Intersensory interactions across and within the senses

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In general, intersensory interaction occurs when a perceptual response based on one sensory channel is affected by the input from another. My talk focuses on situations where multiple channels convey information about some property of the environment. For example, vision, sounds of interaction, and forces from touch can all contribute to the perception that an object is rigid and not compliant.

I will describe models of intersensory interaction, beginning with the maximum-likelihood integration model, which predicts that multiple inputs are weighted according to their reliability, leading to an optimal perceptual response. There are important variations on this model, however: When the goal is to isolate information on a single channel, other senses may compete rather than cooperate. Moreover, sensory information may contribute to the estimate of a physical property indirectly: after memory mediation, associative chaining, or even heuristic inference. Such indirect pathways may produce unreliability and noise in the product of interaction.

I will then consider intersensory interactions of another sort: when multiple parameters are necessary for a complex perceptual computation, such as force and position being input to the computation of stiffness. In the case of these "hybrid" properties, we can ask whether the interaction occurs at the level of the parameter or the computed higher-level outcome.

I will conclude with lessons we might learn from inter-sensory integration for more complex perception, as in the social domain.