

The relationship between awareness and verbal conditioning^{1,2}

CHARLES L. RICHMAN, Wake Forest University, Winston-Salem, N.C. 27109, and EUGENIA RIDDLE, GEORGE SCHNEIDER, and PAUL SIMMONS, University of Cincinnati, Cincinnati, Ohio 45221

Preceding a verbal-conditioning experiment, half the Ss were told the response-reinforcement contingency, and the other half were given no information. During the operant period, informed Ss showed a higher critical response level than did the uninformed ones; however, neither level nor rate differences were found during the acquisition and extinction periods. Differences were lacking also in the percent "aware" informed and uninformed Ss. These results were discussed in terms of the methodological problems investigators confront in interpreting the relationship between awareness reports and verbal conditioning.

To determine the extent to which awareness inferences in verbal conditioning (VC) could be validly deduced from Ss' responses in postconditioning awareness interviews, Levy (1967) gave 16 Ss full information about the experiment, via a confederate, before they were run in a VC study and compared their conditioning and interview behavior with 16 uninformed Ss. Levy (1967) found that the informed and uninformed groups did not differ in their operant-period level or conditioning-period rate of performance. Informed Ss did "achieve" a higher acquisition level than did noninformed Ss. However, this acquisition-level difference may have been due to Levy's instructing Ss that the first 20 trials were test trials (operant period), thereby reducing the probability of informed Ss' emitting the critical response during the pretest period.

The purposes of this study were twofold: (1) to replicate Levy's (1967) study without Ss being told of the pretest phase—it was predicted that operant- instead of acquisition-period performance levels would differ between informed and uninformed groups due to the lack of preexperimental set (the set not to respond with the critical responses at a high level until the pretest phase is over) given to the informed Ss—and (2) to assess the effects of extinction on the critical response rate for both informed and uninformed Ss.

SUBJECTS

The Ss were 40 male and 40 female undergraduate students enrolled at the University of Cincinnati.

STIMULI

One hundred 3 x 5 in. white index cards, each containing a different past-tense verb, provided the stimuli. Twenty male and 20 female Ss were assigned randomly to an informed (IN) and 20 each to an uninformed (UN) group in a Taffel- (1955) type conditioning procedure. The Es consisted of a male and female confederate, whose job it was to inform (Group IN) or not to inform (Group UN) Ss about the experiment. The Ss' and confederates' sexes were counterbalanced. When one E served as a confederate, the other E served as the postconditioning interviewer. A third E served as the conditioner. The conditioner and interviewer had no prior knowledge of an S's group assignment.

On arriving for the experiment, each of the 80 Ss was met by a confederate sitting outside the experimental room with a vacant chair beside him. The confederate engaged S in small talk and, for Group IN Ss, added the following: "Are you waiting to be in the experiment, 'Words?' I just got through with it and I have to wait for a second part or something. I think the person running it is doing it for a doctoral dissertation. Boy, I bet he's really, worried about getting the right results. It's a funny experiment. You have to sit there and make up sentences using words he has on a card. It seems he wants you to make up sentences using 'I' or 'We' as the pronoun. I think I did pretty good once I caught on. Better not say I told you about it." In this way, awareness was provided to Group IN.

At the termination of the conversation between the confederate and an S, the conditioner arrived and escorted the S to the experimental room. Ss were instructed to create a sentence for each verb presented. During Trials (sentences) 21-70 (acquisition period), E said "Good" immediately following each sentence containing the pronoun "I" or "We." During Trials 1-20 (operant period) and Trials 71-100 (extinction period), Ss were not reinforced.

At the end of the extinction period, E escorted S into an interview room, where the interviewer assessed awareness, using Spielberger & Levine's (1962) postconditioning interview.

RESULTS

Employing Levy's (1967) procedure, Ss were classified aware if any answers during the postconditioning interview (Spielberger & Levine, 1962) could be taken as statements of the reinforcement contingency "good" for sentences beginning with "I" alone, with "We" alone, or with "I" or "We." Ss were classified aware or unaware without the interviewer's knowledge of their preexperimental treatment or their performance in verbal conditioning; 72.5% of the informed Ss and 65% of the uninformed Ss were classified as aware ($\chi^2 < 1.00$, $p > .05$). Verbal reports of awareness did not reflect the preexperimental treatment.

A t test comparing Group IN's and Group UN's mean number of "I-We" responses during the operant period showed the former superior to the latter [$t(78) = 8.06$, $p < .001$].

Because Groups IN and UN differed in their operant period critical response frequency, the subsequent acquisition period ANOVA was performed on "I-We" responses after the scores had been adjusted for the operant period differences. For blocks of 10 trials, each Group UN Ss' mean acquisition and extinction period score was increased by 1.46 units. The acquisition period ANOVA showed that Groups IN and UN did not differ with regard to level (groups main effect: $F < 1.00$, $p > .05$) or rate [Groups by Trials interaction: $F(4,312) = 1.33$, $p > .05$] of conditioning. There was, however, an increase in the number of critical responses emitted across trials [a trials effect: $F(4,312) = 9.27$, $p < .01$].³ Figure 1 represents the mean number of critical responses for the operant, acquisition, and extinction periods for all Ss after the scores had been adjusted for operant period differences.

Two correlated t tests were performed on both Groups IN and UN, comparing the mean number of critical responses emitted during the last 10 trials of acquisition and the last 10 extinction trials. These results revealed that both Group IN and Group UN demonstrated extinction [$t(39) = 5.68$, $p < .001$ and $t(39) = 4.44$, $p < .001$, respectively]. An ANOVA performed on the adjusted extinction scores (Blocks 8-10) showed that Groups IN and UN did not differ at any point during extinction (groups main effect, $F < 1.00$, $p > .05$, and Groups by Trials interaction, $F < 1.00$, $p > .05$), yet both groups demonstrated a statistically significant decrease in "I-We" responses over trials [trials effect: $F(2,156) = 16.19$, $p < .01$].

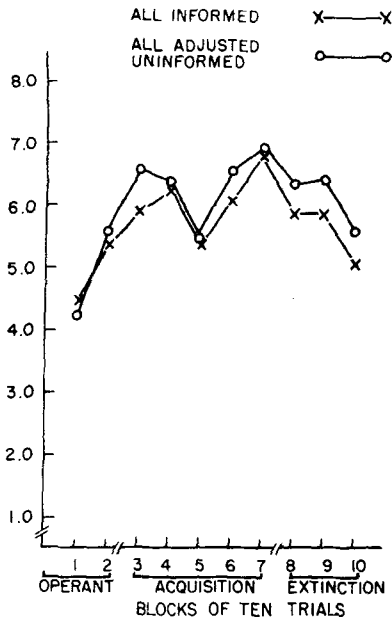


Fig. 1. Mean number "I-We" responses across operant, acquisition, and extinction periods for Group IN and Group UN following the data transform (an increase of 1.46 units for each S in Group UN).

DISCUSSION

The results clearly indicated that, after adjusting for operant-period differences, the rate and level of "I-We" responses during "conditioning" were in no way altered by Ss' prior knowledge of the experiment. Levy (1967) demonstrated that informed Ss obtained a higher critical response level during acquisition than did uninformed ones but showed no differences during the operant period. These data suggest that Levy's procedure of instructing Ss about the pretest retarded the informed Ss' critical response level during the operant period.

Perhaps the most interesting finding in this study was the lack of differences between the per cent informed and uninformed Ss reporting awareness (i.e., 27.5% of the informed Ss and 35.0% of the uninformed Ss did not report awareness during the postconditioning interview). This result was at variance with Levy's finding that Group IN Ss reported awareness significantly more than Group UN. This difference may have been due to our introduction of an intervening extinction period. The extinction period may have reduced the probability that Group IN Ss reported awareness. Whether this was a function of memory loss, motivational variable, or some other factors was not determined.

Both Levy's experiment and the present one suggest strongly that the curves obtained in VC studies reflect the volitional processes of human Ss instead of the automatic consequences of reinforcement. Levy (1967) concluded that it is misleading to speak of these studies as demonstrating VC. The data may be more a function of the beneficence of the Ss than of the potency of reinforcement. What is also implied in these data is a methodology for estimating a population of Ss' beneficence in VC experiments. For example, if one finds, as in the present study, no difference between the percentage of informed and uninformed Ss demonstrating awareness (the former being a beneficence control group, the latter the usual VC experimental group), then interpreting the lack of VC in unaware experimental-group Ss as being a function of their lack of a "state of awareness" may be incorrect, or at least nonparsimonious, since the uninformed Ss' lack of awareness and conditioning could be a function of the Ss' beneficence, intentions, willingness to cooperate, etc. Therefore, these results may be taken as evidence that exemplifies

the behaviorist's assertion that the positive correlation, usually found between awareness reports and verbal conditioning, is due to a positive correlation between these two *dependent measures* and a third independent variable, e.g., an S's preexperimental set or intentions to cooperate or succeed during the experiment. It is not unheard of to find two measures correlated because of their covariation with a third. For example, Maltzman & Raskin (1965) have asserted that a relationship exists between awareness and semantic conditioning because they both covary with an orienting reflex.

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NOTES

1. The preparation of this paper was supported by a grant to the senior author from the Graduate Council of Wake Forest University.
2. The authors are indebted to John E. Williams and Leonard D. Goodstein for their critical reading of this paper.
3. Without acquisition period data transform, the findings were identical to those cited in the result section, i.e., the groups main effect ($F = 2.67$, $df = 1/78$, $p > .05$) and the Groups by Trials interaction ($F = .80$, $df = 4/312$, $p > .05$) were both statistically nonsignificant, and the trials effect ($F = 11.35$, $df = 4/312$, $p < .01$) was statistically significant.