

PSYCHOLOGICAL ERROR MECHANISMS

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ABSTRACT

This paper discusses the role Psychological Error Mechanisms (PEMs) can play in making Operations staff susceptible to human errors in industrial supervisory control tasks. Actual supervisory control events that involved engineers, operators, maintenance and management personnel and resulted in equipment failure and potential personnel injury are used to illustrate the presence and operation of Psychological Error Mechanisms. The authors advocate that a description of Psychological Error Mechanisms (PEMs) and their role in inducing operating errors should be taught to all Control Room personnel to better prepare them to recognize and combat error prone situations.

SUMMARY

Human Reliability Analysis (HRA) research identifies over forty (40) Psychological Error Mechanisms (PEMs) that operate in each of our minds and can affect our performance on and off the job. These Psychological Error Mechanisms can operate during our cognitive tasks of problem solving, deductive reasoning and decision making. Some of the error mechanisms relevant to Control Room Operations are the belief bias effect, constructing only one model of a premise, illicit conversion, confirmation bias, failing to transfer knowledge, overconfidence, anchoring and adjustment heuristic, availability heuristic and representativeness heuristic.

The authors believe that industrial plant personnel need to be taught the concepts and accompanying vocabulary so that individuals can recognize

situations when they are susceptible to a Psychological Error Mechanism and possibly avoid pending error prone situations by stopping, thinking, consulting, then acting and then reviewing. Knowing the concepts and the vocabulary, we can better recognize, describe and understand some of what happened when, we feel that we were led down a path, were trapped, frustrated, or let down in an operational situation and can only conclude that we screwed up and not even know why. Operators are trained to be effective process control supervisors and decision makers but are at risk from PEMs. There are usually good internal cognitive reasons and external reasons that explain human error and human failure in specific situations. We can all be trained to be alert and look for these potential mechanisms of Human Failure to catch errors before the consequences occur.

The fundamental attribution error states that we do tend to think about others and the causes behind their actions. However, we do not always give a lot of thought to determining the cause and we do not equally disposition our judgments about internal and external causality. We are prone to assume other's behaviour is due to the way they are, their traits and dispositions. We tend to judge and conclude what others should have done or what we would probably do using the benefit of hindsight bias. However, using hindsight we tend to overestimate our competence as we reconstruct their prior judgments by re-judging the outcome. We may use cognitive strategies to make our judgments consistent with reality.

With knowledge of just a few of the Psychological Error Mechanisms, each of us should be able to identify instances of those Psychological Error Mechanisms at work. Using this knowledge in either in the work place in our own personal experience, we should be able to avoid the fundamental attribution error and get closer to and understand the root of Human Failure.