

A NEW MATCHING PROCEDURE BASED ON SIMILARITY AND ATTRACTION

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A dissertation submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
of the degree of

MASTER OF ARTS

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ABSTRACT

In order to avoid some of the problems of conventionally matched groups, such as sample shrinkage, lack of power of generality etc., a new method of matching subjects was proposed: the work of Newcomb (1961) and Byrne and his associates (1971) indicated a strong relationship between similarity of attitudes and attraction and it was believed that this relationship could be incorporated into a procedure that matched subjects on the basis of expressed attraction (friendship).

An exploratory attempt was made to determine which of a number of diverse items (relating to attitudes, self-concept, values and beliefs) exhibited a strong relationship between similarity and attraction for the undergraduate students chosen for this study. Subjects were paired with "close friends" and randomly selected others to determine whether differences existed between the similarity of responses of pairs of each kind.

Significant differences between the two kinds of pairing were found for several of the items used, indicating that with respect to the dimensions measured in this study, matching on the basis of friendship would result in more similar pairs than matching on a random basis.

Suggestions for further research and discussion of the results of this pilot study are outlined in the report.

INTRODUCTION

Anyone involved in experimental research, both in the lab and in the field, probably recognizes the need for a control group which allows the experimenter to decide, on the basis of a reference point, whether or not his experimental manipulation was effective in influencing his dependent measure(s). There exist a number of useful experimental designs which satisfy this decision-making criterion but the two which seem to spring to mind immediately are the random groups design and the matched groups design. In the former design one chooses subjects at random from a "target population" (the population to which one eventually wishes to generalize his results) and randomly assigns subjects to each of his experimental and control conditions. A major assumption of this design is summarized as follows by Plutchik (1968):

The basic assumption of the random groups design is that the random selection procedure will produce groups which are alike initially and which do not differ, on the average, on any variables which are likely to affect the behavior which is to be measured (p. 172).

In brief, this procedure theoretically ensures that the only systematic differences between the experimental and control groups are those due solely to the experimental manipulation(s). In practice these randomization criteria are not always met but, assuming that they have been, one can be reasonably confident about the conclusions which he draws and the inferences that he makes.

Many kinds of studies, however, do not lend themselves to the random groups design. One apparent implication of the design is that the groups must be sufficiently large that, in the long run, they will be equivalent in all respects. In the field especially, this lower limit on size might entirely prevent the use of the completely randomized design. If, for example, one were interested in examining the effects of a new lighting system on the production of a small group of girls in a steno pool and that pool consisted of relatively few individuals, assigning them at random to experimental and control groups might not culminate in two equivalent or homogenous groups.

The matched groups design, on the other hand, allows one to create equivalence amongst the various conditions by actually matching subjects on any criteria deemed important to the investigation. If one knows which variables he would like evenly distributed over all groups, then he selects those individuals (usually in pairs) with the same amounts of each variable and assigns them to different groups. In this manner one ensures equality of groups by creating the groups equal. The variables which one typically matches, are those that might systematically affect the dependent measure(s) differentially, but are not of special interest to the investigator.

An important instance in which a matched groups design is preferable to others, is where we do not wish for our experimental and control groups to be initially equated. If subjects are preselected accord-

ing to their respective positions on some dimension such as I.Q., then the assumption of random selection will be intentionally violated. Suppose we wished to compare the performances of high I.Q. and low I.Q. subjects on some task suspecting that those in the high I.Q. condition would outperform the others. We must take into account the possibility that the subjects in the two different conditions may differ from one another in other respects besides intelligence, as measured by I.Q. scores: Since age, sex and educational background may all vary with intelligence, how can we be sure that any differences in task performance are due solely to differences in I.Q. and not some covarying factor?

The solution is to match our groups with respect to any variable(s) that might be related to the dependent variable (age, sex, etc.). In this manner we can be justifiably sure that the only systematic differences between our groups are due to intelligence the intended variable.

One important limiting factor in matched groups designs is the number of variables to be matched. An example should make this point lucid: if colour of eyes is an intended variable, then we might have two experimental groups (blue-eyed and brown-eyed subjects). Some covarying factors might be color of hair, height, race, etc. In order to control for these potential affectors of our dependent measure(s), we shall have to match the subjects with regard to hair color, height, and so on. If we do this, however, for all such variables, we shall have reduced our original sample of subjects appreciably: One group might contain

only medium-tall blue-eyed blondes, while another might contain only medium-tall brown-eyed blondes. Two such groups will obviously represent only a very small proportion of subjects from our target population and this very fact presents a major obstacle which can be stated in general terms: By creating initially homogenous experimental and control groups, a prerequisite of proper experimentation, conventional matching procedures set a lower limit on the initial population size, and depending on the number of dimensions that need be accounted for by matching, may place that very lower limit at an impractical and unwieldy level. A corollary of this proposition is that complex matching procedures may prove costly to the experimenter, not only in terms of sample shrinkage and subject availability, but as well, in terms of time, equipment, and sheer energy expended in the creation of the desired homogeneity.

An important theoretical, but realistic implication of the above discussion is, that the end product (a completely matched sample), may be quite unrepresentative of the initial target population; it would be fairly difficult to extrapolate results from medium-tall blue-eyed blondes to subjects in general. In short, it (the matching procedure) makes generalization from the final sample to the initial population somewhat dubious.

One striking advantage of the matched groups design, is that employing such homogenous or pure groups magnifies the ability of the design to detect very small influences of the intended experimental manipulation.

Matheson, Bruce, and Beauchamp (1970) list some advantages of the matched design:

Matching is efficient in controlling individual differences (that is, between groups variance). . . . A matching design is more sensitive to small experimental effects (for example, small differences in levels of the independent variable) than designs using random assignment. Difference scores (the difference between scores from matched subjects) are simple to analyze and interpret (p. 48).

It would seem that a procedure which reduces the costs of matching, yet which retains some sensitivity to small intended experimental manipulations, would be a valuable and desirable methodological tool. It is toward the goal of developing such a procedure, that this research was aimed.

Matching consists of selecting subjects for each experimental condition who are similar enough to one another, that for all intents and purposes, the summed conditions constitute one larger homogenous group save for the experimental differences we intend to create. Logically, if we choose subjects on the basis of similarity, the homogeneity criterion will be at least partly satisfied.

The interpersonal attraction literature abounds with studies involving person similarity: many common notions about interpersonal attraction, such as "birds of a feather flock together" are empirically

investigated; the implicit message in these "obviously intuitive" adages is that attraction varies with similarity. The literature in this area addresses itself to the complementary theory (the theory that opposites attract) as well, but support for this view is sparse and this review will deliberately ignore this area of the literature as the "similarity hypothesis" has received more attention and more experimental attention. Newcomb (1956) has suggested that similarity on a number of characteristics, predisposes individuals to be attracted to one another, and they will be attracted to the degree that those characteristics provide a basis for similarity. One of the propositions to which Newcomb addressed himself, was whether or not attitudinal similarity produces and predicts interpersonal attraction. To answer the question, Newcomb (1961) gave rent-free accommodation to transfer students at a dormitory at the University of Michigan in return for a specified number of hours of participation in social research. Students were not acquainted with one another previous to their sharing of accommodations and before arriving, each completed a variety of attitudinal, belief, and value surveys. The attraction patterns which developed throughout the school term were predictable near the end of the year (although not initially) on the basis of preacquaintance similarity.

Because of the absence of attraction before arrival at the school, one might infer that the students were attracted to one another as a consequence of their similarity: attitudinal similarity facilitated friendship

or long lasting attraction, but was not a good predictor of initial attraction. This, of course, does not nullify the converse, that attraction facilitates attitudinal similarity (I shall return to this proposition later). Newcomb attributed much of this relationship to the homogeneity with regard to age, sex and student status of his subjects. There was a reduction in the variability of the students' attitudes from what one might expect with a more variable or heterogeneous sample of subjects.

Byrne and his associates have devised a laboratory procedure for studying the relationship between similarity and attraction (Byrne, 1971). In this procedure, the subject fills out an attitudinal survey (see Appendix B). Some time later, the subject is asked to make judgments about a stranger, given only the stranger's responses to the same attitude survey (actually, there is no stranger; the responses are filled out by the experimenter and are made to be similar or dissimilar to the subject's responses). Attraction is measured by the subject's responses toward the bogus stranger on two items of an Interpersonal Judgement Scale (Byrne, 1966): items 5 and 6 (see Appendix A). On these items, the subject is requested to rate the bogus stranger in terms of likeability and desirability as a potential work partner. An attraction rating is obtained by summing the scores for the two items (each item consisted of a seven-point scale) yielding maximum and minimum scores of 14 and 2 respectively. Byrne (1971) has demonstrated many times,

that a significant relationship exists between attitudinal similarity and attraction, and further, that the level of attraction is proportional to the percentage of attitudinally similar statements made by the target individual.

Newcomb (1956) proposed that the importance of topics chosen for use would have a profound effect on the relationship between attitudinal similarity and attraction. As a result, he restricted his study to important topics only. Byrne and Nelson (1964, 1965) tested the issue of topic importance employing 4 separate fourteen-item questionnaires, ranging in order of topic importance from highest (belief in God, war, college education etc.) to lowest (gardening, tipping, etc.). No effect was found for differential topic importance.

A third study in the series (Byrne, London, and Griffitt, 1968) showed a significant effect for topic importance on attraction for the following situation: when a single stranger expresses attitudes on more than one level of topic importance then the different levels exert different influences on attraction; when a single stranger expresses attitudes on a single level of topic importance then the important and unimportant topics have the same effect. Clore and Baldridge (1968) replicated these latter results, employing measures of topic interest (as indicated by subjects beforehand) rather than topic importance. The Illinois Ratings of Interest (used by Clore and Baldridge) and the Texas Ratings of Importance (used by Byrne et al) were shown to correlate .80.

Byrne (1971) has cited test-retest reliability coefficients for some of the attitude items in the survey, ranging from .55 to .95 over a two week period. Griffitt and Nelson (1970) demonstrated that in the absence of additional information, the initial impressions formed by subject of strangers were relatively stable over short time periods (actual similarity between the subjects and bogus strangers correlated .83 with recalled similarity, measured a week later).

The attitudinal similarity-attraction relationship has been shown to be relatively stable and predictable and the relationship of topic importance to these other factors has been outlined but in order to extend these relationships, as found using the Byrne design, to real-life situations two further propositions must be supported: It must first be shown that other modes of presentation of attitudinal similarity share the same functional relationship with attraction that the paper-and-pencil survey of attitudes does: Second, it must be demonstrated that other more realistic measures of attraction are influenced in the same manner as ratings on the Interpersonal Judgement Scale (IJS). Byrne (1971) has referred to these modes of presentation and attraction measures as stimulus and response generality respectively. To study stimulus generality, Byrne and Clore (1966) examined the differential effects of attitudinal similarity-dissimilarity on attraction for three separate groups of subjects: The first group was presented with attitudinal information via the Survey of Attitudes (the usual format of presentation in the Byrne procedure); the second group received identical information

via audio tape; and the third group obtained the same information by viewing a colored movie with sound track. No differences were found between the attraction scores for the three modes of presentation.

The crucial extension of stimulus generality has come from studies involving face-to-face encounters; here the literature is not as clear-cut as one would wish. McWhirter and Jecker (1967) compared attitudes presented by a real stimulus person to those presented by a "paper-and-pencil stranger". Holding proportion of similar attitudes expressed constant no effect was found to be due to stimulus manipulation. The relationship between attitude similarity and attraction has been supported by others, also involved with face-to-face encounters (Byrne and Griffitt, 1966; Brewer and Brewer, 1968). Some investigators have reported similar findings, except that the positive effect on attraction due to attitudinal similarity was heightened when the stranger was present as opposed to absent: the relative differences between attraction for different levels of similarity was not altered only their absolute values changed (Griffitt and Guay, 1969; McDonald, 1962; and Wiener, 1969).

The Brewer and Brewer (1968) study deserves some expansion because of the important gap that it bridges between artificial and realistic modes of stimulus presentation. In that study subjects were selected on the basis of their attitudes toward capital punishment. Some felt

strongly in favour of capital punishment while others were strongly opposed to it. Subjects were then paired of half the subjects were similar to their partners while half were dissimilar. A twenty-minute discussion ensued for each of the dyads about the issue of capital punishment. At the end of the discussion period each subject rated the attractiveness of his discussion partner; a statistically significant correlation was obtained between similarity (vis a vis the specialized attitudinal scales employed in the study) and attraction ($r = .62$).

An additional series of studies was undertaken to investigate the effect of personal evaluations of subjects by others, as compared to attitudinal similarity (Aronson and Worchel, 1966; Byrne and Griffitt, 1966a). Aronson and Worchel used the standard "Byrne design" with the following exceptions: (a) the subject interacted with a stooge rather than with a bogus stranger; and (b) at the end of the interaction the confederate gave the subject written feedback as to how much the subject was liked by him. The personal evaluation of the subject was found to exert a significant influence on the subject's attraction ratings of the confederate while the attitudinal similarity variable seemed not to have any effect. Byrne and Griffitt later reported that the Aronson and Worchel study had restricted the range of attitudinal similarity too much, so by including other degrees of similarity besides those used by Aronson and Worchel they were able to extend the range for their own study. Within this context it was found that both variables (similarity and personal evaluation) exerted influence on the attraction measure and the personal

evaluation exerted approximately three times the effect that attitudinal similarity showed.

It is clear that various investigators have extended the relationship between attitudinal similarity and attraction to more realistic modes of presentation, namely face-to-face encounters. Further, personal evaluation of the subject by an "other" (expression of positive or negative feelings toward the subject) shows a profound influence on attraction.

In addition to the extension of the similarity-attraction relationship to other stimulus modes several studies indicate that the relationship also holds for populations other than college undergraduates: Children down to the fourth grade and adolescents (Byrne and Griffitt, 1966b); female clerical workers (Krauss, 1966); Jobs Corps trainees, surgical, alcoholic and schizophrenic hospital patients (Byrne, Griffitt, Hodgins, and Reeves, 1969); and senior citizens (Griffitt, Nelson, and Littlepage, 1972). The similarity-attraction relationship has also been shown not to be culturally bound, in a study involving Japanese, Indian, and Mexican students (Byrne, Gouaux, Griffitt, Lamberth, Murakawa, Prasad, Prasad, and Ramirez, 1971).

The other requisite condition mentioned earlier was that of response generality. If one could show that the similarity-attraction relationship manifested itself in realistic response modes, then it would seem reasonable to suggest that the relationship probably exists "out

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in the real world".

The IJS, already described earlier, has been shown to correlate highly with other attraction response measures that deal with social interactions of varying degrees of closeness: A social distance scale (Schwartz, 1966); social choice in dating behavior for males (Moss, 1969); ratings of desirability, as a date, sexual partner, and spouse (Byrne, Ervin, and Lamberth, 1970); voluntary physical proximity (how close a subject would sit to a confederate posing as a fellow participant, following an attitude similarity-attraction experiment) (Byrne, Baskett, and Hodges, 1971; Byrne, Ervin, and Lamberth, 1970); visual contact (Efran, 1969); and voting choices where prospective candidates were represented as sharing similar or dissimilar attitudes with the subject (Byrne, Bond, and Diamond, 1969).

In summary to this point: It has been demonstrated that there is a very strong relationship between attitudinal similarity and attraction. From a knowledge of attitudinal similarity one can predict the extent of attraction. That this relationship is not restricted to topics of importance (except under certain specifiable conditions) has been supported, as well as the stability of this relationship over time. Further, investigators have provided evidence to suggest that the relationship holds for other intracultural populations as well as being borne out in cross-cultural studies. The relationship is not constrained to unique response modes, such as Byrne's IJS.

Returning for a moment to the initial task of this present research, to develop a matching procedure based on a "similarity of characteristics" approach, one should not be blind to the existence of the above relationship (the similarity-attraction relationship), but due to the correlational nature of the data, he should realize that inference about directionality of any casual relationships are consequently obscured. Does knowing something about the degree of attraction within a dyad allow us to infer something about attitudinal similarity? Within the framework of the Byrne paradigm, the answer would appear to be "Yes", just as the converse has already been shown to apply (Newcomb, 1961, for example).

Moss (1970) manipulated liking by creating bogus strangers' IJS responses; he then asked subjects to complete attitude surveys as they thought the strangers would have (the only information available to the subjects were the IJS's which the experimenter asked them to assume was filled out by them, about a stranger). The correlation between the liking response and the attitudinal similarity resembled that typically obtained in the usual Byrne procedure. These results were corroborated by other investigators (Byrne, 1971).

How does all this contribute to developing a "new and improved" matching procedure? I have already discussed the issue of homogeneity as a requisite condition for well matched groups; the key to an "inexpensive"

matching procedure would be the ability to select groups from the target population which already happen to be relatively homogenous. If, for example, we chose subjects at random and placed them into an experimental group and then recruited "close friends" of the subjects in the experimental group to act as the control group, we might obtain two groups which were well matched on at least certain dimensions. A most important consideration is whether or not the groups would be sufficiently similar to one another that for most purposes they could in fact constitute matched samples. Is it reasonable to assume that "friendship" produces enough similarity to satisfy this "sufficiency" condition? Friendship usually entails attraction (though one could undoubtedly think of exceptions to this rule) and on the basis of the evidence presented for the relationship between similarity and attraction (at least attitudinal similarity), one might infer a degree of similarity between friends with regard to their attitudes. Of course attitudes are not the sole interest coveted by psychologists, though undoubtedly they are a popular one, so we should like to show similar relationships between attraction and other variables as well.

The relationship between personality and interpersonal attraction has received considerable attention in the past; Berscheid and Walster (1969) had this to say about personality and attraction:

A few investigators, . . . have found positive correlations between friends'

personality traits. Generally, however, positive correlations have not been obtained with the great regularity with which positive correlations between attitudinal similarity and attraction have been found. In addition, positive personality correlations are much lower than attitudinal correlations (p. 78).

Berscheid and Walster cite one example of a positive relationship between personality and friendship, as well as one example of little or no relationship between the two variables, and then seem to assume that the relationship is a weak one. Certainly there are inconsistencies in the literature: Banta and Hetherington (1963) and Izard (1960) have suggested that similarity of personality fosters attraction, while Hoffman (1958) and Hoffman and Maier (1966) found no relationship between personality and attraction. Several others support both camps, but as Byrne, Giffitt, and Stefaniak (1967) point out, none of the investigators takes into account the multidetermined nature of attraction responses, by controlling for other potentially contaminating factors (propinquity, physical attractiveness, attitude similarity-dissimilarity, etc.). As well, they feel that personality has been defined in too restrictive a manner; in Byrne's words (1971):

The situation, then, is one in which the effect of a very limited number of independent variables on attraction is determined in a context where n...l uncontrolled independent variables are operating. Only if the variable under

investigation were of sufficient strength to override all other independent variables or if a sufficient number of the other independent variables happened to covary with it or if the other variables were accidentally controlled through randomization would the hypothesized relationships be observed (p. 166-167).

Byrne, Griffitt, and Stefaniak (1967) investigated the relationship between personality and attraction in the usual Byrne procedure, except that instead of filling out the survey of attitudes, subjects were requested to complete a modified version of the Repression-Sensitization (R-S) scale (the R-S scale measures characteristic responding to anxiety-evoking stimuli) (Byrne, Barry, and Nelson, 1963; Byrne, 1964). A significant and linear relationship was found between personality similarity (as defined by the R-S scale) and attraction. These results are also supported by Byrne and Griffitt (1969).

Using the same kind of design other investigators have found a positive relationship between attraction and various other personality dimensions: self-concept (Griffitt, 1966; Griffitt, 1969); need for approval (Goldstein and Rosenfield, 1969; Nowicki, 1971); self-esteem (Hendrick and Page, 1970); extroversion (Hendrick and Brown, 1971), where introversion was not found to be significantly related to attraction); dominance-submissiveness (Palmer and Byrne, 1970); and internal-external control (Phares and Wilson, 1971).

One can only suggest that given the same experimental design and

more time, other personality dimensions besides these, might be shown to be related to attraction in like manner. Thus far, it has been shown that attraction is related to attitudinal similarity and to personality similarity (within the confines of the particular personality dimensions mentioned above), but personality and attitudes do not exhaust the major interests of psychological research (although they do constitute a major portion of the psychological literature).

Other non-attitudinal and non-personality similarities have demonstrated a relationship to attraction: intellectual similarity and similarity of abilities (Jones, 1929; Richardson, 1939; Zander and Havelin, 1960; Reed and Reed, 1965; London, 1967; Reagor and Clore, 1970); economic similarity, (Lundberg, 1937; Lundberg and Steele, 1938; Smith, Form, and Stone, 1954; Byrne, Clore, and Worchel, 1966); task performance (Senn, 1971; Zandler and Havelin, 1960); emotional states (Zimbardo and Forica, 1963); perceived social desirability (Berscheid and Walster, 1971; Moss, 1969); and physical attractiveness (Walster, Aronson, Abrahams, and Rottman, 1966; Byrne, London and Reeves, 1969; Berscheid and Walster, 1974).

The literature on interpersonal attraction is so extensive, that one hardly knows what variables to include and which to omit: a myriad of investigations seem to suggest a relationship between proximity and attraction, but one cannot know, for the most part, whether it is physical proximity per se or a host of other related variables which is

producing the observed effect (the problem here is much the same as that inherent in the earlier studies examining the relationship between personality and attraction).

The variables acknowledged and reported in this review seem to be those of interest to many psychologists and consequently are the ones for which sufficient evidence exists to justify their inclusion in the present research.

Certain variables have been suggested as covarying with attraction in more than just a weak fashion; others are reported as varying with attraction but the relationship would not appear to be as strong. Many of these variables are of continuing interest to psychologists in many different areas of research. If the resulting matching procedure proposed here is to be a useful one, it should incorporate similarity along several of those dimensions mentioned.

Friendship and attraction seem not to have been delineated in the literature; the unwritten assumption seems to have been that if someone is your friend, then you will like him, or at least be attracted to him (the latter proposition seems to be the safer of the two) in most circumstances. The present research did not explore the viability of this implicit assumption, but rather, employed it. The justification of the assertion, however, does to the author's knowledge lay in its "intuitive truth", not in empirical fact.

It was proposed that by selecting experimental and control subjects on the basis of friendship (to wit, attraction), groups would have been obtained which are sufficiently homogenous on several dimensions that they could be considered matched to a specifiable extent. It was the purpose of the present investigation to determine empirically which of several dimensions could be matched employing a friendship basis for the matching. Specifically, many different and varied items were examined for similarity by respondents paired on a friendship basis: The intention was to test the proposition that selection of subjects on the basis of friendship alone would yield adequately matched groups on a number of dimensions (attitudes and beliefs; values; self-concept; and other demographic dimensions), such that the matching procedure employed would satisfy the criterion of homogeneity in designs desiring a matching procedure.

METHOD

Subjects

Three hundred male and female subjects were selected initially from the Department of Psychology Subject Pool at the University of Manitoba. All subjects participated in Phase I of the study. Of these three hundred subjects, fifty-seven were selected on a cooperative basis, to participate in Phase II of the study, which entailed the recruitment of one friend each from outside the initial sample, for the purpose of additional study.

Apparatus

Assessing attitudes and beliefs: Attitudes were assessed employing a short form of the Survey of Attitudes (Byrne, 1971). The items which made reference to student activities were deleted from the questionnaire, as it was anticipated that some of the "recruited friends" might not be students (for these subjects, student oriented items would not be relevant). In all, 25 items from the Survey of Attitudes were administered, ranging in topic importance, from trivial to meaningful (from gardening and tipping to war and college education). Each item consisted of a single topic, followed by a six-point scale on which the subject was requested to rate each topic, either positively or negatively (see Appendix B).

Assessing self-concept: Subjects' favourableness of self-concept