

# A Computational Account of how Anxiety and Impulsivity Impact Uncertainty Computations

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## Abstract

Anxiety and impulsivity can impact human decision making by changing our underlying uncertainty computations. In an online study of 109 participants, we tested how anxiety and impulsivity impact perceptual (“what am I seeing?”) and conceptual (“how does this fit into my knowledge of the world?”) uncertainty, when both types of uncertainty are presented together. Participants were asked to classify and rate their confidence on 35 naturalistic hybrid animal images with varying degree of perceptual and conceptual uncertainty (e.g. 50% deer – 50% goat vs. 20% moose-80% penguin). Higher impulsivity scores correlated with more uncertainty in ratings under most uncertainty conditions. A Bayes-drift-diffusion (DDM) hybrid model predicting people’s task ratings and reaction times based on different types of uncertainty showed how impulsivity and anxiety impact uncertainty computations in mixed perceptual-and-conceptual uncertainty settings, by updating and leveraging conceptual beliefs to estimate the reliability of the estimated perceptual category response in the DDM.