

COGNITION, CONSCIOUSNESS AND INTUITION IN PROJECT MANAGEMENT

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Purpose: This paper proposes a shift in the educational paradigm of project management towards fostering over-consciousness-based intuition and intuitive decision-making. The author argues that such a transformation increases the likelihood of developing sense-making intelligence, a critical attribute distinguishing successful project leaders. The study aims to stimulate further research and influence curriculum development.

Design/methodology/approach: Adopting a pragmatic research paradigm, this study assumes that effective project managers prioritize intuitive judgment and sense-making over rigid theoretical models. The research methodology included: (a) collecting unbiased experiential accounts from practitioners; (b) modeling their decision-making processes; (c) identifying phenomenological interdependencies; and (d) situating these insights within an appropriate theoretical framework.

Findings: The results suggest that successful project managers exhibit advanced sense-making intelligence and make extensive use of intuitive reasoning. A phenomenological classification, based on the TCI (Theme-Centered Interaction) model, contextualizes the role of intuition within a broader theoretical perspective. Cybernetic principles and the ORCH-OR theory further support and validate these findings.

Research limitations/implications: While rooted in well-documented practice, the study highlights the need for further empirical research to define the boundary conditions and mechanisms of intuition-based decision-making. It also challenges the dominance of discursive, linear reasoning in current project management standards, which may be inherently limited when applied to complex, NP-complete project environments—where exhaustive, rational decision-making is computationally infeasible and prone to error.

Practical implications: Endorsing intuitive decision-making may significantly improve project outcomes. Drawing on extensive practical experience, the author heuristically estimates a potential performance gain of at least 10% when intuition is integrated into managerial practice.

Social implications: The acceptance of intuitive decision-making reflects a cultural shift towards trust and openness in leadership. It may influence societal views on project success factors and lead to broader performance gains at organizational and systemic levels.

Originality/value: Existing project management methodologies overwhelmingly emphasize rational, discursive approaches. Research on the role of intuition remains limited. This paper offers a novel contribution by bridging theoretically grounded intuition-based decision-making with its demonstrated effectiveness in successful project management practice.

Keywords: Intuition in projects, human brain decision-making process models, mental models, cognition, consciousness, project success.

Category of the paper: empirical construction of a model.

1. Introduction

Projects are inherently dynamic and complex (Lent, Gadomski, 2017). Project manager has to cope with approximately 5000 activities during project life cycle, each demanding several decisions. He frequently encounter NP-complete problems, that means that the problem cannot be solved within a finite (polynomial) time (Alzalg, 2024; Garey, Johnson, 1979; Stanescu, 2024). This imply, that the discursive approach may not lead to the desired solution. Sooner or later the intuitive decisions are on demand.

Practitioners apply more or less consciously their ability to deploy their intuition. Several researchers analysed the external impact of the intuitively made decisions and willingness of the project managers to decide intuitively (Sadler-Smith, 2023; Liebowitz, 2023; Henke, 2021; Ilgen, 2019; Thome, 2017; Elbanna, 2015; Kahneman, 2012; Bousquet, 2009; Leybourne, Sadler-Smith, 2006).

Complexity in projects is primarily determined by the human acting in project and by stakeholders. So the authors of the well-known Nonaka-Yamaguchi knowledge exchange model discuss profoundly the role of the intuition in the empathy and people interrelation (Nonaka et al., 2022).

In all above mentioned researches intuition is evaluated by the decisions taken by the human.

The following considerations aim specifically to identify the internal factors, which influence the intuition, leading to possibly conscious development of the intuition capabilities and further research in this area.

2. Research Paradigms, Hypothesis and Applied Research Methodology

2.1. Conceptualization of the Methodology

The methods chosen in this research origin from the basic aim of the author to stimulate further research by indicating the successful practice and positioning it within the theoretical background. The conclusions shall help ambiguously the researchers as well as practitioners to set the right accents and priorities in their work. The balanced strategy of the European Commission broad research programs: EI2 HORIZON 2020 determined the choice of the

methods: Real impact of the research, balanced with the professional project management, have driven this work (EC, 2019).

Basic epistemological assumption is, that it is rather the successful practitioner with a proven track of records, who applies the right tools and sets correctly the priorities in leading the people, who does it right, than any, even most sophisticated, theoretician. It is ontological *expresis verbis* that the reality is equivocal, but grounded in terms of language, history and culture (Klenke, 2008). Woolcott (2002) consider this approach as a core of qualitative research. The interpretive non-categorical approach let us to formulate the **research question as follows** (Thorne, 1997): Most management theories solicit practice which justify them. Will the reverse approach: mapping of the real (project) managers' decision making onto the theoretical background expose any particularities?

The pragmatic **paradigm set up for our research sounds**: Successful project managers trust their intuition and sense making intelligence rather than any coherent theory. The central **hypothesis** of this study is that intuition-based decision-making contributes to improved project outcomes in complex environments.

Based on these considerations the following research steps were performed:

- Collect the unbiased abstract descriptions of intuition based decisions from the acknowledged practitioners.
- Draw the decision process model and its composites.
- Design the phenomenological interdependences between the model and intuition.
- Choose the theoretical background which focus on specific terms.
- Draw conclusions.

With this approach the ontologically, epistemologically and methodologically congruent standards for the research are achieved (Woolcott, 2002).

2.2. Theoretical Background

Projects are dynamic systems. Finite models of dynamic systems are limited in their predictability leading to the unavoidable imprecision. Due to the phenomenon of chance, predictability is bound to the probability and hardly deterministic in such systems (Stewart, 2002). Yet, the short term predictability is nevertheless feasible (Bousquet, 2009), so it makes sense to try to exercise the project management.

Project Management decisions are equivocally concerning management as well as leadership. Management covers basically the administrative processes (Lent, 2014), where discursive decision process is appropriate and efficient, due to the well known facts and data. The human factor processes concern peoples, whose behaviour in interaction with the environment is too complex to get described by algorithms (Gödel theorem, Hoffman, 2024), solvable in a finite time (NP-complete problem, Garey, Johnson, 1979; Stanescu, 2024). Therefore the human factor area subject mainly to intuitive decision making, and this leads to the considerations of leadership capabilities of project manager.

Most leadership theories view leadership as a unidirectional process of leaders influencing socially their team members (e.g. Avolio, 2007; Fiedler, 2005; Verma, 1996). Few recognize that it is rather a mutual dynamically evolving relationship and leader has first to create the way to perform for the team, than win the team (dyadic theories) and that the leader himself develops with the task execution, taking the context into account (Fiedler, 2005; Cragan et al., 2009). An overview of the leadership theories, relevant in project management may be found in Lent (2014).

Our research question focus on “What?” and “How?” leaving purposely the causal and conditional “Why?” for further research (Meredith, 1988). No claim of completeness, neither orthogonality is raised in this paper. The criteria behind the selected theories further referred to, are:

- a. Is there a theory explaining the intuition origins in a good leadership of practitioners? and
- b. If there is not a single one, which other than matches the best a given term?

In the term assessment, the intentions of the practitioner are given the priority over the pure semantics. Excluded are the issues of multicultural impact, as well as gender, age and position aspects (Chipulu et al., 2014).

The project management relevance is evaluated under the criterion whether practitioner applies a process approach. This is detected by analysing whether any attributes named by the practitioner match at least one of the holistic four stages model of leadership LEAD (Lent, 2014):

- L = Launch (Initialization of the project Leadership)
- E = Engage (Motivate and empower the project team)
- A = Act (Handle the daily leadership)
- D = Deliver (Assure the BSC - balanced score results)

Particular attention is given to the issue of feed backing. Feedback is considered crucial to the project success and forms the principle of the cybernetic approach to the project management (Lent, 2014):

- I. order cybernetic feedback through the project (actions cause intended reaction of the project).
- II. order feedback: outstanding issues and the optimization goals in each process.
- III. order: the human decision process feedback from the reactions upon taken actions.

Similar approach, yet not explicitly identifying the III order cybernetic feedback may be found in Mesjasz et al. (2022) and Rowbotham (2021).

2.3. Phenomenological classification

Elbanna (2015) examined the impact of the environment on intuition and III order cybernetic feedbacking on project outcome. Involved are team members and project goal. Therefore, Team Centred Interaction model TCI has been chosen as a comprehensive behavioural reference to an individual, placed in social and material environment (Cohn, 2021).

In this model, person focuses the personal orientation either on personal topics (“I”), on interaction with others (“We” replaced here for differentiating purposes with “Team”, T) or on common goal (“It”, replaced for the same reason with “Goal” G). The environment (“World”, W) is taken under considerations in closest as well as in broad meaning into account, while considering each of the perspectives. The cognitive processes permanently rotate: while focusing on “I” we influence our “Team” thinking, “Team” thinking leads to common goal focusing (“Goal”) and goal oriented thinking influence back our egocentric orientation. All biased by the “World”. According to Cohn an individual and the team are successful when for each team member, including the leader, all items are in balance (Cohn, 2021, 1975). This justifies the choice of TCI for the phenomenological classification. On the other side our engagement stipulated by this cognitive process is conditioned by: a) the Willingness/Courage, b) our Capabilities/Potential and c) Feasibility to act (Ion, Brand, 2009).

The correlation of both: the cognitive process and the engagement conditions resulted in the matrix presented in the Table 1 further down. For space delimitation is this table given already with the superimposed results of the analysis of the practitioner’s views.

3. Models of cognition process of the III order cybernetics

3.1. Overview of the Cognition process

The cognition process in von Foerster Observer (von Foerster, 1974) is depicted in Figure 1.

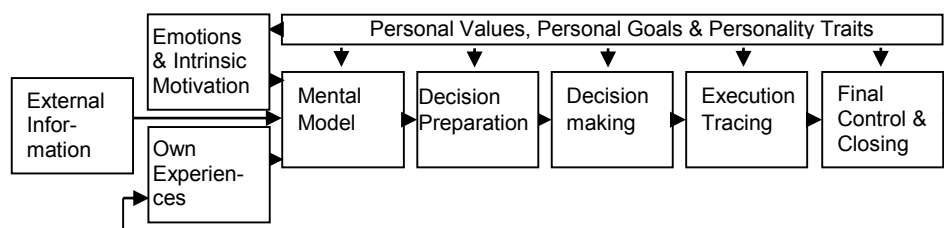


Figure 1. Decision process of project manager.

Source: Lent (2014).

It holds true for all decisions taken by project manager in any project management process. Managers see the system as linear one and try to master the corrective feedback loop (e.g. by increasing the frequency of project progress control) imposing order (Figure 2).

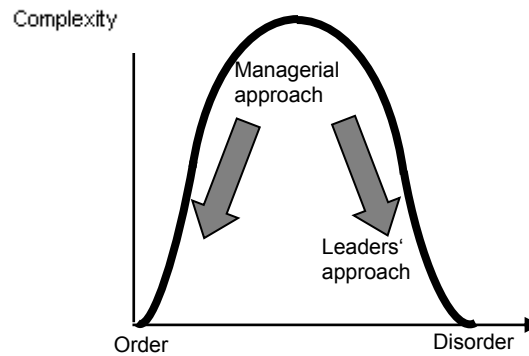


Figure 2. Decision process of project manager.

Source: Lent (2014).

The leaders, oriented towards dealing with the uncertainty of nonlinear systems, focus on adaptive feedback. They let the system to certain degree freely float or even intentionally destabilize, to learn the equilibriums and the resistance to change around those points. This adaptive learning let leaders to develop the cognitive intuition (Bousquet, 2009). This operation on the verge of chaos is viewed by several authors as the most successful strategy to deal with the nonlinear systems (Bousquet, 2009; Kaufmann, 1955; Singh, Singh, 2002). The right approach is that of manager and leader: to keep balance between positive and negative feedbacks (Bousquet, 2009).

We lend credibility to Singh and Singh (Singh, Singh, 2002), who conclude that project managers have to balance between linear (management) systems and non-linear systems, effective in chaos and complexity management. The high degree of the complexity at the edge of chaos is simultaneously the biggest chance: the management systems handling these situations are most flexible and creative, best suited to adapt for a contingent operation and handle the unpredictability (Bousquet, 2009) To handle the last, an awareness of context and relations, even anticipation of their possibility, may be crucial to project success. Linear systems focus on quantitative analysis and project controls limiting the capability of the perception of deviations or stochastic occurrences with impact on the project fate, what may explain, why today's project are not better managed than 20 and 20 years ago.

Authors own experience lead to observation, that in stress situations, typical in any project day life, it is rather the problem solving approach, than the systematic development of understanding, evaluation of alternatives, and risk analysis. We act mostly instantly and spontaneously, without questioning assumptions or implications of our action. This reaction comes from our sense making capability in view of non-linear system encounter, paired with the intuition (Thomas, Mengel, 2008). The findings of Kahneman (2011) confirms this experience.

3.2. Mental model

The key issue in sense making intelligence plays mental model of the situation, depicted in Figure 3.

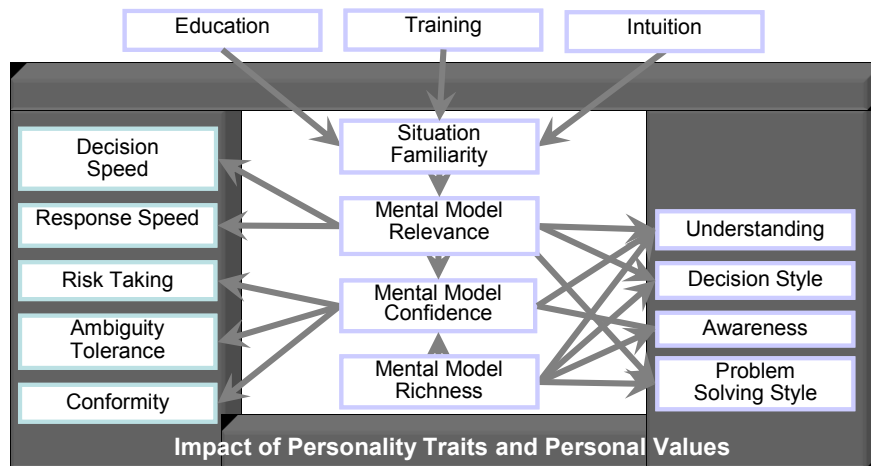


Figure 3. Mental Model Components in decision process of project manager.

Source: extended and adapted on the base of RTO (2007).

In this model, derived from RTO (2007) we extend the sources of situation familiarity with intuition (Antoniou et al., 2013) and impact of personality traits and personal values (Motta, Vascencelos, 2010). Whereas education and training are mainly impaired through discourse, intuition is shaped by self-reflections (Morgenstrahl, 2019).

3.3. Decision making model

Our brain is the best democratic behaviour example. In the decision making is never a single cell deciding. The mechanism of weighting between the groups of cortex cells decide about the choice of strategy: cooperation or confrontation (Philippe et al., 2024). Pre-frontal cortex (working memory) communicate with hippocampus (long-term memory). The voting system between the amygdala and cortex (in particular pre-frontal cortex) leads to the elaboration of the decision (Berkowitz, 2016). In Cortex we exercise the discursive process with traceable decisions. Amygdala hosts our emotions, with dominating fear. As amygdala is stronger and better interconnected with neighbouring cells, our decisions are rather induced by the emotions than rational elaboration.

Our brain makes about 20'000 decisions daily – 90% of them beside our consciousness (Pöppel, 2008), vastly based on unconsciously collected and stored in long term brain memory (Henke, 2021).

4. Consciousness

Baars and Gage (2019) see the cognition is a biological process in our brain of conscious combination of perception and memory. Many researchers (see comprehensive survey in e.g. Sattin et al., 2021) question this finding. Morsella (2016) *expressis verbis* consider the consciousness as a middle-man. Yet all agree, that it is a biological process in our brain.

In above models, the activity of a brain, communication between the cells, and voting, they all demand energy. Author consider the Orch-OR Theory (ORCHestrated Objective Reduction) of Penrose and Hameroff (2014) as currently best explaining the consciousness and the relation to the cognition, in context of Clapson (2016) theory, that consciousness is related to the fundamental time-space geometry, making our brain to work rather like quantum, than von Neumann computer. The proof of the Orch-OR Theory is yet to be brought.

According to ORCH-OR theory, in each of our 85 billions neural cells in the brain another millions of microtubules oscillate in bipolar states with a frequency of about 10 MHz. Each microtubule is simultaneously in two instable states (e.g. when we consider alternatives: apple or pear?). The spiral currents (spikes) moves the bipolar states in a three steps automatic leading to computations and choices. When the neural cells finally choose apple, the “pear” – states disseminate and gradually dissolve.

Microtubules needs energy to oscillate. Therefore, Penrose and Hameroff consider consciousness as a combination of the information (in memory cells) and energy. The information never disappear. However, when the microtubules do not get energy (e.g. as a consequence of the death), the quantum-state of the microtubules disappear. Authors conclude that our consciousness makes us the only existing world, all alternative worlds, disappear being unstable. Similar conclusion drafted Moser (1989) almost four decades earlier!

5. Intuition

Some 130 years ago, Rudolf Steiner (1893, 2020) formulated the thesis, that the choice of action, undertaken by a human is most of all depending on how his/her intuition capabilities can handle the concrete situation.

Leybourne and Sadler-Smith (2006) define the intuition as “a cognitive conclusion based on decision maker’s previous experiences and emotional inputs”. Morgenthaler (2019) sees the intuition capabilities in a direct relation to the degree of consciousness development. Our reaction to the intuition impulses upon received inputs decide about the development and efficiency of the intuition. As we absorb and store unconsciously inputs (e.g. perception of body language of our interlocutor) the intuitive conclusion based on broader information base,

than our discursive thinking. Katharina Henke proved, that human stores the unconsciously collected information in their long term memory in brain (Henke, 2021). Therefore Morgenthaler call it justified “over-consciousness”.

This over-consciousness, paired with ones’ own brain energy optimization, lead to spontaneous, intuitive, heuristic decision making, which proved to be efficient in solving complex problems (Kahneman, 2011; Thome, 2017). Ilgen (2019) consider intuition particularly relevant in strategic decisions.

Yet, cognitive biases in our thinking may negatively affect the outcomes of intuitively formed decisions (Smith, Griffin, 2024; Gigerenzer, 2023; Shedletsky, 2021; Kahneman, 2011). In this context, awareness of potential biases can support a more critical assessment of intuition-based decisions (Smith, Griffin, 2024).

6. Results discussion

6.1. Intuition in praxis

Natural sciences follows two axioms: Logics (clarity, freedom from contradiction, justification) and experiment (reproducibility, quantification, analysis). These exclude the spiritual and mental phenomena, thus intuition (Morgenstrahl, 2019).

According to the study of Parikh et al (1994), 13’000 american CEOs said, that they owe 80% of successful decisions to their intuition. Several papers, analysing the role of the intuition in management success may be found in Liebowitz (2023). Graf (2025) explicitly states, that he decides intuitively in his practice. Roeder (2011) broaden it in project management context.

Intuition require less cognitive efforts than discourse. As cognition is related to consciousness and the last to the information and energy, the shorter intuition based decisions use less energy than the discursive one. Thus intuitively deciding managers manage better their limited cognitive resources.

Intuition and discourse as two complementary processes. Keller and Sadler-Smith (2019) include the part of the discourse: the analysis in their Paradox Theory, which explores the synthesis of both the intuition and an analysis (Paradox: persistent contradiction between interdependent elements (Schad et al., 2016). Otherwise, this combination is called also dual process theory, developed in the last 25 years and successfully applied in management decisions (Kahneman, 2011; Haoye et al., 2021).

In the experiment of Leybourne with 521 project managers (Leybourne, Sadler-Smith, 2006) intuitive decision making was closely related to the improvisation capabilities of project managers. Managers with focus on external factors (“We” and “World”-dimensions) deployed

more often the intuitive thinking. And lastly more experienced managers decided more often intuitively than less experienced managers.

As intuition bases on over-consciousness, it comprises in the decision making more inputs, both internal and external, than the purely analytical cognition. Therefore it is more successful in complex management decisions, in particular in relation to inter-human relations and is a prerequisite of innovation (Wempe, 2021).

6.2. LEAD-Perspective

Launching of a project demands meticulous elaboration of the project foundations and certain, scheduled interaction with the stakeholder in the Environment. So the dimensions Goal and Environment dominate, without an urgency of problem solving. Intuition is here helpful, but rather Kahneman slow thinking is beneficial.

It changes in the next two following phases: Engage and Act. Here the human factor dominates the occurrences. Project Manager is well advised to listen to his “over-consciousness” and intuition. Capability to perceive the intuition impulses let him fast and proper react, thus reducing firstly the conflict potential, secondly to reduce the project risks impact. Dimensions We and Goal dominates.

The last phase: Deliver is again Goal and World oriented. Decisions in this phase are less intuition dependent and has more discursive character, relevant to the future users of the product.

6.3. Phenomenological Perspective

Leaders cognition processes consume less resources, are more flexible and relay on mental shortcuts. Perception formation and risk taking characterize the powerholders (Wang, 2024).

Table 1.

Phenomenological classification of the main decision impact factors

Dimension	(Me) Leader personality orientation	(We) Working place relationship leader orientation	(Goal) Attitude towards the goal	(World) Environment leadership orientation
WILLINGNESS/ COURAGE	Intuitive Risk taking Ambiguity tolerance	Intuitive heuristic Decision speed	Decision speed (Intuition first)	Intuitive Response speed, Conformity
CAPABILITIES/ POTENTIAL	Problem Solving Style, Awareness	Understanding	Problem Solving Style	Awareness
FEASIBILITY	Mental Model Confidence	Mental Model Relevance	Mental Model Relevance and Richness	Mental Model Confidence

Source: own taxonomy.

Feasibility of decision-making across all four dimensions is influenced by the underlying mental model, particularly through the dimensions of Relevance, Richness, Confidence, and their combinations. Within the capabilities domain, Awareness enhances decision-making

quality in both the World and Me dimensions. The Goal and Me elements are notably impacted within the Problem-Solving Style, while collaboration in the We dimension is primarily shaped by Understanding.

Moreover, several intuitive factors influence the willingness and courage to make decisions under uncertainty. The phenomenological classification presented in this section is based on the author's interpretation of practitioner experiences and is conceptually grounded in the TCI (Theme-Centered Interaction) model. While care has been taken to ensure theoretical consistency and relevance, the classification remains inherently subjective. It represents a synthesis informed by professional practice rather than empirical generalization. Accordingly, this framework should be regarded as a proposed model that requires further empirical validation.

7. Conclusions

This paper explores the central role of intuition in project management decision-making, emphasizing its significance as a crucial cognitive tool for experienced project managers. Theoretical insights drawn from the reviewed literature, as well as the phenomenological classification presented herein, reveal that intuition, particularly when rooted in over-consciousness, plays a vital role in enhancing decision-making efficiency and strategic thinking. These insights are grounded in the understanding that mental models, as a third-order cybernetic loop, integrate internal experiences with external inputs, supporting decision preparation (Ashby, 1956). While part of the mental model is consciously constructed, a substantial portion arises from unconscious perception of external stimuli (Kahneman, 2011), making decision-making itself predominantly unconscious. The Orch-OR theory (Penrose, Hameroff, 2011), though still unproven, offers a conceptual framework that lends credibility to the idea that consciousness involves an interplay of information and energy, explaining the dynamics of intuitive decision-making.

The key recommendations emerging from the models and reflections include:

1. **Development of Intuitive Capacity:** Project managers should be encouraged to actively develop their intuitive thinking alongside rational decision-making skills. Training programs should incorporate strategies to enhance awareness of intuitive processes and foster the confidence to apply them in practice.
2. **Educational Paradigm Shift:** Project management education should evolve to include intuition as a core component, ensuring that practitioners understand its role and learn how to integrate intuition and rational analysis in their decision-making processes.

3. Future Research and Empirical Validation: Further empirical studies are needed to explore the specific conditions under which intuition-based decision-making yields the most effective outcomes, as well as to refine the theoretical frameworks presented in this paper. This could lead to the development of concrete tools, training approaches, and methodologies that integrate intuition into standard project management practice.

In summary, this paper presents a conceptual foundation for understanding the role of intuition in project management and offers both theoretical insights and practical recommendations for future development in this area.

Acknowledgements

Author is grateful to Conference Chairman, Prof. dr hab. Leszek Kiełtyka and Programme Committee Chairman Prof. dr hab. Robert Kućba for their encouragement in formulating this research conclusions. Special thanks are to the reviewers for their helpful improvement suggestions.

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