Preferential Decision Making and Cognitive Load

A Cognitive Modeling Approach

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In our daily lives we often suffer from reduced cognitive capacities, due to sleep deprivation, stress, or simultaneous task demand. To help people making better decisions, it is important to understand how decision strategies change when cognitive capacity is restricted. In the literature, many studies link resource manipulations to changes in time, risk or fairness preferences (e.g. Deck & Jahedi, 2015). However, a study of Franco-Watkins, Rickard and Pashler (2010) stated that cognitive load increased choice error (or decreased choice sensitivity) but did not change preferences.

To study whether behavior under limited cognitive capacities can be better explained as a shift in preference or sensitivity in a unifying mathematical model, we developed a hierarchical Bayesian framework. We tested this framework empirically in three different domains: risky binary choices, present value elicitation of delayed outcomes and responder choices in the ultimatum game. In all three experiments we combined a deterministic utility function with an error model. All experiments used a within-subject design: participants made choices in a control and a cognitive load condition (3-back task). Over all choice domains we consistently found that cognitive load affected choice sensitivity more severely than preferences, both on an individual and a group level.

Thus, we conclude that research on the effect of resource limitation on preferential choice benefits from the here presented mathematical model that explicitly allows to test a shift in preference against a change in choice sensitivity.