Studying Cognitive Systems in Context:
The Cognitive Systems Triad

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It is, …, the fundamental principle of cognition that the universal can be perceived only in the particular, while the particular can be thought of only in reference to the universal.
Cassirer (1923/1953), p. 86

The study of joint cognitive systems in context is a process of discovering how the behavior and strategies of practitioners are adapted to the various purposes and constraints of the field of activity.
This single sentence both describes the enterprise and points to the difficulties and challenges embedded in that enterprise (see e.g., Hutchins, 1995; Nyssen and De Keyser, 1998).

Studying cognitive systems in context is concerned with discovery, not simply compiling a long list of the tasks, data, knowledge, or linkages involved in handling a specified situation. As a discovery process the question becomes: how do we prepare ourselves to be ready to see/notice/recognize something fresh, something we did not know to look for? To paraphrase Orville Wright’s comment about discovering the secret of flight, “Doing a cognitive task analysis is like trying to learn the secret of a magic trick: once you know the trick and

Learning the secret of flight from a bird was great deal like learning the secret of magic from a magician. After you once know the trick and know what to look for, you see things that you did not notice when you did not know exactly what to look for. 

Fluency law: Well adapted cognitive work occurs with a facility that belies the difficulty of the demands resolved and the dilemmas balanced.

In the study of cognitive systems in context it is not enough to note specific behaviors or tease out the strategies of individual practitioners. Rather, we are out to learn how these more or less visible activities are part of a larger process of collaboration and coordination, how they are shaped by the artifacts and in turn shape how those artifacts function in the workplace, and how they are adapted to the multiple goals and constraints of the organizational context and the work domain. These factors of complex artifacts, dynamic worlds, cognitive work, coordinated activity, and organizational dynamics do not come to us pristine, isolated, one at a time. Rather they come in association with each other, embodied in the particular, cloaked by some observer's vantage point. In other words, cognitive systems in context come in a “wrapped package” as a complex conglomerate of interdependent variables (Woods, 1993). How do we know where to break or “partially decompose” such a conglomerate into meaningful parts and their interactions?

‘Spartan’ lab experiments would simplify such conglomerates into more manageable units for experimental manipulation, but such efforts fall prey to reductionistic or oversimplification biases which eliminate the very phenomena of interest in the process of simplification (Feltovich et al., 1997). Simplifying dynamic processes into a series of static snapshots or treating a highly interconnected set of factors as separable represent a retreat from complexity that values the means of experimental tractability over the end of adding to our understanding of the phenomena of interest.

Furthermore, deciding what to leave out, whether in an experimenter created micro-world or in a scaled world simulation is in itself a potent model of what matters in situ. As a result more and more, we see people following Frederick Bartlett’s (1932) dictum to precede more experimentally oriented studies with observations of ongoing activities in situ and other natural history techniques. The question then is how to carry out and coordinate such techniques in order

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2 The original is from Orville Wright from How We Invented the Airplane, Orville Wright, Dover Publications, 1988:

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to begin unpacking complex wholes to find the structure and function of the parts within.

In the stew of multiple purposes, multiple labels, and multiple traditions for cognitive task analysis and cognitive field research, there lies a common enterprise. Discovering how the behavior and strategies of practitioners are adapted to the various purposes and constraints of the field of activity is a part of the larger effort to understand people in organizations at work, and it is part of the larger effort to use the potential of new technology skillfully to aid all aspects of human performance.

Readings


