Evidence accumulation

Accumulation of evidence in decision-making is the process by which noisy sensory information is sequentially sampled until sufficient evidence has accrued to favor one decision over another or others.

A fundamental scientific question concerns the neural basis of perceptual consciousness and perceptual monitoring resulting from the processing of sensory events. Although recent studies identified neurons reflecting stimulus visibility, their functional role remains unknown.

Pereira et al. from Geneva showed that perceptual consciousness and monitoring involve evidence accumulation. They performed single-unit recording in a participant with a microelectrode in the posterior parietal cortex, while they detected vibrotactile stimuli around the detection threshold and provided confidence estimates. They find that detected stimuli elicited neuronal responses resembling evidence accumulation during decision-making, irrespective of motor confounds or task demands. They generalized these findings in healthy volunteers using electroencephalography. Behavioral and neural responses are reproduced with a computational model considering a stimulus as detected if accumulated evidence reaches a bound, and confidence as the distance between maximal evidence and that bound. They concluded that gradual changes in neuronal dynamics during evidence accumulation relates to perceptual consciousness and perceptual monitoring in humans [1)]

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Pereira M, Megevand P, Tan MX, Chang W, Wang S, Rezai A, Seeck M, Corniola M, Momjian S, Bernasconi F, Blanke O, Faivre N. Evidence accumulation relates to perceptual consciousness and monitoring. Nat Commun. 2021 May 31;12(1):3261. doi: 10.1038/s41467-021-23540-y. PMID: 34059682.