



Automatic bias of temporal expectations following temporally regular input independently of high-level temporal expectation.

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Breska, A, Deouell LY. 2014.

Abstract:

Exposure to rhythmic stimulation results in facilitated responses to events that appear in-phase with the rhythm and modulation of anticipatory and target-evoked brain activity, presumably reflecting "exogenous," unintentional temporal expectations. However, the extent to which this effect is independent from intentional processes is not clear. In two EEG experiments, we isolated the unintentional component of this effect from high-level, intentional factors. Visual targets were presented either in-phase or out-of-phase with regularly flickering colored stimuli. In different blocks, the rhythm could be predictive (i.e., high probability for in-phase target) or not, and the color could be predictive (i.e., validly cue the interval to the target) or not. Exposure to nonpredictive rhythms resulted in faster responses for in-phase targets, even when the color predicted specific out-of-phase target times. Also, the contingent negative variation, an EEG component reflecting temporal anticipation, followed the interval of the nonpredictive rhythm and not that of the predictive color. Thus, rhythmic stimulation unintentionally induced expectations, even when this was detrimental. Intentional usage of predictive rhythms to form expectations resulted in a stronger behavioral effect, and only predictive cues modulated the latency of the target-evoked P3, presumably reflecting stimulus evaluation. These findings establish the existence of unintentional temporal expectations in rhythmic contexts, dissociate them from intentional expectations, and highlight the need to distinguish between the source of expectation (exogenous-endogenous) and the level of voluntary control involved in it (unintentional-intentional).

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