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Adverse effect of accessory stimulus on postural adjustments during stepping task

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【Purpose】Errors in initial weight transfer of postural responses（postural adjustment errors : PA errors）may occur when there is an uncertainty about direction of movement, possibly caused by declined inhibitory control. The purpose of the research was to examine the effects of accessory stimulus（AS）simultaneously presented with visual imperative stimulus on inhibitory function during stepping task.
【Methods】Subjects stepped forward on a force plate in response to visual stimuli（< or >）presented either left or right side of a PC monitor. The pointing direction and location of an arrow matched in congruent condition while they didn't in incongruent condition. An acoustic AS was randomly presented with the visual stimulus. Center of pressure（COP）data were obtained to extract the following parameters ; reaction time（RT）, PA duration（time between RT and foot lift）, and foot lift time. PA errors were also identified by the initial transfer of COP toward the stance leg.
【Results】PA error rate significantly increased in trials with AS in incongruent condition（$p < 0.001$）. Further, AS significantly reduced the RT of PA−error trials in incongruent condition（$p < 0.001$）, whereas AS shortened the RT more of non−PA−error trials（22.15 ms）than PA−error trials（4.58 ms）in congruent condition although this didn't reach the significant level. PA duration was lengthened in the presence of PA errors, which caused the foot lift to be prolonged.
【Discussion】The AS speeded the response toward the visual stimulus location and consequently increased the PA errors in incongruent condition. AS may modulate the inhibitory function by increasing the tendency to react toward the stimulus location. This implies the potential application of AS loading in assessments and interventions for those who are in risk of falls since prolonged step execution time is reported related to falls.