

# Multivariate decoding of EEG data reveals similar mechanisms mediate perceptual adaptation and spontaneous perceptual reversals

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## Background

The cause of perceptual reversals of visually ambiguous stimuli has been attributed to several different mechanisms.



One hypothesis is that an accumulation of adaptation, or “neural fatigue”, when one percept dominates could drive these reversals (Kohler, 1940; Long & Toppino, 2004).

Behavioural evidence supports this hypothesis – adapting to an unambiguous stimulus can bias perception of a subsequently presented ambiguous one (Kanai & Verstraten, 2005).

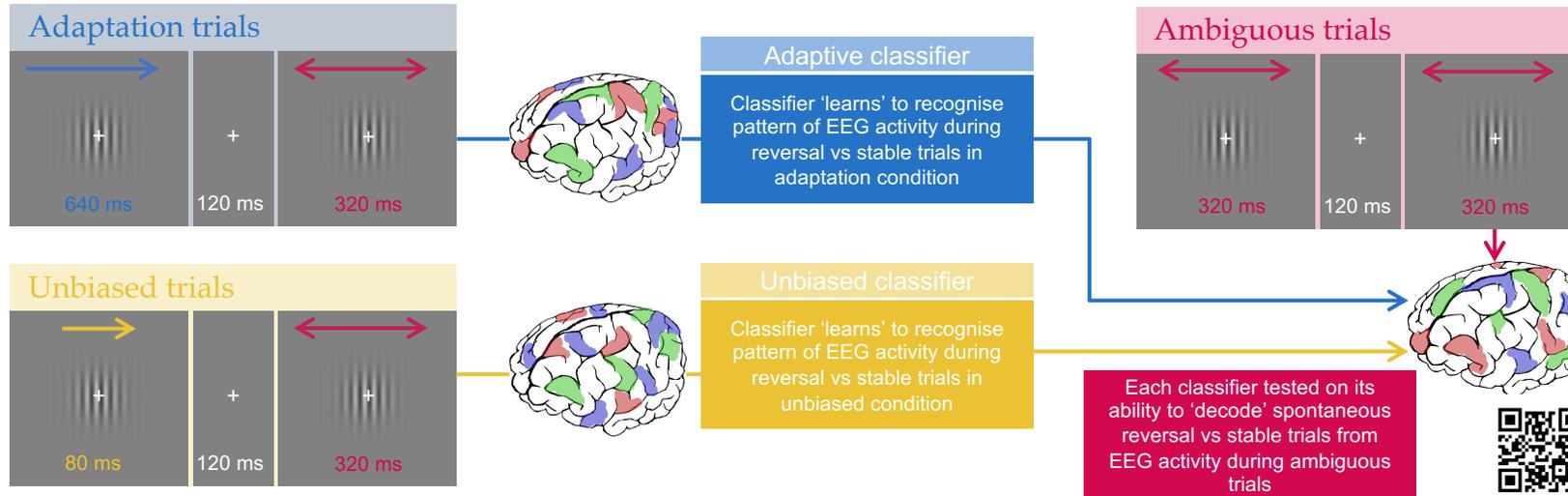
Currently unclear whether the same mechanism has a role in spontaneous perceptual reversals.

## Research Question

Does adaptation play a role in spontaneous reversals in perception?

This question was addressed using multivariate pattern analysis of human EEG data

## Task Design



## Methods

**Participants:** 25 (21F 4M) mean age 21.48 years

**EEG recording:** Cz reference, filtered 0.1 – 30Hz

**MVPA:** Support vector machine classifier

## Conclusions

Results suggest that similar brain mechanisms mediate perceptual adaptation and spontaneous reversals in perception

Provides support for the “neural fatigue hypothesis”

## References

Kanai, R., & Verstraten, F. A. (2005). Perceptual manifestations of fast neural plasticity: Motion priming, rapid motion aftereffect and perceptual sensitization. *Vision research*, 45(25-26), 3109-3116.

Kohler, W. (1940). Dynamics in psychology. Oxford: Liveright.

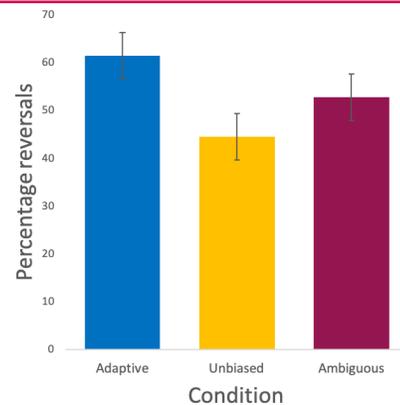
Long, G. M., & Toppino, T. C. (2004). Enduring interest in perceptual ambiguity: alternating views of reversible figures. *Psychological bulletin*, 130(5), 748.

## Results

### Behavioural

Reversal rate in adaptive condition consistent with adaptation – significantly higher than chance (61.45%)

Reversal rates in unbiased and ambiguous conditions consistent with stochastic, spontaneous reversals – not significantly different from chance (44.56% & 52.83%)



### MVPA

The classifier trained on the pattern of EEG scalp voltage patterns from adaptation-induced reversals can decode spontaneously occurring reversals significantly better than the classifier trained on unbiased reversals

