# Causal inference in cue combination and sensorimotor integration

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Our nervous system continually combines information from multiple modalities into an estimate of the properties of the world which we use to move successfully. Von Helmholtz, more than a century ago realized that the problem the nervous system is faced with, is to come up with a probabilistic estimate of the causes of our sensory percepts. At any point of time there are a number of causes of sensory stimulation. Interacting with another human will produce visual auditory, olfactory and potentially tactile cues. Other objects may produce only visual cues. Typically, many different entities are the causes for our sensory stimuli. As I type this abstract, the keyboard is a cause of visual, auditory and tactile stimulation, the computer screen is a cause of visual stimulation and my phone is a source of visual and auditory stimulation. The nervous system is thus faced with a causal inference problem, which is often also called the binding problem. Which signals have a common cause and should thus be combined into a common estimate and which signals have different causes and should thus be processed independently. Here I discuss how the notion of causal inference is relevant whenever cue combination is happening and also how it is central to motor.