

# Children's response speeds to familiarized stimuli<sup>1</sup>

KENNETH L. WITTE

INSTITUTE OF CHILD BEHAVIOR AND DEVELOPMENT, UNIVERSITY OF IOWA

Young children observed 20 presentations each of a red and a green light. The duration of 1 light (NS) was 1.5 sec., that of the other (FS) was 4.5 sec. Ss then responded to the onset of the stimuli in a lever-pulling task. Starting, but not movement, speeds to the NS were significantly greater than those to the FS. No evidence for a change effect was obtained.

Cantor & Cantor (1964, 1965, 1966) employed a paradigm in which a stimulus was repeatedly presented to a child S during a familiarization phase; S simply attended to the stimulus. The Ss then responded to the onset of either the familiarized stimulus (FS) or a nonfamiliarized "novel" stimulus (NS) which was not presented during familiarization. A stimulus familiarization effect (SFE), i.e., faster responding to the NS than to the FS, has been consistently obtained. There is also evidence for a change effect (CE) which is characterized by faster responding to either stimulus if the other was presented on the previous trial.

Cantor & Cantor (1965) offered one possible hypothesis regarding the SFE. They indicated that, "If repetitive exposure to one stimulus makes the subsequent appearance of a second stimulus a 'surprising' event, it could be argued that an increased level of generalized drive or perhaps a heightened 'orientation reaction' accompanying the surprise made the response to the novel stimulus more effective than it might otherwise have been" (Cantor & Cantor, 1965, p. 8).

In the present study, each of the two stimuli presented in a motor task was initially presented 20 times during a familiarization phase; however, the duration of one stimulus was three times that of the other. Thus, the occurrence of either stimulus in the motor task should not have been "surprising," and hence the SFE should not have been obtained if surprise did in fact play a crucial role in the earlier studies. However, if the SFE is due to a habituation process (Cantor & Cantor, 1965; Bogartz & Witte, 1966), then more habituation should have occurred during familiarization to the stimulus presented for the longer duration and thus the SFE should have been obtained.

## Method

The Ss were 28 4- and 5-year-old children enrolled in the Head Start Program in Burlington, Iowa. Data from 14 additional Ss were discarded; these Ss either did not follow instructions or failed to complete the task. Each S was brought individually to a dimly illuminated room and was seated before a lever-pulling apparatus. During familiarization, S was given

20 presentations of a red light and 20 of a green light; S was instructed to watch each light carefully. Here, as well as in the motor task, each pair of trials involved one presentation of each stimulus color, the order of appearance of the two colors within each successive pair of trials being randomly determined for each S. This produced stimulus sequences in which, on approximately 75% of the trials, the stimulus presented was different from that presented on the previous trial. The duration of one stimulus was 4.5 sec., that of the other was 1.5 sec. The stimulus color presented for the longer duration was randomly determined; the green light served this function for 16 Ss. The intertrial interval was 5 sec.

For the motor task, S stood before the apparatus, placing his right hand on a start mark located on its front face. S was instructed to pull the lever down through its complete excursion as quickly as possible upon the onset of either stimulus. Stimulus onset in this phase, as well as during familiarization, followed a verbal "ready" signal by 2, 3, or 4 sec. according to a random order common to all Ss. The Ss were given 26 trials; each color stimulus served as the signal on 13 trials. Starting time, i.e., time from light onset until initial movement of the lever, and movement time, i.e., time to move the lever through the lever channel, were recorded to the nearest .01 sec.

## Results and Discussion

SFE. Starting and movement latencies on trials 3 through 26 were reciprocalized to produce speed scores, and S's mean speeds of responding within 6-trial blocks were determined separately for the NS and the FS. Here, NS refers to the stimulus presented for the shorter duration during familiarization, while FS refers to the stimulus presented the longer duration. Two A by B by S analyses of variance (Lindquist, 1953), one for each response measure, were conducted using these scores. Trial blocks and NS vs. FS (the SFE comparison) were the within-Ss variables. A .05 level of significance was used for all tests of main effects and interactions.

Table 1 shows the mean starting speeds of interest. A significant trials effect, indicating decreasing speeds

Table 1. Mean Starting Speeds to the Familiar and Novel Stimuli Across 6-Trial Blocks

Stimulus Event	Trial Blocks		Over-all
	1	2	
Familiar	.90	.86	.88
Novel	.98	.87	.92

across trial blocks, was obtained ( $F=7.05$ ,  $df=1/27$ ). Starting speeds to the NS were significantly greater than those to the FS ( $F=4.87$ ,  $df=1/27$ ), i.e., a significant SFE was obtained. A significant SFE by trials interaction was also found ( $F=5.10$ ,  $df=1/27$ ). Follow-up analyses indicated that starting speeds to the NS were significantly greater than those to the FS on trial block one ( $F=12.44$ ,  $df=1/27$ ), while such was not the case for trial block two ( $F<1$ ). All effects for movement speeds were nonsignificant.

The present findings are consistent with the hypothesis that the SFE reflects habituation processes occurring during familiarization and, in conjunction with other data (Bogartz & Witte, 1966), indicate that Cantor & Cantor's (1965) "surprising" event hypothesis is probably untenable. The significant SFE obtained for starting speeds, and the absence of such an effect for movement speeds, are in agreement with findings of previous studies in which a significant SFE was obtained only for the initiation segment of the motor response. Finally, the fact that the SFE was significant only for the first trial block is inconsistent with previous findings in which the SFE was maintained throughout the course of 50 trials (Cantor & Cantor, 1964, 1965). However, the NS in the previous studies was not presented prior to the motor task, while in the present study the NS occurred 20 times for a total exposure time of 30 sec. during familiarization.

CE. The speed scores were also used to calculate for each S mean starting and movement speeds for responses to the NS following a NS on the previous trial (novel, but no change), NS following FS (novel and change), FS following FS (familiar, but no change), and FS following NS (familiar and change). These data were entered into two additional A by B by S analyses of variance, one for each response measure, in which the SFE comparison and change from the previous trial vs. no change (the CE comparison) were the within-Ss variables.

These analyses failed to reveal a significant CE for either response measure ( $p>.20$  in both cases). The present failure to find a CE is consistent with similar findings in other studies (Cantor & Cantor, 1964; Bogartz & Witte, 1966, Experiment I) in which Ss made the same response to both stimuli (as was the case here), and inconsistent with positive findings in other studies (Cantor & Cantor, 1965, 1966) in which Ss responded differentially to the stimuli. The absence of a CE in the present study is not inconsistent with the assertion that the CE obtained by Cantor & Cantor (1965, 1966) resulted from their use of a predominantly alternating stimulus sequence and a task in which Ss responded differentially to the stimuli (see Bogartz & Witte, 1966), and is inconsistent with Cantor & Cantor's (1966) hypothesis that the CE may reflect a form of "novelty" inherent in changing from one stimulus to another from trial to trial within the motor task.

### References

- Bogartz, R. S., & Witte, K. L. On the locus of the stimulus familiarization effect in young children. *J. exp. child Psychol.*, 1966, in press.
- Cantor, G. N., & Cantor, Joan H. Effects of conditioned-stimulus familiarization on instrumental learning in children. *J. exp. child Psychol.*, 1964, 1, 71-78.
- Cantor, G. N., & Cantor, Joan H. Discriminative reaction time performance in children as related to stimulus familiarization. *J. exp. child Psychol.*, 1965, 2, 1-9.
- Cantor, G. N., & Cantor, Joan H. Discriminative reaction time in children as related to amount of stimulus familiarization. *J. exp. child Psychol.*, 1966, in press.
- Lindquist, E. F. *Design and analysis of experiments in psychology and education*. New York: Houghton Mifflin, 1953.

### Note

1. This report written during the author's tenure as a Public Health Service Predoctoral Fellow, National Institute of Mental Health. Thanks are due to Winifred Witte who collected the data, to Burlington, Iowa, Head Start officials for providing Ss, and to Dr. Gordon Cantor for his helpful suggestions regarding this manuscript.