgemental variable, indicating that, even within a single subject, pleasantness is not a consistently defined dimension.

Table 1

Stability Scale Values from the
Crano and Cooper Study (1973)

P/O	P/Q	O/Q		Study 1 (POQ)			Study 2 (POX)			Study 3 (POQ)		
P/O	P/X	O/X		males	females	all Ss	males	females	all Ss	males	females	all Ss
+	+	+	(A)	1.41(1)	1.14(1)	1.25(1)	1.08(1)	1.31(1)	1.14(1)	1.28(1)	1.17(1)	1.21(1)
+	-	-	(B)	1.21(2)	.88(2)	1.02(2)	.80(2)	1.25(2)	.98(2)	.90(2)	.90(2)	.89(2)
-	-	+	(C)	.83(3)	.68(3)	.74(3)	.57(3)	.52(6)	.51(5)	.66(4)	.73(4)	.67(4)
-	+	-	(D)	.68(4)	.60(5)	.63(4)	.54(4)	.57(5)	.52(4)	.63(5)	.62(5)	.62(5)
-	-	-	(E)	.58(5)	.66(4)	.61(5)	.46(5)	.68(3)	.53(3)	.71(3)	.75(3)	.72(3)
-	+	+	(F)	.42(6)	.48(6)	.44(6)	.30(6)	.64(4)	.43(6)	.38(6)	.61(6)	.49(6)
+	-	+	(G)	.19(7)	.26(7)	.21(7)	.04(7)	.00(8)	.00(8)	.24(7)	.40(7)	.32(7)
+	+	-	(H)	.00(8)	.00(8)	.00(8)	.00(8)	.13(7)	.03(7)	.00(8)	.00(8)	.00(8)

instance, that situation A is always rated above situation B, both of which fall in the same class in both the Newcomb and the Cartwright and Harary models. Similarly, situation E is always rated above F, both of which are nonbalanced according to Newcomb and imbalanced by the Jordan and Cartwright and Harary modifications of Heider's model. It thus appears that more could be accounted for in these data than either model attempts.

There are several possible approaches to this problem indicated by previous balance research. For example, several studies have cited positivity, a preference for positive relations, as a possible alternative or contributory phenomenon (e.g., Burnstein, 1967; Rodrigues, 1967; Whitney, 1971; Zajonc & Burnstein, 1965). Yet this explanation cannot account for both the AB and the EF differences, since in the first case the stable situation has more positive relations while in the other, it has more negatives. Agreement between individuals has been suggested by several sources in a similar fashion (e.g., Rodrigues, 1968; Taylor, 1968; Whitney, 1971; Zajonc & Sherman, 1967). Again agreement cannot account for the differences in the situations cited--both the AB and EF pairs display equal agreement. Thus the problem of these consistencies is not solved by the application of either of these more traditional approaches.

Reciprocity

One of the key assumptions of balance theory, at least implicit in Heider's work, is the necessity of dyadic balance or reciprocity for a discussion of triadic balance. Cartwright and Harary (1956) noted that most balance research had assumed reciprocity and indicated that if

reciprocity does not hold, balance, by their definition, is not possible. However, this discussion, both by Heider and by Cartwright and Harary, concerned a two state classification of situations. Since several other psychologists (especially Newcomb, 1968) have indicated an interest in the development of classification systems having more than two levels, it may be useful to consider the possible role of dyadic non-reciprocity in the degree of imbalance of perceived social situations.

The importance of the reciprocity assumption in balance theory and research can be seen in several reviews of the literature. For example, both Taylor (1970) and Phillips (1971) have based major portions of their treatises on the assumption that reciprocity has been experimentally verified. Yet a reexamination of the data cited by these authors and by others indicates that the literature is not entirely consistent, and that degree of reciprocity varies as a function of several rather critical differences in the situations in which it is observed. Although not directly applicable to the issue of perceived reciprocity, sociometric studies which show evidence of objective reciprocity much higher than chance expectation (e.g., Kogan & Tagiuri, 1958) may be an explanation for assumed reciprocity. Yet there is some evidence that even objective reciprocity does not exceed chance levels (e.g., Tagiuri, Blake, & Bruner, 1953). For example, data in a table in Davol's (1959) report of a sociometric study of permanent VA hospital residents indicate that 44 percent (136 of 301 cases in the table) of the relationships were <u>not</u> reciprocal.

In Heider's formulation, it is the perceptions of an individual that are important, and it is his cognitions that are or are not balanced. Thus data on the subjective probability of reciprocity are important.

DeSoto and Kuethe (1958, 1959) asked subjects to estimate the probabilities of various relationships between hypothetical individuals on a scale which they then converted to numerical probabilities. Subjects asked to estimate "Ernie likes Len. Does Len like Ernie?" gave an average estimate of .74 (DeSoto & Kuethe, 1959, Tables 1 and 2). However, the probability of direct liking, "Does Les like Al?" was .59; the difference of 15 probability points may indicate a perception of reciprocity between two other individuals. Another interesting result of the DeSoto and Kuethe study, more important for the present paper, is that the negative relations "dislike" and "hate" were considered less likely to be reciprocated than was positive affect. Thus it seems that the subjective expectation of reciprocity differs for positive and negative relationships.

The most critical aspect of reciprocity in the present case involves the perception of P about relationships between the self and another, rather than two others. Very little evidence is available in this regard. Backman and Secord (1959) found that subjects induced to believe that they were liked or disliked (O/P) tended to reciprocate by evaluating the other as more or less attractive (P/O): thus O/P tends to induce reciprocal P/O. Blumberg (1969) reported studies of the "comfort" of various combinations of emitted liking and perceived received liking. In his first study, for example, all possible combinations of four levels of each relationship were examined. Contrary to Blumberg's textual statement regarding his results, his Table 1 (p. 123) indicates little preference between symmetrical situations and asymmetrical liking situations in which the received liking exceeded emitted liking. Further, for disliking, the only level of emitted affect where

the means support his hypothesis of a preference for symmetry, Blumberg notes evidence of a variability sufficiently large so as to render these differences statistically significant. In fact, Blumberg's data reveal that in situations of emitted disliking, at least 22 of his 52 subjects either preferred to be strongly liked, or expressed no preference. Even so these results fail to address successfully the issue of the existence of reciprocity or non-reciprocity of interpersonal relationships.

More directly applicable to this issue is the report by Price, Harburg, and Newcomb (1966) who found that 98 percent of their subjects reported that a specific liked other also liked them, and only 2 percent were unsure. At the same time, however, only 27 percent reported the reciprocation of negative affect, 47 percent were unsure, and 26 percent assumed that someone they strongly disliked would like them (pp. 267-268). This last result is, in fact, not inconsistent with that expected from an esteem orientation; it seems quite reasonable that an individual would prefer--and thus perceive--that others would evaluate him more highly than he did them, especially when the latter was negative. This does not mean that the P/O to O/P correlation is not high (more than 60 percent of the total number of relationships in the Price, Harburg & Newcomb study were reciprocal), but rather that the relationship is far from perfect. The foregoing results would also be consistent with the experience one might have, given the accepted modes of behavior in our society. It is quite proper to express openly a positive affective relationship, especially by attempting to increase interaction with the liked other--which would also seem to increase the probability of knowledge of the other's feelings. On the other hand, people are expected to limit even behavioral expressions of dislike in the presence of the

recipient; in fact, the modal effect of such dislike is a relatively covert avoidance of the other. Since both parties in a mutual disliking relationship may act civil and even friendly in each other's presence, both may assume that their negative opinion of the other is not reciprocated.

It thus seems relatively safe to conclude on the basis of this review that reciprocity is generally true: 1) for perceptions of relationships between others (DeSoto & Kuethe, 1959), 2) for relationships involving positive affect from the self to the other (Price, Harburg, & Newcomb, 1966) and 3) perhaps for new acquaintances in which the person knows the other-to-self relation (Backman & Secord, 1959). Reciprocity does not appear to be a safe assumption in situations of negative self-to-other affect (Price, Harburg, & Newcomb, 1966; Blumberg, 1969), and these are a critical segment of situations in triadic balance research.

The possibility of non-reciprocal interpersonal relationships opens the way for consideration of another traditional approach by which these regularities might be explained. This possibility involves assuming a lack of reciprocity in negative interpersonal relationships involving P and applying a semi-cycle analysis similar to that developed by Cartwright and Harary (1956) or Morissette (1955). Since this task becomes rather complicated for POQ situations, only the POX situations will be analyzed in this fashion. When O/P is considered independent of P/O, there are three possible semi-cycles: P/O, P/X, O/X; O/P, P/X, O/X; P/O, O/P. Table 2 presents the sign product for each of these semicycles. Some might wish to infer that cycles containing direct, specified relationships should receive a greater weight than those with an indirect or implied bond; the last column in the table indicates the results of such

Table 2

Application of Semi-Cycle Analysis to All Positive O/P Relationships

P/O	P/X	O/X	O/P		Sign of POX	Sign of OPX	Sign of POP	Average of 3-Cycles	Average of All Cycles	Weighted Average[1] of 3 Cycles
+	+	+	+	(A)	+	+	+	+1.00	+1.00	a ($\approx$+1)
+	-	-	+	(B)	+	+	+	+1.00	+1.00	a ($\approx$+1)
-	-	+	+	(C)	+	-	-	0.00	-0.33	b ($>$ 0)
-	+	-	+	(D)	+	-	-	0.00	-0.33	b ($>$ 0)
-	-	-	+	(E)	-	+	-	0.00	-0.33	c ($<$ 0)
-	+	+	+	(F)	-	+	-	0.00	-0.33	c ($<$ 0)
+	-	+	+	(G)	-	-	+	-1.00	-0.33	d ($\approx$-1)
+	+	-	+	(H)	-	-	+	-1.00	-0.33	d ($\approx$-1)

[1]Weighted as p(POX)+q(OPX) where p+q=1 and p $>$ .5)

a procedure on the 3-cycles with situations not differentiated by this method designated by the same lower case letter. It can easily be seen from Table 2 that a Cartwright and Harary type semi-cycle analysis does not discriminate among the critical pairs of situations differently than do the Newcomb or the Cartwright and Harary models. Thus we are confronted with differences which none of the previous approaches to balance seem to be able to explain in a consistent fashion.

A Solution

The solution to this problem would seem to lie in reconsidering the assumption of dyadic reciprocity together with a return to some possible principle derivable from the Gestalt framework within which Heider was working. Gestalt theory, as expounded by Heider (see especially, 1960), includes as a motivational construct a tendency toward representing any cognitive structure in the simplest possible form, by application of Gestalt principles. Heider's "unit-formation" principle can be expanded into a model which expresses this simplicity concept and makes more detailed predictions regarding the order of triadic situations.

Heiders "unit" concept is, in this respect, very similar to the notion of clusters and clustering as put forth by Davis (1967). To Heider, a unit is two objects which are positively related and which are similarly related to (or coact with regard to) other objects in the environment. This is precisely the definition of a cluster given by Davis, except that Davis included more than two objects in a cluster. Heider's concept of imbalance is the inability to form a unit because of a failure of two positively related objects to coact with regard to

another object, a principle which defines the conditions under which clustering is not possible.

Thus a model which offers to make a distinction between those situations which are clusterable and those which are not, and distinguishes among clusterable situations by the number of clusters, seems very close to the basic foundation of the Heider theory. It is this model, together with the added consideration of non-reciprocity, that is proposed as an alternative to those heretofore expounded.

The left side of Table 3 presents the proposed model for situations in which the O/P bond is always the same as the P/O bond (thus only the P/O, P/X, and O/X bonds are considered). It may be seen that this model is highly correlated with Heider's original model, but also more definitive in its predictions.

For situations where the O/P bond is positive irrespective of the P/O bond (the result of reciprocity except when P/O is negative), the model becomes somewhat more complex, and the situations must be considered as the hybridization of two distinct parts in order to apply the model. P is, in the first of these, the self as actor or emitter and in the second, the self as receiver of affect; his response is a hybrid of these two situations. The right side of Table 3 presents the results of this process with "P/O Clusters" referring to P as emitter and "O/P Clusters" to P as receiver. The resulting rank order is primarily by clusterability with more clusterable situations ranked ahead of the less clusterable, and within a level of clusterability, by the number of clusters.

Table 3

Reciprocal and All Positive O/P in Cluster Analysis

of POX Situations

Situation	O/P Reciprocal		O/P Positive			Composite
	Cluster	Rank	P/O Clusters	O/P Clusters	Rank	Rank
A (+++)	1	1	1	1	1	1
B (+--)	2	3	2	2	2	2
C (--+)	2	3	2	*	5.5	4.5
D (-+-)	2	3	2	*	5.5	4.5
E (---)	3	5	3	2	3	3
F (-++)	*	7	*	1	4	6
G (+-+)	*	7	*	*	7.5	7.5
H (++-)	*	7	*	*	7.5	7.5

*Designates situations where clustering is not possible

If the rank orders in Table 3 are compared with Study II in Table 1, it can be seen that the order for reciprocal O/P parallels the data for male subjects and that the order for all positive O/P follows the data for female subjects. A hypothesis could be that these two populations differed to some extent on the reciprocity issue, thus producing the differences in results. The last column in Table 3 represents a ranking of results which might be expected if a population consisted of equal numbers of subjects fitting each of the two conditions of O/P affect; comparison with the results for all subjects in Study II of Table 1 shows a strong correspondence.

A similar type of analysis can be performed for the three person situation (POQ), but the task is complicated somewhat in that either the O/P or the Q/P relationship might not be reciprocal. In the case where both of these relationships are reciprocal, the left side of Table 3 is still appropriate. Similarly, if O/P is positive and Q/P is reciprocal, then the right side of Table 3 applies. Table 4 presents this analysis for the other two cases. On the left side of the table, for Q/P positive and O/P reciprocal, only the non-reciprocal relationship is considered and the analysis proceeds in a fashion similar to that presented in Table 3. The right side of the table presents the four combinations relevant for the remaining case in which both O/P and Q/P are positive.

Comparing this model to the data in Table 1 is difficult and, at best, an academic exercise. Given the four orders and the three degrees of freedom available for estimating the proportions of a group that would fit each order, there are many orders which could be predicted for a group of subjects. Thus, new data, including measures of the relevant affect variables, are required to obtain any sense of the possible

Table 4

Cluster Analysis of POQ Situations Involving

All Positive Q/P[1]

Situation	Q/P Positive and O/P Recirpocal			Both Q/P and O/P Positive				
	P/Q Clusters	O/P Clusters	Rank	P/O, P/Q Clusters	P/O, Q/P Clusters	O/P, P/Q Clusters	O/P, Q/P Clusters	Rank
A (+++)	1	1	1	1	1	1	1	1
B (+--)	2	*	5.5	2	*	2	1	2
C (--+)	2	*	5.5	2	*	*	1	6
D (-+-)	2	2	2	2	2	*	*	7
E (---)	3	2	3	3	2	2	*	3
F (-++)	*	*	7.5	*	*	1	1	4.5
G (+-+)	*	1	4	*	1	*	1	4.5
H (++-)	*	*	7.5	*	*	*	*	8

[1]See Table 3 for POQ situations involving reciprocal Q/P

*Disignates situations where clustering is not possible

validity of this model. Thus the major objective of the research to be described below is the collection of data appropriate for testing this model, both as it applies to POX situations and to POQ situations.

Hypotheses

In the research to be described below the following hypotheses were tested:

I. a) A substantial number of subjects will report that a disliked other likes them.

b) Additionally, on the average, other-to-self affect from disliked others will exceed self-to-other affect.

c) The relationship between other-to-self affect and self-to-other affect will be stronger for liked others than for disliked others.

d) Further, the variance for disliked other-to-self will exceed that for self-to-disliked other or liked-other-to-self, indicative of smaller confidence about these relations on the part of subjects.

II. The rank orders of triadic situations will differ as a function of O/P from disliked O's for POX situations and as a function of both O/P and Q/P for POQ situations.

III. Comparisons of the proposed model with the Cartwright and Harary, and the Newcomb extensions of Heider's model will favor the model proposed above and outlined in Tables 3 and 4.

METHODS

Study I

Overview. Study I consisted of ranking by subjects of two sets of the eight possible POX situations. The same X (an issue chosen by the subject) was used in both sets but the O's were different. Data were collected between February 21 and March 8, 1973.

Subjects. The subjects were undergraduate students in introductory psychology classes at Michigan State University who received credit for experimental participation. Subjects were recruited by the experimenter who stood at a table near the doorway of the classroom before and after class; sign up sheets were placed on the table. Each sign up sheet had spaces for 11 persons to sign up, six designated for males and five for females. The experimenter attempted to answer any questions that the potential subjects asked as to location (Psychology Research Building or Baker Hall), duration (one hour or less), or task ("you would be evaluating situations involving yourself and people you know."). Approximately 90 percent of the subjects who signed up actually appeared at the experiment; the sign up and show up percentages were somewhat larger for females than for males as expected from previous experience.

Approximately 160 subjects actually participated in the experiment, of whom 3 had to be eliminated for failure to follow instructions. Of the remainder, data from the last 60 of each sex were retained for analysis; this choice was based on some minor changes in procedure following the first two sessions.

Instruments. The instruments and procedure consisted of several parts, with the major part being repeated, once for pleasantness and once for stability evaluations with the order counterbalanced between subjects.

First the subjects were given a sheet entitled "Groups Experiment"; the sheet began by explaining in general terms that the experiment concerned the stability and pleasantness of triadic situations. Then the definitions of stability and pleasantness were given: "STABLE--A stable situation is one where the feelings of the members of the group are very likely to stay the same. An unstable situation is one where some sort of change seems likely to occur in the feelings of some members of the group." "PLEASANT--A pleasant situation is an enjoyable one, one in which you would feel comfortable. An unpleasant situation is one where you would feel uptight and uncomfortable."

Next the subjects were asked to provide the initials of two same sex peers whom they liked very much (A & B). Verbally, subjects were told that these should be people who would recognize the subject should they hear his name or see a picture of him. Next the subject was asked to provide the initials of two same sex peers whom they disliked very much (D & E). Several subjects expressed some difficulty with this task at first, but with encouragement, every subject appeared to be able to provide initials for two such people. The subject was then asked to think of an issue about which he felt very strongly and to write the name of the issue on the instruction sheet. Then the subject was asked to supply an acronym for the side of the issue which he favored (C) and another acronym for an opposing viewpoint (F). Finally, the subject was instructed to fill in any blanks he encountered in the experiment with

the matching set of initials. A copy of this instruction sheet is included as Appendix A.

For the major task of the experiment, the subject was given two packs of eight 5 by 8 inch cards, representing the two sets of POX situations. On each card was printed, on three double spaced lines, the relationships specifying one of the situations, with blanks for the initials of the appropriate individuals or the issue acronym. In addition, there was printed in the upper right hand corner of each card a code consisting of one letter and two digits, chosen so as to make the code difficult to break or to associate with any of the variables in the study.[4] On the back of the card was printed a scale consisting of the numbers from 1 to 15 printed under spaces separated by colons. At the ends of the scale were the words identifying the choice variable, either "stable" and "unstable" or "pleasant" and "unpleasant." A copy of both sides of one of these cards is included as Appendix B.

The subjects were verbally instructed to fill in the initials on the cards corresponding with the letters in the blanks, and then to rate each situation by placing a mark on the scale on the back of the cards. It was explained that the scale was merely to help them get started with the complex task of ranking the eight situations in each of the two packs, but that the more accurate the ratings the easier the ranking task would be; the subjects were encouraged to check their ratings a second time and to make any changes they felt necessary to be accurate.

Next the experimenter or an assistant helped each subject put

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[4]Only one subject out of all 335 in both studies succeeded in breaking the code; it is not known how many attempted.

each pack into the order implied by the ratings. The subjects were then told that they should now ignore the ratings on the back of the cards and to compare each card with the next to be sure that the situation was more stable (or pleasant) than the next one, and to rearrange them so that this would be true if it were not. Once a subject indicated that he believed the cards were in the proper rank order he was asked to check pairwise again "just to be sure." Next the subject was asked to integrate his two packs of cards by selecting from the top cards of each pack the more stable (or pleasant) situation, and to continue until all cards were exhausted, thus producing one deck with the situations in order from the most stable (pleasant) to least stable (unpleasant).

During this last task, an "ANSWER SHEET" (Appendix C) was distributed. This consisted of a sheet of paper mimeographed on both sides. Each side consisted of a space for the subject to indicate the appropriate sex, the title "ANSWER SHEET" with the name of one of the variables in parentheses, spaces for indicating the code number and the rating for each of sixteen ranked objects, and a place to indicate whether this side of the sheet was used first or second. The experimenter or assistant showed each subject how to transfer the code numbers and ratings onto the sheet. As soon as this task was completed, each subject was given two packs of cards and the process was repeated with the second variable as the choice dimension.

As soon as the subject had finished with both sets of cards (pleasantness and stability), he was given a legal sized paper titled "AFFECT QUESTIONNAIRE" (Appendix D) which asked him to indicate, on fifteen point scales from "like very much" to "dislike very much," his feelings toward the four persons and two issue positions and his

perception of the feelings of the four individuals toward him. In addition, each subject was asked to rate the experiment in terms of its interestingness and difficulty relative to his experience or perception of other experiments.

After completing the affect questionnaire, each subject was free to leave the experiment. An offer was made to debrief any subject immediately after the session, and any who stayed were given a short explanation of balance theory including the notion of reciprocity as possibly affecting the fit of the balance model. Each subject was pledged not to impart this information to other potential subjects, but was encouraged to tell others whether the experiment was interesting or enjoyable.

Data preparation. Immediately after each session, the research assistant coded the subjects' responses from the answer sheet and the affect questionnaire to data coding forms, translating the situation codes into numerical information. In this format, the data represented the code number of the situation receiving the first rank, the second rank, etc. By computer techniques, these codes were translated and the data rearranged into two sets such that the numbers represented the rank assigned to situation A, the rank assigned to situation B, etc. At this stage of the data preparation, two subjects' data had to be replaced by those of other subjects because they had assigned to two ranks the same situation code, probably by an error in copying the code onto the answer sheet. The analyses performed on these data are reported in the results section.

Study II

Overview. Study II consisted of ranking by subjects of three sets of the eight possible POQ situations. The second set used the same O's but different Q's than the first; the third set used the same Q's as the second, but different O's. The method of Study II was essentially the same as that of Study I, with the exception that the rating task was not used as a preliminary to the ranking of the situations. Data were collected between April 2, 1973 and April 19, 1973.

Subjects. The subjects were recruited and rewarded in the same manner as in Study I, and similar sign up and show up rates were observed. Approximately 175 subjects actually participated in the experiment of whom five had to be eliminated for failure to follow the instructions. As in Study I, data from the last 60 subjects of each sex were retained for analysis.

Instruments. The instruments and procedure for Study II were essentially the same as those for Study I with the modifications necessitated by the increased number of situations to be ranked, the dropping of the rating task, and the change from POX to POQ situations.

The instruction sheet for Study II (see Appendix E) was similar to the one for Study I; the changes involved adding space for a third liked peer and a third disliked peer, and dropping the spaces and instruction regarding the issue.

The same type of cards were used for Study II, with an additional set prepared for the third group of situations. Subjects were again verbally instructed to fill in the initials corresponding to the blanks on the cards and then to sort each set of eight cards into order from the most pleasant (or stable) to the least pleasant (stable). Each

subject was then instructed to check pairwise through each set to be sure that the situations were in order. After all three sets were in order, the subject was shown how to integrate the three sets into a single rank order by selecting the most pleasant (stable) situation from the top card in each of the three stacks, and continuing until all three stacks were exhausted.

While the subjects were preforming the integration task, the answer sheet was distributed. This sheet was similar to the one used for Study I, except that the sex designation was placed toward the bottom rather than the top of the sheet, and the word "pleasantness" or "stability," indicating which side of the sheet should be used, was not placed in parentheses. In addition, there were blanks for 24 code numbers, arranged in two columns and the spaces for indicating the rating of the situations were dropped. A copy of this sheet is included as Appendix F. Each subject was shown how to use the answer sheet on an individual basis.

Rather than distribute another set of the 24 cards for the second ranking task, the experimenter or assistant sorted the cards for each subject into the three packs, shuffling each pack in the process. The subject was then instructed to repeat the ranking process, using alternative choice variable (stability or pleasantness). Using the same cards a second time substantially reduced the amount of time involved in writing the initials in the spaces on the cards, thus conserving subject time for other tasks.

After the subject had completed the ranking task for both variables, he was given the affect questionnaire for Study II (Appendix G). This questionnaire was similar to the one used in Study I, but was

printed on two pages. The first contained the instructions for the questionnaire and spaces for the subject to indicate his affect for each of the six individuals (A through F). The second page contained spaces for the subject to indicate his perception of each of the other individual's feelings toward him and his perception of the interestingness and difficulty of the experiment. Each of the scales on the affect questionnaire for Study II had the spaces numbered for easier location by the subjects of the midpoint of the scales, the result of a suggestion from several subjects in the first study.

As in Study I, the experimenter offered to debrief each subject, and a similar explanation was given to each subject that made such a request.

Data preparation. The data preparation for Study II paralleled the technique used in Study I, with the additional complication of the third set of situations. In Study II, one subject's data were lost due to his use of the same situation code for two different ranks.

RESULTS

Definitions

For the purpose of clear and concise exposition, the following definitions will be used throughout the remaining discussion of this research. In these definitions, i is a letter representing an individual or one side of an issue (see Appendix A). For Study I, the letters A and B refer to liked others, C to the liked side of an issue, D and E to disliked others, and F to the disliked side of the issue. For Study II, A, B, and C, indicate liked others, and D, E, and F refer to disliked others. For reference to the two (Study I) or three (Study II) liked and disliked others in general, the symbols +L and -L will be used.

S to i refers to responses to the question "My feelings toward (i):" in the affect questionnaires.

i to S indicates responses to the question "(i)'s feelings toward me:".

For relationships representing specific bonds in the POX and POQ triads, the symbolic presentation will be P/+O, P/+X and P/+Q for affect toward the liked, O, X and Q and P/-O, P/-X, and P/-Q toward the disliked objects. Similarly, +O/P, -O/P, +Q/P and -Q/P will refer to affect from others in the situation.

Affective Relations

Hypothesis Ic predicts that the relationship between self-to-other affect and perception of other-to-self affect will be stronger for

liked others than for disliked others, i.e., that the correlation between S to +L and +L to S will exceed that between S to -L and -L to S. Table 5 presents the correlations between the affective relations, with entries above the diagonal for Study I and below the diagonal for Study II. The correlations between measures directly relevant for the issue of reciprocity are underlined in Table 5. It can be seen that all but one of the correlations between S to +L and +L to S exceed the largest correlation between S to -L and -L to S. Table 6 shows the results of tests of the differences between these two classes of correlations. Since there is more than one pair of correlations in each study, a number of tests are possible and the maximum and minimum t's are presented for each study. In addition, average correlations were calculated for liked others and for disliked others in each study, and these were also compared by means of a t test. It can be seen from Table 6 that all possible t tests were significant ($p < .0025$) in the predicted direction in Study I. For Study II, one of nine possible tests is in the wrong direction but the difference is nonsignificant; however, the test on the average correlations is significant at the .05 level and all the other differences are in the predicted direction. These results appear to support Hypothesis Ic in that, in both studies, the correlation between self-to-other affect and perceived other-to-self affect is greater, in general, for liked others than for disliked others.

Hypothesis Id predicts that disliked-other-to-self (-L to S) affect will be more variable than either self-to-disliked-other (S to -L) or liked-other-to-self (+L to S) affect. Table 7 presents both the means and the variances for the affective relationships for both studies. The parallelism of these values across the two studies

Table 5

Correlations between Affective Relations[a,b]

Relation	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. S to A	XXXX	0.32	0.08	0.14	-.03	-.07	0.70	0.27	----	0.12	0.13	----
2. S to B	0.38	XXXX	0.16	-.08	-.13	-.16	0.43	0.74	----	0.00	-.04	----
3. S to C	0.28	0.39	XXXX	0.12	-.05	-.16	-.07	0.11	----	0.00	-.10	----
4. S to D	-.03	0.00	0.10	XXXX	0.45	0.14	0.01	-.08	----	0.40	0.14	----
5. S to E	0.07	0.01	-.02	0.18	XXXX	-.05	-.01	-.02	----	0.12	0.44	----
6. S to F	-.15	-.03	-.05	0.06	0.32	XXXX	-.13	-.17	----	0.03	-.15	----
7. A to S	0.75	0.33	0.18	0.00	0.07	-.10	XXXX	0.50	----	0.06	0.09	----
8. B to S	0.45	0.70	0.36	0.09	0.01	-.06	0.43	XXXX	----	0.11	0.05	----
9. C to S	0.27	0.27	0.55	0.05	0.00	-.15	0.36	0.43	XXXX	----	----	----
10. D to S	0.03	-.12	0.13	0.50	0.08	0.13	-.01	0.01	0.03	XXXX	0.32	----
11. E to S	0.08	-.07	-.05	0.06	0.45	0.14	0.11	0.04	0.07	0.32	XXXX	----
12. F to S	-.08	-.07	0.08	0.04	0.13	0.57	-.03	-.10	-.01	0.28	0.35	XXXX

[a]Study I (POX) is above the diagonal; the missing entries would represent affect from an issue. Study II is below the diagonal.

[b]Underlined correlations are those directly relevant to the issue of reciprocity.

Table 6

Differences in Affect Correlations

S to +L with +L to S vs. S to -L with -L to S

	r_{+L}	r_{-L}	t^a	p
		Study I (POX)		
r's	.74, .70	.44, .40	$2.985 < t < 3.904$	$< .0025$
Average[b] r	.72	.42	$t < 3.444$	$< .0005$
		Study II (POQ)		
r's	.75, .70, .55	.57, .50, .45	$-.23 < t < 3.614$	-
Average r	.68	.51	$t < 2.012$	$< .05$

[a]Test chosen to be conservative by dropping of the correlation term from standard error (see Peters & VanVoorlis, 1940, p. 185-188) and by use of 117 degrees of freedom.

[b]Average r calculated by r to z transformation (McNemar, 1962).

Table 7

Means and Variances of Affective Relations

Affect Relation	Study I (POX) Mean	Study I (POX) Variance	Study II (POQ) Mean	Study II (POQ) Variance
1. S to A	1.87	1.08	1.56	.99
2. S to B	2.03	1.72	1.85	1.27
3. S to C	-	-	2.25	1.94
4. S to +L	1.95	1.40	1.89	1.47
5. S to D	11.76	5.52	11.98	6.35
6. S to E	12.18	6.86	11.90	5.68
7. S to F	-	-	11.73	6.45
8. S to -L	11.97	6.20	11.87	6.14
9. A to S	2.29	1.72	1.78	1.23
10. B to S	2.37	1.66	2.03	1.43
11. C to S	-	-	2.43	1.96
12. +L to S	2.33	1.69	2.09	1.60
13. D to S	9.85	9.54	9.78	13.48
14. E to S	9.62	11.23	9.68	13.64
15. F to S	-	-	9.64	12.33
16. -L to S	9.73	10.36	9.70	13.09
17. S to C (+X)	2.80	7.84		
18. S to F (-X)	13.53	6.82		

is readily evident from an inspection of the summary means and variances presented in rows 4, 8, 12, and 16. In addition to the comparisons implied by the hypothesis, there are two others that are of particular interest in both studies, and another of moderate interest in Study I. The results of *t* tests for correlated variances (McNemar, 1962) are presented in Table 8. Comparisons A and B are significant and in the direction predicted by Hypothesis Id. In addition, Comparison C, *S to -L* with *S to +L*, is also significant; but neither of Comparisons D and E were significant. Thus, there was more variability in affect ratings from a disliked other than from a liked other or to the disliked other, and, in addition, more variance in ratings of affect to a disliked other than to a liked other. These results seem to indicate a lower degree of certainty regarding relationships concerning disliked others and especially in perceptions of affect from these individuals, consistent with Hypothesis Id.

The means in Table 7 are relevant for Hypothesis Ib which states that *-L to S* ratings will, on the average, indicate more liking than *S to -L* affect. Differences in these means are most appropriately tested by means of a *t* for correlated observations, and the results of tests for each of the disliked others are presented in Table 9. In addition, Table 9 includes tests of the differences between *+L to S* and *S to +L* for purposes of comparison. Table 9 indicates that all of the differences involving disliked others are significant ($p < .0005$) and in the predicted direction. In addition, all but one of the differences involving liked others were significant, but in the opposite direction from those for disliked others, i.e., subjects in both studies perceived being liked less than they liked a liked other. Thus, Hypothesis Ib

Table 8

Correlated Variances Test (t) on Affective Relations

Comparison	Study I (POX)		Study II (POQ)	
	t	p[b]	t	p
A. -L to S vs. S to -L (16, 8)[a]	3.17	<.0025	4.92	<.0005
B. -L to S vs. +L to S (16, 12)	11.34	<.0005	13.70	<.0005
C. S to -L vs. S to +L (8, 4)	8.89	<.0005	8.48	<.0005
D. +L to S vs. S to +L (12, 4)	1.48	>.10	.63	>.25
E. S to C vs. S to F (17, 18)	.77	>.25		

[a]Numbers in parenthesis refer to rows in Table 7, specifying the variance used in the test.

[b]The degrees of freedom used in each test was 118, with recognition that a larger number could have been used (either 238 or 358 for Study I and Study II, respectively) but would have resulted in a less conservative test.

Table 9

Self-To-Other vs. Other-To-Self Affective Relations

(Matched *t*)

	Study I (POX)			Study II (POQ)		
	Mean Difference[a]	*t*	p	Mean Difference	*t*	p
A to S vs. S to A	-.425	-4.95	<.0005	-.225	-3.29	<.001
B to S vs. S to B	-.342	-4.02	<.0005	-.183	-2.21	<.05
C to S vs. S To C	-	-	-	-.183	-1.51	>.10
D to S vs. S to D	1.91	6.88	<.0005	2.20	7.43	<.0005
E to S vs. S to E	2.57	8.77	<.0005	2.23	7.22	<.0005
F to S vs. S to F	-	-	-	2.09	7.78	<.0005

[a]A positive mean difference indicates that self-to-other affect was more positive (liking) than other-to-self affect.

appears to be supported in that perceived liking from disliked others exceeded affect toward disliked others. Although no prediction was made concerning differences for liked others, the fact that these were, in general, significant and in the opposite direction from differences for disliked others provides an interesting contrast.

Finally, Hypothesis Ia predicts that a substantial portion of the subjects would indicate that a disliked other liked the subject, i.e., that at least one -L to S relationship would indicate liking. Table 10 presents the distribution of the number of -L to S responses on the liking side of the affect scale midpoint. Inspection of Table 10 reveals that about 39 percent of the subjects in Study I and 51 percent of those in Study II reported that at least one disliked other liked the subject. For Study I, the lower confidence limit ($p = .05$) for .39 is approximately .30, indicating that 39 percent significantly exceeds any percentage smaller than 30. For Study II, the similar confidence limit for .51 is .42 or 42 percent. Thus both studies appear to have substantial numbers of subjects indicating that a disliked other also likes the subject, thereby supporting Hypothesis Ia.

Table 10 also presents a means of examining the independence of reciprocity-nonreciprocity within subjects. The question of whether reciprocity tends to be the consistent perception of a subject, or varies within a subject, can be tested by comparing the observed distribution with one based on an assumption of independence and using the overall percentage of observed liking from disliked others in a binomial expansion. The expected distributions are included in Table 10 and differ significantly from the observed distributions ($\underline{\chi}^2 = 9.06$, df = 1, $p < .001$ and $\underline{\chi}^2 = 18.86$, df = 1, $p < .001$ for the two studies respectively).

Table 10

Number of Disliked Others Reported as Liking the Subject[1]

Number of Disliked Others Liking S	Study I (POX) Percent of Ss	Number of Ss	Expected No. of Ss	Study II (POQ) Percent of Ss	Number of Ss	Expected No. of Ss
0	60.8%	73	66.75	48.3	58	43.14
1	27.5	33	45.50	24.2	29	52.66
2	11.7	14	7.75	20.0	24	21.36
3	-	-	-	7.5	9	2.89
Total	100.0	120	120.00	100.0	120	120.00
$\underline{X}^2$		9.06			18.86[2]	
df		1			1	
p		<.001			<.001	

[1]Scale responses 1 through 7 on 15 point scale.

[2]For Study II, the last two categories were grouped for $\underline{X}^2$ due to low expected frequency.

The differences between the observed and expected distributions are similar in the two studies in that there were fewer subjects than expected reporting a single positive -L to S relationship and more than expected who either reported no positive -L to S or gave two or three such relationships. This pattern of differences shows a significant lack of independence in the -L to S responses of the subjects. The same hypothesis can also be tested by examining the correlation coefficients from Table 5 for D to S, E to S and F to S. For Study I, the coefficient is .32 and for Study II, .32, .28, and .35; all of these correlations are significantly different from zero ($p < .01$, Diem & Lentner, 1970). However, the percentage of variance accounted for by these correlations is sufficiently small (range 7.84 percent to 12.25 percent) so as to contraindicate the conclusion that there is a consistent tendency within individuals regarding the perception of affect from disliked others.

Review. Support was found for all parts of Hypothesis I in that: a) A substantial number (39 percent and 51 percent) of the subjects reported at least one -L to S as a liking relationship; b) -L to S ratings indicated significantly more liking than S to -L ($p < .005$ in all cases); c) L to S and S to L ratings were more highly correlated for liked others than for disliked others ($r_{av} = .72$ vs. .42, $p < .005$ and $r^{av} = .68$ vs. .51, $p < .05$); and d) Variances for -L to S ratings exceeded the variances for both L to S and S to -L affect ($p < .0025$ for both comparisons). In addition, it was observed that: a) Although there is a significant lack of independence in the perceptions of subjects regarding affect from disliked others, the relationship is not so strong as to justify treatment of these perceptions as a consistent tendency within subjects; b) +L to S ratings indicated significantly less liking

than did S to +L affect in all but one instance, in which the difference was in the same direction but not significant; and c) There was a greater variance in S to -L responses than in S to +L ratings ($p < .0005$ in both studies.)

Affective Measures and Ranks Assigned to Situations

Summary data for the ranks assigned to the situations are presented in Table 11, including means, variances and medians. The results for the stability rankings in Study I are directly comparable to those reported in Table 1 for the Crano and Cooper (1973) Study II. Thus, situation A is distinctly the most stable situation, and situation B is clearly the second most stable. Situation E and F are ranked closely together followed by C, D, and lastly the pair G and H. The pleasantness data are quite different from those that would appear to be expected on the basis of the two traditional models discussed above and most past research, particularly the high ranks (unpleasantness) assigned to situations C and D. The stability rankings for Study II also appear to be somewhat similar to those reported by Crano and Cooper in their first and third studies (POQ), with situations C, D, E, and F all ranked relatively closely together. For pleasantness rankings, however, the results are again somewhat different from the more usual expectations, especially the ranks assigned to situation C.

Hypothesis II suggests that there will be a relationship between the rank orders and the affective measures, particularly the -O/P bond in the POX triad and the -O/P and -O/P bonds in the POQ triad. There are several approaches to the problem of relating a rank order of objects to

Table 11

Means, Variances, and Medians of Ranks Assigned to Situations[a]

Situation	Pleasantness			Stability		
	Mean	Variance	Median	Mean	Variance	Median
			Study I (POX)			
A (+++)	1.71	1.27	1	1.97	2.48	1
B (+--)	2.21	1.81	2	2.59	2.94	2
C (--+)	6.39	3.09	7	5.25	4.26	5
D (-+-)	6.29	2.93	7	5.64	3.66	6
E (---)	4.47	2.58	4	4.43	2.66	4
F (-++)	4.34	2.47	4	4.38	3.52	4
G (+-+)	5.33	3.21	5	5.92	3.25	6
H (++-)	5.25	3.63	5	5.82	3.67	6
			Study II (POQ)			
A (+++)	1.26	1.04	1	1.71	2.14	1
B (+--)	3.40	2.79	3	3.39	3.16	3
C (--+)	5.59	3.52	6	4.63	4.19	4
D (-+-)	4.81	2.63	5	4.45	3.11	4
E (---)	5.29	3.64	5	4.53	4.27	4
F (-++)	4.37	3.20	4	4.99	3.19	5
G (+-+)	5.02	3.64	5	5.77	3.15	6
H (++-)	6.25	4.61	7	6.53	3.89	7

[a]Low numbers indicate pleasantness or stability.

other variables, and each of these will be discussed in relation to the present hypothesis.

The first approach is to represent the rank order by a single measurement, and then to relate this measurement to the variables of interest. The technique used in the present case is Kruskal's (1968) adaptation of Coombs' multidimensional unfolding method (see Coombs, Dawes, & Tversky, 1970). This program produces output that includes a space of subject ideal points and a set of stimuli values such that the distance between a subject's ideal point and the stimuli points are a monotonic function of his rankings. Because the solution with a large number of subjects is rarely perfect, the program operates by minimizing a measure of the degree of non-monotonicity called stress. Because of the limitations of the capacity of the computer and the program, the data for each of the two studies were divided into four equal groups, and solutions were obtained for each replication for 1, 2, and 3 dimensions. Table 12 presents the degree of stress remaining for each group at each of these numbers of dimensions. It should be noted that the degree of stress is smaller as the number of dimensions increases, a factor inherent in multidimensional scaling because of the ability to represent the data more accurately in more dimensions. The numbers reported in Table 12 do not represent large amounts of stress for these numbers of dimensions and any differences in the degree of stress between replications are probably not meaningful.

There is some problem in the interpretation of the multidimensional scaling data reported here which may reduce the meaningfulness of any associated results. The spaces resulting from the unfolding technique seem to have been strongly influenced by the data of a few

Table 12

Stress Remaining Between Solution and Data After Multidimensional Unfolding

Replication	1	2	3	4
Number of Dimensions		Study I (POX)		
		A. Pleasantness		
1	.212	.249	.297	.370
2	.189	.174	.228	.234
3	.156	.026	.129	.140
		B. Stability		
1	.343	.376	.283	.423
2	.118	.292	.225	.275
3	.105	.210	.129	.179
		Study II (POQ)		
		A. Pleasantness		
1	.240	.225	.194	.240
2	.240	.137	.167	.158
3	.162	.096	.126	.128
		B. Stability		
1	.364	.379	.391	.362
2	.264	.262	.261	.263
3	.132	.173	.220	.195

observations in which situation A was given rank 3 or greater or situation B rank 4 or greater. This influence resulted in a very tight clustering of most ideal points at the center of the spaces, thereby discounting, to some extent, the variability within these clusters. One solution to this problem is to arbitrarily remove those subjects from the sample and repeat the unfolding program. However, this solution does not appear to be methodologically defensible, especially since the process of arbitrary removal of subjects could be repeated at the discretion of the experimenter until the only observations remaining were those appropriate to the hypotheses. This factor, together with the phenomenal time and expense of such a process, effectively precludes its use.

Relating the ideal points to the affective measures can be accomplished by the calculation of correlation coefficients if the space is unidimensional, since the single dimension is unique up to a change in sign. For a multidimensional space, since the solution is unique only up to a rotation, correlations between the coordinates of the points and the affective measures would depend on the arbitrary choice of the dimensions. To overcome this problem, Kruskal and his associates have programmed a least squares method called Profit, which locates in a space a vector composed of external measurements on some variable (in this case the affect measures) by minimizing the sum of the squared distances between the subject's point in the space and his location on the vector variable. The goodness of fit of this vector is analogous to the correlation coefficient in the unidimensional case, and in fact, the program output includes the maximum correlation coefficient possible between the vector and the ideal points, ignoring

the sign of the coefficient. Table 13 presents these maximum possible correlation coefficients for the pleasantness and stability solutions for the four replications in each study.

Examination of Table 13 can be undertaken in several fashions. First, since the data should be best represented in the solutions having more dimensions, any functional relationship between the rank orders and the affect variables should appear as a stronger correlation as the number of dimensions increases. Second, given that there are four independent replications each representing 60 observations in Study I and 90 in Study II, any meaningful relationship would be expected to appear in all four replications, or at least three of the four. Finally, the correlation coefficients significantly different from zero at the 5 percent and 1 percent levels are underlined by one and two lines respectively, for easier inspection. The problem of multiple tests in this instance is somewhat offset by the existence of the four independent replications. Thus, for present purposes, any discussion of the results presented in Table 13 is predicated on the joint requirement that significance be observed in three of the four replications.

Applying these approaches to Study I in Table 13 reveals that there is no relationship consistent across the four replications. For Study II, in three dimensions there are four cases in which at least three of the four correlations are significant. For pleasantness rankings these are P/-O, P/-Q, and -O/P; the last of these also appears for the stability rankings. Thus there appears to be some evidence, though not particularly strong, for a relationship between some of the affect measures, especially for disliked others, and the observed rank orders.

Table 13

Maximum Correlations Between Ideal Points and Affective Relations[a]

	Pleasantness				Stability			
Replication	1	2	3	4	1	2	3	4
				Study I (POX)				
Relation				A. One Dimension Solutions				
P/+O	.03	.02	.10	.19	.31	.16	.04	.07
P/-O	.16	.16	.22	.04	.17	.01	.14	.10
P/+X	.10	.00	.08	.39	.09	.24	.11	.01
P/-X	.09	.29	.21	.26	.07	.11	.16	.02
+O/P	.03	.13	.11	.22	.12	.00	.01	.08
-O/P	.01	.19	.02	.08	.02	.14	.06	.15
				B. Two Dimension Solutions				
P/+O	.34	.20	.24	.02	.50	.02	.23	.30
P/-O	.11	.33	.21	.12	.23	.28	.21	.39
P/+X	.11	.15	.26	.15	.13	.34	.28	.16
P/-X	.12	.30	.36	.04	.07	.03	.27	.03
+O/P	.19	.10	.33	.05	.28	.04	.33	.23
-O/P	.09	.28	.15	.11	.12	.25	.15	.14
				C. Three Dimension Solutions				
P/+O	.21	.25	.23	.30	.54	.14	.23	.33
P/-O	.06	.18	.24	.42	.21	.14	.24	.34
P/+X	.10	.08	.20	.60	.11	.27	.20	.31
P/-X	.28	.09	.20	.13	.14	.18	.20	.21

Table 13 (cont'd.)

Relation								
			C. Three Dimension Solutions					
+O/P	.22	.12	.24	.14	.29	.08	.24	.21
-O/P	.23	.25	.14	.21	.14	.11	.17	.17
			Study II (POQ)					
			A. One Dimension Solutions					
P/+O	.02	.02	.00	.02	.00	.04	.34	.10
P/-O	.01	.26	.04	.10	.02	.27	.10	.02
P/+O	.05	.00	.13	.11	.10	.04	.13	.31
P/-O	.04	.28	.18	.11	.06	.04	.06	.22
+O/P	.01	.02	.05	.01	.04	.14	.16	.08
-O/P	.01	.15	.12	.14	.12	.23	.11	.13
+O/P	.10	.03	.11	.04	.07	.19	.19	.27
-O/P	.06	.21	.04	.10	.30	.06	.06	.02
			B. Two Dimension Solutions					
P/+O	.07	.31	.11	.15	.08	.07	.44	.08
P/-O	.08	.20	.04	.13	.12	.15	.15	.19
P/+O	.10	.08	.19	.14	.17	.16	.31	.30
P/-O	.07	.22	.10	.25	.08	.27	.15	.21
+O/P	.20	.31	.01	.11	.18	.12	.18	.11
-O/P	.16	.18	.06	.19	.23	.04	.19	.19
+O/P	.23	.19	.18	.23	.19	.20	.23	.25
-O/P	.20	.22	.12	.21	.34	.17	.04	.05

Table 13 (cont'd.)

Relation	C. Three Dimension Solutions							
P/+O	.05	.27	.08	.18	.16	.14	.30	.14
P/-O	.21	.25	.18	.23	.13	.32	.19	.16
P/+Q	.20	.07	.16	.28	.13	.17	.41	.28
P/-Q	.29	.24	.25	.31	.23	.13	.18	.24
+O/P	.18	.28	.16	.17	.12	.05	.14	.17
-O/P	.21	.16	.27	.24	.28	.33	.28	.11
+Q/P	.15	.29	.13	.25	.06	.26	.20	.25
-Q/P	.21	.20	.17	.31	.33	.13	.14	.12

[a]Correlations underlined with a single line are significantly different from zero at the .05 level; those with two lines at the .01 level, each test.

A second possible approach to relating the affective measures and the rank orders involves treating the orders as the independent or classification variable and the affective measures as the dependent variable in the analysis of variance. In the present data, however, there is a problem that is revealed in Table 14, which presents the distribution of the number of observations in each class if the classes are composed of one order each. As can be seen from the table, a large majority of orders are represented only once in the data. The problem of performing an analysis of variance on such data is obvious, given the number of cells and the lack of within cell variance. The possibility of grouping the orders together exists, but there is a very large number of possible groupings, each of which could produce different results, and any selection would be, of necessity, arbitrary.

Table 14

Number of Orders Versus Number of Observations per Order

Observations per Order	Study I (POX)		Study II (POQ)	
	Pleasantness	Stability	Pleasantness	Stability
1	122	154	224	255
2	17	13	43	26
3	8	7	11	8
4	5	6	2	4
5	2	3	0	0
6	0	0	0	1
7	2	0	0	1
8	2	0	0	0
9	0	0	1	0
Total	158	183	281	295

A third possible approach to determining the existence of any relationship between the affective measures and the orders is the calculation of correlations between the ranks assigned to each situation and the affective measures. While this does not directly involve the orders, any relationship involving the ranks assigned to a situation must be reflected in the orders. Table 15 presents the correlations between the affective measures and the ranks assigned to each of the situations for both stability and pleasantness rankings for both studies. Correlations significantly different from zero at the 1 percent level are underlined for convenience, with the level of significance chosen because of the problem of multiple tests. Inspection of correlations for Study I reveals that six of the 96 correlations are significant at the .01 level, but that the largest of these is .21. Additionally, none of these appear for -O/P bonds, which are of primary interest in Hypothesis II. Given the size and small number of these coefficients, further interpretation of them seems inappropriate and will not be attempted here.

For Study II, 21 of 128 coefficients are significant at the 1 percent level, as a correlation of .13 is sufficiently large with 360 observations to reach significance. Given the dependency between ranks, the correlations between the ranks assigned to two different situations and the same affect variable are not independent and should be of opposite sign. Thus the results in the second half of Table 15 will be discussed according to the type of affective relationship involved. First, the most relevant to Hypothesis II, -O/P bonds are significantly related to the pleasantness ranks assigned to four situations, B, D, F, and G such that the more that -O likes P, the more pleasant F and G are

Table 15

Correlations between Affect Measures and Ranks Assigned to the Situations[a]

Situation:	A	B	C	D	E	F	G	H
Affect Relation				Study I (POX)				
				A. Pleasantness				
P/+O	-.02	.14	.03	.02	.11	.07	.01	.09
P/-O	.05	-.21	-.04	.04	.02	.13	.01	-.02
P/+X	-.01	.14	-.05	-.10	.01	.02	.04	-.01
P/-X	-.02	-.20	.16	.03	-.06	-.09	.14	-.04
+O/P	-.08	.08	-.08	-.01	-.04	-.02	.06	.07
-O/P	.06	-.07	.03	.02	.02	-.01	-.04	.00
				B. Stability				
P/+O	.09	.12	.04	.09	-.13	-.20	-.04	.04
P/-O	-.01	-.11	-.08	-.02	.11	-.03	.13	.02
P/+X	.09	.18	-.04	-.03	-.04	-.14	.04	-.03
P/-X	.04	-.11	.05	-.04	.01	.03	.08	-.05
+O/P	.00	.00	.04	.17	-.08	-.10	-.05	-.01
-O/P	-.12	-.08	.04	.05	.01	.01	.04	.02
				Study II (POQ)				
				A. Pleasantness				
P/+O	-.02	.01	.00	-.05	.02	.08	.07	-.11
P/-Q	.02	-.13	-.09	-.10	.02	.20	.08	.00
P/+Q	-.03	-.11	.05	-.11	-.02	.20	.11	-.09

Table 15 (cont'd.)

A. Pleasantness

P/-Q	-.05	-.21	.06	.01	-.07	.04	.11	.06
+Q/P	-.05	-.07	.05	.01	-.03	.04	.06	-.04
-Q/P	-.07	-.13	-.02	-.17	-.10	.23	.15	.04
+Q/P	-.04	-.11	.03	-.06	-.07	.09	.15	-.02
-Q/P	-.04	-.22	.01	.00	-.07	.05	.15	.06

B. Stability

P/+Q	.13	.01	.04	-.02	.04	.02	-.04	-.16
P/-Q	-.02	.03	.02	-.14	.02	.21	-.01	-.11
P/+Q	.19	-.03	.05	-.07	.00	.11	-.05	-.15
P/-Q	.03	.00	.01	-.02	-.07	.02	.11	-.06
+Q/P	.02	.05	.03	.00	-.09	.08	-.07	-.02
-Q/P	.02	.00	-.10	-.22	.02	.27	-.02	.04
+Q/P	.14	-.08	-.08	.01	.02	.12	-.05	-.05
-Q/P	.10	-.04	-.08	-.02	-.13	.09	.06	.06

[a]Underlined correlations are significantly different from zero, $p < .01$

ranked and the less pleasant B and D are ranked. For -Q/P similar relationships are observed for situations B and G. In addition, ranks assigned to situations are related to bonds such that the more disliked -O the more pleasant is situation B and the less pleasant situation F; the more -Q is disliked, the more pleasant situation B; the more +Q is liked, the more pleasant situation F; and the more +Q likes P, the more pleasant situation G. These relationships, particularly those for -O/P and -Q/P, appear to support Hypothesis II with regard to the pleasantness rankings in Study II.

For the stability rankings for Study II, -O/P is related to situations D and F in the same manner as in the pleasantness data, such that the more -O likes P, the more stable the rank of situation F and the less stable that of situation D. For -Q/P the only significant relation is that the more -Q likes P the less stable the ranking of situation E. In addition, the more +O and +Q are liked, the more stable the ranking of situation A and the less stable situation H; the more disliked -O, the more stable situation D and the less stable situation F; and the more +Q likes P the more stable situation A is ranked. The results for the stability rankings for Study II also appear to support Hypothesis II, even though the relationships are not strong.

Review. Thus, the hypothesis that some relationships exist between the affective measures and the rank orders assigned to situations seems to be supported, although none of the relationships were very strong. The results of the multidimensional scaling analysis could conceivably be either more or less strong than those which would have been observed had the process not been so dominated by the relatively few observations not following the general pattern of low ranks assigned

to situations A and B. The correlations using actual ranks assigned to each situation, although not directly addressing the problem of rank orders, demonstrate that the ranks are related to the affective measures, thereby implying some differences between orders as a function of these measures. The failure of the approach based on using the orders as the levels of an independent variable in the analysis of variance, while not providing any information with regard to the issue of Hypothesis II, indicates that there is a great deal of variability in the assigning of ranks to the situations, a variability not even substantially accounted for by the affective measures.

Tests of the Models

Hypothesis III relates to the relative fit of three models, the Cartwright and Harary, the Newcomb, and the present cluster revisions of Heider's balance theory. One approach to making these comparisons is to count the number of observations where the rank order is non inconsistent with the predictions of the model. For the cluster model, this approach requires that each observation be assigned to one of the appropriate submodels on the basis of the -O/P and -O/P bonds. For the present analysis, these bonds were defined as reciprocal if ratings between 9 and 15 on the 15 point affect scale were obtained, and as nonreciprocal if the rating was between 1 and 8, this being an approximate median split for both the -O/P and the -O/P bonds. Table 16 presents the number and proportion of observations fitting the requirements of each model, including the 5 percent confidence limit on the proportion observed. In addition, the table includes the proportion of observations which would be expected to fit each model under an assumption of equal

Table 16

Proportions of Observations Fitting Each Model

Model	Observed Proportion (Confidence Range) Pleasantness	Stability	Expected Proportion
	Study I (POX)		
Cartwright & Harary	.0417 (.017-.078)	.1625 (.112-.218)	.0143
Newcomb	.1458 (.099-.202)	.2333 (.152-.268)	.0024
Cluster[a]	.0250 (.008-.058)	.0458 (.021-.084)	.0005
	Study II (POQ)		
Cartwright & Harary	.0750 (.046-.113)	.1670 (.126-.214)	.0143
Newcomb	.1389 (.100-.185)	.1611 (.121-.210)	.0024
Cluster[a]	.0250 (.009-.052)	.0278 (.012-.056)	.0003

[a]Cluster model based on a division of -O/P and -Q/P between responses 8 and 9 on the affect scale, the approximate median of both distributions.

probability for all rank orders. For the cluster model, the expected proportion depends on the number of observations in the two or four reciprocity in the two studies respectively. Examination of Table 16 shows that the best fit of any model on an individual observation basis is about 23 percent, obtained by the Newcomb model on the stability data of Study I, but that, even given the small number of observations fitting each model, significantly more observations fit each model than predicted on the basis of equally likely rank orders.

Comparing the degree of fit of the models, that is, determining which demonstrates the better predictability, becomes somewhat difficult with these data. The models differ with respect to the restrictiveness that they impose on an order in determining whether it fits the model. For example, the Cartwright and Harary model allows six degrees of freedom within which it may be fit, three among the balance situations and three among the imbalanced. Similarly the Newcomb version allows 5 degrees and the cluster model allows either 1, 2, or 4 degrees of freedom depending on which of the submodels is appropriate. Thus any comparison of the models must take into account both the differences in the restrictiveness of the models and the fact that the models are not independent of each other.

One approach which might permit such comparisons involves the use of Bayesian probability analysis to determine the probability of the truth of the model given the data (see Mendelsohn, 1970). This approach involves determining for each order the probability of the order if the model were true, dividing by the probability (relative frequency) of the order in the data, and taking the product of all such quantities together with some a priori estimate of the model's truth. In the present

context, some of the orders observed have a probability of zero for all three models, with the result that the produce becomes zero for all three models, thus not differentiating between the models. An alternative approach is to consider an order occurring below a certain frequency as unusual (and probably representing error), and to calculate the probabilities based on the remainder of the orders. In the present instance, as demonstrated by Table 14, this alternative would result in not using most of the data, since most observations are represented by orders which occurred only once. Thus the Bayesian analysis approach does not prove useful in differentiating between the models.

Another possible approach to determining the relative fit of the models involves the multidimensional scaling analysis discussed above. The space resulting from the unfolding should theoretically be partitionable into areas fitting each of the models. Then the percentage of the total space fitting each model could be used as the expected proportion to test against the number of observations in the area in a chi-square test, and the resulting chi-squares could be compared by means of a test such as the F ratio. However, as noted above, the multidimensional scaling analysis placed inordinate weight on the unusual cases as far as the rankings of situations A and B were concerned. This resulted in the location of most cases near the origin to such an extent that points representing differing orders were not distinguishable. Thus it becomes impossible to determine the division between an area fitting a model and those not fitting the model, and the comparison cannot be made.

A final approach to comparing the models involves calculating, for each observation, the rank correlation between the observed order and the orders implied by the models. By virtue of having a correlation

value for each model on every observation, the models can be compared by use of a t for correlated means. Table 17 presents the average rank correlation for each of the models in each study. For the cluster model, the -O/P and -Q/P bonds were classified on the same basis as in previous analyses. Inspection of Table 17 reveals that in every case, the average correlation for the Newcomb revision was greater than for either of the other models. Compared by a t for correlated means, the average correlations for both the cluster and the Newcomb models significantly exceeded the average for the Cartwright and Harary version in every case (t = 5.14 to 17.52, $p < .001$). In addition, the Newcomb model was more highly correlated with the observations than the cluster model for the stability rankings for both studies (t = 2.72 and 3.55 for the two studies respectively, $p < .005$) but not for the pleasantness rankings (t = 1.14 and 0.99, respectively, $p > .20$). The differences between the Newcomb model and the proposed cluster model in predicting the observations, although significant, do not appear to be very great. Given the differences in the restrictiveness of the models, it is questionable whether the differences in correlations are sufficient to warrant a preference for the Newcomb model over the cluster model; thus Hypothesis III is neither strongly contradicted nor is it supported.

A question might be raised regarding the utility of not maintaining the reciprocity assumption in the cluster model. Table 18 presents the average rank correlation for each of the cluster submodels in each of the reciprocity conditions of each study. For Study I, it must be observed that the nonreciprocity model is more highly correlated with the observed orders than the reciprocity model in both classes. Thus it seems that in this study, the nonreciprocity model is a better predictor even

Table 17

Average Rank Correlations Between

Observations and Models

Model	Pleasantness	Stability
	Study I (POX)	
Cartwright & Harary	.153	.278
Newcomb	.514	.554
Cluster	.492	.495
	Study II (POQ)	
Cartwright & Harary	.321	.278
Newcomb	.511	.555
Cluster	.494	.508

Table 18

Average Correlations Between Observations and Cluster Submodels by Reciprocity Conditions in Data[a]

Study I (POX)

Data	Model: R	N
	A. Pleasantness	
R	.267	.622
N	.292	.609
	B. Stability	
R	.414	.550
N	.364	.520

Study II (POQ)

Data	Model: RR	RN	NR	NN
	A. Pleasantness			
RR	.502	.375	.505	.532
RN	.428	.378	.470	.428
NR	.414	.339	.580	.559
NN	.323	.282	.466	.419
	B. Stability			
RR	.561	.433	.438	.496
RN	.564	.456	.343	.414
NR	.498	.357	.494	.557
RR	.497	.342	.519	.570

[a]Underlined entries denote instances where data is appropriate to the specified model. R indicates reciprocity; NR, non reciprocity.

for data in which reciprocity is observed. For Study II, the data reveal no such clear trend, although it appears that the model for reciprocity-nonreciprocity is the least strong of the four. It can also be seen, for instance, that the appropriate model is never the most predictive for both the stability and pleasantness data, and that the differences between the three remaining models are neither as consistent or large as that observed in Study I. Thus the results appear to indicate that the $\underline{-O/P}$ and $\underline{-Q/P}$ relationships did not play the significant role in the fit of the models to the data that would be expected given the use of the relationships in the development of the models.

DISCUSSION

The hypotheses put forth at an earlier point in this paper propose the existence of a set of conditions and of certain relationships between that existence and predictions associated with various models. The results presented here pose a problem in that, even though the preconditions were demonstrated to exist, the association between those conditions and the hypothesized effects was not consistently observed. Thus the discussion of this research must focus on these inconsistencies. The occurrence of the hypothesized preconditions, however, merits integration with the previously available psychological lore.

Affective Relations

It has been argued that the existence of reciprocity in perceived interpersonal relationships is both a safe assumption and a necessary condition for the conduct of balance research. While the necessity issue will be discussed at a later point, the safety of an assumption of reciprocity can, and should be discarded immediately. As noted above, the often cited evidence for this assumption, on closer examination becomes open to interpretation and seems quite limited regarding perceptions of relationships involving the perceiver. The most direct evidence in regard to this class of relationships in fact contradicts the assumption in the case of affect from a disliked other (Price, Harburg, & Newcomb, 1966). The results of the present two studies constitute a further contradiction of the assumption of reciprocity, again in the case of perceived affect from a disliked other. In both studies, a substantial number of subjects reported the belief that at least one or two or three

disliked others liked them.

The remaining results relative to Hypothesis I may permit some insight into the nature of the perception of affect from a disliked other. Although the predominant variance in these perceptions was not between subjects and it cannot thus be said that the perception of being liked by a disliked other is a consistent and strong difference between individuals, the data at hand are most consistent with the notion that some individuals possess more of a tendency to have such perceptions than do others. Further clarification of this lack of independence in such perceptions is a problem for further research to determine whether it represents a consistent behavioral or perceptual trait and to uncover the nature and origins of such a trait.

As noted earlier, the modal behavior in our society is to avoid those whom we dislike and to otherwise interact with them in a stereotypical friendly manner. This relative decrease in interaction and in the meaningfulness of whatever interaction occurs would logically lead to a decrease in the degree of certainty or reliability of perceptions about the affective responses of these disliked others. Such an unreliability is perhaps reflected in the larger variance associated with such perceptions in the present research.

Finally, some psychologists with an investment in the reciprocity assumption might be inclined to view the pattern of results for affective relations as the product of a statistical artifact. That is, the subjects selected those toward whom they had extreme affect and other variables associated with these extremes would be expected to regress toward the mean of the affect scale. Yet the relatively larger difference observed for one end of the affect distribution demands more than this statistical

artifact explanation. If one were to accept the existence of some regression artifact as a contributory phenomenon and then somehow transformed the data to remove its effects, the differences between -L to S and S to -L ratings would be smaller but still of significant magnitude. The artifact hypothesis is not a sufficient explanation for the lack of reciprocity observed in the data of the present research.

The most consistant explanation for the present data is that reciprocity, as it relates to perceived affect, is neither the universal nor overwhelmingly predominant phenomenon claimed by balance researchers. Correspondingly, this conclusion dictates certain restrictions on research using interpersonal affective relationships, restrictions counter to assumptions heretofore accepted.

Ranks and Affective Relations

The mean and median pleasantness ranks assigned to each situation present a pattern somewhat outside the relatively broad range reported in the balance literature. This result is not inconsistent with the Crano and Cooper (1973) contention that noncomparative methods, such as the often used rating scale, may be inappropriate for use with variables whose scaling characteristics are unknown. In their research, Crano and Cooper demonstrated the nonscalibility of pleasantness comparisons, probably due to a lack of transitivity in the judgements of pairs of situations. Although the present method does not allow the researcher to discover whether intransitivity is a normal characteristic of a particular variable, it has the advantage of preventing its occurance in the data by forcing the simultaneous comparison of all stimuli. Thus differences between the present results and previous findings may be

solely reflective of the poor scaling characteristics of the pleasantness construct. The fact that the stability results are more consistent with previous research supports this notion of an interaction between method and the scaling properties of the variables used in this research. Thus differences between the present results and those of previous studies need not be attributed to other, extraneous variables.

The multidimensional scaling approach to finding possible relationships between the affective variables and the rank orders proved somewhat disappointing, although the use of such procedures always involves the risk of uninterpretable output. The one notable result from the procedure appears to be that, where significant relationships were consistently observed, however weak, these involved bonds to or from disliked others as indicated in the hypotheses.

The other attempts to observe relationships between rank orders and the affective bonds deserve similar comment. The large variety of orders observed in the data precluded any comparison of means for different classes of observations and at the same time seems indicative of a potential difficulty for balance research which will be discussed when the various models are considered. The correlations between the ranks and the affective bonds are again inconclusive, in the one study due to the lack of significance and in the other to the pattern of the small correlations observed. It should be noted that the significant correlations in Table 15 for $\underline{-O/P}$ and $\underline{-Q/P}$ bonds are in directions not inconsistent with the model proposed in this paper.

Thus it appears that some relationships, however weak, do exist between the ranks and the affective bonds. Yet the meaning and theoretical significance of these relationships cannot be assessed through the

present data, due greatly to the relative size and pattern of the relationships and the failure of the multidimensional analysis procedure to produce unequivocal results. The resolution of this question must await research using some other, as yet unrevealed, methodology.

The Models

The present research set out to compare several models derived from Heider's cognitive balance theory. The results presented above indicate a great diversity in the preferences of individuals among the basic triadic situations so central to this area of research. This constitutes a severe problem for any model attempting to predict these individual preferences, and yet this must be the goal of any psychological theory or model, as opposed to the description of the average behavior, especially in the light of such diversity. A model which would attain any degree of success in predicting the present data would necessarily have to predict differences in the preferences of individuals; yet at the same time the criterion of accuracy of the model must be maintained. The cluster model, by the inclusion of the reciprocity variable, was exactly such an attempt, and it must be viewed as a failure given the results presented above.

Yet neither is there any support in the present data for either of the other two models considered in this research. The Cartwright and Harary model, which allows but does not predict differences in individuals, was shown to be of such small predictive accuracy as to deserve no further consideration here. The Newcomb model, while giving a better account of itself, cannot be said to have been successful in terms of the present data, fitting only about one-fourth of the individual

observations, or accounting for an average of only about one-fourth of the variance over all observations, even though the group means for stability were consistent with the model's predictions.

The failure of the cluster submodels to display greater accuracy in the appropriate reciprocity conditions than in the others seems to be a further problem for this approach. Together with the overall poor performance of the model, this result constitutes a failure of the present research to demonstrate any practical utility to be gained from the inclusion of the reciprocity variable in this area of research, regardless of the finding that reciprocity does not hold in the case of affect from a disliked other. Nevertheless, one is confronted with the existence of some relationship, however small and confusing, between the affective variables and the preferences assigned to the triadic situations. And, the task of developing some model capable of predicting those preferences still remains unaccomplished. If the area of cognitive balance is to remain a viable part of the science of social psychology, these two facts are deserving of further psychological effort, both theoretical and research.

On Necessity

Finally, some commentary on the necessity of an assumption of reciprocity in the conduct of balance research seems in order. Regardless of the area of research, there always exist some methods which seem to be of extreme utility, but which also require assumptions or restrictions which may not be otherwise justified. In these instances it is incumbent upon the researcher to choose between the loss of a valuable method or the possible loss in the generalizability in the results he obtains. If the

assumptions or restrictions can be made sufficiently explicit and are included in the expression of the findings of the research, together with notice of the limitations thus placed on the generality of the findings, then the method need not be lost, and the research should proceed. In the present case, methods which require the existence of reciprocity in perceptions of interpersonal relationships are apparently only restricted in the case of perceptions involving affect from a disliked other toward the subject and situations which might theoretically involve such perceptions. Even in these instances, the researcher has at his disposal the means to observe whether any subject or situation falls within the portion of cases excluded by this restriction. On the whole, the loss in any study may amount to only a small portion of the situations of interest to a particular researcher. Whether the corresponding loss of generality is important becomes an additional matter for research effort.

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APPENDICES

APPENDIX A

INSTRUCTION SHEET FOR STUDY I

GROUPS EXPERIMENT

The instructions for this experiment are probably relatively complicated. Please read them carefully and ask if you have any questions or doubts. Please take your time; everyone will be working for about 50 minutes on the experiment.

This experiment is a study of the stability and pleasantness of various groups of people and their feelings about issues. Your primary task in the experiment will be to judge the pleasantness and stability of situations involving yourself, another person, and an issue. To assist you in doing this, we have defined these as follows:

STABLE--A stable situation is one where the feelings of the members of the group are very likely to stay the same. An unstable situation is one where some sort of change seems likely to occur in the feelings of some member of the group.

PLEASANT--A pleasant situation is an enjoyable one, one in which you would feel comfortable. An unpleasant situation is one where you would feel uptight and uncomfortable.

The study involves relationships between yourself and people whom you know personally, that is, people who also know you. We would like you to think of two persons of the same sex as yourself and whom you like very much. These should be people of about the same age as yourself, for example students at Michigan State or from your high school class. Place their initials on the following lines (you may keep this sheet after the experiment is over):

A. _____

B. _____

Now think of two people whom you know personally, who are of the same sex and about the same age as yourself, but whom you dislike very much. (This may seem harder at first, but most people can think of two people they dislike pretty much, even though they do not wish them harm. For example, think of people you sort of try to avoid as much as possible and really don't like to be around very much.) When you think of two people you dislike very much, write their initials by the letters below.

D. _____

E. _____

Now think of some issue about which you feel very strongly. Some examples might be abortion, marijuana reform, financial aid to parochial schools, busing or amnesty. It does not matter yet whether you are for or against the issue, just that you feel very strongly about it. Write the name of the issue in the blank below

_____.

Now think of a short label for the side of the issue you are in favor of and another short label for the side you are against. Write these labels on the appropriate lines below:

(I am in favor of) C. _____.

(I am against) F. _____.

Throughout the experiment you will find blanks marked with the letters A through F. Whenever you find these blanks you should write in the initials or label from the correspondingly lettered line on this sheet. Be sure to note that the letters do not appear in order on this sheet, but go A, B, D, E, C, F.

APPENDIX B

SAMPLE SITUATION CARD

W25

I like (B)_____.

I dislike (F)_____.

(B)_____ strongly likes (F)_____.

PLEASANT **UNPLEASANT**

:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

APPENDIX C

ANSWER SHEET FOR STUDY I

Circle: Female Male

ANSWER SHEET
(Pleasantness)

Rank	Code Number	Rating
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____
11	_____	_____
12	_____	_____
13	_____	_____
14	_____	_____
15	_____	_____
16	_____	_____

I did pleasantness ranking: first second

Circle: Male Female

ANSWER SHEET
(Stability)

Rank	Code Number	Rating
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____
11	_____	_____
12	_____	_____
13	_____	_____
14	_____	_____
15	_____	_____
16	_____	_____

I did stability ranking: first second

APPENDIX D

AFFECT QUESTIONNAIRE FOR STUDY I

AFFECT QUESTIONNAIRE

Now we would like you to rate for us just how much you like each of the other people in these situations and how they feel about you. We would also like for you to rate how strongly you feel toward each side of the issue that you have used in the experiment. The scales below are very similar to those that you have used on the situations. Just fill in the initials in the blanks and place a mark in the space best indicating how you feel about each person and issue or how they feel toward you.

My feelings toward (A)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

My feelings toward (B)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

My feelings toward (C)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

My feelings toward (D)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

My feelings toward (E)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

My feelings toward (F)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

(A)_____ feelings toward me:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

(B)_____ feelings toward me:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

(D)_____ feelings toward me:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

(E)_____ feelings toward me:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:dislike
very much very much

Relative to other experiments that I have been in or have heard about this one was:

boring:___:___:___:___:___:___:___:___:___:___:___:___:___:___:interesting

difficult:___:___:___:___:___:___:___:___:___:___:___:___:___:___:easy

APPENDIX E

INSTRUCTION SHEET FOR STUDY II

GROUPS EXPERIMENT

The instructions for this experiment are probably relatively complicated. Please read them carefully and ask if you have any questions or doubts. Please take your time; everyone will be working for about 60 minutes on the experiment.

This experiment is a study of the stability and pleasantness of various groups of people who you know. Your primary task in the experiment will be to judge the pleasantness and stability of situations involving yourself and two other people. To assist you in doing this, we have defined these as follows:

STABLE--A stable situation is one where the feelings of the members of the group are very likely to stay the same. An unstable situation is one where some sort of change seems likely to occur in the feelings of some member of the group.

PLEASANT--A pleasant situation is an enjoyable one, one in which you would feel comfortable. An unpleasant situation is one where you would feel uptight and uncomfortable.

The study involves relationships between yourself and people whom you know personally, that is, people who also know you. We would like you to think of three persons of the same sex as yourself and who you like very much. These should be people of about the same age as yourself, for example students at Michigan State or from your high school class. Place their initials on the following lines. (you may keep this sheet after the experiment is over, so if writing the names out will help, please do so)

A. _____

B. _____

C. _____

Now think of three people who you know personally, who are of the same sex and about the same age as yourself, but whom you dislike very much. (This may seem harder at first, but most people can think of three people they dislike pretty much, even though they do not wish them harm. For example, think of people you sort of try to avoid as much as possible and really don't like to be around very much). When you think of three people you dislike very much, write their initials by the letters below.

D. _____

E. _____

F. _____

Throughout the experiment you will find blanks marked with the letters A through F. Whenever you find these blanks you should write in the initials from the correspondingly lettered line on this sheet.

APPENDIX F

ANSWER SHEET FOR STUDY II

ANSWER SHEET

Stability

Rank	Code Number	Rank	Code Number
1	_____	13	_____
2	_____	14	_____
3	_____	15	_____
4	_____	16	_____
5	_____	17	_____
6	_____	18	_____
7	_____	19	_____
8	_____	20	_____
9	_____	21	_____
10	_____	22	_____
11	_____	23	_____
12	_____	24	_____

I did stability ranking: first second

Circle: Female Male

ANSWER SHEET

Pleasantness

Rank	Code Number	Rank	Code Number
1	_____	13	_____
2	_____	14	_____
3	_____	15	_____
4	_____	16	_____
5	_____	17	_____
6	_____	18	_____
7	_____	19	_____
8	_____	20	_____
9	_____	21	_____
10	_____	22	_____
11	_____	23	_____
12	_____	24	_____

I did pleasantness ranking: first second

Circle: Male Female

APPENDIX G

AFFECT QUESTIONNAIRE FOR STUDY II

AFFECT QUESTIONNAIRE

Now we would like you to rate for us just how much you like each of the other people in these situations and how they feel about you. Just place a check mark in the space best indicating the feeling involved.

My feelings toward (A)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___: dislike
very much 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 very much

My feelings toward (B)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___: dislike
very much 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 very much

My feelings toward (C)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___: dislike
very much 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 very much

My feelings toward (D)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___: dislike
very much 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 very much

My feelings toward (E)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___: dislike
very much 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 very much

My feelings toward (F)_____:

like:___:___:___:___:___:___:___:___:___:___:___:___:___:___:___: dislike
very much 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 very much

continued

(A) 's feelings toward me:

very much like: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :dislike very much

(B) 's feelings toward me:

very much like: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :dislike very much

(C) 's feelings toward me:

very much like: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :dislike very much

(D) 's feelings toward me:

very much like: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :dislike very much

(E) 's feelings toward me:

very much like: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :dislike very much

(F) 's feelings toward me:

very much like: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :dislike very much

Relative to other experiments that I have been in or have heard about this one was:

boring: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :interesting

difficult: 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15 :easy