A Computational Framework to Account for Attention in Multi-attribute Decisions

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Abstract

The impact of visual attention on choice processes has been established over the last decades. Several studies are consistent with the view that visual attention increases the subjective value of the attended option. However, a few computational models have been proposed to investigate how attention and subjective values interact in multi-attribute choices. Moreover, these models disagree in terms of whether value is modulated by attention additively or multiplicatively. The additive theory states that the boost up subjective value depends only on gaze duration, and gaze on an option magnifies the subjective value at a constant rate. On the other hand, the multiplicative theory assumes that the magnitude of the attention-driven boost is value-dependent, and gazing at a high-value option yields a more significant boost in subjective value. Although there is a long debate on these two theories, recent studies have shown that both additive and multiplicative interactions between subjective value and gaze time may be essential for explaining empirical data and have suggested hybrid theories. For multi-attribute decisions, however, extant attentional models only consider the multiplicative interaction. This work introduces a new computational framework to account for attention in multi-attribute decisions. Our model assumes a hybrid attentional mechanism for the interaction between subjective values and gaze duration. We have tested the model on four datasets from various domains (e.g., clothing/brand, food/nutrition, food bundle, and money risk tasks). The results from the nested model comparison show that the proposed hybrid model works better than the other computational models.

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