Journal of Safety Research 42 (2011) 309

Contents lists available at SciVerse ScienceDirect

Journal of Safety Research

journal homepage: www.elsevier.com/locate/jsr

Commentary from Oliver Wirth on "Complexity and Safety" by Rosa Antonia Carrillo

Oliver Wirth

Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Morgantown, 1095 Willowdale Road (MS 2027), Morgantown, WV 26505, USA

Contingencies Still Matter in Safety Despite Complexity

The article titled "Complexity and Safety" (this issue) addresses an extremely important safety topic. Too often, well-intentioned safety experts miss or even disregard what is so obvious to many others—sometimes workers make risky decisions or engage in risky behavior. Thus a greater understanding of safety-related decisions and behavior should be viewed as a fundamental and inescapable priority for safety researchers and professionals. Nevertheless, I am not convinced that complexity theory is the answer. Perhaps a more scholarly analysis of the theory and its conceptual underpinnings will help to bolster its relevance. Perhaps a more thorough evaluation of relevant empirical research will help distinguish the theory's evidence base from the superficial musings of an armchair psychologist. If complexity theory helps to identify even a few useful tools to include in our safety toolbox, then perhaps the theory will have some value. But I am not hopeful.

Given that classical science principles have served humankind well, it is unfortunate that complexity theorists feel the need to replace these principles with a *radical*, *non-linear*, *holistic*, *self-organizing*, and *flexible* approach. Even if we discount the shaky foundations and logical pitfalls upon which this approach is applied to management practice (cf. Rosenhead, 1998), then we should still be wary of the underlying assumption that human behavior is much too complex to be explained by a relatively simple set of behavioral principles. Although our current understanding of human behavior is far from complete, we are nowhere near the point of abandoning well-established basic principles simply because some behavior-change efforts fail. Why not first attempt to build upon those principles, question the application technique, or ask whether all relevant variables are taken into account? We should abandon basic principles of behavior no sooner than we should abandon the principles of physics when a bridge collapses.

I am particularly puzzled by any theory or account of safety behavior that does not include or even acknowledge the role of reinforcement contingencies—the if-then functional relations between behavior and its various consequences—play in shaping and maintaining safe or risky behavior. Instead, the *ladder of inference* is cited to show a casual chain of antecedents (mostly private events) leading to action (behavior). The ladder's appeal reflects the much-too-common approach of attempting to achieve behavior change by targeting everything except behavior and its consequences. The general strategy is this: If you change beliefs, values, and assumptions about safety, then, voilà, you will change behavior! It is not surprising then that suggestions for *sensemaking* include group-based activities for reframing change initiatives, cultivating discussions, shifting vocabulary, interpreting the leader's intent, and cultivating a shared mindset, to list a few. Indeed, these activities may have a positive influence on what workers discuss, verbalize, or, essentially, say. But even after workers learn to verbalize safety-minded intentions, there is no guarantee that corresponding safe behavior will follow. Empirical evidence suggests that say-do correspondences are not automatic and must be explicitly reinforced (see Catania, 1995, and Lloyd, 2002 for relevant discussions). Unless safety professionals address the reinforcement contingencies that govern what workers learn to do, it will not matter what workers learn to say. Practical drift or no behavior change is the likely outcome.

Most workers, managers, and safety professionals seek common-sense, practical solutions to safety problems. The behavioral sciences can contribute empirically-based principles and a technology to intervene successfully. The careful, effective, and ethical application of behavioral technology requires collaboration and cooperation among workers, managers, safety professionals, and behavioral experts. In this regard, many of the prescriptions associated with complexity theory might prove to be helpful in promoting support, trust, and a shared investment in the entire safety process. But these things should not be promoted in lieu of also establishing explicit reinforcement contingencies that support safe behavior at all levels of an organization.

Disclaimer

The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

References

Catania, A. C. (1995). Higher-order behavior classes: Contingencies, beliefs, and verbal behavior. *Journal Behavior Therapy and Experimental Psychiatry*, *26*, 191–200.
Lloyd, K. E. (2002). A review of correspondence training: Suggestions for a revival. *Behavior Analyst*, *25*, 57–73.
Rosenhead, J. (1998). Complexity theory and management practice. *The Human Nature Daily Review*. Retrieved May 18, 2011 from http://www.human-nature.com/science-as-culture/rosenhead.html.

E-mail address: owirth@cdc.gov.

doi:10.1016/j.jsr.2011.07.003