New experimental paradigm: Reaction to own response with time lag

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Abstract

We propose the new experimental paradigm in this report. Traditional and usual method of psychophysical paradigm is based on function between physical input and psychological output. In contrast, in our experiment, the participants had to make judgment based on products of their own responses which had large time lag to make exposure. This experimental situation was very difficult for participants. The participants needed "the feedforward-like judgment" and their performance did not show improvement through repetition of experience.

We operated the time lag between response and exposure of products. The influence of the large time lag was few researched. The participants had to make judgment based on products of their own responses which had large time lag to make exposure.

Method

Subjects

Twelve men were undergraduates who were university students. The present experiment was carried out included two adjoining rooms, a sound proof room and a monitor's room. Subjects sat alone in the quiet dark room.

Apparatus

The apparatus consisted of general PC, a monitor, a keyboard, and software made by ourselves. The software displayed virtual 3D environment. The presentation of the stimuli and timing of the responses were performed wireless LAN by the monitor computer. Visual stimuli were displayed on a LCD display in the sound proof room and in the monitor's room. The participants had to stop the moving object on the static target object. There was time lag between key press and object stopped. There were some marker objects located between the moving object and the target object. Those positions were at random and in constant distance each other. The initial moving object location was at random. It allowed subjects to make response between 10 seconds and 60 seconds from the trial started. Figure 1 shows the stimulus display, while figure 2 shows the moving object over target. If the moving object was over target, the virtual camera following the moving object was stopped on target and focused at the moving object. Figure 3 shows the positional relation.

Experimental Design

There were three conditions with respect to time lag between response and exposure. First condition included the no time lag (0 second), second condition included the small time lag (5 seconds), and third condition included the large time lag (10 seconds). There was no difference with other than factors. The participants divided into three groups by time lag conditions. We carried out experiments through total 30 trials to one subject.

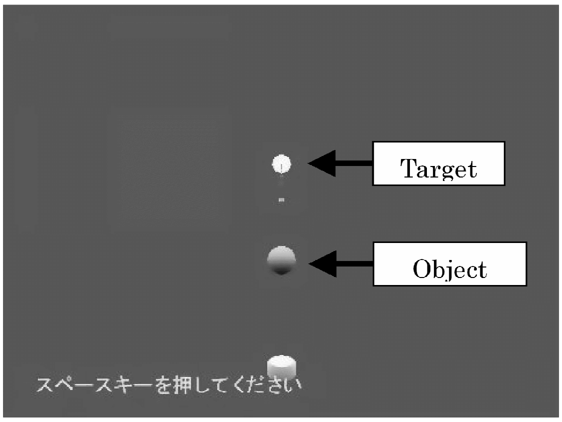

Fig.1. Visual stimulus

Fig. 2. The moving object over target

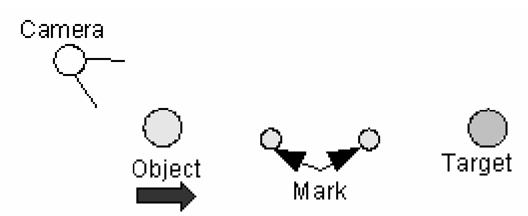

Fig. 3. Positional relation

Procedure

The subjects were tested individually. Each trial displayed with the moving object toward the target object. The traveling object moved in a straight line with constant speed. The participants made operate to stop the moving object through key input adjust the target object. The moving speed was slowdown by degrees, and there was time lag until slowdown starting. If the moving object was over target, the key input was automatically by PC program. After the moving objects stopped, the message displayed “stopped”.

Results and Discussion

Figure 4, figure 5 and figure 6 show the transition of the average response distance of time lag (0 second condition, figure 4; 5 seconds condition, figure 5; 10 seconds condition, figure 6).

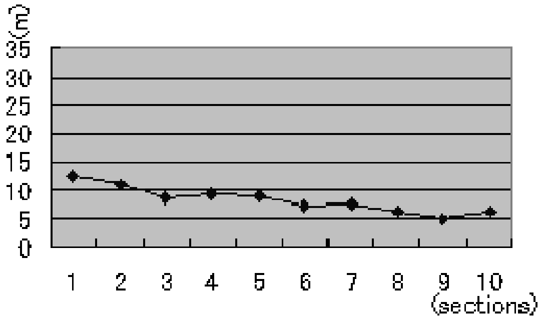

Fig. 4. Time Course of Accuracy under Time Lag 0 second (Vertical Axis: Distance between Moving Object and Target (m))(Horizontal Axis: Sections)

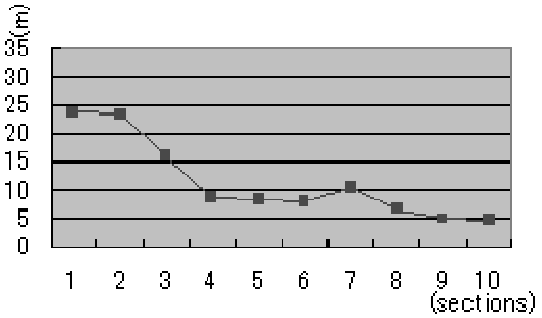

Fig. 5. Time Course of Accuracy under Time Lag 5 seconds (Vertical Axis: Distance between Moving Object and Target (m))(Horizontal Axis: Sections)

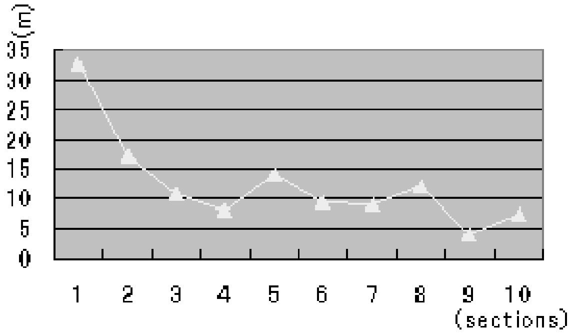

Fig. 6. Time Course of Accuracy under Time Lag 10 seconds (Vertical Axis: Distance between Moving Object and Target (m))(Horizontal Axis: Sections)

The decentralized analysis result is shown in Table1.

Table 1 analysis of variance

	Df	Sum Sq	Mean Sq	F	Pr (>F)	
Section (A)	9	3206	356.2	7.16	9.193e-08	***
delay (B)	2	366	183.4	3.69	0.028	*
Section (A) x delay (B)	18	1059	58.9	1.18	0.292	
Residuals	90	4480	49.8			

Significant effects were obtained every two significant main effects; main effect A as Section （$F= 7.16$, $p<.05$） , main effect B as delay ($F=3.69$, $p<.05$). There was no significant interaction effect between section and delay.

It was suggested that none or small time-lag situation was easy for participants, so their performance showed improvement through repetition of experience. In contrast with it, large time-lag situation was very difficult for participants, so their performance did not show improvement through repetition of experience, and unstable.