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Ulrike Stege* (stege@cs.uvic.ca), Department of Computer Science, University of Victoria,
Victoria, BC V8W 3P6, Canada. *Applying Parameterized Complexity to Cognitive Science.*

We discuss the role of parameterized complexity in cognitive science, highlighting two aspects. First, when explaining cognitive processes such as decisions, cognitive scientists often use models formulated as optimization problems. Many such problems are computationally intractable (NP-hard), although the cognitive processes they model are expected to be "cognitively tractable". The cognitive-science community often employs heuristics to explain this apparent disconnect. A heuristic does not provide evidence to prove or refute a particular model. Parameterized complexity analysis can lead to the identification of the sources of intractability. This in turn can lead to the rejection or refinement of such models. We present computational problems that are discussed in the literature as models for cognitive processes, including Subset Choice and Coherence. Second, when investigating the human problem solving capabilities for computationally hard problems, many experiments discussed in the literature indicate a very good human performance on such problems. Again, often explanations in the literature rely on heuristics. We discuss on the example of Vertex Cover how tractable parameterizations and fixed-parameter algorithms can help to shed light on such results. (Received September 24, 2012)