Learning effects in information integration: Manipulation of cue validity in an impression formation task

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In Stage 1, Ss predicted whether the majority of students in a previous study liked or disliked each of a series of hypothetical persons described by pairs of personality trait adjectives. One trait within each pair was highly polarized on a social desirability dimension, and the other was highly polarized on an intellectual desirability dimension. In Stage 2, new person descriptions were presented and Ss either predicted likability ratings for the reference group or gave their own personal ratings. Responses on Stage 2 varied as a function of feedback manipulations on Stage 1. The effect of feedback was to increase the relative weight of the dimension associated with reinforcement on Stage 1. This effect was more pronounced for Ss predicting the ratings of the reference group on Stage 2 than for Ss making personal ratings. These results illustrate how the weighting of information in an integration task can be manipulated through reinforcement contingencies.

The area of information integration is concerned with the development of models describing how several pieces of information are combined to arrive at a unified response. According to Anderson's (1971, 1972) integration theory, which has guided much of the work in this area, each piece of information in an integration task can be represented by two parameters, a subjective scale value s representing the S's evaluation of that information on the dimension of judgment and a weight w representing the degree of influence of the information. The net effect of a given piece of information is the product, ws . While a number of studies have been concerned with how these parameters vary over a variety of task characteristics (e.g., order of presentation of information differing in value, amount of information of a given value, information redundancy or inconsistency), there have been few attempts to manipulate systematically parameter values through reinforcement contingencies. The present study represents such an endeavor and attempts to bridge the gap between two important areas of information usage, information integration, and learning.

Much of the theoretical development in information integration has derived from studies using the personality impression formation task. In these studies, Ss are presented a series of person descriptions. Each description of a hypothetical stimulus person consists of several personality trait adjectives. Ss are typically asked to rate how much they like or dislike each stimulus person. Support has been found for a weighted average model of the impression response (Anderson, 1971). One variable shown to have a large and reliable effect on

the weighting of information in a task of this type is source credibility. Information supplied by high credibility sources is given more weight than information supplied by low credibility sources (Rosenbaum & Levin, 1968, 1969). Source credibility may be an example of a more general construct, information reliability or validity. In that sense, the manipulation of source credibility in impression formation may be related to the manipulation of cue validity in previous studies of stimulus compounding and multiple-cue learning (Himmelfarb, 1970; Peterson, Hammond, & Summers, 1965). In those studies, cues which are most highly correlated with reward come to receive greater weight.

In the present impression formation study, cue validity is manipulated directly through reinforcement contingencies introduced in conjunction with the multidimensional aspects of the usual impression response. Rosenberg, Nelson, and Vivekananthan (1968) showed that the evaluative dimension in impression formation can be divided into a *social desirability* dimension and an *intellectual desirability* dimension. The social desirability dimension pertains to traits concerned with interpersonal activities, and the intellectual desirability dimension pertains to traits concerned with task-related activities. Zanna and Hamilton (1972) emphasized the importance of considering these dimensions in understanding inferential processes by showing that manipulation of unique information on one dimension affects trait inferences on that dimension alone. The present study shows that an initial phase of reinforcement correlated with values on one dimension increases the relative influence of that dimension on future responses.

Person descriptions were composed of pairs of personality trait adjectives, where one adjective was high or low on the social desirability dimension and relatively neutral on the intellectual desirability dimension. The other adjective was high or low on the intellectual

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Table 1
Adjective Pairs Used in Stages 1 and 2

Adjective Pair Type	Stage 1		Stage 2	
H _S -L _I	Sincere*	Foolish*	Warm*	Frivolous*
	Happy*	Unproductive	Good-Natured*	Naive*
	Considerate	Inaccurate	Courteous	Inefficient
	Humorous*	Unintelligent*	Sociable*	Incompetent
	Polite	Unwise	Cordial	Unskilled
	Kindly	Impractical	Generous	Illogical
L _S -H _I	Unsociable*	Industrious*	Cold*	Scientific*
	Unhappy*	Discriminating*	Irritable*	Shrewd*
	Humorless*	Intelligent*	Boring*	Serious*
	Vain*	Determined*	Selfish	Skillful*
	Grouchy	Brilliant	Ungrateful	Efficient
	Domineering	Wise	Gossipy	Resourceful
H _S -H _I	Modest*	Persistent*	Honest*	Imaginative*
	Helpful*	Cautious*	Tolerant*	Important*
L _S -L _I	Unpopular*	Wasteful*	Moody*	Clumsy*
	Pessimistic*	Wavering*	Finicky*	Irresponsible*

*Words chosen from the poles of Rosenberg, Nelson, & Vivekananthan's (1968) dimensions.

desirability dimension and relatively neutral on the social desirability dimension. The descriptions of particular interest were those consisting of an adjective high in value on one dimension paired with an adjective low in value on the other dimension, such as *sincere-foolish* or *industrious-unsociable*.

In the first stage of the task, Ss were asked to predict how another group rated the adjective pairs. For some Ss, feedback concerning the responses of the reference group was correlated with the value of the social desirability trait in a given pair (Condition S), and for other Ss feedback was correlated with the value of the intellectual desirability trait (Condition I). In the second stage of the task, no feedback was given and new pairs of adjectives were presented. Ss were asked either to give their own personal rating of how much they liked or disliked each stimulus person (Condition O) or to predict how much each stimulus person was liked or disliked by the reference group (Condition P). If the feedback manipulation affects cue validity, then Ss in Condition S would be expected to assign the social desirability dimension a greater weight in determining responses on the second stage than would Ss in Condition I. Because of greater similarity on the two parts of the task, feedback effects were expected to be greater for Ss in Condition P than for Ss in Condition O.

METHOD

Materials

Personality trait adjectives were chosen so as to be of high or low value on one of the dimensions, social desirability or intellectual desirability, and of approximately neutral value on the other dimension. The nucleus of words came from the poles of Rosenberg et al's (1968) two dimensions. To complete the lists required, additional adjectives were chosen from Anderson's (1968) norms that appeared to have the appropriate characteristics. To the extent that any adjectives were

inappropriately classified, this would work against the hypotheses being tested. The complete list of adjectives and pairings used in this study is shown in Table 1. Adjectives of high and low social desirability value and high and low intellectual desirability value are labeled H_S, L_S, H_I, and L_I, respectively.

Experimental Design and Procedure

Each person description consisted of one H_S or L_S adjective paired with an H_I or L_I adjective. Each adjective within a given pair was said to be supplied by a different acquaintance of the person.

Four experimental groups were defined by combining Stage 1 Condition S or I with Stage 2 Condition P or O. The resulting groups are defined as SP, IP, SO, and IO. The Ss in these groups received feedback following each response in Stage 1. For each person description, they were asked to predict whether the majority of upperclassmen in a similar study last year liked or disliked the person described. Ss were told that different people might interpret the term "like" in different ways, such as "like as a friend" or "like as a business partner," and that following each of their predictions they would be told the actual outcome. The person descriptions consisted of six adjective pairs of the type H_S-L_I, six of the type L_S-H_I, two of the type H_S-H_I, and two of the type L_S-L_I.

Feedback was programmed following each response as follows: Ss in Groups SP and SO were told that the majority of last year's students *liked* the person described whenever the description contained an H_S adjective and were told that the majority of last year's students *disliked* the person described whenever the description contained an L_S adjective. The Ss in Groups IP and IO were told that the majority of last year's students *liked* the person described whenever the description contained an H_I adjective and were told that the majority of students *disliked* the person described whenever the description contained an L_I adjective.

Consider, for example, a stimulus person described by the L_S-H_I adjective pair *humorless-intelligent*. The Ss in Groups SP and SO were told that the majority of last year's students *disliked* the person (because the trait *humorless* is low in value on the social desirability dimension). In contrast, the Ss in Groups IP and IO were told that the majority of last year's students *liked* the person (because the trait *intelligent* is high in value on the intellectual desirability dimension). The reverse feedback was given for a stimulus person described by an H_S-L_I

Table 2
Summary of Results

Summary of Results											Mean Percentage Choices of Social Desirability Traits	
Mean Percentage of <i>Like</i> Responses on Stage 1				Rating Responses on Stage 2								
H _S -L _I Pairs		L _S -H _I Pairs		H _S -L _I Pairs		L _S -H _I Pairs		Difference				
Replication				M	SE	M	SE	M	SE			
Group	1	2	1							2		
SP	91.2	93.1	10.8	4.9	14.73	.71	5.06	.36	9.67	.89	83.3	89.2
IP	57.8	22.5	44.1	80.4	8.40	.81	10.76	.95	-2.36	1.59	50.0	41.2
SO	91.2	100.0	15.7	5.9	13.27	.30	6.05	.44	7.22	.56	91.2	80.4
IO	49.0	8.8	43.1	87.3	11.98	.64	7.43	.87	4.55	1.41	70.6	59.8
NF	81.4	86.3	19.6	16.7	11.88	.60	5.53	.65	6.35	.88	76.5	82.4

adjective pair such as *polite-unwise*. After the 16 person descriptions were presented the first time (Replication 1), Ss were told that each description would be repeated (Replication 2) and that they were again to indicate whether the majority of last year's students liked or disliked each person. Following each response, the same feedback was presented as on the first time through the list.

Stage 2 involved presentation of person descriptions constructed in the same way as those of Stage 1. However, different adjectives were used, a different response scale was employed, and no feedback was given. Table 1 lists the person descriptions chosen for Stages 1 and 2. Care was taken to minimize the formal similarity between the words used in the two different stages. Ss in Groups SP and IP were told to predict how much the students in last year's study liked or disliked each person being described. They were asked to predict the average response on a 20-point rating scale, where numbers around 1 mean that the person was disliked very much and numbers around 20 mean that the person was liked very much. Ss in Groups SO and IO were asked to give their own personal evaluation on the 20-point scale of how much they liked or disliked each stimulus person. After each of the 16 person descriptions was rated, each description was presented a second time and S was asked to choose the one word in each pair which was the most important in determining his rating response.

In addition to the four groups described above, a fifth group was included which did not receive feedback on Stage 1. This no-feedback group will be called NF. In Stage 1, Ss in Group NF were asked to guess whether the majority of last year's students liked or disliked each stimulus person, but they were given no information as to the accuracy of their responses. In Stage 2, Ss in this group were asked to give their personal evaluations of each stimulus person on a 20-point scale and were then asked to indicate which word in each pair was the most important in determining their ratings. This group was included for several reasons: (1) to provide a baseline level of the relative influence of the social desirability and intellectual desirability dimensions in the absence of feedback effects; (2) to serve as a control condition for assessing the effects of feedback on Stage 1 performance; (3) to serve as a control condition for assessing the effects of Stage 1 feedback on Stage 2 performance for Groups SO and IO, those groups expected to show the smallest feedback effects.

Person descriptions and responses were marked in test booklets. The two adjectives comprising a given description were printed in vertical array on a single page. Counterbalancing procedures were used to determine which adjective appeared on top. Sequencing of person descriptions was random, with the exception that the first two pairs presented in each stage of the experiment were an H_S-H_I and an L_S-L_I. These univalent adjective pairs were included to lend credence to the feedback manipulation on Stage 1 and to anchor the ends of the category scale used in Stage 2. Data for these pairs were not included in the main analyses of the results.

In Stage 1, S was told to print an "L" for *like* or a "D" for *dislike* at the bottom of each sheet to indicate his prediction response. Following a response interval of approximately 4 sec, E presented feedback orally (except for Group NF) and then after about 3 sec told S to turn the page to the next person description. In Stage 2, S was asked to print a number between 1 and 20 at the bottom of the page to indicate his prediction or evaluation response to each stimulus person. After a response interval of approximately 4 sec, E signaled S to turn the page to the next description. Finally, when the pairs were presented again on new pages, S was asked to circle one word in each pair to indicate which one was the most important in determining his earlier prediction or evaluation response. This part of the experiment was S paced, but S was not allowed to look back at his numerical rating response when he chose the most important word in a given pair.

Subjects

There were 17 Ss in each group, obtained from introductory psychology classes at the University of Iowa. The Ss were tested in subgroups ranging in size from 7 to 10. Two subgroups were assigned randomly to each experimental condition.

RESULTS

Responses to mixed-value adjective pairs, H_S-L_I and L_S-H_I, for each group on each stage of the task are summarized in Table 2.

Data for Group NF can be examined to assess the relative influence of social desirability traits and intellectual desirability traits in the absence of feedback. These data show that, for the material used here, the social desirability traits had a much greater influence on responses than did the intellectual desirability traits, both for prediction responses (Stage 1) and personal evaluations (Stage 2). In Stage 1, the percentage of *like* responses for Group NF was much greater for H_S-L_I pairs than for L_S-H_I pairs. In Stage 2, the mean rating response was more than twice as great for H_S-L_I pairs as for L_S-H_I pairs. Finally, Ss in Group NF chose the social desirability trait as the most important trait in a pair about 80% of the time. The tendency for social desirability traits to have more influence than intellectual desirability traits was greater for pairs composed of traits taken from Rosenberg et al (1968) than for the other pairs (see Table 1). However, there was no reversal of any of the comparisons described

above for either type of pair.

The relative influence of social and intellectual traits on Stage 1 performance for each of the other groups can be assessed in relation to the baseline level of Group NF. The Ss in Groups SP and SO gave more *like* responses to H_S-L_I pairs and fewer *like* responses to L_S-H_I pairs than did Ss in Group NF. The reverse was true for Ss in Groups IP and IO. As can be seen in Table 2, these differences tended to be greater on Replication 2 than on Replication 1. Thus, there is evidence of learning on Stage 1.

In assessing the relative importance of the two dimensions on the rating responses of Stage 2, the dependent variable chosen for statistical analysis was the algebraic difference between responses to H_S-L_I pairs and L_S-H_I pairs. The larger the algebraic difference, the greater the influence of the social desirability traits relative to the intellectual desirability traits. Groups SP, IP, SO, and IO were compared in a 2 by 2 analysis of variance with Stage 1 feedback (reinforcement correlated with social vs intellectual desirability value) and Stage 2 response type (predict responses of reference group vs own personal evaluations) as factors. Stage 1 feedback was a significant source of variance [$F(1,64) = 38.45, p < .01$], with the mean difference score being greater for Groups SP and SO, for whom reinforcement was correlated with social desirability value, than for Groups IP and IO, for whom reinforcement was correlated with intellectual desirability value. The interaction was also a significant source of variance [$F(1,64) = 15.56, p < .01$], with Stage 1 feedback effects being greater for Groups SP and IP than for Groups SO and IO. That is, the feedback effect was greater when S was asked to predict the behavior of the same reference group for whom he had received information on Stage 1 than when S was asked to give his own personal evaluations of each stimulus person. The difference between Groups SP and IP was highly significant ($p < .001$), while the difference between Groups SO and IO was of only borderline significance at the .05 level. Neither Group SO nor Group IO differed significantly from Group NF.

Mean percentage choices of the social desirability trait as the most important trait in a pair are shown in the right-hand portion of Table 2. These values closely parallel the mean difference scores on Stage 2. Those groups with the largest mean difference scores tended to have the highest mean percentage choices of the social desirability trait. Only for Group IP were intellectual traits chosen as often as social traits. This is also the only group for whom Stage 2 rating responses were higher to L_S-H_I pairs than to H_S-L_I pairs.

DISCUSSION

The present results have several implications for the study of impression formation. An examination of data from Group NF reveals that the typical impression

response is influenced more by traits taken from the poles of Rosenberg et al's (1968) social desirability dimension than by traits taken from the poles of the intellectual desirability dimension. Since the traits were not prescaled for the population used in this study, this effect could be due to some unspecified combination of greater weight and/or more extreme scale values for the social traits as compared to the intellectual traits.

Stage 1 of the present task is analogous to a concept identification task. Group differences appeared as early as on Replication 1 of Stage 1. This shows that Ss utilize feedback on early trials correlated with trait values on a given dimension to infer subsequent responses of the reference group on later trials. This can be viewed as an extension of the findings of Zanna and Hamilton (1972), who found that Ss were able to use dimensionalized information to infer additional traits that characterize a given stimulus person. In each case, support is provided for considering the dimensionalized aspects of an impression response.

The presentation of feedback correlated with adjective trait values on a particular dimension is seen as increasing the weight or influence of traits at the poles of that dimension. The increased weighting of traits associated with reinforcement transferred from the binary prediction responses of Stage 1 to the rating responses and choices of Stage 2. This is substantiated by the group differences observed in the mean percentage of choices of the social trait as the most important trait in a pair.

As expected, transfer of feedback effects was less for Ss giving their own personal ratings of the person descriptions in Stage 2 than for Ss predicting the ratings of the reference group. Some Ss could have disagreed with the responses of the reference group and ignored that information when making their personal ratings. Those Ss whose personal ratings were influenced by prior feedback may have been responding to what they considered to be the demand characteristics of the task. Even if this was the case, it is still of interest that these latter Ss were able to utilize dimensionalized feedback on Stage 1 in assigning weights to the traits presented in the person descriptions of Stage 2.

In addition to its particular relevance to the area of impression formation, the present investigation has more general implications for the study of information integration. Slovic and Lichtenstein (1971) point to the need for more research relating areas such as learning and information integration. The present study illustrates how the integration of information is affected by the manipulation of prior reinforcement history. Ss apparently learn to increase the weight given to stimulus values associated with reinforcement and can transfer this tendency to new stimuli, even when the response scale is changed. Results similar to those of the present study are reported by Norman (1973) in a study of feedback effects in the integration of psychophysical stimuli. It may be expected that learning effects are

important in a wide variety of information integration tasks.

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