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ACQUISITION AND CONTEXTUAL BLOCKING OF
CONDITIONED ATTRACTION

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ACQUISITION AND CONTEXTUAL BLOCKING OF
CONDITIONED ATTRACTION

A Thesis
Presented to the
Faculty of
California State College
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by
Walter W. Henry III
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Approved by



Chairman

March 17, 1983

Date





ABSTRACT

The blocking of conditioned attraction was investigated under the guise of an impression formation experiment. The 32 subjects were led to believe that we were interested in positive impression formation to characters from a novel, person A and person X (CS analogs). The characters were represented by three letter initials. Positive traits (UCS analogs) were paired with the initials in a delayed conditioning procedure. Both the initials and traits were prepared on 35 mm slides and presented to the subject on a standard movie screen. The experimental group, designated A+/AX+, was presented with both A+ (single stimulus analog) and AX+ (compound stimulus analog) conditioning trials. The A+ conditioning trials constituted pretraining to person A. The control group, designated AX+, was presented with only AX+ conditioning trials. Subjects were instructed to press a button when either initials or a trait gave them a positive impression. Button press latency was operationally defined as the measure of attraction (CR analog); a faster response means greater attraction. The A+/AX+ group responded significantly slower ($p < .01$) to person X on the CS_X test trials than did the control group. Hence, the context within which conditioning occurs was demonstrated to be an important determinant of the degree of conditioning to a neutral CS.

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ACQUISITION AND CONTEXTUAL BLOCKING OF CONDITIONED ATTRACTION

Attraction as an Attitude

Interpersonal attraction has been broadly defined as "an attitude toward another. ...an individual's tendency or predisposition to evaluate another person or the symbol of the person in a positive (or negative) way" (Walster & Walster, 1976, p. 280). Like other attitudes, interpersonal attraction can be treated as consisting of three components: a cognitive, an affective, and a behavioral component. The cognitive component has been investigated using the information processing paradigm as in impression formation research. The affective component or evaluation dimension, is the primary concern of the attraction research conducted to date (Byrne, 1971; Clore & Byrne, 1974).

Behavioral measures of attraction have frequently included pupil dilation, eye contact, propinquity, clustering, one's approach toward another person, sociograms, and the performance on self report questionnaires (e.g., Thurston, Likert and Guttman-like scales), the Bogardus Social Distance Scale and the Interpersonal Judgement Scale (IJS) (Byrne, 1971; Walster & Walster, 1976). Like other attitudes, attraction has often been considered to be a function of reinforcement contingencies (Byrne, 1971). Hence, attraction is learned. Byrne (1971) suggests that

such learning is a process of discovering which people offer us self validation through the rewarding experience of consensually supporting our beliefs, values, attitudes or behaviors; that is, people who are similar to ourselves offer us greater confidence in who we think we are. This general notion dates back to Aristotle;

And they are friends who have come to regard the same things as good and the same things as evil, they who are friends of the same people, and they who are enemies of the same people...

We like those who resemble us, and are engaged in the same pursuits....We like those who desire the same things as we, if the case is such that we can share the things together ... (Aristotle, translated 1932, p. 103-105.)

Similarity and Attraction

Contemporary research on the similarity-attraction relationship had its empirical roots in Europe with Sir Francis Galton's study of "hereditary genius." Galton was interested in demonstrating that behavioral differences were inherited in a lawful manner. Karl Pearson (Pearson & Lee, 1903) expanded and quantified the data collected by Galton in 1870, and concluded that likes select likes. Similarly, Schuster and Elderton (1906) found that husbands and wives maintained similar attitudinal characteristics.

American psychologists became involved with attraction research in the late 1930's. As noted above, the initial population used in the investigation of the similarity-attraction relationship had been husbands and wives. By

1939 American psychologists had expanded the research to correlational analyses of friendships at the preschool, elementary, secondary and college level. Richardson (1939), in her review article, summarized the approach by noting that "The field of attitude and interests appears to be one of the most promising approaches to the study of marital compatibility" (p. 117).

More recently, Smith (1957) introduced an important methodological advancement, the hypothetical stranger. Smith administered the Revised Allport-Vernon Scale of Values to college-age subjects. From these scales he created "bogus" scales ostensibly filled out by another individual. By using the scale filled out by the college student, Smith was able to manipulate the degree of similarity and dissimilarity between a "hypothetical stranger" and the subject's actual attitudes. Subjects were then asked to study the experimenter-created scale, form an overall impression, and then complete the unfinished items as they thought the other "person" might. The hypothetical stranger paradigm controlled such variables as physical attractiveness, vocal accent, interpersonal style, gestures, physical size, race, and acting skills of confederates, and allowed direct experimental manipulation of the degree of similarity-dissimilarity. Smith (1957, 1958, 1960) moved the field of attraction from one involving strictly correlational research to experimental analysis. In

addition to his methodological contributions, Smith's results provided additional support for the general hypothesis that perceived similarity is an important determinant of attraction.

Reinforcement-Affect Model of Attraction

Byrne began a systematic investigation of the similarity-attraction relationship in 1961. He developed a variant of Smith's (1957) procedure using a six point IJS to measure attraction. The IJS measures such variables as degree of liking, perceived intelligence, morality, adjustment, and knowledge on a 7 point Likert-type scale. Using a method similar to Smith's, attitudes purported to be held by strangers were created from the subject's own completed attitude survey by systematically altering the subjects actual attitude statements to the desired degree of similarity-dissimilarity between the purported stranger and the subject. Byrne was able to investigate the relationship between similarity and attraction by attributing the statements to a stranger and then asking the subject to rate the stranger on the IJS. The subject's degree of attraction to the stranger was determined by summing the subject's rating of the stranger on the IJS's last two questions. The questions assessed the subject's personal feelings about the stranger and how much he or she would like working with the stranger in an experiment. The result of Byrne's research is summarized in his law of attraction: "Attraction toward

a person is a positive linear function of the sum of the weighted positive reinforcements (Number x Magnitude) associated with him, divided by the total number of weighted positive and negative reinforcements associated with him" (Clore & Byrne, 1974, p. 15). According to the Byrne-Clore Reinforcement-Affect theory of attraction, any reinforcing stimulus can function as a second-order unconditioned stimulus (UCS) for an implicit affective response. This implicit response theoretically mediates the relationship between a conditioned stimulus (CS), usually a person, paired with the UCS and a measurable attraction response (IJS score).

Byrne's model of attraction assumes the following conditions: (a) social communications function as reinforcers, (b) reinforcement elicits positive affect and punishment elicits negative affect, (c) stimuli associated with positive or negative affect elicit that affect, and (d) positive affect is liked while negative affect is disliked.

Clore and Byrne (1974) pronounce that they "explicitly intend to appeal to the body of literature on reinforcement and classical conditioning as a source of hypotheses about attraction" (p. 145). However, it is important to note that "Reinforcement is less central to the model...than the affective response it produces. ...the core of the model is the idea that attraction toward a person depends on the affect associated with him...reinforcement is simply one

source of that affect" (p. 148). They have observed that the intensity of interpersonal attraction to a stranger is a function of the intensity of the subject's affective response and, that the spread of affect appears to be a function of the subject's inability to accurately identify the source of their affective response. Clore and Byrne (1974) maintain that, "Many of the associations made in the process of attraction development are between words, thoughts, images, or collections, rather than between buzzers, electric shocks, or visceral responses" (p. 146). According to Clore and Byrne (1974), the associative development of attraction is analogous to, rather than identical to, traditional classical conditioning.

Byrne's law of attraction has been empirically established using a paradigm that implicitly treats the CS, the artificial stranger, in social isolation. As noted above, the subject is required, by design, to estimate his/her degree of attraction to a single hypothetical person. However, interpersonal attraction without the competition and distraction characteristic of group processes is relatively unusual. Relationships are usually established within a context of a wide range of alternatives, and, as a result, are rarely exclusive or singular.

Context Effects in Attraction

The results of a number of empirical investigations indicate that context is a very powerful determinant of

associative learning (Kamin, 1968; Rescorla & Wagner, 1972). Given the collage or mosaic of potentially discriminable "elemental" events or stimuli, the problem for the scientist is to determine between which elemental events associations will be formed. Rudy and Wagner (1975) specify the problem in terms of stimulus selection: "...specifying the rules whereby a relationship will or will not appear to be learned about depending upon the context of environmental events in which it is embedded" (p. 270). Hence, not all discriminable elements are expected to have equiprobable associative potential.

Historically, the psychologist's concern with context effects is represented in Gestalt theory, figure and ground in perception, in Lewin's concept of life space, and adaptation-level theory in psychophysics. Only relatively recently in the long history of attraction research, have the effects of context on attraction been investigated. As Berscheid, Brothen, and Graziano (1976) emphasize "...while other areas of psychology are reaffirming, and in some cases discovering, the importance of stimulus context in the prediction of behavior, it...is particularly curious that contextual factors have been relatively neglected in the area of interpersonal attraction" (p. 718). Context effects in attraction have been most frequently investigated with

experimental designs that present stimuli to the subject in either sequential or simultaneous contiguity.

The contextual effects of sequential contiguity have been demonstrated in attraction research employing either an attitude or an evaluative shift. The evaluative shift consists of a confederate changing his or her personal evaluation of the subject from either initially positive to negative or initially negative to positive (Aronson & Linder, 1965). These investigators proposed a gain-loss theory of attraction in order to account for their finding that a confederate was liked more when they initially evaluated the subject negatively and then changed to a positive evaluation than when the confederate consistently evaluated the subject positively. They suggested that a gain (or a loss) of self-esteem was a more potent reward than consistent positive regard, despite the fact that the percentage of positive reinforcement was higher in the consistent evaluation condition. However, Tognoli and Keisner (1972) failed to replicate Aronson and Linder's (1965) results, and suggested that recency effects were a more plausible explanation. Berscheid et al. (1976) found that the gain effect "vanished" in a so called double-evaluator or within groups design. Rather than using a single evaluator they used two confederates to evaluate the subject intermittently. Contrary to the Aronson and Linder (1965) results, Berscheid et al. (1976) found

"...that in an evaluative triangle, the continuously positive evaluator will be liked more than the person whose evaluations begin negative but eventually become positive" (p. 714).

The attitude shift consists of a change in attitudinal agreements or disagreements (i.e., a shift from initially similar to dissimilar, or initially dissimilar to similar). Byrne, Lambreth, Palmer and London (1969) found that an artificial stranger with initially dissimilar attitudes that changed to similar attitudes was liked better than one whose attitudes changed from initially similar to dissimilar. Further investigations demonstrated that the significant difference was due to a recency effect. The recency effect was found to be a function of the subject's interpolated attraction judgements (i.e., responses made within the series of attitude statements attributed to the stranger rather than the typical single attraction response measure taken at the end of the series of attitude statements). Interpolated attraction judgements resulted in the recency effect whether or not the subject responded overtly or covertly. Byrne et al. (1969) suggested that the recency effect occurred due to a neutralization of affect resulting from the act of symbolizing the response. The subject's attraction judgements presumably are the results of an averaging process. When attraction judgements are interpolated within a discrete series of attitudinal

statements they reflect the average value of that segment of the series, and exert no influence on subsequent segments. As a result, the subject's final attraction judgement reflects a recency effect.

Further evidence for the importance of context on subsequent attraction judgements was provided by Lombardo, Weiss and Buchanan (1972). They found that a yield condition (i.e., an initial disagreement which changed to agreement) resulted in more liking than consistent agreement. They suggested that the stranger's yielding generated a greater magnitude of reward than did consistent agreement and a greater magnitude of reward would be expected to result in greater attraction.

Mascaro and Graves (1973) used a between-series shift, rather than the traditional within-series shift. They found that a second stranger (the target) that agreed with the subject 50% of the time was perceived to be more similar and liked more by the subject when the first rated stranger was only 10% similar than when the first stranger was 90% similar. From these results Mascaro and Graves (1973) concluded that "perceptual processes mediate the effects of sequence of exposure to similar or dissimilar persons on the similarity-attraction relationship" (p. 349).

Mascaro and Graves (1973) interpreted their results in terms of Helson's (1970) adaptation-level theory. According to Helson, adaptation level (AL) is the weighted product of

background, focal and residual stimuli. Adaptation level changes in the direction of the background stimulus, the first stranger in the Mascaro and Graves study, in lesser increments than the total objective difference between the AL value and the background value. Judgements about the focal stimulus, the second stranger, are expected to change as a function of the difference between the focal and background stimuli. When the second stranger (with 50% similarity) is more intense or extreme than the first stranger (with either 10% or 90% similarity), the evaluation of the second stranger will be shifted in a direction opposite the first stranger. This shift produces a contrast effect. The contrast effect is evidenced by the significant difference in liking toward the second stranger as a function of the subject's initial exposure to either one of the two extremely different first strangers. The evidence cited above indicates that regardless of the researchers' use of either an attitudinal or evaluative shift paradigm or particular theoretical interpretation of their results, context reliably effects the subject's attraction response to a stranger.

The contextual effects arising from simultaneous contiguity are less well documented. One approach to the study of simultaneous contiguity is derived from adaptation-level theory. Hensley and Duval (1976) used lettered dots on Cartesian coordinates to present the stimuli

simultaneously to their subjects. The coordinates represented the subjects' agreement or disagreement with two previously administered attitude statements. The dots ostensibly represented the attitudes of the other members of the group (other subjects) by their particular location on the grid. The focal stimuli, group S, consisted of seven dots clustered in the upper left quadrant of the grid. The subject (the person looking at the grid) was always represented by the dot lettered G and was always close to the cluster constituting the focal stimuli. Placement of G was a function of the actual attitudes of the subject population on the two pretested attitude statements. The background stimuli, group O, consisted of two dots always one inch apart. The distance between the background stimuli and G varied from two to ten inches (2, 4, 6, 8, or 10 in.).

After studying the grid, subjects were asked three questions about group S members and group O members. They indicated their answers on a 15-point scale. The questions measured: (a) to what extent the opinions of other group members were similar or dissimilar to the subject's (b) to what extent the others and the subject were correct, and (c) to what extent the subject would like the other members of group S and group O. Hensley and Duval's (1976) results confirmed their hypotheses derived from adaptation-level theory. As the distance between G and the background stimuli (group O) increased, the subjects perceived their

own opinions to be more similar to those of other members of group S, and their own opinions and the opinions of other group S members to be more correct. Furthermore, the subject's liking of group S members increased. Group O's perceived similarity to the subject and correctness decreased, and, the subject's liking of group O members decreased.

Compound Stimulus Conditioning

A second approach to the study of contextual effects arising from simultaneously contiguous stimulus elements on the attraction response has been derived from classical conditioning. The so-called "blocking effect" and the related issues of stimulus selection, are of particular interest in that they are both counterintuitive results with respect to traditional approaches to attraction formation and contradict Byrne's law of attraction.

It has long been known that a more salient CS presented in a stimulus compound with a less salient CS during conditioning will overshadow the weaker CS. The extent to which the more salient cue will overshadow a less salient CS is a function of the relative physical intensity of the two cues, the reinforcement schedule used in training and in a special case (blocking) the prior training of one CS in isolation before compound training is initiated (Mackintosh, 1971). Conditioned response (CR) acquisition to a neutral stimulus will be blocked if the novel cue is reinforced in

the presence of an additional stimulus which already reliably signals the UCS (Kamin, 1968). The blocking phenomenon has been demonstrated using the conditioned emotional response (CER) procedure (Kamin, 1968) and with rabbit eyelid conditioning (Wagner & Saavedra, reported in Wagner, 1971).

Rescorla-Wagner Theory

Rescorla and Wagner (1972) have proposed a neo-Hullian model of associative learning from which the blocking effect becomes a logical deduction. They have suggested that the total amount of conditioning possible to a neutral stimulus is a function of the difference between the associative strength of that particular stimulus (V), or compound stimulus (\bar{V}), and the theoretical asymptote of conditioning supportable by a particular UCS (λ). When the difference between λ and V , or \bar{V} , is negligible, additional conditioning is not predicted. That is, if stimulus A reliably signals the occurrence of a particular UCS, the conditioning to stimulus X, (the novel cue), presented in compound with A, will be blocked. The Rescorla-Wagner equations for predicting conditioning in a two cue arrangement (A and X) are given below:

$$\Delta V_A = \alpha_A \beta_{UCS} (\lambda - \bar{V}_{AX}). \quad (1)$$

$$\Delta V_X = \alpha_X \beta_{UCS} (\lambda - \bar{V}_{AX}). \quad (2)$$

where α is a learning rate parameter associated with a particular CS, and β is a learning rate parameter associated with a particular UCS. It is assumed at this point in theory development, that $\bar{V} = V_A + V_X$. If CS_A , as a result of prior training, is made a strong predictor of the UCS relative to a neutral CS_X , then the amount of conditioning available to CS_X when both A and X are reinforced in a compound is negligible ($\lambda - \bar{V}$ being very small) and conditioning to CS_X will be blocked.

Blocking of Attraction

Both Byrne's law of attraction and the Rescorla-Wagner theory are founded upon learning variables (classical conditioning). The law of attraction suggests that, given 100% positive reinforcement from a stranger, no attenuation to the development of attraction should occur (i.e., no blocking effect). The Rescorla-Wagner model, however, implies that attraction (CR analog) to a stranger (CS analog) will be blocked if the stranger is in the company of another person who already reliably reinforces the subject. Using Rescorla and Wagner's theory as a model, Cramer, Weiss, Steigleder and Balling (1982) took one of the first steps toward resolving the contradiction between the two approaches. These researchers demonstrated the blocking

effect in conditioned attraction under the guise of an opinion change experiment. The subjects in the Cramer et al. study had the possibility of "communicating" with two bogus subjects (person A and person X), each having been designated to be a spokesperson for a group of bogus discussants. After having expressed their opinion on a preselected topic, the subjects would receive verbal feedback from either person A (CS_A analog) or persons A and X together (compound stimulus CS_{AX} analog). In every case the feedback was "we agree" (agreement being the UCS analog).

Two groups of subjects were used. The experimental group, designated A+/AX+, received six reward conditioning trials (person A saying "we agree") to person A alone (A+) and six trials to persons A and X (persons A and X saying "we agree" together) (AX+). The control group, designated AX+, received only six AX+ conditioning trials. The attraction response (CR analog) was operationally defined as the time taken to open the communication channel to person X on the test trials. Agreements, in addition to eliciting positive affect, can also elicit directed action or "striving for" social behavior (O'Connell & Rashotte, 1982; Hearst & Jenkins, 1974; Staats, 1975). Person-directed action or "striving for" responses often take the form of an increased willingness or tendency to interact and communicate with an agreeable person (Byrne, 1971).

Cramer et al. (1982) used two different classical conditioning procedures for conditioning the experimental group. In Experiment 1, the experimental group's A+ trials were presented prior to the AX+ trials (Kamin, 1968). In Experiment 2, however, the A+ trials were interspersed with the AX+ trials (Wagner, 1969). As predicted, attraction response speed for both the experimental and control group was a function of the number of reinforced agreement trials, with the experimental group showing an attenuated level of attraction to person X (blocking) on the CS_X test trials.

Statement of the Problem

The present research is an extension of the Cramer et al. (1982) investigation. The problem to be investigated is: Will a symbol, i.e., the representation of a person (name initials), that reliably signals positive reinforcement, block the acquisition of attraction to a symbol, i.e., the representation of another person also associated with reward? Three white lettered initials on a black background were used to represent two people (person A and person X) symbolically. Both the initials and affectively positive traits (Anderson, 1968) were prepared on 35 mm slides. The initials and adjectives were presented to the subjects in a delayed conditioning paradigm. The subjects' button press latency during the presentation of the initials, indicating a positive impression, was used as the dependent measure of attraction; faster button press means greater attraction

(see Weiss, 1962 and 1968). Because blocking takes some time to develop (Mackintosh, 1971), the blocking of attraction would be expected to occur over the final test trials.

Hypothesis 1

Acquisition. It is predicted that an attraction response (CR analog) will be conditioned to the initials representing person A (CS_A analog) by pairing them with positive personal adjectives (UCS analogs). As a result of the acquisition of attraction to person A, the blocking of attraction to person X is expected.

Hypothesis 2

Blocking. The experimental group will manifest longer button press latencies to person X presented alone on the test trials than will the control group. That is, attraction to person X on the part of the experimental group will be blocked by virtue of prior attraction conditioning to person A.

METHOD

Subjects

Subjects were recruited from undergraduate classes at California State College, San Bernardino. Eight males and 24 female subjects were randomly assigned to either the experimental, designated A+/AX+, or control, designated AX+, group. Each group had four males and 12 females. Because of a failure to understand the instructions and the resulting failure to respond to any stimulus presentation, 16 subjects were eliminated. The final sample consisted of 8 subjects in the A+/AX+ group and 8 subjects in the AX+ group.

Stimulus Materials

The stimulus materials consisted of two sets of 35 mm slides. All slides contained verbal material using white lettering on a black background. The first set consisted of a series of three printed initials (CS analogs). The initials used were FRA, JUD, MAR, and BET. The instructions indicated that the initials were randomly selected from a popular novel and, as a result, did not represent any living person. The initials FRA and JUD represented persons A and X, respectively, in a completely counterbalanced design. To simplify the explanation of the procedure, the theoretical

labels A and X, rather than the initials FRA and JUD, will be used, as in learning research. The second set of slides consisted of a series of adjective traits (Anderson, 1968) (UCS analogs). Both positive and negative traits were depicted in the slide series. Persons A and X were always paired with positive traits, whereas the initials MAR and BET were always paired with negative traits. Hence, MAR and BET served as distractor stimuli, B and Y, respectively (see Appendix A).

Apparatus

The experiment took place in a laboratory room adjacent to a control booth. The subject sat alone at a small desk while the experimenter controlled the experiment from the booth. Two slide projectors (Kodak model 800 and 850 H) one for presenting the CS_A , CS_X , and CS_{AX} slides and one for presenting the UCS slides were used. The slides were presented on a standard movie screen mounted on a wall approximately 2.5 m directly in front of the subject. The slide material was projected on the screen from the control booth located behind and above the subject. The control of the slide material was accomplished by a series of interval timers (BRS Foringer TI-906). These timers controlled three important learning parameters: (a) CS presentation length, (b) interstimulus interval, the time between CS onset and UCS onset, and (c) intertrial interval (ITI). A 1/1000 sec.

latency timer (Lafayette Clock/Counter 54519) served to measure the subjects conditioned and unconditioned attraction responses to the initials and traits, respectively. The attraction responses were made by pressing a microswitch (connected to the latency timer in the control booth) mounted on a desk directly in front of the subject.

Procedure

When volunteers arrived for the experiment, they were asked to read and sign a standard consent form (see Appendix B). No one refused to participate. Subjects were randomly assigned to either the A+/AX+ or the AX+ group.

The same set of instructions (see Appendix C) were read to each subject. The instructions indicated that they were going to participate in an impression formation experiment and that the research involved specifically the formation of positive impressions. The subjects were told that they would be viewing a series of slides. The slides containing the initials of various fictitious characters appearing in a novel would sometimes appear alone and sometimes appear together on the left side of the movie screen. On the right side of the screen would appear various traits culled from the novel that had described the characters. The instructions indicated that the researchers were interested in seeing if they could develop an impression about the

character without reading the novel. The subjects were told that we wanted them to press the button on the desk if either a set of initials or a trait gave them a positive impression. If they had a negative impression they were to do nothing. From the subjects perspective, the dichotomous response of either pressing the button to indicate a positive impression or withholding a response to indicate a negative or no impression, rather than response speed, was the important variable.

In order that the subjects not generate alternative hypotheses about the nature of the experimental task, the instructions alluded to the possibility that an association between the initials and traits would likely be formed. Social stimuli paired together have been found to result in an association. Considerable evidence exists for this association effect (Lott & Lott, 1968; Staats & Staats, 1957, 1958; Weiss, 1968). We did not want the subjects to perceive that an association should be formed without instructions suggesting this possibility. It is not our intention to reexamine this already well established associative phenomenon. Although the instructions led the subject to believe an association between the initials and traits could be formed, there was no indication that this association should be incrementally acquired, as in traditional learning research. Furthermore, a simple

knowledge of association would not be expected to result in the subjects' differential acquisition to CS_X in the experimental and control group such that blocking would be evidenced in the A+/AX+ group.

A+/AX+ attraction conditioning. The A+/AX+ group viewed a sequence of slides consisting of: (a) 20 slides with a single set of initials paired with a positive adjective, these presentations constitute CS_A -UCS trials, (b) 20 slides containing two sets of counterbalanced initials paired with a positive adjective, these presentations constitute compound CS_{AX} -UCS trials, (c) 10 CS_A test trials, stimulus A presented alone, and (d) 10 CS_X test trials, stimulus X presented alone.

AX+ attraction conditioning. The control group, AX+, viewed a sequence of slides consisting of: (a) 20 compound CS_{AX} -UCS training trials, (b) 10 CS_A test trials and (c) 10 CS_X test trials. Both the A+/AX+ and the AX+ group also received a series of distractor slide presentations. For the exact ordering of the A+/AX+ and AX+ slides see Appendix A.

The single and compound CS-UCS training trials consisted of the CS presented for 10 sec.. The UCS was then initiated 5 sec. after CS onset and both CS and UCS offset simultaneously 5 sec. later. This delayed conditioning procedure had a 10 sec. ITI. Upon CS onset the latency

timer was initiated. If a button push (CR) took place within 5 sec. it was scored as a conditioned attraction response and the latency tabulated. If a response occurred after 5 sec. had elapsed but before 10 sec. had elapsed (i.e., during UCS presentation) it was scored as an unconditioned response. A 10 sec. interval separated each trial. The equipment automatically reset upon termination of the ITI.

The experimenter recorded latencies manually on a sheet of paper during the slide presentation. After having seen all of the slides, each subject was asked to rate the initials on a 10 point Semantic Differential scale. After having completed the rating task, the subjects were thanked for their participation and excused.

RESULTS AND DISCUSSION

Acquisition

Figure 1 shows a gradual learning curve of attraction response speed to person A, just as in learning research, $F(9,63) = 5.01$, $p < .001$. Orthogonal polynomials indicated two significant trends in the attraction acquisition data of group A+/AX+. As expected, the trend analysis resulted in both a significant linear component, $F(1,63) = 11.44$, $p < .01$, and a significant quadratic component, $F(1,63) = 26.588$, $p < .001$. Tests on the remaining sources of variability failed to reveal any significant effects. Such a pattern of outcomes as depicted in Table 1 should result in the blocking of attraction to person X in the A+/AX+ group.

Blocking

In Figure 2, the mean attraction strength to stimulus A, collapsed across all CS_A test trials, is approximately .72. Like Figure 1, this value represents the attraction strength of the experimental group to person A. As a result of this acquisition, the presence of stimulus A during conditioning of stimulus X would be expected to block the acquisition of attraction strength to X. Figure 2 also depicts the mean attraction strength to stimulus X for both

A+/AX+ and AX+ groups. These data represent the mean attraction strength over the last five CS_X test trials, the time during which the most prominent blocking effect is expected to occur, (Mackintosh, 1971).

Because the blocking effect is a between groups rather than a within groups phenomenon, the essential comparison to be made is between the A+/AX+ and the AX+ group's attraction strength to person X. The experimental group's mean attraction strength to X ($\bar{M} = .5023$) over all ten test trials is lower than the control group's mean attraction strength to X ($\bar{M} = .6125$). This predicted blocking effect is statistically reliable, $t(18) = -2.23$, $p < .025$ (one tail). If the same comparison is conducted over the last 5 test trials the blocking effect is even more dramatic, $t(8) = -3.375$, $p < .005$ (one tail) (See Figure 2). Attraction to X depended importantly on the context in which X is paired with positive traits. If another stimulus already evoked attraction (person A) then the acquisition of attraction to X was blocked.

Table 1
Summary of Analysis of Variance Conducted on the
Attraction Strength of Group A+/AX+ to Person A

Source	SS	df	MS	F	p
Trials (T)	1.534	9	.170	5.01	< .001
Linear	.389	1	.389	11.44	< .01
Quad	.904	1	.904	26.58	< .001
Cubic	.051	1	.051	1.51	< .05
Subjects (S)	6.113	7	.873		
Residual (TxS)	2.161	63	.034		

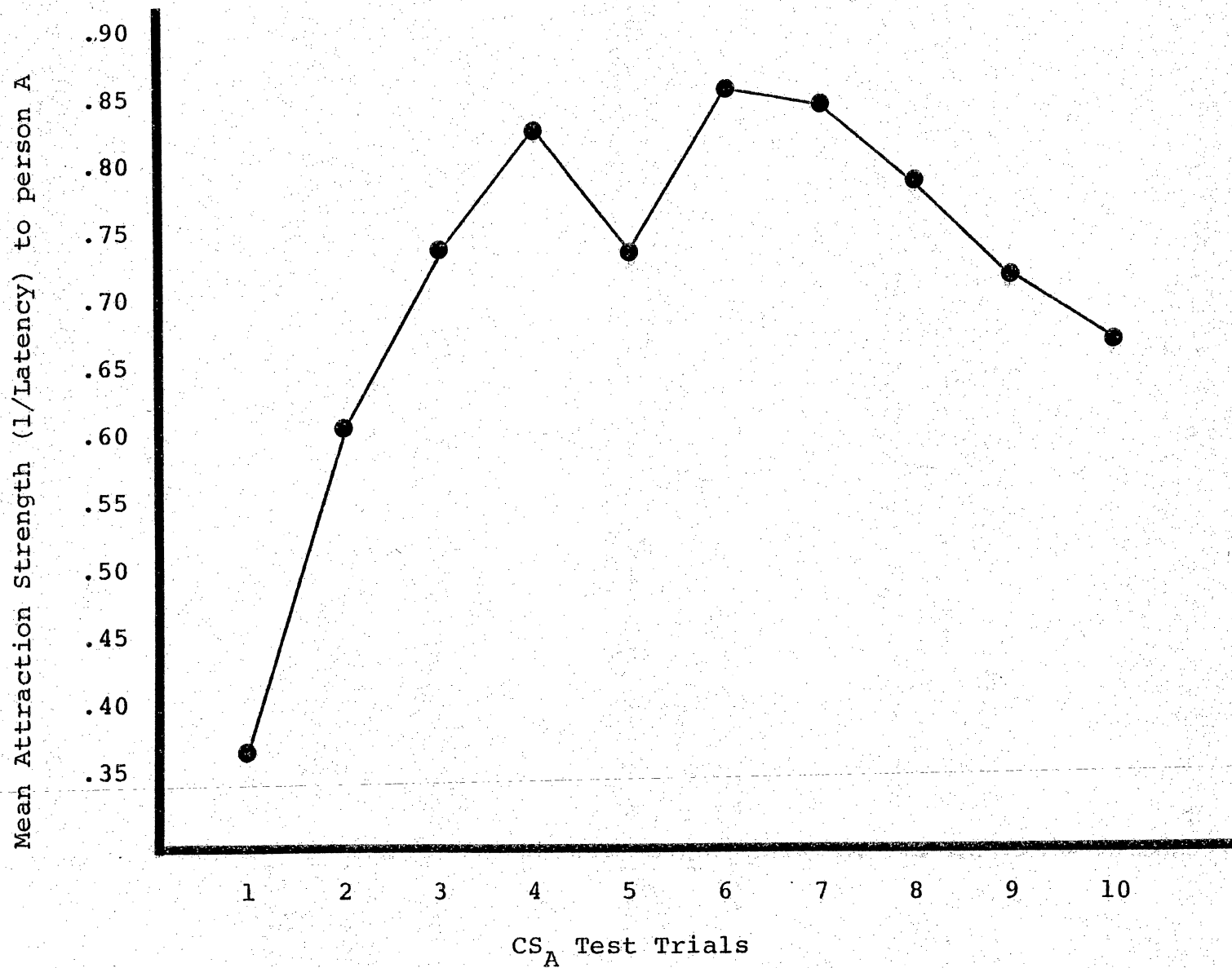


Figure 1. Mean attraction strength of group A+/AX+ to person A.

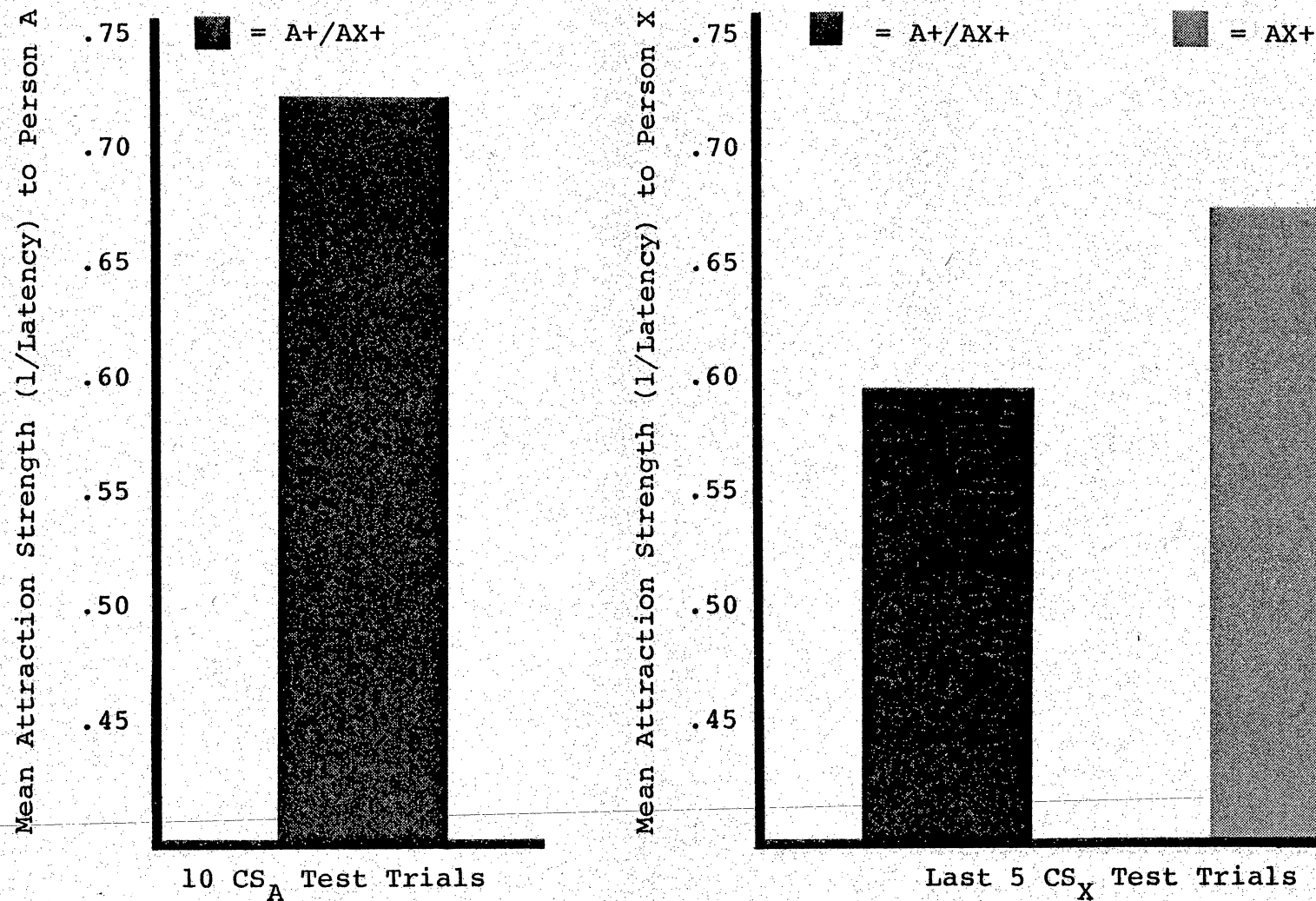


Figure 2. Mean attraction strength of group A+/AX+ to Person A; Mean attraction strength of group A+/AX+ and AX+ to Person X over last five test trials.

GENERAL DISCUSSION

Both the acquisition and the blocking hypotheses were confirmed. Using reaction time as a dependent measure of attraction strength, the trajectory of developing conditioned attraction approximated a negatively accelerated learning curve for the response speed to a person A (see Figure 1). The neutral CS, when presented in compound with a cue that was manipulated to reliably signal positive reinforcement (traits) was responded to at a slower rate, blocked, than when presented in a compound with that same cue not so manipulated (see Figure 2). Hence, the acquisition of attraction to person X was influenced by the context within which X was paired with reinforcement.

The Law of Attraction and the Blocking Effect

While the present study was not intended to directly contrast the Rescorla-Wagner theory with the law of attraction, it is obvious that differences in the choice of dependent variables can generate very different theoretical formulations. The choice of a learning dependent variable imposes an inherent organismic upper limit of performance on the data. The learning task and the upper limit are unknown to the subject by definition. If latency is the dependent variable, increasingly smaller increments in performance

should theoretically occur (assuming the subject remains on task) as the behavioral trajectory approaches asymptote. As actual performance approaches criterial performance, less and less improvement can be made; as the number of positive reinforced trials increases (assuming 100% positive reinforcement), the greater the certainty, and, hence, the quicker the button press up to the subjects' maximal reaction time.

If a cognitive/judgement dependent variable is chosen, the limits imposed on the data come from the experimenter's choice of lowest and highest values on the rating scale. The task of making a judgement is a familiar algorithm and the possible responses are all known. The subject can distribute his or her responses anywhere along the continuum and, in fact, must consider the upper and lower values of the scale in choosing a response value. The experimental demands on the subjects in Byrne's attraction paradigm are quite different from those in the classical conditioning paradigm. Little can be said at this point about their relative efficacy in accounting for interpersonal attraction beyond noting that the blocking of conditioned attraction can be accommodated by the Rescorla-Wagner theory while blocking is contradictory of Byrne's law of attraction.

Theoretical Approaches to the Blocking Effect

There are at least three theoretical approaches which attempt to explain the blocking effect. The issue here is

not the shape of the behavioral trajectory, as with Byrne's linear versus Rescorla-Wagner's negatively accelerating curve, but the difference in magnitude of conditioning to a neutral CS when it is presented in a compound with a stimulus that already reliably signals positive reinforcement and when the compound does not contain that signal. The issue is the distance between the two trajectories.

Limited Processing Capacity. Two of the approaches maintain that the blocking effect is a function of limited processing capacity. Mackintosh (1971) has suggested that blocking can be accounted for by selective attention. Stimuli are seen to be in competition for the limited available channel capacity. While one stimulus is attended to and learned about the other is not attended to or attended to less, learning is blocked and performance is suppressed.

A second approach attributes the blocking effect to limited short term memory (STM) capacity. Wagner (1978) bases this analysis on several commonly held assumptions about the characteristics of STM: (a) that input from the sensory register activates the representation of that input that is in long term memory (LTM), the memory structure, (b) associated elements are also activated, (c) STM is that set of elements from LTM that is currently active, (d) an activated element reverts to inactivity, (e) activity can be

maintained by "rehearsal", (f) STM has limited capacity, and (g) representative elements are only permanently associated if they are jointly active in STM. A critical proposition in this analysis is Kamin's (1968) observation that a surprising event is more likely to be "rehearsed" than an expected event. If event CS_{AX} , where CS_A -UCS is pretrained, is presented, the UCS is expected, not rehearsed, not held in STM and no or little association occurs between CS_X and the UCS. Conditioning to CS_X is blocked because it reverts to inactivity before an effective association can be formed. If CS_A -UCS is not pretrained, the UCS is not expected upon the presentation of CS_{AX} . The event is surprising, is rehearsed, and associations are formed between CS_A -UCS and CS_X -UCS.

Limited Energy. The Rescorla-Wagner theory proposes that any given UCS can support only a finite amount of conditioning, that the upper limit of performance is a function on the energy of the UCS. Conditioning to a stimulus is blocked because there is no energy to support that conditioning. Cramer et al. (1982) has extended the theoretical formulation of the Rescorla-Wagner theory into the analogic Reinforcement-Context model of attraction formation.

The application of an established model of behavior to a less well understood area of investigation offers two distinct advantages to a researcher, determinant combination

and quantitative specification of the experimental variables (Weiss, 1968). Cramer et al. (1982) has established Rules of Correspondence, a dictionary of analogies, relating the variables of the classical conditioning model to analogous variables assumed to be important in the development of attraction. The determinant combination of the classical conditioning variable analogs should be reflected in a mechanism for applying the Rules of Correspondence. The mechanism is given below:

$$\Delta V_A = \alpha_A \beta_{\text{agreement}} (\lambda - \bar{V}). \quad (3)$$

$$\Delta V_X = \alpha_X \beta_{\text{agreement}} (\lambda - \bar{V}). \quad (4)$$

where α is a function of the saliency of the social stimulus (CS analog), β is a function of the power of a social reinforcer such as positive personal evaluations, agreement, perceived similarity, or positive traits (UCS analogs), to elicit an attraction response, λ is the theoretical asymptote of attraction supportable by the social reinforcer, where V_i is the attraction strength of any potentially discriminable stimulus element (S_i) within the context of the perceptual field, \bar{V} is the total attraction strength of all social and nonsocial stimulus elements that comprise the perceptual field; \bar{V} is assumed to be the algebraic sum of the attraction strengths of all

stimulus elements in the context ($\bar{V} = V_A + V_B \dots + V_i$).

The mechanism incorporates the law of effect, a context and a variable reinforcement principle. Repeated pairings of the social stimulus with a social reinforcer changes the attraction strength of V_i . If $\lambda < \bar{V}$, the attraction strength of V_i will be decremented; if $\lambda > \bar{V}$, attraction strength will be incremented. The context principle indicates that the ΔV_i is a function of the aggregate attraction strength of all other contiguous stimulus elements; as V_i is incremented, so is the value of \bar{V} incremented, reducing the value of $\lambda - \bar{V}$, and the amount of energy theoretically available to support additional conditioning to CS_x . The variable reinforcement principle indicates that the actual value of a social reinforcer is a function of the value $\lambda - \bar{V}$. When $\lambda - \bar{V}$ has a large positive value, a social reinforcer will be very rewarding. With repeated CS-UCS pairings, the value of \bar{V} approaches the value of λ , $\lambda - \bar{V}$ decreases to a smaller positive value, rendering the social reinforcer less rewarding.

The critical element in this formulation from learning theory (classical conditioning) is the assumption that λ is a fixed, finite value. Hence, any given UCS can support the conditioning of a neutral CS only up to the limit of the energy of its associated λ value.

APPENDIX A: STIMULUS PRESENTATION SEQUENCE

Group AX+

<u>Trial</u>	<u>Initial(s)</u>	<u>Trait</u>	<u>Trial</u>	<u>Initial(s)</u>	<u>Trait</u>
1	AX	Honest	26	AX	Generous
2	A		27	X	
3	AX	Loyal	28	Y	Fickle
4	Y	Liar	29	A	
5	XA	Wise	30	AX	Witty
6	X		31	XA	Lively
7	YB	Phony	32	A	
8	AX	Mature	33	Y	Angry
9	BY	Cruel	34	A	
10	A		35	BY	Sloppy
11	XA	Warm	36	AX	Cheerful
12	Y	Rude	37	A	
13	AX	Patient	38	XA	Cordial
14	X		39	X	
15	XA	Happy	40	XA	Skillful
16	AX	Clean	41	AX	Tender
17	X		42	X	
18	XA	Smart	43	XA	Poised
19	YB	Boring	44	YB	Profane
20	AX	Modest	45	X	
21	XA	Able	46	A	
22	A		47	A	
23	A		48	X	
24	X		49	Y	Nosey
25	XA	Nice	50	X	

APPENDIX A: CONTINUED

Group A+/AX+

<u>Trial</u>	<u>Initial(s)</u>	<u>Trait</u>	<u>Trial</u>	<u>Initial(s)</u>	<u>Trait</u>
1	A	Poised	36	A	Happy
2	AX	Honest	37	A	
3	A		38	A	Patient
4	A	Tender	39	X	
5	AX	Loyal	40	A	Warm
6	Y	Liar	41	XA	Nice
7	A	Skillful	42	A	Mature
8	XA	Wise	43	AX	Generous
9	A	Cordial	44	X	
10	X		45	A	Wise
11	YB	Phony	46	Y	Fickle
12	A	Cheerful	47	A	
13	AX	Mature	48	A	Loyal
14	BY	Cruel	49	AX	Witty
15	A	Lively	50	A	Honest
16	A		51	XA	Lively
17	A	Witty	52	A	
18	XA	Warm	53	Y	Angry
19	Y	Rude	54	A	
20	A	Generous	55	BY	Sloppy
21	AX	Patient	56	AX	Cheerful
22	X		57	A	
23	A	Nice	58	XA	Cordial
24	XA	Happy	59	X	
25	AX	Clean	60	XA	Skillful
26	A	Able	61	AX	Tender
27	X		62	X	
28	A	Modest	63	XA	Poised
29	XA	Smart	64	YB	Profane
30	YB	Boring	65	X	
31	A	Smart	66	A	
32	AX	Modest	67	A	
33	A	Clean	68	X	
34	XA	Able	69	Y	Nosey
35	A		70	X	

APPENDIX B: CONSENT FORM

The experiment is designed to analyze processes involved in impression formation. With your consent, you will be asked to view a series of visual slide presentations. The slides will present verbal material. One set of slides includes personal names, while the other set includes personal traits. Your task will be to press a button if, in your judgement, a particular slide gives you a positive impression. Your particular selection of slides is the response set we are interested in measuring.

Your cooperation is very much appreciated. However, feel free to ask any questions you may have and, if you desire, you may terminate the experiment at any time.

I agree to participate in the experiment described above with the understanding that I may terminate my obligation at any time.

Print Name _____

Signature _____

Date _____

APPENDIX C: INSTRUCTIONS TO SUBJECTS

In this experiment we are interested in impression formation. Impression formation concerns the process of developing an overall "picture" of a person by evaluating various items of information. In particular, we are interested in studying the development of positive impressions.

In this experiment, you will be seeing two kinds of slides. Both kinds of slides were chosen at random from a popular novel. On the left will appear slides with either one or two sets of initials on it. On the right will appear a slide with an adjective on it. The initials represent characters chosen from the novel. The author of the novel used the traits to describe the characters. When the author describes a character or characters, a trait will be presented with the initials. If the author refers to the character or characters without using a trait, no trait will appear on the screen.

We want to know if you can form the kind of impression about the character that the author intended to convey by associating the initials and the adjectives or traits with which they are presented.

Here are two samples of slides that you might see:

KAJ

FAITHFUL

KAJ

ALERT

ANS

Just as in the book, sometimes one character is represented and sometimes two characters are represented.

Because we are interested in impression formation, your task is to tell us which slides give you a positive impression. Your selection of "positive impression" slides can come from both the characters, represented by the initials, and the personal traits. You can tell us which characters and traits give you a positive impression by pushing the red button attached to the table top in front of you. If you do not have a positive impression formed you do not have to do anything. By not pressing the button we will know that you do not have a positive impression formed.

APPENDIX C: CONTINUED

For example, if KAJ appeared and you had no positive impression, you do not press the button. If FAITHFUL then appears and you think that it is a positive trait, press the button. If the next time you see KAJ, you have a positive impression, press the button. In other words, it is important for you to know that we want you to judge all of the initials and traits you see. When a slide is displayed press the button if you have a positive impression and do not press the button if you do not have a positive impression formed yet.

To use the button properly, use your dominant hand, always keeping one finger resting lightly on the top of the button. When you have a positive impression of the slide presented on the screen, press the button firmly. The button operates only when a slide is presented. After a particular slide is removed your response cannot be counted.

After a fixed number of slides are presented the first part of the experiment will be over. The second part of the experiment involves answering some questions about the slide material.

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