Int. J. Human-Computer Studies 86 (2016) 94–108

Contents lists available at ScienceDirect

Int. J. Human-Computer Studies

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

Collaborative sense-making during simulated Intelligence Analysis Exercises ☆

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ARTICLE INFO

Article history:
Received 23 September 2014
Received in revised form
21 September 2015
Accepted 2 October 2015
Communicated by Francoise Detienne
Available online 22 October 2015

Keywords:
Sense-making
Intelligence Analysis
Representations

ABSTRACT

Sense-making plays an important role in Intelligence Analysis, but can be difficult to study in situ. Thus, it is useful to exploit training exercises to study this phenomenon. In this paper two versions of the same exercise are reported: one undertaken by participants at a conference and one undertaken by Military Intelligence personnel. The behaviour of groups of analysts (experienced versus inexperienced) is considered in terms the Data/Frame model of sense-making. The paper illustrates how Intelligence Analysis often involves parallel and overlapping explorations of data, with multiple frames that might be minimal and sketchy. The use of representations, such as link diagrams, provides a means of externalising frames and it is suggested that these can shift the style of reasoning exhibited by the teams as the Exercise progresses. Such a shift was seen more clearly in the behaviour of the Military Intelligence Officers who also spent more time developing and refining the diagrams to support the presentation of their findings.

1. Introduction

A perennial challenge for Intelligence Analysis, whether it is performed in business or military settings, lies in the need to draw useful conclusions from disparate data. Data can vary in their accuracy, their timeliness, or the reliability and validity of their sources, and often the source material is incomplete, inconclusive or ambiguous (Tecucci et al., 2010). While it is unlikely that there is a single, definitive way of 'doing' Intelligence Analysis (with each Intelligence Analyst adopting an approach from a broad range that is deemed appropriate to the task at hand), there are generic descriptions of how Intelligence Analysis could be performed. While there are different versions of the Intelligence (or Analysis) Cycle, NATO (2008) describes it in terms of four phases:

- Direction (i.e. definition of objectives for gathering intelligence through Intelligence Requirements and Requests for Information);
- Collection (i.e., gathering and receipt of information by agents in response to the Intelligence Requirements or through more spontaneous and serendipitous routes);
- Processing (i.e., compiling and interpreting information to produce intelligence);
- Dissemination (i.e., distribution of appropriate parts of the intelligence to relevant parties).

Although this sequence of phases implies a linear flow from Collection to Dissemination, the use of the term 'cycle' emphasises the recursive nature of the analysis process in which information is sought, combined and reflected upon in order to create 'sense' as the basis for subsequent action. Heuer (1999) distinguishes between 'data driven analysis' (i.e., applying well understand analytic procedures to well defined data sets) and 'conceptually driven analysis' (i.e., dealing with complex, ambiguous and uncertain data). Conceptually-driven analysis implies a cycle of activity that involves *"the reciprocal interaction of information seeking, meaning ascription and action"* [Thomas et al., 1993, p. 240].

Elm et al. (2005) define this activity in terms of 'down-collect' (sample from the available data for material deemed to be 'on analysis'), 'conflict and corroboration' (ensure accurate and robust interpretation of findings, and modify the 'down-collect' accordingly), and 'hypothesis exploration' (construct coherent narrative to explain the findings, and reflect this narrative back to the 'conflict and corroboration' activity). Similarly, Kang and Stasko (2011), in a study of a 'strategic intelligence' project over 10 weeks, identified four main activities: construct conceptual model of issues, Collect information, Analysis, and Report key findings

☆This paper has been recommended for acceptance by Francoise Detienne.
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http://dx.doi.org/10.1016/j.ijhcs.2015.10.001
1071-5819/

(noting that these activities overlapped and intertwined as the project developed).

Given the nature of intelligence Analysis, it is difficult to study this activity in vivo. Thus, research into this activity either involves interviews and discussions with Subject Matter Experts (Cook and Smallman, 2008; Pirolli and Card, 2005), or studies in which teams perform exercises (Kang and Stasko, 2011; Kang et al., 2009; Stasko et al., 2008). In this paper, we have opted for the latter approach, although this has been tempered by discussions with Subject Matter Experts where possible. Before explaining the Exercise that was used for this study, the next section presents the concept of sense-making explored in this paper.

1.1. Sense-making

As Wu et al. (2013) point out, sense-making is essential to all forms of knowledge work and *"occurs when people face new problem or unfamiliar situations and their knowledge is insufficient for the task. Sense-making finds critical patterns in a seemingly unstructured situation…"* [p.6]. Sense-making happens when you experience a 'gap', or contradiction, in your understanding of the context in which you are currently acting; it is a means by which uncertainty or discomfort can be dealt with through the recruitment of prior experiences or new information (Dervin, 2003). For Fishbein and Treverton (2004), sense-making *"…involves the application of expertise, imagination and conversation – and the benefit of intuition – within intelligence analytic organisations to identify changes in existing patterns of the emergence of new patterns, without systematic, consideration of alternative hypotheses"* (p.16). The suggestion that sense-making need not involve 'systematic, consideration of alternative hypotheses' in this quotation might strike one as a little odd (because making sense inevitably involves dealing with competing ideas and explanations) but, we think, signals a distinction between an approach which is primarily heuristic, i.e., driven by expertise and intuition (sense-making) from other approaches which are more algorithmic, i.e., driven by procedures and data-analytic tools. There is a range of frameworks and theories of how sense-making underpins performance (for example, Dervin, 2003; Pirolli and Card, 2005; Weick, 1995). In this paper, we adopt the Data-Frame model (Klein et al., 2006a, 2006b).

Central to sense-making in the Data/Frame model (illustrated by Fig. 1) is the relationship between the data to which the analyst has access and the different 'frames' that can be used to interpret, make sense of, or explain, these data. Klein et al. (2006a) point out that, *"When people try to make sense of events, they begin with some perspective, viewpoint, or framework – however minimal. For now, let's use a metaphor and call this a frame."* (p. 88, emphasis added).

The suggestion of a 'frame' as a metaphor, rather than a literal description of a knowledge structure, is particularly important to this paper. For example, cognitive psychology has used the concept of 'schema' to describe knowledge structures that are based on past experiences (Bartlett, 1932; Taylor and Crocker, 1981; Plant and Stanton, 2012). A schema can help reduce the mental workload associated with making sense of situations by "…*providing a ready-made knowledge system for interpreting and storing information…"* (Lord and Foti, 1986, p.38). A key stage in sense-making is therefore deriving a sufficient understanding of the situation in order to be able to match it to an appropriate schema. In the Data/Frame model the relationship between data and frame is both reciprocal and parallel. In other words, a frame could be applied to a set of the data, or a set of the data could suggest a frame. This reciprocity points to the continuous interweaving of activities of exploring data and generating interpretations. What is particularly useful about the notion of a frame is that it need not imply a 'solution' or final 'product' but can serve as a temporary explanatory model of aspects of the data.

The suggestion that people will seek to apply frames to fit data might also sound like the concept of heuristics in decision making (e.g., Tversky and Kahneman (1974) which assumes that 'framing' of information can influence, or bias, decision making. In this instance, 'framing' is the manner in which the data is presented (as

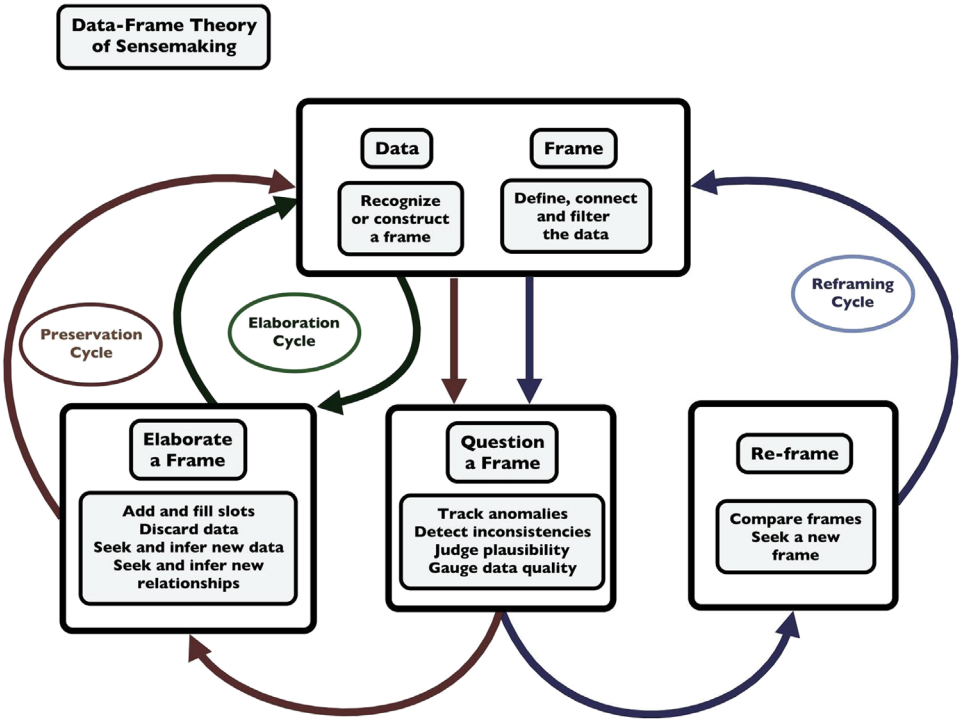

Fig. 1. Data Frame model of sensemaking [Robert Hoffman, private communication].