Title: Unconscious perceptual sequence learning revealed by a Breaking Continuous Flash Suppression paradigm

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Abstract: 2.40

The time needed for a stimulus to break from suppression is often viewed as an indicator of unconscious processing in a breaking-CFS paradigm (Yang & Yeh, 2011; Stein et al., 2011; Gobbini et al., 2013; Stewart et al., 2012). Although it has been demonstrated that both motor and perceptual learning can contribute to implicit sequence learning, it remains unclear whether implicit sequence learning can influence the breaking time of unconscious processing in breaking-CFS paradigm.

To addresses this issue, we adopted a breaking-CFS paradigm in a serial reaction task. On each trial, distinct flash patterns were presented to the dominant eye and four English letters were presented to the non-dominant eye. In the perceptual-motor group, participants were asked to press a corresponding button as quickly and as accurately as possible once they saw letters z, v, x or p, while in the perceptual group, participants were told to press the space button when they saw a letter. In the training blocks 1 to 10 and 12, the stimuli followed one second conditional sequence (SOC 1), and in the transfer block 11, the stimuli followed the other second conditional sequence (SOC 2). The breaking RT differences between the RTs for the transfer block 11 and the average RTs for the blocks 10 and 12 was used to measure the learning effects.

The breaking RT results showed that participants responded significantly slower to the letters in the transfer block than those in the training blocks in both perceptual-motor group and perceptual group. Importantly, there were no significant differences in the learning effect between the perceptual-motor and perceptual sequence learning groups, providing strong evidence for the existence of implicit or unconscious perceptual sequence learning. These results help to understand how perceptual and motor components contribute to implicit sequence learning.