Instrumental escape conditioning and extinction as a function of UCS intensity and instructions

JOHN J. PORTER, JAMES M. DAWLEY, and JEANNE H. PORTER, *University of Wisconsin-Milwaukee, Milwaukee, Wisc. 53201*

The effects of auditory stimulus intensity (115, 95, or 65 dB) and two degrees of task information upon a key-tapping escape task were examined. Tapping speed, the time required to make 20 key taps per trial, was dependent upon instructions during both acquisition and extinction while auditory stimulus intensity had little effect upon performance. Start speed showed no significant instructions effect but was significantly faster to the 115 dB sound intensity than to the other two intensities during both acquisition and extinction.

Recently Porter & Dawley (1966) examined the effects of intense sound upon an instrumental escape key-tapping task and found that performance was determined both by the degree of instructed task information and the intensity of the auditory stimulus used (115, 95, or 65 dB). The most striking finding of this study was the large instruction effect produced by a small variation in content; the effect being sufficient that the slowest of the explicit instruction groups exceeded the performance of the fastest of the implicit groups. On the other hand 115 dB was needed for performance to significantly exceed that of the 95 and 65 dB groups which did not differ significantly.

The present study attempted to replicate the instruction and UCS intensity effects observed by Porter and Dawley with the addition of a start speed measure and a series of extinction trials. The extinction trials, with the auditory stimulus absent, and a light signalling the start of a trial, were included to assess the perseverative effects of instructions and the auditory stimulus upon performance.

METHOD

Ninety-six General Psychology students were used, 16 Ss per cell of a 2 by 3 design. Ss received explicit or implicit instructions and 115, 95, or 65 dB sound intensity. The auditory stimulus used, a 1000 Hz square wave, was delivered via Grason-Stadler 600 ohm headphones powered by an EICO sine-square wave generator. A light, presented in conjunction with the auditory stimulus, appeared under the transparent response key and signalled the beginning of each trial. Twenty key taps were necessary in order to terminate light and sound. Both start speed and tapping speed were measured. Start speed was defined as 1/time from light onset until the first key tap. Tapping speed was defined 1/time for key taps 1-20 inclusive.

The Ss received one of two sets of instructions. Explicit instructions informed S that the faster he/she tapped the key the more rapidly the light and sound would terminate. Implicit instructions told S to key tap when the light and sound came on, speed of tapping was not mentioned. All Ss received 90 trials at intervals of 7, 9, or 11 sec between light presentations. During acquisition (Trials 1-60) the light and sound came on simultaneously; during extinction (Trial 61-90) the light alone signalled the beginning of a trial.

RESULTS AND DISCUSSION

The tapping speed of the six groups, in blocks of 10 trials, are shown in Fig. 1. During acquisition these results closely resembled the previous results of Porter & Dawley (1966) in that all three explicitly instructed groups responded more rapidly than the implicit groups, over Trials 51-60 of acquisition ($F = 21.57$, $df = 1/90$, $p < .001$). The effects of auditory intensity also were significant ($F = 3.92$, $df = 2/90$,

$p < .025$), but a Newman-Keuls test (Winer, 1962) showed that this effect was due to the superiority of the 115 dB groups over both 95 and 65 dB groups ($p < .05$), the latter did not differ significantly.

As was apparent from Fig. 2, start speed was determined primarily by auditory intensity ($F = 9.08$, $df = 2/90$, $p < .001$), again due to the significantly faster start speed of the 115 dB groups when compared with the 95 and 65 dB groups ($p < .01$), which did not differ significantly. There was no significant change in start speed as a function of variation in instructions.

Extinction tapping speed was analyzed using Trials 51-60 (Block 6) of acquisition and 61-70 (Block 7) of extinction. As was clear from Fig. 1, the 115 dB groups showed a marked drop in performance from Blocks 6 to 7, while the 95 and 65 dB groups showed no significant performance decrement. This latter trend was reflected in a significant Trial Blocks by Auditory Intensity interaction ($F = 10.0$, $df = 2/90$, $p < .001$), and in the simple effects of auditory intensity on tapping speed which showed the loss of the auditory intensity effect on Trial Block 7. Thus it appeared that Ss' tapping speed increased when auditory intensity exceeded 95 dB, and that an intensity greater than 95 dB was necessary in order to increase resistance to extinction. It was noteworthy that differential instructions exerted a significant effect throughout extinction ($F = 7.62$, $df = 1/90$, $p < .01$, for Blocks 7 through 9), but that instructions did not interact significantly with trial blocks or auditory intensity.

Extinction start speed showed a decrement for all groups from Blocks 6 to 7 ($F = 227.85$, $df = 1/90$, $p < .001$). This decrement was differentially greater as UCS intensity increased ($F = 18.59$, $df = 2/90$, $p < .001$). The simple effects of prior auditory intensity at Trial Block 7 were marginally significant ($F = 3.14$, $df = 2/90$, $p < .05$), while Newman-Keuls tests over Trial Blocks 7 through 9 indicated that the 115 dB groups were starting faster than the 95 dB groups ($p < .05$) but no other significant difference. Differential instructions did not significantly affect extinction performance. Again differences in performance were due primarily to the 115 dB intensity groups

Fig. 1. Mean tapping speed in blocks of 10 trials. The vertical line between Trial Blocks 6 and 7 separates acquisition and extinction.

Fig. 2. Mean start speed in blocks of 10 trials. The vertical line between Trial Blocks 6 and 7 separates acquisition and extinction.

These results confirmed the strong instructions effect obtained by Porter and Dawley, but only for tapping speed. The persistently superior performance of the explicit groups during extinction indicated that the effects of instructions were relatively independent of the presence or absence of an intense auditory stimulus, whether noxious or not. However, for start speed, a measure not used by Porter and Dawley, it was clear that instructions did not influence performance. Conversely, auditory intensity influenced start latency to a much greater extent than tapping speed; this trend was particularly evident during extinction where the 115 dB group maintained its superior performance throughout extinction.

Finally, it was clear that despite the effectiveness of the 115 dB stimulus in energizing behavior that the narrow range of intensities between effectiveness (approximately 100 dB) and auditory damage (approximately 125 dB) leaves a range of differential stimulus intensities too narrow to be effectively employed in studies of motivation.

REFERENCES

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