The Paradox of Intuitive Analysis and the Implications for Professionalism

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Abstract
Increasing public and governmental scrutiny has drawn attention to the analyst’s role and the cognitive and environmental obstacles they face. This has contributed to the ongoing debate of intelligence as art versus science and the implications of an analytical tradecraft for professionalism. This paper draws on a substantial body of theoretical and empirical decision making research to contribute to this debate. It argues that while progress has been made over the past 20 years or more, analysts are still not fully conscious of their role as decision makers. The paper will review the progress that has been made in this area, drawing on traditional and naturalistic decision theory and research to understand the current context of analytical decision making and the most viable future directions.

Introduction
Increased internal reflection and external scrutiny of the intelligence community has led to the identification of obstacles, both cognitive and contextual. Anecdotal and empirical investigations have led to many publications that aim to either depict how analysis is done or identify how it ought to be done. A review of this literature highlights a clear disjunction: while analysis is meant to be the ‘scientification of policing”, it is often a much more subjective process. The debate of whether criminal intelligence analysis should be a science or an art is well-known. On one side, best practice and intelligence guides argue the importance of scientific rigour, rationality, logic, and defensible process. On the other side, accounts of analysis-in-practice depict a more intuitive, unstructured process. Despite remaining a point of contention, a comprehensive investigation into the role of analysis and intuition in intelligence has not been conducted.

This paper recognises the analyst as a decision maker and identifies the parallels between the art versus science debate in intelligence, and the competition between naturalistic and traditional decision making methods. By explaining and applying these frameworks to the intelligence process, this paper identifies a seeming paradox of intuitive analysis. This paradox has implications for professionalism, at both the analyst and organisation level.
The analyst as decision maker
Before proceeding, it is important to identify how the analyst, and intelligence analysis process, is conceptualised within this paper. Traditionally, analysts have been seen as supporting end-user decision making, rather than as decision makers themselves. In this discussion, the analyst is conceptualised as a decision maker who is responsible for navigating the series of decision points necessary to complete an intelligence product.

Decision making research clearly demonstrates that individuals make decisions constantly and that those decisions can be influenced by many factors. Furthermore, the decisions made and strategies employed can significantly influence the end-product. This is particularly significant in criminal intelligence because analysts’ decisions around information, techniques and recommendations, shape the products used in operational and executive decision making. This in turn can significantly impact on police, offenders and law-abiding members of the public.

Throughout the intelligence cycle a multitude of decision points can be hypothesised. For example, in planning and direction the analyst may need to decide whether indicators are strong enough to initiate an intelligence assessment. During collection and collation, the analyst will need to evaluate information sources, to decide what is the ‘wheat’ and what is the ‘chaff’. Figure 1 visually depicts more examples of hypothetical decision points. The figure below exposes the decision making role of analysts and raises the question of how analysts make these decisions.

**Figure 1.** A visualisation depicting the intelligence cycle with hypothetical decision points.
The parallels between debates
Over the years, practitioners and their critics have debated whether intelligence analysis is an art or a science. As an art, the intelligence process requires a complex interplay of skill, knowledge and experience. Analysts develop this tradecraft over time and use it to solve problems, identify courses of action and develop recommendations. As a science, intelligence analysis is a systematic process, which generates and tests hypotheses objectively. Following the scientific method, analysts adhere to rules to develop sound and logical judgments.

Such conflicting depictions have implications for the reputation of analysts as professionals. An increase in public intelligence ‘failures’ may place pressure on the intelligence community to devalue the art and promote the science. If the intelligence process is, in fact, inhospitable to the scientific method, analysts will struggle to perform effectively. Despite its implications, this debate remains contentious and unresolved, receiving little attention from researchers.

If we view the analyst as a decision maker, a strong history of decision making research provides a theoretical framework for better understanding the concepts under debate. Indeed, a similar debate with clear applications to the intelligence profession exists: that is, whether decision making should follow naturalistic or traditional methods. Similar to the conceptualisation of intelligence as an art, naturalistic methods emphasise the role of experience⁴. Knowledge and expertise allows decision makers to rapidly assess situations and react appropriately. Analogous to intelligence as a science, traditional methods assume rationality, and prescribe rules for generating and evaluating all options in order to select the optimal course of action (COA)⁵. These descriptions mirror the competing methods in the intelligence community’s art versus science debate.

With the link between intelligence and decision making made clear, the frameworks of traditional and naturalistic decision making, as well as their application to intelligence, can be developed.

Traditional decision making (TDM)
TDM prescribes formal rules people should follow to choose between options. The framework rests on assumptions of rationality, maximisation and transitivity. Rationality implies that analysts will always follow a logical, rule-based process in decision making. Maximisation refers to the assumption that analysts will maximise their accuracy or seek the optimal option⁶. The principal of transitivity states that analysts will be consistent in their valuation of options. For example, if the analyst prefers option A to option B, and prefers option B to option C, then transitivity suggests
that they should prefer option A to option C. If they do not, then their preferences are intransitive\textsuperscript{7}.

Traditional models are developed deductively, through testing the effectiveness of strategies. Effective strategies are prescribed as optimal methods of decision making and taught to decision makers for application in their daily functioning. Studies suggest, however, that training analysts in TDM strategies will not always ensure that they will be utilised in future decision making, even when instructed to do so\textsuperscript{8}. It is important to note, however, that studies have also found that experts may TDM methodologies when they deem them appropriate and useful\textsuperscript{9}.

TDM models typically involve concurrent generation and evaluation of multiple options using formal rules in order to maximise the chances of optimal choice. There is a wide range of TDM models, some examples include: satisficing, conjunction/disjunction, elimination by aspects, maximisation of subjective expected utility, and single-feature difference. Such models differ in their goals and the option attributes. In criminal intelligence, the goal of a method may be screening out inappropriate data sources, selecting the optimal technique or selecting the first appropriate intervention. To do this, analysts may compare options by different attributes such as their value, certainty, or advantages. The formal rules of the method will dictate the process the analyst should follow.

Although research has yet to apply TDM theory to criminal intelligence analysis, examples of rule-based methods can be identified in literature on intelligence. For example, Multi-Attribute Utility Analysis, Decision Tree analysis, Sleipnir, Analysis of Competing Hypotheses, 5x5x5, Linkage analysis, and Bayesian analysis\textsuperscript{10}. These methods vary in the level of structure they entail, but share the common feature of a structured method.

The key strength of TDM is its ability to provide explainable, defensible processes\textsuperscript{11}. Formal rules provide structure, order and consistency. Followed correctly, such traditional methods would allow a level of transparency and accountability, which is not available with more subjective, intuitive strategies. This is highly important to a field such as criminal intelligence analysis, with a potentially large impact on stakeholders' quality of life. With increased scrutiny in intelligence processes, increased accountability, transparency and defensibility of process are often a high priority for intelligence agencies\textsuperscript{12}. Followed correctly, analytical strategies often result in the correct answer: a highly desirable outcome. However, when mistakes are during application, errors can be more inaccurate than intuitive strategies\textsuperscript{13}.
TDM research is largely conducted through experiments and, consequently, task and contextual variables are often controlled and unrealistic. This is perhaps the most prominent criticism of TDM: that prescribed methods are not ecologically valid, leaving applicability to real-world decisions somewhat limited\(^{14}\). In reality, analysts often have to perform in situations that impinge significantly on TDM’s time and resource requirements.

Research in other professions has demonstrated how individual, task and contextual variables may affect the implementation of TDM in criminal intelligence. Studies have found that individual differences in emotion, cognitive style, need for closure, and experience may influence the likelihood of an analyst employing TDM\(^{15}\). Differences in the intelligence task, such as structure and complexity, problem framing and information presentation, consequences and the quality and quantity of information available have been found to influence the ability of individuals to implement traditional methods\(^{16}\). Similarly, context variables such as time pressure, organisational norms and group influences have also been shown to impact on decision making\(^{17}\).

Identification of weaknesses in the traditional assumptions and methods paved the way for descriptive and naturalistic models of decision making. Rule-based strategies for decision making assume that the analyst is always rational and will act in a way that is logical and thorough\(^{18}\). Much research has demonstrated that this belief in the rational man as decision maker is not always valid\(^{19}\). In fact, in many naturalistic decisions, subjects often fail to follow a rule, select the optimal choice, or generate and consider all options\(^{20}\). Analysts, as decision makers, are constrained by cognitive and contextual features encouraging them to take shortcuts (heuristics) and thus failing to adhere to a rule-based strategy\(^{21}\). An extensive literature on heuristics and biases supports the suggestion that taking a mental shortcut is not an anomaly, and is actually the most common decision method. It is this recognition of a decision maker’s ‘bounded rationality’ that helped pave the way for a more descriptive and naturalistic exploration of decision making\(^{22}\).

Summary. TDM prescribes formal methods for concurrently generating and evaluating options. These methods are based on the assumption that analysts will be rational, seek out the best option and be consistent in their valuations. The transparency and consistency that traditional methods provide, would be of significant value to intelligence organisations. There are situations of certainty and clarity in criminal intelligence, where traditional methods could be effectively employed. Indeed, there is some evidence in the literature on the use of traditional methods in intelligence, such as MAUA and Bayesian Reasoning. However, studies also suggest that the likelihood of implementing and accurately performing TDM is reduced by a number
of variables: variables which are often present in criminal intelligence analysis. Furthermore, training in traditional methods does not always transfer into the work environment. Taken together, this summary suggests that there is certainly a role for TDM in criminal intelligence. However, it does not provide a comprehensive representation of analyst decision making.

**Naturalistic decision making (NDM)**

NDM describes the way people use their experience to make decisions. NDM research examines the whole decision process, which includes pre-decisional situation assessment, option selection, and continual assessment and evaluation. It aims to understand the more intuitive, experientially-based decisions that characterise real-time work environments.

NDM develops models of decision making inductively, by investigating the cognitive processes of experts to identifying effective strategies. These can be taught, encouraged and applied in contexts where TDM methods are less appropriate. NDM has been applied in contexts such as aviation, navy intelligence, fire-fighting and military command-and-control, yet it has not been applied explicitly in the criminal intelligence domain.

NDM models typically involve matching a situation with the appropriate response. Recognition-primed decision making (RPDM) is the model most commonly associated with NDM. Although this model has at least three variations, in simple terms, it involves developing an awareness of the situation, which allows the recognition of important cues and matching to previous situations. This association identifies an appropriate COA that can be implemented. Often, this initial COA is maintained, with the decision maker reassessing the situation to ensure situation-action fit. If the COA is no longer appropriate, it may be adapted or abandoned. Where more than one COA is considered, it is done sequentially rather than concurrently as in TDM. Along the same vein as RPDM, other NDM strategies often involve mentally simulating potential events and building stories to explain outcomes.

NDM strategies are forms of intuitive decision making that are rapid, highly automatic and under less cognitive control than TDM methods. The rapid nature of NDM is a result of the use of past experience. In this way, the COA can be implemented rapidly and evolve as the situation does. Research has yet to determine the naturalistic strategies employed in criminal intelligence analysis. However, descriptions of intelligence techniques provide some insight into more intuitive strategies that are used: such as red teaming, devil’s advocate, team A/team B, and scenario development. These strategies are not calculative in nature; instead they rely on mental simulation, past experience and forecasting.
NDM explicitly recognises the influence of the situation, and researchers have identified 10 key characteristics of naturalistic decision making:

1. Ill-defined goals and ill-structured tasks
2. Uncertainty, ambiguity and missing data
3. Shifting and competing goals
4. Dynamic and changing conditions
5. Action-feedback loops
6. Time constraints
7. High stakes
8. Multiple players
9. Organisational goals and norms
10. Experienced decision makers

These ten characteristics have many applications to both routine intelligence tasks and more extreme intelligence scenarios. A simple example can be demonstrated using the following scenario:

*Analyst Smith is tasked to gather intelligence about local, street-level drug dealers. He begins searching internal data repositories, only to find that they contain contradictory information. Through human sources, he discovers that a major drug shipment is about to arrive. After briefing supervisors, he is re-tasked to uncover the criminal network responsible for the drug importation. He is concerned about the implications of leaving drugs on the street, but knows that a major drug bust would be better for the organisation. In conjunction with undercover detectives, he uses his knowledge of the area and local drug dealers to target visual and communications surveillance to uncover the criminal network.*

The analyst in this scenario faces ill-defined goals when tasked to simply ‘gather intelligence’. The data that he finds is ambiguous and ‘contradictory’. There is competition between the goal of targeting ‘street-level drug dealers’ and a ‘major drug bust’. The situation changes when the analyst discovers information about ‘a major drug shipment’. As a result of this discovery, the analyst is ‘re-tasked’ and his time to work becomes constrained as the ‘shipment is about to arrive’. While he is concerned with the risks of ‘leaving drugs on the street’, he is also aware of the organisational need for high-profile drug busts. He draws on his own experience and ‘knowledge of the area and local drug dealers’, but he also makes use of ‘human sources’, ‘supervisors’ and ‘undercover detectives’ for information and direction.
Summary. NDM describes the way people develop an awareness of situations, using their experience to identify appropriate courses of action. Unlike TDM, NDM develops models inductively by learning from domain experts’ ability to match a situation with the appropriate response. This rapid form of decision making would be of significant value to intelligence organisations, which often face significant pressure to act quickly and accurately. The parallels between NDM characteristics and features of the intelligence environment are distinct and numerous, indicating a significant place for naturalistic strategies in criminal intelligence. Indeed, there is evidence of intuitive strategies in the intelligence literature. However, research indicates that with more subjective strategies comes the opportunity for bias and misperception. Taken together, this summary suggests that there is a distinct place for NDM in criminal intelligence. However, like TDM, it does not provide a complete understanding of analyst decision making. This discussion has demonstrated that there is reason to apply both TDM and NDM in criminal intelligence: that analysts need to alternate between conducting intelligence as a science and an art. Taking this into account, the intelligence community may ask how these methods should be employed and what implications will they have for effective intelligence.

Cognitive continuum theory (CCT) and effective intelligence
CCT views decision making as an adaptive process, reflective of the decision situation faced. The theory posits that decision making can be placed along three continua: task continuum, cognitive continuum, and surface-depth continuum. These continua explicitly place analysis and intuition at opposing ends. Rather than being a dichotomy, decision making is usually a blend of the two anchors: varying in degrees of rationality and intuitiveness\textsuperscript{30}. This is in contrast to theories such as System 1 and System 2 thinking, which assume a strict dichotomy of analytical versus intuitive\textsuperscript{31}. It is argued that corresponding positions on these continua will lead to effective decision making.

The properties of a task exist on the task continuum, anchored at one end by properties that induce analytical processes and, at the other end, by properties that induce intuitive processes\textsuperscript{32}. Here, a task is broken down into its properties, which allow comparison amongst tasks and across domains. This is important as criminal intelligence tasks can vary significantly: comparing task components may improve the likelihood of determining trends and highlighting consistencies. This in turn may allow analysts to identify where similar decision methods will be appropriate.

CCT hypothesises that task properties naturally induce corresponding types of cognitive activity. More specifically, task properties towards the analytical end of the continuum will induce more analytical cognitive functions and properties towards the intuitive end will induce intuitive cognitive functions\textsuperscript{33}. 
The **cognitive continuum** is anchored by analysis and intuition. Quasi-rationality exists between the two extremes of pure analysis and intuition. Such strategies vary in the proportions of analytical and intuitive cognition used\(^{34}\). Rather than approaching a decision in a purely analytical way (for example, using multi-attribute utility analysis) or relying purely on previous experience, an analyst may employ a combination of the two. For example, the analyst may rely on past experience to determine which alternatives are the most feasible for operational personnel to implement, before proceeding with a calculative analysis of those selected alternatives.

The **surface-depth continuum** highlights the influence of data on decision making processes. Surface data is directly experienced by the decision maker. Depth data is more remote, such as pictures of unknown people\(^{35}\). It might be argued that analysts will often work at the depth end of the continuum, using statistics, computer data and secondary intelligence about offenders they have no relationship with. Alternatively, in roles where intelligence analysis involves primary collection of information, an analyst may actually see, feel and experience the situation under analysis.

The implications of surface-depth data for analysts may not be entirely clear: it is much easier to decide which punch was harder from experiencing it, than from watching it on security camera footage. Similarly, it is inherently more difficult to make decisions about an offender’s motivations, than your own. Analysts must infer motivations and intentions (depth) from visually apparent and readily accessible information (surface). An analyst’s ability to do this will depend on the quality of information available on offenders, networks or events.

Oscillation is the term used to describe movement along the continuum. This movement is reflective of the changes in task and surface-depth continua. Flexible movement is particularly important in the dynamic criminal environment, as a change in circumstance may lead the analyst to retrace their steps and approach in a different way. It is feasible that certain phases of the intelligence cycle, and even the subtasks within them, will induce more or less analytical or intuitive cognition. In addition, the changing environment or event under analysis may require the analysts retrace their steps and alter the approach in order to fit new circumstances. To be effective, analysts must be flexible and perceptive enough to identify changes and move along the cognitive continuum as required, matching the task and surface-depth continua.
The paradox of intuitive analysis
A number of key assumptions can be deduced from the discussion above, including the following:

- Analysts are decision makers in their own right
- There is a role for both scientific analysis (TDM) and analytic tradecraft (NDM)
- The intelligence task and context will influence where these methods are appropriate/effective
- The intelligence environment lends itself more readily to the naturalistic than traditional decision methods

Taken together, we are presented with a paradox, that of intuitive analysis. As decision makers, analysts work in increasingly intuition-inducing environments. Despite this, they face pressures to perform in a scientific, traditional and analytic way. While theory indicates that this disjuncture between situation and approach will lead to ineffective decision making, it also provides us with viable ways of improving analyst decision making and thus improving professionalism.

Implications for professionalism
Over the past twenty years, the intelligence community has significantly increased its attention to training, skill development, best practice and internal reflection. Through these changes, it becomes clear that the intelligence community is committed to an intelligence profession and the development of the professional analyst.

Professionalism itself is comprised of a number of components, not limited to, but including skill, experience, and reflective and ethical practice. By examining criminal intelligence analysis through the conceptual lens of traditional and naturalistic decision theories, a number of direct implications for professionalism can be identified. For the purposes of brevity, three key implications are discussed here.

The naturalistic environment in which analysts must make decisions will inevitably induce more intuitive and subjective strategies. As mentioned previously, stakeholders may wish for intelligence to be a scientific process, devoid of subjectivity and intuition. However, analysts work in an environment characterised by time pressure, data overload, uncertainty and dynamism. If agencies want to increase TDM methods, they could create a more analysis-inducing environment. Alternatively, they could make traditional methods easier to perform, by providing computer-support for advanced statistical/calculative procedures or complicated decision making methods (e.g. Sleipnir)\textsuperscript{36}.
Analysts are decision makers and must take responsibility for decision making to be considered professionals. If analysts want to improve their professionalism, they could improve their meta-cognitive awareness: that is, thinking about thinking and more specifically, deciding how to decide. Decision making is a cognitive phenomenon that occurs continuously throughout each day no matter what the profession. This decision making occurs at various levels of consciousness and deliberation and, as such, analysts may be unaware of how many decisions they are actually making. As a professional, it is imperative that critical thinking goes beyond the training in cognitive biases, tunnel vision and the norm. Organisations must recognise analysts as decision makers, and analysts must take responsibility for their decision making and its consequences.

It is important that analysts are aware of what decision methods they are using and why. Without full awareness of the subjectivity involved in decisions they make, they cannot clearly communicate uncertainties and assumptions to end-users. This could contribute to the view of intelligence as a subjective construction of the situation, rather than a professional analysis, and ultimately result in an under-valued product and profession. Similarly, it is important for analysts to record what worked, when and why. This type of knowledge is invaluable when faced with experiential decision situations.

With the potential reliance on experiential strategies of decision making comes a potential consequence of depleting organisational memory. This paper has identified the possible extent of NDM in intelligence analysis. As these strategies rely heavily on personal experience to recognise appropriate courses of action, such knowledge is inevitably located within the analyst’s own mind. As analysts move between agencies, they inevitably take with them their experience and knowledge. Without some method of recording intelligence successes and failures, organisations will be left without an organisational memory or knowledge bank. Organisations should devote time and resources to knowledge elicitation to develop repositories for analyst knowledge. In a young and mobile profession, such a repository could also be used as a tool to support and train novice analysts. That way, when using intuitive methods, novice analysts are drawing on accurate knowledge rather than simply guessing.

**Conclusions**

The aim of this paper was to explore the application of traditional and naturalistic decision making frameworks to the practice of criminal intelligence analysis. Doing so provides an evidence-based contribution to the debate about whether intelligence analysis is an art or a science. By exposing the analyst as a decision maker, the potential role of both traditional (science) and naturalistic (art) methods were highlighted.
As both were adaptive in different circumstances, the CCT emphasised the importance of flexibility and the fit between the situation and the strategy to ensuring effective decision making. Taken together, this discussion identified the potential conflict between the reality and ideal of intelligence analysis: the paradox of intuitive analysis. With this in mind, three key implications for professionalism were identified: (1) the need to counter-balance the intuition-inducing nature of the intelligence environment, (2) the need to identify analysts as decision makers, and (3) the need to improve organisational memory. While progress has been made over the past 20 years, it is the responsibility of a profession to continually reflect and improve upon their processes. It is hoped that this paper provides analysts, and organisations alike, an opportunity to do so.

References


24. Ibid.

25. Ibid.


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