

Changing Horses in Midstream: Sudden Changes in Plan in Dynamic Decision-making Problems

Silvia Gilardi

Università di Milano
silvia.gilardi@unimi.it

Shawna J Perry

Virginia Commonwealth University
sperry4@mcvh-vcu.edu

Chiara Guglielmetti

Università di Milano
chiara.guglielmetti@unimi.it

Gabriella Pravettoni

Università di Milano
gabriella.pravettoni@unimi.it

Robert L Wears

University of Florida; Imperial College London
wears@ufl.edu; r.wears@imperial.ac.uk

ABSTRACT

Motivation – Why and how do expert unexpectedly change from their original plan in dynamic, uncertain settings? **Research approach** – Critical event interviews of practitioners self-reporting cases of sudden plan changes. **Findings** – Sudden plan changes developed in much the same manner as an expert's initial plan in recognition-primed decision-making. **Limitations** – Cases were limited to the healthcare domain; self-reporting distorts some aspects of the events; only cases where the change in plan worked were volunteered. **Originality/Value** – Many studies have examined persistence in an erroneous plan; fewer have examined sudden switches from bad to good plans. **Take away message** – Sudden plan changes arise in ways similar to experts' initial plan formulations: appearing as if unbidden, often not preceded by growing awareness of the need for reassessment, and once present seem obviously correct.

Keywords

Health care, dynamic decision problems, changes in plan, cognition and decision-making.

INTRODUCTION

Healthcare work typically involves dynamic decision-making problems (Brehmer, 1987), in which problems must be recognized and characterized, often as actions are being taken; these actions then affect the state of the world, thereby changing the existing problem, creating new problems, or re-ordering priorities. Although in their formal discussions of decision-making, health professionals seldom articulate this evolving, sense-making, dynamic aspect of clinical work, characterizing problems as fixed entities that can be resolved by applying the proper set of preplanned procedures, their actual practices do reflect it (although sometimes in an apologetic, *sub rosa* manner). One manifestation of this adaptiveness can be seen when clinicians rapidly change plans for the evaluation and management of patients. We report 4 cases in clinical decision-making involving a significant and sudden change of plans. The cases were elicited from practitioners in acute care settings using the critical incident method (Crandall, Klein, & Hoffman, 2006). The cases are presented without giving their final resolutions, to minimize the effects of outcome knowledge.

CASE SYNOPSES

Case 1

An extremely agitated and violent young man was brought into the emergency department (ED), shackled face down on a stretcher after having attacked a police officer following a minor traffic accident due to erratic driving. The police has used a Taser multiple times to try to control him. No other history was available. The ED staff began to follow their rapid sedation protocol, but after only a short time, decided to abandon the established protocol and instead use another drug, propofol, typically used for anesthesia; propofol use is strictly controlled because it can rapidly stop breathing and severely low blood pressure; its use in this setting violated organizational protocols set up when .

Case 2

An elderly man with chronic heart disease was admitted to the hospital for suspected pneumonia that failed to respond to outpatient antibiotics. Despite intensification of his antibiotic and cardiac therapies, he became progressively worse, and was transferred to the intensive care unit (ICU) and placed on a ventilator, but continued to deteriorate. Microbiological studies over the course of hospitalization did not identify an agent, and biopsies were compatible with, but not diagnostic of, pulmonary toxicity due to amiodarone, one of his cardiac medications. Amiodarone was stopped and a drug to treat the toxicity, prednisone was started; but prednisone is generally contraindicated in serious infections because it suppresses the immune system.

Case 3

A child was brought to the pediatric ED after having fallen onto a concrete bench. Because of the severity of pain, the physician was concerned about serious injury, but the initial ultrasound scan was negative. The ED nurse felt the child was only frightened and tried to get him discharged. Initial blood tests showed abnormalities, so the plan was to admit him for observation. The nurse began to feel uneasy, and asked for the physicians to reassess the child. They agreed to call a surgical consult, but took no other action. The child seemed to worsen so the nurse moved with him to the surgical ED, and then to CT scan, despite the fact that she was supposed to return directly to triage.

Case 4

A middle-aged man was seen in the trauma center after a motor vehicle crash, complaining of chest and abdominal pain. His trauma evaluation was negative for serious injury requiring surgery, and the trauma team's plan was to admit him to the hospital for observation. One physician noted the patient "didn't look like" a trauma case and ordered an electrocardiogram; it showed the patient was also having a heart attack.

COMPARISON AND CONTRAST

All 4 cases began as problems that were considered readily apparent, relatively straightforward, and for which well-understood and frequently practiced procedures existed. In Case 1, the clinicians' understanding of the problem did not change, but the plan dramatically changed to one that in fact involved a deliberate violation of existing procedures; thus it sheds light on the projective aspects of decision-making (since it entailed an expectation of failure if standard procedures were continued), and on the area of normal or necessary violations. The decision was not triggered by a violation of expectations, but rather a mental simulation of projected possible courses (all of which were bad). Case 2 did not involve a violation of formal policies, but is similar since the change in plan was contradictory to the original plan, because immunosuppressing drugs are relatively contraindicated in suspected infections.

In Case 3, the change in understanding of the problem was not initially shared across the entire workgroup; thus it exposes the negotiated nature of problem recognition and characterization. The nurses' understanding here completely reversed itself, and it led her to violate expected procedures. Case 4 was characterized by a similar sudden change in the understanding of the patient's problem.

The cases differ in the nature of the plans adopted. In Cases 2 and 4, the ultimate plan was also a well-understood and frequently practiced pathway, although in Case 2 the new pathway contradicted the original. In case 3 delaying tactics and novel procedures were used while the group struggled to reach agreement; and in Case 1, the new plan was a novel application of a procedure typically used in other clinical situations, but neither used nor permitted in the current one. All 4 cases involved situations of significant risk, where unsuccessful outcomes would have led the decision-making to be strongly criticized, regardless of which plan was followed. In all cases, the change in plans was initiated by a single clinician but was only rapidly assented to by others involved in cases 1 and 4. Finally, all 4 cases, the change in plan did not originate from conscious, explicit reasoning about alternatives, but "came into mind" suddenly, apparently unbidden, but with a convincing sense that the change was in fact the correct course of action.

LIMITATIONS

The cases discussed here unfortunately do not cover the entirety of sudden changes in plan, as all turned out well. This undoubtedly represents a selection bias on at least the part of our informants, who could choose which cases they were willing to relate. We hope to elicit contrasting cases where sudden changes in plan resulted in going off course.

CONCLUSION

Naturalistic decision making research has highlighted how often experts' initial (or first few decision options) turn out to be satisficing if not optimal. These cases extend that thinking to situations in which the initial course has already been set, but dramatic changes are made without correspondingly dramatic changes in positive or negative cues. In these cases, the new option sprang to a practitioner's mind unbidden, and immediately "seemed right." Except for Case 2, they were not preceded by a general sense that something was not right; instead they thought they were on the right path until the intrusion of another, better and immediately convincing alternative persuaded them they were not.

ACKNOWLEDGMENTS

We thank all the clinicians who provided cases, details and insights to us.

REFERENCES

- Brehmer, B. (1987). Development of mental models for decision in technological systems. In J. Rasmussen, K. Duncan & J. Leplat (Eds.), *New Technology and Human Error* (pp. 111 - 120). Chichester, UK: John Wiley & Sons.
- Crandall, B., Klein, G., & Hoffman, R. R. (2006). *Working Minds: A Practitioner's Guide to Cognitive Task Analysis*. Cambridge, MA: The MIT Press.