Humans measure algorithmic complexity to guide engagement with event sequences

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Abstract

The criteria for guiding endogenous attention are largely unknown. A prominent view is that humans preferentially engage with information of intermediate complexity, and minimize engagement with too simple or too complex events. Here, we operationalize the notions of engagement and complexity to test this hypothesis. We asked participants to engage with differentially complex sequences of symbols shown one-by-one and disengage when they 1) could predict the next element of the sequence, or 2) felt the sequence was unpredictable. We define sequence complexity as a function of the probability of obtaining that sequence from a particular Hidden Markov Model. This extends previous measures of complexity to respect sequential structure and closely relates to the algorithmic complexity of sequence-generating programs. We construct different measures using this operationalization of sequence complexity to predict the probability of disengagement at each event. We assess under which definitions intermediate complexity is preferred.