Expectancy modulates perception of Gestalt motion

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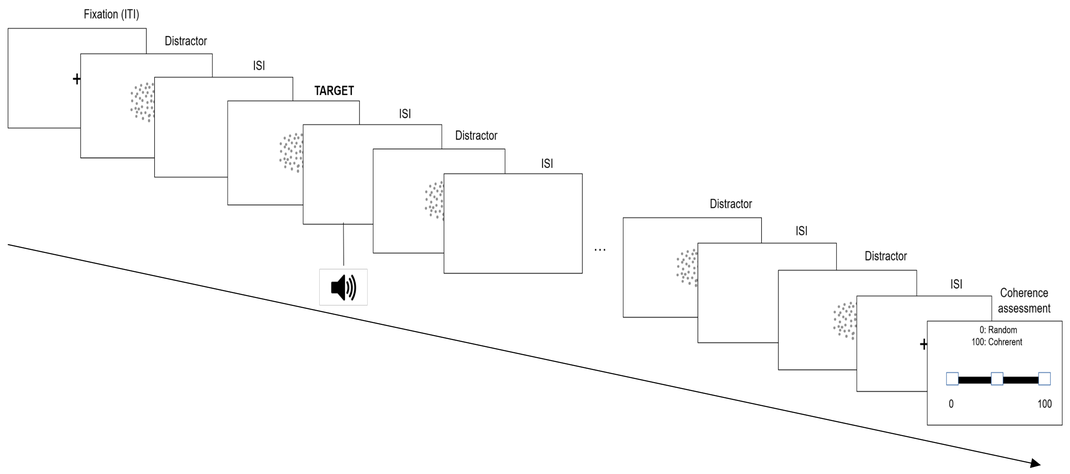
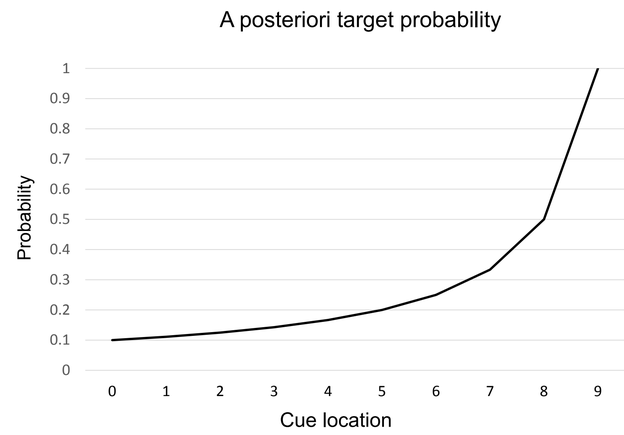
- Expectancy improves perception of visual stimuli (Nobre & van Ede, 2018). However, less is known about its effects on the perception of Gestalt configurations, which have been proposed to be created automatically, such as ones grouped by common-fate (Uttal et al., 2000).
- Here, we investigated the effects of temporal expectancies on the perception of Gestalt motion stimuli grouped by common-fate.

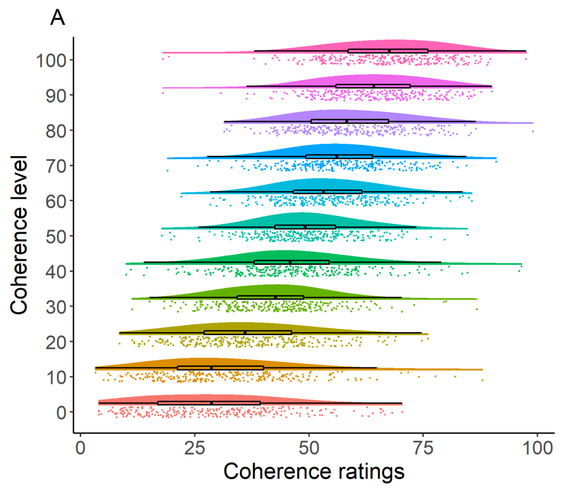
•**Stimuli:** random-dot kinematograms (RDKs) with the coherence level varying between 0 and 100% in steps of 10.

•**Procedure:** In each trial, participants saw a sequence of 10 RDKs. The target RDK was indicated by an auditory *post-cue* and could occur in any stimulus position in the sequence. Because participants were informed that every trial had a target, a posteriori probability of the target increased as the sequence progressed, leading to increased expectancy of the target (*expectancy condition*). After occurrence of the post-cue, target probability and hence expectancy fell to zero *(post-expectancy condition*). Following the sequence, participants rated the target's coherence level using a continuous response bar.



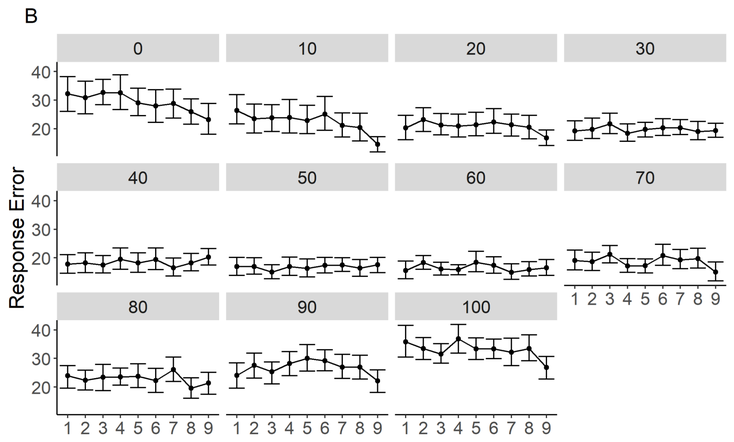


BEHAVIORAL RESULTS



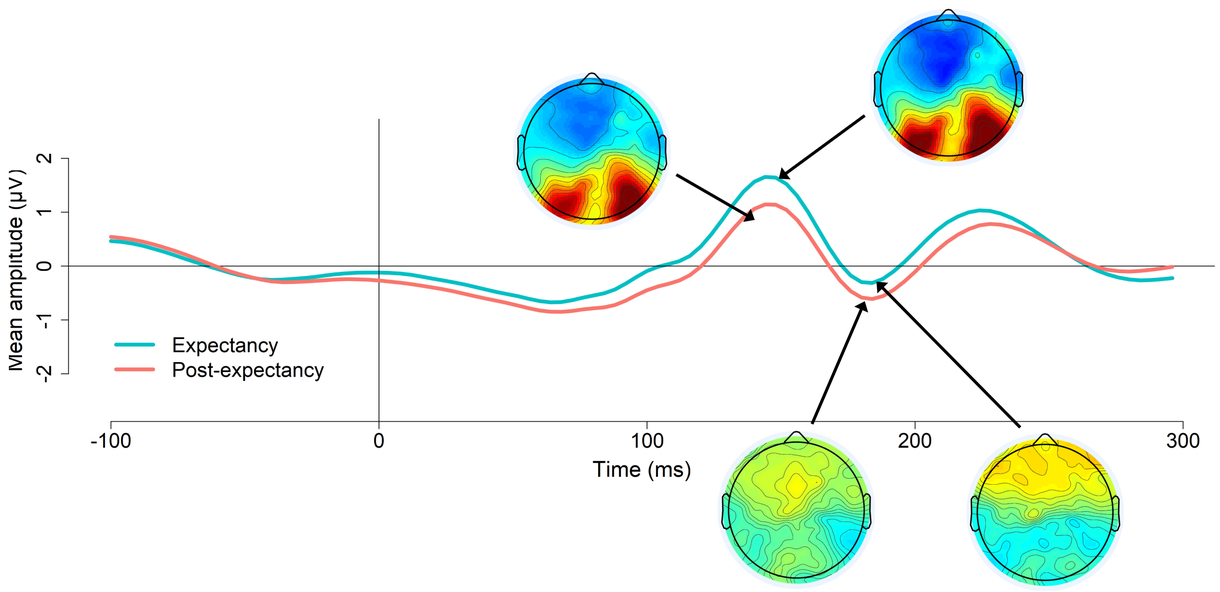
A. Coherence ratings (probability density, raw rating values, median and interquartile range) by coherence level of the stimulus, collapsed across cue locations.

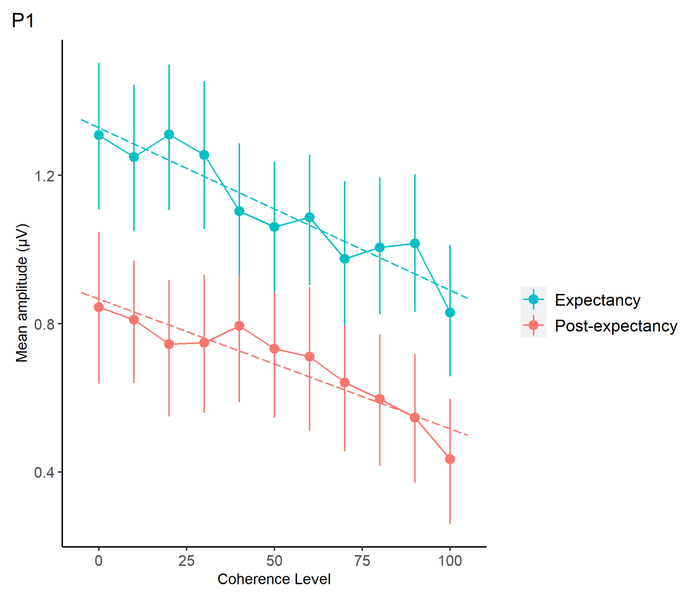
B. Response errors (coherence ratings minus true coherence level) as a function of cue location, separated by coherence level in each panel.

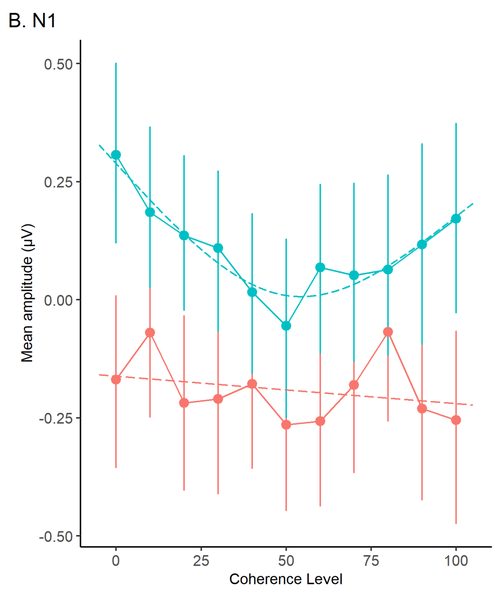


Expectancy, as assessed by cue location, reduces response errors for clearly random and clearly coherent targets, as shown by the negative slopes, but not for intermediate coherence targets.

ERP RESULTS







Grand averaged ERP amplitudes for the electrode cluster used and voltage maps at 140 ms and 180 ms for expectancy and post-expectancy conditions. Larger P1 mean amplitude and smaller N1 mean amplitude observed when stimuli were expected (before the cue) than when they were not expected (after the cue), reproducing earlier results.

A: Linear decrease of P1 amplitude with coherence level. No interaction between expectancy and coherence level. B: Interaction between coherence level and expectancy for N1 amplitudes – linear trend for post-expectancy, quadratic trend for expectancy.
Larger (more negative) N1 amplitudes were observed for RDKs with intermediate coherence levels, i.e., for more ambiguous configurations, but only when the RDKs were expected.

CONCLUSIONS

- Expectancy does not affect early processing stages (as measured by the P1) of motion coherence; however, it influences later processing stages (indexed by the N1) and may help to resolve stimulus ambiguity.
- The effect of expectancy depends on the level of coherence, being stronger for clearly random or clearly coherent stimuli than for the intermediate level of coherence.

REFERENCES

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