Individual variability in pattern recognition and set shifting under the influence of ambiguity priming

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Humans generally use causal inference in order to generate hypotheses from pre-existing data, which under conditions of uncertainty may lead to perceiving patterns where none exist, missing patterns that do exist, or detecting patterns optimally. The intent of this study is to correlate the ambiguity-performance differential with susceptibility to ambiguity priming, or the process in which a period of uncertainty followed by the sudden discovery of a definite pattern leads to perseveration toward that particular pattern. We programmed a graphical pattern detection task which involved the participant selecting an answer choice based on information and receiving feedback with varying levels of ambiguity. The program recorded each response along with its time and accuracy, and an optical topography system based on near-infrared spectroscopy measured shifts in the cortical hemodynamic response over time. The formulation of stochastic models of the behavioral data allowed for comparisons between individuals by predicting the probabilities of their possible future decision making states. ANOVA on the localized hemispherical data led to the calculation of F values when contrasted between various feedback ambiguities and states of activity, and for each individual, the magnitude of the difference in these F values between hemispheres showed a correspondence with both retention of performance on higher ambiguity levels and resistance to priming as determined from the behavioral results. Finally, a statistical test correlating entropy values of stimuli to performance showed that individuals displayed a consistent level of aptitude regardless of the nature of the information presented, suggesting that pattern recognition relies less on environmental factors than previously thought. A future direction for this study lies in psychotherapy for mental disorders such as schizophrenia, which has been associated with apophenia or the perception of false patterns; and Asperger's syndrome, which is characterized by difficulty in adapting to changing circumstances, suggesting a larger-than-average performance gap between relative ambiguities along with a higher susceptibility to ambiguity priming.