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GRADUATE COLLEGE

PAVLOVIAN CONDITIONING OF COMPOUND SOCIAL STIMULI: BLOCKING EFFECTS IN INTERPERSONAL ATTRACTION

A DISSERTATION

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PAVLOVIAN CONDITIONING OF COMPOUND SOCIAL STIMULI:

BLOCKING EFFECTS IN INTERPERSONAL ATTRACTION

APPROVED BY

DISSERTATION COMMITTEE

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Abstract

An associative learning theory developed by Rescorla and Wagner was used to generate research designed to examine the stimulus selection problem in interpersonal attraction. By drawing analogies between the independent and dependent variables of the model and the corresponding independent and dependent variables of attraction, the theoretical method served to develop predictions regarding the "blocking effect." Two experiments provided support for the prediction that a previously neutral person (CS analog) associated with social reinforcement (UCS analog), while in the the presence of another person already reliably signalling social reward will elicit an attenuated attraction response (CR analog). The heuristic value of the Rescorla-Wagner model for addressing contextual issues in attraction was discussed.

Pavlovian Conditioning of Compound Social Stimuli: Blocking Effects in Interpersonal Attraction

It has proven to be convenient to define interpersonal attraction as an individual's attitude about, or tendency to evaluate, either positively or negatively, another person (Berscheid & Walster, 1978; Walster & Walster, 1976). Consequently, attraction, like other attitudes, has frequently been divided into three fundamental elements: a cognitive, an affective and a behavioral component (Tedeschi, 1974). Consistent with a behavioral component, it is possible to define attraction as a learned tendency to physically approach specific individuals in our society. The results of a number of experiments suggest that subjects frequently indicate a willingness to participate in anticipated activities with persons whom they find attractive (Byrne, 1971).

One approach to the study of interpersonal attraction, employing a number of learning-theoretical concepts, has successfully used reinforcement theory (Byrne, 1969, 1971; Byrne & Clore, 1970; Clore, Note 1; Griffitt, 1971; Lamberth, Gouaux & Padd, 1973; Lombardo, Weiss & Buchanan, 1972; Lott & Lott, 1960, 1972). This particular research strategy has developed an impressive record with regard to the explanation of existing empirical relationships and the generation of testable new predictions. According to the Byrne-Clore reinforcement theory of attraction, any reinforcing stimulus can function as a second-order unconditioned stimulus (UCS) for an implicit affective

response. This implicit response mediates the relationship between a conditioned stimulus (CS) associated with the UCS and a measurable attraction response (Byrne & Clore, 1970; Clore, Note 1; Clore & Byrne, 1974). The specific degree of attraction is a function of the proportion of reinforcement received. Frequently, attitudinal statements indicating interpersonal agreement have been employed as the reinforcing stimulus; attitudinal statements, reflecting interpersonal similarity or dissimilarity, have been shown to function in a manner similar to familiar reinforcers and punishers (Byrne, Griffitt & Clore, 1968; Lamberth & Craig, 1970; Reitz, Douey & Mason, 1968). Although the Byrne-Clore theory is modelled upon classical conditioning, it is not committed to any particular theoretical treatment (e.g., Byrne, 1971, p. 269). As a result, much of the research affecting the heuristic status of contemporary classical conditioning models has been overlooked in the development of the Byrne-Clore theory.

An examination of the contemporary associative learning literature indicates a rapidly developing interest in contextual variation and its impact on conditioning. The issues raised by contextual manipulations fall within a general class of problems termed stimulus selection. Rudy and Wagner (1975) briefly describe the stimulus selection problem as "one of specifying the rules whereby a relationship will or will not be learned about depending upon the context of environmental events in which it is embedded (p. 270). With regard to the stimulus selection problem, a number of experiments have been designed to examine the "blocking effect." The results of these experiments indicate that the conditioning of a neutral CS is dramatically affected by the stimulus environment,

containing the CS and all other component stimuli, concurrent in a conditioning arrangement with the UCS (Kamin, 1968, 1969; Rescorla & Wagner, 1972; Wagner & Rescorla, 1972). In particular, conditioning is blocked if the neutral CS is reinforced in the presence of an additional cue which already reliably signals the UCS. On the other hand, if another component stimulus in the environment does not reliably signal the UCS, conditioning of the new CS proceeds unabated.

An interest in contextual social variables, and their effect on the manifestation of interpersonal attraction, although not addressed in terms of stimulus selection, has recently developed in social psychology (Berscheid, Brothen & Graziano, 1976; Hensley & Duval, 1976; Mascaro & Graves, 1973; Wagner, 1975). Consistent with the blocking effect results reported in the conditioning literature, variations in the attractiveness of contextual social stimuli have been found to attenuate an individual's attraction response to another person. Berscheid et al. (1976) have cogently summarized their findings by suggesting that "an affective reaction to an evaluator is influenced by the context in which the evaluations are received; the more positive the evaluations of the evaluator's rival, the less attraction the evaluator tends to generate" (p. 716). The magnitude of our attraction to an individual appears to be attenuated if the total attractiveness of other composite social stimuli in the environment (including other people) is high.

It is possible to address interpersonal attraction in terms of the stimulus selection problem. That is, by what rules do persons become, or not become, attracted to another individual associated with social reinforcement given the presence of particular environmental

events (i.e., the attractiveness of other social stimuli concurrent in the immediate environment)? Stating the problem another way, what effect does the presence of attractive social stimuli (including people) have on an individual's attraction response to a previously neutral social cue currently associated with social reinforcement?

General Method

Theoretical Method

Through the use of analogy, a relatively well-understood conditioning model is used to guide the investigation of a less well-understood research area. In particular, analogies are drawn between classical conditioning variables and variables assumed to be important in the development of attraction. A dictionary of analogies (Rules of Correspondence) relates the independent and dependent variables of the model to the corresponding (analogous) independent and dependent variables of attraction. Consistent with this construction, the empirical relationships holding among the variables in the conditioning model should, theoretically, hold among the corresponding attraction variables (Campbell, 1920; Lachman, 1960; Nagel, 1961; Oppenheimer, 1956).

In classical conditioning, repeatedly pairing a neutral cue (CS) with reinforcement (UCS) will contribute to the cue's acquisition of associative strength and a negatively accelerated increasing learning curve for the conditioned response (CR) will result (Bush & Mosteller, 1955; Estes & Burke, 1953; Hull, 1943; Spence, 1956; Wagner, 1971). Carefully developing and manipulating analogous attraction independent and dependent variables produces empirical relationships which are similar to the conditioning relationships. Hence, repeatedly

pairing a discriminable neutral social stimulus (CS analog) with agreement (UCS analog) should result in the cue's acquisition of associative strength. This associative learning procedure directly contributes to the cue's capacity to evoke an attraction response (CR analog). Consistent with a learning-theoretical analysis, the attraction CR should be analogous to familiar learning dependent variables (e.g., speed or probability). If the analogies are tightly drawn, mapping this response across conditioning trials results in a negatively accelerated increasing learning curve for the appropriate analogous attraction dependent variable (e.g., speed of approach or probability of approach). The stimulus selection problem in attraction can be examined by drawing one additional analogy between the stimulus elements in a compound cue and the stimulus elements of a compound social cue. The social analog of a compound CS conditioning trial is two or more social cues (including people) paired with a social reward.

Rescorla-Wagner Theory

The present investigation is modelled on a contemporary classical conditioning theory formally developed by Rescorla and Wagner (1972, Wagner & Rescorla, 1972) and is consistent with a general programmatic approach termed "extension of liberalized S-R theory" by Neal Miller (1959). Employing the variable-reinforcement assumption, the theory powerfully and almost effortlessly addresses the issue of stimulus selection. Briefly, the variable-reinforcement position suggests that the effectiveness of a UCS in incrementing the associative strength (V) of a CS progressively diminishes as the signal-value of the cue increases. Changes in associative strength (ΔV) are determined, in part, by the discrepancy between the current V and the theoretical

asymptote of conditioning supportable by the UCS (λ). As the quantity (λ-V) decreases across conditioning trials, the increments in V will progressively diminish, and the result is the familiar negatively accelerated learning curve. The magnitude of ΔV is determined by the specific properties (saliency and/or intensity) of two learning rate parameters, (α) determined by the CS and (β) determined by the UCS. The formal equation for determining changes in associative strength of a single cue is:

$$\Delta V_{CS} = \alpha_{CS}\beta(\lambda - V_{CS})$$

Rescorla and Wagner propose a unique refinement of this general model of conditioning. They suggest that changes in the associative strength of a CS are not determined by the current strength of that component stimulus alone but the total associative strength ($\bar{V}$) of all cues present in the conditioning situation, including background or apparatus cues (hereafter referred to as X). As a result, the theory predicts that conditioning of a neutral CS will be affected by the composite associative strength of all other component and background stimuli contiguous with the UCS. If $\bar{V}$ is at or near λ, the UCS will be ineffective in conditioning any new cues introduced into the conditioning arrangement (blocking). Procedures which increase λ, such as UCS intensity manipulations, increase the UCS' capacity to support conditioning and will contribute to the new cue's acquisition of V (unblocking). Changes in the associative strength of component stimuli in a two-cue (hereafter referred to as A and B) conditioning arrangement are governed by the following equations:

$$\Delta V_A = \alpha_A\beta\{\lambda - (V_A + V_B + V_X)\}$$

$$\Delta V_B = \alpha_B \beta \{\lambda - (V_A + V_B + V_X)\}$$

A reliance on the particular conditioning theory developed by Rescorla and Wagner provides the research endeavor with two powerful scientific virtues: (a) the theory functions in a specifiable determinate manner and (b) the theory sustains an exceptionally high degree of mathematical sophistication. In order to properly use the theory for studying attraction, two important assumptions are required: (a) as $\bar{V}$ of a stimulus compound increases, and thus, the quantity $(\lambda - \bar{V})$ decreases, the reinforcing effectiveness of the UCS will progressively diminish, and (b) changes in an individual stimulus component's V is a function of the $\bar{V}$ of all stimuli concurrent in the conditioning arrangement. Regarding interpersonal attraction, these assumptions pertain directly to the relative effectiveness of agreements (or other social reinforcers) to increment the attractiveness of an individual. Furthermore, changes in an individual's attractiveness are assumed to depend upon the total attractiveness of all other social stimuli (including other people) concurrently associated with reward and the theoretical asymptote of conditioning supportable by the social reinforcer. An adoption of these assumptions goes beyond the specification of analogies between classical conditioning and interpersonal attraction. These assumptions allow a calculated utilization of the Rescorla and Wagner theory for addressing stimulus selection in interpersonal attraction.

Paradigms

The research reported employs two contemporary associative learning paradigms to investigate the stimulus selection problem in

general, and blocking effects in particular, in interpersonal attraction. The first experiment used a two-phase conditioning procedure analogous to the procedure described by Kamin (1968, 1969; see also Kremer, 1978). In the initial phase of Kamin's experiment a single CS was paired with the UCS (A+ conditioning), while in the second phase, the conditioned cue and a new neutral cue were paired with the UCS (AB+ conditioning). This particular procedure reliably blocks CR responding to the neutral cue in the compound when compared to the CR responding of subjects receiving only compound CS or phase 2 procedures. The second experiment used an alternative procedure for studying blocking, described by Rescorla and Wagner (1972), in which the A+ and AB+ conditioning trials are randomly interspersed rather than segregated into separate phases. Compared to subjects receiving only AB+ trials, subjects receiving interspersed A+ and AB+ conditioning trials manifest less conditioning to the B cue. Rescorla and Wagner (1972), relying on a variable-reinforcement assumption, suggest that the UCS is limited in its effectiveness with regard to the total amount of conditioning it can support. In short, if other cues in the environment reliably predict the UCS, it will be limited in its capacity to condition any additional new cues.

Conversation Procedure and Masking Task

In an effort to override the subject's normal use of higher mental capacities (Spence, 1960), both experiments 1 and 2 were presented to the research participants as a study of opinion change. The subjects were told: "In this experiment, we are interested in how an individual's opinion affects the majority opinion of a group, and how that majority opinion may affect the opinions of a single individual."

The experimental procedures conformed to a general conversation paradigm successfully used in studying such diverse social processes as speaking in reply (e.g., Weiss, Lombardo, Warren & Kelley, 1971), yielding (e.g., Lombardo et al., 1972), and learned helplessness (e.g., Feinberg, Weiss, Miller, Steigleder & Lombardo, Note 2). All of the subjects were told that following a systematically controlled conversation between themselves and a group of other students, all participants would be provided an opportunity to indicate any degree of opinion change which might have occurred. Actually, the subject was the only participant in the experimental conversation. The group's portion of the conversation consisted of prerecorded verbal statements delivered to the subject by the experimenter at predetermined points in the conversation cycle.

Two bogus subjects, referred to as Subject Blue and Subject Orange, were associated with verbal feedback ostensibly indicating attitude similarity. Because an agreement (UCS analog) simultaneously reported by two people, as opposed to a single person, is analogous to an increased magnitude of reinforcement manipulation, the spokesperson(s) was said to be reporting a group's majority opinion. Depending upon the experimental condition, either one spokesperson (A+ conditioning) or both spokespersons (AB+ conditioning) reported the group's opinion. In an effort to maintain an equal level of agreement strength the instructions clearly indicated that the verbal feedback referred to a group's attitude rather than to the specific attitude of the spokesperson(s). The experimental instructions were precisely designed to control for the physical differences in the unconditioned stimuli present when one person was associated with reward as opposed to when two people were associated with reward. The specification of predictions

generated from the Rescorla and Wagner model critically depends upon the success or failure of this instructional manipulation.

Predictions

Juxtaposing single social CS and compound social CS conditioning trial analogies in the associative learning paradigms described by Kamin and by Rescorla and Wagner, affords the opportunity to test predictions regarding stimulus selection in attraction. Specifically, the capacity of an individual to evoke an attraction response will be blocked if this individual is associated with social reinforcement (agreements) while in the presence of another person signalling agreement. If the total attractiveness of all social cues in the conditioning arrangement is at or near the theoretical asymptote of conditioning, the social reinforcer will be ineffective in conditioning a new social cue. This prediction can be tested using a series of single social stimulus A+ conditioning trials (person A associated with agreement) and compound social stimulus AB+ conditioning trials (persons A and B associated with agreement) juxtaposed in either a two-phase or interspersed-trials procedure. The conditioning of attraction to person A should reliably block the subject's attraction to person B. On the other hand, subjects not receiving extra conditioning trials to person A alone, but only AB+ trials, should not manifest blocking to person B.

These predictions, generated from the Rescorla and Wagner model, are warranted only if the experimental instructions reliably override the physical characteristics of two spokespersons reporting the group's majority opinion on the AB+ trials. If the subjects respond to the physical characteristics of the UCS analog, rather than to the instructional manipulation, the Rescorla and Wagner model would make an

alternative prediction. In situations where the new stimulus signals a larger magnitude UCS on AB+ trials a reduction in the blocking effect is predicted. The addition of a larger UCS on the AB+ trials increases the quantity $(\lambda-\bar{V})$ resulting in an increase in the UCS' capacity to support conditioning to B. Analogously, having a larger magnitude of agreement on the AB+ trials, in the attraction conditioning paradigm, would allow conditioning to occur to person B. Although the model predicts that person B would manifest some conditioning in spite of the additional A alone conditioning, attraction to B would still not equal that of subjects receiving only AB+ trials. Even the addition of a larger magnitude UCS on the AB+ trials would not support total conditioning of B. The separate conditioning of person A alone would still influence the extent of conditioning to B on AB+ trials. Because the larger UCS used on the AB+ trials would support additional conditioning to A, any increments in attraction to person A would be at the expense of conditioning to B. Hence, in a between groups comparison, the attraction to B of subjects receiving only AB+ trials is expected to exceed the attraction to B of subjects receiving both A+ and AB+ conditioning trials.

Subjects

Seventy-two college students (36 males and 36 females) recruited from an introductory psychology subject pool at the University of Oklahoma served as subjects. Each subject completed a forty item opinion survey consisting of statements about contemporary social issues (e.g., abortion, equal rights, marijuana) prior to coming to the laboratory. After completing the survey, the subjects were asked to list the twenty items they were most interested in. It was from this list that the experimenter randomly selected the topics for discussion.

Apparatus

The subject and experimenter were both visually and spatially separated by a sound-proof partition. Communication between all the participants in the experiment proceeded via a two-way intercom system. An elaborate apparatus consisting of a subject module and an experimenter module served to coordinate the invariant conversation cycle.

The subject's module contained a series of visual cues and manipulanda constructed in order to deliver stimulus material to the subject and provide the subject with a mechanism for communicating with the experimenter. Signal lights mounted on the subject's module labelled (a) "listen," (b) "press switch to open intercom to Subject Orange," (c) "press switch to open intercom to Subject Blue," (d) "talk," (e) "reporting" and (f) "final opinion" served to guide the subject through the experimental cycle. Both the words and phrases were mounted on the back of transparent mirror glass and appeared only when illuminated. One of the open intercom signals displayed a blue light when illuminated while the other displayed an orange light. The reporting signal had the capacity to display a blue light, or an orange light, or a blue and an orange light simultaneously. In addition to the visual cues, the subject's apparatus contained four manipulanda: (a) intercom switch (telephone toggle switch with a spring return), (b) start talk button, (c) finish talk button and (d) final opinion indicator.

The experimenter's module contained the capacity to present visual and auditory materials to the subject and measure the subject's verbal and motor behavior at predetermined points in the experimental cycle. A series of toggle switches and other manipulanda allowed the experimenter to display predetermined visual material to the subject.

Prerecorded taped feedback was delivered to the subject via the intercom system using a cassette model tape recorder (Craig 2603). A 1/100 sec. stop clock (Haydon #k 15140) measured response latency (the time between the open intercom signal onset and the time the circuit was broken by the intercom switch being depressed).

Procedure

Prior to receiving the experimental instructions, each subject was given a brief written summary of their particular role and responsibilities. The subject was led to believe that a number of additional students, recruited from other university departments and always of the same sex, were going to participate with them in an opinion change experiment. Consistent with the opinion change rationale, the subject's specific role in the experiment was to initiate a "discussion" with a small group of fellow students by disclosing his(her) personal opinions regarding some contemporary social issues. In order to maintain complete confidentiality both the instructions and experimenter referred to the participants by color names. The research participant was referred to as Subject Green and two bogus subjects, acting as group spokespersons, were referred to as subjects Blue and Orange (social stimuli A and B, respectively). The bogus subjects' color names were counterbalanced across research participants; there were no main or interactive effects for color name and all analyses were collapsed over that variable. The procedure outlined refers to Subject Blue as the blocking Stimulus A and Subject Orange as the target Stimulus B. Following the subject's agreement to participate in the research the instructions were delivered via a two-way intercom system before the formal experiment began.

Single CS conditioning. The purpose of the single CS conditioning trials (A+) was to provide a mechanism for associating a single social stimulus (a person, CS analog) with a particular social outcome (agreement, UCS analog). From the subject's perspective, the experiment proceeded in an invariant cycle. The subject was told that a number of students would listen to his(her) comments and then briefly discuss the opinions presented. Following the brief discussion, the group's spokesperson (Subject A) provided the subject with information regarding the group's majority opinion on the issue discussed. Subsequently, all research participants were given an opportunity to register their final opinion on the topic.

At the beginning of the cycle, during the illumination of the "listen" signal, the experimenter gave the subject a predetermined topic to be discussed. When the "listen" signal was extinguished a signal labelled "press switch to open intercom to Subject Blue" was illuminated. Upon illumination of the blue intercom signal, the subject's task was to push the intercom switch opening lines of communication between themselves and Subject A. A 1/100 sec. stop clock automatically started when the intercom signal was illuminated and stopped when the subject pushed the intercom switch. This segment of the conversation cycle provided an opportunity to test the CS. The switch-pushing response, opening lines of communication, served as a conditioned response (CR) analog, and objectively mapped the conditioning of attraction to the single social stimulus, Subject A. It was assumed that as Subject A became more attractive the CR speed would increase. After the subject pushed the intercom switch, he(she) received a "talk" signal. It is at this point that the subject could develop his(her) comments regarding the topic

presented for discussion. When the subject was prepared to comment he(she) was asked to press the "start" button and the "finish" button when the comments were completed.

Following the subject's comments, 15-20 seconds passed before Subject A, acting as the group's spokesperson, delivered feedback regarding the group's majority opinion. Subject A's portion of the conversation consisted of the prerecorded verbal statement, "We agree." The single social stimulus, Subject A, was not presenting his(her) own opinion. Rather, Subject A was associated with the group's majority position on the topic discussed indicating attitude similarity. The reporting of the group's majority opinion was accompanied by a reporting signal illuminated for 3 seconds on the subject's module before the feedback began. The color of this light corresponded to the spokesperson's color name, and when the prerecorded feedback was complete the light was immediately extinguished. This segment of the conversation cycle served to associate a particular stimulus person (CS analog) with social reinforcement (UCS analog) and thus functions as a CS-UCS conditioning trial analog (A+).

Immediately following the receipt of verbal feedback, a "final opinion" signal was illuminated directing the subject to indicate his(her) final opinion. By pressing one of seven buttons located on the subject module, the subject could indicate either a strengthening, a weakening, or no change in their original opinion. After one of the buttons was pressed, the apparatus automatically reset and a new cycle began.

Compound CS conditioning. The purpose of the compound CS conditioning procedure (AB+) was to provide a mechanism for associating

two social stimuli (2 persons, compound CS analog) with social reinforcement. On the compound trials, Stimulus A and Stimulus B, Subject A and Subject B respectively, were associated with agreement. The conversation cycle used for AB+ conditioning unfolded in a manner similar to the A+ conditioning procedure with two major exceptions. On the AB+ trials the subject was required to open the intercom first to Subject B and then to Subject A. The "press switch to open intercom to Subject Orange" signal was colored orange and illuminated first. After the intercom switch was pressed a blue "press switch to open intercom to Subject Blue" sign was illuminated. After pressing the intercom switch once again the subject received the standard "talk" signal. A 1/100 sec. stop clock recorded both CR response latencies.

An additional change from the A+ procedure pertained to the reporting signal and subsequent verbal feedback. Following the group's discussion, both subjects B and A provided feedback regarding the group's majority opinion. Three seconds prior to the delivery of the prerecorded verbal feedback orange and blue lights were illuminated under the reporting sign. On the AB+ trials subjects B and A simultaneously said, "We agree." Immediately after the group's majority opinion was reported, the lights were extinguished. This segment of the conversation cycle served to associate two social stimuli with social reinforcement and thus functions as a compound stimulus conditioning trial analog (AB+). After one of the "final opinion" buttons was pressed, the apparatus automatically reset and a new conversation cycle began.

Consistent with the A+ trials, the experimental instructions indicated that the spokespersons on the AB+ trials were associated with

the group's majority opinion. The attitude similarity expressed by the spokespersons indicated that the group majority agreed with the subject. Although the physical characteristics of the CS-UCS arrangements are different on A+ (1 person speaking) and AB+ (2 people speaking) trials, the experimental instructions clearly indicated that the spokesperson's report referred to a group majority opinion. And, for both A+ and AB+ trials, the group size was constant. Upon this construction, the agreements or UCS strength was assumed to be equal on both the A+ and AB+ trials.

Experiment 1

Method

Experiment 1 employed a two-phase conditioning procedure described by Kamin (1968, 1969). Two groups of subjects were included in the design. The A-Agree group received 6 single CS conditioning trials (A+) before receiving an equal number of compound CS conditioning trials (AB+). A second group of subjects (AB-Only), on the other hand, received only 6 compound CS conditioning trials. Where the AB+ conditioning was preceded by the A+ pretreatment, the conditioning of B was expected to be considerably less effective, Hence, it was predicted that the A-Agree group when compared to the AB-Only group would manifest significantly less attraction to the target Stimulus B.

Subjects and design. Thirty-two college students, recruited from an introductory psychology subject pool, were randomly assigned to one of two treatment conditions, A-Agree and AB-Only. Each group had 8 males and 8 females. The design included two factors, 1 between and 1 within; the between factor was group (A-Agree and AB-Only), and 6 test trials constituted the repeated factor.

Deception and masking task. For the transition from phase 1 to phase 2 subjects in the A-Agree group were led to believe that a new group of students would play the role of discussants. These students ostensibly listened to music during the initial phase of the experiment and did not hear any of the opinions presented. After completion of phase 1, the discussants had supposedly been dismissed with one exception. Subject A had been asked to remain and participate in phase 2. Once again Subject A acted as the group's spokesperson. However, rather than having only one spokesperson, the new group of discussants in phase 2 had two spokespersons (subjects A and B).

Results and Discussion

Phase 1 conditioning. Using a reciprocal transformation, the approach response latencies were converted to speeds (1/Latency). Because the subjects' first approach response to person A in phase 1 precedes the establishment of a reinforcement history, it serves as a behavioral baseline. In order to reduce within-subject variability the response speed for each test trial in phase 1 was divided by the subjects' response speed on the first trial (T_n/T_1). To examine acquisition of the approach response to person A, the transformed speeds for the A-Agree group were analyzed using a simple repeated measures ANOVA. The A-Agree group showed a steady improvement in their approach speed to person A resulting in a significant Trials effect, F (5,75) = 2.45, $p < .04$. The equal degree of dependence assumption for the repeated measures design was addressed by correcting the F-test degrees of freedom (Box, 1954); the statistical significance of the Trials effect was confirmed ($p < .057$). The approach speeds to person A in phase 1 were stabilized after 6 test trials and would be expected to block attraction

conditioning to person B.

Insert Figure 1 about here

Phase 2 conditioning. Figure 1 shows steadily increasing approach response curves over the 6 test trials. In the A-Agree group, the approach speed initially increases and then stabilizes, whereas in the AB-Only group the approach speed continues to show improvement. To test for blocking effects, a 2 groups by 6 trials repeated measures ANOVA was conducted on the approach speeds to person B. This initial analysis revealed only a significant Trials effect, F (5,150) = 5.41, $p < .0003$, indicating that the subjects improved over test trials. Although the remaining effects were not statistically reliable, the approach curves indicate a divergence beginning on trial 4. To test for possible group differences present late in phase 2, a comparison of the two groups was conducted over the last 3 trials. This analysis indicated a nonsignificant trend in the predicted direction, F (1,30) = 2.23, $p < .14$. The AB-Only curve does not appear to be stabilized after 6 trials. It is possible that with continued testing, the divergence between the A-Agree and AB-Only groups would have become more dramatic.

An examination of Figure 1 indicates incomplete blocking (i.e, prior experience with person A does not completely attenuate conditioning to person B in phase 2). A contributing factor to the incomplete blocking may have been the result of experiencing a larger UCS in phase 2. According to Rescorla and Wagner, the presence of a larger magnitude UCS in phase 2 would promote some conditioning to the neutral cue in the compound. In a study just completed, using a different UCS analog and

an experimental design which precluded the possibility of a larger UCS in phase 2, subjects showed less responding to person B in phase 2 than person A in phase 1 (Siclari, Note 2).

Although an analysis of these data revealed only a marginal blocking effect, two important points are worth emphasizing. For example, the data indicate that the subjects increased their approach speed over conditioning trials. This result supports the theoretical prediction that attraction is progressively established (i.e., conditioned) for the social cue as the result of repeated experiences with social reinforcement. In addition, the shape of the acquisition curves conforms nicely to the widely familiar and predicted negatively accelerated function.

Experiment 2

Method

Experiment 2 used an interspersed trials procedure described by Rescorla and Wagner (1972). Two groups, referred to as A-Agree and AB-Only, were included in the design. The A-Agree group received 6 single CS conditioning trials (A+) and 6 compound CS conditioning trials (AB+) interspersed according to four semi-random schedules; the initial trial was always an A+ trial. The AB-Only group, on the other hand, received just 6 compound CS conditioning trials. It was predicted that subjects receiving both A+ and AB+ trials would manifest a blocking of attraction to person B as a result of the additional conditioning to person A.

Subjects and design. Forty college students were randomly assigned to one of two treatment conditions, A-Agree and AB-Only. Each group had 10 males and 10 females. The experimental design included a

between factor (2 levels, A-Agree and AB-Only) and a within factor (6 test trials).

Design and masking task. In keeping with the opinion change rationale, the subject was told that 2 groups of students (referred to as group blue and group orange) were selected as discussants in order to examine opinion change when a group had either one spokesperson (Subject A) or two spokespersons (subjects A and B). In addition, the cover story indicated that by using this particular experimental arrangement, it was possible to study a person's opinion change when that person (Subject A) was a member of 2 groups. At the beginning of each trial, subjects in the A-Agree group were told which group of discussants, blue or orange, they were going to talk to. The instructions indicated that the group not participating in the discussion on a specific trial was ostensibly listening to music during the conversation. This procedure served to intersperse the A+ and AB+ conditioning trials.

Results and Discussion

A+ conditioning. The approach latencies for the A+ test trials were transformed in a manner described in Experiment 1. A simple repeated measures ANOVA indicated that the A-Agree group's steady improvement in approach speed to person A was significant, F (5,95) = 3.98, $p < .003$. Correcting the F-test degrees of freedom confirmed the statistical reliability of the Trials effect ($p < .02$). The acquisition and stability of the approach response to person A would be expected to block attraction conditioning to person B.

Insert Figure 2 about here

AB+ conditioning. Figure 2 shows steadily increasing approach speeds to person B, for both the A-Agree and AB-Only groups over the 6 test trials. As in experiment 1, both treatment groups are approximately equal at the beginning of testing and show an improvement in approach speed and a divergence over the 6 test trials. In order to test for a blocking effect, a 2 groups by 6 trials repeated measures ANOVA was conducted on the approach speeds to person B. The analysis revealed a significant Groups main effect, F (1,38) = 5.88, $p < .02$, and a significant Trials effect, F (5,190) = 10.12, $p < .0001$. An additional analysis comparing the groups response speeds over the first 3 and last 3 trials indicates a significant Groups effect for only the later portion of conditioning, F (1,38) = 4.92, $p < .03$.

As Figure 2 indicates, the approach speed to person B for the A-Agree group did improve over test trials. This result indicates that the additional conditioning to A alone did not produce complete blocking of B. Nevertheless, the response to person B for the A-Agree group is attenuated compared to the group having no experience with person A. These data, coupled with the results of Experiment 1, suggest the presence of a larger magnitude UCS on the AB+ trials. A larger magnitude UCS on the AB+ trials would predictably lead to a reduction in blocking. Although the additional conditioning to person A did not completely block conditioning to B in the A-Agree group, the conditioning to B was attenuated relative to a neutral cue not compounded with a reliable CS. As would be predicted by Rescorla and Wagner, additional conditioning to person A limited the effectiveness of the larger magnitude UCS to fully condition attraction to person B.

As in Experiment 1, acquisition curves of attraction reveal the

negatively accelerated growth function characteristic of "conditioning" curves.

General Discussion

Contemporary research trends in both the associative learning and attraction literature indicate an interest in contextual issues. Stated in terms of the stimulus selection problem, both disciplines seek to understand the rules by which the relationship between two stimulus events will be learned, or not learned, about given the context within which the events are imbedded. Two experiments reported in this paper were designed to examine the stimulus selection problem in attraction. Specifically, the Rescorla-Wagner associative learning model served as a tool for generating predictions regarding blocking effects. In summary, the results of both experiments provide evidence for a blocking effect. As a result of an increased UCS intensity on the AB+ trials, however, the blocking was less than complete. Consistent with a prediction from the Rescorla-Wagner theory, the additional experience with the A+ trials attenuated attraction conditioning to person B. Conditioning of attraction to person B was affected by the environmental context within which the association between person B and a social reward was imbedded.

The data appear to indicate that the subjects responded in a predictable manner to the physical characteristics of the social UCS rather than to the instructional manipulations. Carefully developed instructions indicated that person A, on the A+ trials, and both persons A and B, on the AB+ trials, reported the group's majority opinion and hence were associated with an equal magnitude of reward. Despite this manipulation the conditioning curves indicate that the subjects responded to the physical characteristics of two people speaking on the

AB+ trials, and the resulting higher magnitude UCS on the AB+ trials predictably led to a reduction in overall blocking. It should be heartening to reinforcement theorists to know that college freshmen did not "cognitively transform" the UCS analog. Contrary to results reported by Mischel and his associates (see Mischel, 1976), the present data indicate that the subjects responded to the physical world rather than to what was hypothetically in their heads.

The blocking effect evidenced in this paper indicates that not all social stimuli and social rewards are equally associable. Conditioning of attraction was affected by the environment within which a social cue was paired with reward. These findings indicate that although person B was associated with 100 percent reinforcement in both the A-Agree and AB-Only groups, the attraction to B differed as a function of the stimulus context within which the association occurred. Hence, a person's failure to evoke attraction may be the result of either conditioned repulsion (person paired with disagreements) or the misfortune of being associated with reward while in the presence of other attractive people reliably signalling reward. The current popular reinforcement theories of attraction do not yet provide a mechanism for addressing the blocking effect or other stimulus selection problems (e.g., overshadowing). However, by adopting the variable-reinforcement assumption and the specific model developed by Rescorla and Wagner, the problem of stimulus selection in attraction is afforded a powerful theoretical tool.

The results also provide considerable evidence supporting the conditionability of attraction. Consistent with the predictions from the Rescorla-Wagner theory, the behavioral component of attraction gradually increased in strength following repeated exposures to a social

cue (person) paired with social reinforcement. This finding is not inconsistent with contemporary reinforcement theories of attraction although research generated by these theories has generally focused an interest on the affective or evaluative component of attraction.

The conditionability, or incremental development, of attraction is consistent with a hierarchical structure underlying interpersonal relationships (Altman, 1974; Levinger, 1974). That is, our attraction to another person gradually develops over time, and hence, less than asymptotic conditioning does not reflect the total strength of attraction possible. Superficial relationships may be supported by knowledge of attitude similarity or the satisfaction of temporary mutual needs. Asymptotic attraction, producing stronger and more frequent approach responses, may eventually lead to social rewards of a larger magnitude (e.g., romantic involvement, shared personal knowledge or trust). These particular social rewards, being of a higher magnitude, can then support additional conditioning of attraction and subsequent stronger approach responses. Hence, the extent of attraction develops gradually, rather than spontaneously, into a robust interpersonal relationship.

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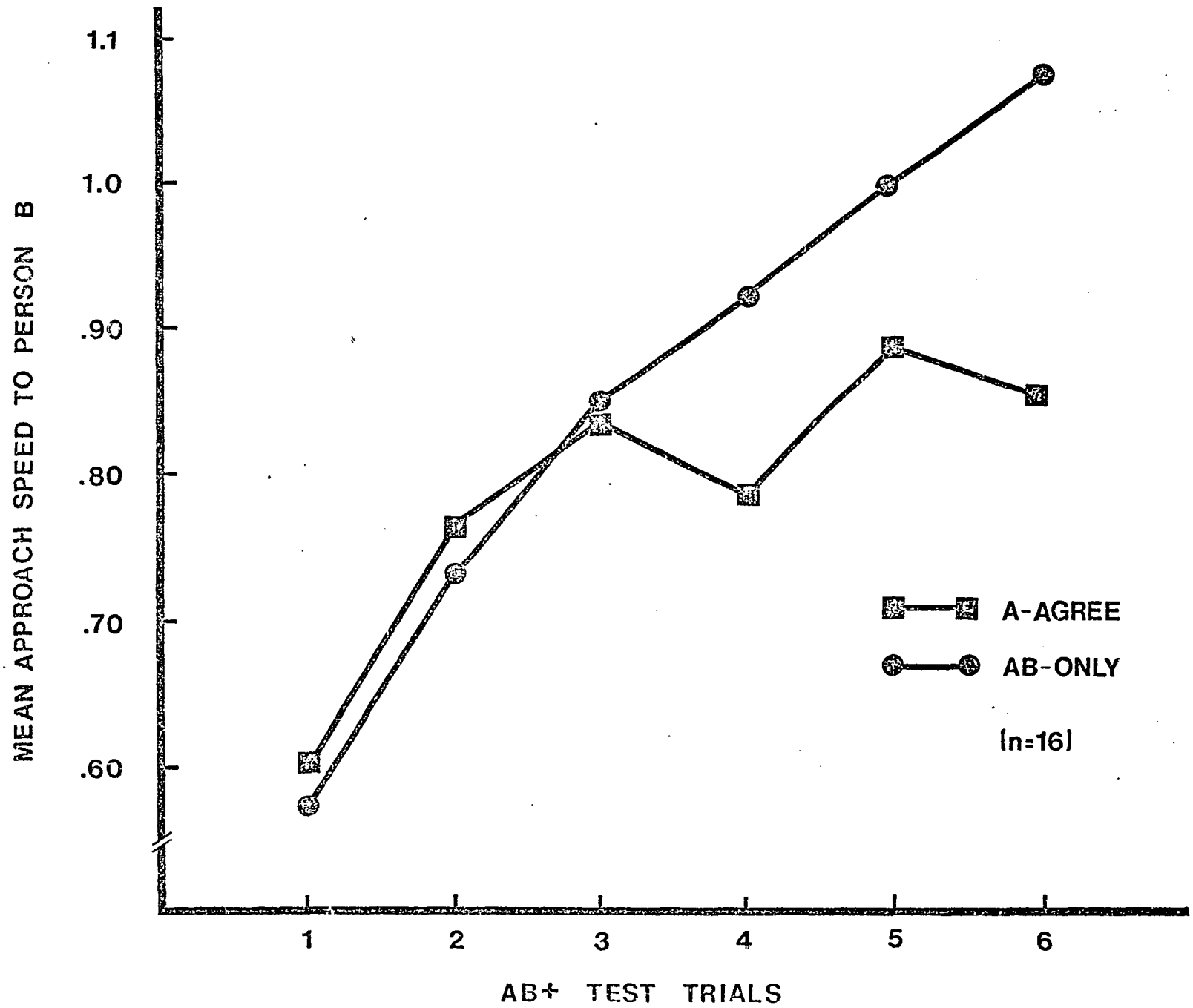
Figure Captions

Figure 1. Mean approach speed to person B in phase 2, for both the A-Agree and AB-Only groups.

Figure 2. Mean approach speed to person B on the AB+ trials, for both the A-Agree and AB-Only groups,


MEAN APPROACH SPEED TO PERSON B
1.1
1.0
.90
.80
.70
.60
1
2
3
4
5
6
AB+ TEST TRIALS
A-AGREE
AB-ONLY
(n=16)

MEAN APPROACH SPEED TO PERSON B
.35
.45
.55
.65
.75
.85
1
2
3
4
5
6
AB+ TEST TRIALS
A-AGREE
AB-ONLY
(n=20)