Right Hemisphere Dominance in Arousal Induced by Facilitating Positions

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IRIE, N. and NAKAMURA, R. Right Hemisphere Dominance in Arousal Induced by Facilitating Positions. Tohoku J. exp. Med., 1984, 142 (2), 229-230 — To clarify whether there is left-right difference in arousal induced by position changes, vocal reaction times (RTs) were measured at three different positions of the arms for 10 normal subjects. RTs at the facilitating position of either arm were faster than RTs at the neutral position, and RTs at the facilitating position of the left arm were faster than those of the right. The results indicate that the left facilitating position is more effective for increasing arousal than the right one.

reaction time ; facilitating position ; arousal ; hemispheric dominance

Simple reaction times (RTs) increase in patients with unilateral lesion of either cerebral hemisphere, responding with the hand ipsilateral to the lesion, but the effect is much greater when the lesion is in the right hemisphere (De Renzi and Faglioni 1965; Howes and Boller 1975). A reason for this phenomenon may lie in the functional difference between both hemispheres for arousal response (Heilman et al. 1978). Arousal level is modifiable through visual or cutaneous stimulation, which results in the shift of RTs. Effect of the stimulation upon arousal level is more prominent when the stimulus is directed to the right hemisphere than to the left hemisphere (Heilman and Van Den Abell 1980). Facilitating positions utilized in proprioceptive neuromuscular facilitation technique (Knott and Voss 1968) induce faster vocal RTs than neutral position. According to Nakamura (1983), effect of these position changes on RTs is also attributed to arousal.

The purpose of this paper is to clarify whether there is left-right difference in arousal induced by position changes, using RT procedure for normal subjects.

Subjects were 10 normal males aged from 25 to 45 years and were right handed by self-report.

Vocal RTs were measured at three different positions of the arms: N, the both arms at neutral position (the shoulder at anatomical reference position and the elbow at 90° flexion); LF, the left arm at facilitating position of the triceps brachii (the shoulder at 135° abduction, 45° horizontal adduction and 30° internal rotation, and the elbow at 90° flexion) and the right at the neutral; and RF, the right arm at the facilitating position and the left at the neutral. The subject was instructed to say “pa” as quickly as possible responding to a sound stimulus (100 Hz, 50 msec duration) given 2 sec after a warning (500 Hz, 50 msec duration), which was delivered through head-phones. The vocal response was recorded through a unidirectional microphone and was displayed on a memoscope where the latency from the onset of the stimulus to the vocal response, RT, was measured in msec scale. The three positions were alternately changed in every 5 trials. The number of trials was 20 in

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each position. The mean and S.D. calculated from 20 trials in each position were used for statistical analysis.

Overall means and S.D.s of RTs were 177.3 ± 13.2 msec at N, 171.8 ± 13.6 msec at LF and 174.2 ± 16.0 msec at RF. RT was faster at LF than at N (t = 4.00, df = 9, p < 0.01). Compared to N, RT at RF tended to be fast, although the difference did not reach a statistical significance (t = 1.80, df = 9). RT was faster at LF than at RF (t = 2.30, df = 9, p < 0.05). The results indicate that the left facilitating position is more effective for increasing arousal than the right facilitating position.

In this experiment, the sound stimulus was delivered binaurally and the vocal response was considered to be controlled by both hemispheres (Penfield and Rasmussen 1952), so that laterality effect in the stimulus–response relation could be negligible. Assuming that kinesthetic information from a unilateral side of the body projects into the contralateral hemisphere, the present results support the notion that the right hemisphere is dominant for arousal response.

References