

# 選手の素早い反応を実現する超短潜時の 視覚運動処理系の特性

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## Characteristics of Visuomotor System Generating a Quick Response to Visual Motion

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### ABSTRACT

Despite our body will not stay stable because there are various internal and/or external fluctuation, we can perform several physical activities with higher accuracy. This would imply that our motor system is equipped with some mechanism for compensating these perturbations automatically. Recently, several visuomotor studies demonstrated that visual background motion during target reaching induces a reflexive manual response with ultra-short latency (manual following response). Although the function is still unclear, this is assumed to be a candidate of automatic compensating system for the motor error caused by body fluctuation because visual background motion varied according to the self (body) motion in the real world.

To make a better understanding of motor-error compensation mechanism in sport, we examined the adaptive inhibition of the quick visuomotor response which occurs when the response was evoked iteratively. In a first experiment, participants required correctly reaching to visual target represented on the screen (240 trials) , and were perturbed by the visual background motion which would evoke a quick response of

reaching arm. In next experiment, the participants were asked to perform a visual-motion discrimination-reaction task which using visual background motion (120 trials) , following reaching task (60 trials). And then, they asked to perform additional reaching task (60 trials). The changes in the amplitudes of manual response throughout each experiment were compared. In the result, the mean amplitude was significantly decreased with the repetition of reaching in the first experiment, but not in the second experiment. The results obviously suggested that the frequency of exposure to the background visual motion is not a determinative factor for the inhibition of the response amplitude. Rather, top-down suppression by higher brain area might be responsible for the amplitude inhibition.

## 要 旨

スポーツにおいて重要と考えられる素早い運動応答の制御特性を理解するために、到達運動中の視野背景の運動が誘発する超短潜時の運動応答が示す抑制現象の原因を、心理物理実験により検討した。まず被験者は60回の到達運動を4セット行い、運動中に視野背景を移動させ運動応答を誘発した(実験1)。すると、セットの反復に伴い運動応答の振幅は有意に減少した。次に全く同じ到達運動を1セット行った後、視野背景の移動方向をボタン押しで回答する選択反応課題を60回2セット、最後に到達運動を1セット行った(実験2)。その結果、被験者は実験1と全く同じ視覚刺激の量に暴露されたにも関わらず、運動応答の振幅は変化しなかった。つまり、この運動応答の抑制は視覚刺激に対する暴露量ではなく、運動応答の生成回数が強く影響することが明らかとなった。これら結果から、運動生成系やより高次の処理系がこの応答抑制の主要な座である可能性が示唆された。