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Behavioural Insights and Naturalistic Decision Making

in Trading Surveillance

ABSTRACT

This paper reports a collaborative, practitioner-academic project which aimed to elicit and document the cognitive expertise of compliance professional working within international banking. 11 in-depth interviews were completed (n=7 expert, n=4 journeymen), using a number of elicitation techniques including the Critical Decision Method(CDM), and Card sort exercises in the UK and US. Results of the CDM and a Hierarchical Task Analysis of a key compliance task had high ecological validity for practitioners. Elicited cognitions included a combination of adaptive technical skills and detailed mental models, highlighting undocumented context specific expertise. On-going work aims to design and build Cognitive Assistants to enhance the decision making and sense-making performance of this group of compliance professionals, working with vast data sets in time pressured domains with complex organisational goals and norms.

Keywords:
Surveillance analysis, cognitive task analysis, framing, sense-making, elegant design

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INTRODUCTION

With the exception of work completed by McAndrew and Gore (2010, 2012) and Leaver, Griffiths & Reader (2018), the domain of financial trading and surveillance has been relatively unexplored through the lens of Naturalistic Decision Making (NDM). Insights into the psychological and emotional resilience of international banking and trading have been examined by a range of management scholars including economists, organisational theorists, organizational psychologists and neuroscientists (see Fenton-O'Creevy, Lins, Vohra, Richards, Davies, & Schaaff, 2012; Tuckett, 2011; Fenton-O'Creevy, Soan, Nicholson & Willman, 2011). Findings from this body of work recognise the importance of human decision making, emotional and cognitive constraints and the importance of the context of uncertainty. This study, one in a larger Behavioural Science programme at Nasdaq, aims to examine some of the behaviours in this domain, providing insights from the theoretical and methodological contributions of NDM and human factors research to understand the complex role of compliance and surveillance officers. The project aims to assist the redesign of the computer-human relationship, to enhance compliance officer's performance in surveying and processing large amounts of data associated with trading surveillance.

Theoretical Considerations: Naturalistic decision making (NDM)

Naturalistic Decision Making (NDM) research has developed over the past thirty years become a mainstream applied research paradigm in cognitive psychology. Originally motivated to take decision making research out of the laboratory and into the real world, the

methods and approaches from recognition-primed decision making to meta and macrocognition have become foundations of the researchers' and practitioners' tool box. (Schraagen, Klein & Hoffman, 2008; Klein, 2010; Hoffman, Ward, Feltovich, et al, 2014; Chaudet, Pelligrin & Bonnardel, 2015; Ward, Hoffman, Conway et al, 2016; Gore, Ward, & Conway, 2017; Gore, Ward, Conway, Ormerod, Wong, Stanton, 2018).

NDM research emerged in the 1980s to study how people make decisions in complex real-world settings that are characterised by dynamic, uncertain, and rapidly changing conditions, and that require real-time decisions with significant consequences for mistakes. NDM methods emphasise descriptive studies conducted in field and operational workplace settings, complementing the controlled experimental studies that occur in the lab. It thus examines decision-making processes with the belief that, by examining what experienced people do cognitively well, research in this community can tap into this tacit knowledge – what experts implicitly 'know'.

Some of the central challenges addressed by NDM research include ill-structured problems; uncertain dynamic environments; shifting, ill-defined or competing goals; action/feedback loops; time stress; high stakes; multiple players; and organisational goals and norms (Orasanu and Connolly 1993).

NDM models, tools and techniques have been applied in domains as diverse as defence, aviation and aerospace, financial trading, energy production and distribution, transportation, nuclear, manufacturing, maritime, health, rail, oil and gas (Gore, Flin, Wong, & Stanton, 2015; Gore & Ward, 2017; Gore & Ward, 2018).

Organizational Context

Compliance officers in financial trading work with vast amounts of data and aim to resolve and navigate uncertainty. They leverage human intelligence and integrate E-

Communications into their surveillance activities on a daily basis. Whilst technological systems currently aid this complex decision making process, organisational norms suggest that professionals involved in this activity also complete insightful investigation narratives. The purpose of gathering these expert insights is to propose a solution design which is capable of supporting Constant Surveillance and adaptive narrative construction to be truly effective in assisting Compliance Officers to resolve uncertainty.
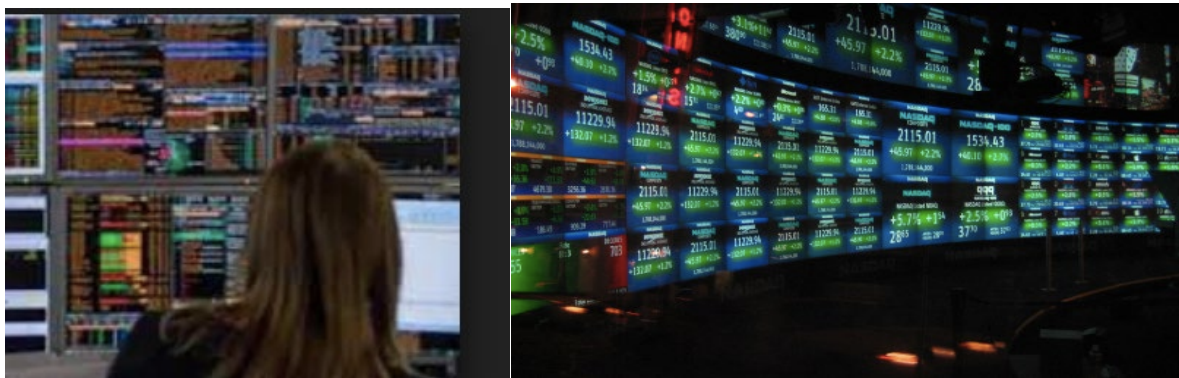

Fig 1: Illustration of a compliance officer at work

METHOD

We collected data in the UK & USA. Eleven Critical Decision Method (CDM) interviews were completed with 7 experts and 4 journeymen totalling over 25 hours of data collection. The four authors of this paper took part in the interview process as interviewers and note takers and ensured that knowledge associated with domain specific acronyms was fully understood. Additionally, a Card sort exercise was completed with 2 of the experts to focus upon the relationships between the task and the sources of information available. A Hierarchical Task Analysis (HTA) was then completed for a Compliance Task to 'close alerts'. HTA is as a way of representing a system sub-goal hierarchy for extended analysis. It

has been used for a range of applications, including interface design and evaluation, allocation

of function, job aid design, error prediction, and workload assessment.

Critical Decision Method 'E-comms' investigation incidents – begining to end description.	
Goal Specification	What were your specific goals at the various decision points?
Cue identification	What features were you looking for when you formulated your decision? How did you know what you needed in order to make the decision? How did you know when to make the decision?
Expectancy	Were you expecting to make this sort of decision during the course of the event? Describe how this affected your decision making process.
Conceptual	Are there any situations in which your decision would have turned out differently? Describe the nature of these situations and the characteristics that would have changed the outcome of your decision.
Influence of uncertainty	At any stage were you uncertain about the reliability or relevance of the information that you had available? At any stage were you uncertain about the appropriateness of the decision ?
Information integration	What was the most important information that you used to formulate the decision?
Situation awareness	What information did you have available at the time of your decision?
Situation assessment	Did you use all of the information available to you when formalising the decision?
Options	Were there any other alternatives available to you other than the decision you made?
Decision blocking - stress	Was there any stage during the decision making process in which you found it difficult to process and integrate the information available? Describe precisely the nature of the situation.
Basis of choice	Do you think that you could develop a rule, based on your experience, which could assist another person to make the same decision successfully? Why/Why not?
Analogy/generalisation	Were you at any time reminded of previous experiences in which a similar decision was made? Were you at any time reminded of previous experiences in which a different decision was made?

Table 1: Critical Decision Method Questions & Probes (Stanton, 2005)

RESULTS

Our analysis of the data to date[1], suggests that compliance officers have detailed mental maps and a number of experience-based heuristics which help them analyse vast quantities of data. The cognitive demand table extract below in Table 2 is illustrative of the types of insights experts have in this domain, including base-lining trading activities, individuals, trading & e-communication (eComms) data, and scanning the wider context for intelligence gathering.

An extract from the HTA illustrated in Figure 2 shows a discrete section of the complex task to "Close Alerts'. The figure illustrates the complexity and scope of the task for the analysts who complete this task hundreds of times in their working day. As a result of this and further analysis of the Card Sort exercise we are in the process of developing eight Cognitive assistants (based on expert knowledge) which can be added to the compliance officer's desk top – thus developing a cognitively informed computer design interface for examining surveillance data.

Theme	*Goal*	*Cues & Considerations*	*Knowledge & Experience*	*Existing Strategies*
Baselining	Understand the actor	Personailty, tone, relationship, usual lexicon	….	Review …
		Risk Problem areas	…..	Targeted review
Investigation	Understand the behaviour	Look to identify anomalies	Ability to read 3000 rows of data Diligence	Scan, manipulate, Macro Micro analysis
	Understand the context	Look at market reactions	Trading knowledge makes sense of data	Severity, Hotwords, time specific

Table 2 Illustrative extract of Cognitive Demand from CDM

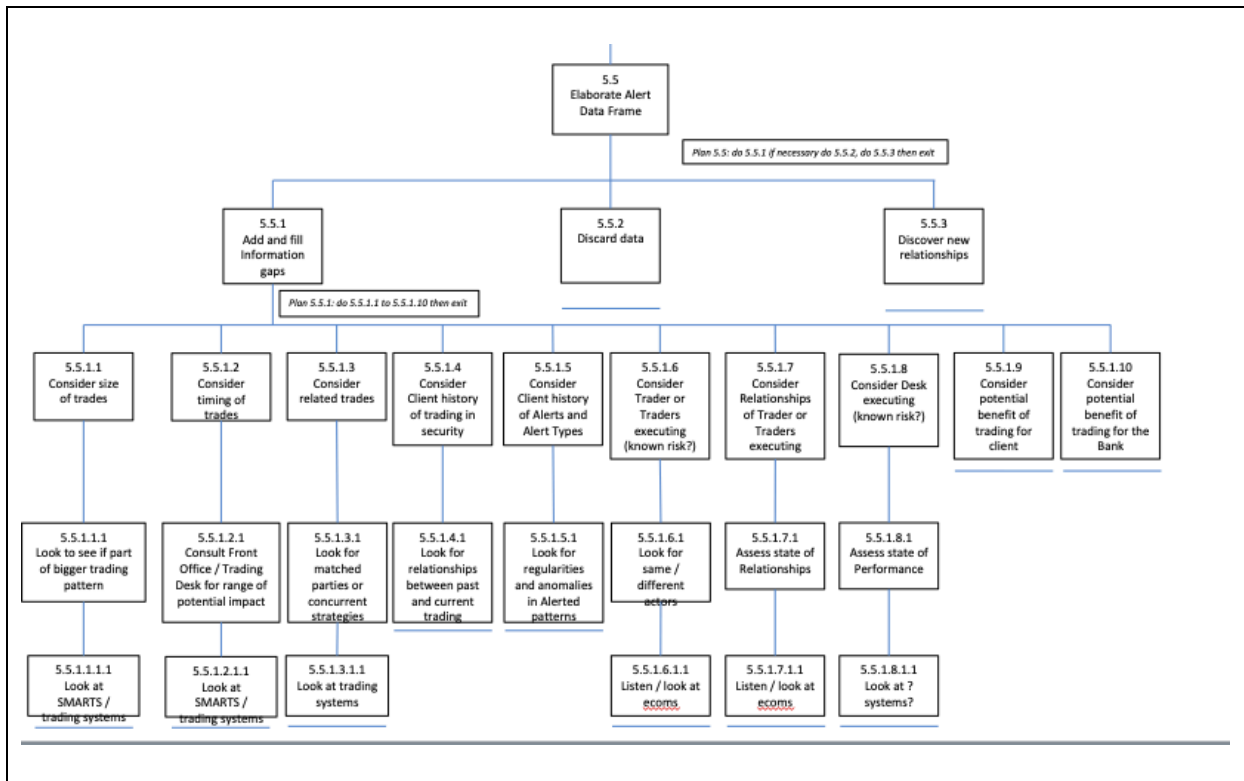[1] Further results will be presented for discussion as the paper develops

Figure 2 Illustrative Extract from HTA Compliance Task

CONCLUSION

We propose that the insights from NDM, CDM and related methods for expert knowledge elicitation have much to offer the financial domain. This early study demonstrates how research into the naturalistic decision making of compliance professionals is a very useful exploration of decision making with ecological validity which in turn can be translated to more elegant design solutions for improved efficacy and performance.

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