

Key Findings from the Improvisation in Emergency Response Project: Linking Cognition, Behavior, and Social Interaction

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Abstract

Four vignettes of findings from the *Improvisation in Emergency Response Project* [1] are presented. This project is an NSF funded research initiative charged with understanding the relationship between improvisational and conventional behavior in uncertain situations, especially during disaster response scenarios.

Our case studies span two major U.S. domestic disasters—the 1995 bombing of the Alfred P. Murrah Federal Building in downtown Oklahoma City and the 2001 terrorist attacks on the World Trade Center in New York City—, two types of response agencies—police and fire—, and two types of data sources—informant reports and radio transcripts. This is an extensive comparative study of responses to anthropogenic disasters.

The analyses summarized here come from a variety of research methods including simple cross-tabs to complex simulations and relational event modeling [2]. The datasets used in this research are packaged as R data objects, complete with documentation, for future public distribution.

References

- [1] D. Mendonça, C. T. Butts, & G. Webb, *Contingency Today*, (2006).
- [2] C. T. Butts, *Sociological Methodology*, (2008).
- [3] C. T. Butts, M. Petruscu-Prahova, & B. R. Cross, *Journal of Mathematical Sociology*, (2007).

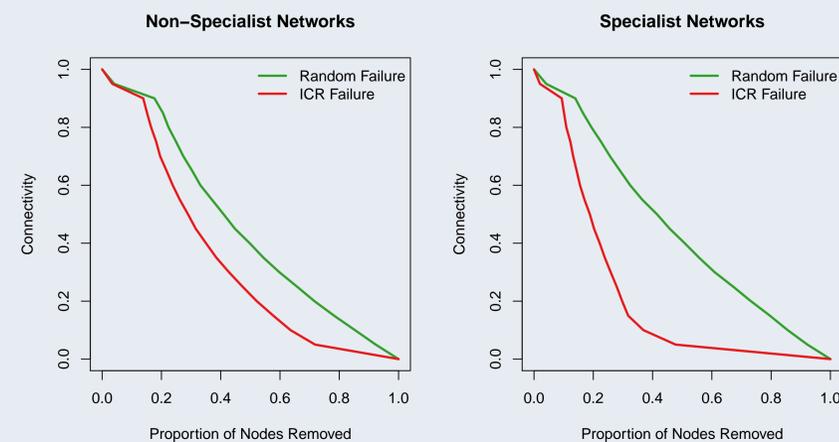
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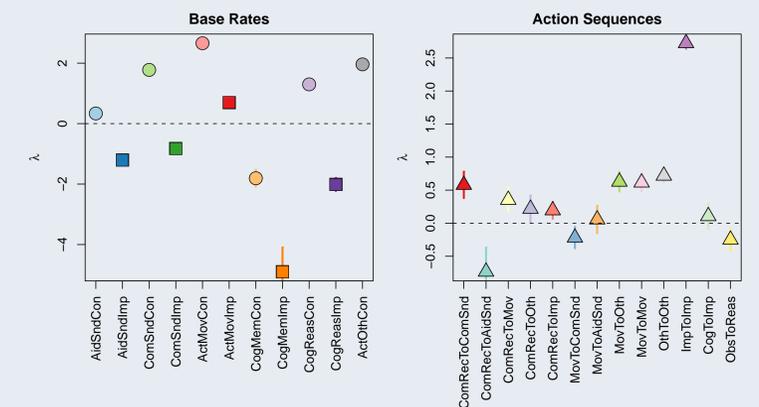
Summary of Key Findings

Coordinator Roles in 9/11 WTC Radio Networks



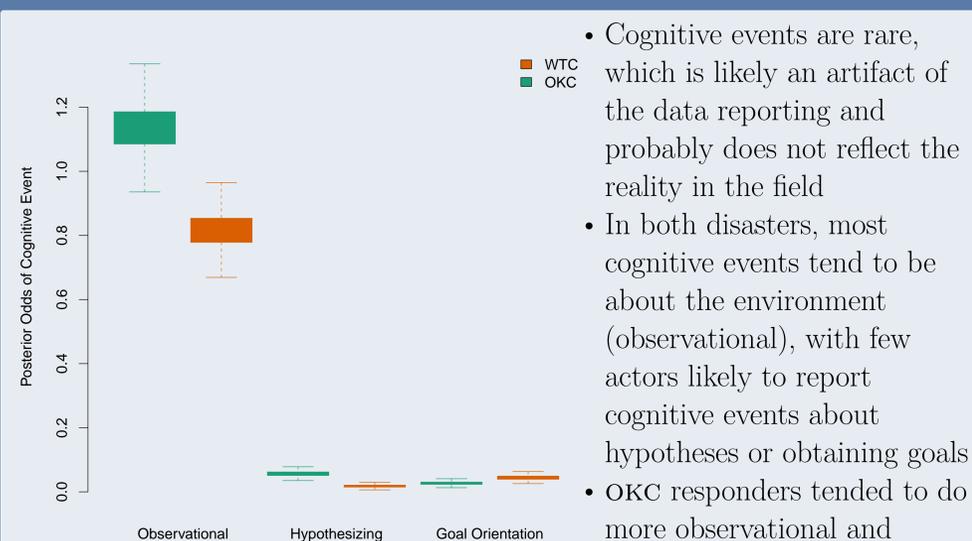
- Specialist responders are vulnerable to loss of those with institutionalized coordinative roles (ICRs)
- Simulating loss of ICRs, remaining actors are isolated, less connected
- Non-specialist responder networks are more resilient to the loss of ICRs

Improvised and Conventional Behavioral Patterns



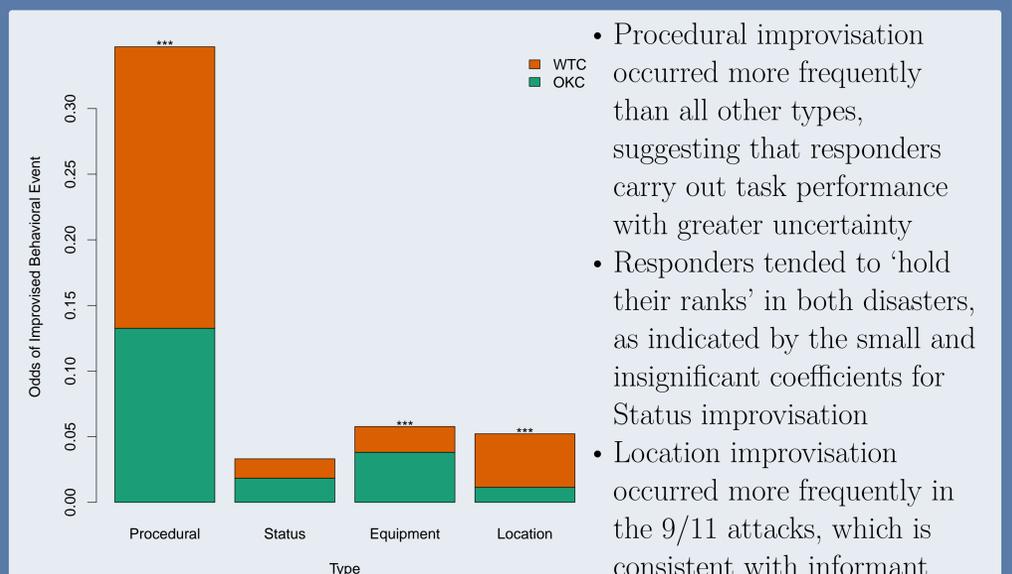
- Improvisation is relatively rare in disaster response behavior, not preceded by cognition, but tends to be inertial
- Receiving communication increases probability of: sending communication, task performance, and improvisation
- Moving increases chances of giving aid and task performance, but lowers chance of communication

Responder Cognitive Events by Disaster



- Cognitive events are rare, which is likely an artifact of the data reporting and probably does not reflect the reality in the field
- In both disasters, most cognitive events tend to be about the environment (observational), with few actors likely to report cognitive events about hypotheses or obtaining goals
- OKC responders tended to do more observational and hypothesis cognition, while WTC responders tended to focus more on goals.

Differences in Type of Improvisation by Disaster



- Procedural improvisation occurred more frequently than all other types, suggesting that responders carry out task performance with greater uncertainty
- Responders tended to 'hold their ranks' in both disasters, as indicated by the small and insignificant coefficients for Status improvisation
- Location improvisation occurred more frequently in the 9/11 attacks, which is consistent with informant accounts from other sources [3]

**** indicates significant difference ($Pr(|z|) \geq 0.95$)

Posterior simulations drawn with observed means set as priors.