

Paradoxical consequences of conflict: Interference and facilitation

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Conflicts produced by two different sequences of stimulus presentation were expected to have different consequences: interfering in one case and facilitating in the other. The sequence of stimulus presentation is critical because it determines whether the response measure will reflect the competition that occurs during the resolution of a conflict, or whether the response measure will reflect the effects of conflict-produced drive on the performance of the dominant response. The responses made by college students during conflict and nonconflict test trials under both conditions supported this hypothesis.

Motor conflicts defined by the simultaneous arousal of incompatible responses are expected to have paradoxical consequences. On one hand, conflict, because of the competition between the incompatible responses, is expected to result in blocking, hesitation, and vacillation (Miller, 1944). Studies reporting this effect of conflict have been conducted by Andreas (1958), Castaneda and Worell (1961), Hovland and Sears (1938) when using hand movement data, and by Dunckley (1977). Conflict, on the other hand, is assumed to contribute to drive, and thus, is also expected to enhance or energize responses that occur (Brown & Farber, 1951; Miller, 1959). Experiments finding this consequence of conflict have been reported by Castaneda and Worell (1961) when using grip pressure data, and by Yelen (1969).

A review of these experiments suggests that the sequence of stimulus presentation is the variable that determines whether conflict will have an interfering or a facilitating effect. In the procedure used by Hovland and Sears (1938), and other studies reporting interference, three stimuli are employed. First, a ready signal of some sort is given, and then, after an interval of time, the two remaining stimuli, each designating a different response, are simultaneously presented. The dependent measure is usually the speed of the response after the simultaneous presentation of the two stimuli. When this sequence of stimuli is used, the response measure reflects in part or in whole the resolution of the conflict. To the extent that resolution involves competition between response alternatives, we would expect to observe vacillation, hesitation, and even blocking.

An energizing or facilitating effect of conflict was reported by Yelen (1969). Three stimuli were also used in this study, but the sequence of stimulus presentation was reversed. That is, during a conflict trial two stimuli, each designating a different response to be made, were simultaneously presented, and then, after an interval of time, a signal to respond was given. Time from the onset of the signal to respond to the occurrence of a response

was used as the dependent measure. When the stimuli are presented in this sequence, an opportunity to resolve the conflict is provided before the response is measured; and therefore, the response measure reflects only the performance of the dominant response. Since the occurrence of the dominant response closely follows a period of conflict, any residual conflict-produced drive would be expected to enhance or facilitate the performance of that response (Brown, 1961).

The present experiment compared the effects of a conflict based on the Hovland and Sears (1938) sequence of stimulus presentation with the effects of a conflict produced by the Yelen (1969) sequence. It was expected that a conflict based on the Hovland and Sears sequence would result in interference and that the Yelen sequence would result in facilitation. Interference and facilitation were defined by the difference between the latency of a response on a conflict trial and the latency of the same kind of response on a nonconflict trial.

METHOD

Subjects

A total of 50 introductory psychology students participated in this investigation. A block randomization procedure was used to assign half of the students to a condition that involved the Hovland and Sears (1938) sequence of stimulus presentation and half to a condition that used the Yelen (1969) sequence.

Apparatus

A stimulus display panel with three lights mounted on it, one 15-W light in the center and a 7.5-W light in both the top left-hand and the top right-hand corners, was placed in front of a typing table. A keyboard with a starting block and two response levers, one 10 cm to the left and one 10 cm to the right of the starting block, was attached to the writing surface of the typing table. Silent Hunter timers were used to control the onset and offset of the lights. Gerbrands digital clocks were used to measure response latencies.

Procedure

Instructions for performing the task with either the Hovland and Sears (1938) sequence of stimuli or the Yelen (1969) sequence were read to each student. In the Hovland and Sears

condition, each student was instructed to get ready to respond by placing the index finger of the right hand on the starting block when the center light came on. The students were then to wait for either one or both of the top lights to come on. If only one of the top lights came on, the students were to press the lever on the same side, that is, the left lever if the left light came on or the right lever if the right light came on. The students were instructed that they were free to press either the left or the right lever if both of the top lights came on at the same time. All responses were to be made as quickly as possible.

In the Yelen (1969) condition, the students were instructed to get ready to respond by placing the index finger of the right hand on the starting block when either one of the top lights came on or when both of the top lights came on. The students were then to wait until the center light came on and, at that time, they were to press one of the response levers as quickly as possible. The left lever was to be pressed if only the left light had been presented and the right lever was to be pressed if only the right light had been presented. The students were instructed that they were free to press either of the levers if both of the top lights had been presented.

A total of 70 trials on the task was administered to each student after the instructions had been given. Trials 1-60 were training trials. In both the Hovland and Sears (1938) condition and the Yelen (1969) condition, 30 of these trials required a response to the left and 30 trials a response to the right.

Trials 61-70 involved two sequences of nonconflict and conflict test trials separated by four filler trials. In each test sequence, two nonconflict trials were given. In the Hovland and Sears (1938) condition, each nonconflict trial involved the onset of the center light for 4 sec, and then the onset of one of the top lights. The top left and the top right lights were each used on one trial. The latency of the student's response to the onset of the top light was recorded. These nonconflict trials were the same as the training trials given in the Hovland and Sears condition. Each one of the nonconflict trials given in the Yelen (1969) condition consisted of the onset of either the top left or the top right light, and then, after an interval of 4 sec, the onset of the center light. The latency of the student's response to the onset of the center light was recorded. These nonconflict trials were the same as the training trials administered in the Yelen condition.

One conflict trial was administered in each of the two test sequences. In the Hovland and Sears (1938) condition, each conflict trial involved the onset of the center light for 4 sec, and then the onset of both top lights. The response that was made and the latency of that response were both recorded. In the Yelen (1969) condition, each conflict trial involved the onset of both the top left and the top right lights, and, after an interval of 4 sec, the onset of the center light. The response that was made and the latency of that response were both recorded.

Dependent Measures

The response made during a conflict trial was compared to the same kind of response made on one of the nonconflict trials in each test sequence. For example, if a student responded to the left on the first conflict trial and to the right on the second conflict trial, then the nonconflict response to the left in the first sequence and the nonconflict response to the right in the second sequence were selected for comparison purposes. The mean of the two latencies for the responses made during the conflict trials and the mean of the latencies for the two comparison nonconflict responses were used as the dependent measures for each student.

RESULTS

Figure 1 presents the mean latency for the responses made during the conflict and nonconflict trials in both

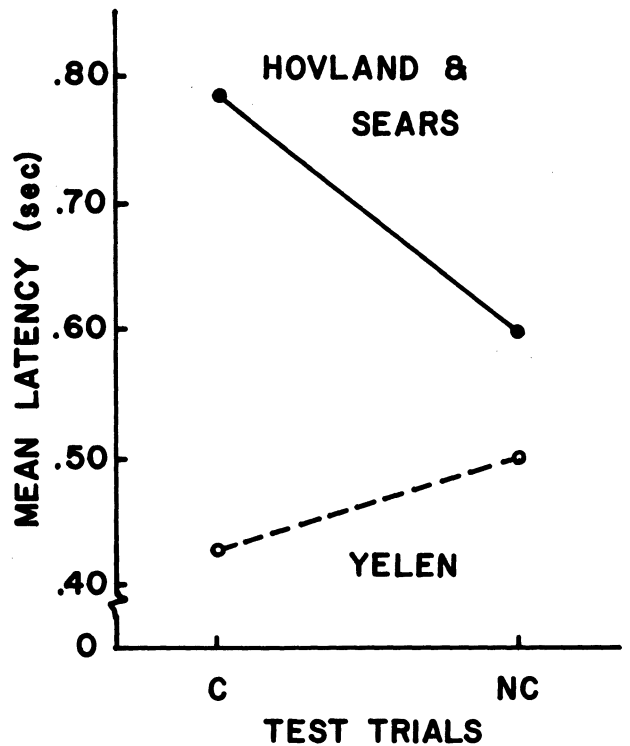


Figure 1. The mean latency for responses made during the conflict (C) and nonconflict (NC) trials in both the Hovland and Sears (1938) condition and in the Yelen (1969) condition.

the Hovland and Sears (1938) condition and in the Yelen (1969) condition. Inspection of this figure indicates that a conflict based on the Hovland and Sears sequence of stimulus presentation resulted in interference, while a conflict based on the Yelen sequence resulted in facilitation. The results of an analysis of variance supported these observations. That is, the analysis indicated that the interaction of conditions (Hovland and Sears vs. Yelen) with type of test trial (conflict vs. nonconflict) was significant [$F(1,48) = 33.65, p < .001$]. Subsequent analysis of the simple effects indicated, first, that the latency of the response on the conflict trial was significantly longer [$F(1,24) = 26.52, p < .001$] than the latency of the same response on the nonconflict trial in the Hovland and Sears condition, and second, that the latency of the response on the conflict trial was significantly shorter [$F(1,24) = 7.29, p < .025$] than the latency of the same response on the nonconflict trial in the Yelen condition.

DISCUSSION

The results of the present experiment support the hypothesis that the sequence of stimulus presentation determines the consequences of conflict: When the Hovland and Sears (1938) sequence is used, the result is interference, but when the Yelen (1969) sequence is used, the result is facilitation. The sequence of stimulus presentation is critical because it determines what the response measure will reflect. In conflicts produced by the Hovland and Sears sequence, the response measure is taken

during the resolution process, and thus, it is likely to reflect competition between the response alternatives. In conflicts based on the Yelen sequence, the response is measured after an opportunity to resolve the conflict, and therefore, the response measure is likely to reflect the facilitating effect of conflict-produced drive on the performance of the dominant response.

Independent support for this interpretation is provided by the results of Castaneda and Worell (1961). These investigators studied the effects of conflicts produced by easy and difficult discrimination problems. Students in this study were instructed to get ready to respond by placing their hands on a starting platform, to wait for two stimuli to be presented, to decide which of the two stimuli was brighter or dimmer, and finally, once a decision had been made, to remove their hands from the start platform and grip a hand dynamometer below the correct stimulus. Two response measures were taken, first, the time required to remove the hand from the start platform, and second, the amount of pressure exerted on the hand dynamometer. The Castaneda and Worell results showed that the time required for students to remove their hands from the start platform was longer for difficult discriminations than for easy discriminations. These data are consistent, then, with the idea that response measures taken while a conflict is being resolved will reflect the competition between alternatives, the more intense the conflict, the greater the competition. The grip pressure data from Castaneda and Worell indicated that more pressure was exerted after the difficult discriminations had been made than after the easy discriminations had been made. The grip pressure data, then, are consistent with the idea that response measures taken soon after a conflict has been resolved will reflect the energizing or facilitating effect of conflict-produced drive, the more intense the conflict the greater the drive.

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