Shape Perception by Active Touch and Passive Touch : The Effect of a Long Retention Interval —Pilot Study—

Shoji Itakura and Rika Nakagawa

Department of Communication
Oita Prefectural College of Arts and Culture

ABSTRACT

The performance of recognition of shape in active touch and passive touch is an exploratory investigation using delays between acquisition and recognition tests. The results suggested that the type of touching effected the performance of recognition.

Key word : active touch ; passive touch ; retention interval

The modality which can perceive an object's shape is not only visual but also tactual. According to Gibson (1962,1966), there are two types of touching : active touch (AT) and passive touch (PT). He writes, "Active touch refers to what is ordinarily called touching. This ought to be distinguished from passive touch, or being touched." He also writes that "Active touch is an exploratory rather than a merely receptive sense (Gibson, 1962, p477)." Gibson (1962) reported that active touch is superior to passive touch in tactual shape perception and emphasized that touching movements of the fingers are like the movements of the eyes. In his experiment, however, the tasks were cross-modal recognition between tactual modality and visual modality. It seems that we need to compare the performance of active touch and passive touch in the same modality.

The present pilot study was conducted to compare active touch to passive touch by using delays between acquisition and recognition tests. In other words, we evaluated the dominance of active touch in memory retention.

METHOD

Subjects.

The subjects were 60 female college students. They attended the experiments voluntarily. The subjects were tested at the Oita Prefectural College of Arts and Culture.

Stimuli.

The stimuli consisted of "codon" which provides a complete basis for describing any wiggly curve and hence can be used to enumerate a class of silhouettes (Hoffman & Richards, 1982). Codon quadruples were chosen as stimuli (Figure 1, see Richards,et, al., 1988).

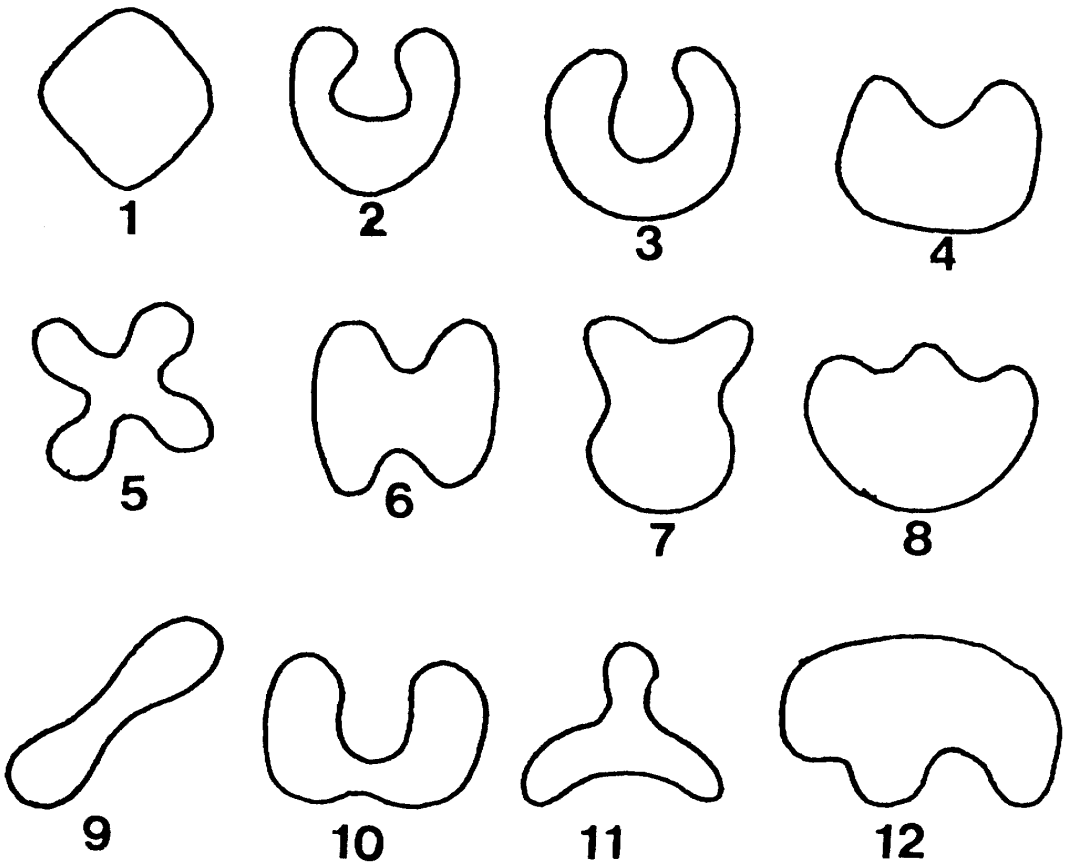

Figure 1. Shapes of 12 four-codons used in experiment as stimuli

A codon was made of white plastic board,. 7 cm thick and 6 cm in size. Each stimulus was stuck on a black paper panel (8 × 8 cm). Six of twelve codons chosen randomly were the target stimuli. Each codon had a number as a label from 1 to 12 which made it easy for the experimenter to treat.

Procedure.

The subjects were divided into 12 groups according to the combination of how they were assigned to touch (AT-AT : active touch acquisition-active touch recognition, AT-PT : active touch acqusition-passive touch recognition, PT-PT : passive touch acquisition -passive touch recognition, and PT-AT : passive touch acquisition-active touch recognition ; see below) and three different delays (0, 1-week, and 2-week). Each group consisted of five subjects. The tasks were basically recognition tests.

A trial was initiated by the presenting of the sample stimulus by the experimenter. The subject's right hand was guided to the stimulus by the experimenter and she was required to touch the stimulus without seeing it (The subject was given an "eye-mask" to cover her eyes). The subject was also required to associate the number, which was told the subject by the experimenter when the stimulus was presented, and the shape of stimulus. There were two types of touching, active touch (AT) and passive touch (PT) as defined by Gibson (1962, 1966). In active touch, the subject was instructed to explore the stimulus freely and actively for 5-sec. In passive touch, on the other hand, the subject's right palm was pressed to the stimulus by the experimenter for 5-sec. After six target stimuli were presented and the subject touched them successively, the subject was required to touch them again and asked to tell the stimulus number. This was a pseudo-task in order not to let the subjects know that this was concerned with the memory experiments.

After the assigned delay (0, 1-week, and 2-week), all the subjects received recognition tests with 12 codons, including the target stimuli. The subjects were required to touch the 12 stimuli successively actively (AT) or passively (PT) and asked to answer "YES" or "NO" according to whether the stimulus touched was a target or not.

RESULTS

The mean number of correct responses in each group was depicted in Table 1.

Table 1
The mean number of correct responses in each group

Condition	Delays		
	0	1-week	2-week
AT-AT	9.2	8.8	8.6
AT-PT	9.4	8.8	7.0
PT-PT	8.0	8.6	8.0
PT-AT	6.2	7.8	7.4

AT: Active Touch; PT: Passive Touch

These results were subjected to a two-way analysis in which the main terms were tactual condition (AT-AT, AT-PT, PT-PT, and PT-AT) and delays (0, 1-week, and 2-week). This analysis produced significant differences among tactual conditions ($F=3.56$, $df=3$, $p<.05$), but there were no significant differences among delay conditions. The former demonstrates that the performance of this task depends on the tactual condition and the latter demonstrates that it is not effected by delays. There was no interaction between tactual conditions and delays.

There were no significant differences in the number of correct associations between the stimulus number and a stimulus, and the ratio of "YES" and "NO" responses during recognition tests.

DISCUSSION

The purpose of this study was to compare the performance of recognition between active touch conditions and passive touch conditions from the perspective of memory retention. The main result of this experiment was that the type of touching effected the performance of recognition. This result supported Gison's reports. However, there were no differences of performance between active touch and passive touch in each delay condition. This is interesting because in general the subjects tend to make increasing errors with increasing delays. Itakura et. al.(1992) and Imamizu et. al. (1992) reported that young children showed better performance in tactual conditions with a 1-week delay than a no-delay in cross-modal matching tasks. This fact may be the key point of the quality of tactual modality.

The mean number of correct responses in each tactual condition through delays were follows : 9.1 for A-A, 8.4 for A-P, 8.2 for P-P, and 7.1 for P-A. It seems that information gathered by active touch is more stable than information gathered by passive touch. It also seems that the performance in the same modality between acquisition and recognition is better than that of cross modality.

This was just the pilot experiment of tactual shape perception. We found that the performance was effected by the types of touching but not effected by delays. Further data need to be collected.

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