Stimulus Generalization as a Function of Stimulus Novelty and Familiarity in Rats

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Three experiments used rats as subjects to investigate the generalization of conditioned responding between stimuli as a function of the subjects' exposure to these cues prior to conditioning. Experiment 1 used a between-subjects design, food as the reinforcer, and measured the tendency of subjects to approach the site of food delivery during the stimuli. Generalization of this response was more marked when the training and test stimuli were equated in terms of their novelty (i.e., when both were novel or both were familiar) than when the stimuli differed in this respect (i.e., when one was novel and the other was familiar). Experiments 2a and 2b used within-subjects designs to confirm the reliability of the results of Experiment 1. Implications of these results for current theories of stimulus representation are discussed.

It has become customary for theories of Pavlovian conditioning to assume that the presentation of a stimulus unconditionally activates many representational elements (e.g., Wagner, 1981; see also Estes, 1950). This assumption allows these theories to provide a simple explanation for stimulus generalization, the observation that establishing one stimulus as an effective signal for a reinforcer will, to some extent, permit a conditioned response (CR) to be elicited by other stimuli. Thus, to the degree that the conditioned stimulus (CS) and the test stimulus excite some of the same representational elements, common elements, the test stimulus will be able to elicit a CR. The fact that this generalized CR is often less pronounced than that elicited by the CS is taken to reflect that the CS activates some elements, unique elements, that the test stimulus does not. The associative strength of these unique elements will contribute to the CR that is elicited by the CS but not to the CR evoked by the test stimulus. The unique elements of the test stimulus, on the other hand, will affect test performance insofar as the unconditioned response (UR) that they elicit interacts with the CR that the common elements elicit (see Mackintosh, 1974, pp. 486-487; Pavlov, 1927).

Representational elements have usually been taken to correspond directly to physical and unchanging attributes of the experimenter's stimuli, for example, to the frequency or the intensity of a tone. It has been suggested, however, that subjects may also encode properties of a stimulus that are more abstract and that change as a consequence of experience. For example, Best and Batson (1977) suggested that when stimuli are first encountered, they might be coded as novel, but that repeated exposure would cause them to become coded as familiar. This suggestion stemmed from the observation that the generalization of conditioned aversion from one flavor to a second flavor appeared to be reduced if subjects had been exposed to this second flavor prior to conditioning (Best & Batson, 1977; Domjan, 1975; Honey & Hall, 1989a; see also Franchina & Gilley, 1986). Best and Batson (1977) argued that this finding could be explained if stimulus novelty was considered a dimension along which the generalization of associative strength occurred. Thus, as a result of pairing one novel flavor with aversive consequences, animals might show an aversion to other novel stimuli on the basis of an association between stimulus novelty and illness. This association, however, would not contribute to the aversion shown by subjects that had received exposure to, and were therefore fully familiar with, the test stimulus. Rather, for such subjects, the fact that the test stimulus was familiar would serve to distinguish it from the novel CS.

Unfortunately, the results reported by Best and Batson (1977) and others are open to a theoretically less interesting interpretation. Preexposure to the test flavor will allow habituation of the neophobic UR it tends to evoke (Domjan, 1977). Subjects not given preexposure can thus be expected to show a low level of consumption on the test simply because for them the UR will still be present and will summate with the generalized CR. Attempts to disconfirm this interpretation are not fully convincing. Several experimenters have demonstrated that control subjects that have not experienced an effective conditioning regime consume novel and preexposed test flavors equally readily (see Best & Batson, 1977; Domjan, 1975; Honey & Hall, 1989a). This null result has been taken to indicate that the presence of a neophobic UR in subjects not given preexposure was not sufficient to produce a suppression of test consumption. These control subjects, however, having no aversion to the CS, consumed greater quantities of the test stimulus than those that had acquired a CR. The possibility remains, therefore, that a ceiling effect might have acted to obscure differences between groups in the control condition.

An alternative strategy for assessing the influence of conditioned effects in the test phase of such experiments is to make use of a different training procedure in which the UR,
rather than summatung with the CR, might be expected to 
compete with it. In such a procedure a novel test stimulus 
would elicit a UR that should interfere with the exhibition of 
associative strength governed by the common elements. 
Accordingly, if novel and preexposed test stimuli differ only in 
their tendency to evoke the UR, the overt CR should be more 
marked in the presence of a preexposed stimulus than a novel 
stimulus, because for a preexposed stimulus the UR would 
have habituated, and the CR elicited by the common elements 
could appear at full strength. On the other hand, if generali-
ization along the dimension of novelty is an important con-
tributor to the magnitude of the CR evoked in the test phase 
of such an experiment, then it might still be possible to observe 
more responding to a novel than to a preexposed stimulus. 
Experiment 1 adopted this strategy of pitting any effect pro-
duced by generalization based on novelty/familiarity against 
that to be expected on the basis of the habituation of the UR 
evoked by a familiar stimulus.

Experiment 1

The experiment made use of an appetitive Pavlovian con-
ditioning procedure in which the CR measured was the tend-
cy of the subject to approach the site of food delivery in 
the presence of the CS. The effect of a novel stimulus in this 
training situation is to suppress behavior and thus render the 
CR less likely to occur (Channell & Hall, 1983). There were 
four groups of subjects. All subjects received conditioning 
trials in which the presentation of one auditory event, A, was 
followed by the delivery of food. Subsequently, the subjects 
were given a test in which the ability of another auditory 
stimulus, B, to elicit responding was measured. The four 
groups of subjects differed in their experience with these 
events prior to conditioning. For one group, Group APP, 
both stimuli were novel at the outset of conditioning; a second 
group (Group B) received preexposure to B. If subjects show 
generalization on the basis of the shared property of stimulus 
novelty, then the level of approach in the presence of B should 
be greater in Group APP than in Group B, assuming, of 
course, that this conditioning procedure is effective in endow-
ing stimulus novelty with associative strength. In an attempt 
to ensure that novelty rather than familiarity would gain 
strength, the subjects were given very few conditioning trials 
with Stimulus A, the minimum necessary to generate condi-
tioned responding.

The second pair of groups investigated the symmetrical 
possibility that subjects might show generalization between 
two stimuli because they share the attribute of being familiar. 
Thus, Group B/A received preexposure to Stimulus A and to 
Stimulus B, whereas Group A was preexposed to Stimulus A. 
Accordingly, if stimulus familiarity operates in the same way 
that Best and Batson (1977) supposed that stimulus novelty 
does, then subjects in Group B/A should show higher levels 
of approach during Stimulus B than Group A. If stimulus 
activity influences test performance only by virtue of its 
effect on the UR, however, subjects in Groups B and B/A 
should show higher levels of approach in the presence of B 
than Groups APP and A.

Method

Subjects

The subjects were 32 naive male hooded Lister rats with a mean 
ad lib weight of 310 g (range: 290–340 g). The animals were main-
tained at 80% of their free-feeding weights.

Apparatus

Four identical Skinner boxes, supplied by Campden Instru-
ments Ltd., were used. Each of the boxes contained a recessed food tray to 
which 45-mg food pellets could be delivered. Access to this food tray 
was by means of a rectangular aperture 6 cm high and 5 cm wide. A 
transparent plastic flap of the same dimensions was attached by a 
hinge to the top of the entrance to the food tray. Pushing this flap 
upward from its vertical resting position allowed subjects to gain entry 
to the food tray. This movement actuated a microswitch, and each 
closing of this switch was recorded as a single response. The flap 
automatically returned to its resting position when the rat removed 
its snout from the food tray. The retractable levers that the boxes 
were equipped with were withdrawn throughout the experiment. A 
loudspeaker mounted on the wall opposite the food tray was used to 
present a tone of 2000 Hz at an intensity of 82 dB (A), re 20 µN/m², 
a 20-Hz click, and white noise both at the same intensity as that of 
the tone. This intensity was measured close to the flap and was 16– 
20 dB above the background noise level that was produced by a 
ventilation fan. The floor was constructed from stainless steel rods. 
Background illumination was provided by a 3-W jewel light (rated 
for 24 V but operated at 16 V) mounted 14.5 cm above the food tray. 
The boxes were housed in light- and sound-attenuating shells that 
contained the ventilation fan.

Procedure

Pretraining. On the first 2 days of the experiment, the rats re-
ceived magazine training in which 45-mg food pellets were delivered 
on a variable-time 60-s schedule during the course of two 40-min 
sessions. The flap covering the opening to the food tray was fixed in 
a raised position on Day 1 so as to facilitate retrieval of the pellets by 
the rats. On Day 2 the flap was returned to its vertical resting position so 
that subjects were required to move the flap in order to retrieve 
the food pellets when they were delivered.

Preexposure. The subjects were randomly assigned to one of four 
groups, and eight daily 60-min sessions were given. No food pellets 
were delivered during these sessions. In each session, Group B/A 
received six presentations of a 30-s stimulus, B, and six presentations 
of a second, different stimulus, A, that was 10 s in duration. This 
duration was chosen to be the same as that used in the conditioning 
phase of the experiment, a duration that was known to be particularly 
effective in engendering acquisition of the appetitive CR (Hall & 
Honey, 1989). The timing of the onset of the first stimulus presenta-
tion was, on average, 260 s, and the intertrial interval was, on average, 
280 s. The first trial of each session alternated between B and A; the 
order of stimulus presentation within a session was otherwise random 
with the constraint that no more than two trials of the same type (B 
or A) occurred in succession. Subjects in Group A received only the 
A presentations, and those in Group B received only the B presenta-
tions. For these two groups the stimuli were presented in the same 
temporal positions as they were presented in Group B/A. Finally, 
animals in Group APP were placed in the apparatus for the duration 
of the session, but no stimuli were presented. The stimuli assigned as 
A and B were counterbalanced so that for half of the subjects in each
of the groups, Stimulus B was the tone, and the click served as Stimulus A; for the remainder this arrangement was reversed.

Conditioning and test. During the next three 60-min sessions, all subjects were given appetitive conditioning with A. Each session included three trials; each trial consisted of the presentation of A for 10 s followed immediately by the delivery of three food pellets. The first trial in each session was presented after 890 s, and the interval between the onset of subsequent trials was 910 s.

The test session was 60 min in duration, and during the session, subjects received three presentations of B. The timing of these three trials within the session was identical to the timing of the conditioning trials. Each trial had a duration of 30 s.

### Results

Subjects responded at a uniformly low rate during the first conditioning session. By the final conditioning session, however, subjects in each group responded at a higher rate during A presentations than in the rest of the session. Thus, the mean rates of background responding during the final session were 2.32 responses per minute (rpm) in Group APP, 2.04 in Group B, 4.32 in Group A, and 2.74 in Group B/A. An analysis of variance (ANOVA) conducted on the individual scores on which these mean rates were computed revealed no effect of whether subjects had been preexposed to the CS, A, no effect of preexposure to B, and no interaction between these variables, largest \( F(1, 28) = 3.86, p > .05 \). The rates of response during stimulus presentations were 22.25 rpm in Group APP, 21.75 in Group B, 13.75 in Group A, and 13.00 in Group B/A. An analysis of these rates revealed an effect of preexposure to A, \( F(1, 28) = 12.37, p < .01 \), no effect of preexposure to B, and no interaction between these variables (Fs < 1). The fact that the groups that had received preexposure to A appeared to exhibit a lower rate of responding than the nonpreexposed groups simply reflects the typical retardation of learning observed with preexposed stimuli, a latent inhibition effect (Lubow, 1973). These differences in responding to A, however, should not confound the critical comparisons that are between Group APP and Group B, and between Group A and Group B/A, because the members of each pair of groups did not differ in their response rates in the presence of A.

Inspection of the test performance revealed that there were no differences dependent on the particular stimuli assigned as A and B. Therefore, the data for each group were pooled across the counterbalanced factor of stimulus type and also across the three test trials. Figure 1 represents the mean response rates shown by each of the groups in the presence of Stimulus B in Experiment 1. (The group labels refer to whether the animals had received preexposure to the CS, A; the test stimulus, B; both stimuli, B/A; or had just been given apparatus exposure, APP.)

![Figure 1. Group mean response rates during the test phase with Stimulus B in Experiment 1. (The group labels refer to whether the animals had received preexposure to the CS, A; the test stimulus, B; both stimuli, B/A; or had just been given apparatus exposure, APP.)](image)

Discussion

Best and Batson (1977; see also Domjan, 1975; Honey & Hall, 1989a) showed that an aversion established to a novel flavor appears to generalize more readily to other novel flavors than to other familiar flavors. It has been argued that these results might reflect only that a novel stimulus elicits a UR that tends to summate with the generalized CR. But the present experiment made use of a procedure in which a novel stimulus might be expected to elicit a UR that would interfere with the generalized CR. In spite of this, subjects in Group APP showed more marked generalization to the novel B stimulus than did Group B for which this stimulus was familiar. The results of these two groups, therefore, encourage the conclusion that there can be generalization of conditioned responding on the basis of stimulus novelty. But before accepting this conclusion, one should consider an alternative explanation of this result that can be derived from another effect that often follows stimulus exposure: latent inhibition (Lubow, 1973). In particular, it seems possible that preexposure to B, in Group B, may have resulted in latent inhibition to the elements that B shares with A. If this were the case, then these elements would gain little of the available associative strength when A was trained as a CS. Accordingly, the low level of stimulus generalization that this group showed to Stimulus B might merely reflect that the common elements.
it shared with A governed little associative strength. In Group APP, by contrast, these elements should gain a full measure of strength during conditioning, and generalization should be more extensive.

The performances shown by Groups B/A and A, however, cannot be explained in this way. Subjects in Group B/A received twice as many exposures to the elements shared by A and B than did Group A. In the former group, the common elements were being experienced on A and B trials, whereas in the latter these elements were present only on the A trials. Acquisition of strength by the elements common to A and B should then proceed less well in Group B/A than in Group A. It follows that generalized responding should, therefore, be more evident in Group A than in Group B/A. But in fact Group B/A showed a higher level of responding during Stimulus B than did Group A. It might be argued that the high level of responding shown to B in Group B/A reflected the removal of the competing UR that was serving to reduce performance to this stimulus in Group A. This explanation, however, is unparsimonious, because such an effect ought to have resulted in Group B also showing a high level of responding during Stimulus B.

In summary, the pattern of results observed in Experiment 1 cannot be explained in terms of the effects of stimulus exposure—habituation and latent inhibition—that are mediated by the type of representational elements to which current theories of stimulus generalization appeal (Mackintosh, 1974; Rescorla, 1976). Rather, the findings appear to be best characterized by the notion that subjects in some way code stimuli as novel or familiar, and these stimulus properties can affect stimulus generalization. Thus, when two stimuli are both novel or both familiar, subjects will show a greater tendency to respond to each in a more similar way than when one is novel and the other familiar. Indeed, the fact that the level of responding elicited by B depended critically on whether the CS, A, was novel or familiar provides convincing evidence that test performance did reflect the generalization of associative strength from A to B.

Experiments 2a and 2b

Because the results of Experiment 1 represent what is perhaps the first unambiguous demonstration of generalization on the basis of stimulus novelty and familiarity, it seemed worthwhile to attempt to replicate and extend these theoretically important findings. Experiments 2a and 2b made use of a within-subjects design. In Experiment 2a, Group B received conditioning trials in which a stimulus that was novel at the outset of training (A) was paired with the delivery of food. The subjects were then given a test in which the level of magazine approach was measured during two other auditory cues, one of which, B, had been preexposed and the other of which, C, was novel. If, as in Experiment 1, subjects show generalization based on the shared property of novelty, then the level of responding should be greater during C than during B.

The second group of subjects in Experiment 2a, Group B/A, investigated the possibility that generalization occurs as a consequence of the shared attribute of being familiar. This group's treatment differed from that received by Group B in that the CS, A, was also preexposed prior to conditioning. If, in accord with Experiment 1, subjects show generalization on the basis of stimulus familiarity, then subjects in this group should show higher levels of approach during the familiar B stimulus than during the novel C stimulus.

In Experiment 2b the subjects (Group B/D) received exposure to the critical B stimulus and also to a further stimulus (D) that was irrelevant to the subsequent stages of the experiment, when subjects were given conditioning with a novel stimulus, A, and then were tested with B and a further novel cue, C. To the extent that Group B/D received exposure to two different stimuli in the first stage of training, their treatment matched that received by Group B/A of Experiment 2a. But if the critical factor in determining test performance is indeed the extent to which the CS and test stimulus are equated in novelty/familiarity, then the subjects of Experiment 2b should produce results matching those of Group B of Experiment 2a.

Method

Subjects and Apparatus

The subjects in Experiment 2a were 16 naive male hooded Lister rats with a mean ad lib weight of 389 g (range: 355–415 g), and those in Experiment 2b were 8 naive hooded Lister rats with a mean ad lib weight of 400 g (range: 375–425 g). All animals were maintained in the same way as in Experiment 1. The apparatus was that used in Experiment 1, with the exception that a white noise was used as the third stimulus in Experiment 2a. The fourth stimulus in Experiment 2b was a 5-KHz tone that was pulsed at the rate of 60 pulses per minute. Each pulse of the tone was 0.5 s in duration, and the interval between successive pulses was 0.5 s. These stimuli were presented at the same intensity as the other auditory stimuli.

Procedure

After 2 days of magazine training, subjects were given eight daily 60-min sessions. In each session, Group B/A (Experiment 2a) and Group B/D (Experiment 2b) received six presentations of a 30-s stimulus, B, and six presentations of a second, different stimulus—A for Group B/A and D for Group B/D. For half of the subjects in these groups, Stimulus B was the tone, and the novel test stimulus, C, was the click; for the remainder this arrangement was reversed. The noise served as Stimulus A for all subjects in Group B/A. In Group B/D, half of the subjects experienced the noise as Stimulus D, and the novel CS, A, was the pulsed tone; for the remainder this arrangement was reversed. The temporal sequencing and the order in which these stimuli were presented was the same as for Group B/A in Experiment 1. Subjects in Group B (Experiment 2a) received only the B presentations, and those occurred in the same temporal positions as they were presented in Group B/A. For half of the subjects in this group, Stimulus B was the tone, and the click served as Stimulus C; for the remainder this arrangement was reversed.

During the next four 60-min sessions, all subjects were given appetitive training with A according to the procedures outlined for Experiment 1.

The test sessions in Experiments 2a and 2b consisted of three presentations of Stimulus B and three presentations of Stimulus C. The trial sequence was C, B, B, C, B, C for half of the subjects in
each of the groups and B, C, C, B, C, B for the remainder. The first trial was presented 500 s after the beginning of the session, and the remaining trials were presented with an intertrial interval of 530 s. Each trial had a duration of 530 s.

Other details of Experiments 2a and 2b that have not been specified were identical to those of Experiment 1.

Results

Experiment 2a

Acquisition of conditioned responding proceeded in much the same way as in Experiment 1. Thus, subjects responded at a low rate throughout the first session, but by the final conditioning session, subjects in each group responded at a consistently higher rate during A presentations than during the rest of the session. On the final day of conditioning, the rates of responding during A were 14.75 rpm for Group B and 18.75 for Group B/A. Statistical analysis confirmed the impression that these conditioning scores did not differ \( F < 1 \). In this study, unlike in Experiment 1, there was no latent inhibition manifest on the last day of conditioning. This discrepancy in all probability reflected the fact that in Experiment 2a, unlike in Experiment 1, a noise served as the CS or that there were 4 days as opposed to 3 days of training. The rates of response during the remainder of the session, with means of 2.13 rpm for Group B and 2.37 for Group B/A, also did not differ significantly \( F < 1 \).

The results of the test phase were pooled across the counterbalanced factor of stimulus type (click or tone) and across the three test trials. Figure 2 represents the mean response rates shown by the two groups to the test stimuli, B and C. It is apparent that the response rate for Group B was greater in the presence of Stimulus C than during Stimulus B and that Group B/A showed a higher level of responding to Stimulus B than to C. Statistical analysis of the results confirmed these impressions.

An ANOVA was conducted with the variables being group and whether the test stimuli, B and C, were equated with the CS, A, in terms of novelty/familiarity. This analysis revealed an effect of whether the test stimuli were equated with A, \( F(1, 14) = 5.58, p < .05 \), and there was no effect of group \( F(1, 14) = 1.17, p > .29 \). An analysis of the background rates of responding, with means of 2.03 rpm for Group B and 1.43 for Group B/A, revealed no difference between the groups in these rates, \( F(1, 14) = 1.66, p > .21 \).

Experiment 2b

Conditioning proceeded in the same manner as in Experiment 2a and was uninfluenced by whether the noise or the pulsed tone served as the CS. The mean rate of background responding during the final session of conditioning was 1.47 rpm, and the rate of responding during A was 24.5 rpm.

The results of the test phase were pooled across the counterbalanced factor of stimulus type and across the three test trials. Figure 3 represents the mean response rates shown to

Figure 2. The two left-hand bars of the figure represent the performance of Group B, and the two right-hand bars represent the results of Group B/A in Experiment 2a. (The group designation refers to whether the animals had received preexposure to the CS, A. For both groups, Stimulus B had been preexposed, and Stimulus C was novel.)

Stimulus B and Stimulus C during the test phase of the study. It is apparent that the level of responding during Stimulus C was greater than during Stimulus B. A one-way ANOVA confirmed this description of the results, \( F(1, 7) = 6.06, p < .05 \). The rate of responding during the remainder of the session was 1.05 rpm.

Discussion

The results of Experiments 2a and 2b, with their within-subjects procedures, confirm the reliability and extend the generality of the findings of Experiment 1 in which a between-subjects design was used. Thus, subjects in Group B and Group B/D showed greater test levels of responding to Stimulus C than to Stimulus B, whereas subjects in Group B/A exhibited higher levels of responding to Stimulus B than to Stimulus C. The only difference between the treatment received by these groups was that for Group B/A, the CS (A) had been preexposed, whereas for Group B and Group B/D, Stimulus A was novel at the outset of conditioning. These results, like those of Experiment 1, can be taken to indicate that stimulus novelty, for Groups B and B/D, and stimulus familiarity, for Group B/A, can serve as a basis for stimulus generalization.

It is interesting to note that an analogous finding to that observed in the present series of studies has recently been reported using pigeons as subjects. Macphail and Reilly (1989) presented pigeons with a large number of different slides depicting a variety of natural scenes. Each slide was presented
influenced by the novelty and familiarity of stimuli per se. Thus, generalization of conditioned responding based on an appetitive reinforcer was more marked between stimuli when both were novel or both familiar than when one of the stimuli was novel and the other familiar.

Generalization on the basis of novelty and familiarity is not anticipated by current theories of stimulus representation (Mackintosh, 1974; Rescorla, 1976; Wagner, 1981). One seemingly straightforward way in which these theories might be extended to account for the present results, however, has been proposed by Best and Batson (1977). They suggested that the novelty (or familiarity) of a given stimulus might constitute a stimulus element and that these elements might determine the extent of stimulus generalization in the same way that it is supposed that elements that directly reflect the physical characteristics of a stimulus do. A response established to one familiar stimulus would also be elicited by another familiar stimulus, but not by a novel stimulus, because of an association between familiarity and the US. In the same way, pairing a novel stimulus with a US would permit other novel but not familiar stimuli to elicit a CR.

This interpretation of the results can be taken to imply that there is some mechanism that can subserve detection of novelty/familiarity and that subjects, in some way, are able to represent these attributes of stimuli once detected. This supposition is shared by a number of theories of habituation (see Konorski, 1967; Sokolov, 1963). These theories assume that subjects possess a comparator that enables them to ascertain the availability of a stored representation that matches incoming stimulation. It is just such a mechanism that might be considered a prerequisite for the detection of stimulus novelty/familiarity.

There is, however, another mechanism that has been entertained in the context of effects of experience with stimuli on subjects' ability to discriminate among them that might also underlie the effects reported here. Miller and Dollard (1941; see also Lawrence, 1949) proposed that stimulus generalization would be more marked between stimuli that, as a result of prior training, had come to elicit the same response than that between stimuli that had come to elicit differing responses. This proposition has received direct support from a series of experiments investigating the influence of associative history on the extent of stimulus generalization (Honey & Hall, 1989b). In the first stage of one of these experiments, subjects were given appetitive training designed to establish the same response to two stimuli, A and N, and a different response to a third stimulus, B. Thus, in one condition, A and N both signaled the delivery of food, whereas B was associated with the absence of food; in a second condition, A and N signaled the absence of food and B its delivery. As a result of this training, in the former condition the presentation of A and N elicited the CR of approaching the site of the food delivery, whereas B did not; in the latter condition, A and N did not elicit a CR, whereas B elicited approach. Subsequently, animals received aversive conditioning with N, and the generalization of the response established by this training was measured. In both conditions it was found that animals showed greater evidence of stimulus generalization to A than to B, a result that is perfectly consistent with Miller and
Dollard's claims about acquired changes in stimulus discriminability.

The same form of interpretation can be applied to the results reported here. In Experiment 2a, for example, in Group B the source of stimulus generalization, A, may have elicited a UR that was similar to that elicited by the test stimulus, C (both A and C were novel). This UR would, however, not be elicited by B, because it would have habituated during stimulus exposure. Accordingly, generalization of the CR should be more marked between A and C, which elicit the same UR, than between A and B, which have come to elicit differing responses. Similarly, in Group B/A there will be less stimulus generalization from A to C than from A to B, because the former pair of stimuli are likely to elicit different responses, whereas the latter pair are not. This analysis requires only that exposure to a stimulus results in a decline in the UR that it elicits, but it need not implicate the operation of a comparator mechanism in determining habituation (cf. Konorski, 1967; Sokolov, 1963). Groves and Thompson (1970), for example, presented a theory in which the decline in the UR reflects a reduction in the efficacy of the stimulus–response pathway, and it makes no reference to a comparator mechanism.

The form of explanation just outlined can also be phrased in terms of the associates that stimuli elicit as a consequence of their prior history (see Honey & Hall, 1989b). Thus, it has been supposed that during exposure to a stimulus, subjects learn a stimulus-no-event association (e.g., Hall & Honey, 1989). In Group B of Experiment 2a, such an association would result in Stimulus B, but not Stimulus C, being differentiated from the nonpreexposed CS, A. As a result, generalization should tend to be less marked to B than to C. In Group B/A, however, A and B will share the ability to activate the no-event associate, whereas A and C will not. Consequently, generalization should be more marked between A and B than between A and C.

The results of the experiments reported here do not permit a choice to be made between the notion that animals encode the novelty and familiarity of stimuli (Best & Batson, 1977) and the suggestion that the responses or the associates that stimuli elicit will influence stimulus generalization (Honey & Hall, in press-b). Parsimony, however, would dictate that the present results and those reported by Honey and Hall (1989b) be attributed to the operation of the same mechanism: Other things being equal, there will be less generalization between stimuli that have come to elicit different responses or associates than between stimuli that elicit the same response or associate.

References


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