The effect of temporal distortions on the error diagnosis in the control of a complex technical system

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In complex technical systems temporal properties of symptoms can signal disturbances. Operators are able to interpret these temporal properties (Decortis, de Keyser, Cacciabue & Volta 1991). But during the interaction with a complex system an operator typically overestimates intervals filled with ongoing cognitive demands (*full durations*) and underestimates intervals without additional cognitive demands (*empty durations*) (Decortis et al. 1991). Block & Zakay (1996) proposed an attention-based model of experienced duration. Thus, experienced duration increases to the extent that a person allocates more attentional resources to processing temporal information.
The question, how temporal distortions affect error diagnosis, has not been experimentally investigated yet. Therefore 10 timing-situations within a technical microworld were simulated. A total of 30 subjects had to work on each situation respectively. The situations differed in the cognitive demands of a primary liquid-level control task (independent variable). As a secondary task the scenarios had to be interrupted according to a given temporal criterion (dependent variable).
The analysis of interruption latencies showed significant differences between empty and divided (i.e. cognitive demands persisted temporarily), but not between empty and full interval conditions. Explanations of these results are discussed in terms of the Attentional Gate Model (Zakay, Block, & Tsal, 1999).