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A Multidimensional Scaling Approach to Interperson Similarity and Attraction

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A MULTIDIMENSIONAL SCALING APPROACH TO INTERPERSON SIMILARITY AND ATTRACTION

by

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This thesis submitted by Brenda Gryting Heltne in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota is hereby approved by the Faculty Advisory Committee under whom the work has been done.

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ABSTRACT

The intent of this investigation was to determine what judgment strategies are actually employed when judging the similarity of individuals, and the relationship of similarity estimates to a rated attraction index. The Stone-Coles (1970) multidimensional scaling technique was utilized. The input was based on the estimates of interperson similarity made by 16 pledges of a sorority. Each pledge also ranked the attractiveness of the other 15 pledges.

The four factor-dimensions which emerged from the judgmental data, similarity estimates, were interpreted as "dating conservatism-liberalism," "sociability," "non-dependability-dependability," and "dominance-submission." Only the "sociability" and "dominance-submission" dimensions were found to be linearly related to the rated attraction index. The more sociable, extroverted individuals and the more dominant individuals were better liked by all Ss regardless of their own positions on these same factor-dimensions. However, those Ss loading high on dating conservatism and those loading low on this dimension showed a preference for others with similar loadings. A similar finding was observed for the dependability dimension, showing a relationship between similarity on these dimensions and attraction.

Other findings presented were: (1) individuals who were seen as being more similar to all those in the group were ranked as being more attractive by the group; (2) those pairs whom the group saw as

being most similar to each other ranked each other as more attractive; (3) for most judges, those individuals who the judge saw as being most similar to herself were also seen by the judge as more attractive.

A comparison was drawn between methodologies and results of Hogan and Mankin's (1970) investigation and the present investigation. Both studies found personal interaction styles that were preferred across subjects. However, the present investigation also found a relationship between personality similarity and attraction which Hogan and Mankin purport to disprove. The difference in findings was interpreted partially as a result of the different methods used to measure similarity. The judgment dimensions used in the present investigation arose from Ss' estimations of overall similarity between pairs. The dimensions used by Hogan and Mankin were determined by the investigators prior to the data gathering and were based on a personality inventory. It was concluded that those dimensions which emerge from similarity judgments are more defensible as measurements of similarity in a similarity-attraction study than those selected to constitute an a priori definition of similarity.

CHAPTER I

INTRODUCTION

Investigation of Similarity-Attraction

Similarity and its relationship to interpersonal attraction has een and continues to be a much researched topic. Most of the studies o date have dealt with the relationship between attitude similarity nd attraction. Observations of this relationship appear to have been ade by Aristotle, Spinoza, and Samuel Johnson long before any attempt as made to quantify the relationship. Karl Pearson, working with data ollected by Galton and others, was probably the first to quantify the elationship between similarity and attraction (Byrne, 1969).

Byrne (1969) describes four main paradigms which have been used o find the relationship between attitude similarity and attraction. he first (e.g., Schachter, 1951) utilized small groups in which one onfederate behaved in a manner which either agreed or disagreed with he prevailing group opinion. The confederate who deviated from the roup opinion was found to be the most rejected. Berkowitz and Howard 1959) created a situation in which members of a group, supposedly discussing" a topic by sending notes from separate cubicles, received ictitious opinions prepared by the experimenter. An attraction rating owed that those who were thought to be expressing deviate or dissent- ng opinions were rated the most negatively. The third paradigm pre- ented was one in which subjects were to choose between two solutions

to a problem and subsequently listen to a tape recording of either an agreeing or a disagreeing solution by another subject (e.g., Worchel & McCormick, 1963). A disagreeing stranger was rated more negatively than an agreeing one, especially in a group which had a low self-ideal discrepancy. Smith (1957) was among the first to utilize an attitude scale as the measure of opinion or attitude similarity with a bogus stranger. When presented with an attitude scale completed by such a bogus stranger, subjects tended to rate those who completed the scale in a manner similar to their own higher on an attraction scale than those who answered the scale in a dissimilar manner.

Recent correlational studies have generally used an attitude scale as the attitude similarity dimension upon which the subject (S) can compare his responses to those of a friend, mate, or theoretical "other person" whose responses are actually determined by the experimenter. In those studies dealing with friends or mates, a correlation is determined between actual responses of pairs on the attitude dimension. These correlations are generally quite high (e.g., Schiller, 1934; Kirkpatrick & Stone, 1935; Hunt, 1935). In studies where a bogus stranger is involved, the subject then rates this "other person," who may have endorsed either similar or dissimilar attitudes, on the dimensions of emotional adjustment, intelligence, desirability as a roommate or partner in an experiment, and/or extent to which S feels he would like him. This may be done by filling out a social desirability scale or the Interpersonal Judgment Scale (IJS) (Byrne, 1966). The proposed relationship between attitude similarity and attraction has been verified quite uniformly (e.g., Byrne & Clore, 1966; Byrne & Griffitt, 1966; Krauss, 1966; Byrne, Griffitt, Hudgins, & Reeves,

1969). However, Wright and Crawford (1971) question the importance of attitude similarity as a determinant of attraction. They see the relationship between attitude similarity and attraction as indirect and state that one should attempt to determine underlying and more crucial variables related to attraction. In giving a subject information only about another's attitudes, an experimenter places more importance upon attitudes than the subject may place upon them in a real life situation.

Although there have been relatively few studies of relationships between non-attitudinal similarity and attraction, it has been proposed that any aspect of similarity affects attraction in a manner similar to attitude similarity (Byrne, Clore, & Worchel, 1966), as similarity of any kind would seem to be reinforcing. Byrne et al. (1966), using the last described paradigm, manipulated various aspects of economic similarity between the subject and the stranger. It was found that Ss' responses were most positive toward those most similar in economic status and least positive toward strangers most dissimilar in economic status. In another study (Byrne, Griffitt, & Stefaniak, 1967), similarity between S and stranger on a repression-sensitization measure was manipulated with the result that attraction responses were influenced by this aspect of similarity. Similarity in self-concept between S and stranger also showed the expected effect on attraction responses (Griffitt, 1966).

Other studies which generalize the similarity-attraction effect supported the relationship between the two. However, one study which did not support this relationship was the Hogan-Mankin investigation (1970). These investigators used the California Psychological Inventory as a multidimensional device for measuring numerous personality

variables. They purported to show that similarity on the various personality dimensions was not related to attraction if one dealt with a group not normally associated or typically interacting as a total group. Instead, they found a preference across Ss for certain personality styles such as dominance, sociability, tolerance, and others. They believe that in groups where members typically interact, the attraction measure represents a "clique" measure which may well yield a similarity-attraction relationship. However, a "general liking" measure will not show this relationship, but rather a preference for personal interaction styles.

A Possible New Approach

The before mentioned studies show wide generalization of the similarity-attraction relationship. Similarity has been variously defined in terms of economic status, attitude similarity, similarity of self-concept, and similarity on a repression-sensitization dimension. All of these have shown a relationship to attraction. However, in all the studies mentioned, the experimenter was responsible for determining the measure of similarity to be completed and considered by Ss. Perceived similarity to self was thus influenced by the specific dimension of similarity in use by the investigator. Whether the employed dimension was attitude similarity, biographical similarity, economic similarity, or similarity of personality characteristics, the subject was responding to one, and only one, aspect of the person when rating him on the attraction dimension. This preconceived structure is not evidenced in a multidimensional scaling technique where, according to Stone, Coles, and Lindem (1970):

> . . . the judgmental task is relatively unstructured, the only requirements are that numbers between 0 and 100 be employed as statements of perceived degree of similarity. Such is not the case when an investigator chooses, devises or specifies an unidimensional evaluation measurement scheme. The specified unidimension may be quite irrelevant to the observer-judge and, certainly, it can be expected that many of the possibly specified unidimensions will be highly interrelated (p. 17).

Ekman and his associates (cf. Ekman & Sjöberg, 1965) provide the groundwork for a multidimensional model measuring judgment-opinion. His particular model is a "content" model in that it assumes that the judged similarity of two things or persons is based on the amount of perceptual-psychological content they share or have in common. His model requires direct estimation of the similarity of two things or persons. The judge estimates similarity between the stimuli which are presented two at a time (pair comparisons). In the Ekman procedure the resulting similarity matrix is factor analyzed. The Stone-Coles revision of this similarity analysis method proposes that similarity estimates should be considered only as averaged raw data, perhaps only possessing interval or ordinal measurement properties at best. They propose that product-moment correlations be calculated between all columns (intercolumnar correlation) of the similarity estimation matrix. The resulting similarity correlations would then be values on a ratio scale (the product-moment correlation scale), as well as having the following stated advantages:

> . . .: (1) correlational similarity is based on more information than are single similarity estimates, (2) correlations are appropriate input for factor analysis, and (3) broader measurement can be obtained, i.e., mean similarity can vary from zero to unity; whereas, correlational similarity can range from -1.00 to 1.00 (Stone, Coles, and Lindem, 1970, p. 3).

These similarity correlations, based on the assumption that the judged similarity of two stimuli is due to the fact that these stimuli

are related perceptually, in varying degrees, to the same common dimensions, are then factor analyzed to produce n extracted factor-dimensions (Stone & Coles, in press). The dimensions thus constructed are viewed as the psychological or perceptual dimensions common to the stimuli judged, especially if the dimensions can be "identified." Each stimulus has a loading on each factor-dimension and from such loadings judges are subsequently asked to identify or name the dimensions.

Nunnally (1967) has stated that:

> Multidimensional scaling is used in two related types of studies. In one type of study, the investigator does not know what dimensions people typically use in responding to a class of stimuli and the purpose of such investigations is to learn the dimensions. In the second type of study . . . the investigator is rather sure what the major dimensions of preference or judgment are, but he is not sure how people use those dimensions (p. 404).

In determining the perceived similarity of persons, the dimensions commonly used are not known. Neither is it known whether all or any of these dimensions of similarity are used when evaluating the attractiveness of a person. These points make the multidimensional approach seemingly well suited for the present investigation.

Purpose

The present investigation used the Stone-Coles multidimensional approach to determine the factors of similarity actually utilized by a sorority pledge-class evaluating each other's similarity to self and to everyone else in the pledge class group. The investigation attempted to answer the following questions: (1) Which possible factor-dimensions might be related to an attraction ranking? (2) Are those individuals whom the group sees as being highly attractive also seen as being highly similar to the other members of the group? (3) If the group sees two

individuals as being similar, do these individuals see each other as being attractive? (4) Is a girl more attracted to those girls whom she sees as being similar to herself?

CHAPTER II

PROCEDURE

Judges-Stimuli

Sixteen members of a sorority (Alpha Phi) pledge class at the University of North Dakota served both as the judges (Js) and as the stimuli. The sorority was given $25.00 from a research fund held by the Psychology Department of the University of North Dakota for the pledge class' participation. From a biographical questionnaire filled out by each member of the pledge class, it was determined that all except three were 18 years of age and freshmen. The remaining three were 19 years of age and sophomores. Their cumulative grade-point averages ranged from 1.0 to 4.0 (where 4.0 = A, and 0.0 = F).

Task

The judges were given the following instructions (instructions for similarity estimates were modified from those used by Coles, 1970):

> First, would you please volunteer the information requested on the questionnaire sheet. Do this as quickly as possible. When you are all finished, you will be given further instructions.
>
> Enclosed in the large envelope is a deck of computer cards on each of which is printed a pair of member's names. Would you please estimate the degree of overall similarity of the two

using a number scheme where 0 (zero) denotes no similarity at all and 100 denotes identity. Please attempt to base your estimates on your immediate impression of similarity; that is, estimate the degree of similarity as it first comes to mind. In other words, you are to use numbers between 0 and 100 to rate the percent of immediately perceived similarity.

For example, let us estimate the degree of similarity in meaning of the two word pairs, happy-content and happy-sad. Since the degree of similarity between happy-content is quite high, you would undoubtedly estimate the degree of immediately perceived similarity to be correspondingly high (with perhaps an 85). On the other hand, happy and sad are quite dissimilar (that is, their degree of similarity is low) and you might estimate their degree of overall similarity to be perhaps 7. In like manner you are to estimate the similarity as immediately perceived between all pairs of member's names.

Would you write your estimate in the lower left-hand corner of each card in approximately the area of each as that indicated by the circle on the first card in your deck. You may use either pen or pencil. Also, please write your name in the lower right-hand corner of the first card in your deck. Please do not discuss the task with others who have not yet completed the task as we wish each of the judge's ratings to be as independent of the others as possible. When you are

finished return the cards to the envelope. The last task will be explained when everyone is done.

The small envelope contains 3 x 5 cards with the stimuli for the last task. Please arrange these names, including all present members except your own name, in order of how much you like the person. Put the person you like best at the top, the person you like second best, next, and so on to the person you like least well. Please do not compare or discuss this task as it is to be an individual preference ranking. After completing the task, number the cards from 1 to 15 with 1 for the person you like the best and 15 for the last, least liked, person's name.

The method of similarity analysis described by Ekman (1965) and by Stone and Coles (1970) requires that Js estimate the degree of overall similarity of all pair comparisons of the stimulus set investigated. The number of pair comparisons presented totaled [n (n-1)]/2 where n equaled the number of stimuli. Each judge thus made 120 similarity estimates of pair comparisons randomly presented on computer cards. Effects of position of names in each pair were not controlled as Stone, Coles, and Lindem (1970, p. 4) have implied that this is inconsequential. For instance, stimulus A was presented first when compared with any other stimulus. Thus, stimulus A never appeared in second position. Stimulus P always appeared in second position when compared with another stimulus. This unbalanced presentation facilitated the reduction of the number of pair comparisons presented which therefore reduced the amount of time and effort required of the subjects.

The attraction dimension was determined from each J's ranking of the names of all other judge-stimuli. The names were presented in random order on 3 x 5 cards.

CHAPTER III

RESULTS

Determination of Factors

The 120 similarity estimates were averaged for each pair comparison across all 16 Js. The entries in the ij^{th} element were used to fill the ji^{th} element. This produced a 16 x 16 mean similarity matrix (Table 1). The columns of this full mean similarity matrix (with unity values in the diagonal) were then intercorrelated to produce a 16 x 16 correlational similarity matrix (Table 1) which was factor analyzed (principal components) and rotated to simple structure using Kaiser's varimax criterion (1958). A 16 x 16 interjudge correlation matrix based on the 120 estimates of each J was also factor analyzed using the same factor analytic method. This kind of Q-type analysis is referred to by Stone, Coles, and Lindem (1970) as OFJA (Observer Factor Judgment Analysis) and the correlational similarity factor analysis as GCSA (Group Composition Structure Analysis). In both analyses a limiting eigenvalue of 1.0 was prescribed.

The OFJA resulted basically in one major judge-factor which indicated an adherence to some sort of a single general judgmental approach by the 16 Js. Four of the Js had higher loadings on three other extracted factors which were much smaller. These loadings were often only slightly greater than the corresponding loadings on factor I. Also, for each specific smaller factor, only one J generally

TABLE 1

MEAN SIMILARITY ESTIMATES AND CORRELATIONAL SIMILARITY FOR PAIRS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	100	-26	-34	31	03	46	44	46	19	62	31	-10	-43	-04	-07	-42
B	47	100	78	08	23	-44	19	-45	43	-16	31	34	-34	38	19	-34
C	41	81	100	11	31	-28	-24	-34	07	-41	-04	-13	-22	08	-17	-31
D	60	55	54	100	59	33	19	19	14	42	34	12	-51	20	-04	-50
E	48	60	60	70	100	48	02	19	12	32	14	-17	-54	-01	18	-54
F	62	39	43	60	67	100	12	56	-18	37	08	-34	-40	-35	20	-40
G	65	61	43	58	53	57	100	11	60	63	61	62	-54	49	47	-50
H	58	38	39	53	52	61	54	100	-30	52	-08	-40	-41	-40	02	-45
I	56	64	49	54	56	46	69	38	100	32	53	48	-42	48	05	-34
J	70	57	36	64	65	60	70	67	60	100	55	33	-62	31	31	-55
K	62	64	51	63	58	58	68	49	65	70	100	66	-47	65	32	-38
L	46	60	43	59	45	41	71	35	62	64	72	100	-18	77	50	-12
M	42	43	44	43	40	42	41	39	41	39	44	47	100	-21	-26	94
N	50	61	52	58	54	43	66	38	60	64	71	76	48	100	08	-18
O	47	61	44	49	60	60	67	49	49	61	62	70	47	50	100	-24
P	39	41	35	40	37	39	38	32	41	39	45	45	84	45	44	100

Note:

Similarity estimates are below the major diagonal (unity values) and correlational similarities are above. All decimals have been omitted.

loaded higher on that factor than on any other factor. This made the factor "unique" to that particular J (see Table 2). One J (N) loaded higher on factor II than on any other factor, while a second J (C) loaded higher on factor IV than on any other factor. As only one J for each of these factors showed such a pattern, these factors cannot be said to represent a general or common judgmental approach. They are seemingly each "unique" to a single J. These two Js (N and C) also show their second highest loadings on factor I, the most general judgmental approach. Two other Js (J and P) show higher loadings on factor III than on any other factor. However, as one shows a high positive and the other a high negative loading, they seemingly have used a judgmental approach in opposing ways and cannot be said to show a consensus on use of this approach. Thus, these smaller secondary interjudge factors seem not to support the existence of a strong second general judgmental approach. The main interjudge factor (factor I) accounted for 35 percent of the interjudge variance. The loadings on this first factor ranged from 0.34 to 0.73.

Four factors, which account for 79 percent of the judgmental variance of the mean similarity estimates, emerged from the GCSA. These four rotated factors and the communalities for each stimulus, which ranged from 0.51 to 0.95 (mean $\underline{h}^2 = 0.79$), are shown in Table 3. Factors I and III were clearly bipolar with high loadings (above $\pm$ .5) on both poles. Factors II and IV showed high loadings on one pole, but only low or moderate loadings on the other pole. In other words, factors II and IV seemed to be only mildly bipolar in character.

TABLE 2

UNROTATED OFJA FACTOR MATRIX

Judge	I	II	III	IV	h^2
A	.73	.16	.13	.05	.58
B	.69	-.32	.20	.13	.64
C	.34	.17	.01	-.81	.80
D	.59	.38	-.04	.24	.55
E	.70	.20	.03	.08	.54
F	.65	.46	-.19	.01	.67
G	.58	.02	-.04	-.30	.44
H	.53	.08	-.18	.08	.33
I	.67	-.44	.18	-.10	.68
J	.34	.37	.65	.02	.68
K	.70	-.02	-.33	.24	.66
L	.64	-.35	.01	-.31	.63
M	.48	-.18	.43	.14	.47
N	.40	-.53	-.02	.17	.48
O	.71	.16	-.16	.08	.56
P	.44	-.18	-.50	-.06	.44
Percentage of total variance accounted for	35	09	07	06	57

TABLE 3

JUDGMENT FACTOR MATRIX (ROTATED FACTORS)

Stimulus	I	II	III	IV	h^2
A	.40	.24	.67	-.31	.77
B	.27	.37	-.80	.07	.86
C	.34	-.10	-.87	-.18	.92
D	.67	.18	.06	-.18	.51
E	.79	-.14	-.19	.16	.71
F	.57	-.30	.54	.21	.76
G	.26	.76	.29	.26	.80
H	.49	-.31	.65	.03	.76
I	.19	.75	-.14	-.17	.64
J	.51	.49	.55	.13	.83
K	.28	.79	.07	.12	.72
L	-.16	.85	-.11	.38	.91
M	-.87	-.34	-.05	-.08	.88
N	-.03	.83	-.21	-.03	.74
O	.13	.22	.04	.94	.95
P	-.89	-.26	-.01	-.08	.86
Percentage of Total Variance Accounted for	25	26	19	09	79

Similarity-Attraction Correlations

The estimates of similarity of each stimulus to each of the other stimuli were transformed into correlational similarities. These correlational similarities were averaged to produce correlational similarity means for each stimulus. Such mean correlational similarities indicate the degree to which the stimulus was seen to be similar to all other stimuli in the group. A single stimulus' general similarity to the total group of stimuli is thus represented by a single number. These mean correlational similarities can be compared. The attraction values given each stimulus were also averaged across Js to produce a mean attraction value for each stimulus. The values for both mean correlational similarity and mean attraction are presented in Table 4. A correlation between these two measures indicates the relationship between similarity to the group and attraction as rated by the group. A product-moment correlation (r) between these indices was computed. This coefficient was high, -0.84, and is significant beyond the .001 level ($df = 14$).

In interpreting correlations between the attraction dimension and the various judgmental factor-dimensions, it must be borne in mind that a higher numerical value on the attraction dimension denotes less attractiveness while a higher similarity score or factor loading is indicative of greater strength on the involved dimension. Thus, a high negative correlation between the attraction dimension and a specific judgment factor implies a strong positive relationship between rated attraction and that factor. Each stimulus had a loading on each factor extracted from the correlational similarity matrix. For

TABLE 4

EACH STIMULUS' ATTRACTION RANKS AND CORRELATIONAL SIMILARITY AVERAGED ACROSS Js

Stimulus	Mean Attraction	Mean Correlational Similarity
A	9.07	.56
B	5.6	.58
C	9.8	.51
D	9.4	.59
E	8.53	.58
F	8.93	.55
G	4.73	.61
H	11.4	.50
I	8.67	.57
J	5.93	.62
K	6.53	.63
L	5.27	.58
M	11.73	.49
N	5.33	.58
O	5.4	.57
P	11.67	.46

each factor, a product-moment correlation was calculated between the factor loadings (Table 3) and the mean attraction ranks (Table 4). Thus, the relationship between Factor I and the mean attraction ranks was shown to be quite low and nonsignificant (r = 0.26, df = 14, $p > 0.10$). This indicates that Factor I is not highly related to attraction. In other words, those who had high loadings on Factor I were neither consistently more nor less liked than those who had low loadings on this factor. A high linear relationship was shown between Factor II and the mean attraction ranks (r = -0.81, df = 14, $p < .001$). Those who loaded high on this dimension tended to have a smaller attraction rank. As a small attraction rank indicates more attraction, these girls were better liked than those who loaded high and negative on this factor. Little relationship was shown between Factor III and the mean attraction dimension (r = 0.12, df = 14, $p > .10$). Factor IV showed a significant correlation with mean attraction rank (r = -0.56, df = 14, $p < .05$). A girl who loaded high on Factor IV was better liked than one who loaded low or negative. To determine if similarity of loading rather than direction of loading on Factors I and III was related to attraction, the judges-stimuli were divided into two equal groups according to their loadings on Factor I (Table 3). Group I consisted of the eight stimuli with highest positive loadings on Factor I (P, M, L, N, O, I, G, and B), while Group II included the remaining eight stimuli with low or negative loadings on Factor I (E, D, F, J, H, A, C, and K). The attraction ranks that each member of Group I gave to every other member of Group I and those that each member of Group II gave to every other member of Group II were taken from Table 5 and a mean attraction value was determined for each J. A t-test was then computed to compare these values with the mean

TABLE 5

ATTRACTION RANKS GIVEN TO EACH STIMULUS BY EACH JUDGE

	Stimulus															
Judge	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A		6	12	10	7	2	4	5	8	1	9	11	14	13	3	15
B	8		1	10	12	13	2	11	5	7	9	6	14	4	3	15
C	13	1		9	2	10	12	15	7	11	14	4	8	3	5	6
D	13	3	6		1	2	4	11	12	5	8	7	15	9	10	14
E	15	10	4	1		3	5	11	13	2	7	9	14	8	6	12
F	1	15	14	3	2		6	12	10	7	4	8	13	11	5	9
G	3	9	15	8	11	10		7	6	4	13	2	12	1	5	14
H	7	2	10	14	8	11	5		15	6	4	9	13	1	3	12
I	6	2	7	11	10	12	1	15		9	5	3	13	4	8	14
J	2	1	13	8	4	11	7	9	15		3	5	12	10	6	14
K	13	6	10	8	12	7	5	11	4	3		1	15	2	9	14
L	14	6	8	9	13	12	3	15	2	7	5		10	1	4	11
M	10	7	12	14	13	11	6	15	8	9	2	5		3	4	1
O	15	5	10	8	9	11	2	12	4	3	6	1	13		7	14
P	3	2	14	13	12	11	4	8	15	5	7	1	9	6		10

Example:

When ranking all other stimuli for attraction, Judge B gave Stimulus M a rank of 14 and Stimulus C a rank of 1; Judge M gave Stimulus B a rank of 7 and Stimulus C a rank of 12.

attraction ranking that each member of Group I gave to the members of Group II and those that each member of Group II gave to the members of Group I. In other words, a comparison was made between the 16 mean attraction rankings of those stimuli similar in loading on Factor I ("own group"), and the rankings given to those stimuli dissimilar in loadings on Factor I ("other group"). Rankings that Group I gave Group I and those that Group II gave Group II would generally be more favorable than the rankings that Group I gave Group II and Group II gave Group I if attraction and similarity on this dimension were related. A relationship between similarity on this dimension and attraction was shown ($t = 4.57$, $n = 15$, $p < .001$). The same procedure was used to determine if those girls loading positively (A, H, J, F, G, K, D, and O) and those loading negatively (C, B, N, F, I, L, M, and P) on Factor III showed preference for other girls with loadings similar to their own. A significant difference between the means of rankings of "own group" and rankings of "other group" was found for this dimension also ($t = 3.63$, $n = 15$, $p < .01$). This finding supports the relationship between similarity on this dimension and attraction.

The similarity estimates for each pair of stimuli had been averaged to produce mean similarity estimates. These mean similarity estimates were correlationally transformed to produce the correlational similarities for each pair of stimuli (Table 1). A dyadic attraction score for each pair (Table 6) was determined by averaging the attraction ranks each member of a pair gave the other member (Table 5). The correlation between the mean correlational similarity for each pair and the dyadic attraction scores was high ($r = -0.70$,

TABLE 6

DYADIC ATTRACTION RANKS

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	7.0	12.5	11.5	11.0	1.5	3.5	6.0	7.0	1.5	11.0	12.5	12.0	14.0	3.0	14.0
B		1.0	6.5	11.0	14.0	5.5	6.5	3.5	4.0	7.5	6.0	10.5	4.5	2.5	12.0
C			7.5	3.0	12.0	13.5	12.5	7.0	12.0	12.0	6.0	10.0	6.5	9.5	8.5
D				1.0	2.5	6.0	12.5	11.5	6.5	8.0	8.0	14.5	8.5	11.5	14.5
E					2.5	8.0	9.5	11.5	3.0	9.5	11.0	13.5	8.5	9.0	12.0
F						8.0	11.5	11.0	9.0	5.5	10.0	12.0	11.0	8.0	8.5
G							6.0	3.5	5.5	9.0	2.5	9.0	1.5	4.5	9.5
H								15.0	7.5	7.5	12.0	14.0	6.5	5.5	13.0
I									12.0	4.5	2.5	10.5	4.0	11.5	10.0
J										3.0	6.0	10.5	6.5	5.5	12.0
K											3.0	8.5	4.0	8.0	8.0
L												7.5	1.0	2.5	9.0
M													8.0	6.5	1.0
N														6.5	9.0
O															6.5

Note:

Averaged from Table 5. Example: On Table 5, Judge A is shown to have given Stimulus C an attraction rank of 12. Judge C gave Stimulus A an attraction rank of 13. These two values yield a value of 12.5 when averaged. This value is entered in Table 6 in the column where A and C intersect.

df = 118). This coefficient is significant well beyond the .001 level. Thus, those who the group saw as being most similar, consequently saw each other as being most attractive.

A GCSA was computed for each *J*'s similarity estimates. The columns of a single *J*'s similarity estimation matrix (16 x 16) were intercorrelated to produce an individual *J*'s correlational similarity matrix. Such a matrix contained correlational similarities between all pairs (based on a single *J*'s estimates), including the correlational similarity of each stimulus to herself. That *J*'s correlational similarities to each of the other stimuli were designated as "correlational similarity-to-self" scores (Table 7). Each *J* also ranked all stimuli on the attraction dimension (Table 5). A *J*'s "correlational similarity-to-self" index was then compared to her produced attraction rankings to determine if a relationship existed between these measurement variables for that *J*. In other words, the row corresponding to *J* A on Table 5 was correlated with its counterpart (the *J* A row) on Table 7. The same was done for *J*s B through P. The degree to which similarity-to-self and attraction were related thus depended only upon the estimates provided by the individual *J* concerned. For each *J* such a correlation coefficient between these two measures was computed (Table 8). These correlation coefficients ranged from -.19 to -.94 with all but *J*s M and O showing correlations significant beyond the .01 level. The correlation for *J* M showed some relationship between similarity-to-self and attraction (r = -.51, df = 13, $p < .10$). However, little relationship was found between these two measures for *J* O (r = -.19, df = 13, $p > .10$).

TABLE 7

CORRELATIONAL SIMILARITY-TO-SELF: DETERMINED FROM EACH J'S ESTIMATES OF EACH STIMULUS' SIMILARITY TO HERSELF

	Stimulus															
Judge	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A		19	-23	23	25	65	74	58	33	51	22	14	-44	-17	82	-38
B	55		62	48	13	-27	87	24	32	66	71	71	-40	80	57	-70
C	-42	53		04	47	-32	-55	-73	-16	-32	-50	00	66	39	68	67
D	-73	53	54		73	02	09	-28	-37	01	39	35	-63	21	-22	-24
E	-30	35	05	85		34	34	20	01	64	56	38	-45	06	60	-17
F	73	-60	-51	69	36		61	48	43	76	83	70	10	-50	63	17
G	44	-42	-40	06	-31	05		38	-34	55	-12	44	-58	61	19	-56
H	61	61	36	-06	-01	-08	61		-23	26	38	54	-20	64	33	-28
I	56	71	58	08	18	-41	79	-50		16	52	50	-48	63	09	-48
J	50	64	09	67	49	22	36	-16	-59		67	59	05	02	70	-34
K	-56	65	38	62	35	-09	67	58	56	40		70	-55	62	16	-62
L	-42	12	-04	-05	-33	-32	55	-12	52	07	47		-03	58	36	-31
M	-24	12	15	24	-47	-28	-25	-03	02	-52	24	25		35	08	45
N	-18	49	-51	88	-57	-50	87	-78	87	82	91	92	-71		-33	-22
O	33	06	30	42	42	56	40	65	-28	53	08	56	-67	-22		-34
P	-50	-34	-39	-36	-39	04	-43	-40	21	-31	61	33	87	02	39	

Note:

All decimals have been omitted. Correlational similarity is based upon each J's estimates of similarity when comparing each stimulus to herself. Thus, Judge A saw Stimulus O as being most similar to herself and Stimulus M as being least similar to herself.

TABLE 8

CORRELATIONS BETWEEN THE CORRELATIONAL SIMILARITY-TO-SELF SCORES AND ATTRACTION RANKINGS OF ALL STIMULI AS DETERMINED BY EACH J

Judge	r	p (with 13 df)
A	-.92	<.001
B	-.83	<.001
C	-.82	<.001
D	-.79	<.001
E	-.80	<.001
F	-.75	<.01
G	-.84	<.001
H	-.80	<.001
I	-.94	<.001
J	-.84	<.001
K	-.74	<.01
L	-.94	<.001
M	-.51	<.10
N	-.79	<.001
O	-.19	>.10
P	-.82	<.001

Note:

Table 8 shows the results of correlating each row of Table 5 with the corresponding row in Table 7.

In order to determine if an overall relatedness existed between similarity-to-self and attraction, a single correlation coefficient was computed between all Js' correlational similarity-to-self scores and their attraction rankings of all stimuli. This was accomplished by correlating all of Table 7 with all of Table 5. It was determined that correlational similarity-to-self was systematically related to attraction ($r = -0.73$, $df = 238$, $p < .001$). Those girls who a J saw as being similar to herself were also generally the girls to whom she was attracted.

CHAPTER IV

DISCUSSION

Interpretation of Factors

The factor analytic multidimensional scaling results presented in Table 3 were shown to the 16 judges-stimuli for their interpretation. Identification of the psychological nature of each dimension was to be determined by the pattern of loadings on each factor and their relationship to discernable stimulus characteristics.

Factor I, accounting for 25 percent of the mean similarity variance, after rotation, was the most difficult to label. Those who loaded high on this factor (E, D, and F) were wealthy, neat dressers, and conservative in their party-going behavior. They also were all from Bismarck (North Dakota) where they had known each other before coming to college. Those who loaded high on the other pole (N, M, L, and P) were reported as putting themselves through college, had less money for clothes, and frequently attended parties without dates or switched dates during the evening. Although M, L, and P were all from Grand Forks (North Dakota), N was a Bismarck resident. Some speculation as to the existence of pre-existing friendship groups and biographical proximity may have been well founded. However, most Js felt that this was not indicative of the identity of the first factor. This factor, after some deliberation, was labeled "dating conservatism-liberalism."

The second factor was labeled "sociability" or "extroversion-introversion" and accounted (after rotation) for 26 percent of the mean similarity variance. Those who loaded high and positive, L, N, K, G, and I, were uniformly described as loud, silly, and outgoing extroverts. Because all the girls were outgoing to some extent, the negative pole had only low loadings and these girls (M, H, F, and P) were seen as being prone to be more quiet, reserved, and alone.

Those who seemed to put school work responsibilities first loaded highly on the negative pole of the third factor. B and C were "straight A" students and showed highest loadings on this factor. Although those students with the poorest grades did not define the positive pole, the students who did load the highest in this direction (A, H, J, and F) were seen as less responsible in academic and social duties and were regarded as not very concerned about school work. This factor was frequently interpreted as "non-studiers vs. studiers." However, it is believed that the negative pole might best be named "dependability."

Only one girl (O) loaded very high on the fourth factor, and she was described as being most outspoken and very sure of herself. This factor was determined to represent a "dominance-submission" dimension. Although no one loaded very high on the submission pole, those loading the highest (A, C, and D) were seen as less likely to defy the group and more likely to go along with ideas even when they did not agree with them.

It is important to note that these factors emerged from estimates made by young, female college students. As such, their opportunities for observing one another and the situations they encountered as a group are not easily generalizable to the general population of

adults. As a social group with few responsibilities, their priorities and experiences might be vastly different than those of the general population of adults. The general population might perhaps evaluate similarity along other dimensions as they seemingly would have different experiences and priorities upon which to base their estimates. However, these obtained factor-dimensions do appear to provide a guideline for further study in the similarity-attraction area.

Attraction and Its Relationships to Similarity Factor-Dimensions

Factors I and III showed very little linear relationship to rated attraction. A slight, statistically nonsignificant, preference was shown for the wealthier, more conservative daters and the more studious or dependable girls. Although no significant preference was shown for the wealthier, more conservative daters, this in itself would not preclude a reliable relationship between similarity on this dimension and attraction. The very fact that all or most girls did not prefer either the wealthier or the less wealthy girls might point to the existence of a preference for those of similar economic standing or dating habits. If those girls who loaded negatively on this dimension preferred other girls who loaded negatively, and if those loading positively preferred others loading positively, a correlation between attraction and this dimension might be very low or close to zero. Those who loaded negatively would be liked best by some, while those who loaded positively would be preferred by others. Averaging the attraction rankings would fail to show this preference difference. This preference difference was shown by the results of a t-test between means of rankings of "own group" as opposed to "other group." The

results showed that those girls loading high and positive on Factor I preferred other girls loading positive, while those who loaded low or negative preferred girls who also loaded low or negative. Byrne, Clore, and Worchel (1966) found a relationship between economic similarity and attraction. Factor I could have some bearing on this type of similarity. The lack of preference shown for girls at either pole of Factor III would lead to much the same speculations. The relationship between similarity on Factor III and attraction was also supported by a t-test between means of "own group" rankings and "other group" rankings. Thus, those girls who were more studious or more dependable preferred others who were more dependable, while those at the opposite pole of Factor III preferred others loading at that end, those less studious and less dependable.

The "sociability" or "extroversion" dimension (Factor II) showed a high relationship to rated attraction. Those seen as more sociable or extroverted were ranked as being significantly more attractive than the more introverted or less sociable subjects. This is in agreement with a finding by Hogan and Mankin (1970). They found that men showed a significant preference for men who ranked high in sociability as defined by the California Psychological Inventory.

The fourth factor, "dominance-submission," was found to be significantly related to rated attractiveness. The more dominant girls were preferred to those who were more submissive. Although this relationship was not as strong as that between attraction and sociability, it supports other previously reported findings. Palmer and Byrne (1970) found an overall preference across Ss for the dominant over the submissive stranger; as did the previously mentioned Hogan and Mankin study (1970) for acquaintances.

If the interpretation of these judgment factors can be accepted, the four dimensions which were spontaneously used, without cueing or suggestion by the experimenter, for similarity estimates and which also showed a relationship to attraction were dominance, sociability, dependability, and dating conservatism. However, all Ss, regardless of their loadings on the dominance and sociability factors, showed a preference for the more dominant and the more sociable peer, while Ss preferred those peers of similar loading on the dependability and dating conservatism dimensions. Thus dominance and sociability were personality styles preferred across Ss while attraction depended upon similarity to S in dependability and dating conservatism, with no general preference across Ss.

Overall Similarity and Attraction

The forementioned correlations were between attraction and each of the four factors and thus were not meant to show a relationship between non-dimensionalized or mean similarity and mean attraction. Such a relationship was shown, however, by the correlation of the mean correlational similarities for each stimulus and the mean attraction values for each stimulus. Those who were seen by the group as being the most highly similar to all members of the group were also seen as being more attractive by the group as evidenced by their average attraction values. This finding of a similarity-attraction relationship also held for those pairs whom the group saw as being similar. A dyadic attraction rank was calculated by averaging the attraction ranks each member of a pair gave the other member (Table 6). This was then correlated with the mean correlational similarity of each pair

(Table 1). Those who were seen by the group as being similar (as expressed by the mean correlational similarities) ranked each other as being more attractive than others whom the group saw as being less similar. A group perception of the similarity of two persons was thus related to the attraction values these individuals gave each other. A more direct method of similarity-attraction measurement would be to correlate an individual's preference ranking of the stimuli with a measure of her own perceived similarity to those stimuli. The following provides a discussion of the results of such correlations.

Correlations Between Each J's Similarity-to-Self Estimates and Attraction Ranks

All Js except two (M and O) showed high correlations between their similarity-to-self scores and their attraction rankings of the stimuli. Thus, those girls who a J saw as being most similar to herself were also the girls to whom she was attracted. Judges M and O, however, did not seem to follow this trend. Descriptions of these two girls suggested possible reasons for such a discrepancy. Although not to the same degree as the others, J M showed quite a tendency to respond in the expected direction. She was described by other subjects as quiet and reserved. She was seen as the least extroverted by the group as shown by her loading on Factor II. She was reluctant when interpreting the factors as she felt she did not know most of the girls very well. Perhaps this lack of rapport or intimacy was associated with the lower correlations between her attraction rankings and similarity-to-self scores. The other and most atypical J (O) showed a very low, but positive, relationship between attraction and similarity-to-self. This judge was described by others as unconventional, most

sure of herself, and very outspoken. She defined the dominance pole of Factor IV almost individually and was singled out as "someone to get to know." Seriousness, understanding, and likability (fourth in the group mean attraction rankings) were other descriptions given her. Perhaps her unconventionality and uniqueness affected her estimates of similarity-to-self and attraction rankings. Whatever the explanation, all people cannot be said to operate under the similarity-attraction hypothesis. However, a correlation of all Js' similarity-to-self scores and produced attraction rankings showed that there does exist a considerable, on the average, relationship between general similarity and attraction.

In terms of the before mentioned Hogan and Mankin study (1970), the present investigation would seem to give a "clique" measure of likability as all subjects were pledges of the same sorority. However, all members of the group had not had opportunities for close interaction as had the Hogan-Mankin sample. Also, some of the pledges never became "active" because of subsequent cumulative low grade averages or lack of interest. Thus these 16 girls could not be called an intimate or typically interacting group at the time of the data collection. They were in the process of getting to know each other, which was also the case with the Hogan-Mankin sample.

The foregoing provides a rationale for comparing the results of this "general liking" investigation with that of Hogan and Mankin. Both investigations found a general preference across Ss for certain personal interaction styles (notably dominance and sociability). However, the present investigation also found a generalized relationship between attraction and similarity, something not found in the Hogan-Mankin

study. This discrepancy in the findings of the two investigations was interpreted as perhaps due to the differences in methods of estimating similarity employed in the two studies. Although the four factors emerging from the present investigation were personality variables as interpreted, they may not have been comparable to the personality variables from the California Psychological Inventory which were used by Hogan and Mankin. However, it is believed that the considerations actually used by the judges in estimating similarity-to-self are more defensible than an a priori determined measure upon which to base similarity. The present investigation was designed under this assumption and does show support (1) for a definite relationship between similarity and attraction, and (2) for a general preference across Ss for persons who "score" high on specific judgmental dimensions extracted from between-persons similarity information.

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