

Die Funktion des Arbeitsgedächtnisses beim abduktiven Schliessen: Experimente zur Verfügbarkeit der mentalen Repräsentation erklärter und nicht erklärter Beobachtungen

Martin Baumann

Abductive reasoning is the process of finding a best explanation for a set of observations. In many abductive problems, like medical diagnosis, scientific discovery, debugging or troubleshooting, an amount of information far beyond the capacity limits of working memory (WM) must be processed. Although WM plays a central role in theories of human cognition, theories of abductive reasoning do not specify WM processes during the generation of explanations. On the basis of a computational model of abductive reasoning and of theories of text comprehension a mechanism is proposed that reduces WM load during abductive reasoning. The computational model views abductive reasoning as the sequential comprehension and integration of observations into a situation model that represents the current best explanation for the observations. The proposed WM mechanism assumes that the situation model is only partly kept in WM, whereas other pieces are stored in long-term memory. These long-term representation part can be reliably accessed through retrieval structures to reinstatiate information in WM during abductive reasoning. It is assumed that unexplained observations are actively maintained in WM until an explanation for them could be generated. Thereafter their representation is lost from WM. But these explained observations can be recalled from long-term memory via their integration into the situation model. This mechanism makes predictions about the availability of the mental representation of explained and unexplained observations. These predictions were tested in four experiments, using different memory tests for observations. In Experiments 1 and 2 a recognition test was used, in Experiment 3 an implicit memory test was used and in Experiment 4 the participants had to perform an unexpected recall after task interruption. The results show that unexplained observations are accessed faster than explained ones during abductive reasoning. This confirms the mechanism's assumption that unexplained observations are kept in WM and explained ones not. But explained observations seem not to be represented in long-term memory. Rather, it seems that observations are rapidly forgotten after they are explained. Different possible reasons for this pattern of result are discussed.