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Does similarity always lead to attraction?

A quantitative research synthesis of the similarity effect

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Abstract

To evaluate the robustness of similarity's influence on interpersonal attraction, we collected 385 effect sizes from 293 laboratory and field investigations. Results from the quantitative research synthesis suggested that although the similarity effect was strong in laboratory investigations, the effect was small to non-significant in field investigations. Three additional findings relevant to the robustness of the similarity effect were also noted: (a) moderators significant in the laboratory were not significant in the field; (b) although attitude similarity produced more attraction than personality traits in laboratory investigations, personality trait similarity produced more attraction than attitudes in field studies; and (c) after taking into consideration biases in the publication process, the effect for similarity in field studies was no longer significant. Potential explanations for these results are discussed.

Does similarity always lead to attraction?

A quantitative research synthesis of the similarity effect

Tremendous anecdotal and empirical evidence has suggested that similarity breeds attraction. This phenomenon -- dubbed the *similarity effect* -- has been evidenced using personality traits (e.g., Banikiotes & Neimeyer, 1981; Bleda, 1974; Russell & Wells, 1994), attitudes (e.g., Byrne, Baskett, & Hodges, 1971; Hoyle, 1993; Tan, 1995), physical attractiveness (e.g., Hill, Rubin, & Peplau, 1976; Peterson & Miller, 1980; Stevens, Owens, & Schaefer, 1990), and hobbies (e.g., Curry & Emerson, 1970; Werner & Latané, 1976; Werner & Parmelee, 1979) and has been documented in both laboratory manipulations (e.g., Byrne, 1965; Byrne & Nelson, 1964; Storms & Thomas, 1971) and field investigations of existing relationships (e.g., Amos, 1970; Carli, Ganley, Pierce-Otay, 1991).[1] In turn, many theorists regard the similarity effect as a fundamental rule of interpersonal attraction (e.g., Berschied & Walster, 1978; Byrne, 1971; Hatfield & Rapson, 1992). Based largely on the strength of the laboratory data, relationship researchers have become convinced of the robustness and strength of the similarity effect. For example, Berger (1975) proclaimed that the similarity effect is "one of the most robust relationships in all of the behavioral sciences," (pg. 281) whereas Layton and Insko (1971) declared that similarity is "one of the best documented generalizations in social psychology" (pg. 149).

Despite overwhelming empirical evidence and ubiquitous anecdotal evidence in support of the similarity effect, a persistent undercurrent of evidence over the past 20 years has questioned the robustness of the similarity-attraction link. For example, one line of research argues that the similarity effect may be limited to laboratory conditions and to a narrow band of strongly valenced stimuli (Kaplan & Anderson, 1971; Horton & Montoya, 2004). Further, in a

lengthy line of research, Sunnafrank (1992) argued that typical methods to evaluate the similarity effect (e.g., *the phantom-other technique*) do not accurately represent and replicate actual relationship formation. As a result, the similarity effect is limited to artificial situations in which raters never meet the target other. In the following sections, we outline a quantitative research synthesis to evaluate the robustness of the similarity effect. We investigate the ability of similarity to produce attraction across various stimuli, research conditions, and relationship types. We begin by providing a brief history of the similarity effect and then by describing the most accepted explanations of the similarity effect.

Brief History of the Similarity Effect

The link between similarity and attraction was first evidenced in investigations of similarity between relationship partners. Sir Francis Galton (1871) was one of the first to investigate this topic, finding a tendency for individuals similar on intellectual attributes to be paired together. Between the time of Galton and the late 1940's, numerous researchers detected similarity between friendship, dating, and married couples for attitudinal, demographic, and intellectual attributes (e.g., Himes, 1949; Hoffeditz, 1934; Kelly, 1940; Kirkpatrick, 1937; Terman, 1938; Terman and Buttenwieser, 1935). For instance, Hunt (1935) found that married couples' attitudes were more strongly correlated than were the attitudes of random pairs of individuals, whereas Richardson (1940) found small, but significant, correlations between college friendship pairs for a wide variety of attitudes. Although many of these studies documented similarity between relationship members for various personality traits or attitudes, they did not attempt to establish a causal relation between similarity and attraction.

Byrne (1961a) took this next step by developing a laboratory procedure to investigate the causal link between similarity and interpersonal attraction. This procedure was based on a

method developed by Smith (1957) and was later dubbed the phantom-other technique. The procedure began with participants completing a self-report measure of attitudes. Next, participants were asked to participate in a person-perception task in which they would form an impression of and then evaluate another person (the target). Attitude similarity was manipulated by presenting a simulated target who was either attitudinally similar or dissimilar. After receiving the similarity information, the participant typically completed the Interpersonal Judgment Scale (IJS; Byrne & Wong, 1962), on which the participant evaluated the target's intelligence, knowledge of current events, morality, and adjustment, as well as how much the participant would like the target, and to what extent the participant would like to meet the target. The last two items were summed to produce the assessment of interpersonal attraction.

Research using the phantom-other technique documented consistently that individuals were more attracted to those who held similar, rather than dissimilar, views (Byrne, 1971; Byrne, Clore, & Smeaton, 1986). Based on repeated empirical observations using this method, Byrne and colleagues (Byrne, 1971; Byrne & Rhamey, 1965) concluded that attraction to others is a linear function of the proportion of similar attitudes (which Byrne and Rhamey dubbed the *law of attraction*). Numerous researchers followed this lead and produced evidence of the phenomenon's robustness. The similarity effect has since been observed in school children (Byrne & Griffitt, 1966a; Gaynor, 1976; Tan & Singh, 1995) and undergraduates (Clore & Baldridge, 1970; Hoffman & Maier, 1966) and is supported by evidence using personality traits (Singh, 1973; Steele & McGlynn, 1979; Tesser, 1969) and attitudes (Bond, Byrne, & Diamond, 1968; Byrne & Clore, 1966).

Classic Views of the Similarity Effect

To explain the relationship between similarity and interpersonal attraction, Byrne (1971)

borrowed concepts from cognitive dissonance theory (Festinger, 1957) and classical conditioning and argued that similar attitudes serve as reinforcers. According to Byrne's perspective, individuals have a fundamental need for a logical and consistent view of the world (what he called *the effectance motive*). Individuals favor stimuli that reinforce the logic and consistency of their world. People who agree with us validate our ideas and attitudes and in so doing, reinforce the logic and consistency of our world (i.e., satisfy our effectance motive). Similar people are reinforcing and thus, are associated with positive feelings, which in turn, leads to attraction. People who disagree with us create inconsistency in our world (i.e., do not satisfy the effectance motive) and are associated with anxiety and confusion, feelings that lead to repulsion or, at the very least, lack of attraction. Byrne and colleagues combined this theoretical framework with the empirically derived law of attraction and labeled it the *reinforcement model* (Byrne, Clore, Griffitt, Lamberth, & Mitchell, 1973).

A key dissenting view of the similarity effect's causal mechanism was spawned by information integration theorists (e.g., Kaplan & Anderson, 1972). According to these researchers, an individual's attitudes convey information about the attributes of the individual. Because we tend believe that our own attitudes are correct and good (Stallings, 1970; Tashakkori & Insko, 1981), we infer positive information about those who share our attitudes and negative information about those who do not share our attitudes. As such, information integration theorists point to the valence of the information implied by an attitude as the operative mechanism of the similarity effect (e.g., Ajzen, 1974, Lydon, Jamieson, & Zanna, 1988; McLaughlin, 1970; Montoya & Horton, 2004).[2]

Potential Moderators of the Similarity Effect

To evaluate the robustness and strength of the similarity effect across stimuli and

experimental manipulations, we reviewed 293 studies that assessed similarity's influence on interpersonal attraction. 42 of those studies were *field studies* (studies that assessed similarity when no manipulation of the partner's attributes occurred) and 251 of those studies were *laboratory studies* (studies in which similarity was measured after manipulating the partner's attributes). Our review of the similarity literature identified six variables that moderated the similarity effect: attitude vs. personality trait similarity, centrality of attitudes, set size, proportion of similarity, type of attraction assessment, and amount of social interaction wit the target person.

Attitude vs. Personality Similarity

One pervasive moderator of the similarity effect is the type of stimulus on which one is regarded as similar to or dissimilar from a target. Attitudes and personality traits are the two types of stimuli that are most often manipulated and/or assessed in similarity research. Early research in the laboratory setting found that personality trait similarity could lead to interpersonal attraction (e.g., Byrne, Griffitt, & Stefaniak, 1967). However, Singh (1973) found that attitude similarity produced more attraction than personality trait similarity, a result that was also supported by a review by White and Hatcher (1984).

Centrality of Attitudes

A frequently assumed moderator of the similarity effect is the centrality, or the importance, of the attitudes used in the description of the target other. Newcomb (1956) argued that "the discovery of agreement between oneself and a new acquaintance regarding some matter of only casual interest will probably be less rewarding than the discovery of agreement concerning one's own pet prejudices (pg. 578)." After initial failures to detect an effect for centrality of attitudes (e.g., Byrne & Nelson, 1964), two studies (Clore & Baldridge, 1968;

Byrne, London, & Griffitt, 1968) noted that central attitude similarity produced more attraction than peripheral attitude similarity.

Set Size

Set size refers to the number of stimuli used to manipulate and assess similarity. Previous research has been inconsistent regarding the impact of set size on attraction (Byrne, 1971). Byrne and colleagues reasoned that the lack of consensus is due to the problems of demand characteristics or response frequency. These two problems have consistently plagued laboratory studies devoted to comparing the impact of different set sizes on attraction (Byrne, Clore, Griffitt, Lamberth, & Mitchell, 1973). In spite of such inconsistencies and based on specific empirical evidence, Byrne and Rhamey (1965) developed the law of attraction that stated that attraction is a function of the proportion of similar attitudes regardless of whether 10 or 100 attitudes were used in the similarity manipulation.

Proportion of Similarity

We assessed the proportion of similarity as a potential moderator of the similarity effect. The underlying assumption of reinforcement models of similarity is that positive reinforcements derived from the relatively large percentage of similar attitudes cause interpersonal attraction. The reinforcement model predicts a positive relationship between proportion of similarity and attraction: as proportion of similarity increases, so does attraction. Byrne (1962) manipulated seven progressive levels of proportion of similarity and found that attraction increased linearly. Moreover, in additional studies designed to investigate different proportions of similarity, both Byrne and Nelson (1965) and Byrne and Rhamey (1965) found similar results.

It is important to note that this moderator may be of profound theoretical interest but is specific to laboratory investigations. Laboratory studies have usually manipulated the degree of

similarity between the participant and the target other, whereas field studies, by nature, assessed the amount of similarity between relationship partners, and then related that degree of similarity to the amount of attraction in the relationship. Thus, proportion of similarity can only be calculated in, and thus is only a potential moderator for, laboratory studies.

Type of Attraction Assessment

Is the similarity effect larger when assessed using self-report rather than behavioral measures? Given the subjective nature of interpersonal attraction, it is not surprising that the large majority of interpersonal attraction assessments are self-report. The most common self-report instrument used in similarity research is the Interpersonal Judgment Scale (IJS; Byrne, 1971), which includes two assessment items: one assessing behavioral attraction ("How much would like to meet with this person?") and one assessing affective attraction ("How much do you think you would like this person?") that are commonly preceded by four "filler" items (that assess the target person's intelligence, morality, knowledge of current events, and adjustment). Montoya and Horton (2004) point to the importance of these "filler" items to the size of the similarity effect. Indeed, the filler items may serve to make salient one's overall cognitive evaluation of the target person. This salience, in turn, polarizes attraction responses by making the perceiver aware of the target person's overall quality. As such, assessments of interpersonal attraction that are preceded by an overall cognitive evaluation may produce more attraction from similar and less attraction from dissimilar others.

With respect to behavioral versus affective attraction responses, some researchers have argued that attraction assessments should assess affective responses to others (Huston & Levinger, 1978) that should then predict behavioral responses (Ajzen & Fishbein, 1977). Given this thinking, one would expect larger effects for the most "direct" assessments of interpersonal

attraction (the affective measures) and smaller effects for the behavioral measures. Consistent with this notion, research assessing interpersonal attraction using behavioral measures (e.g., seat distance, eye contact, number of smiles) tends to find effects that are somewhat smaller than those found with "paper-and-pencil" assessments of affective attraction (Golightly, Huffman, & Byrne, 1972; Snyder & Endelman, 1979).

Amount of Social Interaction

Several researchers have argued that the similarity effect does not exist outside of the laboratory, and thus, does not generalize to actual relationships (e.g., Bochner, 1991; Sunnafrank & Miller, 1981; Wright, 1971). Sunnafrank and Miller (1981), in particular, suggest that the phantom-other technique does not provide an appropriate test of the way that similarity might function in actual relationships. Sunnafrank and Miller argue that the phantom-other context is artificial: The procedure provides attitudinal information about a target person before interaction and before a time in which information about a target would normally be learned. After all, in "natural" relationships, individuals do not initially learn the target person's ten relevant attitudes or their agreement or disagreement with these attitudes. Initial interactions tend to be marked by pleasant shallow conversations -- where disagreement would be more indicative of a violation of social norms than a source of attitudinal punishment (Sunnafrank, 1992). Thus, the phantom-other approach does not represent a typical manner in which individuals become acquainted.

To investigate these notions, Sunnafrank and Miller (1981) arranged for individuals to be paired together based on their similarity or dissimilarity on two controversial topics. In the "no interaction" condition (analogous to the phantom-other technique), the participants exchanged attitudes and then rated their attraction to their partner. Participants in the "initial-interaction" condition exchanged attitude questionnaires, spent five minutes talking with their partner and

then rated their attraction to their partner. Sunnafrank and Miller found that there was a large effect for similarity in the "no interaction" condition but that the effect of similarity was eliminated in the "initial-interaction" condition. This result and replications of it (Sunnafrank, 1983; 1985; 1986) seem to indicate that the similarity effect is only a laboratory phenomena caused by the solitary similarity information given in an otherwise informationless, artificial setting.

Amount of Interaction with a Target. Investigations of the similarity effect have assessed similarity after no interaction between participant and target (i.e., the basic phantom-other technique), after brief interaction between participant and target (e.g., procedures akin to the procedures developed by Sunnafrank & Miller, 1981), and between partners who interact at great length and in a variety of contexts (i.e., studies that assess *existing relationships*). The impact of similarity on attraction is largely unquestioned (Berschied & Walster, 1978; Byrne, 1971; Hatfield & Rapson, 1992). However, research assessing the similarity effect after a short interaction with a partner has provided equivocal results. Initial investigations of the similarity effect after a brief interaction detected an effect for similarity (Byrne, Ervin, & Lamberth, 1970; Cappella & Palmer, 1992). Cappella and Palmer (1992) propose that similarity leads to interpersonal attraction in relationships because (a) similarity provides continuous reinforcement throughout the relationship, and (b) dissimilarity should eventually be extinguished due to the lack of reinforcement (see Davis & Rusbult, 2001). However, as discussed above, Sunnafrank (Sunnafrank, 1983, 1985, 1986), in a lengthy line of research, demonstrated that a short interaction with the target person eliminates the effect for similarity. Finally, investigations of the similarity effect in existing relationships -- defined as studies that measure the amount of similarity and attraction in romantic relationships -- tend to find small, but positive, effects for

similarity (White & Hatcher, 1984). In a review of the similarity effect in established relationships, Pickford, Signori, & Rempel (1966) found that relationship partners were more similar than would be expected by chance, though the effect was quite small.

Additional factors

In an effort to investigate thoroughly research on the similarity effect, we assessed numerous other factors that may contribute to the power of similarity to influence interpersonal attraction. Specifically, we coded for author(s), location, source (journal, edited volume, thesis or dissertation, and unpublished manuscript), sample (college students, adults, or schoolchildren), type of relationship (phantom other, stranger, dating partner, marriage partner), recruitment method (participant pool, monetary incentive, or volunteer), and sex composition of the sample (e.g., all men, all women, men and women in interactions that were homogenous with respect to sex, and men and women in interactions that were heterogeneous with respect to sex).

Publication Bias

As with all syntheses of research, it is important to acknowledge that any observed effects may be due to the relative publication rate of positive significant effects compared with small, negative, or nonsignificant results. This pattern may result from either self-censorship by the authors or by elimination during the editorial process. However, an advantage of the meta-analytic process is that it can account for such bias in the available research by determining whether researchers are more likely to observe significant studies with large effect sizes compared with small or negative results.

To assess publication bias, we first examined the funnel plot for evidence of any bias in the publication process (Light & Pillemer, 1984). A funnel plot, which is a scatter plot of effect sizes by the sample size, should reflect a relatively normal distribution curve: Studies with large

samples should be in the middle of the distribution (because larger sampled studies better represent the true population mean), whereas smaller studies, because of their greater variability, should compose both the positive and negative tails of the distribution. If such a funnel plot provides evidence of publication bias (e.g., the positive or negative tail of the distribution is "thin" or missing; Vevea & Woods, 2004), we would employ a recently developed technique that allows one to assess the impact that such missing studies would have on the sample mean if those missing studies had been included in the analysis.

Laboratory versus Field Studies

Studies that investigated the similarity effect can be categorized into two distinct categories: field studies and laboratory studies. The important distinction between these studies is how they assessed and manipulated similarity: laboratory studies manipulated the attributes of an unmet other, whereas field studies did not include a manipulation of the target other's attributes. In laboratory studies, little more than the similarity information is made available to the participant, whereas in field studies sometimes months of experiences, memories, and interactions can contribute to the amount of information available to the participant. Given the methodological differences between these two types of studies, we considered it appropriate to analyze laboratory and field studies independently. However, the laboratory versus field distinction also provided a valuable comparison by which to assess the robustness of the similarity effect. After all, moderators of the similarity effect in laboratory investigations should also moerate the similarity effect in field investigations. This way of viewing the results is similar to the Anderson and Bushman (1997) method to defend the external validity of laboratory expressions of aggression. Anderson and Bushman demonstrated that the same variables that moderated aggressive responses in the laboratory also did so in the field. In a similar vein, the

robustness of the similarity effect would be bolstered if variables that moderate the power of similarity in laboratory studies (such as the type of stimuli used) also moderate the similarity effect in existing relationships.

The Present Quantitative Research Synthesis

The purpose of this quantitative research synthesis was to assess the robustness of the similarity effect across various moderators and contexts. Three questions speak to this purpose: (a) is the similarity effect similar for laboratory and field studies across various research methods?; (b) do the variables that moderate the effect in laboratory settings moderate similarly in field settings?; and (c) given its theoretical underpinnings, do the variables thought to moderate the similarity effect do so?

Method

Sample of Studies

We began by conducting an electronic literature search using the PsycINFO (1887 – July 2002) and *Dissertation Abstracts International* (1861 - July 2002) databases. Keywords were 'similarity,' 'attraction,' 'attitude,' 'reinforcement-affect,' 'personality,' 'ideal self,' 'dissimilarity,' 'homogamy,' 'complimentary,' 'repulsion,' and 'liking.' We also sent a request for relevant studies to an Internet discussion forum commonly used by social psychologists (spsp-discuss@stolaf.edu). Additionally, we conducted a backward search of reference sections of the retrieved articles until we found no new entries. Finally, we contacted 15 investigators, all of whom had repeatedly published research on the topic to request copies of any relevant unpublished or in press articles.

Inclusion Criteria

In an effort to assess the similarity effect as precisely as possible, we included only

studies that satisfied all of the following criteria for the independent and dependent variables.

Assessed Similarity

We selected only those studies that compared similar with dissimilar attitudes, or similar with dissimilar personality traits. We excluded studies of similarity of needs; needs relate to what the individual needs from a given relationship or individual and not to the individual's attributes, our specific topic of interest. This exclusion relates most to complementarity research (e.g., Meyer & Pepper, 1977). We also excluded a large number of studies that assessed the similarity of relationship members (e.g., Kirkpatrick & Hobart, 1954; Precker, 1951; Thompson & Nishimura, 1952) because those studies did not report the relationship between similarity and attraction.

We narrowed the search further by focusing on attraction between individuals who were not nested within a larger group. Studies excluded on the basis of this criterion included those that compared attraction of individuals in a similar group with attraction among those in a dissimilar group (e.g., Hansson & Fiedler, 1973). We excluded these studies because recent research suggests that attraction amongst ingroup members is mediated by intragroup factors (such as entitativity; Gaertner, Iuzzini, Witt, & Oriña, 2003) and as a result, does not reflect a "pure" assessment of *inter*personal similarity.

Assessed Specific Traits

For the laboratory studies, we included only those studies that manipulated similarity with either a single or composite set of personality traits or attitudes. For studies that provided indices of interpersonal attraction and similarity for multiple personality traits or attitudes without a composite index (or without sufficient information to compute a composite; e.g., effect sizes for each individual Big Five personality trait without a composite index), we computed an

effect size for traits for which literature had predicted a similarity effect (see Botwin, Buss, & Shackelford, 1997; Botwin & Buss, 1995). In order of preferred use, we used the personality trait agreeableness, then conscientiousness.

Interpersonal Attraction

We included studies in which the dependent variable was a behavioral or affective assessment of interpersonal attraction. We also included eight studies that compared differences between satisfied and unsatisfied relationships (e.g., unstable marriage partners vs. stable marriage partners) as the measure of interpersonal attraction. Kurdek (2000) noted a strong relationship between satisfaction and attraction in marital relationships and White and Hatcher (1984), in a review of couple complementarily and similarity research, concluded that there is a strong relationship between attraction, satisfaction, and marital stability. Thus, for these eight studies, an effect for similarity was computed by contrasting the degree of similarity between satisfied and dissatisfied couples.

Study Sample

The search strategy and selection criteria resulted in 293 studies. From these studies, we extracted 366 independent similarity-dissimilarity comparisons. We included an additional 13 effect sizes for behavioral assessments of interpersonal attraction from studies in which an affective measure of interpersonal attraction had already been included. Beyond the 13 aforementioned behavioral effect sizes, a participant in any one study contributed only one effect size. The total sample included 385 effect sizes, with a total sample size of 33,256 participants. Sample sizes ranged from 10 to 614 (M = 85.89, SD = 76.16). Table 1 provides a display of the cell sizes for the various moderators for field studies and laboratory studies.

Data Coding

Attitude vs. Personality Study

We coded this moderator as a categorical variable with two levels: attitude study, personality study. A study was coded as an attitude study if participants were asked to evaluate specific objects or issues (e.g., death penalty, abortion, discotheques). We coded studies as a personality trait study if participants completed either a personality trait assessment questionnaire (e.g., California Personality Inventory; Minnesota Multiphasic Personality Inventory) or a specific personality trait assessment (e.g., extraversion, agreeableness, hypertraditionality).

Set Size

We coded set size as a continuous variable that was equivalent to the number of items used to manipulate the degree of similarity. In any study in which the participant received information from the target other, set size was defined as the number of stimuli the participant received.

Type of Attraction Assessment

We coded assessment of attraction as a categorical variable with four levels: full use of the IJS, partial use of the IJS, other interpersonal attraction questionnaire (e.g., Martial Satisfaction Questionnaire), and behavioral measure (e.g., sitting distance, eye contact). In situations in which results were provided separately for the two IJS items, we computed an effect size separately for the two items, then used an average of the two effect sizes.

We coded into one of two categories each study that used the IJS. The IJS is typically preceded by four questions that assess the target other's intelligence, adjustment, morality, and competence. Studies that used the four "filler" items or analogous items that preceded the attraction assessment were coded as "Full IJS." Studies that did not include the four items before

the assessment of attraction were coded as "Partial IJS."

Centrality of attitudes

Centrality of attitudes was classified as a categorical variable with three levels: peripheral, central, and unclassified. Studies that used attitudes to manipulate similarity in which the attitudes were defined by the authors as "central," "critical," or "important" attitudes were coded as "central" attitude studies. Studies that included attitudes that were described by the authors as "unimportant," "irrelevant," or "peripheral" were coded as "peripheral" attitude studies. A vast majority of studies either did not report their attitudes and were labeled "unclassified."

Proportion of Similarity

We coded proportion of similarity as a continuous variable with the value assigned equal to the percentage of similar attributes. The proportion of similarity was the percent of the partner's attributes that were similar to those of the participant. For example, in studies that were characterized by "75 vs. 25," participants shared 75% attitudes in the similar condition, and 25% attitudes in the dissimilar condition, and thus, these studies were coded with a value of "75." We excluded from this analysis any studies that failed to report the degree of similarity or were continuous in nature (i.e., the percent of similarity between individuals was derived from a post hoc comparison of the participant's attributes compared with another's attributes).

Amount of Interaction

We coded amount of interaction as a categorical variable with three levels: no interaction, short interaction, and existing relationship. In studies that were classified as no interaction, participants never interacted with, but did receive information about, the target other before the assessment of interpersonal attraction. In studies classified as short interaction, participants first

received information about, then interacted with (between 5 minutes and a few hours) a previously unacquainted target other. Existing relationship studies measured similarity between relationship partners (e.g., friendships, dating, or married couples) Due to the nature of laboratory and field studies, laboratory studies could only be classified as no interaction or short interaction studies, whereas field studies could only be classified as short interaction or existing relationship studies.

Other variables

For each similarity-dissimilarity comparison we coded basic descriptive information and additional variables for exploratory and sensitivity analyses. These variables included: author and full citation, source (journal, edited volume, thesis or dissertation, and unpublished manuscript), sample (college students, adults, or school children), type of relationship (phantom other, stranger, dating partner, marriage partner), type of personality traits measured (specific personality trait, complete scale), recruitment method (participant pool, monetary incentive, or volunteer), and sex composition of the sample (all men, all women, men and women in interactions that were homogenous with respect to sex, or men and women in interactions that were heterogeneous with respect to sex).

Statistical Methods

Effect sizes used

The effect-size index was Fisher's *z* (Fisher, 1928), calculated such that greater positive values indicated greater attraction for similar others and negative values indicate more attraction for dissimilar others. An effect size of zero indicates no relationship between similarity and interpersonal attraction. Following the recommendations of Rosenthal (1994), we used the effect size *z* because of its conceptual superiority over effect size *d* for studies involving continuous

data. However, we report and discuss our data using *r* because of its greater familiarity to most readers.

Random-effects model

Because we were interested in making unconditional inferences that generalized to a universe of possible similarity experiments that could exist, we employed a random-effects meta-analytic approach (Hedges & Vevea, 1998). Fixed-effects models, which only consider the randomness associated with the sampling of participants into experiments and of treatment conditions into experiments, have a single variance component that estimates the uncertainty due to the sampling of observations from within a particular study. Random-effects models consider not only the randomness that accompanies the sampling of participants into studies, as fixed-effects models do, but also the randomness due to sampling studies from a larger sample of possible studies (Hedges & Vevea, 1998). This second variance component estimates the variability among effect sizes that assumes a population of hypothetical studies that could exist. A *Q*-test determines whether this variance component is zero. A variance component that is different from zero suggests that there is additional uncertainty not captured by the fixed-effects analyses and that the fixed-effects model underestimates the uncertainty of the model. Such underestimation of uncertainty results in standard errors that are too small, and consequently, artificially narrow confidence intervals and inflated Type I error rates.

Explanatory model. Mixed-effects models are random-effects models with explanatory variables added to the model. Based upon reasoning presented previously, we included six explanatory variables for the initial moderator analyses. Because a meta-analysis is inherently a correlational process, it is likely that the design of the model will be unbalanced and that the interactions between moderators will be difficult to interpret. Before interpreting the mixed-

effects, we ensured that all interpretable interactions (i.e., cells with fewer than four observations were not interpreted) were non-significant.

Sensitivity analyses. We made two critical decisions regarding the design and implementation of this analysis. First, we selected moderators that the existing literature suggests are important to explaining and exploring the similarity effect. The selection of these moderators implies that we believe that other moderators are unimportant or irrelevant to explaining the similarity effect. To determine if a potentially important moderator was excluded, we conducted additional analyses in which each additional moderator was included one at a time into the a priori model. Our interests were, first, whether other significant predictors of the similarity effect would emerge and, second, whether these findings could influence our existing model.

As noted above, we also decided to use random-effects models compared with fixed-effects models. Because random-effects models tend to have lower power compared to fixed-effects models, we conducted a parallel set of fixed-effects analyses. Using both analyses would reveal whether the more conservative random-effects analyses and the fixed effects analyses would lead to similar conclusions.

Publication Bias

We also considered whether the publication process biased our results. Previous techniques to assess publication bias estimate a weight function given the likelihood that studies of a given p-value survive the publication process (Vevea & Hedges, 1995). Because estimation of a weight function via maximum likelihood estimation requires a large sample size, syntheses such as this one are of insufficient size to produce effective weight estimates (as a reminder, we investigated laboratory and field studies separately, so our sample of 64 field studies was smaller than the size suggested [$N > 200$]; Vevea & Woods, 2004). Thus, we employed a technique that

allows the user to apply a set of weights to represent the likelihood of a study's inclusion in this analysis. As such, the selection bias was evaluated by the adjusted parameter estimates based upon this fixed-weight function (Vevea & Woods, 2004).

Results

Analysis Strategy

Our first step was to assess the role of six moderators: attitude vs. personality similarity, set size, amount of interaction, proportion of similarity, centrality of attitudes, and type of attraction assessment. We first considered laboratory and field studies separately. We next combined laboratory and field studies together to investigate the sole and interactive influence of each moderator and the type of study (laboratory vs. field) on the similarity effect. Finally, we considered any potential influence of publication bias on the size of the similarity effect.

Overall Effect

Before assessing the overall effect sizes of the similarity effect, a Q-test was first performed to determine if it was statistically plausible that the true variance component was zero. The variance component was significant (0.107), $Q(384) = 3696.67$, $p < .05$. Fixed-effects models, which do not model this variability, are misspecified: the *p*-values from the fixed-effects model are inaccurately low because these models underestimate the standard errors of model parameters. To model this variability, we used the random-effect estimate. The overall similarity effect was significant and descriptively large, $r = .536$, $\chi^2(1) = 840.61$, $p < .05$.[3]

Specific Analyses

Laboratory Analyses

Overall Model. After selecting only the laboratory effect sizes ($N = 311$), we deleted cases with incomplete data for moderators associated with this analysis (i.e., attitude vs.

personality traits, set size, type of attraction assessment, proportion of similarity), which resulted in a final sample of 282 effects.

A Q-test of the null hypothesis that it is plausible the true variance component is zero was significant (variance component = 0.064), $Q(281) = 2405.00$, $p < .05$. The effect size for laboratory studies was descriptively large ($r = .506$; 95% CI: .425, .586) and different from zero, $z = 13.62$, $p < .05$. As presented in Table 2, the random-effects analysis revealed several significant predictors. First,. the attitude vs. personality similarity contrast was significant, $\chi^2(1) = 11.47$, $p < .05$. Consistent with predictions, attitude similarity was a more potent predictor of attraction than was personality trait similarity.[4] With respect to amount of interaction, the similarity effect was larger in no interaction studies ($r = .552$) compared with the short interaction studies ($r = .254$), $\chi^2(1) = 46.59$, $p < .05$. As for proportion of similarity, the similarity effect was stronger as the proportion of similarity increased, $\chi^2(1) = 10.72$, $p < .05$. And as for set size, the positive coefficient denotes that the effect for similarity marginally increased as the number of stimuli increased, $\chi^2(1) = 3.02$, $p = .08$.

Type of Attraction Assessment. There was a significant effect for type of attraction assessment, $\chi^2(3) = 17.50$, $p < .05$. The significant effect of type of attraction assessment suggests that the size of the similarity effect depends on whether studies assessed attraction with the full IJS (i.e., the four filler items in addition to the two assessment items), the partial IJS (i.e., just the two assessment items), other attraction questionnaires, or behavioral measures. In order to investigate this effect further, we computed three contrasts to reflect the variability of this variable. The first contrast compared studies that used the full IJS with studies that used part of the IJS. The second contrast compared the other attraction questionnaires with behavioral assessments of attraction. The third contrast compared the combination of full and partial use of

the IJS with those studies that used either other attraction questionnaires or behavioral assessments of attraction. The results of these contrasts are presented in Table 2. The first contrast revealed that although the full IJS (r = .554) was associated with more attraction than the partial IJS (r = .506), this difference was not significant. The second contrast noted a non-significant difference between other questionnaire assessments of attraction (r = .448) and behavioral assessments of attraction (r = .408). The third contrast revealed that any use of the IJS was associated with more attraction than other assessments of attraction.

Centrality of attitudes. We investigated the centrality variable by selecting only those studies that manipulated similarity using attitudes (n = 261). The centrality of attitudes moderator failed to reach significance, $\chi^2(2) = 5.21$, $p = .14$.[5]

Because more specific analyses were specifically of interest, we contrast coded this three level variable using two contrasts. The first contrast compared peripheral attitude studies to central attitude studies, and the second contrast compared the combination of central and peripheral attitude studies to unclassified attitude studies. The critical contrast central vs. peripheral attitude study contrast was significant, b = 0.098, se = 0.046, z = 2.098, $p < .05$. As expected, peripheral attitude studies were associated with less attraction (r = .431) than central attitude similarity (r = .550). The second contrast comparing peripheral and central studies to unclassifiable studies failed to reach significance, b = 0.017, se = 0.020, z = 0.884, p = .33.

Field Analyses

Overall Model. Similar to the laboratory results reported above, we selected only those studies that were defined as field studies. This selection procedure resulted in a sample of 64 effects. A Q-test of the null hypothesis that the true variance component is zero was significant (variance component = 0.068), $Q(63) = 137.52$, $p < .05$. The effect size for field studies was

descriptively small (r = .150) and different from zero, z = 3.99, p < .05. The mixed-effects analysis revealed that none of the moderators was significant: type of attraction assessment, $\chi^2(3)$ = 1.80, p = .61, set size, $\chi^2(1)$ = 0.26, p = .61, amount of interaction, $\chi^2(1)$ = 0.57, p = .45; and attitude vs. personality trait, $\chi^2(1)$ = 0.56, p = .45.[4]

It is important to note that the classification of "field study" included studies that assessed existing relationships (e.g., the assessment of actual dating, friendship, or marital relationships) as well as short interaction studies (e.g., a computer dating study in which participants were paired by similarity). The test to determine if length of relationship differed within field studies revealed that short interaction studies (r = .202) were not associated with a statistically larger effect than existing relationship studies (r = .116).

Full Dataset Analyses

We analyzed the entire sample of studies to investigate further differences between laboratory and field studies. More specifically, we investigated the size of the similarity effect as a sole and interactive function of type of study (field versus laboratory) and moderating variables. A Q-test of the null hypothesis that it was plausible the true variance component is zero was significant (variance component = 0.065), $Q(344)$ = 3696.67, p < .05. The random-effect analysis revealed a significant main effect for laboratory vs. field studies, $\chi^2(1)$ = 6.38, p < .05, and, more interesting, an interaction between laboratory vs. field studies and attitude vs. personality trait studies, $\chi^2(1)$ = 5.83, p < .05. The interaction suggested that whereas in laboratory studies attitudes produced more attraction (r = 0.563) than field studies (r = 0.449), the opposite pattern was observed for field studies, in which personality traits produced more attraction (r = 0.212) than attitudes (r = 0.105). No main effects reached significance: attitude vs. personality trait, $\chi^2(1)$ = 0.44, p = .50; type of attraction assessment, $\chi^2(2)$ = 4.34, p = .11; and set

size, $\chi^2(1) = 2.33$, $p = .12$.

Amount of Interaction. Using the combined laboratory-field sample, we compared studies that involved no interaction, a short interaction, and existing relationships. The fixed-effects estimates for this analysis were misspecified (variance component = .0069), $Q(345) = 3677.60$, $p < .05$. There was a significant association between the amount of interaction and the similarity effect, $\chi^2(2) = 136.61$, $p < .05$, an effect that was explored using orthogonal contrasts. The first contrast compared existing relationship and short interaction studies with studies in which no previous interaction had occurred. The second contrast assessed the difference between existing relationships and short interaction studies. As displayed in Table 3, the first contrast suggested that the similarity effect is more potent for no interaction studies ($r = .551$) compared with studies in which any previous interaction occurred before the assessment of attraction. The second contrast, which compared short interactions ($r = .252$) with existing relationships ($r = .116$), suggested that short interaction studies are associated with marginally larger effect sizes than are studies that assessed existing relationships.

We constructed an additional set of two contrasts to investigate whether the similarity effect was more potent in no interaction studies compared with short interaction studies. The first contrast compared the short interaction studies with the no interaction studies, whereas the second contrast compared the combination of the short interaction and no interaction studies with the existing relationship studies. Both contrasts were significant. The first contrast revealed that no interaction studies were associated with a more powerful similarity effect than were short interactions studies, $b = 0.196$, $se = 0.023$, $z = 8.361$, $p < .025$. The second contrast revealed that short and no interaction studies, together, averaged a larger similarity effect than did existing relationship studies, $b = 0.206$, $se = 0.036$, $z = 5.630$, $p < .025$. These results suggest that the

similarity effect does not generalize well beyond the laboratory-based phantom-other technique.

Sensitivity Analyses

Gender

Our sensitivity analysis for both the laboratory and field analyses discovered that one additional factor, gender, was also associated with the size of the similarity effect in laboratory studies, $\chi^2(3) = 12.42$, $p < .05$. Here, results from the overall laboratory analysis are discussed. To account for gender's association with the similarity effect, we created a factor that accounted for not only the gender of the participant, but also the gender of the target other. The factor included four participant gender and target gender combinations: female participant – female target, male participant – male target, unspecified participant (defined as a participant whose gender was not specified, nor accounted for, in the original study) – matched gender target, and unspecified participant – opposite gender target. To explore this moderator, we created three orthogonal contrasts. Most theoretically interesting, the first contrast compared female – female interactions with male – male interactions. This contrast revealed that female – female interactions were associated with a stronger similarity effect than male – male interactions, $b = 0.069$, $se = 0.030$, $z = 2.31$, $p < .05$. The second contrast compared unspecified participant – matched gender with the male – male and female – female conditions, which was marginally significant, $b = 0.023$, $se = 0.011$, $z = 1.92$, $p < .06$. This contrast suggested that unspecified – matched interactions produce more attraction than the combined other combinations. The final contrast compared the unspecified participant – opposite gender target condition to the three other levels (contexts in which the gender of the target matched that of the participant) – and was not significant, $b = 0.001$, $se = 0.011$, $z = 0.169$, $p = .86$.

Publication Bias Analyses

An advantage of the meta-analytic process is that it can take into account publication bias: The increased probability that significant results, rather than nonsignificant or negative results, will be published due to either self-censorship by the authors or the editorial process. When bias is present, the estimate of the effect is likely to be inflated. We began by investigating the possibility of publication bias in the sample of field studies. Figure 1 displays a scatter plot of the effect sizes for field studies by its fixed-effects weight.[6] When no publication bias is present, the distribution of studies should be normally distributed around the mean (in this case, the weighted mean was 0.152). Inspection of the funnel plot suggests a marked absence of studies with negative effect and an overabundance of studies with small positive effects and small samples. It is also important to note that Figure 1 shows that all of the studies with large samples, which better represent the true population mean, have a mean near zero. This distribution of studies, especially the lack of studies with negative effects, suggests a bias in the publication process.

To investigate the role of publication bias in determining the actual presence of this effect, we employed a computer program designed by Vevea and Woods (2004). The program allows for the implementation of different weight functions based upon the probability of an article being published given its *p*-value. We applied a weight function that assumed that studies with *p*-values of less than .005 are always observed, studies with *p*-values between .005 and .010 are observed 99% of the time, .050 to .100 are observed 90% of the time, .100 to .250 are observed 70% of the time, .250 to .500 are observed 40% of the time, .500 to .650 (i.e., studies with negative effects) are observed 35% of the time, .650 to .750 are observed 30% of the time, .750 to .875 are observed with a probability of .20, and .875 to 1.000 are observed 15% of the time. When we imposed this weight function, it resulted in a transformed mean of 0.029, with an

standard error of 0.021. This resulted in nearly an 81% attenuation in the magnitude of the similarity effect in field studies. After applying this weight function, the similarity effect in field studies was no longer significant, $z = 1.37$, $p = .17$. This adjusted estimate represents the mean effect given that the weight function (which was based on the distribution of effects in Figure 1) accurately represented the probability of publication. Additional sensitivity analyses using different weight functions to represent the probability of a specific study's inclusion likelihood also resulted in a severe attenuation in the power of the similarity effect and nonsignificant comparisons relative to a zero effect.

We also subjected laboratory studies to an investigation of publication bias. Inspection of Figure 2 suggests that the effect sizes are distributed fairly symmetrically (beyond a slight truncation of the distribution for negative effects) around the mean ($r = .552$), giving little evidence that a bias in the publication process is responsible for the observed effect.

Discussion

Over the years, hundreds of laboratory studies have illustrated the dynamic power of similarity to produce attraction and have, in so doing, confirmed conventional wisdom that similarity plays an important role in romantic relationships. Consistent with this accepted notion, this synthesis found a descriptively large effect for similarity ($r = .536$) when considering all 293 field and laboratory studies. However, there were four patterns of results that raised questions about the robustness of the similarity effect: (a) Four variables moderated the similarity effect in the laboratory but not in the field; (b) in both laboratory and field studies, the size of the similarity effect was smaller as the amount of interaction with the target person increased; (c) stimulus type and type of study interacted, such that attitudes produced more attraction than personality traits in laboratory studies, but personality traits produced more attraction than

attitudes in field studies; and (d) the similarity effect in field studies was not statistically reliable when accounting for possible publication bias. Beyond these findings that speak to the robustness of the similarity effect, several findings were also relevant to the various explanations of the similarity effect.

Implications for the Similarity Effect Models

To review quickly, the reinforcement model argues that similarity stimuli act as "reinforcers" that attract us to the target via the target's ability to validate us and our beliefs. Alternatively, the information integration model maintains that similar stimuli act as "informers" that provide the perceiver with an understanding of the overall quality of the target person -- an evaluation of quality that then drives attraction. These different conceptions of stimuli can lead to different predictions for different moderators.

Set size and Proportion of similarity. Information integration theorists propose that increasing set size leads to more attraction by providing the perceiver with disproportionately more positive information (Kaplan & Anderson, 1973). The reinforcement model, grounded in the law of attraction, hypothesizes that set size should have no influence on the similarity effect. After all, according to this perspective, the proportion of similar attitudes, not the total number of similar attributes, is the critical factor that leads to increased attraction (Byrne & Rhamey, 1965; Byrne & Nelson, 1965). Consistent with the predictions of the original law of attraction, and inconsistent with the predictions of the information integration model, we found a significant effect for proportion of similarity and a marginal effect for set size.

Type of Attraction Assessment. Information integration models suggest that the similarity effect is augmented if an overall evaluation of the quality of the target other precedes the assessment of attraction (Montoya & Horton, 2004). In contrast, reinforcement models argue that

attraction assessments either precede the overall quality evaluation or occur at the same time as the evaluation (Byrne, Rasche, & Kelley, 1974; Clore & Gormly, 1974), and as a result, an overall evaluation would have no effect on the attraction assessment. We failed to find that the full use of the IJS was associated with more attraction than the partial use of the IJS. However, this result should not be taken as a dismissal of the possible role of this factor. The means were consistent with the predictions of the information integration perspective; the similarity effect was stronger when an assessment of overall evaluation preceded the assessment of interpersonal attraction compared with when no assessment of overall evaluation was made. Additionally, the only study to manipulate the order of evaluation of the assessment of attraction to and overall evaluation of the target other failed to detect an effect for similarity when an overall evaluation did not precede the assessment of attraction (Montoya & Horton, 2004). Unfortunately, no other studies that used the full IJS also included the partial IJS comparison condition. It is then difficult to understand fully what is the impact of an assessment of overall evaluation. Given the tentative support for overall evaluation salience as a moderator and the findings of Montoya and Horton (2004), the role of a cognitive evaluation in the similarity effect warrants further empirical and theoretical attention.

Consistency between models. Two moderators were consistent both empirically and theoretically with the reinforcement and information integration models. First, attitude similarity, compared with personality trait similarity, was associated with more attraction. The effect for personality traits had been hypothesized to be smaller because one derives less reinforcement from a target who is similar on personality traits (Singh, 1973). Whereas Singh's explanation is consistent with reinforcement model, the information integration model proposes the same conclusion via the fact that attitudes are more informative than are personality traits. There is

some evidence to support the latter perspective (Horton & Montoya, 2004). As for the attitude centrality moderator, although the overall attitude centrality moderator failed to reach significance, the specific contrast between central and peripheral attitudes did reach significance. The predictions of the reinforcement model and the information integration models, in this case, were identical: the reinforcement model hypothesized that the greater reinforcements for similar central attitudes produce more interpersonal attraction, and integration information models suggested that central attitudes convey more positive or negative information (Horton & Montoya, 2004; Montoya & Horton, 2004) and as a result, lead to more or less attraction.

Field Studies vs. Laboratory Studies

Comparisons between laboratory and field studies resulted in several key findings: First, the similarity effect was more powerful in laboratory investigations than in field studies; second, in laboratory studies, attitudes similarity was a more potent predictor of attraction than was personality similarity; whereas in field studies attitude similarity produced less attraction than personality trait similarity. Finally, variables that moderated the similarity effect in the laboratory did not also moderate the similarity effect in field investigations.

Attitude versus Personality Traits

The fact that attitude and personality similarity impact attraction differently causes problems for traditional explanation of the similarity effect: Attitudes should produce more attraction than personality traits because attitudes are associated with a greater reinforcement than personality traits (Singh, 1973). So why would personality traits lead to more attraction in field studies compared with laboratory studies?

One potential explanation for this finding is that field studies may suffer from a lack of attitude salience that undercuts the similarity-attraction link. As an example of the power of

salience, one of the arguments in the T.V. violence-aggression link suggests that violence viewed in the laboratory produces powerful effects due to the salience of the recently observed violence (Driscoll, 1982; Zillman, 1998). A similar interpretation may apply to the similarity effect. In laboratory studies, participants often receive the target other's attributes immediately preceding their attraction assessments (high attitude salience). In contrast, field studies often collect a partner's attitudes separately from the participants' attitudes (low attitude salience). Relatively low salience of the partner's attributes may inhibit the responder's ability, either consciously or unconsciously, to acknowledge the paired affective response that would accompany the stimuli and would, in turn, guide attraction. Under such attitude non-salience, similarity would be unlikely to lead to attraction. Lack of salience of the powerful attitudes would inhibit the ability of similarity to exert an influence on attraction. Taking this argument to a further extreme, it may be that in field studies, participants are completely unaware of their partner's attitudes towards many topics (such as freshman housing/parking on campus, abortion, foreign wars, discotheques, or novels) or personality traits. This lack of awareness may then be responsible for the failure to find an association between similarity and attraction.

An additional possibility is that individuals misperceive their partner's actual beliefs. For example, Kenny (1991), Brewer and Brewer (1968), and Swann and Gill (1997) have all suggested that individuals are notoriously poor at accurately evaluating friends and romantic partners. This incorrect information may also account for the decrease in the observed similarity effect.

With respect to personality traits, personality traits may not be influenced to the same degree by their salience. Whereas it has been demonstrated that attitudes convey more information than personality traits, it may be that specific behavioral information (which would

be ubiquitous in field studies but not in laboratory studies) is more informative of personality traits than attitudes. For example, the fundamental attribution error literature has noted that specific behaviors are more informative of the target's specific personality traits than the target's attitudes (Ross & Fletcher, 1986). As a result, the ubiquity of behaviors in existing relationships allows for a better understanding of the individuals personality (and not attitudes) only in field studies and not necessarily in laboratory studies.

Discontinuity of laboratory and field investigations

We further noted a discrepancy between the magnitude of the effect size in field studies compared with laboratory studies. Further, the similarity effect was moderated by whether participants interacted, even for a brief time, with a target person. Consistent with the predictions of Bochner (1991), Sunnafrank and Miller (1981), and Wright (1971), we noted a specific pattern of means: Although the contrast that compared the phantom-other technique studies with short and field studies was significant, the contrast between short and field studies failed to reach significance. This evidence, combined with the significant contrast between the no interaction studies and short interaction studies suggests that any interaction with the target individual significantly attenuates -- or eliminates -- any detectible influence of similarity on attraction.

To further complicate this issue, our initial analysis revealed that the effect for similarity in field studies was small, but significant; however, after closely inspecting the distribution of these effect sizes, we noted that (a) there was a marked absence of studies with negative results and (b) large sample studies had a mean effect near zero. To investigate if the observed mean was inflated due to the publication of only positive effects, we subjected the data to a publication bias analysis. Results of that analysis suggested that, assuming a selection bias scenario modeled by the weight was correct, the effect for similarity reduces to zero. It is also interesting to note

that the magnitude of the similarity-attraction effect was similar, on average, in field studies and short interaction studies. The combination of this significant differences in laboratory and field studies, along with the publication bias evidence suggests that *any* previous "human" contact with the target other attenuates the effect of similarity on attraction.

Why is the similarity effect smaller after an interaction or in existing relationships?

The similarity effect, at least according to the theoretical underpinnings, should have great external and ecological validity - the effect should be just as powerful in established relationships as it is in the laboratory. Reinforcement from similar attitudes *should be* equal to, or more powerful, in established relationships than it is in the laboratory. If an individual is a source of positive reinforcement, those reinforcements should not quickly dissipate (unless extinguished), which should lead to a strong effect for similarity from the initial meeting to years into the relationship. Cappella and Palmer (1992) go even further to suggest that reinforcement from attitude similarity should *increase* as the length of the relationship increases due to the continuous and perpetual reinforcement of similar attitudes and the minimization and eventual extinction of dissimilar attitudes (see also Davis & Rusbult, 2001). So, what could have caused our failure to detect an effect? Below, we discuss several of the potential factors for the failure of this powerful laboratory effect to generalize to the field.

Environmental Factors. Cappella and Palmer (1992) and Byrne (1992) suggest that environmental cues of which one is aware during a short interaction dilute the impact of similarity on attraction. More specifically, Byrne suggests that factors such as room temperature (Griffitt, 1970), background music (May & Hamilton, 1980), target race (Byrne & Wong, 1962), and physical attractiveness (Hatfield & Sprecher, 1986) are "presumably … interpreted and cognitively processed by the subject on the basis of what he or she believes about attractiveness,

dominant behavior, specific attitudinal processes, etc." (Byrne, 1992; pg. 194). Thus, each of these factors contributes to one's attraction to the target, usurps influence from similarity, and decreases the possibility that researchers detect the impact of similarity.

However, factors such as ambient temperature and background music would seem to have a more profound influence on initial interactions than on established, long-term relationships. Conceptually and empirically, long-term relationships tend to be founded on the persistent attributes of others (e.g., Altman & Taylor, 1973; Buss, 1995), and as such, these attributes should be critical determinants of interpersonal attraction in relationships. But beyond the potential effects of environmental factors on attraction, the core mechanism operating the reinforcement model is that interpersonal attraction results from a function of the proportion of weighted units of positive affect associated with the person. Byrne (1992) concedes that other environmental factors confound our ability to detect similarity's effect in short interactions. However, the analysis of similarity in existing relationships suggests that the effect is not detectable due to the countless other factors. But does "not detectable" mean "insignificant"? If we agree with Byrne that countless other factors are important to the "positive affect associated with the person" (pg. 195), it would be logical to conclude that, at most, similarity plays only a minimal role in the attraction process because of the influence of many other factors.

Methods used to assess and manipulate interpersonal attraction and similarity. It is important to note that the techniques used to assess the similarity effect may contribute to the relatively small effect size observed in field studies. Many of the methods may be appropriate for the laboratory, but not for the field. For example, Duck and Craig (1975, 1978) found that different types of personality similarity are important at different stages of a relationship: similarity on easily accessible personality traits produced attraction early in relationships,

whereas similarity on fundamental core traits produced attraction in established relationships. Thus, studies of similarity in existing relationships may produce small to negligible effect sizes, because they fail to tap "core" traits or attitudes.

Irrelevance of Perceiver's Attitudes. As noted above, Byrne and colleagues (e.g., Byrne & Wong, 1962) argue vehemently that similarity impacts attraction; however, two different perspectives suggest that similarity is a cue to more important, proximal determinants of attraction. First, the similarity effect may result from our expectations that we will be liked by those who share our attitudes (reciprocal liking; Condon & Crano, 1988). According to this perspective, similarity does impact attraction but only via the expectation of reciprocal affection and the possibility of a successful relationship. In the face of other information regarding these latter factors, similarity would be irrelevant. Second, information integration theorists emphasize the information presented about the other person and downplay the perceivers specific characteristics. In fact, a number of studies have suggested that our own attributes play a limited role in the interpersonal attraction process. For example, Horton and Montoya (2004) manipulated orthogonally the degree to which the personality traits participants received were informative of their partner and the participants' similarity to that partner. Only the informativeness of the feedback influenced assessments of the partner; similarity did not. This result suggests that what drives the interpersonal attraction process is the positive information one infers about a target, independent of the degree to which that information is similar to the self.

What about perceived similarity?

Though we failed to find that attitude or personality trait similarity led to attraction in field studies after taking into account publication bias. It is important to note that whereas many

field studies detect only a small effect for similarity, a powerful effect is usually found for perceived similarity (Acitelli, Douvan, & Veroff, 1993; Arias & O'Leary, 1985; Granberg & King, 1980). Proponents of the perceived similarity effect (the degree to which one perceives similarity with the other for attitudes or personality traits) argue that perceived similarity predicts interpersonal attraction in relationships and mediates the effect of actual similarity on attraction. Whereas field studies tend to produce effects near zero for actual similarity, perceived similarity's relation to interpersonal attraction is often quite strong (e.g., Meck & Leunes, 1976).

If perceived similarity, and not actual similarity, is important to the attraction process, what implications would this have on the relevance of the similarity effect? Not much. The reinforcement model supposes that similar others reward us by providing validation of our beliefs. The anticipation of future positive reinforcement from another, whether guided or misguided, may be as powerful as the actual reinforcements one has received in the past from attitude agreements or disagreements. Of course, if perceived similarity is the primary influence on existing relationships, genetic perspectives on the power of similarity may require modification.

Some theorists have argued that there is a genetic or evolved attraction to those who are similar to us for either attitudes or personality traits. For instance, Russell, Wells, and Rushton (1985) suggest that mating with a genetically similar other is evolutionarily advantageous because such pairings result in a greater percentage of one's genes being passed on to the offspring (i.e., all of one's own genes, plus the genes that are shared with the mating partner, are passed on). This drive for a genetic bonus is proposed to be widespread amongst humans and other species and has been argued for both psychological (Botwin et al. 1997; Mascie-Taylor, 1988; Murstein, 1967; Thiessen & Gregg, 1980) and physical traits (Spuhler, 1968; Susanne &

Lepage, 1988). If one were to accept the drive for this genetic bonus as the primary mating motivation, one would first note the consistent trend for actual similarity between relationship partners (e.g., Botwin et al. 1997; Buss, 1995; Himes, 1949; Hoffeditz, 1934; Kelly, 1940; Kirkpatrick, 1937; Terman, 1938), but then note the current finding that similarity is only minimally related to attraction. This pattern of data translates into a relatively unsettling suggestion that our drive for genetic similarity may override our need for satisfying or rewarding relationships. It is interesting to note that this proposition has support from Burley (1983), who argued that relationship members who pair with others with undesirable characteristics (such as mental illness) were more concerned with genetic similarity than individual fitness or satisfaction.

Conclusion

In their informative chapter regarding interpersonal attraction, Berscheid and Walster (1978) answer the question of whether or not similarity leads to attraction with "a resounding yes" (pg. 4). The results of this quantitative synthesis suggest a qualification to this conclusion: similarity leads to attraction only in the laboratory setting, but not when there is even a short interaction with the target other. These results indicate that researchers would be well-served to investigate factors that are more potent predictors of attraction than is similarity, such as reciprocation of liking (Aronson & Worchel, 1966), physical attractiveness (Berschied & Walster, 1978; Mathes, 1975; Murstein, 1971; Townsend & Levy, 1990), commitment (Rusbult, 1983), and factors that contribute to the increased assessment of the overall quality of the target other (Altman & Taylor, 1973; Montoya & Horton, 2004). Of course, before the field of psychology strikes a stake into the heart of similarity as the cause of attraction in existing relationships, it would be wise to develop techniques that are capable of assessing similarity

accurately and that are immune to the shortcomings described previously.

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Footnotes

[1] We decided a priori to operationalize the similarity effect using only attitudes and personality trait similarity. We investigate and discuss only research and theories that explain attitude or personality trait similarity. The reasons for this decision are twofold: first, the dominant theory of similarity, the reinforcement model of attraction (Byrne, 1961b; 1971), argues that only stimuli associated with reinforcement lead to changes in attraction and, as such, suggests that other types of similarity (e.g., hobbies) may be only negligibly associated with reinforcement. Second, research investigating how other types of similarity (e.g., hobbies, activities, education) impacts attraction is scant (i.e., whereas investigations assessing similarity of physical attractiveness level are numerous, the number of studies that correlate this similarity to attraction is small).

[2] Two other models, the repulsion hypothesis (Rosenbaum, 1986) and anticipated liking (Aronson & Worchel, 1966) have also received limited support. Rosenbaum (1986) hypothesized that only dissimilar attitudes influence attraction by producing repulsion -- i.e., similarity does not cause an increase attraction. Whereas Rosenbaum found support for his repulsion hypothesis, Smeaton, Byrne, and Murnen (1989), Byrne, Clore, and Smeaton (1986), and Singh and Ho (2000) have produced convincing evidence that similarity does produce attraction and that much of Rosenbaum's own data are inconsistent with his model of repulsion. For instance, Smeaton and colleagues found an increase in attraction for a target while holding the amount of dissimilarity constant and varying the amount of similarity. Given such evidence, Singh and Ho concluded that such a model not only lacks sufficient empirical evidence, but lacks a valid theoretical framework.

As for anticipated liking -- initially proposed 40 years ago -- only limited work has been

conducted to compare the predictions of anticipated liking versus those of the reinforcement model (Erwin, 1981; Gonzales, Davis, Loney, Lukens, & Junghans, 1983; Insko, Thompson, Stroebe, Shaud, Pinner, & Layton, 1973; Stroebe, 1971). Anticipated liking argues that the similarity-attraction link is mediated by the anticipated positive evaluation one would receive from another who is similar to oneself (Aronson & Worchel, 1966). Whereas Condon and Crano (1988) found evidence to support anticipated liking as a mediator of the similarity effect, few studies have investigated this link directly. Although research exists to support this approach, three factors limit this model's utility in this aggregation of research: First, the amount of available research is limited (Condon & Crano, 1988); second, questions exist about the appropriate causal order (Insko et al., 1973); and third, consistent and reliable evidence that inferred evaluation is the causal process has not been detected (Byrne & Griffitt, 1966; Byrne & Rhamey, 1965; McWhirter & Jecker, 1967; Nelson, 1966).

[3] The resulting population effect size were interpreted using Cohen's (1988) suggestion that an *r* of at least .10 be labeled a "small effect," an *r* of at least .24 a "medium effect," and an *r* of at least .37 a "large effect."

[4] Three laboratory studies manipulated similarity using both personality traits and attitudes. These studies were excluded from this analysis.

[5] To evaluate the potential influence of the different moderators within the attitude studies, included in attitude analysis were four moderators: set size, proportion of similarity, type of attraction assessment, and amount of interaction. The results of these moderators were identical to the larger analysis using all laboratory studies.

[6] One effect size with a large sample size ($N = 620$) was removed from the scatter plot to facilitate the clarity of the distribution.

Table 1

Moderators and Number of Effects included in the Moderator Analysis.

Laboratory Studies	# of Effects	Field Studies	# of Effects
Centrality of Attitudes		Centrality of Attitudes	
Central Attitudes	42	Central Attitudes	5
Peripheral Attitudes	7	Peripheral Attitudes	0
Unclassified	212	Unclassified	32
Assessment of Attraction		Assessment of Attraction	
IJS	221	IJS	19
Other Questionnaire	41	Other Questionnaire	43
Behavioral Assessment	13	Behavioral Assessment	2
Set Size	282	Set Size	59
Proportion of Similarity	270	Proportion of Similarity	- -[a]
Attitude vs. Personality Study		Attitude vs. Personality Study	
Personality	21	Personality	27
Attitude	261	Attitude	37

Note. The total number of effects in laboratory studies was 298. The total number of effects in field studies was 64. The numbers for any moderator may not add up to the total because of missing values. [a] = This moderator was dropped from the field analysis simply due to the nature of this factor.

Table 2

Parameter Estimates for Laboratory Studies.

Parameter	Estimate	SE	Z	P > |Z|
Set size	0.000	0.000	1.718	.086
Attitude vs. personality	-0.193	0.057	-3.388	.000
Amount of Interaction (no interaction vs. short interaction)	-0.392	0.057	-6.826	.000
Type of attraction assessment				
Partial IJS vs. Full IJS	-0.044	0.049	-0.903	.367
Other questionnaire vs. Behavioral assessments	-0.020	0.037	-0.559	.576
Partial IJS & Full IJS versus				
Other questionnaire & Behavioral assessments	-0.062	0.301	-1.990	.047
Proportion of similarity	0.025	0.011	2.320	.020

Note. $N = 282$. IJS = Interpersonal Judgment Scale.

Table 3

Parameter Estimates for Field and Laboratory Studies.

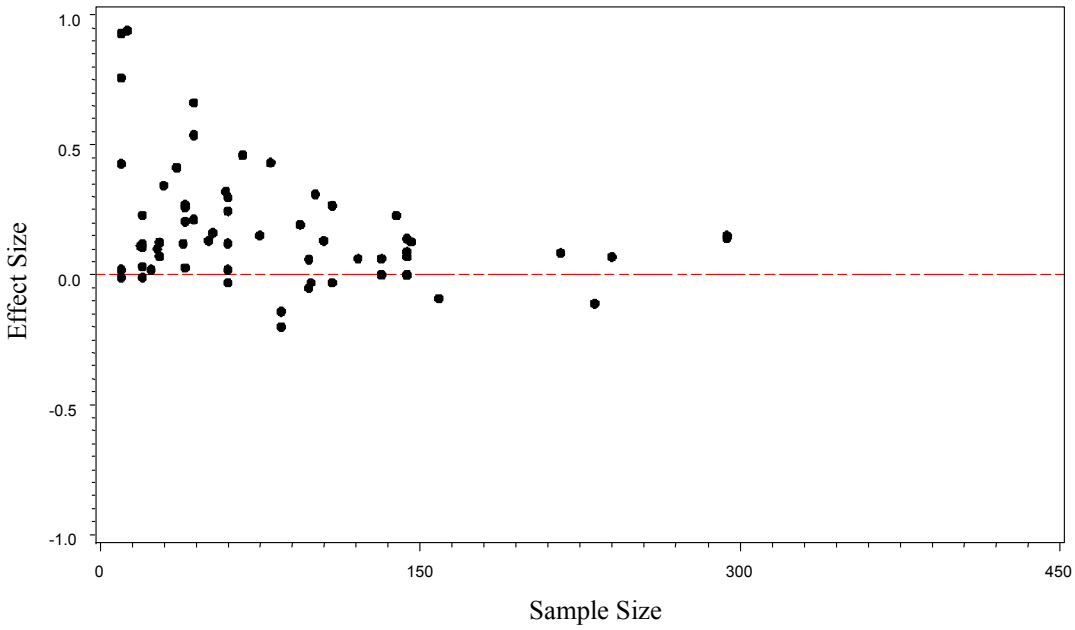
	Mixed-effects analysis			
Parameter	Estimate	SE	Z	p > |Z|
Existing relationship vs. short interaction	-0.056	0.032	-1.730	.083
No interaction vs. existing & short interaction	-0.299	0.024	-12.051	.000

Note. $N = 376$.

Figure Captions

Figure 1. Funnel plot of effect sizes (in *z*) against sample size, field studies only.

Figure 2. Funnel plot of effect sizes (in *z*) against sample size, laboratory studies only.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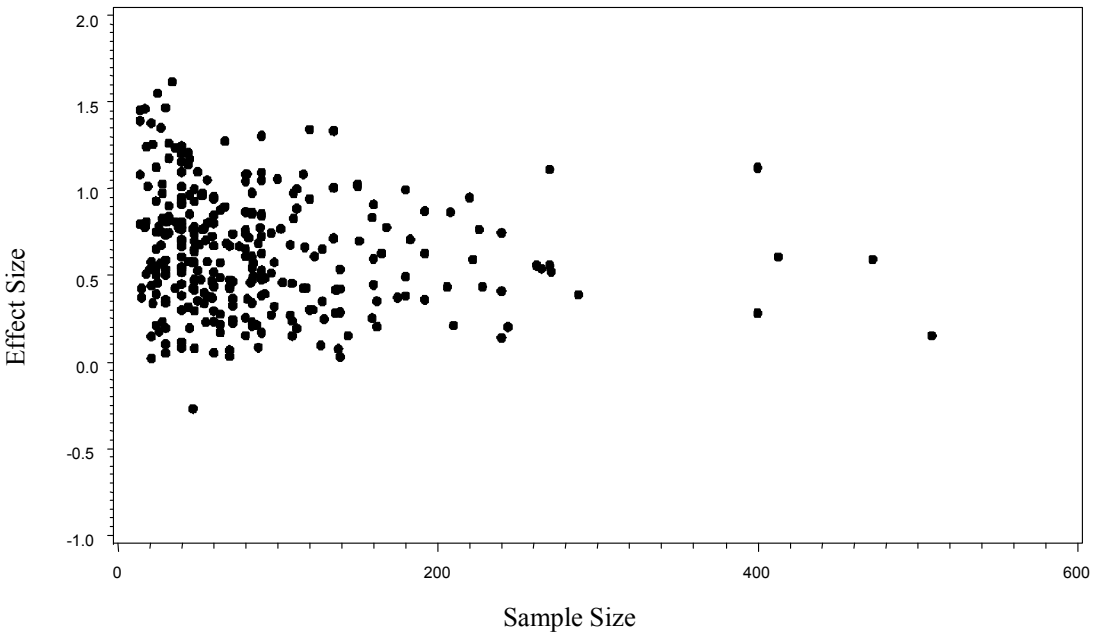
0.0
-0.5
-1.0
Effect Size
0
150
300
450
Sample Size


2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
Effect Size
0
200
400
600
Sample Size