
Attention directed to body movements changes their encoding by muscle receptors, a microneurographic study

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Abstract

Body awareness relies on multisensory information. Among them, the muscle proprioceptive information probably plays a crucial role since it informs about positions and movements of the body. This information arises from muscle receptors, the muscle spindles, which sensitivity may be selectively regulated, by the central nervous system, via the fusimotor system. The aim of the present study was to analyse whether this top-down regulation of muscle spindle sensitivity may be triggered in humans. More specifically, we analyzed whether a fusimotor drive is triggered when selective attention is directed on a two-dimensional movement trajectory in order to recognize it as a writing symbol. A microelectrode was inserted into a superficial nerve to record the activity of single sensory muscle fibers in healthy volunteers (microneurography). The muscle afferent responses to imposed movements forming cursive letters were enhanced when subjects recognized and named the character as compared to when they did not pay attention to the imposed movement. This is the first demonstration of a context-dependent adjustment of muscle spindle sensitivity in humans. We suggest that this top-down regulation acts as a cognitive filter liable to select, as soon as the periphery, the more accurate information depending on the behavioural and environmental context.

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