

Asymmetrical coupling between eye and hand when aiming toward common or separate targets

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ABSTRACT

Eye-hand coordination is central in many everyday activities. Literature has shown that reaction times (RT) of eye and hand are tightly coupled. However to our knowledge this coupling has always been shown in situations where both effectors had a similar spatial goal. As a result it is unclear whether this temporal coupling arises because both effectors share a common action plan or simply because they are simultaneously recruited. To address this issue we designed an experiment in which participants had to reach right/left targets that could impose similar or opposite actions for eye and hand. Furthermore literature has shown that RTs are largely influenced by the stimulus probability, with shorter/longer RT for high/low probabilities. However to our knowledge it has never been explored whether eye and hand priors are computed independently. We reasoned that if eye and hand priors are computed in a joint manner, their RTs should remain largely coupled even when changing unexpectedly the target side for one effector only. Our results showed first that, although RTs were longer for congruent than incongruent actions (+60ms), the temporal coupling between eye and hand RT persisted. Second we found that, although eye and hand RTs increased when switching unexpectedly target side for the eye, only hand RTs increased when switching unexpectedly target side for the hand. Overall we conclude that the temporal coupling between eye and hand does not stem from a similar action plan, and is rather asymmetrical considering that the eye is more influential on the hand, than the other way around.