Superattraction: The superlearning phenomenon in interpersonal attraction

Ryan Edward Lipinski

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SUPERATTRACTION: THE SUPERLEARNING PHENOMENON IN INTERPERSONAL ATTRACTION

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Masters of Arts
in
Psychology:
General Experimental

by
Ryan Edward Lipinski
December 2005
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Approved by:

[Signatures and dates]

Dr. Robert Cramer, Chair, Psychology
Dr. Jodie Ullman
Dr. Allen Butt
ABSTRACT

Our understanding of social processes such as human causal learning, attitude formation, emotional expression, and interpersonal attraction has been improved by the application of conditioning theory. This thesis was designed to extend the application of conditioning principles in the study of interpersonal attraction by testing cue competition predictions made by the reinforcement-context theory of attraction. To date, empirical evidence of cue competition in interpersonal attraction is in short supply. Thus, social analogs of familiar conditioning variables were created to test the predictions of attraction acquisition, inhibition of attraction, and the superlearning of attraction. Female undergraduates ($N = 57$) assumed the role of a consultant to a fictitious online dating service and were asked to determine which men female clients of the service should be encouraged or discouraged to date. Within the context of this masking task, participants experienced social analogs of acquisition, inhibition, and superlearning using pictures of males as conditioned stimuli and feedback regarding their long-term partner potential as
unconditioned stimuli. Despite showing strong support for the acquisition of attraction hypothesis, the results did not reveal support for the inhibition and superlearning of attraction hypotheses. Discussion focused the importance of observing acquisition using a novel within-subjects design, possible explanations for the less than robust acquisition effects and the challenges in testing cue competition effects of inhibition and superlearning of attraction.
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CHAPTER ONE

INTRODUCTION

Overview of Thesis

This project will discuss Pavlovian conditioning and its utility in researching various areas of psychology including interpersonal attraction. The discussion will begin with a brief overview of Pavlovian principles, followed by a contemporary view of conditioning beginning with the discovery of the blocking effect. Next, the application of conditioning to social psychology will be examined, highlighting the correspondence between familiar conditioning variables and social variables. The next section will discuss the extension of these correspondences to Donn Byrne’s interpersonal attraction research and the influence that social context has on this process. The last section of the proposal will focus on response acquisition, inhibition, and an effect termed superconditioning. Superconditioning of attraction will be studied using three steps. First, Man A, will be trained as a predictor of social reward (acquisition). Second, Man A will be compounded with a novel male, Man B, in a non-
reinforced social stimulus. As a result, Man B will be viewed as an inhibitor of attraction. Third, when Man B is subsequently compounded with yet another novel male, Man C, and reinforced superattraction to Man C is predicted.

Classical Conditioning

Traditional Pavlovian Conditioning

The foundation of the project is the seminal work of Ivan J. Pavlov (1927) and his research on the digestive processes of dogs. Pavlov's well known finding that dogs produce digestive secretions and saliva upon the expectation of receiving food has spawned research in many areas of psychology. This work came to be known as Pavlovian conditioning, and is commonly referred to as classical conditioning. Classical conditioning grants animals the ability to adapt to their environment by associating effects with their respective "causes" (see Rescorla, 1988; Shanks & Dickinson, 1987). The four basic components of Pavlovian conditioning are the unconditioned stimulus (US), which without prior training possesses the ability to produce a response, referred to as the unconditioned response (UR). The two
remaining components are the conditioned stimulus (CS), which is paired with the US in order for an association between the two to develop. The resulting learned reaction to the CS is referred to as the conditioned response (CR). Early classical conditioning viewed CS-US contiguity as both a necessary and sufficient condition for the development of an association (Pavlov, 1927; Rescorla, 1967, 1988). That is, in order for two stimuli to gain associative strength between one another they only needed to appear in a close temporal arrangement.

**Contemporary Classical Conditioning**

In the contemporary world of classical conditioning, the principle of simple contiguity is no longer viewed as being sufficient for the development of CS-US associations. Rather, it is now widely believed that contiguity is only part of the equation and that the contingency, or informational relationships between the CS and US are the keys to associative learning (Bolles, 1972; Rescorla, 1967, 1988). Contingency is defined by the probabilities of (1) the US occurring with the CS, $p(US/CS)$ and (2) the US occurring without the CS, $p(US/-CS)$. If the probability of the US occurring with the CS is 1.00, a perfect positive
contingency exists. A zero contingency exists between the CS and US when both outcomes are equally likely to occur (i.e., \( p(US/CS) = p(US/-CS) \)) and a negative contingency refers to situations where \( p(US/-CS) \) is greater than \( p(US/CS) \). In classical conditioning, positive contingencies promote the development of CS-US associations.

The discovery of the blocking effect by Kamin (1968; 1969) was one piece of evidence that challenged the argument that simple contiguity was sufficient for associative learning. In Kamin’s blocking group, a light (CS₁) was first trained to reliably predict a shock (US). Next, the light was presented in compound with a novel stimulus tone (CS₂) and paired with the US. Following compound training, the tone was tested for its ability to elicit the CR. Kamin found reduced responding to the tone in the blocking group relative to an acquisition group that received only the compound light/tone-shock training. In the blocking group, the light was a reliable predictor of shock before it was compounded with the tone and again paired with the US. Therefore, the tone can be viewed as redundant (i.e., not informative) in predicting the shock, and as a result,
acquires reduced associative strength. Kamin argued that associative connections only occur when the animal is forced to undergo "mental work". In this instance, the shock was already reliably predicted by the light, thus making further mental work to predict the outcome unnecessary when the tone appeared (Kamin, 1969).

The Rescorla-Wagner (RW) model (Rescorla & Wagner, 1972; Wagner & Rescorla, 1972) of associative learning was developed, in part, as a response to conditioning phenomena like the blocking effect. The model is based upon two central tenets, (1) the extent to which the presence of the US is surprising (Allan, 1993; Miller, Barnet, & Grahme, 1995; Rescorla & Wagner, 1972; Wagner & Rescorla, 1972), and (2) that a finite capacity exists for associations between a given US and CS (Rescorla & Wagner, 1972; Wagner & Rescorla, 1972). The RW equation is:

\[ \Delta V_{CS} = \alpha_{CS} \beta_{US} (\lambda - \Sigma V) \]

In the equation the term \( \Delta V \) describes the change in associative strength for a given CS per trial. Learning rate parameters include \( \alpha \), for the saliency of the CS, and \( \beta \), for the intensity of the US. Inside of the
parentheses are the values λ, for the asymptotic level of association supportable by the US, and \( \Sigma V \), for the total associative strength of all stimuli present on a given conditioning trial.

The model assumes that a surprising US requires greater adjustments to organisms' expectations and therefore stronger associations and greater amounts of learning develop to and about the CSs that predict them. Subjects adapt to the contingencies between the CS and US until the relationship reaches the asymptotic level of association supportable by the US. At this point, the relationship between the CS and US is no longer surprising and learning ceases. The RW model predicts that associative learning will exhibit a negatively accelerated curve, whereas a US becomes less surprising with repeated exposures it produces smaller changes in associative strength.

Successful single CS predictions derived from the model include acquisition, extinction, stimulus generalization, and discrimination. The model has also made many successful cue competition predictions such as blocking, conditioned inhibition, overshadowing, and
superlearning (Miller et al., 1995). Despite intense scrutiny, the RW model's many successes have allowed it to remain the preeminent theoretical tool in animal learning for the last 30 years. During this time many domains in psychology including verbal learning, human category learning, reasoning, perception, social psychology, and physiological regulation have also utilized the model (Siegal & Allan, 1996). Its widespread application has brought accolades for being the most influential export of learning theory to psychology (Miller et al., 1995).

Classical Conditioning in Social Psychology

Although originally conceptualized and tested using animals, classical conditioning, in general, and the RW model, in particular, has demonstrated utility in social psychological research. Many researchers have argued for and provided support for using an associative perspective when studying social behaviors (e.g., Allan, 1993; Arenson, Lannon, Offerman, & Kafton, 1982; Cramer et al., 2002; Sachs, 1975; Shanks, 1985; Shanks & Dickinson, 1987; Weiss, 1968; Williams, 1995). More specifically, research in diverse areas such as attitude
formation, emotional responses, human causal learning (HCL), and interpersonal attraction have benefited from applying classical conditioning principles.

**Attitude Formation**

Staats and Staats (1957) viewed attitudes as modifiable by pairing a neutral target stimulus with an affectively arousing stimulus. In their initial study, nonsense syllables (e.g., EXV) serving as CSs were visually presented to participants while an experimenter read positive, negative or neutral words serving as USs to the participant. Following the "conditioning trials", the nonsense syllables were rated for their subjective pleasantness by participants. The results showed that nonsense syllables paired with positive words were rated more pleasant than those paired with negative words. This finding demonstrated acquisition as well as discrimination learning when particular syllables were paired with either positive or negative words.

Acquisition effects were also found using names of countries and familiar masculine names as conditioned stimuli paired with evaluative words as unconditioned stimuli (Staats & Staats, 1958). For example, Dutch (or Tom) was paired with positive words such as pretty,
happy, and sacred, while Swedish (or Bill) was paired with negative words such as bitter, ugly, and failure. This procedure lead to predictable differential ratings of these social stimuli as a function of the type of affect evoked when they were presented. That is, countries or names paired with positive words were rated more favorably, while countries and names paired with negative words were rated less favorably.

The early interpretation of these phenomena postulated that human attitudes could be manipulated using classical conditioning principles. It was argued that associations developed between the attitudinal components of the object a word represented (e.g., happy) and the social stimulus with which it was paired (e.g., Tom). Therefore, a person learns that particular meaning responses are associated with their respective social signs (Staats & Staats, 1957, 1958). Following Staats and Staats work, the conditioning of attitudes was widely replicated using a variety of conditioned and unconditioned stimuli (e.g., Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992). In addition, a lively research area termed evaluative conditioning examines
the learning of likes and dislikes (see De Houwer, Thomas, & Baeyens, 2001 for a review).

**Emotional Expression**

Research in emotional expression has also utilized conditioning principles. Originally, work in conditioned emotional responses was based upon the idea that organisms may be biologically prepared to associate emotional facial expressions with their respective outcomes based on their importance for survival (Orr & Lanzetta, 1980). The learning concept of “preparedness” (Seligman, 1970) found empirical support in social psychology studies demonstrating the development of associations between angry facial expressions and the administration of a shock (Lanzetta & Orr, 1980, 1981, 1986; Ohman & Dimberg, 1978; Orr & Lanzetta, 1980). Participants’ exhibited negatively accelerated acquisition functions when an angry but not a happy face was paired with the aversive shock US (Lanzetta & Orr, 1980, 1986). These findings are analogous to response acquisition and the CS-US relevancy effect in the animal conditioning taste aversion literature (Garcia & Koelling, 1966).
Emotional response research using the facial expression paradigm has also documented the familiar cue competition effect termed overshadowing. Lanzetta and Orr (1980, 1981), for example, found that associations to a neutral facial expression were overshadowed when presented in compound with a fearful expression and paired with shock. Responses to the fearful expressions were stronger than to the neutral expressions despite the objective contiguity between the two expressions and the shock. The overshadowing effect can be attributed to the higher level of importance fearful facial expressions have for signaling potential threats and danger. In RW terms, on compound stimulus trials where the fearful and neutral expressions are presented, larger amounts of associative strength will accrue to the fearful face because of its increased saliency that is represented in the equation by a larger $\alpha$ value.

**Human Causal Learning**

Work in human causal judgments has provided the most consistent argument for the practice of applying associative principles to the study of human behavior (Allan, 1993). Shanks and Dickinson (1987), prominent
British associationists, argued like Hume (1888) that causal judgments can be viewed as dependent upon the associations between the mental representations of a cause and an effect. In fact, Shanks and Dickinson view conditioning itself as a causality detection task that is controlled by mechanisms designed to recognize causal relationships.

Early work in this area made use of a video game procedure in which a simulated tank traversed a field (Dickinson, Shanks, & Evenden, 1984; Shanks, 1985). Participants were asked to fire a shell at the tank as it crossed the video screen and to assess the efficacy of the shell in destroying the tank (Dickinson et al., 1984). Later, a similar method was employed by asking participants to press the spacebar on a computer keyboard and rate the influence of the key press on lighting up a triangle presented on the screen (Shanks, 1987, 1989). Another set of procedures consisted of a stock market prediction task where participants were asked to determine the likelihood of a stock to increase or decrease the value of the stock market (Chapman & Robbins, 1990); and a food allergy prediction task where different foods were rated on their likelihood of
causing an allergic reaction in a fictitious patient (Aitken, Larkin, & Dickinson, 2000; Van Hamme & Wasserman, 1994). Most recently, Cramer et al. (2002) asked participants to rate the causal status of a worker for a company’s monthly work output.

Using these various paradigms researchers have reliably demonstrated that there are notable similarities between conditioning and human causal learning (HCL; Allan, 1993). One important finding is the acquisition of causal status. Participant’s perception of causal status over repeated estimates (trials) mirrors the negatively accelerated learning functions frequently reported in the animal conditioning literature (Allan, 1993; Cramer et al., 2002; Shanks, 1985, 1987; Shanks & Dickinson, 1987). The similarities between conditioning and HCL also include response sensitivity to contingency manipulations (Dickinson et al., 1984). That is, participants’ ratings of the causal status of the shell in the tank paradigm corresponded with the precise frequency with which the shell destroyed the tank. Additional single element conditioning-like findings in HCL include the effect of signaling and temporal contiguity (Allan, 1993).
Cue competition effects in HCL have also been widely documented using many of the procedures described above. The first reported cue competition effect in HCL was stimulus blocking (Dickinson et al., 1984; Shanks, 1985). In their tank video game procedure, participants were first given single “cause” trials (i.e., minefield only) before being presented with compound “cause” trials (i.e., minefield and shell). Analogous to Kamin’s (1968, 1969) findings, participants in the blocking group who first learned that the minefield predicted destruction of the tank rated the shells effectiveness lower than in the acquisition group not receiving the prior minefield alone training. This blocking effect was replicated using both contingent and noncontingent relationships (Dickinson et al., 1984; Shanks, 1985) and forward and backward blocking procedures (Shanks, 1985). More recently, blocking has been replicated using the stock market prediction task in a within-subjects design (Chapman & Robbins, 1990); the food allergy prediction task using a within-subjects design (Aitken et al., 2000); and the worker-production effectiveness task using both a phased and interspersed conditioning trials procedure (Cramer et al., 2002).
Another cue competition prediction from the RW model found in HCL research is conditioned inhibition (Aitken et al., 2000; Chapman & Robbins, 1990; Williams, 1995). Inhibition is defined as the suppression of a response (Pavlov, 1927) and results from compounding a conditioned excitor with a novel cue in the absence of the US (Pavlov, 1927; Rescorla & LoLordo, 1965). Rescorla (1969) posits that the reduced responding to conditioned inhibitors is a result of the organism learning that the CS predicts the absence of the US. In fact, Rescorla's suggestion that "inhibitory associations" occur has recently been supported in the animal literature (Williams & McDevitt, 2002). In HCL, cues presented in compound with an excitor in the absence of the US show inhibitory causal status. For example, when a novel food is compounded with another food that already predicts an allergic reaction and no allergic reaction occurs, the novel food is rated as a "preventative" agent of the outcome (Aitken et al., 2000).

**Interpersonal Attraction**

The framework for studying interpersonal attraction using classical conditioning was laid out by Donn Byrne
(1961, 1971). Byrne’s (1971) reinforcement theory of attraction predicts that a positive linear relationship exists between attraction and the amount of attitudinal agreement that people share. In one experiment, strangers who filled out a questionnaire similarly to participants were judged more likeable and more desirable as future experimental partners. In addition, strangers with attitudes similar to the participants were seen as more intelligent about current events, having higher morality, and as being better adjusted than strangers who had dissimilar attitudes. Byrne argued that attraction was conditioned through simple contiguity between the stranger (CS) and the attitudinal agreement (US) provided to the participant. The agreement, in theory, validates the participant’s beliefs, and acting as a social reinforcer results in increased positive evaluations of the stranger (Byrne, 1961).

The reinforcement theory of attraction posits that stimuli which both elicit affective responses and possess reinforcing properties can serve as a US (Byrne & Clore, 1970). Byrne and Clore (1971) state that if the reinforcement theory is viable in interpersonal
attraction research then "...the variables which have been identified in the study of classical conditioning should be relevant in the study of attraction (p.108)."

Variables found to be relevant in the attraction literature include the saliency of the US (Clore & Baldridge, 1968); emotional responsiveness of the subject (Byrne & Rhamey, 1965); temporal relationship between a social CS and US (Cramer, Helzer & Mone, 1986; Riordan & Tedeschi, 1983); effects of negative reinforcement (Riordan & Tedeschi, 1983); and number of conditioning trials (Cramer et al., 1986; Cramer, Weiss, Steigleder, & Balling, 1985).

Extending Byrne’s (1971) reinforcement theory of attraction, Cramer et al., (1985) found that the context in which attitudinal agreement was provided predictably affected attraction to the stranger. In their design, participants were told they were involved in a study of opinion change and how group opinion might affect a single person’s perspective. After giving their opinion on an important topic, participants received feedback about the groups’ majority opinion from either one or two group spokespersons. During the first phase of conditioning only one spokesperson presented the group
opinion (A+). A second spokesperson joined during the second phase and reported the group’s opinion (AX+). Either a single spokesperson or two spokespersons reported the group majority’s agreement with the participant’s opinion on 100% of the trials.

Similar to Byrne’s findings, attraction developed through simple contiguity between a single spokesperson and agreement on the A+ trials. However, Byrne’s (1971) theory is not a sufficient explanatory mechanism for the attraction results when two spokespersons, both reliably paired with agreement, appeared together. That is, the reinforcement theory of attraction could not explain participants who did not have prior training to person A responding faster to person X, than participants who had the previous training. Cramer et al. (1985) argued that such a finding is analogous to the previously mentioned blocking phenomenon from the animal literature (Kamin, 1968, 1969).

Cramer et al., (1985), taking into consideration the social context in which social rewards are received, proposed a new model of interpersonal attraction called the reinforcement-context theory. This theory was based upon drawing analogies between factors assumed to be
important in the development of classical conditioning and attraction. Cramer et al. (1985) also developed attraction equations using the RW model of associative learning (Rescorla & Wagner, 1972; Wagner & Rescorla, 1972). The attraction equations, as a result, generate acquisition, blocking, conditioned inhibition, stimulus overshadowing, and superlearning of attraction predictions similar to the RW predictions in animal learning.

Superlearning

Superlearning, one of the more unique predictions of the RW model (Miller et al., 1995), results from compounding a novel CS with a conditioned inhibitor in the presence of the US (Aitken et al., 2000; Blanchard & Honig, 1976; Rescorla, 1971; Taukulis & Revusky, 1975; Wagner, 1971). Recent research proposes that superlearning is the symmetric opposite of the blocking effect and is reliant on inhibitory training creating a negative expectation about the occurrence of the US (Williams & McDevitt, 2002). In the RW model, superlearning results from having an increased value of
\( \lambda - \Sigma V \) when the novel CS is compounded with the trained inhibitor. The total associative strength available to condition the novel CS is larger due to the negative associative strength that the inhibitory cue accrues from previous training. The result is an increase in the effective value of \( \lambda - \Sigma V \) (Miller et al., 1995; Rescorla & Wagner, 1972). Because the inhibitor has negative associative strength the value of \( \lambda - \Sigma V \) is larger than it would be if the neutral CS was compounded with another neutral CS and reinforced. As a result, more conditioning is possible to a neutral CS compounded with an inhibitor.

Rescorla (1971) was the first to demonstrate superlearning using rats and a conditioned fear task. In examining the effect of variations of reinforcement on cues with prior training, Rescorla found that reinforcing a compound containing a trained inhibitor and a novel cue produced increased bar suppression to the novel stimulus. That is, when a light was compounded with a previously trained inhibitory tone, and paired with shock, rats demonstrated greater conditioned-suppression to the light. This effect has since been
replicated using a variety of procedures and animals (e.g., Blanchard & Honig, 1976; Rescorla, 2004; Wagner, 1971; Williams & McDevitt, 2002).

In humans, research in HCL has also demonstrated superlearning using a food-allergy prediction task (Aitken et al., 2000). Participants were asked to assume the role of an allergist who would determine which foods would either cause or prevent an allergic reaction in a fictitious patient, "Mr. X." In this analogy, foods represented the CS, while an allergic or no allergic reaction represented the US or no US, respectively. The training procedure consisted of first training an excitatory food cue, A, to predict an allergic reaction. Following this, food cue A was presented in compound with food cue B and no allergic reaction was reported. This conditional procedure (Pavlov, 1927) resulted in food cue B acquiring inhibitory properties. The third stage of training compounded food cue B with a novel food cue, C, and then paired the compound with an allergic reaction in "Mr. X." When asked to respond, participants rated food cue C as "super" responsible for causing an allergic reaction compared to another food cue in a compound control condition.
Recent work drawing on the reinforcement context theory (Cramer et al., 1985) predicted and produced superlearning of attraction to an individual using a between-subjects design (Weiss, Shull, Schultz, Shultz, & Hiserodt, 1995). Weiss and collaborators used a backward conditioning paradigm (i.e., US-CS; agreement-Person A), with participants receiving five, two or zero backward training trials. Backward conditioning grants Person A with properties analogous to an inhibitory stimulus (Pavlov, 1927), with more trials producing greater inhibition. Person A was then compounded with Person X and paired with attitudinal agreement on 100 percent of the subsequent standard conditioning trials (Person A and X-agreement). Results revealed that participants' attraction to Person X was a positive function of the number of backward conditioning trials (i.e., amount of inhibition) they had received to Person A. The stronger the inhibition of attraction to Person A, the more participants were attracted to Person X.

Statement of the Problem

Conditioning theory and research has contributed substantially to a more complete understanding of a
variety of social processes like attitude formation and emotional expressions. The goal of this research was to further illuminate another frequently investigated social process, interpersonal attraction. The research involved developing and testing social analogs of several critical variables assumed to be vital to an understanding of cue competition effects in attraction.

To date, studies manipulating social analogs of attraction have done so using between-groups designs. In this research a more statistically powerful within-subjects design will be used. Another advantage of using a within-subjects design is the increase in the mundane realism such a design affords. In contrast to a between-groups design, research participants in within-subjects design can be exposed to all of the attraction variables and procedural manipulations.

The reinforcement context theory of attraction (Cramer et al., 1985) predicts acquisition, inhibition, and superlearning of attraction. In order to test these proposed hypotheses several social variables will be assumed to function in a manner analogous to familiar conditioning variables. These social variables will be manipulated in the context of a research participant
consulting with an internet dating service. Corresponding to a conditioned stimulus, for example, is a male client of an internet dating service (CS analog). Pairing the CS analog with an unconditioned stimulus (US) analog such as positive feedback regarding the male client’s potential as a long-term partner corresponds to a CS-US conditioning trial. Corresponding to a reinforced compound CS trial is a trial where two male clients are jointly paired with the US analog. A measure of the female participants’ encouragement to female clients of the dating service to go out with a male client is an attraction response and corresponds to a CR analog. The hypotheses described below are testable by manipulating the social analogs in specific ways.

**Acquisition of Attraction**

In conditioning, acquisition of a CR is an increasing function of the number of times a CS is paired with a US (Pavlov, 1927). Therefore, the likelihood that a participant will encourage female clients of the dating service to date a male client (CR analog) is an increasing function of the number of times a male client (CS analog) is paired with positive long-term partner feedback (US analog).
Inhibition of Attraction

According to Pavlov (1927), if a CS that reliably elicits a CR (acquisition) is presented in compound with a novel CS and not reinforced (i.e., no US is presented), conditioned inhibition to the novel CS results (see also Aitken et al., 2000; Rescorla & Wagner, 1972). This conditional procedure for producing conditioned inhibition has not yet been used to study inhibition of attraction. By analogy, it is predicted that if an attractive male client is presented in compound with another male client the participant has not previously been exposed to (novel CS analog) and no positive long-term partner feedback (US analog) is presented, the participant will discourage female clients of the dating service from dating the novel male client (inhibition of the CR analog).

Superlearning of Attraction

In conditioning, superlearning (i.e., stronger CR strength) to a novel CS is observed when a CS compound containing the novel CS and a conditioned inhibitory CS is reliably paired with a US (Aitken et al., 2000; Rescorla & Wagner, 1972). Superlearning of attraction to a novel male client is predicted when a compound
containing the novel male client and a male who inhibits attraction is reliably paired with positive long-term partner feedback (US analog). Following this procedure, the strength with which participants will encourage female clients of the dating service to date the novel male client is predicted to be significantly stronger than appropriate controls.
Participants

This study was conducted using 57 heterosexual undergraduate female volunteers (M Age = 22.44 years, SD = 3.28) from California State University, San Bernardino. Of the sample 38.6 percent (N = 22) reported being Hispanic; 28.1 percent (N = 16) reported being Caucasian; 15.8 percent (N = 9) reported being African American; 12.5 percent (N = 7) reported their ethnicity as other; and 5.3 percent (N = 3) reported being Asian American. The majority of participants, 52.6 percent (N = 30), reported being single, not in a serious relationship; 35.1 percent (N = 20) reported being single, but in a serious relationship; and 12.3 percent (N = 7) reported being married.

Volunteers were provided extra credit for use in their undergraduate Psychology courses. In order to maximize mate interest the sample was limited to women, ages 18 – 35 (Buss & Schmitt, 1993). The men whose photographs were used in the experiment were sampled.
from the same age range. All participants were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 1992).

Masking Task

The conditioning manipulations were masked by asking participants to assume the role of a consultant to a fictitious online dating service, e-MATCH. The instructions indicated that "You have been hired as a consultant by a new on-line dating service called e-MATCH. Traditional on-line dating services use personal information their clients provide to help them 'make a connection.' When clients make a connection they go on a date with one another."

Participants were then informed that e-MATCH operates differently than other online dating services. Specifically, "e-MATCH does things a little differently. Like the popular TV dating shows Elimidate, The 5th Wheel and Dismissed, e-MATCH clients can go on dates with two people at the same time. This way e-MATCH's clients can evaluate potential matches under the same situations and circumstances. After a date e-MATCH randomly asks some of its clients to complete a short survey about the
This software controls the presentation of instructions, visual stimuli, and measurement of the participants' responses. During the course of the experiment participants responses to two evaluation measures were collected using the keyboard. Stickers were placed on all keyboard keys to isolate those keys that will be used by participants. The top row of numerical keys had stickers that ranged from -4 on the 1 key to +4 on the 9 key. Additionally, the key for the letter V had a sticker with the word “Yes”, while the N key had a sticker with the word “No”. All remaining keys had a blank white sticker placed over the letter or number.

**Conditioned Stimulus (CS) Analogs**

E-prime presented photographs, either individually or two at a time, to each participant. Color photographs of men, downloaded from a national online dating service (i.e., www.match.com), served as CS analogs. The photographs were selected mainly from the East Coast and Alaska in order to decrease the probability of participant familiarity with the men.

In order to control pre-experiment evaluation differences, only men that were rated as “average” in physical attractiveness were used in the study. The
inclusion process was accomplished in two stages. The first stage was a pilot study where female participants rated 75 men on their physical attractiveness. The men chosen for inclusion in the study were rated as "average in attractiveness" on a 9-point scale (i.e., mean ratings ranged between 4 and 5). A second measure, undertaken to ensure the use of "average men," was obtained using pre-experiment ratings from two pilot studies. Each man was rated in terms of evoking sexual excitement on a 9-point scale (-4 = strongly prevents sexual excitement to +4 strongly provokes sexual excitement). The men chosen for inclusion in the proposed study earned absolute ratings closest to zero in the two pilot studies.

Unconditioned Stimulus (US) Analogs

Participants were presented with an outcome screen that consisted of graphic feedback of the male clients "Long-Term Partner Potential (LPP)." Long-term Partner Potential was conceptualized as a composite rating of the male’s generosity, emotional stability, and dependability provided by the female client that he previously dated. These traits were chosen to constitute LPP based on their relative importance in the mating
market. When selecting a mate from potential suitors, females show a preference for those who possess these resources (Buss, 2003). Thus, Positive LPP feedback represented a US analog, and when it was presented following the CS analog, corresponded to a CS+ trial. The graph was labeled from -10 to +10 on the Y-axis with the anchors Poor = -10, Average = 0, and Excellent = +10. The graph included a red bar that extended from the zero point of the graphs’ X-axis to approximately the number 8.5. Four different graphs with red bars that range from 8.2 to 8.8 were used to ensure the feedback reflects realistic individual ratings, while still remaining similar in magnitude. The no US analog (i.e., CS- trial) was represented by an outcome labeled "Rating of Long-term Partner Potential was not required" in plain black text.

**Conditioned Response (CR) Analogs**

At specified points during the experiment participants were asked to evaluate the men in the photographs. These evaluations constituted CR analogs. Participants made their responses using one of two rating scales provided on the computer screen. The Conditioned Response-1 (CR-1) scale asked participants
to indicate how strongly they would discourage or encourage e-MATCH’s female clients to date the male pictured on the screen. The response scale was a 9-point Likert-type scale anchored with -4 = Strongly Discourage and +4 = Strongly Encourage (see Appendix H for CR-1). The CR-1 scale was used to measure participant’s terminal ratings at specific points throughout the experiment. The Conditioned Response-2 (CR-2) rating scale simply asked participants whether or not they would recommend e-MATCH’s female clients to date the man or men pictured. Responses to this scale were made using the keys designated “Yes” and “No” on the bottom row of the keyboard (see Appendix I for CR-2). Responses from CR-2 were used to map participant’s trial by trial responses to the males.

**Experimental Design**

A within-subjects experimental design was conducted using seven versions. The versions were designed to rotate target male photographs through each of the critical contingencies across three training stages (see Appendix K for Table 1: Experimental Design). That is, seven target males were randomly assigned to represent one of seven target CSs (A, B, C, D, E, F & X). An
additional two men (G & H) served as fillers and remained in the position they were originally assigned across the experiment’s versions. In the first version each man represented the CS to which he was assigned. In subsequent versions, the men rotated through each of the CSs until each man represented each of the target CSs. On compound CS trials the position of the two photographs on the computer screen was counterbalanced within-subjects.

Procedure

Upon arriving at the laboratory, the experimenter greeted and asked the participant to read and sign an Informed Consent. Volunteers placed an “X” and noted the date on the consent form in order to verify they understand their rights as a research participant. After completing a short demographics form, participants were randomly assigned to one of the seven versions of the experiment.

The participants were asked to read over the instructional set presented on the computer screen (see Appendix A for first set of onscreen instructions). After participants finish reading the preliminary instructions, the experimenter asked if there are any
questions and then reviewed key elements of the experiment to avoid any confusion.

Pretraining Evaluation. Before beginning the conditioning trials, participants provided pretraining evaluations of each man. Photographs of the seven target men appearing in the study were presented in random order for 9 s each. Participants then rated how strongly they would encourage the dating service’s female clients to date the man pictured using CR-1. The men appeared on the upper half of the screen while CR-1 appeared at the bottom of the screen. Participants evaluated each man by pressing one of the nine keys labeled -4 to +4. Each pretraining evaluation screen was separated by a 7 s intertrial interval (ITI).

After completing the pretraining evaluation participants read additional instructions indicating that e-MATCH wants them to be able to answer three questions about each male client using the LPP feedback from its female clients (see Appendix B for second set of onscreen instructions). The instructions indicated that the participants would be exposed to single dater situations (one man-one woman). After reading the instructions participants were instructed to press the
space bar to initiate the first set of dating outcome presentations.

**Stage 1 Training Trials.** The goal of Stage 1 was to condition attraction to a single male, A, by pairing A with positive LPP. Participants were presented with 12 training trials, six A+ acquisition trials and six X-acquisition control trials. The X-trials control for the positive effects of mere exposure, where as the more a person is exposed to a stimulus the more favorably they evaluate the stimulus (Zajonc, 1968). Additionally, the X-trials also indicated that a LPP rating was not required (see Appendix J for examples of CS/US and CS/No US contingencies).

Each photograph appeared on the left side of the screen, and CR-2 appeared directly below each photograph. The CS analogs and CR-2 remained on the screen for 7 s, during which the participant were instructed to record whether or not they would encourage the dating service’s female clients to date the man shown by pressing either the "Yes" or "No" key. Data from CR-2 tracked trial by trial variation in the target men’s attractiveness. After 7 s elapse, CR-2 was removed and the US analog simultaneously appeared adjacent to
the CS-analog for an additional 7 s. That is, the positive LPP feedback appeared centered on the right hand side of the screen only on the A+ trials. The CS analog-US analog presentation was followed by a 7 s ITI. Conceptually, this procedure represented one complete analog of a CS-US delay conditioning training trial (Mackintosh, 1974).

A similar procedure was followed on the X- trials with the following exception. Rather than being paired with positive LPP feedback, X was paired with the phrase "Rating of Long-term Partner Potential was not required." Such a procedure is analogous to a non-reinforced trial (see Cramer et al., 2002).

Evaluation 1. The instructions and the CR-1 rating scale for Evaluation 1 are the same as used in Pretraining Evaluation (see Appendix C for third set of onscreen instructions). Two men that appeared in Stage 1 (Man A & Man X) was randomly presented to the female participants who rated how strongly they would discourage or encourage future female clients of the dating service to date the man pictured. Data from CR-1 provided a stage-level terminal measure of each man's attractiveness.
After completing Evaluation 1 participants read an additional set of instructions (see Appendix D for fourth set of onscreen instructions) informing them that they would again view a series of photographs of men and feedback regarding their potential as a long-term partner. After participants pressed the spacebar they were alerted that the next two month segment of dating outcomes was set to begin.

**Stage 2 Training Trials.** Stage 2 trials included both single and compound CS-analog presentations. Stage 2 training consisted of 18 trials with three target males appearing six times each (see Appendix K for Table 1: Experimental Design). The A+ man (for a particular version) continued in Stage 2, presented either alone or in compound with one of two other men. The CS analogs were either paired with the US-analog or not: A+ (one man paired with positive LPP feedback), AX+ (two men paired with positive LPP) and AB- (two men paired with "Rating of Long-term Partner Potential was not required").

The single male A+ trials followed the procedure described for the Stage 1 Training Trials. On the compound CS-analog trials, the photographs of two men
were included on the screen with CR-2. The two photographs appeared next to each other, centered on the left side of the screen with CR-2 directly below for 7 s. Again, during the presentation participants registered their response to CR-2 as described for the Stage 1 trials. After responding to CR-2 the compound trials followed the procedure described for the Stage 1 single CS-analog trials. On the rewarded trials the compound CS analogs were paired with the US analog and on the non-rewarded trials the compound was paired with "Rating of Long-term Partner Potential Was Not Required". This procedure represents reinforced and non-reinforced training trials and is analogous to compound stimulus delayed conditioning.

Evaluation 2. At the end of the Stage 2 Training Trials participants were asked to rate the three men (A, B & X) using CR-1 (see Appendix E for fifth set of onscreen instructions). The procedure for Evaluation 2 followed the same format as that described for Evaluation 1.

Following completion of Evaluation 2, participants were presented with an additional set of instructions that informed them that they would again view a series
of photographs of men and feedback regarding their potential as a long-term partner (see Appendix F for sixth set of onscreen instructions). After reading the instructions and pressing the spacebar participants were alerted that the next two month segment of dating outcomes was set to begin.

**Stage 3 Training Trials.** Stage 3 trials included single and compound CS analog presentations. Stage 3 consisted of 24 trials. Three target contingencies (BC+, D+, & EF+) appeared six times each. A filler compound CS, (GH-) also appeared six times, indicating that LPP ratings may not be required. During Stage 3 participants were presented with the superlearning compound, BC+; the standard superlearning control, EF+; and a single CS control for superlearning, D+. The single CS control was suggested as a more appropriate control for superlearning by Navarro, Hallam, Matzel, and Miller (1989). Both the single and compound CS trials followed the format described in Stage 2.

**Evaluation 3.** Following completion of Stage 3 participants were asked to evaluate the five target and two filler men presented (B, C, D, E, F, G & H) using CR-1 (see Appendix G for seventh set of onscreen
instructions). The procedure for Evaluation 3 followed that used in Evaluation 1 and 2. After completing the final phase of the experiment participants were asked to fill out an additional paper survey. This survey consisted of questions pertaining to the participant’s perspective of modern dating shows and the reality of dating more than one person at a time. Immediately following completion participants received a debriefing statement, had any questions answered, were given their extra credit slips, and dismissed.
CHAPTER THREE

RESULTS

Results

Data Screening

Before conducting the primary analyses the data were screened for missing values and outliers. Participant responses during the Pretraining Evaluations (Man A, X, B, C, D, G, H), Evaluation 1 (Man A, X), Evaluation 2 (Man A, X, B), and Evaluation 3 (Man B, C, D, E, F, G, H) were examined for univariate outliers. This assessment was conducted by examining standardized measures of attraction for each of the cues. No outliers were found. Standardized measures of attraction did not exceed the criterion of plus or minus 3.3 standard deviation units (Tabachnik & Fidell, 2001).

Participant responses were also examined for the presence of missing data. Two variables contained more than five percent of missing data. The Pretraining Evaluations of Men C and D were missing seven percent \((N = 4)\) and 5.3 percent \((N = 3)\) of responses, respectively. Examination of the missing Man C and Man D Pretraining Evaluations data revealed no discernable patterns for
either variable. Therefore, the data were treated as missing at random and the Expectation Maximization Algorithm (EMA) was used for imputation of missing values for all variables. Using the EMA provided a total sample of 57 participants with complete responses to all variables during each of the evaluation stages.

Evaluating Statistical Assumptions

The statistical assumptions underlying the use of repeated measures ANOVA were examined for the Pretraining Evaluation and Evaluation 3. Examination of Pretraining Evaluation distributions for each social stimulus revealed responses to Man A were slightly negatively skewed, $z = -3.46$. Based upon the very small degree of skewness (using plus or minus 3.33 as a criterion; Tabachnik & Fidell, 2001) the variable was retained in its original form. Normality of the errors was assumed to be met because the sample size for each variable was equal ($N = 57$) and the degrees of freedom for the error term easily exceeded 20. Again, because the sample size was equal the homogeneity of the errors assumption was likely to have been met. Because subjects were randomly assigned to one of the seven versions of the experiment and completed the experiment as
individuals the independence of the errors assumption was likely to have been met.

Keppel (1991) argues that in most behavioral science experiments the sphericity assumption is unlikely to be met. Therefore, the outcomes from the repeated measures ANOVA conducted on the Pretraining Evaluations will be evaluated using the conservative F test (Geisser & Greenhouse, 1958).

Pretraining Evaluations. A repeated measures ANOVA was conducted on the Pretraining Evaluations to assure that the predicted conditioning effects were not compromised by a priori evaluation differences among the men. The analysis was conducted on the attraction ratings (CR-1) of the seven men who rotated through the critical contingencies. The ANOVA revealed that prior to the conditioning phases of the experiment participants' encouraged female clients of the dating service to date each of the men with equal strength $F(6, 336) = .52, p > .05$.

Testing the Hypotheses

Acquisition of Attraction Hypothesis. Acquisition of a conditioned attraction response was tested using three methods. First, participants' CR-2 trial by trial
responses to Man A and Man X during Stage 1 were used to construct acquisition curves. Figure 1 depicts the proportion of participants indicating they would encourage the dating service’s female clients to date Man A, the acquisition contingency and Man X, the mere exposure control. A descriptive analysis indicates that across trials in Stage 1 the proportion of yes responses to Man A showed a modest increase from .78 on Trial 1 to .83 on Trial 2 and remained relatively stable until Trial 6 ($M = .84$). The proportion of yes responses to Man X, in contrast, did not increase across trials. In fact, participants’ encouragement given to female clients to date Man X decreased from .61 on Trial 1 to .46 on Trial 6.

A second test of acquisition was conducted by comparing the Pretraining Evaluations and Evaluation 1 ratings for Man A using a paired samples $t$-test. The encouragement participants gave to female clients of the dating service to date Man A was significantly greater at Evaluation 1 ($M = 1.97$, $SD = 1.70$) than their initial level of encouragement given during the Pretraining Evaluations ($M = .92$, $SD = 1.86$), $t(56) = 3.55$, $p < .05$, Cohen’s $d = .95$. In contrast, the encouragement given to
date Man X decreased between Pretraining Evaluations ($M = .68$, $SD = 1.94$) and Evaluation 1 ($M = .24$, $SD = 2.02$), however, this difference was not statistically reliable, $t(56) = 1.55, p > .05$.

A third acquisition test compared participant responses from Evaluation 1 for Man A and Man X using a paired samples $t$-test. This test revealed that, as predicted, the strength of encouragement given to female clients to date Man A ($M = 1.97$, $SD = 1.70$) was significantly greater than the strength of encouragement given to date Man X ($M = .24$, $SD = 2.02$), $t(56) = 5.28, p < .05, d = 1.41$.

**Inhibition of Attraction Hypothesis.** Participants’ CR-1 ratings from Evaluation 2 were used to test the inhibition of attraction hypothesis. Specifically, the ratings given to Man B following the AB-training in Stage 2 were compared to the expected mean of zero under the null hypothesis using a one-sample $t$-test. This test would determine if participants discouraged female clients from dating Man B by assigning him negative values on CR-1. Inhibition of attraction would be demonstrated if Man B’s rating was significantly lower than zero. Results revealed that the level of
encouragement participants provided female clients to date Man B was significantly different than zero, $t(56) = 2.60, p < .05, d = .69$. These results indicate that participants did not evidence inhibition of attraction to Man B because the level of encouragement given to female clients to date him ($M = .59, SD = 1.73$) was significantly greater than zero.

Superlearning of Attraction Hypothesis. To test the superlearning of attraction hypothesis participants’ CR-1 ratings from Evaluation 3 were used to compare Man C to Man D and Man G. Two planned comparisons between the superlearning contingency (Man C) and the controls (Man D and Man G) were conducted to test the superlearning hypotheses. In both comparisons, female clients were predicted to receive stronger encouragement to date Man C than either Man D or Man G. These comparisons revealed that the amount of encouragement given to the superlearning contingency (Man C) was not significantly greater than either the single cue control (Man D) ($M = 1.07, SD = 1.89$ vs. $M = 1.49, SD = 1.98$), $t(57) = -1.23, p > .05$ or the compound control condition (Man G) ($M = 1.07, SD = 1.89$ vs. $M = .86, SD = 2.06$), $t(57) = .62, p > .05$. 

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Chapter Four
Discussion

Overview of Thesis

Conditioning theory has contributed substantially to our understanding of a variety of important social processes including attitude formation, emotional expression, human causal learning, and interpersonal attraction. The goal of this thesis was to extend further the application of conditioning principles to the study of interpersonal attraction. More specifically, the reinforcement-context theory of attraction (Cramer et al., 1985; Weiss et al., 1995) was used in conjunction with social analogs of familiar conditioning variables to test predictions regarding attraction acquisition, inhibition of attraction, and superlearning of attraction.

The experimental instructions asked participants to assume the role of a consultant to an online dating service. Within the context of this masking task, participants experienced experimental manipulations designed to produce social analogs of acquisition, inhibition, and superlearning using pictures of male
clients as conditioned stimuli and feedback regarding their long-term partner potential as unconditioned stimuli. Participants responded to the conditioning manipulations by indicating how strongly they would discourage or encourage future female dating service clients to date male clients.

**Acquisition of Attraction Hypothesis**

In Pavlovian conditioning, acquisition refers to the development of an association between two stimuli as a result of their repeated contiguous pairings with one another (Pavlov, 1927). In theory, as the number of pairings between the two stimuli increase so does their degree of association, which leads to the initially neutral stimulus acquiring the response eliciting properties of the second stimulus. In the current study, participants were presented with two social stimuli, Man A and Man X, consistently paired with reinforcing positive long-term partner feedback (treatment) or the absence of such feedback (control), respectively. Using these conditioning manipulations the following acquisition hypothesis was tested: The likelihood that a participant will encourage female clients of the dating service to date a male client is an increasing function
of the number of times a male client is paired with positive long-term partner feedback.

The results yielded strong support for the acquisition of attraction hypothesis using a previously untested within-subjects experimental design. Both Man A and Man X received a substantial proportion of “yes responses” on the first Stage 1 trial. That is, prior to experiencing the reinforcing feedback or the no reinforcement control, a substantial proportion of participants reported that they would encourage female clients to date Man A and Man X. However, the subsequent pattern of “yes responses” on the remaining five trials was predictably different. For example, the proportion of participants encouraging female clients to date Man A (treatment) increased modestly while the proportion of participants continuing to encourage female clients to date Man X (control) steadily decreased. These two response patterns approximate the commonly found acquisition and control functions found in the animal and human conditioning literature, and demonstrate participants’ ability to discriminate between contingencies of reinforcement and non-reinforcement.
In conditioning research it is not uncommon to compare changes in response strength from a pre-treatment (baseline) level of performance. A conceptually similar analysis provided support for the acquisition of attraction hypothesis when the CR-1 responses from the Pretraining Evaluations and Evaluation 1 were compared. The CR-1 responses to Man A were, as predicted, significantly higher on Evaluation 1 after Stage 1 than on the Pretraining Evaluation. In contrast, the difference between the Pretraining CR-1 mean and the Evaluation 1 CR-1 mean for Man X was negative albeit not statistically reliable.

Research in animal conditioning has historically been informed by general learning theory (Hull-Spence Tradition: Hull, 1943, Spence, 1960; Pavlov, 1927) because of its success in explaining and predicting the growth of response strength over repeated reinforced trials. As a result, measures of terminal response strength, compared to changes in response strength over trials, between treatment and control conditions are only rarely directly compared. However, because the predictive power of general learning theories and statistical/cognitive theories are frequently compared
in the human learning literature it has become more common to measure terminal response differences (see Allan, 1993 for a discussion of associative and rule-based theory in human causal learning). Following this trend in comparing terminal responses a third test was conducted confirming the acquisition of attraction hypothesis. Treatment Man A’s CR-1 mean was significantly greater than control Man X’s Evaluation 1 CR-1 mean.

Despite finding acquisition of attraction effects using three comparison procedures the effects are, nevertheless, not as robust as anticipated. Frankly, the changes in the proportion of “yes responses” (CR-2) to Man A, in particular, were expected to be more substantial across the six reinforced trials. The Pretraining Evaluation and Evaluation 1 difference for Man A were also expected to be more robust, and the difference between the terminal CR-1 means for Man A and Man X was expected to be greater.

If the analogies between the conditioning and the social variables used in this research were valid, the reinforcing feedback following the presentation of Man A would be expected to support only a limited amount of
attraction acquisition (Cramer et al., 1985; Rescorla & Wagner, 1972). Therefore, if the initial attraction responses to Man A were higher on Trial 1 \( (M = .78 \) on CR-2) than assumed prior to the initial positive feedback it is reasonable to argue that the reinforcement used in the present research may have had only a limited effect. Three plausible explanations, two theoretical and one procedural, for the less than robust acquisition effects to Man A can be developed.

All photographs had previously been rated as "average" in physical attractiveness. Although necessary to ensure that stimuli used in the experiment were of equal preconditioning physical attractiveness, this control mechanism could have created an unexpected effect. Past research has shown that people rate average faces compared to "extreme" faces as more interpersonally attractive (Langlois & Roggman, 1990; Langlois, Roggman, & Musselman, 1994). Preference for an average face stems from a person's experience and familiarity with such faces (Langlois et al., 1994). It is logical to argue that the photographs used in this thesis were, because of their averageness, familiar to
the participants, and thus responded to more favorably on Trial 1 than anticipated.

The mere exposure effect is a well-documented phenomenon that describes an individual's enhanced positive affect to a stimulus that is repeatedly presented without reinforcement (Bornstein, 1989; Harmon-Jones & Allen, 2001; Lee, 2001; Zajonc, 1968). In a meta-analysis, Bornstein (1989) discovered that the most robust exposure effects occur when stimuli are presented between 1 and 9 times. On Trial 1 in Stage 1 in the present experiment, participants were viewing Man A for the second time. It is plausible, based on the effect of mere exposure, that the number of "yes responses" participants gave to Man A were inflated because participants were exposed to him twice before making their Trial 1 CR-2 responses. Any inflation in CR-2 responding prior to conditioning would be expected to reduce the effectiveness of the rewarding positive feedback to support attraction acquisition.

Previous evidence for acquisition effects in attraction was found using between-groups experimental designs (Byrne, 1961; Cramer et al., 1985; Weiss et al., 1995). The diminished acquisition effects found in the
present thesis may have resulted from the use of the novel, more complex within-subjects experimental design. Although within-subjects designs create more mundane realism, such designs like the social world are frequently complex. In the present design the participants were required to attend to and respond to seven social cues presented across three distinct stages. These cues were presented either individually or in compound, and with or without positive feedback. Arguably, this level of experimental complexity could have moderated the size of the acquisition effects found for Man A.

**Inhibition of Attraction Hypothesis**

When a CS reliably elicits a CR and is then presented in a compound with a novel CS that is not reinforced, conditioned inhibition to the novel CS is predicted (Aitken et al., 2000; Pavlov, 1927; Rescorla & Wagner, 1972). In Stage 2 of the present thesis participants were presented with a compound social analogue containing Man A, who was previously reinforced in Stage 1, and a novel stimulus, Man B. This social compound was followed by an analog of non-reinforcement. The participants were informed that a report regarding
Man A and Man B's long-term partner potential was not required. This social analog of the Pavlovian conditional procedure for producing inhibition was expected to result in Man B inhibiting participants from encouraging female clients of the dating service to date him. This conditional procedure has not previously been used to study the inhibition of interpersonal attraction.

Results, however, revealed no support for the inhibition of attraction to Man B. Rather than being an inhibitor of attraction with a mean CR-2 rating below zero there was evidence that Man B actually elicited a modest level of attraction from the participants; his mean CR-2 rating was reliably greater than a level of zero. One possible solution for understanding this unexpected result may be found by assuming that the observed result is nevertheless consistent with familiar learning phenomena found under the broad classifications of within-stimulus learning and contextual conditioning (e.g., Balsam & Tomie, 1985; Durlach & Rescorla, 1980; Gordon & Weaver, 1989; Rescorla & Wagner, 1972). Learning about and responding to a novel stimulus like Man B can, in theory, be influenced by the context in
which the stimulus is trained and/or the context in which the stimulus is tested (i.e., context similar to training or not similar to training). In the present case Man B was presented in the context of the attractive Man A and the compound social stimulus was not reinforced. Attraction to Man B increased as a result rather than decreased as was expected. Additional research with the proper experimental controls would be required to determine if Man B’s unexpected attractiveness could be accounted for by variables known to influence within-stimulus learning or contextual conditioning.

**Superlearning of Attraction Hypothesis**

Superlearning refers to the enhanced responding to a novel stimulus that is presented in a reinforced stimulus compound containing a conditioned inhibitor. During the third and final stage of the present study, participants were presented with a social analog compound that contained a novel stimulus Man C and an anticipated conditioned inhibitor, Man B. This social compound was paired with positive long-term partner potential feedback (US analog). Participants were expected to give higher levels of encouragement to date
Man C than the appropriate single social stimulus and compound social stimulus controls. These predictions were unfortunately not confirmed by the results. In fact, the results are not surprising given that superlearning is, in theory, entirely dependent upon the presence of a conditioned inhibitor in the reinforced social compound. Because conditioned inhibition was not established during Stage 2, superlearning would not be expected to develop. An alternative explanation for the failure to observe superlearning of attraction would be required only if inhibition effects had been observed following Stage 2.

Future Directions

While single cue acquisition of attraction effects were found, compound cue competition effects using social stimuli were elusive. Future attempts to demonstrate inhibition and superlearning effects in interpersonal attraction could benefit from simplifying the experimental requirements placed on the participants. As previously mentioned, the present experiment used for the first time a within-subjects design. Participants were presented with an array of
social stimuli during this multi-stage experiment, which in addition to being procedurally complex took a substantial amount of time to complete. Future research should develop similar social analogues of single and compound cues and should test acquisition, inhibition, and superlearning using a between-groups experimental design. Using a between-groups design would reduce the number of single and compound cues that participants would need to attend and respond to, therefore, simplifying the task and greatly reducing the time needed to administer the conditioning manipulations and to test their effects.

The present research could also have been simplified by using a well-recognized, alternative procedure for producing conditioned inhibition (i.e., backward procedure). The conditional procedure for producing inhibition to a social stimulus used in the current study is admittedly complex, but has been used successfully in research involving human causal learning (see Cramer et al., 2002 discussion p. 260-261). One goal of the present research was to use, for the first time, the conditional procedure to produce inhibition of attraction. Clearly, without having observed conditioned
inhibition to Man B following Stage 2 the test of the superlearning of attraction hypothesis was, practically speaking, moot. Weiss et al., (1995) successfully used a social analog of backward US-CS conditioning to produce inhibition of attraction. Future research could use a procedure where positive feedback regarding a man’s long-term partner potential was presented prior to participants viewing his picture. Such a backward US-CS procedure would be expected to produce conditioned inhibition of attraction to Man B.

Conclusions

Although the current work did not demonstrate cue competition effects the finding of acquisition provides further support for the application of classical conditioning to the study of social processes, in general, and interpersonal attraction, specifically. The functional equivalency between traditional conditioning variables and social analogs of attraction acquisition found in the current study were apparent. Most importantly this study provides the first example of acquisition of attraction using a within-subjects experimental design. Humans simply do not encounter one
another in a social world that remotely approximates their singular experiences inherent in a between-groups experimental design. In the social world we frequently encounter one another in a complex array of persons and information experienced over time. The importance of demonstrating attraction acquisition is therefore bolstered by the use of the within-subjects experimental design. However, such a design, it can be argued, makes testing cue competition hypotheses involving compound social stimuli extremely challenging.
APPENDIX A

FIRST ONSCREEN INSTRUCTIONS
Please read the following instructions very carefully. If after reading the instructions anything is unclear, ask me, and I will clarify them for you.

You have been hired as a consultant by a new on-line dating service called e-MATCH. Traditional on-line dating services use personal information their clients provide to help them “make a connection.” When clients make a connection they go on a date with one another.

e-MATCH does things a little differently. Like the popular TV dating shows Elimidate, The 5th Wheel and Dismissed, e-MATCH clients can go on dates with two people at the same time. This way e-MATCH’s clients can evaluate potential matches under the same situations and circumstances. After a date e-MATCH randomly asks some of its clients to complete a short survey about the date. e-MATCH randomly asks its clients to rate their dates in terms of long-term partner potential based on the personal traits generosity, emotional stability, and dependability.

For your part you will be evaluating some of e-MATCH’s male clients using dating feedback from some of its female clients. Your evaluations will be the basis for discouraging or encouraging e-MATCH’s future female clients to date its male clients.

All of the information that you need to consult with e-MATCH will be presented on the computer screen. This information was collected from female client’s who dated only one time during a two-month period.

Shortly you will see pictures of some of the men who have dated e-MATCH’s female clients during a two-month period. Of course, you do not know anything about the men. But, e-MATCH would like to know your first impression of each of these men. After looking at each man use the rating scale below the picture to indicate how strongly you would discourage or encourage future female clients to date this man. Press one of the negative numbers on the computer keyboard to indicate how strongly you would discourage female clients from dating this man or press one of the positive numbers to indicate how strongly you would encourage female clients to date this man. Larger negative numbers = strongly discourage, 0 = neither discourage nor encourage, and larger positive numbers = strongly encourage.

Sample Rating Scale

Use the scale below to indicate how strongly you would discourage or encourage future female clients to date this man. Respond by pressing the corresponding key from the scale below.

Strongly Discourage  -4 -3 -2 -1  0 +1 +2 +3 +4 Strongly Encourage

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APPENDIX B

SECOND ONSCREEN INSTRUCTIONS
e-MATCH wants you to answer three questions using feedback from its female clients. The three questions are:

1 – Which men should e-MATCH’s future female clients be discouraged from dating?

2 – Which men should e-MATCH’s future female clients be encouraged to date?

3 – Which men should e-MATCH’s future female clients be neither discouraged from dating nor encouraged to date?

All of the information that you will need to answer the three questions will be presented on the computer screen. This information was collected from e-MATCH’s female clients over a two-month period. Each female client dated only one time.

First, pictures of some of e-MATCH’s male clients will appear on the computer screen. When you see one man’s picture that means he went on a “one man-one woman” date. If you see this man’s picture more than once it simply means he was matched with another female client and went on a date with her.

Second, e-MATCH wants you to evaluate the male clients using a simple rating scale. The scale will be presented under the picture of the man. The scale asks, “Would you encourage e-MATCH’s future female clients to date the man (men) above?” Respond by pressing the letter “Y” = Yes or “N” = No on the computer keyboard.

After making your response a graph will appear revealing the female client’s long-term partner potential (LPP) rating based on the personal traits generosity, emotional stability, and dependability. Men who were perceived as generous, emotionally stable and dependable received a higher LPP rating. The LPP rating can range from −10(Poor) to 0(Average) to +10(Excellent).

Not all of e-MATCH’s clients were asked for a long-term partner potential rating. In this case you will see the words “Long-term Partner Potential Rating Was Not Required” instead of a graph.

This study is not a test of your personal skills or abilities. At first you will not know anything about the men. Using the female clients’ long-term partner potential ratings e-MATCH wants your help in determining which men e-MATCH’s female clients should be discouraged from dating, which men e-MATCH’s female clients should be encouraged to date, and which men should e-MATCH’s female clients be neither discouraged from dating nor encouraged to date.
APPENDIX C

THIRD ONSCREEN INSTRUCTIONS
Once again you will see pictures of some of the men who have dated e-MATCH's female clients. e-MATCH wants your help in determining which men e-MATCH's female clients should be discouraged from dating, which men e-MATCH's female clients should be encouraged to date, and which men should e-MATCH's female clients be neither discouraged from dating nor encouraged to date. After looking at each man use the rating scale below the picture to indicate how strongly you would discourage or encourage future female clients to date this man. Press one of the negative numbers on the computer keyboard to indicate how strongly you would discourage female clients from dating this man or press one of the positive numbers to indicate how strongly you would encourage female clients to date this man. Larger negative numbers = strongly discourage, 0 = neither discourage nor encourage, and larger positive numbers = strongly encourage.

Sample Rating Scale

Use the scale below to indicate how strongly you would discourage or encourage future female clients to date this man. Respond by pressing the corresponding key from the scale below.

Strongly Discourage  -4  -3  -2  -1  0  +1  +2  +3  +4  Strongly Encourage
APPENDIX D

FOURTH ONSCREEN INSTRUCTIONS
Once again pictures of some of e-MATCH's male clients will appear on the computer screen. When you see one man's picture that means he went on a "one man-one woman" date. If you see this man's picture more than once it simply means he was matched with another female client and went on a date with her.

When you see pictures of two men that means these men went on a "two men-one woman" date. If you see pictures of these two men more than once it simply means these two men were matched with another female client and went on a date with her.

Again, e-MATCH wants you to evaluate the male clients using a simple rating scale. The scale will be presented under the picture of one man or the pictures of two men. The scale asks, "Would you encourage e-MATCH's future female clients to date the man (men) above?" Respond by pressing the letter "Y" = Yes or "N" = No on the computer keyboard.

After making your response a graph will appear revealing the female client's long-term partner potential (LPP) rating based on the personal traits generosity, emotional stability, and dependability. Men who were perceived as generous, emotionally stable and dependable received a higher LPP rating. The LPP rating can range from -10(Poor) to 0(Average) to +10(Excellent).

Not all of e-MATCH's clients were asked for a long-term partner potential rating. In this case you will see the words "Long-term Partner Potential Rating Was Not Required" instead of a graph.
APPENDIX E

FIFTH ONSCREEN INSTRUCTIONS
You will see pictures of some of the men who have dated e-MATCH's female clients. e-MATCH wants your help in determining which men e-MATCH's female clients should be discouraged from dating, which men e-MATCH's female clients should be encouraged to date, and which men should e-MATCH's female clients be neither discouraged from dating nor encouraged to date. After looking at each man use the rating scale below the picture to indicate how strongly you would discourage or encourage future female clients to date this man. Press one of the negative numbers on the computer keyboard to indicate how strongly you would discourage female clients from dating this man or press one of the positive numbers to indicate how strongly you would encourage female clients to date this man. Larger negative numbers = strongly discourage, 0 = neither discourage nor encourage, and larger positive numbers = strongly encourage.

**Sample Rating Scale**

Use the scale below to indicate how strongly you would discourage or encourage future female clients to date this man. Respond by pressing the corresponding key from the scale below.

Strongly Discourage  -4  -3  -2  -1  0  +1  +2  +3  +4  Strongly Encourage
APPENDIX F

SIXTH ONSCREEN INSTRUCTIONS
Once again pictures of some of e-MATCH's male clients will appear on the computer screen. When you see one man's picture that means he went on a "one man-one woman" date. If you see this man's picture more than once it simply means he was matched with another female client and went on a date with her.

When you see pictures of two men that means these men went on a "two men-one woman" date. If you see pictures of these two men more than once it simply means these two men were matched with another female client and went on a date with her.

Again, e-MATCH wants you to evaluate the male clients using a simple rating scale. The scale will be presented under the picture of one man or the pictures of two men. The scale asks, "Would you encourage e-MATCH's future female clients to date the man (men) above?" Respond by pressing the letter "Y" = Yes or "N" = No on the computer keyboard.

After making your response a graph will appear revealing the female client's long-term partner potential (LPP) rating based on the personal traits generosity, emotional stability, and dependability. Men who were perceived as generous, emotionally stable and dependable received a higher LPP rating. The LPP rating can range from -10(Poor) to 0(Average) to +10(Excellent).

Not all of e-MATCH's clients were asked for a long-term partner potential rating. In this case you will see the words "Long-term Partner Potential Rating Was Not Required" instead of a graph.
APPENDIX G

SEVENTH ONSCREEN INSTRUCTIONS
You will see pictures of some of the men who have dated e-MATCH’s female clients. e-MATCH wants your help in determining which men e-MATCH’s female clients should be discouraged from dating, which men e-MATCH’s female clients should be encouraged to date, and which men should e-MATCH’s female clients be neither discouraged from dating nor encouraged to date. After looking at each man use the rating scale below the picture to indicate how strongly you would discourage or encourage future female clients to date this man. Press one of the negative numbers on the computer keyboard to indicate how strongly you would discourage female clients from dating this man or press one of the positive numbers to indicate how strongly you would encourage female clients to date this man. Larger negative numbers = strongly discourage, 0 = neither discourage nor encourage, and larger positive numbers = strongly encourage.

Sample Rating Scale

Use the scale below to indicate how strongly you would discourage or encourage future female clients to date this man. Respond by pressing the corresponding key from the scale below.

<table>
<thead>
<tr>
<th>Strongly Discourage</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
<th>+3</th>
<th>+4</th>
<th>Strongly Encourage</th>
</tr>
</thead>
</table>
APPENDIX H

CONDITIONED RESPONSE 1
Use the scale below to indicate how strongly you would discourage or encourage future female clients to date this man. Respond by pressing the corresponding key from the scale below.

Strongly Discourage  -4  -3  -2  -1  0  +1  +2  +3  +4  Strongly Encourage
APPENDIX I

CONDITIONED RESPONSE 2
Would you encourage future female clients of e-MATCH to date the man (men) above?

YES  NO
APPENDIX J

EXAMPLES OF STIMULI
EXAMPLE OF CS-NO US

Report of Long-term Partner Potential was not required
APPENDIX K

TABLE 1: EXPERIMENTAL DESIGN
Table 1

*Experimental Design*

<table>
<thead>
<tr>
<th>Contingency</th>
<th>Pretraining</th>
<th>Stage 1</th>
<th>Evaluation 1</th>
<th>Stage 2</th>
<th>Evaluation 2</th>
<th>Stage 3</th>
<th>Evaluation 3</th>
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<tr>
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<td>A</td>
<td>A</td>
<td>A+</td>
<td>A</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td>D+</td>
<td></td>
<td>D</td>
</tr>
</tbody>
</table>

*Note.* Letters represent male photographs presented to participants. One letter indicates one male photograph and two letters indicate two male photographs presented to participants. In the training stages the photographs are paired with either positive “Long-term Partner Potential” represented by a “+” or paired with “Report of Long-term Partner Potential was not required” represented by a “-“.

Hence, the “+” indicates reinforcement and the “-“ indicates non-reinforcement.
APPENDIX L

ACQUISITION AND CONTROL CURVES
Stage 1 Training Trials

Proportion of Yes Responses

A+  X-
REFERENCES


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