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**UNDERSTANDING MENTAL MODELS AND HOW THEY
CAN BENEFIT MILITARY ORGANIZATIONS**

by

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June 2023

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**UNDERSTANDING MENTAL MODELS AND HOW THEY CAN BENEFIT
MILITARY ORGANIZATIONS**

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ABSTRACT

People—individually, in groups, and as part of organizations—make decisions. Some are snap decisions based on a person’s knowledge and experience. Others come after much debate. Despite their best efforts, people often make suboptimal decisions that can result in inconvenience or, in the case of the military, even fatal consequences.

Drawing on studies by behavioral scientists, this research explores the factors that affect the decision-making process of individuals, groups, and organizations to understand why people unintentionally make poor decisions. First, the thesis examines the influence of mental models in shaping an individual’s decision-making. It finds that an individual’s performance is limited by the understanding of their environment. Then, the thesis explores how the interaction of these mental models leads to group decisions. It also examines how similarities, social identity, and other external factors influence the group decision-making process. Furthermore, the thesis details how a rigid organizational structure and culture hinders not only decision-making but also organizational performance. Mental models are not just a phenomenon but can be used as a tool to understand and improve organizational performance.

Unlike prior research that examined these three levels separately, this study considers the relationship and interactions among them. Such an understanding can help the military to improve recruitment, training, retention, and overall performance.

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TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	METHODOLOGY	7
III.	INDIVIDUAL MENTAL MODELS.....	11
A.	WHAT IT IS.....	12
B.	WHAT IT DOES.....	13
C.	BRAIN AND MIND.....	16
D.	INPUT – FOOD FOR THOUGHT	18
1.	Knowing What or Knowing How?	19
2.	Where You Stand Depends on Where You Sit.....	20
E.	PROCESSING IS REASONING.....	21
1.	Bounded Rationality	22
2.	Three Principles of Mental Models	23
3.	Heuristics and Biases	24
F.	OUTPUT – CHOICES OR DECISIONS	25
1.	Plausible Explanations.....	26
2.	Simplification.....	26
3.	Power of Knowledge	28
G.	SO WHAT?.....	28
IV.	GROUP MENTAL MODELS	33
A.	WHAT THEY ARE	33
B.	SOCIAL IDENTITY THEORY	36
C.	SHARED AND TEAM MENTAL MODELS	39
D.	INPUT	42
1.	Knowledge and Experience.....	42
2.	Group Dynamics	43
3.	Beliefs	45
E.	PROCESSING.....	46
1.	Task or Team Orientation.....	46
2.	Similarity or Accuracy	47
F.	OUTPUT	48
1.	The Power of Identification.....	48
2.	Motivation.....	50
3.	Conformity and Deindividuation.....	51

4.	Team, Task, Similar, Accurate	53
G.	SO WHAT?.....	56
V.	ORGANIZATIONAL MENTAL MODELS – SOCIAL INSTITUTIONS...	63
A.	MENTAL MODELS AT THE ORGANIZATIONAL LEVEL	64
B.	INSTITUTIONAL THEORY	66
C.	INPUT	70
1.	Mental Models.....	70
2.	Organizational Structure	72
D.	PROCESS	75
1.	Organizational Routines.....	75
2.	Transaction Cost	79
3.	Three Pillars of Institutions	81
E.	OUTPUT	88
1.	Stability	89
2.	Legitimacy	91
3.	Pitfalls.....	92
F.	SO WHAT?.....	93
VI.	SYNTHESIS AND DISCUSSION	99
	LIST OF REFERENCES	109
	INITIAL DISTRIBUTION LIST	127

LIST OF FIGURES

Figure 1.	Mental models versus conceptual models and reality.....	15
Figure 2.	The relation between the Triune brain and Maslow’s hierarchy of needs.	18
Figure 3.	The components of fighting power.	32
Figure 4.	The five basic parts of an organization.	73
Figure 5.	Mintzberg’s five organizational configurations.....	74
Figure 6.	The conceptual relationships between the entity’s size and the utility of the knowledge.....	103

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LIST OF TABLES

Table 1.	Characters of group dynamics	44
Table 2.	Three pillars of institutions	87

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EXECUTIVE SUMMARY

Why do individuals make suboptimal decisions? What happens in teams when they work on problems? How do people in organizations act when presented with a challenge?

Exploring such questions and how these ultimately relate to organizational performance is central to this research. The research is a multi-disciplinary, multi-level, qualitative analysis of the role of mental models in how military organizations think and act. In essence, it explores this particular behavioral aspect of organizations in general and military organizations specifically. This thesis describes thinking and decision-making at the individual, group, and organizational levels. It concludes by an investigation of the relationships and interactions among the three levels.

Individuals are boundedly rational because they can never have all information available or the time and ability to process it before making a decision. The human mind helps by envisioning and evaluating options. Mental models aid thinking and decision-making. Because they build on knowledge and experience, mental models do not necessarily present “truth” but represent what could be true. When decisions are required, satisficing behavior is implied.

When operating in groups or teams, people share knowledge and experience. Sharing creates benefits, where “more brains” know more than one. In teams, sharing is relatively easy due to team members’ close ties. Sharing can aim at two objectives: similarity or accuracy. Creating similarity in thoughts is helpful to speed up decision-making and acting. Following standard operating procedures (doctrine) or working in a stable environment benefits from similarity. Accuracy, conversely, is the degree to which mental models are representations of reality. Accuracy is more rewarding in highly volatile, complex, or adaptive environments since in these situations similarity can cause biases and groupthink. Similarity works for learning and applying tactical “drills” but can be dangerous at the strategic and policy levels. It can be risky to fall in love with your own ideas and convince others to love them too.

While behavior is easier to grasp at the individual and team levels, organizations also affect what people do and how they do it. Where the individual has personal knowledge and experience, and the team operates on shared knowledge and experience, the organization's lifeblood is shared knowledge and experience patterns. From an institutionalist point of view, organizational routines largely determine how people should work. However, these routines are not solely based on formal rules and regulations but depend on norms and cultural-cognitive traits. Hence, changing the way we do things entails changing more than rules and regulations; that is only the tip of the iceberg. The most significant part of organizational routines—the informal conventions and habits people are used to—are often less overt like the submerged body of the iceberg. Large bureaucratic organizations, like military organizations, are based on control. Such a mindset or norm spreads throughout the entire organization; therefore, it is not hard to see that freedom of action and related innovation are challenging in these organizations: It requires creating freedom at all three pillars of institutions—the rules, norms, and cultural-cognitive dimensions.

By synthesizing these three levels of analysis, this thesis identifies related but distinct characteristics. Key is the ability to utilize knowledge and experience from an individual's perspective to team sharing and ultimately to apply (and codify) shared knowledge and experience patterns. Due to the human tendency to satisfice and experience pressure when making decisions in groups and organizations, there is little reflection on the thinking and decision-making processes. Every day, people use shortcuts provided by mental models, shared mental models, and (social) institutions. Academic literature from multiple disciplines shows the effectiveness of such shortcuts, especially when experts are involved, and best practices are replicated when facing uncertainty. Nevertheless, there also lies danger in the cumulative effect of these shortcuts on organizational performance. Aggregating individual biases and over-focus on group similarity might create institutional routines in which people are oblivious to the distinction between “doing things right” (following routines) or “doing the right thing.”

Military organizations are among the largest employers in the world. Nonetheless, there is insufficient attention to its human capital. In many military organizations, weapon

systems, technological advancement, and disruptive technology seem to receive more attention than human resources. Although military technology is vital to gaining or sustaining a military advantage, the human aspect (numbers, knowledge, experience, and motivation) is often neglected in strategic planning aimed at achieving such an advantage. Pursuing a competitive or military advantage is the goal of strategy. Because humans make decisions, their minds are fundamental in developing and contributing to strategy. Mental models influence decision-making. Hence these are crucial for strategy and organizational performance. Mental models are not just a phenomenon but can be utilized as a “tool” for understanding how individuals learn and re-learn.

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I. INTRODUCTION

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Exploring such questions and how these ultimately relate to organizational performance is central to this research. The research is a multi-disciplinary, multi-level, qualitative analysis of the role of mental models in how military organizations think and act. In essence, it explores this particular behavioral aspect of organizations in general and military organizations specifically.

Exploring the role of mental models in military organizations provides the core of this research. It starts with the concept of mental models and their relevance to individuals, groups, and organizations. Such models are (personal), incomplete representations of reality, based on knowledge and experience, that actors utilize to interact with their environment. “They are constructed by individuals based on their unique life experiences, perceptions, and understandings of the world. Mental models are used to reason and make decisions and can be the basis of individual behaviors.”¹ Thus, mental models provide shortcuts or so-called heuristics for behavior and decision-making.² While exploring, this research focuses on the negative aspects of relying on mental models and identifies potential improvements for their use by the military.

Working in challenging conditions as a tactical unit leader and being accountable for the unit’s performance, personnel, and material keeps tactical commanders sharp and at the top of their game. Vital to their success is flexibility since situations in the field are

¹ The definition of mental models is slightly amended by the definition of Jones and colleagues. Natalie A. Jones et al., “Mental Models: An Interdisciplinary Synthesis of Theory and Methods,” *Ecology and Society* 16, no. 1 (2011), <https://www.jstor.org/stable/26268859>.

² As explained by Herbert A. Simon, “A Behavioral Model of Rational Choice,” *The Quarterly Journal of Economics* 69, no. 1 (1955): 99–118, <https://doi.org/10.2307/1884852>; Herbert A. Simon, “Rational Choice and the Structure of the Environment,” *Psychological Review* 63 (1956): 129–38, <https://doi.org/10.1037/h0042769>; Amos Tversky and Daniel Kahneman, “Judgment under Uncertainty: Heuristics and Biases,” *Science* 185, no. 4157 (1974): 1124–31, <https://doi.org/10.1126/science.185.4157.1124>.

constantly shifting.³ However, when climbing the military ranks and departing from tactical flexibility, these leaders will find less room to maneuver. At the higher echelons, how performance is determined may not be evident. Is input, process, or output more important? Where the tactical commander is free to think and make decisions, the staff officer might get stuck in established procedures and regulations. Gaining opportunities outside the tactical realm requires the leader to continually navigate bureaucratic hurdles to realize meaningful outcomes. Dealing with change and opposition to change are two opposing forces. It seems that the conventional military perspective is rooted in the latter. Why is this so? Perhaps it is because Western military organizations appear to set goals related to strategy, performance, and change, but still have difficulty changing and coping with change. These military goals may deliver research, development, and change input, they do not constitute a strategy.⁴ Today, emerging and increasing security challenges demand the military adopt a strategy informed by adapted guidelines capable of changing to address these evolving challenges.

Despite increasing budgets (within the EU and NATO), a narrow perspective on the future of war and the militaries fighting it prevails. It could prove a mistake to deliver gadgets that could have won the last battle. More is needed to boost the capabilities that deal with the changing characteristics of war.⁵ Shifting focus to software and soft skills is challenging because they are more elusive and harder to capture in spreadsheets. Integration and collaboration of forces are imperative in security collectives like NATO, understanding each other and having similar representations of what is needed is crucial. Compared to hardware, funding such programs is challenging because their goals are somewhat intangible, more abstract, and difficult to budget.

³ As illustrated by Meir Finkel, *On Flexibility: Recovery from Technological and Doctrinal Surprise on the Battlefield*, *On Flexibility* (Stanford University Press, 2011), <https://doi.org/10.1515/9780804777155>.

⁴ As emphasized by Richard Rumelt, he explains that ambition is not strategy. See Richard P. Rumelt, *The Crux: How Leaders Become Strategists* (London, UK: Profile Books, 2022).

⁵ Gerard Roncolato, "The Character of War Is Constantly Changing," *Proceedings*, 148/5/1,431 (May 2022), <https://www.usni.org/magazines/proceedings/2022/may/character-war-constantly-changing>.

Improving the military's ability to change is much needed. One way to achieve this is by adjusting our focus on the subject. When we think of improving, our minds usually turn to organizational charts, which examine the roles and responsibilities of various departments and offices. However, this often leads to increased overhead costs. Parkinson's Law states that every office will fill its time, whether for good or bad and will always ask for more time and resources to achieve better results. Yet, there is no direct relation between these factors and improved output.⁶ While Parkinson's Law demonstrates how expansion in bureaucracies works, it is only part of the story. Another approach involves examining procedures and organizational routines to improve efficiency instead of expanding bureaucracy. Simply increasing resources does not automatically result in improved effectiveness. When financial incentives drive such change, their focus may be on efficiency, not necessarily effectiveness.

While expanding capacity and changing procedures are part of a solution, other factors are related but often overlooked.⁷ Sometimes, people forget they are human beings. As cognitive creatures, we can think and reason and a part of that occurs automatically. Unfortunately, decision-making is often flawed. Human thinking is far less rational than people think. Worse, their thinking and decision-making are further affected when operating in social structures like teams, groups, or organizations. Although collaboration has significant positive effects, it also has downsides. Reflecting on how and why decisions are not always part of the equation. Regardless of quality, coming up with solutions seems more important than reflecting on their origin and value. Nevertheless, most organizational decisions are made in groups, are born out of thinking and pondering, and then discussed

⁶ Cyril Northcote Parkinson, "Parkinson's Law," *The Economist*, November 19, 1955, <https://www.economist.com/news/1955/11/19/parkinsons-law>. For a general overview of Parkinson's Law, see: https://en.wikipedia.org/wiki/Parkinson%27s_law

⁷ McKinsey research confirms the observations and argued that for the military to change it needs to transform mindset, behavior, and capabilities. These are all soft skills, not hardware. Sometimes it can be viewed as the chicken or egg quiz, how comes first. However, in this instance, without investing in soft skills, the needed change is unlikely. See: David Chinn and John Dowdy, "Five Principles to Manage Change in the Military," McKinsey on Government, no. Winter 2014/2015 (December 1, 2014), <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/five-principles-to-manage-change-in-the-military>.

before they are finalized. Such group decision-making processes can be influenced by conformity.⁸

Ultimately, a balance between accurate content and collective support is needed for organizations to change and improve. Regrettably, the required holistic view to accomplish this is often ignored or obscured by the initial response to focus on single issues. Inertia and organizational myopia exist in many departments across military organizations and their government counterparts. Those prove hard to defeat. Having a narrow perspective on trying to tackle these, is like fighting the symptoms of a disease without curing the illness. Only thinking about changing inertia is a simplification and linear thought. Such a view sees the organization as a ‘black box’ where things happen that lead to such challenges. Unraveling the causal mechanisms contributing to performance and, conversely, inertia and myopia are more valuable.

What is the common factor? Since the answer is humans, a behavioral approach might be rewarding. As all decisions depend on human interaction, the proper mindset and frames of reference are foundational to all types of improvements and subsequent decisions. When we understand and influence thinking, we have the key to coping with and managing change.

Mental models demonstrate how humans think, decide, and behave. Based on knowledge and experience, they provide the foundation for thinking and, thus, decision-making. At the individual level, these represent unique individual perspectives; for teams, they reflect sharedness; and in organizations, these represent social institutions of organizational norms and beliefs.

Attitudes of “This is how we do things” can be devastating for progress and achieving a competitive advantage. While organizations need procedures to be effective,

⁸ Todd Rose, *Collective Illusions: Conformity, Complicity, and the Science of Why We Make Bad Decisions*, First edition (New York City: Hachette Books, 2022), chap. 2.

not challenging them in the business world leads to extinction.⁹ However, staying competitive as a military organization is not about organizational survival (a nation-state requires security forces). Military competitiveness lies primarily in its ability to contribute to national and international security and stability compared to other national instruments of power. Second, it relates to delivering the relative current and future fighting power compared to adversaries and allies. The order and context of such national and military competitiveness are changing fast.

While the world is becoming increasingly complex,¹⁰ many military organizations are struggling to adapt. Growing complexity enlarges uncertainty and makes thinking and decision-making even more demanding. Strategic challenges related to emergent technology, the shifting world order and its strategic competition, climate change, pandemics, and urbanization present complex problems. However, these cannot be separated and addressed individually. Strategic problems interacting is the reality. The fascinating proof is found in the occurrence and outcomes (as far as we understand them today) of the Covid-19 pandemic, the war in Ukraine, and the Global Precipitation Climatology Centre (GPCC) reports on climate change.

To realize the military's goals while sustaining competitive power is imperative. The current processes surrounding strategy development¹¹ in many military organizations can be quite rigid and do not resemble high quality strategic thinking. "Organizational decision processes, in particular, often display features that seem to defy fundamental principles of rationality and sometimes border on the bizarre."¹² Nonetheless, such

⁹ As was the case for the former worldwide market leader Kodak (photography) by not adapting to digital photography. Their business approach to the future was too narrow, which led to their bankruptcy in 2012. See: Scott D. Anthony, "Kodak's Downfall Wasn't About Technology," *Harvard Business Review*, July 15, 2016, <https://hbr.org/2016/07/kodaks-downfall-wasnt-about-technology>.

¹⁰ Josh Kerbel, "It's True, the World Always Has Been Complex — but Not like This," *The Hill*, May 9, 2022, <https://thehill.com/opinion/national-security/3478119-its-true-the-world-always-has-been-complex-but-not-like-this/>.

¹¹ Strategy is a continuous process and a mix of policy and action designed to overcome a significant challenge. See: Rumelt, *The Crux*.

¹² Richard R. Nelson and Sidney G. Winter, "Evolutionary Theorizing in Economics," *Journal of Economic Perspectives* 16, no. 2 (June 2002): 29, <https://doi.org/10.1257/0895330027247>.

strategic thinking¹³ is preferred in times of rapid change. Reflecting on personal, team, and organizational beliefs offers a way out of the “this is how we do it” mentality and enables true consideration of ways to innovate, renew, and improve organizational performance entirely. Strategy should guide people’s behavior and focus on the software (thinking), as well as the hardware (gadgets). Therefore, this research assesses behavior in organizations and starts by looking at the individual, progresses to the team, and ends with the organization.

¹³ As emphasized by Henry Mintzberg, effective strategies develop in strange ways. sometimes deliberate and often emergent. Henry Mintzberg, “Crafting Strategy,” *Harvard Business Review* 65, no. 4 (August 7, 1987): 70; Henry Mintzberg, “The Rise and Fall of Strategic Planning,” *Harvard Business Review* January-February (1994).

II. METHODOLOGY

Most research on military organizations or organizations generally considers the ‘technical’ elements, like structure, resources, and formal regulations. Although these are important to organizational performance, this focus neglects to acknowledge that people are at work, not machines, make up these structures and resources, observe the regulations, and carry out the work in organizations. In many countries, military organizations are among the biggest employers considering the amount of personnel at work. Thus, more research into the behavioral aspects of organizations, including the military, is needed to provide essential feedback on organizational performance. This research aims to contribute to that knowledge by exploring the concept of mental models at the individual, group, and organizational level. From a holistic perspective, mental models are based on dynamic belief systems. For an individual, that means one holds an idea that he or she believes to be true. This view might change when the individual is presented with evidence which contradicts that belief and leads to an adjustment of the mental model. Individual beliefs become interacting belief systems when viewed within the social context, expanding from the individual to groups and, ultimately, organizations or even societies. This research focuses on personal beliefs (mental models),¹⁴ shared mental models, and large organizations’ social institutions and their effect on behavior (as the unit of observation). Exploring three levels creates insight into organizations’ macro and micro behavior and sheds light on their interaction.

Consequently, this research adopts a bottom-up approach to explore how choices and decisions are made, especially considering the presence of perceptions and particular automata in organizations. This approach is founded on the premise that individual belief structures are essential in developing socially shared cognition.¹⁵ Hence, in trying to understand the notion of group mental models or organizational behavior, it is suggested

¹⁴ As defined in the introduction: Mental models are (personal), incomplete representations of reality, based on knowledge and experience, that actors utilize to interact with their environment.

¹⁵ Lauren B . Resnick, “Shared Cognition: Thinking as Social Practice,” in *Perspectives on Socially Shared Cognition* (Washington, DC: American Psychological Association, 1991), 1–20, <https://doi.org/10.1037/10096-018>.

to initially focus on individual cognitive processes.¹⁶ Next, for the multi-level qualitative analysis, this research employs a multi-disciplinary approach¹⁷ to provide a range of insights into organizational, group, and individual behavior. Previous research from the fields of sociology, psychology, economics, and strategic management are reviewed to garner these insights. Although it might create some ontological and epistemological discrepancies, analyzing those academic paradigms is beneficial for it creates useful insights. It is argued that “important analytical benefits come with embracing a layered ontology, specifically concerning the identification of causal mechanisms.”¹⁸ Regrettably, there is no integrative understanding of factors that affect or enhance mental models at three levels of analysis.¹⁹ The present research begins by considering individuals as the smallest level of analysis, as it is claimed to be a micro-level foundation for institutions.²⁰ As Pamela Tolbert and Lynne Zucker mention, “Without a solid cognitive, micro-level foundation, we risk treating institutionalization as a black box at the organizational level, focusing on content at the exclusion of developing a systematic explanatory theory of process, conflating institutionalization with resource dependency, and neglecting institutional variation and persistence.”²¹ Also, such a “layered ontology offers an important analytical heuristic to account for how institutional phenomena play out in micro

¹⁶ As mentioned by Richard Klimoski and Susan Mohammed, “Team Mental Model: Construct or Metaphor?,” *Journal of Management* 20, no. 2 (April 1, 1994): 404, <https://doi.org/10.1177/014920639402000206>.

¹⁷ Such multidisciplinary research on the behavioral aspects of organizations is rare, and not yet established in institutional research. It is argued such research benefits with expertise in different methods and styles of theorizing. See: Patrick Haack, Jost Sieweke, and Lauri Wessel, “Microfoundations and Multi-Level Research on Institutions,” 2019, 34–35, <https://doi.org/10.1108/S0733-558X2019000065A005>.

¹⁸ Haack, Sieweke, and Wessel, 21.

¹⁹ As described for shared mental models by Robin L. J. Lines et al., “Enhancing Shared Mental Models: A Systematic Review and Meta-Analysis of Randomized Controlled Trials,” *Sport, Exercise, and Performance Psychology* 11 (2022): 524–49, <https://doi.org/10.1037/spy0000288>.

²⁰ Pamela S. Tolbert and Lynne G. Zucker, “What Are MicroFoundations? Why and How to Study Them?,” in *Microfoundations of Institutions*, ed. Patrick Haack, Jost Sieweke, and Lauri Wessel, vol. 65A, *Research in the Sociology of Organizations* (London, UK: Emerald Publishing Limited, 2019), 3–8, <https://doi.org/10.1108/S0733-558X2019000065A004>.

²¹ Lynne G. Zucker, “The Role of Institutionalization in Cultural Persistence,” in *The New Institutionalism in Organizational Analysis*, ed. Walter W. Powell and Paul DiMaggio, Chapter 4 (Chicago: University of Chicago Press, 1991), 105–6.

contexts and how these dynamics and interactions coalesce into social structures at the macro level.”²² In contrast, single-level research, or ‘methodological individualism,’ leads to confusing explanations that hardly match reality.²³

Each level of analysis uses a similar approach. First, working from the base of mental models, the analysis reviews what complementary theory is relevant. Next, based on theory, a conceptual distinction is made between input, processing, and output to show causal mechanisms of behavioral processes related to individuals, groups, and organizations. Research on institutions traditionally looks at different levels “through the same lens.”²⁴ Since organizations exist as a whole rather than as distinct and independent entities as examined in the three analytical levels of analysis, the multiple levels are synthesized in the discussion. The discussion provides critical takeaways for military organizations and options for further research.

The thesis is structured as follows. First, the mental models’ perspectives and influence on the individual’s thinking and decision-making processes are assessed. Next, groups or teams in which people collaborate, and share thoughts are analyzed to consider group dynamics and how shared knowledge and experience influence the behavior of groups and individuals. Last, the thesis evaluates the organization as the overarching body in which groups and individuals co-exist. As a corporate entity, the organizations directs and guides the behavior of its subordinate elements through formal and informal rules, norms, and routines. Chapters III, IV, and V each explore one level of analysis, respectively, ending with a short summary and identifying the significance of the findings (‘so what’) for military organizations. Finally, Chapter VI presents a synthesis of all the previous chapters and discusses key findings.

²² Patrick Haack, Jost Sieweke, and Lauri Wessel, *Microfoundations of Institutions* (Bingley, UK: Emerald Publishing Limited, 2019), 21.

²³ Jepperson and Meyer take a slightly different approach, using individual, social-organizational, and institutional levels. Nevertheless, their critique on the reductionist approaches to research are shared by the author, hence the multi-level approach. Ronald Jepperson and John W. Meyer, “Multiple Levels of Analysis and the Limitations of Methodological Individualisms*,” *Sociological Theory* 29, no. 1 (2011): 54–73, <https://doi.org/10.1111/j.1467-9558.2010.01387.x>.

²⁴ Tolbert and Zucker, “What Are MicroFoundations?,” 6.

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III. INDIVIDUAL MENTAL MODELS

“What is the end result of perception? What is the output of linguistic comprehension? How do we anticipate the world, and make sensible decisions about what to do? What underlies thinking and reasoning?

One answer to these questions is that we rely on mental models of the world.”²⁵

Everything is about perspective. It is an ancient notion but very relevant today. “Our views of the world, ourselves, our culture and traditions, and even our norms and values are constructions—all experience is framed, ordered, and organized from particular points of view.”²⁶ Every individual interprets what they see in their own way. What appears as a mental image is directed by many things but primarily reflects previous experiences. For instance, education, environment, emotions, age, and racial background provide context for such representations. Knowledge and experience form the basis of representations, also known as mental models. What and how people sense and mentally evaluate a situation determines the projection of potential solutions to any given problem. Mental models are neither universally, socially, institutionally, nor culturally the same in every person, although they overlap and are socially, institutionally, and culturally shared or shareable with others.²⁷ As such, mental models play a ‘unifying role’ in cognitive science.²⁸

Humans cannot memorize every detail of every event that once happened to them; they only store highlights or nuggets. Simplifications are, therefore, helpful since they provide quick frames of reference to such events, enabling the individual to make decisions unconsciously, subconsciously, and consciously. As can be imagined, basing these

²⁵ Philip N. Johnson-Laird, “The History of Mental Models,” in *Psychology of Reasoning* (London, UK: Psychology Press, 2004), 179.

²⁶ Patricia H. Werhane, “Mental Models, Moral Imagination and System Thinking in the Age of Globalization,” *Journal of Business Ethics* 78, no. 3 (2008): 464, <https://www.jstor.org/stable/25075623>.

²⁷ Patricia Hogue Werhane, *Moral Imagination and Management Decision-Making* (New York: Oxford University Press, 1999), 12.

²⁸ P.n. Johnson-Laird, “Mental Models in Cognitive Science,” *Cognitive Science* 4, no. 1 (1980): 107, https://doi.org/10.1207/s15516709cog0401_4.

simplifications on a single experience or little knowledge is usually inaccurate. Mastering a skill or becoming an expert increases the consistency and accuracy of an individual's representations. There are various forms of mental models that offer unique perspectives on a situation. While none of them are all-encompassing, they do provide multiple frames of reference to consider.²⁹

This chapter starts with a literature review on the mental models of individuals, followed by a conceptualization of the mental models' process. The input to this process depends on the individual's personal knowledge and experience, is processed by intuitive or deliberate thinking, is affected by the environment, and results in unique representations.

As it relates to the military, this process is influenced by how military personnel gain experience and aggregate knowledge in training, education, and on the job. It is argued that most military personnel are 'specialists' in their branch, which ensures effective job employment. On the other hand, it limits critical thinking and keeps their perspectives narrow.

A. WHAT IT IS

Mental models are (personal), incomplete representations of reality, based on knowledge and experience that actors utilize to interact with their environment. The definition used in this research is a product of earlier research and synthesis of the multiple levels of analysis. Below an overview of the perspective of individual's mental models.

Notions of mental models were discussed as early as the 19th century.³⁰ Still, in 1944, Kenneth Craik was the first to write down the idea that a person holds a "small-scale model" of external reality—introducing the concept of a mental model.³¹ Combining this small-scale model with possible actions within his or her head, "a person can try out various alternatives, conclude which is best, react to future situations before they arise, and utilize

²⁹ Werhane, *Moral Imagination and Management Decision-Making*.

³⁰ For more information see: Johnson-Laird, "The History of Mental Models."

³¹ K. J. W. Craik, "The Nature of Explanation," *Philosophy* 19, no. 73 (1944).

the knowledge of past events in dealing with the present and future.”³² In short, any person, or group of persons, draws on a series of frames of reference to make sense of the world.

Experimental psychologist Philip Johnson-Laird further developed Craik’s theory on mental models in the 1980s.³³ Theories of syllogistic inferences³⁴ dominated the former’s early work on mental models. Several field studies found that people make systematic errors or overlook other evidence in logical reasoning. Such errors are due to a tendency for a direction of search (usually linear thinking), a tendency to use quantified assertions,³⁵ and a lack of set rules to make inferences. In short, it is intuitive. Even so, this approach is compatible with the development of formal logic. These mechanisms allow human beings to be capable of rational reasoning. Still, people may “fall into error if they fail to carry out a comprehensive destructive test of the models they create.”³⁶

B. WHAT IT DOES

Mental models are cognitive structures that are built through experience and are used for reasoning, decision-making, and behavior.³⁷ Individuals construct these mental models based on their experiences, social interactions, perceptions, and understanding of

³² Craik, 41.

³³ Johnson-Laird, “Mental Models in Cognitive Science”; Philip N. Johnson-Laird, “Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness” (Cambridge, MA: Harvard University Press, 1983).

³⁴ Syllogisms consist of two premises and a conclusion. For instance: when all A are B, and all B are C, then all A are C.

³⁵ Such as little, few, much, big, etc. Although related to quantities, their value differs per person since these cannot be measured.

³⁶ Johnson-Laird, “Mental Models in Cognitive Science,” 85.

³⁷ Not all behavior is based on mental models. There is a distinction between nature and nurture. Some behavior is programmed in our DNA, other behavior is conditioned. See: Daniel Kahneman and Amos Tversky, “Choices, Values, and Frames,” *American Psychologist* 39, no. 4 (1984): 341–50, <https://doi.org/10.1037/0003-066X.39.4.341>; Gardiner Morse, “Decisions and Desire,” *Harvard Business Review* 84, no. 1 (January 2006): 42–51; Daniel Kahneman, *Thinking, Fast and Slow*, Thinking, Fast and Slow (Farrar, Straus and Giroux (New York, NY, US), 2011), <http://www.proquest.com/docview/912802977/9A2A9D6341054391PQ/2>.; Arthur T. Denzau and Douglass C. North, “Shared Mental Models: Ideologies and Institutions,” *Kyklos* 47, no. 1 (March 1994): 7, <https://doi.org/10.1111/j.1467-6435.1994.tb02246.x>.

reality.³⁸ “They provide the mechanism through which new information is filtered and stored.”³⁹ According to Johnson-Laird’s mental model theory, individuals draw a “conclusion of necessity, probability, or possibility depending on whether a conclusion holds in all, most, or some of the models of the premises.”⁴⁰ From mental model input to output, reasoning is the process in between, in which personal knowledge is used to create simulations of the world. Unfortunately, individual reasoning is based on a unique perception of the world and leads to “systematic errors” in the output of human cognition.⁴¹

Johnson-Laird further asserts that “human reasoning is not simple, neat, and impeccable. It is not similar to logic. No clear distinction between deduction, induction, and abduction is drawn because it tends to exploit what we know.” Daily individual reasoning presents a “kinematic simulation of the world, fleshed out with all our relevant knowledge.”⁴² We base our conclusions and decisions on the simulations we conduct.⁴³ Everyone builds mental models that represent distinct possibilities. In essence, mental models affect reasoning.

When working, learning, and gaining experience, people try to understand real-world events, often by understanding and relating their thoughts to conceptual models. Conceptual models are processed or analyzed (multiple) interpretations of real-world events and codified into accurate models representing those events. Figure 1 is one depiction of how mental models may relate to observations of real-world events by

³⁸ Jones et al., “Mental Models”; Werhane, *Moral Imagination and Management Decision-Making*, 11–12.

³⁹ Jones et al., “Mental Models.”

⁴⁰ P. N. Johnson-Laird, “Mental Models, Sentential Reasoning, and Illusory Inferences,” in *Advances in Psychology*, ed. Carsten Held, Markus Knauff, and Gottfried Vosgerau, vol. 138, Mental Models and the Mind (North-Holland, 2006), 27–51, [https://doi.org/10.1016/S0166-4115\(06\)80026-9](https://doi.org/10.1016/S0166-4115(06)80026-9).

⁴¹ Philip N Johnson-Laird, “Mental Models and Human Reasoning,” *Proceedings of the National Academy of Sciences – PNAS*, Inaugural Article, 107, no. 43 (2010): 18243, <https://doi.org/10.1073/pnas.1012933107>.

⁴² Philip N Johnson-Laird, 18249.

⁴³ People can play “movies” in their minds. It is also known as internal visualization, the ability to mentally animate ideas or information. It correlates with knowledge and experience. Experts rely predominantly on internal visualization techniques over external stimuli. See: Mary Hegarty, “Dynamic Visualizations and Learning: Getting to the Difficult Questions,” *Learning and Instruction* 14, no. 3 (June 2004): 343–51, <https://doi.org/10.1016/j.learninstruc.2004.06.007>.

perception and action. It should be reiterated that created mental models are subjective and do not imply that mental models are subjective and hence not necessarily accurate or useful.

For example, when infantry recruits practice section battle drills for the first time, they have probably seen war movies or played video games representing these drills. Nevertheless, during training, they are presented with conceptual models. Explaining drills like advance to contact, fire and maneuver, and actions on the enemy provides a richer context than a movie or video game could bring. Only by practice do recruits become infantry soldiers, ready for battle. An experienced and knowledgeable person who self-reflects and aligns reality (the physical world) with the mental and conceptual models ensures effective action.

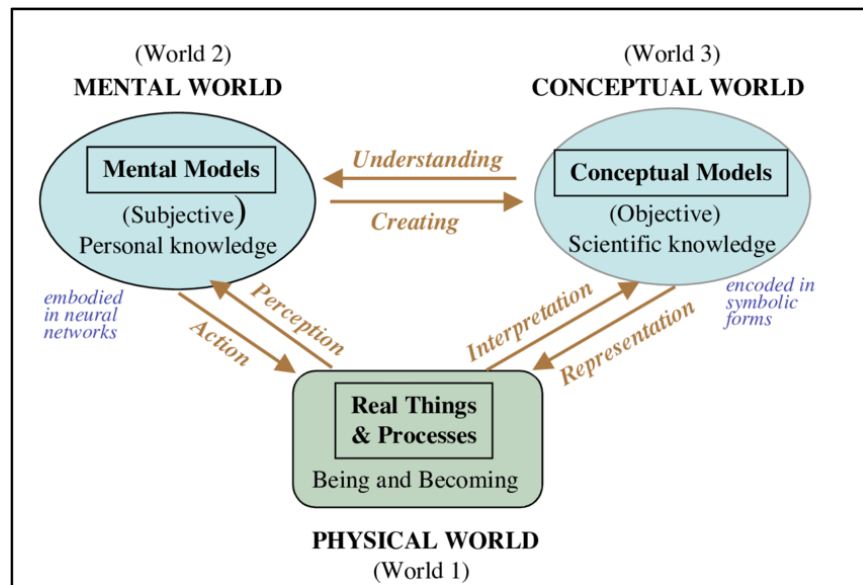


Figure 1. Mental models versus conceptual models and reality.⁴⁴

⁴⁴ Source: David Hestenes, "Notes for a Modeling Theory of Science, Cognition and Instruction," *Proceedings of the 2006 GIREP Conference on Modelling in Physics and Physics Education*, January 1, 2006, <https://www.semanticscholar.org/paper/Notes-for-a-Modeling-Theory-of-Science%2C-Cognition-Hestenes/066bbeae4d25ade2d16055886e330159bf3a2312>.

C. BRAIN AND MIND

In neuroscience, people study the brain and the mind. Although the brain and mind differ, they are often mentioned in one breath. The mind uses the brain to execute mental processes.⁴⁵ The human brain is the physical product of evolutionary development. Forming mental models is affected by the design and working of brains. Triune Brain Theory⁴⁶ explains how the human evolutionary brain has developed. Our brain represents a fusion of three parts, each with its own specifications.⁴⁷ The oldest part, the reptilian brain, safeguards basic needs; next, the limbic system houses emotions, learning, and social connectivity; the brain's newest part, the neo-cortex, holds higher cognitive skills like reasoning and abstract thinking. The primary application of these separate brain parts can be explained by varying evolutionary pressures. They depended on humans' unconscious ability to interpret the environment rapidly.⁴⁸

According to extensive research by psychologists over the past 30 years, cognitive frames play a vital role in various information-processing activities. These activities range from determining which information receives attention to how it is encoded, retained, retrieved, and organized into memory. Cognitive frames also influence how to interpret information, affecting evaluations, judgments, predictions, and inferences.⁴⁹

⁴⁵ This point of view is chosen for the research. Nevertheless, there is debate on the mind-brain problem (MBP) in how to address the relation between mental phenomena and neural (physical) phenomena. Two views exist, the first believes that the mind is a product of brain functioning while the other believes that the mind is something different and may exist beyond the brain. See: Alexander Moreira-Almeida, Saulo de F. Araujo, and C. Robert Cloninger, "The Presentation of the Mind-Brain Problem in Leading Psychiatry Journals," *Brazilian Journal of Psychiatry* 40, no. 3 (February 1, 2018): 335–42, <https://doi.org/10.1590/1516-4446-2017-2342>.

⁴⁶ Considered the most influential concept in neuroscience. Although still controversial, because of its simplifications, it explains three stages of evolutionary brain development. Paul D. MacLean, "A Triune Concept of the Brain and Behavior," *Zygon/Journal of Religion and Science* 2 (1973). And for a recent critical review: Joseph Cesario, David J. Johnson, and Heather L. Eisthen, "Your Brain Is Not an Onion with a Tiny Reptile Inside," *Current Directions in Psychological Science* 29, no. 3 (June 1, 2020): 255–60, <https://doi.org/10.1177/0963721420917687>.

⁴⁷ Paul D. MacLean, "The Triune Brain in Conflict," *Psychotherapy and Psychosomatics* 28, no. 1/4 (1977): 208, <https://www.jstor.org/stable/45114864>.

⁴⁸ John D. Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World*, Nachdr. (Boston: Irwin/McGraw-Hill, 2009), 17.

⁴⁹ W. Richard Scott, *Institutions and Organizations: Ideas, Interests, and Identities*, 4th edition (Los Angeles: SAGE Publications, 2014), 67.

Each component⁵⁰ of Maslow's hierarchy of needs,⁵¹ for example, can also be mapped to the triune brain and any specific mind (see Figure 2).⁵² Maslow's lower-level needs consist of physiological and safety needs attributed to the reptilian physical mind. Next are belongingness and love needs, which are aspects found within the limbic system as the emotional mind. The need for self-actualization, as well as the desire to know and understand, occur in the neocortex. Higher cognitive skills such as abstraction and reasoning, next to the realistic portrayal or accurate representation of the self, are qualities of the intellect. Alternatively, as Maslow states: "Self-actualizing people [...] seem to do what they do for the sake of ultimate, final values, which is for the sake of principles that seem intrinsically worthwhile. These values include truth, efficiency, justice, order, and lawfulness."⁵³

Following Maslow's hierarchy of human needs, the brain automatically turns to basic or emotional needs when cued. Reasoning and abstract thinking can only be possible when no immediate basic or emotional needs exist. However, a mature and self-aware human brain can overcome such deficiencies when it realizes the nature of such needs. Therefore, a person should know himself.

⁵⁰ Maslow's hierarchy of needs, or Maslow's pyramid, consists of five layers. Needs down in the hierarchy need to be satisfied before needs higher up can be attended to. The two lowest levels are basic needs, starting with physiological needs and then safety needs. The middle layers are psychological needs, starting with belonging and esteem as the next level. Above, at the top, is self-actualization as a self-fulfillment need. Like the triune brain theory, Maslow's hierarchy is widely accepted and used but is contested in academic settings due to simplification. Maslow mentioned that his hierarchy should not be interpreted as rigid in 1987. See Saul A. Mcleod, "Maslow's Hierarchy of Needs," Simply Psychology, May 21, 2018, <https://simplypsychology.org/maslow.html>.

⁵¹ Introduced in 1954, but Maslow kept refining the theory and adjusted versions in later reprints (1970 and 1987). The original: Abraham H. Maslow, *Motivation and Personality* (New York, NY: Harper and Rowe, 1954).

⁵² Ron McComb, "Needs, Moral Development, and the Triune Brain," <https://co-bw.com/BSC/TriuneBrainFin.pdf>, 1993.

⁵³ Abraham H. Maslow, *The Farther Reaches of Human Nature*, The Farther Reaches of Human Nature (New York, NY: Arkana/Penguin Books, 1971), 192.

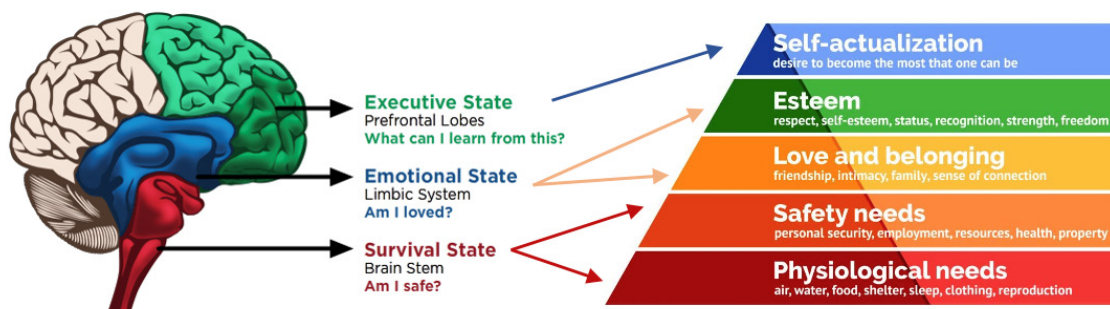


Figure 2. The relation between the Triune brain and Maslow's hierarchy of needs.⁵⁴

Whatever the explanation, “mental models play a crucial role in choice-making.”⁵⁵ Although these models are a ubiquitous part of human thinking and decision-making, most people are “unaware that mental models even exist” or “do not appreciate the ubiquity and invisibility of mental models, instead believing naively that our senses reveal the world as it is.”⁵⁶ When people base decisions on these simplifications and heuristics, it seems unconvincing when individuals need to formulate such mental references.⁵⁷

D. INPUT – FOOD FOR THOUGHT

Although mental models are omnipresent, a direction or goal is needed to elicit the relevant mental models to create images or propositions of potential future states. The creation of mental models depends on knowledge, experience, and beliefs. However, people possess different types of knowledge, tacit and explicit, and apply their knowledge in unique ways. This way, individuals think about problems and devise solutions from different perspectives.⁵⁸

⁵⁴ Adapted from Mcleod, “Maslow's Hierarchy of Needs”; Joehedzin, “Triune Brain Sin And The Behaviour Of Human,” Steemit, July 5, 2017, <https://steemit.com/life/@joehedz/triune-brain-sin-and-the-behaviour-of-human>.

⁵⁵ Denzau and North, “Shared Mental Models,” 7.

⁵⁶ Sterman, *Business Dynamics*, 2009, 16.

⁵⁷ Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy*, Nachdr. (Chicago: University of Chicago Press, 1958), 59.

⁵⁸ Elizabeth A. Smith, “The Role of Tacit and Explicit Knowledge in the Workplace,” *Journal of Knowledge Management* 5, no. 4 (December 1, 2001): 313, <https://doi.org/10.1108/13673270110411733>.

1. Knowing What or Knowing How?

Differentiation in knowledge is based on “knowing what” and “knowing how.”⁵⁹ Michael Polanyi showed in his seminal work on personal knowledge⁶⁰ that knowledge is not the same as skill. “The aim of a skillful performance is achieved by observing a set of rules which are not known to the person following them.”⁶¹ For instance, it occurs by riding a bicycle. People do not need to know the laws of physics of how a person on a bicycle operates. After learning the skill, it becomes natural, and one cycles without thinking and without a need to know how to engineer and build a bicycle or apply physics to calculate the amount of force required to move forward. This type of knowledge Polanyi called tacit knowledge – knowledge for which we have no need for words.⁶² Such tacit knowledge is based and built on experiences; just like mastering a skill is only possible through experience.⁶³ Experience is based on a skillset and about mastering such a skill. To become a karate master, one must gain knowledge and practice for many years. Training develops mastery in the karate skill and will be rewarded with a black belt to acknowledge the master. Skills can only be transferred by example and experimentation, not by precept. “Without direct experience, information about potential outcomes may not be known or easily acquired.”⁶⁴

Explicit knowledge (knowing what) is how people usually frame the term knowledge. It can be considered academic knowledge, described in formal language in

⁵⁹ Carlotta Pavese, “Knowledge How,” in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta and Uri Nodelman, Fall 2022 (Metaphysics Research Lab, Stanford University, 2022), <https://plato.stanford.edu/archives/fall2022/entries/knowledge-how/>.

⁶⁰ Polanyi, *Personal Knowledge*.

⁶¹ It is portrayed as unspecifiable according to Polanyi, 49, 62–63.

⁶² Michael Polanyi, *The Tacit Dimension* (Chicago ; London, UK: University of Chicago Press, 1966).

⁶³ As presented by the Dreyfus skill acquisition model. Acquiring a skill and mastering it is a five stage process. The five developmental stages are: Novice, Competence, Proficiency, Expertise, and Mastery. Stuart E. Dreyfus, “The Five-Stage Model of Adult Skill Acquisition,” *Bulletin of Science, Technology & Society* 24, no. 3 (June 1, 2004): 177–81, <https://doi.org/10.1177/0270467604264992>; S.E. Dreyfus and Hubert Dreyfus, “A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition” (Berkeley: University of California, February 1, 1980).

⁶⁴ Denzau and North, “Shared Mental Models,” 5.

print, or electronic media, and often based on established work processes.⁶⁵ Since explicit knowledge can be written in words, it is easier to transfer it to others. Distinguishing between tacit and explicit knowledge is academically sound but might confuse the military audience, where the notion of experience is highly valued. Therefore, this paper notes the distinction between knowledge (knowing what) and experience (knowing how). Moreover, mentioning knowledge implies explicit knowledge; discussing experience includes tacit knowledge.

From a holistic perspective, people know more than they can tell. Both knowledge and experience have in common that these are intangible. It is hard to define the boundaries of one's knowledge and expertise. People cannot perfectly describe their level of skill or depth of knowledge.⁶⁶ It can be difficult to determine the necessary level of skill and knowledge needed to produce accurate representations. In addition, individuals who lack proficiency in this area may not realize their limitations, which can result in mistakes and an inability to recognize them. Experts may underestimate their abilities, while novices tend to overestimate due to a lack of understanding of what constitutes good performance.⁶⁷

2. Where You Stand Depends on Where You Sit

Experience builds on experiences. It is very dependent on the immediate environment. Although the team and organization levels are discussed in later chapters, viewing the environment from an individual perspective is valuable. Such an immediate environment 'nurtures' the individual.⁶⁸ Miles's law states: "Where you stand depends on

⁶⁵ Smith, "The Role of Tacit and Explicit Knowledge in the Workplace," 324.

⁶⁶ Polanyi, *The Tacit Dimension*, 4.

⁶⁷ Justin Kruger and David Dunning, "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments," *Journal of Personality and Social Psychology* 77 (1999): 1121–34, <https://doi.org/10.1037/0022-3514.77.6.1121>.

⁶⁸ It does not imply it is only about nurture, since behavior is orchestrate by an interplay between inherited and environmental influences. For a technical explanation see: Gene E. Robinson, "Beyond Nature and Nurture," *Science* 304, no. 5669 (April 16, 2004): 397–99, <https://doi.org/10.1126/science.1095766>.

where you sit.”⁶⁹ One’s function and personal context give meaning and direct one’s behavior. What is deemed reasonable and necessary is created by the immediate working environment. Every person has a function to perform, and “that assigned responsibility markedly influences one’s judgment.”⁷⁰ As Stephen R. Covey put it in his influential book on effective people:⁷¹ “Each of us tends to think we see things as they are, that we are objective. But this is not the case. We see the world, not as it is, but as we are—or, as we are conditioned to see it. When we open our mouths to describe what we see, we, in effect, describe ourselves, our perceptions, our paradigms. When other people disagree with us, we immediately think something is wrong with them.” Miles argues that it has to do with loyalty and attachment to one’s department (where you sit).

The notion of ‘where you stand depends on where you sit’ has vertical and horizontal implications. Looking “sideways” implies communicating with peers for commitment, while communicating “upwards” needs confidence, and “down” requires options to make others buy-in on a perspective.⁷² In summary, People see things and form judgments of things from their perspective. Grounding conclusions on personal experience alone does not present a complete picture. We need to discipline ourselves to see things from others’ vantage points.

E. PROCESSING IS REASONING

Thinking depends on tacit processes guided by constraints: that is, “the thinker’s goal, if any, and pertinent knowledge and beliefs.”⁷³ When thinking about a goal, the brain uses simplification to process relevant information and make choices. Each distinct possibility is constructed into a mental model during reasoning to help the individual

⁶⁹ As it was introduced by Rufus Miles, when working for the U.S. government in the 1940s.

⁷⁰ Rufus E. Miles, “The Origin and Meaning of Miles’ Law,” *Public Administration Review* 38, no. 5 (1978): 400, <https://doi.org/10.2307/975497>.

⁷¹ Stephen R. Covey, *The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change*, 25th anniversary ed (London, UK: Simon & Schuster, 2013).

⁷² Graham T. Allison, “Conceptual Models and the Cuban Missile Crisis,” *The American Political Science Review* 63, no. 3 (1969): 711, <https://doi.org/10.2307/1954423>.

⁷³ Philip N. Johnson-Laird, “Mental Models and Deduction,” *Trends in Cognitive Sciences* 5, no. 10 (October 2001): 434, [https://doi.org/10.1016/S1364-6613\(00\)01751-4](https://doi.org/10.1016/S1364-6613(00)01751-4).

compare, contrast, and ultimately decide. At the start, all options are considered equally likely unless there is information or personal beliefs to the contrary, in which case people will assign different probabilities to different options.⁷⁴ “The capacity to draw inferences rests fundamentally on the ability to construct and manipulate mental models.”⁷⁵

1. Bounded Rationality

Rational human behavior has been a central object of study in economics and cognitive psychology.⁷⁶ As human beings, we have inherent limitations when it comes to retaining large amounts of information and comprehending multiple sets of rules.⁷⁷ Choosing options that are good enough to meet aspirations or ambitions is commonplace.⁷⁸ Because human rationality is bounded, individuals’ abilities are limited. In 1955, Herbert Simon introduced the concept of bounded rationality as his response to an economist’s portrayal of rational decision-making as rational behavior. In his seminal article on rational choice⁷⁹ characterizes bounded rationality as:

1. A limited set of alternatives considered,
2. Incomplete information about the present and future,
3. Incomplete information about the probability of the future, and
4. Subject to time constraints which change aspirations over time.

In his 1957 book on the “Models of Man,” Herbert Simon introduced the term “satisficing” (a merging of “satisfy” and “suffice”). He asserts that making decisions based on fulfilling needs satisfactorily is preferred over attempting to maximize outcomes with

⁷⁴ P. N. Johnson-Laird et al., “Naive Probability: A Mental Model Theory of Extensional Reasoning,” *Psychological Review* 106 (1999): 68, <https://doi.org/10.1037/0033-295X.106.1.62>.

⁷⁵ Johnson-Laird, “Mental Models in Cognitive Science,” 108.

⁷⁶ Herbert A. Simon, “From Substantive to Procedural Rationality,” *Method and Appraisal in Economics*, 1976, 65.

⁷⁷ Simon, “A Behavioral Model of Rational Choice.”

⁷⁸ Herbert A. Simon, “Rationality as Process and as Product of Thought,” *The American Economic Review* 68, no. 2 (1978): 1–16, <https://www.jstor.org/stable/1816653>.

⁷⁹ Simon, “A Behavioral Model of Rational Choice.”

imperfect information. Supported by empirical evidence, showing that individuals' conduct is shaped not just by their external surroundings but also by their internal environment, which encompasses their cognitive processes, knowledge, and experience.⁸⁰ Due to bounded rationality, people satisfice rather than optimize because they have incomplete information on future states. Restrictions on time, availability, and information processing capacity inhibit one's ability to make perfect decisions.⁸¹

2. Three Principles of Mental Models

From a different perspective but showing similarity, Johnson-Laird's theory of mental models rests on three principles:

1. Each mental model represents what is common to a distinct set of possibilities.
2. Mental models are iconic. Their structure corresponds (as far as possible) to the system of what they represent.
3. Mental models are based on descriptions representing what is true at the expense of what is false.⁸²

In layperson's terms, these three principles establish that mental models follow what is familiar to a person and are determined by social or environmental factors. People tend to zoom in on the focus of attention and make sense of a situation in a way they understand. Such understanding develops according to the breadth and depth of the individual's experience. With experience, reasoners develop 'tailored' strategies for specific problems. Specialists provide deep but narrow understanding, meaning their mental model representation narrowly focuses on a specific subject. Although this

⁸⁰ Herbert A. Simon, "Bounded Rationality in Social Science: Today and Tomorrow," *Mind & Society* 1, no. 1 (March 2000): 25, <https://doi.org/10.1007/BF02512227>.

⁸¹ Herbert A. Simon, *Models of Man; Social and Rational* (Oxford, UK: Wiley, 1957).

⁸² P. N. Johnson-Laird, "Mental Models and Cognitive Change," *Journal of Cognitive Psychology* 25, no. 2 (March 1, 2013): 132, <https://doi.org/10.1080/20445911.2012.759935>.

approach is useful because of its accuracy, it limits applying a broader and more creative perspective.⁸³

Iconic memory⁸⁴ ensures that when a person captures (details of, or a part of) an image. At least some features are remembered, but mostly not the whole. Such memory fades over time. Passing a billboard along the highway has this effect. Shortly after passing it, one remembers the picture or a quote from the billboard but has forgotten about it after arriving at one's destination. Third, people look for confirmation. When there is no evidence, and something is not determined false, it is perceived as true. In reasoning, people aim for valid, probable conclusions (given the premises). To refute invalid findings, people can search for counterexamples.⁸⁵ Also, there is "a tendency to develop novel but parsimonious ideas. Searching for a property or relation that was not among the premises."⁸⁶ Trying to 'outsmart' conventions is seen as a noble ambition but usually does not work when people have too little experience.

3. Heuristics and Biases

Daniel Kahneman and Amos Tversky famously wrote about their findings on heuristics and cognitive biases. They found systematic errors in the thinking of ordinary people, and they traced those errors back to the "machinery" of cognition, i.e., to its boundedness.⁸⁷ When considering future states, heuristics are often decisive in the human decision-making process by assessing 'probabilities' in an intuitive manner. One form of biases stems from representativeness, where people estimate the probability of an event based on its similarity with a known situation while thinking it is a valid option.⁸⁸

⁸³ As excellently illustrated by David J. Epstein, *Range: Why Generalists Triumph in a Specialized World* (New York: Riverhead Books, 2019).

⁸⁴ As introduced by George Sperling after experimenting with brief visual exposure and memory. George Sperling, "The Information Available in Brief Visual Presentations," *Psychological Monographs: General and Applied* 74 (1960): 1–29, <https://doi.org/10.1037/h0093759>.

⁸⁵ Johnson-Laird, "Mental Models and Deduction," 441.

⁸⁶ Johnson-Laird, "Mental Models and Cognitive Change," 132.

⁸⁷ As mentioned in Daniel Kahneman, *Thinking, Fast and Slow*, Penguin Psychology (London, UK: Penguin Books, 2012), 8.

⁸⁸ Tversky and Kahneman, "Judgment under Uncertainty," 1124–27.

Availability can also cause misrepresentations because frequency of exposure to specific information inclines people to rely on that information. Relying solely on available or readily accessible information might provide flawed input for reasoning.⁸⁹ Another phenomenon is anchoring, by which people use commonly known information as a baseline or initial value to determine their choice and potential adjustment.⁹⁰

Next to judgmental heuristics, people have ways of acting under risk. Prospect theory⁹¹ explains how people behave and decide in situations involving risk and uncertainty, leading to gains or losses relative to the current situation (as a reference point). One of the fundamental principles is loss aversion, reflecting a person's preference to avoid losses because people perceive these as more hurtful than gaining the equivalent. Such hurt especially applies to "owned" objects. They are considered more valuable than their relative market value. This phenomenon is called the endowment effect, where additional emotional value is added to the market value, making the loss more painful.⁹² Loss aversion implies that individuals tend to preserve at the status quo because changing it might result in more significant disadvantages than advantages.⁹³

F. OUTPUT – CHOICES OR DECISIONS

As already mentioned, Maslow described the hierarchy of needs, which posits that there might not be any rational or deliberate thinking while the mind is occupied with basic survival or seeking emotional stability.⁹⁴ Without self-awareness and self-direction, an individual will find it challenging to overcome this mental tendency. Unfortunately, people's awareness that mental models even exist is very low, implying that self-awareness

⁸⁹ Tversky and Kahneman, 1127–28.

⁹⁰ Tversky and Kahneman, 1128–30.

⁹¹ Daniel Kahneman and Amos Tversky, "Prospect Theory: An Analysis of Decision under Risk," *Econometrica* 47, no. 2 (1979): 263–91, <https://doi.org/10.2307/1914185>.

⁹² Daniel Kahneman, Jack L. Knetsch, and Richard H. Thaler, "Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias," *Journal of Economic Perspectives* 5, no. 1 (March 1991): 197, <https://doi.org/10.1257/jep.5.1.193>.

⁹³ Kahneman, Knetsch, and Thaler, 197–98.

⁹⁴ Maslow, *Motivation and Personality*.

and self-direction are not expected.⁹⁵ When assessing individuals' choices or decisions, one should filter potential emotional biases or note the possibility that emotions might affect their choices. As Johnson-Laird and Herbert Simon explained, people satisfice and make choices about what is familiar and perceived as accurate because they can never have or process all the necessary information.⁹⁶

1. Plausible Explanations

From a rational perspective, an evaluation of the output of mental models raises the notion of a double-edged sword. Mental models are not true or false since they are built on multidimensional representations. For instance, language, culture, points of view, and experience contribute to forming mental models. All these are vague concepts, subject to interpretation. Nevertheless, such multi-dimensionality creates a broad array of background information. Therefore, people with a limited understanding of a topic can still make something out of it. Their imagination creates “plausible” ideas⁹⁷ based on such incomplete background information. Although these ideas might not be accurate, they can convey creative ‘out of the box’ options or find new solutions to existing problems. Paradoxically, out-of-the-box ideas or limited understanding can also be considered ignorant and useless. The crux is that people rely on intuitive (experience-based) thinking, but their experience is not necessarily sufficient to imagine potential outcomes.

2. Simplification

Mental models use simplifications and shortcuts to guide decisions. If such behavior were detrimental to the survival of human beings, it would have evolved. However, these mechanisms have kept humans from harm throughout their evolution. Benefits from simplifications are quick decisions based on personal experience and gathered knowledge. In today's intricate and constantly evolving world, intuition can make

⁹⁵ This does not only depend on the awareness of mental model existence. Considering the enormous media attention on improving oneself, such awareness is helped but not directed or structured.

⁹⁶ Simon, “A Behavioral Model of Rational Choice”; Philip N Johnson-Laird, “Mental Models and Human Reasoning.”

⁹⁷ Without decent references or specific experience, one uses imagination to create a large variety of potentially plausible options. Without evidence to counter imaginary options, they are considered possible.

or break your success. In situations where time and decision support are scarce resources, relying on this approach may be the only viable option.⁹⁸ Gaining experience and expertise helps make timely and effective decisions. Building such expertise benefits individuals and support groups, organizations, and society.⁹⁹

Nevertheless, intuitive and less deliberate decision making can be troublesome as a decision-making tool at the managerial level.¹⁰⁰ Due to cognitive limitations or a lack of information, reasoners generally use short-cuts when faced with complex problems. Mental model theory “predicts systematic errors in our reasoning, and the evidence corroborates this prediction.”¹⁰¹ As already noted, it is not feasible to take all possible input into account and process it, for it soon exceeds the capacity of any human mind.¹⁰² Therefore, people draw possible, thus satisfactory conclusions¹⁰³ rather than necessarily accurate ones.¹⁰⁴ Theoretically, problem-solving and decision-making involves breaking down complex problems into manageable parts. These activities concern how people “apply approximation and use heuristic techniques to handle the complexity that cannot be handled exactly.”¹⁰⁵ Although intuition brings many risks and problems, managers use in strategic decision-making. Why? The answer is straightforward, “intuition has a certain allure.”¹⁰⁶

⁹⁸ As supported by C. Miller and R. Duane Ireland, “Intuition in Strategic Decision Making: Friend or Foe in the Fast-Paced 21 St Century?,” *Academy of Management Executive* 19, no. 1 (January 1, 2005): 28.

⁹⁹ As mentioned by Adam Smith where specialization leads to the division of labor to create economic prosperity. Adam Smith, *The Wealth of Nations* (London, UK: W. Strahan and T. Cadell, 1776).

¹⁰⁰ Although different individual perspectives such as roles and responsibilities have not been discussed yet, this example highlights dealing with limited resources. See: Miller and Ireland, “Intuition in Strategic Decision Making,” 19. On the other hand information can also be considered a resource. Herbert Simon partly based his bounded rationality model on imperfect information and lacking time.

¹⁰¹ Philip N Johnson-Laird, “Mental Models and Human Reasoning,” 18243.

¹⁰² As also noted by Philip N Johnson-Laird, 18243.

¹⁰³ As part of the theory of rational decisions, which involves satisficing instead of optimizing criteria. See: Simon, “A Behavioral Model of Rational Choice.”

¹⁰⁴ Simon’s theory is supported by research in psychology. See: Johnson-Laird, “Mental Models and Deduction,” 441.

¹⁰⁵ Herbert A. Simon et al., “Decision Making and Problem Solving,” *Interfaces* 17, no. 5 (October 9, 1987): 13, <https://doi.org/10.1287/inte.17.5.11>.

¹⁰⁶ Miller and Ireland, “Intuition in Strategic Decision Making,” 28.

Using mental models, deductive thinking only represents what is true, not what is false. Therefore, there is a dominant focus on what is true that neglects what is false. Such neglect of falsity leads to systematic illusions in reasoning.¹⁰⁷ Since it is not intuitive to consider false positives or false negatives, the outcome of reasoning improves only when all options, both true and false, are considered.¹⁰⁸ Yet, according to the concept of belief bias, people are “biased to accept invalid inferences if their conclusions are true and reject them if they are false.”¹⁰⁹

3. Power of Knowledge

Gaining more knowledge or experience will improve the breadth and depth of one’s reasoning abilities. More experienced people can imagine things in their specific context or specialty, making outcomes more concrete. Due to their background, and the specific knowledge and experience they possess, specialists quickly and intuitively provide accurate solutions in their field of expertise. Although their options are mostly easier and quicker to apply, there is a downside. Specialists are experts in their field but have difficulty expanding their views beyond their mental models. This leads to ‘more of the same solutions.’ In addition, it can limit creativity in their problems solving since their frame of reference is too narrow or specialized.

G. SO WHAT?

People use intuitive and deliberate thinking to make decisions but are generally unaware that these (distinct) thinking processes exist. Mental models provide mental frameworks to assist individuals in thinking and evaluating their options. However, without the proper background, people can still make decisions based on “gut feelings.” This practice leads to systematic errors (biases) and satisficing behavior, because what people recall remembering might not be a correct representation of reality. Iconic memory determines what is remembered or what features stand out to be remembered (like

¹⁰⁷ Johnson-Laird, “The History of Mental Models,” 199.

¹⁰⁸ In accordance with: Johnson-Laird, “Mental Models and Deduction.”

¹⁰⁹ Johnson-Laird, “Mental Models and Cognitive Change,” 135.

nudging¹¹⁰). It leads to assumptions when the individual thinking or making decisions. Next, these frameworks are built on personal knowledge and experience, the difference between know-what and know-how. Further, iconic memory creates varying perceptions of knowledge and how something can be considered trustworthy. It can be determined by hard facts, individual beliefs, or socially constructed (as discussed in the following chapters). Maybe, questioning what is true is a defective approach and asking the wrong question. Instead, it is more a matter of ‘knowing what you don’t know, not thinking that you do.’ Knowing what you know and accurately perceiving your surroundings can lead to effective strategies for future endeavors.

Since humans are boundedly rational, they are incapable of having or processing all the relevant and applicable information when they are making a decision. Therefore, the likelihood of someone who is not knowledgeable or experienced making a suboptimal decision is relatively high. It provides the excuse: “How could we know?” Furthermore, people perceive things as true (correct, undisputed) unless there is clear evidence that it is false. Poor decisions based on that shortcoming often give rise to the familiar excuse: “We didn’t know any better.” Knowledge fades due to our iconic memory. Experience works best when someone gets exposed to the same information multiple times, which prevents such fading of knowledge and increases the amount of information that can be stored. Otherwise, “I cannot remember” is part of the excuse in this instance. When someone is presented with information but lacks specific experience or knowledge, he or she cannot place it in the proper context. There is no commonality, which is expressed as “I don’t understand” for missing knowledge or “I don’t know how to do it” for missing experience. Understanding one’s environment is imperative in military operations. A lack of understanding can lead to harm to oneself or of team members.

So, what is the significance of this topic for military organizations? As in many other fields, understanding one’s environment is imperative in military operations. A lack of understanding can lead to harm to oneself or team members. Yet, this author found little

¹¹⁰ Cass R. Sunstein, “Nudging: A Very Short Guide,” *Journal of Consumer Policy* 37, no. 4 (December 1, 2014): 583–88, <https://doi.org/10.1007/s10603-014-9273-1>.

research exploring the role of mental models in the military profession,¹¹¹ even though as overarching concepts mental models apply to all humans. Young adults starting their career in the military develop many mental models that simulate the military profession. Before becoming service members, these individuals' gained experience and knowledge by living in a relatively safe environment with their families, being at school, and having a social life with family, peers, and sports teams. To become military professionals, all military personnel start with military training and education programs. According to the United States Department of Defense (DOD) Instruction for Military Education, such training aims to:

1. Equip warfighters and security professionals with the knowledge and habits of mind required for operational success to ensure the force's cognitive readiness.
2. Develop strategic-thinking warfighters who leverage diverse experiences, backgrounds, and perspectives to think critically and creatively about using military power to inform national strategy, conduct globally integrated operations, and fight under conditions of disruptive change.
3. Prepare the DOD workforce to perform effectively and ethically across the entire spectrum of DOD operations to achieve national security objectives.¹¹²

These objectives are conceptual and aimed at helping the individual gather knowledge and experience. The difficulty with these high-level intentions is that it seems the individual is acting at the strategic or national level. For instance, the basics (knowledge) of strategic thinking can be learned, but gaining experience in strategic thinking is much more complicated. The latter requires proper context or work environment to achieve. Next, one can question whether all military personnel need to be strategists. Questioning whether knowledge or experience should have the upper hand in training and education is valuable. As depicted by M.D. Feld in 1959, there is a "sharp distinction

¹¹¹ Not at the individual level of analysis, no specific articles were found.

¹¹² U.S. Office of the Under Secretary of Defense for Personnel and Readiness, "DOD Instruction 1322.35, Volume 1 Military Education: Program Management and Administration" (Washington, D.C.: Department of Defense, April 26, 2022), 3.

between posts giving the experience and those giving the understanding of combat.”¹¹³ Another aspect worth clarifying is the setting in which a military operates.¹¹⁴ Most agree that military personnel should be ready to operate under Volatile, Uncertain, Complex, and Ambiguous (VUCA) circumstances. Therefore, policymakers should realize that “the conditions most favorable to rational activity, calm and detachment, stand in direct antithesis to the confusion and involvement of combat.”¹¹⁵ Preparing for such conditions is not only possible¹¹⁶ but should be a basic requirement.¹¹⁷ Regrettably, instead of dealing with uncertainty, military training and education embraces uniformity and emphasizes scenario-based pre-planned drills that create mental models for training-induced conditions that are not present in the real world. The adage “train as you fight” hardly applies.¹¹⁸

The question is, what underlies the aim of training, education, and exercise? In a practical sense, it is about being deployed and being able to add value to that deployment. However, it should be more profound than such a spatial and temporal focus. Some nations see the concept of “fighting power” as their (doctrinal) guidance,¹¹⁹ which is “built upon human capabilities and comprises of the skills, knowledge, and experience” of military

¹¹³ M. D. Feld, “Information and Authority: The Structure of Military Organization,” *American Sociological Review* 24, no. 1 (1959): 15, <https://doi.org/10.2307/2089578>.

¹¹⁴ U.S. Office of the Under Secretary of Defense for Personnel and Readiness, “DOD Instruction 1322.35,” sec. 1.2.

¹¹⁵ Feld, “Information and Authority,” 15.

¹¹⁶ As explained by Nathan Bennett and G. James Lemoine, “What VUCA Really Means for You,” *Harvard Business Review* 92, no. 1/2 (February 1, 2014): 27–27.

¹¹⁷ Feld, “Information and Authority,” 15.

¹¹⁸ As also suggested by Sebastiaan Rietjens, Paul C. Van Fenema, and Peter Essens, “‘Train as You Fight’ Revisited: Preparing for a Comprehensive Approach,” *PRISM* 4, no. 2 (2013): 17–29, <https://www.jstor.org/stable/26469807>. More conceptually discussed by Weick and Sutcliffe, it is not possible to prepare for everything, therefore resilience based on gained experience is more useful than a narrow focus on standards. See: Karl E. Weick and Kathleen M. Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*, Third edition (Hoboken, New Jersey: Wiley, 2015).

¹¹⁹ Such as the Netherlands, the United Kingdom, and Australia. It defines the ability to fight or operate as the military instrument of national power and includes a conceptual, physical, and moral component. See: Netherlands Ministry of Defense, “Nederlandse Defensie Doctrine” (Ministerie van Defensie, June 19, 2019), <https://www.defensie.nl/downloads/publicaties/2019/06/19/herziene-nederlandse-defensie-doctrine-ndd-2019>; UK Ministry of Defence, “Joint Doctrine Publication 0-01 UK Defence Doctrine” (London: Ministry of Defense, November 2014).

organizations (see Figure 3).¹²⁰ As mentioned in the UK Defense Doctrine, this fighting power may be enhanced by applying scientific research relating to the social, psychological, and behavioral aspects of human behavior.¹²¹ Comprising a moral, conceptual, and physical component, fighting power shows the significance of mental models related to knowledge in the conceptual component, experience in the moral component, and a mixture of both in the physical component.

Fighting power underlines the military context and how military organizations contribute to national interests. Its components should direct how to further enhance military personnel building knowledge and gaining experience that contributes to or potentially improves the fighting power itself. Mental models are not just a theoretical phenomenon but can be utilized as a ‘tool’ for understanding how individuals learn and re-learn. Deciding what mindset is imperative can be used to create learning experiences where military professionals gain the right input to achieve such a mindset.

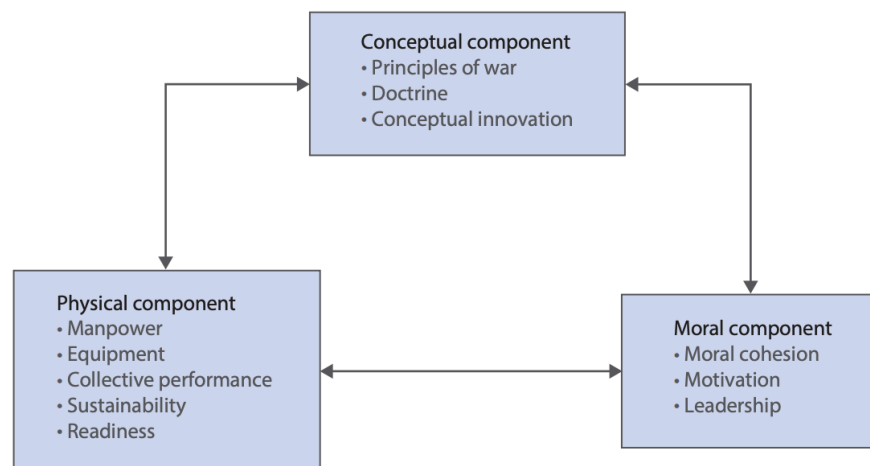


Figure 3. The components of fighting power.¹²²

¹²⁰ UK Ministry of Defence, “UK JDP 0–01,” 26.

¹²¹ UK Ministry of Defence, 26.

¹²² Source: UK Ministry of Defence, 25.

IV. GROUP MENTAL MODELS

In the previous chapter mental models were explored on the individual level. In this chapter, they are studied on the group level. Simply put, a group is two or more persons with something in common that links them by some kind of relationship.¹²³ There are many types of groups, but the ones of interest for this research are formal groups and ad-hoc groups in organizations. As the following chapter illustrates, there is a difference between these two groups in their type of relationships and strength of ties. This difference can be observed in military organizations when looking at small tactical ‘units of action’¹²⁴ or policy teams at the ministerial level, which both share an obligation to pursue broad objectives.

The exploration of group mental models is structured as follows. In addition to individual mental models, social identities influence groups and the people within them. Where the unit has a salient shared social identity, the policy team has not. So, what is this ‘sharedness,’ and how does it affect groups? Using social identity theory, it is possible to conceptualize mental model input which also leans on knowledge and experience but at the group level. Group dynamics play another role, addressing structure, context, and beliefs. Shared mental models are processed by considering task or team orientations and whether accuracy or similarity is dominant. Team or shared mental models can provide mechanisms to enhance and optimize group performance but they can also lead to conformity, depersonalization, and too much similarity which might lead to groupthink.

A. WHAT THEY ARE

The world is too complex for a single individual to learn how it all works. Furthermore, focusing on the individual level in the study of cognition is inadequate for

¹²³ Donelson R. Forsyth, *Group Dynamics*, 6th ed (Belmont, CA: Wadsworth Cengage Learning, 2014), 2.

¹²⁴ Who can conduct small unit tactics. The smallest unit of action is determined on its ability to conduct combat missions independently.

capturing even personal-level thinking in all its variety because ‘making sense’¹²⁵ out of situations is a social phenomenon.¹²⁶ “Decision-making and problem-solving change when attention turns from the behavior of individuals to the conduct of these same individuals operating as members of groups.”¹²⁷ Individuals with common cultural backgrounds, shared experiences, or the same working environments will share reasonably convergent mental models, ideologies, and institutions. Their “physical and socio-cultural linguistic environment” contributes to the individual experience, which creates mental models.¹²⁸

In short, when operating in groups, individuals interact, and this interaction forms shared cognition.¹²⁹ Over time, mental model research expanded from an individual to a collective focus, recognizing that cognition has a social component and that decision-making proceeds from an individual to a group and ultimately to a societal level.¹³⁰ “From the groups and teams literature, we know that to work together successfully, teams should perceive, encode, store, and retrieve information in similar ways.”¹³¹ Such a shared mental model portrays how a group of individuals possesses a similar cognitive representation of some situation or phenomenon. A group with a shared mental model is one where most, if not all, group members “think about a phenomenon or situation in a very similar

¹²⁵ In accordance with the sensemaking concept of Karl Weick, where people interact to make sense out of situations. It results in organizing and organization. See: Karl E. Weick, Kathleen M. Sutcliffe, and David Obstfeld, “Organizing and the Process of Sensemaking,” *Organization Science* 16, no. 4 (2005): 409–21, <https://www.jstor.org.libproxy.nps.edu:2048/stable/25145979>.

¹²⁶ Klimoski and Mohammed, “Team Mental Model,” 406.

¹²⁷ Simon et al., “Decision Making and Problem Solving,” 27.

¹²⁸ Denzau and North, “Shared Mental Models,” 8.

¹²⁹ Janice Langan-Fox et al., “Analyzing Shared and Team Mental Models,” *International Journal of Industrial Ergonomics* 28, no. 2 (August 1, 2001): 99–112, [https://doi.org/10.1016/S0169-8141\(01\)00016-6](https://doi.org/10.1016/S0169-8141(01)00016-6).

¹³⁰ Jones et al., “Mental Models.”

¹³¹ Janice Langan-Fox, Jeromy Anglim, and John R. Wilson, “Mental Models, Team Mental Models, and Performance: Process, Development, and Future Directions,” *Human Factors and Ergonomics in Manufacturing & Service Industries* 14, no. 4 (2004): 335, <https://doi.org/10.1002/hfm.20004>.

manner.”¹³² Group mental models transcend the individual; they are concerned with the commonality of individual mental models and how these emerge within a team.¹³³ Team mental models “fulfill multiple functions, such as allowing team members to interpret information in a similar manner (description), share expectations concerning future events (prediction), and develop similar causal accounts for a situation (explanation).”¹³⁴ In other words, team models contribute to a common view of “what is happening, what will happen next, and why it is happening.”¹³⁵

On the other hand, since group members provide input, individuals with different learning experiences (for instance, in other environments) will have different theories (models, ideologies) about how to interpret their environment.¹³⁶ Teams create and hold multiple mental models simultaneously, and “there can be (and probably would be) multiple mental models co-existing among team members at a given point in time.”¹³⁷ Therefore, the definition of ‘shared’ means in groups is ambiguous.¹³⁸ “It results from the continual interplay between the individual, the context in which they operate, the frames of reference related to these contexts, and the political and social processes at work.”¹³⁹ Additionally, one group member might prefer sharing knowledge, while another considers

¹³² Janis A. Cannon-Bowers, Eduardo Salas, and Sharolyn Converse, “Shared Mental Models in Expert Team Decision Making,” in *Individual and Group Decision Making: Current Issues* (Hillsdale, NJ: Lawrence Erlbaum Associates, Inc, 1993), 221–46.

¹³³ Langan-Fox, Anglim, and Wilson, “Mental Models, Team Mental Models, and Performance,” 341.

¹³⁴ W.B. Rouse, J.A. Cannon-Bowers, and E. Salas, “The Role of Mental Models in Team Performance in Complex Systems,” *IEEE Transactions on Systems, Man, and Cybernetics* 22, no. 6 (November 1992): 1300, <https://doi.org/10.1109/21.199457>.

¹³⁵ Susan Mohammed, Lori Ferzandi, and Katherine Hamilton, “Metaphor No More: A 15-Year Review of the Team Mental Model Construct,” *Journal of Management* 36, no. 4 (July 1, 2010): 879, <https://doi.org/10.1177/0149206309356804>.

¹³⁶ Denzau and North, “Shared Mental Models,” 1.

¹³⁷ Klimoski and Mohammed, “Team Mental Model,” 432.

¹³⁸ What is shared among group members is ambiguous, since ‘sharing’ can mean many things regarding knowledge, experience or expectations. Group members could share by “having in common,” “dividing up,” or “overlapping” in groups. Consider Klimoski and Mohammed, 421. This research considers seeing sharing in mental models as having in common, or overlapping.

¹³⁹ As explained as a process by Gerard P. Hodgkinson and Gerry Johnson, “Exploring the Mental Models of Competitive Strategists: The Case for a Processual Approach,” *Journal of Management Studies* 31, no. 4 (1994): 531, <https://doi.org/10.1111/j.1467-6486.1994.tb00629.x>.

experience most valuable. Showing that the alignment of ‘sharedness’ is not always apparent could lead to group confusion. Importantly, sharing in social settings is thus also about understanding others. Evaluating and sharing mental models depends on finding commonality in possibilities¹⁴⁰ while speaking the same language and using similar references.

Therefore, the evaluation and measurement of shared mental models and related team performance remains challenging and context dependent. Nevertheless, research shows that shared models are positively related to team performance.¹⁴¹ Unfortunately, the downsides to group mental models, such as groupthink, catch-22s,¹⁴² and narrow perspectives, can translate to lousy performance.

B. SOCIAL IDENTITY THEORY

Social identity theory¹⁴³ and, later, the theoretical expansion of self-categorization¹⁴⁴ have steadily and increasingly impacted the field of psychology. Henri Tajfel famously defined social identity as “that part of an individual’s self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership.”¹⁴⁵ The individuals’

¹⁴⁰ As described by the characteristics of mental models by Johnson-Laird. Mental models represent what is common to a distinct set of possibilities and what they believe is true or possible. Johnson-Laird, “Mental Models.”

¹⁴¹ As was found in a meta-analysis on measuring shared mental models. It shows “knowledge structure is predictive of team process and both knowledge content and structure are predictive of team performance.” See: Leslie A. DeChurch and Jessica R. Mesmer-Magnus, “Measuring Shared Team Mental Models: A Meta-Analysis,” *Group Dynamics: Theory, Research, and Practice* 14, no. 1 (March 2010): 1, <https://doi.org/10.1037/a0017455>.

¹⁴² A catch-22 follows a logic where it is impossible to escape a situation due to its paradoxical or contradictory rules or limitations. A Catch-22 situation arises when rules, regulations, or procedures bind individuals they cannot control. Challenging these rules means accepting them, creating a difficult situation. Joseph Heller coined the term in his 1961 novel, satirically describing the bureaucratic constraints on soldiers during WW2. Joseph Heller, *Catch-22* (New York: Simon & Schuster, 1961).

¹⁴³ *Differentiation between Social Groups: Studies in the Social Psychology of Intergroup Relations* (Oxford, UK: Academic Press, 1978); Henri Tajfel and John C. Turner, “An Integrative Theory of Intergroup Conflict,” *Organizational Identity: A Reader* 56, no. 65 (1979): 9780203505984–16.

¹⁴⁴ John C. Turner et al., *Rediscovering the Social Group: A Self-Categorization Theory*, *Rediscovering the Social Group: A Self-Categorization Theory* (Cambridge, MA, US: Basil Blackwell, 1987).

¹⁴⁵ *Differentiation between Social Groups*.

group membership has serious implications for their experience and behavior.¹⁴⁶ “Personal identity, commitment, and social identification with groups have similar roots in the individual need to be meaningfully connected to the world.”¹⁴⁷ Social identity and identification are viewed as core constructs in organizational phenomena¹⁴⁸ and form central tools that individuals use to adapt to the dynamism of their daily lives.¹⁴⁹ According to Reicher and colleagues, selfhood can be conceptualized on several levels: “the subordinate or personal (I vs. you), the intermediate or categorical (we vs. they), and the superordinate, where all people are conceptualized as a single whole.” Those authors view that the “level at which the self is defined determines how one relates to others and makes sense of the world.”¹⁵⁰ According to Stuart Albert and his colleagues,¹⁵¹ an action can be attributed to an organization, group, or individual. Therefore, each “actor” involved must be able to provide an answer to the question. “Who are we?” or “Who am I?” to interact effectively with other actors. Furthermore, other actors need at least to answer a preliminary question, “Who are they?” for effective interaction. Thus, “identities situate the organization, group, and person,” interaction cannot be meaningful if group members do not have a “situated sense of who they are and who their fellow actors are.”¹⁵²

Social identity theory proposes that people categorize themselves into specific social groups or “in-groups” and view others as “out-groups,” creating a tendency for

¹⁴⁶ Tajfel and Turner, “An Integrative Theory of Intergroup Conflict”; John C. Turner et al., *Rediscovering the Social Group: A Self-Categorization Theory* (Cambridge, MA: Basil Blackwell, 1987).

¹⁴⁷ Elisabetta Crocetti, Francesca Prati, and Monica Rubini, “The Interplay of Personal and Social Identity,” *European Psychologist* 23, no. 4 (2018): 306, <https://doi.org/10.1027/1016-9040/a000336>.

¹⁴⁸ Stuart Albert, Blake E. Ashforth, and Jane E. Dutton, “Organizational Identity and Identification: Charting New Waters and Building New Bridges,” *Academy of Management Review* 25, no. 1 (January 2000): 13, <https://doi.org/10.5465/amr.2000.2791600>.

¹⁴⁹ Crocetti, Prati, and Rubini, “The Interplay of Personal and Social Identity,” 306.

¹⁵⁰ S. D. Reicher, R. Spears, and T. Postmes, “A Social Identity Model of Deindividuation Phenomena,” *European Review of Social Psychology* 6, no. 1 (January 1, 1995): 177, <https://doi.org/10.1080/14792779443000049>.

¹⁵¹ Albert, Ashforth, and Dutton, “Organizational Identity and Identification,” 13.

¹⁵² Blake E. Ashforth, “Distinguished Scholar Invited Essay: Exploring Identity and Identification in Organizations: Time for Some Course Corrections,” *Journal of Leadership & Organizational Studies* 23, no. 4 (November 1, 2016): 361, <https://doi.org/10.1177/1548051816667897>.

collective behavior instead of individual behavior.¹⁵³ Belonging to an organization means being part of multiple groups, including the organization as a whole, one's department, team, or work unit, and others.¹⁵⁴ Individuals will identify in different ways with different groups. In larger organizations, this is of particular importance because there will likely be individual differences in the strength of ties with various groups. Moreover, not all groups are equally influential. The extent to which individuals feel a sense of belonging and connection to their in-groups significantly impacts their psychological well-being and social standing.¹⁵⁵ It has made "in-group identification a near indispensable construct in understanding intra- and intergroup dynamics."¹⁵⁶ As Blake Ashforth asserts, "organizational life is experienced locally. The tasks one performs, the coworkers one interacts with, the manager that directs traffic, and the physical setting where one spends the bulk of one's time tend to be bound to a particular niche of the organization."¹⁵⁷ Furthermore, he claims that research indicates that "identification tends to be stronger" at these lower-order parts of the organization. Nevertheless, this author found that the majority of the empirical research has concentrated on the organization rather than its groups, teams, and subunits.¹⁵⁸

¹⁵³ Also known as self categorization theory. Individuals can self-categorize at three levels, superordinate, intermediate, and subordinate. The focus of this research is on the intermediate level, where individual categorize themselves in terms of group membership in comparison with outgroup members. In being group members individual depersonalize themselves by losing personal identity and gaining social identity. See: Turner et al., *Rediscovering the Social Group*; Crocetti, Prati, and Rubini, "The Interplay of Personal and Social Identity," 303; Henri Tajfel and John C. Turner, "The Social Identity Theory of Intergroup Behavior," in *Political Psychology: Key Readings*, Reprint from 1986 (London, UK: Psychology Press, 2004), 276–93, <https://doi.org/10.4324/9780203505984-16>.

¹⁵⁴ Daan Van Knippenberg, "Work Motivation and Performance: A Social Identity Perspective," *Applied Psychology* 49, no. 3 (2000): 359, <https://doi.org/10.1111/1464-0597.00020>.

¹⁵⁵ Naomi Ellemers, Russell Spears, and Bertjan Doosje, *Social Identity: Context, Commitment, Content* (Oxford, UK: Blackwell Science, 1999), 144.

¹⁵⁶ Colin Wayne Leach et al., "Group-Level Self-Definition and Self-Investment: A Hierarchical (Multicomponent) Model of in-Group Identification," *Journal of Personality and Social Psychology* 95 (2008): 144, <https://doi.org/10.1037/0022-3514.95.1.144>.

¹⁵⁷ Ashforth, "Distinguished Scholar Invited Essay," 365.

¹⁵⁸ As supported by Darja Miscenko and David V. Day, "Identity and Identification at Work," *Organizational Psychology Review* 6, no. 3 (August 1, 2016): 233, <https://doi.org/10.1177/2041386615584009>.

An important aspect of group interaction is information sharing, which allows team members to foster “shared codes and language, shared narratives, trust, norms, and obligations, all of which would enable team members to describe, explain, and predict the behavior of other members.”¹⁵⁹ Sharing information within a team based on social identity makes that information more credible. Therefore, people are more likely to accept information from someone who shares their social identity. In sum, “the trust, norms, obligations, and identification that often develop within teams facilitate the creation of team mental models.”¹⁶⁰

Meanwhile, Reicher and colleagues assert¹⁶¹ that, “when becoming part of a group, individuals do not lose all sense of self;” instead, they “shift from the personal to the social level of identification.” In addition, in becoming a group member, individuals “do not necessarily lose all bases for controlling behavior.” Instead, the criteria for action may “shift from the personal to the social categorical level.” Shifting implies losing some personal identity and suggests that “deindividuation manipulations work through their effects upon the level of self-categorization and the salience of particular social identities.”¹⁶²

C. SHARED AND TEAM MENTAL MODELS

Researchers at the Naval Training Systems Center in Orlando, Florida, conducted the initial research on shared mental models and team performance.¹⁶³ Their research led to the introduction of team mental models to “capture the implicit coordination frequently

¹⁵⁹ Aimée A. Kane, Linda Argote, and John M. Levine, “Knowledge Transfer between Groups via Personnel Rotation: Effects of Social Identity and Knowledge Quality,” *Organizational Behavior and Human Decision Processes* 96, no. 1 (January 1, 2005): 56–71, <https://doi.org/10.1016/j.obhdp.2004.09.002>.

¹⁶⁰ Kevin S. Cruz, “Three Essays on the ‘Dark Side’ of Teams,” *Dissertation Abstracts International Section A: Humanities and Social Sciences* (2012), 16, <https://www.proquest.com/docview/1221858932/2F5D40A421074044PQ/2>.

¹⁶¹ Reicher, Spears, and Postmes, “A Social Identity Model of Deindividuation Phenomena,” 177.

¹⁶² Reicher, Spears, and Postmes, 178.

¹⁶³ Jannis A. Cannon-Bowers and Eduardo Salas. See: Janis A. Cannon-Bowers, Eduardo Salas, and S. A. Converse, “Cognitive Psychology and Team Training: Training Shared Mental Models and Complex Systems,” *Human Factors Society Bulletin* 33, no. 12 (1990): 1–4.

observed in effective teams and to further understand how teams operate in complex, dynamic, and uncertain contexts.”¹⁶⁴ This construct has matured into a research area on team performance and group processes.¹⁶⁵

In the context of organizational teamwork, the cognitive structure or mental model employed by team members to organize information pertaining to team functioning is of utmost significance. Due to the intricate nature of teamwork, this mental model plays a critical role in facilitating effective collaboration among team members.¹⁶⁶ “Group mental models reflect internalized beliefs, assumptions, and perceptions. That is, allowing for the impact of method and circumstances of measurement, they are really how the group members as a collective think or characterize phenomena.”¹⁶⁷ The utility behind shared or team mental models stems from the notion that they minimize process losses and improve team efficiency.¹⁶⁸ Better or more shared cognition is assumed to deliver higher performance outcomes.¹⁶⁹

‘Group mental models’ are not a construct in the literature, but this concept clarifies the commonalities of collaborative mental models’ without distinguishing between team or shared mental models. In terms of group mental models, there is no consensus on the distinction between shared or team mental models due to the overlap of “sharedness.” Research by Richard Klimoski and Susan Mohammed in 1994¹⁷⁰ and a later review in 2010¹⁷¹ use the terms team and shared mental models interchangeably. Because the locus of research has been on team functioning and performance internal to organizations, the

¹⁶⁴ Cannon-Bowers, Salas, and Converse, “Shared Mental Models in Expert Team Decision Making.”

¹⁶⁵ For examples, consult the review by Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 878.

¹⁶⁶ Langan-Fox, Anglim, and Wilson, “Mental Models, Team Mental Models, and Performance,” 335.

¹⁶⁷ Klimoski and Mohammed, “Team Mental Model,” 426.

¹⁶⁸ Cannon-Bowers, Salas, and Converse, “Shared Mental Models in Expert Team Decision Making.”

¹⁶⁹ Janis A. Cannon-Bowers and Eduardo Salas, “Reflections on Shared Cognition,” *Journal of Organizational Behavior* 22, no. 2 (2001): 22, <https://doi.org/10.1002/job.82>.

¹⁷⁰ Klimoski and Mohammed, “Team Mental Model.”

¹⁷¹ Mohammed, Ferzandi, and Hamilton, “Metaphor No More.”

distinction between shared and team mental models is less clear. The input, processing, and output of these two types of group mental models differ. Teams can be seen as organized, structured, and set entities as parts of a larger organization. On the other hand, ad-hoc teams are created outside of organizational structures (between groups) and present a different ‘team’ perspective with different input and shared concepts that affect performance. Therefore, this research distinguishes between two types of group mental models¹⁷² – team and group shared mental models.

The notion of a team mental model brings up what is shared among team members as a collective phenomenon. It refers to “multiple levels or sets of shared knowledge,” or an “aggregate of the individual mental models,” and a “synergistic functional aggregation of the teams mental functioning representing similarity, overlap, and complementarity.”¹⁷³ Team models are viewed as part of in-groups with a high social identity salience. Strong connections among members can be viewed from a tight coupling perspective, meaning there is a high degree of strength, directness, consistency, and dependence.¹⁷⁴ Team mental models are “organized mental representations of the key elements within a team’s relevant environment shared across team members.”¹⁷⁵ It allows for optimizing team processes and performance.¹⁷⁶

The term ‘shared mental model’ has been the subject of debates due to its focus on the concept of sharing, which can be vague and open to interpretation.¹⁷⁷ Shared models are formed in ad-hoc groups, where representatives shape and create ‘teams’ connecting different parts of organizations or departments. The ad-hoc structure might be formally

¹⁷² As supported by Langan-Fox et al., “Analyzing Shared and Team Mental Models.” and in accordance with the review by Jones et al., “Mental Models.”

¹⁷³ Langan-Fox, Anglim, and Wilson, “Mental Models, Team Mental Models, and Performance,” 335.

¹⁷⁴ Rafik I. Beekun and William H. Glick, “Organization Structure from a Loose Coupling Perspective: A Multidimensional Approach,” *Decision Sciences* 32, no. 2 (2001): 235–38, <https://doi.org/10.1111/j.1540-5915.2001.tb00959.x>.

¹⁷⁵ Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 876; Klimoski and Mohammed, “Team Mental Model.”

¹⁷⁶ In accordance with DeChurch and Mesmer-Magnus, “Measuring Shared Team Mental Models.”

¹⁷⁷ For more context see: DeChurch and Mesmer-Magnus.

organized, but there is no mature “this is how we do it” procedural agreement among members. Furthermore, members of these ad-hoc teams usually have less strong ties, have different backgrounds, and potentially consider other members as parts of out-groups. Nevertheless, a collaboration of multiple (sub-)organizations, executed by a team of representatives, also creates sharedness with a different and less structured context. Shared mental models are constructive and should capture the best of all members’ backgrounds as members explore, combine, and create new mental models instead of sticking to old ones. Furthermore, shared mental models can conquer the obstacle of relying on in-group behavior and are constructed ad hoc by opportunity and shared interest. More commonly, these shared mental models develop between persons with weak ties and who are loosely coupled.¹⁷⁸

D. INPUT

As with individual mental models, the mechanism of group mental models utilizes knowledge and experience from its members and as a collective. Since groups have members that interact, group dynamics play a part in their interaction. Next, nested beliefs from social identities and the organizations they work in affect groups.

1. Knowledge and Experience

Since individuals are members of a group, individual mental models, as described in the previous chapter, from the ‘input’¹⁷⁹ to shared mental models. Individual representations are compared, contrasted, and potentially aligned with others. Experience is also shown to be a component of successful teams. Knowledgeable or experienced team

¹⁷⁸ In his seminal piece, Mark Granovetter explains the paradox of strong and weak ties related to social structures and ties among its members. Weak ties provide better opportunities for integration and building networks, while strong ties breed social cohesion but eventually lead to fragmentation. See: Mark S. Granovetter, “The Strength of Weak Ties,” *American Journal of Sociology* 78, no. 6 (1973): 1360–80, <https://doi.org/10.1086/225469>.

¹⁷⁹ In the process of developing and utilizing group mental models, individual perspectives thus mental models, contribute to the shared group mental model. Sensemaking occurs in groups.

members share their experiences to benefit junior team members. On the other hand, junior members can bring new ideas or methods to enable progress.¹⁸⁰

Knowledge is a human, highly personal asset, but when shared, it represents pooled expertise and can create networks and alliances. “Valuable knowledge resources are wasted unless management openly accepts and supports efforts to gather, sort, transform, record, and share knowledge.”¹⁸¹ In teamwork and understanding team performance, such knowledge forms the basis of team functioning. It indicates that “team members must hold knowledge structures compatible with those of fellow team members.”¹⁸²

Again, a distinction is made between know-what (explicit knowledge) and know-how (experience or procedural knowledge), but at the group level. It is also worth noting that group’s environment differs from that of the individual. Groups have a subordinate level and (usually) higher echelons. To ensure fit and alignment with the higher echelons, a third category of knowledge becomes relevant — strategic knowledge or understanding.¹⁸³

2. Group Dynamics

Group dynamics affect team mental models. A group consists of multiple individuals interacting (within group boundaries) and contributing to a common purpose. When and how people cooperate in groups depends on group dynamics. Following the work of Forsyth,¹⁸⁴ Table 1 illustrates the five characteristics of groups: Interaction, Goals, Interdependence, Structure, and Cohesion.

¹⁸⁰ Jon R. Katzenbach and Douglas K. Smith, *The Wisdom of Teams: Creating the High-Performance Organization* (Harvard Business Review Press, 2015).

¹⁸¹ Smith, “The Role of Tacit and Explicit Knowledge in the Workplace,” 311.

¹⁸² Langan-Fox, Anglim, and Wilson, “Mental Models, Team Mental Models, and Performance,” 336.

¹⁸³ Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 880.

¹⁸⁴ Forsyth, *Group Dynamics*, 11.

Table 1. Characters of group dynamics¹⁸⁵

Feature	Description
Interaction	Groups create, organize, and sustain (team) relationships and task interactions among members.
Goals	Groups have instrumental purposes, for they facilitate the achievement of aims or outcomes sought by the members.
Interdependence	Group members depend on one another in that each member influences and is influenced by the other members.
Structure	Groups are organized, with each individual connected to others in a pattern of relationships, roles, and norms.
Cohesion	Groups unite members in a bonded network of interpersonal relations recognized by both the members of the group and those outside of it.

Thus, group dynamics are affected by social identification. Interaction, interdependence, and cohesion in groups are socially bound and partly informal, where structure and goals are usually not up to the groups themselves since higher echelons determine these. Social processes within formal associations create a tendency for a group to “develop fixed ways of perceiving itself and the world, often unconsciously, which is of considerable importance.”¹⁸⁶

Group dynamics are grounded in the formal and informal aspects of teams. Group structure provides some baseline for its hierarchy and external relations. From the social perspective, “interpersonal interactions are more effective when team members share mental models, enabling them to perform better.”¹⁸⁷ Agreeableness among team members is particularly important for working in team settings.¹⁸⁸ However, consensus alone is not

¹⁸⁵ Adapted from Forsyth, 11.

¹⁸⁶ Philip Selznick, *Leadership in Administration: A Sociological Interpretation* (Berkeley, CA: University of California Press, 1957), 10.

¹⁸⁷ Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 894.

¹⁸⁸ Michael K. Mount, Murray R. Barrick, and Greg L. Stewart, “Five-Factor Model of Personality and Performance in Jobs Involving Interpersonal Interactions,” *Human Performance* 11, no. 2/3 (June 1998): 161, <https://doi.org/10.1080/08959285.1998.9668029>.

a consistent indicator of performance.¹⁸⁹ Too much agreeableness may be counterproductive. Furthermore, it should include understanding and commitment.¹⁹⁰

Whether groups consist of in-group members with strong ties (tight coupling) or consist of representatives of multiple organizations or departments with differing goals and backgrounds makes a difference. The latter is less structured, loosely coupled, and does not share perspectives per se. Additionally, “teams composed of members with unique knowledge tend to be ineffective because of obstacles that limit information sharing, including the sampling advantage of common information and contrasting schema structures among team members.”¹⁹¹ Such teams have members with divergent thoughts and are not ‘in sync’ with each other. When common ground is not found, shared mental models are limited, and team performance does not benefit from the sharedness.

3. Beliefs

Mohammed and Klimoski, in their seminal article on team mental models, mention that beliefs differ from knowledge. Knowledge refers to a “descriptive state of nature that one knows to be true,” whereas beliefs are desired states that one “prefers, expects, or demands.” This difference shows in interaction. Team members “likely develop common knowledge structures more readily than belief structures.” Those authors further assert that “belief structures tend to be less stable than knowledge structures, knowledge structures can reinforce beliefs, but belief structures are likely to influence knowledge gathering, storage, and integration.”¹⁹² Military groups, teams, and units all have their own belief structures. According to social identity theory, these beliefs can be solid and normative for behavior. Confirmation to norms and values can affect group mental models.

¹⁸⁹ Bill Wooldridge and Steven W. Floyd, “Research Notes and Communications Strategic Process Effects on Consensus,” *Strategic Management Journal* 10, no. 3 (1989): 295–302, <https://doi.org/10.1002/smj.4250100308>.

¹⁹⁰ Wooldridge and Floyd, 300.

¹⁹¹ Joan R. Rentsch et al., “Facilitating Knowledge Building in Teams: Can a New Team Training Strategy Help?,” *Small Group Research* 41, no. 5 (October 1, 2010): 505, <https://doi.org/10.1177/1046496410369563>.

¹⁹² Susan Mohammed, Richard Klimoski, and Joan R. Rentsch, “The Measurement of Team Mental Models: We Have No Shared Schema,” *Organizational Research Methods* 3, no. 2 (April 1, 2000): 126, <https://doi.org/10.1177/109442810032001>.

E. PROCESSING

This research illustrates two methods which process group mental models. First it looks at the orientation of those shared mental models that can focus at task or team orientations. Next, this sharing can follow other mental models or aim at accurate representations.

1. Task or Team Orientation

Since its beginning, the literature on shared mental models' has assumed that "team members hold multiple mental models simultaneously."¹⁹³ Initial research by Janis Cannon-Bowers et al. posited that the greater overlap or commonality among team mental models, the better their predictions of the team's needs, adaptation to a changing environment, and internal coordination.¹⁹⁴ Since then, researchers have updated the team model framework into teamwork and taskwork categories.¹⁹⁵ Task-oriented models include work goals and performance requirements, whereas team-oriented models regard the team members' interpersonal interaction requirements and skills.¹⁹⁶ Research shows that these two categories are not alike, and "team members hold incongruent models since their mental representations of taskwork and teamwork are strikingly distinct and have no overlap."¹⁹⁷

Similarly, with regard to group rationality, Simon distinguishes between substantive and procedural rationality.¹⁹⁸ Substantive rationality explains "the extent to which appropriate courses of action are chosen." Ergo, it concerns "what to decide," resembling task orientation. Procedural rationality explains "the effectiveness, in light of

¹⁹³ Mohammed, Ferzandi, and Hamilton, "Metaphor No More," 879.

¹⁹⁴ Cannon-Bowers, Salas, and Converse, "Shared Mental Models in Expert Team Decision Making"; Cannon-Bowers, Salas, and Converse, "Cognitive Psychology and Team Training."

¹⁹⁵ Mohammed, Ferzandi, and Hamilton, "Metaphor No More," 880.

¹⁹⁶ Mohammed, Ferzandi, and Hamilton, 880.

¹⁹⁷ Mohammed, Ferzandi, and Hamilton, 903.

¹⁹⁸ Herbert A. Simon, "From Substantive to Procedural Rationality," in *25 Years of Economic Theory: Retrospect and Prospect* (Boston, MA: Springer U.S., 1976), 65–86, https://doi.org/10.1007/978-1-4613-4367-7_6.

human cognitive powers and limitations, of the procedures used to choose an action” – it is about “how to decide,” resembling team orientation. In other words, one considers the quality of the decision-making process, while the other concerns the quality of the outcome. The differentiation resembles the distinction between know-what (knowledge) and know-how (experience). Proper assessments on how to decide should be built on experience and amended by knowledge. What to choose should be based on knowledge aided by relevant experience. As shown, one should not go without the other, but the context determines whether knowledge or experience is the primary factor in making a choice.

2. Similarity or Accuracy

Various terms capture sharedness, including similarity, agreement, convergence, compatibility, commonality, consensus, consistency, and overlap. Joan Rentsch and her colleagues define cognitive similarity as “meanings or understandings that are alike among individuals and utilized to make sense of, attribute meaning to, and interpret internal and external events, including affect, behavior, and thoughts of self and others.”¹⁹⁹ In other words, similarity describes the degree to which knowledge and understanding are similar or overlapping between members.

When sharing occurs among team members, the shared knowledge reflects the degree of similarity within the group. On the other hand, such shared knowledge or understanding is a mutual representation of perceived reality, and thus it can also be evaluated on accuracy. Accurate mental models mirror the actual state of the world (see the mental models overview in Figure 1). The similarity of knowledge does not automatically imply that the knowledge is correct. Failures to measure accuracy may overestimate the importance of similarity. Still, much research has been conducted on

¹⁹⁹ Joan R. Rentsch, Erika E. Small, and Paul J. Hanges, “Cognitions in Organizations and Teams: What Is the Meaning of Cognitive Similarity?,” in *The People Make the Place: Dynamic Linkages between Individuals and Organizations* (New York: Taylor & Francis Group/Lawrence Erlbaum Associates, 2008), 144.

similarity²⁰⁰ but less on accuracy.²⁰¹ Bryan Edwards et al. convincingly argued that accuracy predicts performance better than similarity²⁰² but might depend on team type and environmental dynamism.

F. OUTPUT

Exploring group mental models indicates that social identification plays an important role in how individuals behave in groups. This has positive effects, such as motivation, but could also lead to conformity and depersonalization. Being aware of what matters to groups creates awareness. A simple way might be to view the tendency to follow team or task-oriented decisions. Next, groups could evaluate their output on similarity or accuracy.

1. The Power of Identification

Social identification is important because it is a better predictor of behavior than other factors, such as rewards and personal traits. When individuals identify with an organizational unit, it has a significant impact on their actions.²⁰³ Group mental models contribute not only to group behavior but also affect individuals. The level of shared social identification within groups determines the sense of oneness and strength of normative directions. These directions can overrule individual mental models leading to group conformity since the group has become the focal point in one's attitude towards the

²⁰⁰ For an overview, see: Mohammed, Ferzandi, and Hamilton, "Metaphor No More," 891.

²⁰¹ Bryan D. Edwards et al., "Relationships among Team Ability Composition, Team Mental Models, and Team Performance," *Journal of Applied Psychology* 91 (2006): 727, <https://doi.org/10.1037/0021-9010.91.3.727>.

²⁰² Edwards et al., "Relationships among Team Ability Composition, Team Mental Models, and Team Performance."

²⁰³ Jaap W. Ouwerkerk, Naomi Ellemers, and Dick de Gilder, "Group Commitment and Individual Effort in Experimental and Organizational Contexts," in *Social Identity: Context, Commitment, Content* (Oxford, UK: Blackwell Science, 1999), 184–204; Rolf van Dick and S. Alexander Haslam, "Stress and Well-Being in the Workplace: Support for Key Propositions from the Social Identity Approach," in *The Social Cure* (London, UK: Psychology Press, 2012), 14.

environment. “Without social identity [...] there could be neither organization nor organizations.”²⁰⁴

Research has shown that “identification is positively related to performance, even if it means exerting effort on behalf of the group while other group members are taking it easy.”²⁰⁵ Group cohesiveness has been shown to affect accomplishing group goals positively.²⁰⁶ With collaboration, teams know more and have more experience than single individuals. Knowledge and experience aggregation provides the potential for better-informed decisions, the ability to generate alternatives, and shared obligations during execution. Sharing models on how to perform and what is needed creates redundancy and cross-functionality and decreases the need for communication about tasks and teamwork. People tend to respond more positively to the advice and input of in-group members compared to those belonging to an out-group.²⁰⁷ Such collaboration overcomes the issues of single points of failure. Further, social identity provides persons with the basis for “a shared cognitive framework,” which means that among members offers are likely to be interpreted by the members’ identity, social, and individual well-being.²⁰⁸

Group mental models work beyond the professional realm. In a world that can be confusing and unpredictable, we often seek simple and common explanations for why things occur. It is natural for people to find comfort in shared beliefs and perspectives. Agreement and unity are often seen as positive. No clear distinction exists in what is shared, rather “degrees of sharing exist.”²⁰⁹ Those who disagree with shared beliefs, who upset

²⁰⁴ S. Alexander Haslam and Naomi Ellemers, “Social Identity in Industrial and Organizational Psychology: Concepts, Controversies and Contributions,” in *International Review of Industrial and Organizational Psychology 2005* (Hoboken, NJ: John Wiley & Sons, Ltd, 2005), 87, <https://doi.org/10.1002/0470029307.ch2>.

²⁰⁵ Van Knippenberg, “Work Motivation and Performance,” 365.

²⁰⁶ Paul Hart, “Irving L. Janis’ Victims of Groupthink,” *Political Psychology* 12 (June 1, 1991): 253, <https://doi.org/10.2307/3791464>.

²⁰⁷ S. Alexander Haslam et al., “Social Identity, Social Influence and Reactions to Potentially Stressful Tasks: Support for the Self-Categorization Model of Stress,” *Stress and Health* 20, no. 1 (2004): 3–9, <https://doi.org/10.1002/smi.995>.

²⁰⁸ van Dick and Haslam, “Stress and Well-Being in the Workplace,” 13–14.

²⁰⁹ Mohammed, Klimoski, and Rentsch, “The Measurement of Team Mental Models,” 125.

things, “seem out of place and unpleasant.”²¹⁰ People mainly do not act ‘rationally,’ but instead, they act in part on myths, dogmas, ideologies, and “half-baked” theories.²¹¹ Group mental models are significant because they represent the shared and organized understanding of the team’s environment that influences their decisions and choices.

As Daan van Knippenberg reminds us, even “if an individual identifies with a group, that does not mean the individual is always conscious of their membership, and group membership only affects attitudes and behavior to the extent that the individual is made aware of the membership in the group.”²¹² Nevertheless, strong identification motivates group members to feel, think, perceive and act as one, potentially creating strong emotions.²¹³ Whether people are aware of it or not, identification and commitment affect their behavior.

2. Motivation

Working in teams creates motivation. Being part of a team motivates people to work for the team and what it stands for.²¹⁴ Due to strong ties among members and high social identity salience, a member’s contribution is mainly focused on their team level. Numerous examples exist where individuals sacrifice life, liberty, and personal resources for groups central to their identity.²¹⁵ From a purely economic utility model, these

²¹⁰ Francis J. Gavin, “It May Be Different than You Think,” Texas National Security Review, volume 6, no. 1 (Winter /2023 2022), <https://doi.org/10.26153/tsw/44443>.

²¹¹ Denzau and North, “Shared Mental Models,” 1.

²¹² Van Knippenberg, “Work Motivation and Performance,” 358–59.

²¹³ Dan V. Caprar, Benjamin W. Walker, and Blake E. Ashforth, “The Dark Side of Strong Identification in Organizations: A Conceptual Review,” *Academy of Management Annals*, July 21, 2022, 761, <https://doi.org/10.5465/annals.2020.0338>.

²¹⁴ According to Riketta’s analysis of 38 studies, there is a significant connection between organizational identification and job satisfaction ($r=.54$). Additionally, Riketta and van Dick’s comparison of 19 studies found a moderate correlation between team attachment and job satisfaction ($r=.38$) when examining identity and well-being at work. Michael Riketta, “Organizational Identification: A Meta-Analysis,” *Journal of Vocational Behavior* 66, no. 2 (April 1, 2005): 358–84, <https://doi.org/10.1016/j.jvb.2004.05.005>; Michael Riketta and Rolf Van Dick, “Foci of Attachment in Organizations: A Meta-Analytic Comparison of the Strength and Correlates of Workgroup versus Organizational Identification and Commitment,” *Journal of Vocational Behavior* 67, no. 3 (December 1, 2005): 490–510, <https://doi.org/10.1016/j.jvb.2004.06.001>.

²¹⁵ S. Alexander Haslam, *Psychology in Organizations: The Social Identity Approach*, 2nd ed (London ; Thousand Oaks, CA: Sage Publications, 2004), 171.

sacrifices are difficult to understand²¹⁶ but very familiar in the military context. Teams and ‘buddies’ are deemed more important to work for than the higher (organizational) cause. In researching stress, Rolf van Dick and Alexander Haslam found that a “sense of shared identity should also incline individuals to make more positive secondary appraisals of any organizational challenges” they meet because it generates “a feeling that ‘we are in this together’ rather than that ‘I must deal with this alone.’” Furthermore, being a member of a group has positive effects since it enables individuals to fulfill their potential as social beings.²¹⁷

Today, it is accepted that affect, emotions, and decision-making are interdependent²¹⁸ and play an important role in group behavior. During interactions, members will likely influence others with their behavior. Affect and emotions are consequences of such interaction but can serve as input to motivation and job satisfaction. As can be imagined, the emotional stability of a team can be a significant predictor of team performance.²¹⁹

3. Conformity and Deindividuation

Belonging to a group has significant effects on how an individual behaves and experiences things, but is not always positive.²²⁰ Social identity and identification elicit a sense of oneness with the target of identification.²²¹ However, the strength of that oneness and unity correlates with social identity salience.²²² Social identity salience is increased

²¹⁶ Stephen Worchel et al., “Social and Identity and Individual Productivity within Groups,” *The British Journal of Social Psychology* 37, no. 4 (December 1998): 411, <https://www.proquest.com/docview/219192163/abstract/B5193CB9349F40D6PQ/1>.

²¹⁷ van Dick and Haslam, “Stress and Well-Being in the Workplace,” 19.

²¹⁸ Jennifer M. George and Erik Dane, “Affect, Emotion, and Decision Making,” *Organizational Behavior and Human Decision Processes*, Celebrating Fifty Years of Organizational Behavior and Decision Making Research (1966-2016), 136 (September 1, 2016): 47, <https://doi.org/10.1016/j.obhdp.2016.06.004>.

²¹⁹ Mount, Barrick, and Stewart, “Five-Factor Model of Personality and Performance in Jobs Involving Interpersonal Interactions,” 162.

²²⁰ Tajfel and Turner, “An Integrative Theory of Intergroup Conflict”; Turner et al., *Rediscovering the Social Group*.

²²¹ Van Knippenberg, “Work Motivation and Performance,” 360.s

²²² Hart, “Irving L. Janis’ Victims of Groupthink,” 253.

by competition, conflict, status insecurity, and simple comparison and fit to a situation.²²³ We act, conforming to the in-group, because we imagine that others have a similar objective. “Many behavioral regularities develop in society because of such reciprocating intentions and expectations.”²²⁴ The tendency for conformity in cohesive groups is widespread. The explicit or implicit norms and standards underlying their functioning are essential in cohesive groups. It is held that “the more cohesive the group, the more its members tend to abide by its norms of conduct.”²²⁵ Breaking with conformity is difficult, because a group’s cohesiveness holds immense power in retaining members as valuable participants and enforcing norms and rules.²²⁶

Academic research has shown that “salient social identities are a basis for social judgment, social influence, trust, and cooperation.”²²⁷ Shallow levels of social identity salience do not result in a feeling of oneness. However, high degrees of social identity salience make group members see the world from the perspective of fellow in-group members. They are “more likely to be influenced by in-group members, and they are more likely to trust and cooperate with in-group rather than out-group members.”²²⁸

As social identities become more salient, conformity to group norms increases. In generating group-based emotions, norms become prototypical and likely center on prototypical members.²²⁹ Consequently, behavior in teams gets more depersonalized. Depersonalization is a powerful psychological vehicle for many familiar group processes. Depersonalization means “a person takes the in-group proto-type as a norm, the in-group

²²³ Dominic Abrams et al., “The Social Identity Perspective on Small Groups,” in *Theories of Small Groups: Interdisciplinary Perspectives*, ed. Marshall Scott [Ed Poole and Andrea B. [Ed Hollingshead (Thousand Oaks, CA: Sage Publications, Inc, 2005), 107, <https://doi.org/10.4135/9781483328935.n4>.

²²⁴ Geoffrey M. Hodgson, “What Are Institutions?,” *Journal of Economic Issues* 40, no. 1 (March 1, 2006): 5, <https://doi.org/10.1080/00213624.2006.11506879>.

²²⁵ Hart, “Irving L. Janis’ Victims of Groupthink,” 252.

²²⁶ Hart, 253.

²²⁷ Haslam and Ellemers, “Social Identity in Industrial and Organizational Psychology.”

²²⁸ S. Haslam and Stephen Reicher, “Stressing the Group: Social Identity and the Unfolding Dynamics of Responses to Stress,” *The Journal of Applied Psychology* 91 (October 1, 2006): 1037, <https://doi.org/10.1037/0021-9010.91.5.1037>.

²²⁹ Abrams et al., “The Social Identity Perspective on Small Groups.”

stereotype as a self-description, the in-group's interests as self-interest, and a threat to the in-group as a threat to the self.”²³⁰ In a deindividuated state, individuals exhibit a reduced ability to self-observe and evaluate, resulting in a diminished concern for their social image and perception among others.²³¹ This resembles a sliding scale where individual opinion, based on knowledge and experience, becomes less important and ‘what the group thinks’ more important. Such identification is like falling in love, where love can vary from “little l” to “capital L” in which people are blinded by anything else.

In groups with high social identity salience, outside views will “tend to be perceived by members as matters of opinion. In contrast, sharing views with fellow in-group members are more likely to be seen as matters of fact — and hence to be held with greater conviction and certainty.”²³² Relatedly, being solely invested in one organization or unit may harm one's well-being as it may cause the individual to neglect other memberships that could offer a greater sense of balance and diversity.²³³

4. Team, Task, Similar, Accurate

There is no single solution for working in groups and sharing mental models. Sharing can focus on team or task work. Also, it can be aimed at enhancing similarity (within the group) or accuracy (with reality or a conceptual model) of members' models. In academic research, the assessment of cognitive frameworks associated with team collaboration is indisputably a more arduous task than the evaluation of those linked to task accomplishment. This entails a highly complex and less straightforward process that demands meticulous deliberation and specialized expertise.²³⁴ Both taskwork and

²³⁰ Abrams et al., 110.

²³¹ Reicher, Spears, and Postmes, “A Social Identity Model of Deindividuation Phenomena,” 164.

²³² van Dick and Haslam, “Stress and Well-Being in the Workplace,” 15.

²³³ Elianne F. van Steenbergen et al., “There Is Nothing Either Good or Bad but Thinking Makes It so: Informational Support and Cognitive Appraisal of the Work-Family Interface,” *Journal of Occupational and Organizational Psychology* 81, no. 3 (2008): 349, <https://doi.org/10.1348/096317908X312669>.

²³⁴ Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 895; Beng-Chong Lim and Katherine J. Klein, “Team Mental Models and Team Performance: A Field Study of the Effects of Team Mental Model Similarity and Accuracy,” *Journal of Organizational Behavior* 27, no. 4 (2006): 403–18, <https://doi.org/10.1002/job.387>.

teamwork mental model sharedness have been found to predict performance and are positively associated with team processes, with evidence found that favors either of the categories.²³⁵

Research demonstrates mixed results related to accuracy or similarity of task-oriented and team-oriented mental models.²³⁶ It seems that the outcome is context dependent. However, exploring evidence in the debate on accuracy versus similarity, most researchers favor accuracy.

When Christian Resick and colleagues compared the cognitive ability of groups, they found: “that the team mean-level of cognitive ability was positively related to both accuracy and similarity, and the team mean-level of team agreeableness was positively associated with similarity. In turn, accuracy was positively related to perceived coordination processes and goal accomplishment but not team viability. In contrast, similarity was positively associated with team viability but not goal accomplishment or perceived coordination processes.”²³⁷ Further, Edwards et al. found that “accuracy is a stronger predictor of team performance. In addition, team ability was more strongly related to the accuracy than to the similarity of team mental models, and accuracy partially mediated the relationship between team ability and team performance, but similarity did not.”²³⁸

Furthermore, considering the manager’s role in decision-making, Gary and Wood showed that “more accurate mental models lead to better decision rules and higher performance.”²³⁹ In addition, accuracy was only required in the fundamental principles of a business, not throughout the entire business itself. It is crucial to measure accuracy

²³⁵ Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 892.

²³⁶ Mohammed, Ferzandi, and Hamilton, 894–95.

²³⁷ Christian J. Resick et al., “Team Composition, Cognition, and Effectiveness: Examining Mental Model Similarity and Accuracy,” *Group Dynamics: Theory, Research, and Practice* 14, no. 2 (June 2010): 174–91, <https://doi.org/10.1037/a0018444>.

²³⁸ Edwards et al., “Relationships among Team Ability Composition, Team Mental Models, and Team Performance.”

²³⁹ Michael Shayne Gary and Robert E. Wood, “Mental Models, Decision Rules, and Performance Heterogeneity,” *Strategic Management Journal* 32, no. 6 (2011): 569–94, <https://doi.org/10.1002/smj.899>.

because failing to do so may result in overestimating the significance of similarity in team outcomes, when in reality, accuracy is the driving force behind them.²⁴⁰ Managers and organizations adopt different strategies and achieve varying levels of competitive success due to differences in their mental models.²⁴¹ Logically, having more accuracy leads to better alignment with reality and, therefore, effectiveness. On the other hand, similarity represents not necessarily what is true, but only what notions are dominant in groups. Findings suggest that sharing inaccurate but similar mental models limits learning behaviors and leads to closed minds.²⁴²

Although this paper does not intend to dive deeply into all aspects of team performance, it is noteworthy to mention that there are “significant differences in the ability to reason from one individual to another, and they correlate with measures of academic achievement, serving as proxies for measurements of intelligence.”²⁴³ Such differences might make sharing all relevant mental models difficult because some members may not fully understand other members. Yet, it does not necessarily pose a problem in heterogeneous teams as long as the fundamentals of task and team mental models exist. As Patricia Werhane explains, “In many situations, managers and leaders have a narrow perspective on their situation. Some confuse reality with what they want it to be. Others lack a sense of the variety of possibilities and the ability to imagine various possible issues, consequences, and solutions.”²⁴⁴ Lacking shared mental models might lead to conflict and likely underperformance. Hence, it is essential to avoid assuming that all team members think about taskwork and teamwork in the same way. Instead, it is necessary to have a

²⁴⁰ Kimberly A. Smith-Jentsch, “Measuring Team-Related Cognition: The Devil Is in the Details,” in *Team Effectiveness in Complex Organizations: Cross-Disciplinary Perspectives and Approaches*, ed. Eduardo Salas, Gerald Goodwin F., and C. Shawn Burke (New York, NY: Routledge/Taylor & Francis Group, 2009), 491–508.

²⁴¹ Gary and Wood, “Mental Models, Decision Rules, and Performance Heterogeneity.”

²⁴² Catarina Marques Santos, Ana Margarida Passos, and Sjir Uitdewilligen, “When Shared Cognition Leads to Closed Minds: Temporal Mental Models, Team Learning, Adaptation and Performance,” *European Management Journal* 34, no. 3 (June 2016): 258–68, <https://doi.org/10.1016/j.emj.2015.11.006>.

²⁴³ Philip N Johnson-Laird, “Mental Models and Human Reasoning,” 18243.

²⁴⁴ Werhane, *Moral Imagination and Management Decision-Making*, 11.

detailed understanding of the team's role structure and task. Team members may need similar knowledge or diverse ways of thinking based on their roles.²⁴⁵

In extremis, similarity in mental models might pose a risk. Studies indicate that group mental models, despite enhancing information processing efficiency, may result in biases that resemble "groupthink." This can lead to the team making the same mistakes as an individual decision-maker. Groupthink²⁴⁶ is a type of thinking that occurs when members of a close-knit group tend to adopt a viewpoint or decision that reflects what they believe is the group's consensus, even if they do not necessarily agree with it. This can hinder the group's ability to solve problems effectively because it relies on individual biases in decision-making aggregated at the group level.²⁴⁷ "Concurrence-seeking becomes so dominant that it overrides a realistic appraisal of alternative courses of action."²⁴⁸ Members become motivated to avoid being harsh or critical in their judgment towards other group members, even regarding their own thinking.

G. SO WHAT?

Operating in groups leads to shared cognition. Such sharedness can be based on knowledge, experience, or beliefs (ideology). Group mental models are used for descriptive, predictive, and explanatory purposes. Next, such sharing can have a team or task focus. In other words, it is important to determine whether the group or the task is more important when working as a group. Although most would intuitively assume the task is more important, this might not be the case when thinking more critically. Overall, working in groups effectively leads to high performance levels for both team and task-oriented groups. The fundamental feature of collaborative working is sharing information. Such sharing works best in formalized team structures where people interact daily.

²⁴⁵ Mohammed, Ferzandi, and Hamilton, "Metaphor No More," 903.

²⁴⁶ First introduced by Irving Janis in 1971 after analyzing international relations and political fiascoes and failures, such as the Bay of Pigs invasion, and the failure to prepare Pearl Harbor. Irving L. Janis, *Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes* (Oxford, UK: Houghton Mifflin, 1972); Irving L. Janis, "Groupthink," *Psychology Today* 5, no. 6 (1971): 43–46.

²⁴⁷ Langan-Fox, Anglim, and Wilson, "Mental Models, Team Mental Models, and Performance," 336.

²⁴⁸ Janis, "Groupthink," 43.

In groups, shared and combined representations can be evaluated on their similarity or accuracy. Sharing is commonly robust among those with salient social identities, which can lead to conformity and likeness of thought. These salient social identities tend to view team orientation as more important, thereby devaluating the individual perspective and resulting in depersonalization. Paradoxically, task orientation is often considered impersonal while team orientation is more social. However, these findings suggest that the social aspects of team orientation in groups with salient social identities present a façade since there is nothing ‘personal’ anymore in such teams. As evidenced by research of Mark Granovetter, teams with strong ties among their members breed social cohesion but eventually, lead to fragmentation.²⁴⁹

Additionally, similarity can create clarity and a shared understanding of the group’s role in its environment. In relatively stable environments, similarity ensures performance. However, such similarity and conformity in dynamic environments might lead to narrow-mindedness and even groupthink, potentially resulting in disastrous outcomes. When group members have little ability to reconsider their environment, similarity fails to help them determine how to achieve their given task or purpose accurately. Sometimes, depending on the team, these factors lead to strategic failures. When the team focus becomes too dominant, discussions on coherence prevail over the content.

Military organizations house a wide variety of groups, with human resources as a fundamental part of military capabilities.²⁵⁰ Possibly the first thing that comes to mind when most people hear the term “military personnel” is the infantry units people have seen in movies like “Saving Private Ryan” or *Platoon*. Although it is not a bad picture, it is incomplete. Not only are there more services that hold groups, but military organizations also have hierarchies to structure different levels and sizes of groups. As General Stanley

²⁴⁹ Granovetter, “The Strength of Weak Ties.”

²⁵⁰ Philip Hayward, “The Measurement of Combat Effectiveness,” *Operations Research* 16, no. 2 (April 1968): 317, <https://doi.org/10.1287/opre.16.2.314>.

McChrystal mentioned, it is (or should be) a “team of teams,”²⁵¹ but more often is a centralized, top-down hierarchy. For the purpose for this study, the units are groups the most responsive and adaptable of those units is considered a team. In this regard, that should be the so-called smallest unit of action. A mature unit has close ties, works together on a daily basis, and usually has a clear purpose. “Teams have long been considered essential to the organizational structure of the military. The complex nature of military missions requires knowledge, skills, and abilities beyond those of a single individual, therefore requiring the use of teams”²⁵² in which people share mental models on what to do, how to do it, and who does what, balancing team and task orientation. As mature units, they have gone through the stages of team development.²⁵³ Maturity allows for internal reviewing and feedback, ensuring their performance is effective, (i.e., accurate). Unfortunately, not all teams reach such maturity, which implies that information sharing in groups has limitations due to ongoing social processes that emphasizes the team orientation. Military teams might develop such maturity, but only when these units stick together for a prolonged period.

Military units are expected to work under stress and duress. Under such conditions, working in a team with a salient social identity is beneficial. Haslam and Reicher show that in crisis circumstances (high stress), “group cohesiveness generally increases: Task groups may become primary groups under the pressure of outside events.” It instigates a collective response to stress. “Individually, employees’ coping strategies are likely to involve attempting to avoid or deny the impact of particular stressors, as members of a functioning group can work together to try to resist those stressors.” Furthermore, “the experience of

²⁵¹ The book mentions that a team of teams approach is better suited to the current complex world (as he worked in Afghanistan) than the conventional (US military) top-down hierarchy. Stanley A. McChrystal et al., *Team of Teams: New Rules of Engagement for a Complex World* (New York, New York: Portfolio/Penguin, 2015).

²⁵² Marissa Shuffler, D. Pavlas, and Eduardo Salas, “Teams in the Military: A Review and Emerging Challenges,” in *The Oxford Handbook of Military Psychology*, ed. Janice H. Laurence and Michael Matthews D. (New York: Oxford University Press, 2012), 282.

²⁵³ Tuckman’s model (revisited) demonstrates five stages on small-group development. Groups go through stages of forming, storming, norming, performing, and adjourning. See: Bruce W. Tuckman and Mary Ann C. Jensen, “Stages of Small-Group Development Revisited,” *Group & Organization Studies* 2, no. 4 (December 1977): 419–27, <https://doi.org/10.1177/105960117700200404>.

standing shoulder-to-shoulder with one's teammates creates mutual identification, 'we are in this together,' (both deriving from shared social identity but also helping to build it) and can be an effective way to tackle stress and enhance a sense of collective purpose and well-being." Such coping also leads to action, since stressful experiences "encourage people to look beyond how stressors are changing them (for the worse) and to focus instead on ways in which they can change those stressors (for the better)." ²⁵⁴ Extensive evidence indicates that "appraisals and the overall experience of stress have a significant social dimension." ²⁵⁵ "The most striking examples of primary group ties can be found in military groups in combat situations. Loyalty to the small combat unit kept many soldiers going" ²⁵⁶ during various conflicts. Individuals' experiences as members of these military groups created tolerance and normalized aspects of work that generally might be quite abnormal and threatening. ²⁵⁷ Understanding these military threats and risks can hardly be found outside military organizations, further tying its members together. Individuals who perceive a sense of organizational identity with their work colleagues are better equipped to handle potential threats to themselves. This is because they are more likely to receive and benefit from social support provided by their colleagues. ²⁵⁸

Another differentiation that might be less obvious in thinking about military teams is that they exist beyond tactical units. Teams and groups also exist at the operational, strategic, and policy levels. Their working environment is usually more complex than it is at the tactical level. The tactical level allows for higher levels of similarity when executing tasks. Skills and drills provide the foundation for individuals; this proto-typical way of

²⁵⁴ van Dick and Haslam, "Stress and Well-Being in the Workplace," 18.

²⁵⁵ Haslam, *Psychology in Organizations*, chap. 10.

²⁵⁶ Hart, "Irving L. Janis' Victims of Groupthink," 254.

²⁵⁷ As mentioned in a study of bomb disposal experts and bar staff, During the study, participants were asked to rate the level of stress involved in handling bombs and working in a bar. The pre-testing results from the general population showed that handling bombs was perceived as much more stressful than working in a bar, which was also reflected in the responses from the bar staff in the study. However, bomb disposal officers reported the opposite pattern, with bar work being relatively more stressful for them compared to handling bombs. Overall, bar staff were unfazed by the stresses of their job, while bomb handlers were equally untroubled by the tensions of handling bombs.. See: Haslam et al., "Social Identity, Social Influence and Reactions to Potentially Stressful Tasks."

²⁵⁸ van Dick and Haslam, "Stress and Well-Being in the Workplace," 13.

acting results from accumulated experience codified into procedures. As T.E. Lawrence is alleged to have put it, “With two thousand years of examples behind us, we have no excuse, when fighting, for not fighting well.”²⁵⁹ However, strategic, and military-political ‘battles’ are something else, as history shows.

Examples of misconduct and strategic failure can (partly) be attributed to shared mental models, where similarity prevailed over accuracy. Boundaries fade when an individual is considering what is the right thing to do is and whether to do the right thing certain situations. To get more information out of Iraqi prisoners, American prison guards (military police) and intelligence officers at the Abu Ghraib prison tortured and humiliated prisoners. At the team level, this incident illustrates how military personnel conforms to others’ behavior as the individual response fades away.²⁶⁰ The next chapter will briefly highlight related institutional aspects.

Another extreme example is the infamous ‘My Lai Massacre,’ in which a company of U.S. soldiers killed most of the inhabitants in the village of My Lai in South Vietnam on March 16, 1968. Over 500 people were slaughtered, and young women were raped before being killed.²⁶¹ Although there were no sightings of Viet Cong presence, the notion that ‘there might be’ combined with an aggressive attitude led to a mental model that allowed the soldiers of Charlie company to start killing innocent civilians. This incident is indicative of a salient social identity in this unit, where conformity ruled since all participated in the killing. Both events just described show how a unit can derail from its original purpose and task. Moreover, they are extreme examples of group behavior. Depersonalization and too much similarity can pose an internal threat to military organizations. Hence, situational awareness and understanding are not only required to evaluate the enemy’s strengths and weaknesses but also the force’s their own.

²⁵⁹ The direct source was not found, but the quote appears on various platforms that mention T.E. Lawrence quotes.

²⁶⁰ George R. Mastroianni, “Looking Back: Understanding Abu Ghraib,” *The U.S. Army War College Quarterly: Parameters* 43, no. 2 (June 1, 2013), <https://doi.org/10.55540/0031-1723.2896>.

²⁶¹ As summarized on History.com, based on multiple sources: “My Lai Massacre: Vietnam War & Colin Powell,” HISTORY, March 30, 2023, <https://www.history.com/topics/vietnam-war/my-lai-massacre-1>.

Although there is much evidence of such behavior at the ‘tactical’ level, the strategic and political levels suffer similarly. The point made about understanding the behavior of tactical units is valid at all levels. Simply put, human factors, like qualities of morale, leadership, and temperament, have sometimes been held to be the most important single influence on the outcome of a battle, leading to the view that “In war, the morale is to the physical as three to one.”²⁶² Graham Allison notes that the flawed understanding and a lack of self-consciousness during the Cuban Missile Crisis depended on the conceptual lenses used.²⁶³ In other words, the shared mental models of leaders. In that instance, the models were created by political conviction and rational policy. Based on rationalist zero-sum assumptions, loss aversion can provide extremes, especially when considering one’s own turf, so that the endowment effect also kicks in. Such frames are also shared mental models that affect high-level military and political leadership working closely together. However, at the policy level, it is challenging to determine what is a loss or what may present gains. Being accurate poses more challenges and can also be a matter of framing.²⁶⁴ Nevertheless, it shows that no team (in any organization) is free from shared mental models. Potentially the military might risk falling into the conformity trap sooner since such behavior can be useful in the small-units or at least does not create many problems.

²⁶² Hayward, “The Measurement of Combat Effectiveness,” 317.

²⁶³ Allison, “Conceptual Models and the Cuban Missile Crisis,” 689.

²⁶⁴ As explained by Levy who examined the use of prospect theory and international relations. Jack S. Levy, “Prospect Theory and International Relations: Theoretical Applications and Analytical Problems,” *Political Psychology* 13, no. 2 (1992): 301, <https://doi.org/10.2307/3791682>.

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V. ORGANIZATIONAL MENTAL MODELS – SOCIAL INSTITUTIONS

Previous chapters showed that mental models are individual concepts shared with others, preferably group members who are close to each other. Such a solid relational aspect disappears when groups get bigger or multiple groups exist, like in organizations. However, although mental models are products of individuals, organizations have mechanisms that function similarly. Just like individuals base their thinking and decisions on knowledge and experience, so does an organization, albeit differently. Organizational rules, norms, and routines determine its processes and ‘way of doing things.’ These formal and informal ways are part of the theory of social institutionalism. This theory connects the individual (micro) level with the organizational (macro) level and sees the micro level as providing foundations for institutions.

Looking at large organizations in general and military organizations specifically in this research examines what role ‘the organization’ plays from a behavioral point of view. Although organizations can be seen as abstract notions consisting of structures, processes, and people, the sociological and behavioral aspects are often overlooked by the persons running the organization.

This chapter introduces institutional theory and social institutionalism to provide context for exploring causal mechanisms at the organizational level. To avoid the ambiguous distinction between formal and informal institutions, this research uses Scott’s triad to distinguish the regulative, normative, and culture-cognitive pillars. Institutions provide stability, meaning, and legitimacy to organizations. At the organizational level, individual and group mental models, organizational structure, and context serve as inputs. These inputs are processed by organizational routines, evaluated by (internal) transaction costs, and guided by rules, norms, and values. When these outcomes of these processes become too rigid, extreme forms of bureaucracy and inertia can result.

A. MENTAL MODELS AT THE ORGANIZATIONAL LEVEL

In military organizations, people mostly work and operate in large systems. Solely considering human behavior from an individual and group perspective would be shortsighted. Usually, teams or groups do not act independently but are part of a larger whole, an organization. Hence, teams and their members are affected by the organization they work for and vice versa. As Richard Scott explains,²⁶⁵ when becoming part of an organization, people (unconsciously) accept organizational membership, implying that they are “expected to adopt organizational value premises as a guide for their decisions.” Next, “factual premises–beliefs about means–ends connections–are also commonly supplied” by organizational rules, procedures, and routines.

“Mental models function on the organizational and systemic levels and in individual cognition.”²⁶⁶ From an organizational perspective, mental models are the internal representations created by personal cognition to interpret the environment. Institutions, on the other hand, are the external mechanisms used by individuals to structure and order the environment. These institutions are essential to how humans organize and interact with their environment.²⁶⁷ The key notions of institutionalized organizations are “relation” or “network,” as Mark Granovetter illustrated.²⁶⁸ This ‘institutional theory’ shows that there is even more out there that guides human behavior beyond the individual and group mental models.

Although the earlier definition of mental models²⁶⁹ still stands, it might be too simple at the organizational level since organizational mental models include “our beliefs

²⁶⁵ Scott, *Institutions and Organizations*, 29.

²⁶⁶ This is conceptualized by Peter Senge in the “Learning Organization.” People keep learning and enhance their ability to create. Senge describes five disciplines: team learning, shared vision, mental models, personal mastery, and system thinking. See Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Doubleday/Currency, 2006). ,in Werhane, “Mental Models, Moral Imagination and System Thinking in the Age of Globalization,” 464.

²⁶⁷ Denzau and North, “Shared Mental Models,” 2.

²⁶⁸ Considering those as the primary building blocks of economic behavior in institutions. Mark Granovetter, “Economic Action and Social Structure: The Problem of Embeddedness,” *American Journal of Sociology* 91, no. 3 (1985): 481–510, <https://www.jstor.org/stable/2780199>.

²⁶⁹ Mental models are (personal,) incomplete representations of reality, based on knowledge and experience, that actors utilize to interact with their environment.

about the networks of causes and effects that describe how a system operates, along with the model's boundary (which variables are included and which are excluded) and the relevant time horizon.”²⁷⁰ As previous chapters showed, people do not act ‘rationally’ but are affected by their environment (physical and social) and personal knowledge and experience. Comparable to operating in groups, in organizations, such mental models can prove useful. Unfortunately, some individuals make decisions based on misguided beliefs, unproven doctrines, political ideologies, and incomplete hypotheses, which can have negative consequences.²⁷¹ This chapter mainly explores negative effects at the organizational level.

Organizational models differ from team models because these do not represent team cognition. They go beyond the mental representations of a team's relevant environment, shared across team members.²⁷² Organizations usually have many teams with different (and specific) team and work environments. For instance, the finance department has a different scope, environment, and structure for that of the human resources department. Nevertheless, both are part of the same organization and thus share the overarching organizational beliefs, culture, and institutions. Also, military organizations share knowledge and experience as a whole but have many differences between the services in how they learn about their specific domain or environment (sea, air, land, cyber, space) domain or environment, which has affected the formation of their respective cultures.

Although there is no clear definition of an organization, the notion that it embodies multiple groups of members who work for a common purpose should suffice. Perhaps Hodgson's definition is most applicable; he sees organizations as a formalized type of institution, “Organizations are special institutions that involve (a) criteria to establish their boundaries and to distinguish their members from nonmembers, (b) principles of

²⁷⁰ Sterman, *Business Dynamics*, 2009, 16.

²⁷¹ Denzau and North, “Shared Mental Models,” 1.

²⁷² Mohammed, Ferzandi, and Hamilton, “Metaphor No More,” 876.

sovereignty concerning who is in charge, and (c) chains of command delineating responsibilities within the organization.”²⁷³

B. INSTITUTIONAL THEORY

The study of institutions has “a long history.”²⁷⁴ Richard Scott, one of the influential thinkers in institutional theory, explains that institutions are “social structures that have realized a high degree of resilience and [...] processes by which such structures, including mental models, schemas, rules, norms, and routines, become established as authoritative guidelines for social behavior.”²⁷⁵ With associated activities and resources, institutions provide stability and meaning to social life. Institutions consist of an interacting population, where rules, norms, and meanings arise, which are preserved and modified by human behavior.²⁷⁶ Unlike at the group or team level of analysis, people are not considered members from a managerial perspective. Institutional theory has been analyzed from multiple disciplines, such as economics, political science, sociology, cognitive psychology, and cultural anthropology.²⁷⁷ Institutional processes and structures operate from “the most micro interpersonal level to the most macro transsocietal level.”²⁷⁸ As Scott emphasizes, institutional forces operate at multiple levels – “both above and beneath the level selected”²⁷⁹ from “the world system to interpersonal interaction.”²⁸⁰ Hence, this research follows the social, institutional view.

²⁷³ Hodgson, “What Are Institutions?,” 18.

²⁷⁴ W. Richard Scott, “Reflections: The Past and Future of Research on Institutions and Institutional Change,” *Journal of Change Management* 10, no. 1 (March 1, 2010): 5, <https://doi.org/10.1080/14697010903549408>.

²⁷⁵ W. Scott, “Institutional Theory: Contributing to a Theoretical Research Program,” in *Great Minds in Management: The Process of Theory Development*, by Ken G. Smith and Michael A. Hitt (Oxford University Press, 2005), 2.

²⁷⁶ Scott, *Institutions and Organizations*, 57.

²⁷⁷ As explained by Scott, *Institutions and Organizations*.

²⁷⁸ Scott, “Reflections,” 5.

²⁷⁹ Scott, *Institutions and Organizations*, 56.

²⁸⁰ Scott, 58.

A recent conception of institutions, described in Scott's 2010 book *Institutions and Organizations*, proclaims first that "Institutions comprise regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life."²⁸¹ Further, institutions are "multi-faceted, durable social structures containing symbolic elements, social activities, and material resources, which can be transmitted across generations, maintained, and reproduced."²⁸² Finally, institutions "exhibit stabilizing and meaning-making properties, which provide the central building blocks of institutional structures, providing the elastic fibers that guide behavior and resist change."²⁸³

Many are accustomed to conceptions of organizations as technical instruments designed for definite goals, defined by a formal system of rules and objectives following officially approved patterns that guide the organization's working.²⁸⁴ This view judges the 'design' or engineering premises, which are perceived as expendable. Institutions, on the other hand, are less well understood. As time goes by, an organization tends to develop a unique identity that reflects its history, the individuals who have contributed to it, the various groups within it, the interests it holds, and how it has adjusted to its surroundings.²⁸⁵

To highlight the difference, "to institutionalize is to 'infuse with value' beyond the technical requirements of the task at hand."²⁸⁶ Social institutions focus attention to issues and experiences that are not (entirely) addressed by a technical approach. Therefore, institutions can be viewed as complex mixtures of both designed and responsive behavior.²⁸⁷ "Natural tendencies like the development of defensive ideologies, the

²⁸¹ Scott, 56.

²⁸² Lynne G. Zucker, "The Role of Institutionalization in Cultural Persistence," *American Sociological Review* 42, no. 5 (1977): 726–43, <https://doi.org/10.2307/2094862>.

²⁸³ Scott, *Institutions and Organizations*, 57.

²⁸⁴ Selznick, *Leadership in Administration*, 5.

²⁸⁵ Selznick, 16.

²⁸⁶ Selznick, 16.

²⁸⁷ Selznick, 6.

dependence of institutional values on the formation and sustaining of elites, and the existence of internal conflicts expressing group interests only illustrate the many elements that combine to form the social structure of an organization.”²⁸⁸ An organization is a group of human beings. Its technical design cannot anticipate how people will act and interact. “It is always supplemented by ‘informal structures’ which arise as the individual brings into play his personality, special problems, and interests. Formal relations coordinate roles or specialized activities, not persons.”²⁸⁹ Especially since every person is a member of multiple social groups (with varying levels of social identity), this results in numerous networks and relations tied to individuals. Further, a group or institutional member has a particular social role to fulfill.²⁹⁰ Social institutions define these roles in which the individual finds him or herself. Sometimes “these roles and their concomitant responsibilities overwhelmingly shape one’s worldview and strongly influence one’s judgment,”²⁹¹ as the discussion of shared mental models already explained.

John Meyer explains the history and development of institutional theory, in which old (historical) institutionalism developed into new institutionalism.²⁹² Both the old and new approaches acknowledge that institutionalization limits organizational rationality, but they attribute this constraint to different factors. According to old institutionalism, people and groups are part of a larger cultural context that includes conflicts of interest, power dynamics, informal structures, values, norms, and social commitments. It views institutionalism as a process occurring within an organization and emphasizes the vesting of interests within organizations due to political tradeoffs and alliances.²⁹³ The theory of new institutionalism focuses on the cultural and constitutive processes, routines, schemas,

²⁸⁸ Selznick, 15.

²⁸⁹ Selznick, 8.

²⁹⁰ A member’s background can be a professional, manager, employee, or couch potato next to the role they have in a particular group. For instance, the couch potato can also be the leader of a social group.

²⁹¹ Werhane, *Moral Imagination and Management Decision-Making*, 10.

²⁹² John W Meyer, “Reflections on Institutional Theories of Organizations,” in *The Sage Handbook of Organizational Institutionalism*, by Renate E. Meyer and Christine Oliver, ed. Royston Greenwood and Thomas B. Lawrence (London, UK: SAGE Publications, 2017), 788–809.

²⁹³ Walter W. Powell and Paul DiMaggio, eds., *The New Institutionalism in Organizational Analysis* (Chicago: University of Chicago Press, 1991), 12.

legitimacy processes, and formal structures within organizations. It recognizes that these processes are influenced by the social environment surrounding the organization, which impacts the behaviors, practices, and ideas of individuals and groups.²⁹⁴ “Newer conceptual models emphasize cognitive over normative frameworks and have focused primary attention on the effects of cultural belief systems operating in the environments of organizations rather than on intraorganizational processes.”²⁹⁵ The new approach stresses the relationships between stability and legitimacy and the power of “common understandings that are seldom explicitly articulated.”²⁹⁶ This research follows the latter approach to institutionalism.

Just as shared mental models and the pressure of social identities influence behavior, social institutions affect notions of what is true for individuals and groups. Rationalization of beliefs is part of institutions and plays a vital role in business, government, international relations, and the use of media.²⁹⁷ “Social knowledge, once institutionalized, exists as a fact, as part of objective reality, and can be transmitted directly on that basis”²⁹⁸ These ‘social facts’ do not only operate in the minds of individuals but reside in social institutions and remain true until proven false.²⁹⁹ The creation of meaning and understanding is based on the conceptualization of the organizational environment. Such simplification creates “a supply house of resources and target of outputs but also a source of meanings for the members of organizations.”³⁰⁰ People create meaning and act on behavior and social action by inspecting events, not by abstracting entities into unified

²⁹⁴ Meyer, “Reflections on Institutional Theories of Organizations,” 790.

²⁹⁵ Scott, *Institutions and Organizations*, 53.

²⁹⁶ Lynne G. Zucker, “Organizations as Institutions,” *Research in the Sociology of Organizations* 2, no. 1 (1983): 5.

²⁹⁷ So called ‘fake news’ relies on the rationalization of beliefs that create meaning, based on social facts, and is focused on attaining specific objectives. Another approach is the use of Information Operations to influence a target audience. Nevertheless, these efforts are purposive, whereas the use of such social facts internal to organizations is ubiquitous.

²⁹⁸ Lynne G. Zucker, “The Role of Institutionalization in Cultural Persistence,” *American Sociological Review* 42 (1977): 726, <https://doi.org/10.2307/2094862>.

²⁹⁹ As explained by mental model theory in chapter 2. See: Philip N Johnson-Laird, “Mental Models and Human Reasoning.”

³⁰⁰ Scott, *Institutions and Organizations*, 19.

patterns.³⁰¹ For instance, institutional ‘guidance’ controls and restrains behavior by “defining moral, legal, and cultural boundaries” to distinguish between acceptable and unacceptable behavior. Furthermore, it can support and empower activities and actors. “Institutions provide stimulus, guidelines, and resources for acting as well as prohibitions and constraints on action.”³⁰²

The following is an example of how social facts are part of our daily lives, where we overlook the non-institutional perspective.

One and the same phenomenon (object, organism, event, etc.) can satisfy descriptions under which it is non-institutional (a piece of paper, a human being, a series of movements) and descriptions under which it is institutional (a 20-dollar bill, the president of the United States, a football game). An object or other phenomenon is part of an institutional fact, under a certain description of that object or phenomenon.³⁰³

Even though institutions often resist change and provide stability and order, they undergo incremental and revolutionary change. Therefore, “institutions are not merely a state of an existing social order but also a process (of institutionalization and deinstitutionalization).”³⁰⁴

C. INPUT

Input to the mechanism of mental models at the organizational level are the individual and shared mental models with their (aggregated) knowledge and experience. Organizational structure provides the framework where interaction takes place.

1. Mental Models

Previous chapters illustrated the influence of conscious and subconscious mental models on thinking and decision-making at the individual and group levels. In those

³⁰¹ Clifford Geertz, *The Interpretation of Cultures: Selected Essays* (New York: Basic Books, 1973), 17.

³⁰² Scott, *Institutions and Organizations*, 58.

³⁰³ John R. Searle, “What Is an Institution?,” *Journal of Institutional Economics* 1, no. 1 (June 2005): 10, <https://doi.org/10.1017/S1744137405000020>.

³⁰⁴ Scott, *Institutions and Organizations*, 58.

chapters, the individual's role was shown to be boundedly rational.³⁰⁵ Much of our understanding of a choice situation is based on experience. We perceive things that we are unaware of, which affects our decisions. The main issue is that we are constantly unsure about the specific aspects of knowledge that need to be evaluated.³⁰⁶ Although participation in a group might improve the deficiencies of an individual's thinking, it also tends to create narrow group-central views. Organizations build and are built on human capital and human interaction. Therefore, given such premises, it is easy to see that organizations have nested defects regarding thinking and decision-making.³⁰⁷ Environmental complexity increases exponentially from the individual to the organizational level; it is not dependent on the sum of the people perceiving the organization's environment but related to the number of possible or potential interactions among the people. Therefore, the sharing and aggregation of information (knowledge) is critical in managing organizational complexity. Yet, incompleteness and asymmetry of information are ubiquitous and understanding that is essential for explaining how "individuals and business firms decide when to face uncertainty by insuring, when by hedging, and when by assuming the risk."³⁰⁸

Chapter III mentions how teams operate and perform based on sharing knowledge and experience. In teamwork and understanding team performance, such knowledge forms the basis of team functioning. It implies that "team members must hold knowledge structures compatible with those of fellow team members."³⁰⁹ Similar notions relate to organizations, which need facilities to store and share various kinds of information. Thus, social institutions provide the organizational-level mental model.

³⁰⁵ Simon, "A Behavioral Model of Rational Choice."

³⁰⁶ Denzau and North, "Shared Mental Models," 10.

³⁰⁷ Although it is not the focus of this research, such decision-architecture also provides advantages for thinking and decision making.

³⁰⁸ Simon et al., "Decision Making and Problem Solving," 16.

³⁰⁹ Langan-Fox, Anglim, and Wilson, "Mental Models, Team Mental Models, and Performance," 336.

As with all types of mental models, “knowledge of what has gone before is vital information. Ideas and insights of predecessors provide the context for current efforts and the platforms on which new contributions are crafted.”³¹⁰ Nonetheless, these ideas and insights result from previous analyses, resting on varied assumptions and causal processes that are mostly unclear, and might not be relevant for the future. After all, the future cannot be known, because of various kinds of uncertainty.³¹¹

People use their individual mental models, based on their knowledge and experience, to make sense of situations in groups. These mental models can be narrowed when the more significant part of such experience is gathered internally. In this respect, “institutions do not just constrain options; they establish the criteria by which people discover their preferences.”³¹² Therefore, social institutions can work as echo chambers, reinforcing popular beliefs because there is little room for outside perspectives in social institutions, or because dissenters are pushed out because they do not conform. In addition, the power of cognitive beliefs anchor behavior.³¹³ Consequently, organizational belief structures can influence behavior.

2. Organizational Structure

It is helpful to understand organizational structure and design in portraying the basic parts of organizations. Henry Mintzberg provided a valuable way to consider the structure of organizations. His seminal article on organization design suggested five basic configurations: Simple Structure, Machine Bureaucracy, Professional Bureaucracy, Divisional Form, and Adhocracy.³¹⁴ All configurations included five basic elements: (as shown in Figure 4).

³¹⁰ Scott, *Institutions and Organizations*, 55.

³¹¹ For instance, environmental uncertainty and process uncertainty. See: John Abbott, “Understanding and Managing the Unknown: The Nature of Uncertainty in Planning,” *Journal of Planning Education and Research* 24, no. 3 (March 1, 2005): 237–51, <https://doi.org/10.1177/0739456X04267710>.

³¹² Powell and DiMaggio, *The New Institutionalism in Organizational Analysis*, 11.

³¹³ Zucker, “The Role of Institutionalization in Cultural Persistence,” 1991.

³¹⁴ Henry Mintzberg, “Structure in 5’s: A Synthesis of the Research on Organization Design,” *Management Science* 26, no. 3 (March 1980): 322–41, <https://doi.org/10.1287/mnsc.26.3.322>.

1. The Ideology is not a basic element but constitutes the shared norms, values, and culture.
2. The operating core comprises employees accountable for creating the primary goods and services of the organization, along with those who provide direct assistance in their production.
3. The strategic apex comprises the most senior general managers of the organization and their accompanying staff.
4. The middle level of management consists of middle managers who have formal authority over the operating core and report to the strategic apex.
5. The technostructure comprises analysts who employ various techniques to construct, preserve, and adjust the organization to suit its environment.
6. The support staff consists of groups that provide indirect support to the rest of the organization.

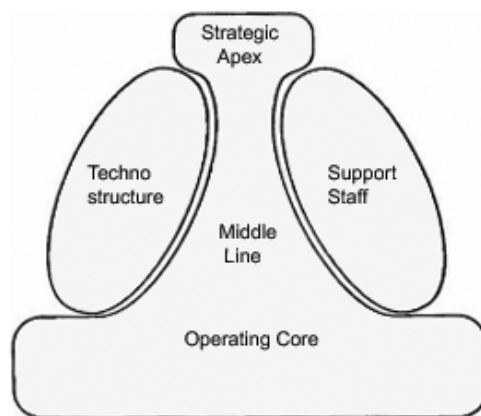


Figure 4. The five basic parts of an organization.³¹⁵

³¹⁵ Source: Mintzberg, 324.

With these essential parts, Mintzberg hypothesized five basic or “pure” configurations (see Figure 5). As can be imagined, the structure of the configuration, together with the mechanism to coordinate activities³¹⁶ and design parameters,³¹⁷ can design or structure an organization.

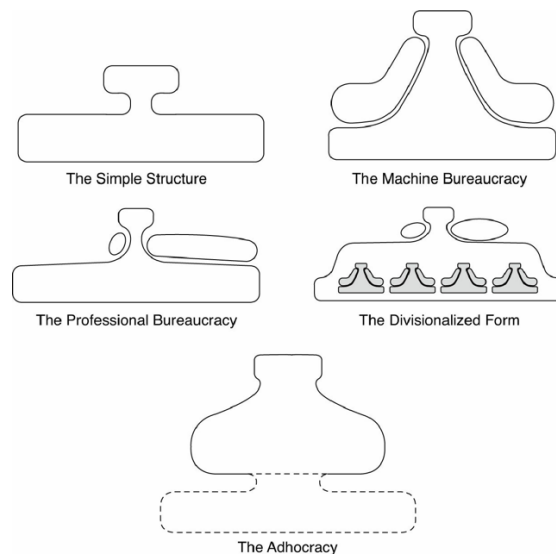


Figure 5. Mintzberg’s five organizational configurations.³¹⁸

Although many believe that organizational design and structure depend on the goals and purpose of organizations,³¹⁹ Mintzberg showed it can also be the opposite and that structure drives strategy, in fact they can follow each other without taking precedence.³²⁰ For an organization to succeed, it must maintain coherence and alignment with its internal

³¹⁶ Mintzberg defined those as: mutual adjustment, direct supervision, standardization of work processes, outputs, and skills.

³¹⁷ According to Mintzberg, these include: Job specialization, behavior formalization, training and indoctrination, unit grouping, unit size, action planning and performance control systems, liaisons, vertical decentralization, and horizontal decentralizations.

³¹⁸ Source: Mintzberg, “Structure in 5’s.”

³¹⁹ As seminally depicted by Alfred D. Chandler, *Strategy and Structure: Chapters in the History of the Industrial Enterprise* (Cambridge, Mass: M.I.T. Press, 1962).

³²⁰ Henry Mintzberg, “The Design School: Reconsidering the Basic Premises of Strategic Management,” *Strategic Management Journal* 11, no. 3 (1990): 183, <https://doi.org/10.1002/smj.4250110302>.

operations and environment. Nevertheless, some organizations might be forced to adopt hybrid structures in response to contradictory pressures.³²¹ As Mintzberg described when presenting these configurations, all represent conceptual frameworks that can be used to comprehend organizational behavior.³²²

D. PROCESS

Social institutions are driven by organizational routines that mainly determine how organizational processes are executed. Such routines can be driven by formal or informal rules. In addition, such processes are commonly evaluated on its (potential) transaction cost.

1. Organizational Routines

The evolutionary theory of the firm introduced organizational routines.³²³ Although academic literature differs in the meaning of organizational routines, most resources consider such routines important³²⁴ a “central feature of human organizations and provide an explanatory mechanism in widely accepted theories.”³²⁵ Early work on organizational routines explains them as “the primary means by which organizations accomplish much of what they do.”³²⁶ In essence, organizational routines provide social mechanisms for the majority of internal tasks, guiding future work and behavior. “Firms may be expected to behave in the future according to the routines they have employed in

³²¹ Mintzberg, “Structure in 5’s,” 322.

³²² Mintzberg, 339.

³²³ Based on Standard Operating Procedures, as discussed in the behavioral theory of the firm, and later named as organizational routines. Consider Richard M. Cyert and James G. March, *A Behavioral Theory of the Firm* (Prentice-Hall: Englewood Cliffs, NJ, 1963); Richard R. Nelson and Sidney G. Winter, *An Evolutionary Theory of Economic Change*, digitally reprinted (Cambridge, MA: The Belknap Press of Harvard University Press, 1982).

³²⁴ Markus C. Becker, “The Concept of Routines: Some Clarifications,” *Cambridge Journal of Economics* 29, no. 2 (2005): 249–50, <https://www.jstor.org/stable/23602185>.

³²⁵ Martha S. Feldman and Brian T. Pentland, “Reconceptualizing Organizational Routines as a Source of Flexibility and Change,” *Administrative Science Quarterly* 48, no. 1 (March 1, 2003): 94, <https://doi.org/10.2307/3556620>.

³²⁶ Cyert and March, *A Behavioral Theory of the Firm*; Nelson and Winter, *An Evolutionary Theory of Economic Change*; James G. March and Herbert A. Simon, *Organizations* (New York: Wiley-Blackwell, 1958).

the past.”³²⁷ Routines enable bureaucracies to “organize expertise and exercise power effectively.”³²⁸ On the downside, they have also been considered one of the sources of organizational inertia³²⁹ or mindlessness.³³⁰ “Routines are perhaps more ubiquitous than previously thought and are involved in more organizational domains than previously considered.”³³¹

Where habits are personal and relate to single individuals, routines are collective phenomena involving multiple individuals and groups.³³² They are components of institutions. Thus, an institution may embody a particular routine involving several people who may be distributed across the organization when faced with a given environmental stimulus. These persons are “linked by interaction,” and when carrying out that routine, it is likely that their habits will also be involved.³³³

Routines — or capabilities — comprise the conscious knowledge and experience held by participants carrying out organizational tasks.³³⁴ They are recognizable, repetitive patterns of organizational reactions to internal or external stimuli carried out by multiple actors³³⁵ and can thus be interpreted as serving a heuristic function.³³⁶ “Routines are practices with internal dynamics that contribute to both stability and change in

³²⁷ Nelson and Winter, *An Evolutionary Theory of Economic Change*, 134.

³²⁸ Feldman and Pentland, “Reconceptualizing Organizational Routines as a Source of Flexibility and Change,” 94.

³²⁹ Michael T. Hannan and John Freeman, “Structural Inertia and Organizational Change,” *American Sociological Review* 49, no. 2 (1984): 149–64, <https://doi.org/10.2307/2095567>.

³³⁰ Blake E. Ashforth and Yitzhak Fried, “The Mindlessness of Organizational Behaviors,” *Human Relations* 41, no. 4 (April 1, 1988): 305–29, <https://doi.org/10.1177/001872678804100403>.

³³¹ Martha S. Feldman et al., “Beyond Routines as Things: Introduction to the Special Issue on Routine Dynamics,” *Organization Science* 27, no. 3 (2016): 505, <https://www.jstor.org/stable/24763625>.

³³² Markus C. Becker, “Organizational Routines: A Review of the Literature,” *Industrial and Corporate Change* 13, no. 4 (August 1, 2004): 646, <https://doi.org/10.1093/icc/dth026>.

³³³ Becker, 647.

³³⁴ Nelson and Winter, “Evolutionary Theorizing in Economics”; Scott, *Institutions and Organizations*, 36.

³³⁵ Becker, “Organizational Routines,” 505; Becker, 644; Maurizio Zollo and Sidney G. Winter, “Deliberate Learning and the Evolution of Dynamic Capabilities,” *Organization Science* 13, no. 3 (June 2002): 340, <https://doi.org/10.1287/orsc.13.3.339.2780>.

³³⁶ Becker, “The Concept of Routines,” 255.

organizations.”³³⁷ Because routines are context-dependent, they develop and evolve organically, making them almost impossible to replicate or transfer.

Since there can be no routine without action, such action forms the basis for routines. Action is situated, partly ad-hoc, embodied, and not necessarily rational.³³⁸ Routines are relevant in a specific time and place, enacted, and part of a social (and material) context. This way, routines are “patterns of action.”³³⁹ Until recently, routines were regarded individually and not considered interacting processes that contribute to stability and change.³⁴⁰ They were perceived as static, like standard operating procedures and doctrine.

In contrast, routines are dynamic because patterns (of behavior) are temporal. Hence, they should be seen as processes, not ‘things.’ Dynamism rests on the ability to change from one state or action to another. In order to survive, an organization needs to be able to adapt and change its routines when faced with new situations.³⁴¹ In summary, “organizational routines are dynamic because they exist through a process of (re)production, over time and space, through the ongoing effort of actants (people and things).”³⁴² Routine dynamics can only exist when routines are understood as “interdependent networks of routines.”³⁴³ At the same time, connections among routines contribute to an organization’s resilience, stability, and innovation. Research shows these connections can “emerge and change through intended and unintended actions.”³⁴⁴ Conversely, “insufficient cross-cutting ties potentially leads to conflict in the business

³³⁷ Feldman and Pentland, “Reconceptualizing Organizational Routines as a Source of Flexibility and Change.”

³³⁸ Feldman et al., “Beyond Routines as Things,” 506.

³³⁹ Feldman et al., 506.

³⁴⁰ Feldman et al., 509.

³⁴¹ Nelson and Winter, “Evolutionary Theorizing in Economics”; Scott, *Institutions and Organizations*, 36.

³⁴² Feldman et al., “Beyond Routines as Things,” 505.

³⁴³ Feldman et al., 509.

³⁴⁴ Feldman et al., 510.

world and in war.”³⁴⁵ Just imagine, when two opposing parties start to gather support and these supporting parties neither have neither relations or networks with the opposing parties, the effort is likely to go awry.

Routines are most valuable in complex situations. Following a routine often makes more sense than trying to understand the situation. Still, most situations are too complex to fully understand, which gives rise to the use of mental models. Individuals only need knowledge and experience to carry out a routine; they do not necessarily need to know why they are doing it. Sometimes, it is difficult to see or comprehend an argument due to the illogical nature of multiple statements. Consider an argument with two, four, or eight statements. With such complexity, it highlights why sequence matters, “not in the sense that it is always the same, but in that the order of actions is often meaningful.”³⁴⁶

It is “quite likely that logical incoherence could exist in any modestly complex ideology.”³⁴⁷ As with group mental models, complexity is often judged by the similarity of mental models.³⁴⁸ Also like the aim of group mental models, accuracy is where the effort should lie. With accuracy, given that routines are actions, they would be effective and purposeful. Since context matters, situated action is preferred, but research shows that situated action takes effort. As explained in the previous chapter, the sharing of knowledge can occur in multiple ways. When shared knowledge overlaps, it leads to similarity. Dispersed knowledge, on the other hand, makes it difficult to get an overview of all the knowledge in the organization³⁴⁹ as a baseline, assuming “the organization does not know what it knows.”³⁵⁰ In such cases where knowledge is dispersed, this drives uncertainty in

³⁴⁵ Granovetter, “Economic Action and Social Structure,” 492–93.

³⁴⁶ Feldman et al., “Beyond Routines as Things,” 507.

³⁴⁷ Denzau and North, “Shared Mental Models,” 14.

³⁴⁸ Denzau and North, 3.

³⁴⁹ Zollo and Winter, “Deliberate Learning and the Evolution of Dynamic Capabilities.”

³⁵⁰ As mentioned by Szulanski in assessing why organization have difficulty with transferring knowledge internally. There is a gap to what is known and what is put to use. Gabriel Szulanski, “Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm,” *Strategic Management Journal* 17, no. S2 (1996): 38, <https://doi.org/10.1002/smj.4250171105>.

an organization because members do not have a full view of all possible alternatives and the factors influencing potential outcomes of their routines and decisions.

Routines may stem from tradition, custom, or habit, but it would be a mistake to think that these actions require no explanation. “They are not mindless, repetitive behaviors. On the contrary, the routinized character of most social activity is something that has to be worked at continuously by those who sustain it in their day-to-day conduct.”³⁵¹ Ironically, exact replication can be more complicated than doing something different (but similar).³⁵² People often operate on autopilot during their daily routines, unaware of their actions or surroundings. In such situated action, their knowledge is often limited to the local context, but the underlying “routines and what they accomplish are distributed across time and space.”³⁵³ Even when such routines show similarity but are enacted at different locations, it might be difficult to anticipate or compare the outcomes since the local context differs.

2. Transaction Cost

Transaction cost theory stems from the work of R.H. Coase,³⁵⁴ who explored why economic exchanges are carried out within organizations, using a governance structure with rules and top-down direction instead of a market mechanism. It aims to minimize the cost of a product or service and considers organizing internally.³⁵⁵ Internalizing does not mean all transaction cost disappears but the cost changes in substance. Oliver

³⁵¹ Anthony Giddens, *The Constitution of Society: Outline of the Theory of Structuration*, First paperback edition (Berkeley: University of California Press, 1986), 86.

³⁵² Feldman et al., “Beyond Routines as Things,” 507.

³⁵³ Feldman et al., 508.

³⁵⁴ R. H. Coase, “The Nature of the Firm,” *Economica* 4, no. 16 (1937): 386–405, <https://doi.org/10.1111/j.1468-0335.1937.tb00002.x>.

³⁵⁵ Coase.

Williamson³⁵⁶ further developed transaction cost theory as an effort to understand complex economic organizations better. This approach looks at the allocation of economic activities across alternative modes of organization and describes the organization as a governance structure. Vertical integration in organizations is at the core of transaction cost theory.³⁵⁷

“New institutional economics takes the transaction as the primary unit of analysis.”³⁵⁸ Information comes at a cost, and people are rationally bounded, creating uncertainty and dependence. Institutions play a crucial role in minimizing uncertainty by establishing reliable and effective systems for economic transactions.³⁵⁹ From an economic (and behavioral) perspective, institutions aim to minimize transaction costs by optimizing effectiveness. In large organizations, specialization and the “division of labor”³⁶⁰ are a fact and are considered vital underlying features of modern economies.³⁶¹ As people become more specialized in their roles and tasks, it becomes important to have institutional structures in place. This allows individuals to navigate complex relationships and situations that require personal knowledge and time.³⁶² Since the transfer of information in an organization is critical combined with shared mental models and institutions providing the causal mechanism, it is imperative to understand that sharing and exchange often come at a cost.

³⁵⁶ Oliver E. Williamson, “Markets and Hierarchies: Some Elementary Considerations,” *The American Economic Review* 63, no. 2 (1973): 316–25, <https://www.jstor.org/stable/1817092>; Oliver E. Williamson, “The Economics of Organization: The Transaction Cost Approach,” *American Journal of Sociology* 87, no. 3 (November 1981): 548–77, <https://doi.org/10.1086/227496>; Oliver E. Williamson, “Transaction Cost Economics,” in *Handbook of New Institutional Economics*, ed. Claude Menard and Mary M. Shirley (Boston, MA: Springer U.S., 2005), 41–65, https://doi.org/10.1007/0-387-25092-1_4.

³⁵⁷ Williamson, “Transaction Cost Economics,” 41.

³⁵⁸ Powell and DiMaggio, *The New Institutionalism in Organizational Analysis*, 4.

³⁵⁹ Douglass C. North, “Institutions,” *Journal of Economic Perspectives* 5, no. 1 (March 1991): 97–112, <https://doi.org/10.1257/jep.5.1.97>.

³⁶⁰ As introduced by Adam Smith when reflecting on the industrial revolution and inquiring into the nature and causes of the wealth of nations. The division of labor was one of the main points. See: Smith, *The Wealth of Nations*.

³⁶¹ Douglass C. North, “Institutions, Transaction Costs and Economic Growth,” *Economic Inquiry* 25, no. 3 (1987): 419, <https://doi.org/10.1111/j.1465-7295.1987.tb00750.x>.

³⁶² North, 421.

In small groups or teams, individuals engage with other team members via personal exchange. Such transactions are relatively straightforward. There is little cost since these individuals have a “great deal of personal knowledge about the attributes, characteristics, and features of each other.”³⁶³ Working in dense social networks, therefore, limits transaction costs. In contrast, in a world of specialized interdependence where individuals depend upon a complex structure characterized by individual specialization, the cost of transactions can be high because the exchange is impersonal and brings with it the “problems of being able to measure the attributes of what is exchanged and problems of enforcement of the exchange.”³⁶⁴ Douglas North identifies four types of transaction cost: Cost of measuring, Exchange process, Enforcement, and Ideological attitudes.³⁶⁵ Three of those are a consequence of the environment. Still, this view is from an economic maximizing perspective, in which individuals are thought to maximize their outcomes. Hence, all potential steps in a transaction add up to an additional cost. The fourth point relates to the behavioral aspects of transactions. “Specialization and division of labor produce divergent perceptions of reality and hence contrasting and conflicting views of the fairness and justice of institutional arrangements.”³⁶⁶

3. Three Pillars of Institutions

To evaluate the complexity of institutions, it is helpful to separate them according to three elements is suggested since the simple distinction between formal and informal is ambiguous.³⁶⁷ “Regulative systems, normative systems, cultural-cognitive systems—each of these elements have been identified by social theorists as the vital ingredient of institutions.”³⁶⁸ Scott considers them as three independent but related institutional pillars that, when viewed separately, have the most potential for progress. Each of these pillars

³⁶³ North, 420.

³⁶⁴ North, 420.

³⁶⁵ North, 423.

³⁶⁶ North, 424.

³⁶⁷ See Hodgson for a discussion and letter exchange with Douglas North on this matter: Hodgson, “What Are Institutions?,” 18–21.

³⁶⁸ Scott, *Institutions and Organizations*, 59.

can be viewed by identifying their different underlying assumptions, mechanisms, and indicators, respectively.³⁶⁹ (See Table 1 for an overview)

a. *Regulative*

The regulative pillar constrains and regularizes behavior. It is about establishing rules, monitoring conformity, and sanctioning behavior (with rewards or punishment) to influence future behavior. As a continuous process, legalization formalizes rules to enhance and guide behavior. This view is particularly popular among economists and rational choice political scientists.³⁷⁰ Coercion is the primary mechanism of control (see Figure 3). The regulatory pillar is heavily dependent on the deployment of force, sanctions, and rapid responses to sustain its efficacy. As Scott mentions, institutions are “often tempered by the existence of rules that justify the use of force.”³⁷¹

Rules provide a formal instrument to govern organizational behavior and performance. The term rule is broadly understood as a “socially transmitted and customary normative injunction or immanently normative disposition, that in the circumstances X do Y.”³⁷² Nevertheless, there is some debate on the notion of rules, whether they should be formal, informal, have legal aspects, or social constraints. According to Scott, “It involves regulatory processes, like rule-setting, monitoring, and sanctioning activities.”³⁷³ The definition encompasses fundamental constitutive rules that form a crucial part of social structure and are integral to social life. These rules are often overlooked because they exist within a context rather than in isolation.³⁷⁴ It is imperative to recognize that others’ perception of individuals and their conduct extends beyond just the individual. Furthermore, collectives are similarly instituted and emanate in various forms.³⁷⁵

³⁶⁹ Scott, 59, 84.

³⁷⁰ Scott, 60–61.

³⁷¹ Scott, 61.

³⁷² Hodgson, “What Are Institutions?,” 3.

³⁷³ Scott, *Institutions and Organizations*, 59.

³⁷⁴ Granovetter, “Economic Action and Social Structure.”

³⁷⁵ Scott, *Institutions and Organizations*, 79.

Sanctioning is the method to ensure compliance with rules, and hence, it is a coercive mechanism. This research views rules as instruments that can be sanctioned by a governance system when they are not observed.³⁷⁶ “A stable system of rules, whether formal or informal, backed by surveillance and sanctioning power affecting actors’ interests that is accompanied by feelings of guilt or innocence constitutes one prevailing view of institutions”³⁷⁷ and a lens through which to view organizational processes.

The legalization or formalization of rules is considered a continuum whose values can vary over three dimensions:

1. Obligation (to obey).
2. Precision (of required conduct).
3. Delegation (granting authority to apply rules and resolve disputes).³⁷⁸

Nevertheless, one should realize the paradox of using rules. “There is an inevitable need for the interpretation of rules— which can not itself be broken down to rules because judgment plays an insubstitutable role in the process of interpretation.”³⁷⁹ Even when rules exist, the interpretation and actions related to these rules determine their value. “For new laws to become rules, they must be enforced so that the avoidance or performance of the behavior in question becomes customary and acquires a normative status.”³⁸⁰

Similarly, “rules do not determine action. They influence action, however, and can be underlying mechanisms that give rise to recurrent action patterns.”³⁸¹ As Wittgenstein asserts: “It may well be the case that I believe to follow a rule but do not do that. Or, I believe not to follow a rule but still do so.”³⁸² In any interactive context, it is crucial to

³⁷⁶ As discussed and shown in Table 2. See: W. Richard Scott, *Institutions and Organizations: Ideas, Interests, and Identities*, Fourth edition (Los Angeles: SAGE, 2014), 60. For a broader discussion on rules, consider: Hodgson, “What Are Institutions?,” 9–13.

³⁷⁷ Scott, *Institutions and Organizations*, 64.

³⁷⁸ Scott, 60.

³⁷⁹ Polanyi, *Personal Knowledge*.

³⁸⁰ From Hodgson, “What Are Institutions?,” 6.

³⁸¹ Becker, “The Concept of Routines,” 254.

³⁸² Wittgenstein’s quote from: Hodgson, “What Are Institutions?,” 6.

assume that individuals are following the rules, even if they are not. This is essential to establish a fair environment that encourages positive interactions.

b. Normative

The normative pillar focuses on normative rules, including values and norms, that prescribe, evaluate, and obligate certain behaviors. The central imperative is: “Given this situation and my role within it, what is the appropriate behavior for me to carry out?”³⁸³ As a social obligation, it provides expectations about behavior, and non-compliance can lead to a sense of shame or disgrace or, alternatively, honor and respect. In a way, it builds on loyalty and conformity.

“The tacit dimension of knowledge creates a problem when we attempt to draw the line between instinctive, or autonomic, behavioral regularities on the one hand and genuine rule following on the other.”³⁸⁴ John Searle’s argument dictates that the mental representations and rules of an institution are crucial elements of its existence. It is imperative to understand that an institution can only survive and thrive if individuals in that institution hold specific beliefs and mental attitudes that are interconnected.³⁸⁵ Therefore, “an institution is a social structure that involves potentially codifiable and (evidently or immanently) normative rules of interpretation and behavior,”³⁸⁶ founded on common standards, and thus expectations about future behavior.

As with groups and teams, some values and norms apply to all members, while others only apply to selected jobs. These beliefs create expectations on how one should behave. These prescriptions can impose constraints but also empower and enable social action.³⁸⁷

³⁸³ Scott, *Institutions and Organizations*, 65.

³⁸⁴ Hodgson, “What Are Institutions?,” 4.

³⁸⁵ John R. Searle, *The Construction of Social Reality* (New York: Free Press, 1995); Searle, “What Is an Institution?”

³⁸⁶ Hodgson, “What Are Institutions?,” 4.

³⁸⁷ Scott, *Institutions and Organizations*, 64.

Scott explains the difference between values and norms clearly.³⁸⁸ “Values are expressions of goals or, more precisely, the criteria employed in selecting goals; norms are the generalized rules governing behavior that specify appropriate means for pursuing goals.” In other words, values refer to what is deemed preferable or desirable, and they are accompanied by benchmarks that can be used to evaluate current structures or behaviors. Norms dictate the appropriate ways of doing things and establish acceptable means of achieving desired outcomes. Such norms are thus based on mental models themselves, where experience and knowledge have determined what is acceptable.

According to Scott,³⁸⁹ “normative systems define goals or objectives and designate appropriate ways to pursue them.” In organizations, certain values and norms are applicable to all members, while others apply only to specific members. Roles prescribe “how specified actors are supposed to behave.”³⁹⁰ Normative systems are generally seen as limitations on social behavior. However, they can also empower and facilitate social action. “They confer rights as well as responsibilities, privileges as well as duties, licenses as well as mandates.”³⁹¹ “Rules and norms of behavior are deeply ingrained in human beings, and security is associated with a given code of conduct and behavior, which will only gradually change.”³⁹²

c. Cultural-Cognitive

The third pillar emphasizes the cultural-cognitive perspective, which highlights how the socially constructed common framework of meanings plays a vital role in institutions.³⁹³ This view concerns the mental models of individuals and how they make sense of their environment. Meanings are created through interactions and continue to

³⁸⁸ Scott, 53.

³⁸⁹ Scott, 64.

³⁹⁰ Scott, 64.

³⁹¹ Scott, 64.

³⁹² North, “Institutions, Transaction Costs and Economic Growth.”

³⁹³ Scott, *Institutions and Organizations*, 70.

evolve as they are used to understand the ongoing events.³⁹⁴ As mentioned in Chapter II, the way individuals respond to external factors is influenced by their mental models, which are symbolic representations of the world that they have internalized. At the institutional level, “symbolic processes, at their most basic level, work to construct social reality, to define the nature and properties of social actors and social actions.”³⁹⁵ Thus, “Symbols—words, signs, gestures—affect the meanings we attribute to objects and activities.”³⁹⁶ According to cultural-cognitive theorists, how we behave is influenced by how we understand and organize information. Our decisions and choices are based on mental models, assumptions, and schemas that are shaped by the social environment.³⁹⁷ To imply compliance, in instances when other types of behavior are inconceivable, people follow a routine because that is “the way we do these things.”³⁹⁸ The common reasoning used to support conformity is based on orthodoxy, which is the belief in the correctness and validity of the ideas behind one’s actions.³⁹⁹ This pillar has an emotional aspect, which includes positive feelings of certainty and confidence, and negative emotions of confusion or disorientation.. “Actors who align themselves with prevailing cultural beliefs are likely to feel competent and connected; those who are at odds are regarded as, at best, clueless or, at worst, crazy”⁴⁰⁰ and could feel that way too.

The cognitive-cultural view suggests that external cultural frameworks influence how we interpret things. Cultural systems operate at different levels, including the personal and collective understandings of local circumstances, as well as established frameworks and belief systems that form an organization’s culture. These levels are interconnected,

³⁹⁴ As explained by Weick, Sutcliffe, and Obstfeld, “Organizing and the Process of Sensemaking.”

³⁹⁵ Scott, *Institutions and Organizations*, 68.

³⁹⁶ Scott, 67.

³⁹⁷ Scott, 82.

³⁹⁸ Scott, 68.

³⁹⁹ Scott, 68.

⁴⁰⁰ Scott, 70.

with broader cultural frameworks shaping individual beliefs, and individual constructs potentially reshaping larger belief systems.⁴⁰¹

Culture shapes our minds and actions through mental programs.⁴⁰² Symbolic processes are the cornerstone for constructing social reality, as they establish the defining characteristics of social actors and their actions.⁴⁰³ To understand or explain any action, one must consider the objective conditions and the actor's subjective interpretation of them.⁴⁰⁴ The degree of embeddedness in routines determines the degree of institutionalization.

Table 2. Three pillars of institutions⁴⁰⁵

	Regulative	Normative	Cultural-cognitive
Basis of compliance	Expedience	Social obligation	Shared understanding "Taken for granted,"
Basis of order	Regulative rules	Binding expectations	Intrinsic schema
Mechanism	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules, Laws, Sanctions	Certification, Accreditation	Common beliefs, Shared logic, Isomorphism
Basis of legitimacy	Legally sanctioned	Morally governed	Recognizable, comprehensible, supported
Symbolic systems	Rules, laws	Values, expectations, standards	Categories, Typifications, Schemas, Frames
Relational system	Governance systems	Regimes, authority systems	Identities, Structural isomorphism
Activities	Monitoring, Sanctioning, Disrupting	Roles, jobs, Routines, Habits	Predispositions, Scripts
Artifacts	Aimed with mandated specifications	Aimed at meeting conventions, standards	Aimed at possessing symbolic value

⁴⁰¹ Scott, 68.

⁴⁰² Geert H. Hofstede, *Cultures and Organizations: Software of the Mind* (London ; New York: McGraw-Hill, 1991), 4.

⁴⁰³ Scott, *Institutions and Organizations*, 68.

⁴⁰⁴ Scott, 67.

⁴⁰⁵ Adapted from Scott, 60, 96.

“When the pillars are aligned, the strength of their combined forces can be formidable.”⁴⁰⁶ Conversely, it is important to understand that under certain circumstances, one of the pillars may virtually operate on its own. Situations in which one pillar takes precedence over the others can lead to conflicting choices and actions. As David Strang and Wesley Sine point out, “Where cognitive, normative, and regulative supports are not well aligned, they provide resources that different actors can employ for different ends.”⁴⁰⁷ Given the nature and structure of large organizations, their multiple (social) identities generate persistent and deep-rooted tensions within the organization.⁴⁰⁸ Such situations are likely to result in both confusion and conflict.

E. OUTPUT

“The sharing of mental models is enabled by communication, and communication allows the creation of ideologies and institutions in a co-evolutionary process.”⁴⁰⁹ This process ultimately relies on sharing knowledge and codifying knowledge patterns into rules, norms, and routines. It is not only enabled by communication; the shared understanding and underlying concepts also make communications easier.⁴¹⁰ Institutions, having a common language and established procedures for sharing information (by routines and accepted transactions), create stability, affect legitimacy, and create meaning.

⁴⁰⁶ Scott, 71.

⁴⁰⁷ David Strang and Wesley D. Sine, “Interorganizational Institutions,” in *The Blackwell Companion to Organizations*, ed. Joel Baum A.C. (Hoboken, NJ: John Wiley & Sons, 2017), 499, <https://doi.org/10.1002/9781405164061.ch21>.

⁴⁰⁸ Matthew S. Kraatz and Emily S. Block, “Organizational Implications of Institutional Pluralism,” in *The SAGE Handbook of Organizational Institutionalism*, ed. Royston Greenwood et al. (London, UK: SAGE, 2008), 243.

⁴⁰⁹ Denzau and North, “Shared Mental Models,” 11.

⁴¹⁰ Denzau and North, 9.

1. Stability

Routines are shaped by history⁴¹¹ and develop into ways of doing, and they are “triggered by external cues or by other actors in the organization.”⁴¹² Furthermore, “The presence of learning creates path dependence in ideas, ideologies, and institutions. Systems of mental models exhibit path dependence such that history matters and suboptimal performance can persist for substantial periods of time.”⁴¹³ People favor known (routine) approaches because they take into account prior experience, their mental models, when making decisions.⁴¹⁴ Such path dependence is an outcome of routines but, at the same time, provides input for routines where a response to feedback leads to incremental change in routines. When facing a new problem, people “use their accustomed older solutions whether or not these ever worked or can reasonably be expected to work.”⁴¹⁵ In other words, there is a tendency for people to act similarly and in accordance with established routines without considering the accuracy or effectiveness of the ‘routine’ activity. Although path dependence provides stability and clarity on potential tasks, it can also lead to competency traps.⁴¹⁶ When a ‘path’ is established, it can be arduous to take a ‘detour.’ This is because it mainly depends primarily on organizational-level experience, not personal knowledge. “Routines capture the experiential lessons of history in a way that makes the lessons, but not the history, accessible to organizations and organizational members, who have not themselves experienced the history.”⁴¹⁷ It is impossible to

⁴¹¹ Becker, “Organizational Routines,” 653; Nelson and Winter, *An Evolutionary Theory of Economic Change*; David J. Teece, Gary Pisano, and Amy Shuen, “Dynamic Capabilities and Strategic Management,” *Strategic Management Journal* 18, no. 7 (1997): 509–33, <http://www.jstor.org/stable/3088148>; Barbara Levitt and James G. March, “Organizational Learning,” *Annual Review of Sociology* 14, no. 1 (1988): 319–38, <https://doi.org/10.1146/annurev.so.14.080188.001535>.

⁴¹² Becker, “Organizational Routines,” 654.

⁴¹³ Denzau and North, “Shared Mental Models,” 15.

⁴¹⁴ As shown by Tilmann Betsch et al., “The Effects of Routine Strength on Adaptation and Information Search in Recurrent Decision Making,” *Organizational Behavior and Human Decision Processes* 84, no. 1 (January 1, 2001): 23–53, <https://doi.org/10.1006/obhd.2000.2916>.

⁴¹⁵ Meyer, “Reflections on Institutional Theories of Organizations,” 790.

⁴¹⁶ As mentioned by Levitt and March, these can result from feedback mechanisms where inferior behavior is rewarded thus making it dominant in the common experience while optimal behavior is not considered. Levitt and March, “Organizational Learning,” 322.

⁴¹⁷ Levitt and March, 320.

reconstruct the path for which the routine was originally the solution without understanding the background and context for why a specific path was developed.⁴¹⁸

As highlighted in Chapter III, individuals will support what is deemed right without clear evidence that something is wrong.⁴¹⁹ In this respect, where thinking and choices at the organizational level are often less clear-cut, proving that something is inaccurate or false is challenging. Chester Barnard mentioned a so-called “zone of indifference” where managers and workers might consider breaking with the status quo but do not want to accept the potential transaction cost that follows that decision. Indeed it is challenging to evaluate efforts in terms of transaction costs, because all cost categories are involved.⁴²⁰

There exists a “zone of indifference” in each individual within which orders are acceptable without conscious questioning of their authority... The zone of indifference will be wider or narrower depending upon the degree to which the inducements exceed the burdens and sacrifices which determine the individual’s adhesion to the organization. It follows that the range of orders that will be accepted will be very limited among those who are barely induced to contribute to the system.⁴²¹

All institutions depend on other institutions.⁴²² Such relations create support but also dependencies and bureaucratic frameworks. For instance, where there is a reciprocal relationship among multiple institutions, the connectedness and relations among the institutions result in stability, reducing internal uncertainty about expectations. Thus, when a network of affiliated institutions exists, it is easy to see that organizational change can only occur effectively when all affected institutions support such change.

When institutions are interdependent, their routines are likely to interact. Moreover, new research into routine interaction by Martha Feldman and colleagues explores

⁴¹⁸ Becker, “Organizational Routines,” 653.

⁴¹⁹ As this is one of the three principles of mental models. See: Philip N Johnson-Laird, “Mental Models and Human Reasoning.”

⁴²⁰ As mentioned in the transaction cost sub-header. These include the cost of measuring, exchange, enforcement, ideological attitudes. See: North, “Institutions, Transaction Costs and Economic Growth,” 423.

⁴²¹ Chester I. Barnard, *The Functions of the Executive*, 30th ed. (Cambridge, MA: Harvard University Press, 1938), 167–69.

⁴²² Hodgson, “What Are Institutions?,” 13.

relationality among routines, not just within them. In their research, they suggest that “organizations and capabilities are not just bundles of routines but may be interdependent networks of routines.”⁴²³ Therefore, routines should be considered as the capabilities required to adapt to a changing environment with various opportunities. This adaptiveness should lead to a more sustained form of stability. Acknowledging this more complex view of institutions with positive and negative aspects is vital. “Institutional forces can liberate as well as constrain. They can both enable and disarm the efforts of those seeking change.”⁴²⁴

2. Legitimacy

“Organizations require more than material resources and technical information if they are to survive and thrive in their social environments. They also need social acceptability and credibility.”⁴²⁵ As Scott explains, each of the three pillars of institutions, mentioned in the process section of this chapter, “provides a basis of legitimacy, albeit a different one [see Table 2].”⁴²⁶ First, the regulatory pillar underlines “conformity to rules.” Organizations that are considered legitimate are the ones that have been established and are operating in accordance with legal or quasi-legal requirements. Second, the normative notion emphasizes a more profound “moral base for assessing legitimacy.” Rules that align with an individual’s values are more likely to be followed than those that are enforced externally. Compliance with such rules is often rewarded. Third, the cultural-cognitive conception is the most profound since it “rests on preconscious, taken-for-granted understandings.” The cultural-cognitive viewpoints on legitimacy come from “conforming to a common definition of the situation, frame of reference, or a recognizable role (for individuals) or structural template (for organizations).” this pillar seeks “the legitimacy of cognitive consistency.” Depending on the perspective, different motivations and indicators emerge for legitimacy. When comparing those, legitimacy is unclear and could have

⁴²³ Feldman et al., “Beyond Routines as Things,” 509.

⁴²⁴ Scott, *Institutions and Organizations*, 74.

⁴²⁵ W. Richard Scott et al., *Institutional Change and Healthcare Organizations: From Professional Dominance to Managed Care* (Chicago: University of Chicago Press, 2000), 237.

⁴²⁶ Scott et al., 237.

multiple meanings. This difference could result in conflict when there is no alignment in the legitimacy perspective.⁴²⁷

3. Pitfalls

Herbert Simon et al. points out that “organizational performance is susceptible to the quality of the routines or “performance programs” that govern behavior and to the adaptability of these routines in the face of a changing environment.”⁴²⁸ Many organizational intentions focus on short-term goals; they do not think much about the long-term. Inherent in the short-term approach is the view that routines and institutions are relatively static. Since a complex organization’s “peripheral vision” is limited, its “responses to novelty in the environment may be inappropriate and quasi-automatic ways that cause major failures.”⁴²⁹ Inertia and myopia play an essential role in institutional persistence. North suggests, however, that the prospective gains from altering institutions outweigh the cost of making the changes.⁴³⁰

Conversely, from a long-term perspective, it becomes evident that environmental change and dealing with it is part of institutions and should be incorporated into institutional behavior. It implies dealing with true uncertainty, which occurs when one cannot determine even subjective probability distribution functions outlined over a set of possible outcomes.⁴³¹ In short, it is ambiguous whether a particular choice will improve one’s circumstances.⁴³² Nevertheless, in the face of uncertainty or ambiguity, people construct explanations and act accordingly. Although the future remains uncertain, having

⁴²⁷ Scott, *Institutions and Organizations*, 74.

⁴²⁸ Simon et al., “Decision Making and Problem Solving,” 27.

⁴²⁹ Simon et al., 27.

⁴³⁰ Douglass C. North, *Institutions, Institutional Change, and Economic Performance*, The Political Economy of Institutions and Decisions (Cambridge ; New York: Cambridge University Press, 1990).

⁴³¹ Arthur T. Denzau and Douglass C. North, “Shared Mental Models: Ideologies and Institutions,” *Kyklos* 47, no. 1 (March 1994): 15, <https://doi.org/10.1111/j.1467-6435.1994.tb02246.x>.

⁴³² As depicted by the concept of causal ambiguity which describes a lack of understanding of causal relations between resources and competitive advantage. As highlighted by Herbert Simon such uncertainty stems from incomplete information and understanding. The initial concept by Steven A. Lippman and Richard P. Rumelt, “A Bargaining Perspective on Resource Advantage,” *Strategic Management Journal* 24, no. 11 (2003): 1069–86, <http://www.proquest.com/docview/37799663/CEDD8694577948F0PQ/1>.

routines for coping with change is helpful. A great example, often used, is how Shell adapted to its changing environment.⁴³³

Comparing individual and organizational knowledge in decision-making, it is evident that tacit knowledge can often hold more value than explicit information. This refers to the deep understanding of unspoken nuances and subtleties, as Michael Polanyi discusses.⁴³⁴ Our decisions can be influenced by things we are not consciously aware of. Unawareness is not only part of the individual's natural deficiency but also an outcome of group and organizational pressures. Routines and similarity of thought do not require much thinking, only following or complying with existing procedures. Unfortunately, it implies that while people think about better alternatives, they are bound by their (institutions') knowledge. Therefore, a fundamental problem with this standard substantive rationality result is that the broader "menu of choices is not really known a priori by the chooser."⁴³⁵ At times, there may be a tendency for individuals to become entrenched in their workplace culture. This can lead to a fixed mindset that may impede the emergence of fresh and innovative ideas.⁴³⁶ In a way, people tend to get stuck in institutional echo chambers.

F. SO WHAT?

Formal and informal organizational perspectives include rules, regulations, norms, and values. Their focus is often on their environment, internal and external, to achieve organizational goals. In addition, legitimacy, stability, and meaning are at the core of procedural rationality. These sometimes-conflicting forces drive organizational routines. For instance, when the focus is too much on stability or 'control,' these objectives become

⁴³³ As mentioned in: William B. Brennenman and J. Bernard Keys, "Learning Across a Living Company: The Shell Companies' Experiences," *Organizational Dynamics* 27, no. 2 (September 1998): 61–70, [https://doi.org/10.1016/S0090-2616\(98\)90024-9](https://doi.org/10.1016/S0090-2616(98)90024-9); Peter Cornelius, Alexander Van de Putte, and Mattia Romani, "Three Decades of Scenario Planning in Shell," *California Management Review* 48, no. 1 (Fall 2005): 92–109, <https://doi.org/10.2307/41166329>.

⁴³⁴ Polanyi, *The Tacit Dimension*.

⁴³⁵ Denzau and North, "Shared Mental Models," 12.

⁴³⁶ Werhane, "Mental Models, Moral Imagination and System Thinking in the Age of Globalization," 464.

causes of inertia⁴³⁷ or myopia⁴³⁸ which might result in decreased organizational performance.

The uses and outcomes of routines differ when they are viewed as dynamic elements that can adapt and support change. Then, they can become causes of continuous organizational change or adaptiveness.⁴³⁹ Although often mentioned, such openness to change is a ‘mindset,’ but it is more than that. Creating routines that allow for openness and adaptiveness is partly due to mindset but mainly based on guidance, direction, and taming organizational parts (with strong identities) to keep their focus on the whole. Answers to the questions: “What is the issue?” and “What must be done?” depend on the position from which the questions are considered. Therefore, an overarching organizational or supra-institutional orientation should be clear so subordinate levels can determine their contributions.

The exploration of mental models in relation to military organizations should begin by determining the organizational structure, which in turn will provide the input of the conceptual mechanism. The review of a military organization will reveal it as a machine bureaucracy with a hierarchical structure.⁴⁴⁰ On the other hand, this bureaucracy resembles the divisionalized form, comprising smaller machine bureaucracies resembling the services. Either way, these configurations are defined by high standardization, specialized and formalized jobs, large functional units at the operating level, and centralized power.⁴⁴¹

Since military organizations comprise multiple services, many units, and even more personnel, they create a plethora of institutions and related routines. Therefore, the behavior of a military organization is less about the choices of leaders than it is about the

⁴³⁷ Hannan and Freeman, “Structural Inertia and Organizational Change.”

⁴³⁸ Daniel A. Levinthal and James G. March, “The Myopia of Learning,” *Strategic Management Journal* 14, no. S2 (1993): 95–112, <https://doi.org/10.1002/smj.4250141009>.

⁴³⁹ Martha S. Feldman, “Organizational Routines as a Source of Continuous Change,” *Organization Science* 11, no. 6 (December 2000): 611–29, <https://doi.org/10.1287/orsc.11.6.611.12529>.

⁴⁴⁰ As one of the five basic configurations mentioned by Mintzberg, “Structure in 5’s,” 185.

⁴⁴¹ Mintzberg, 322.

output of “organizational functioning according to standard patterns of behavior.”⁴⁴² For military organizations to maintain stability internally and legitimacy in the eyes of its citizens, they emphasize performance that depends on the coordinated behavior of individuals captured in complex routines. Such coordination requires standard operating procedures: “rules according to which things are done.”⁴⁴³ These standards are ubiquitous in military organizations, and although they serve a purpose, one should consider the military organization a two-headed beast.

There is only one military organization per nation. It is responsible for protecting national interests through the military instrument of national power.⁴⁴⁴ Nevertheless, there are two distinct parts of military organizations. The ‘fighting body’ is surrounded by a ‘business support’ entity. The fighting body contains all deployable or active units; as Mintzberg describes, they mostly stem from the operating core. In contrast, business support comprises the support staff, technostucture, and strategic apex. While this broad distinction might be apparent, the different types of rules, regulations, and routines related to each of these entities usually is not. Standard operating procedures at the tactical level ensure rapid (inter)action and simple communications during battle to win effectively. These procedures are considered guidelines and best practices in performing and interacting. However, similar standards on the business-support side often result in rigid routines that lead to the opposite—delays, and sub-optimal outcomes. It “does not constitute far-sighted, flexible adaption” to issues.⁴⁴⁵ Changing such procedures in doing business is often considered too high a cost. Furthermore, because of the structure of the machine bureaucracy, the organization is ‘expected’ or forced to impose standardization. When routines are appropriate, average performance of the organization is better than

⁴⁴² Allison, “Conceptual Models and the Cuban Missile Crisis,” 698.

⁴⁴³ Allison, 698.

⁴⁴⁴ As the widely accepted acronym DIME explains, elements of national power include: Diplomatic, Informational, Military, and Economic power. For a broader discussion, consider: R. Craig Nation and J. Boone Bartholomees, “National Power” (Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, 2012), <https://www.jstor.org/stable/resrep12116.14>.

⁴⁴⁵ Allison, “Conceptual Models and the Cuban Missile Crisis,” 702.

individual approaches.⁴⁴⁶ Unfortunately, environments change, opponents adapt, and technology disrupts both categories with this bureaucracy.

Assessing or foreseeing might only be possible with hindsight knowledge. Therefore, knowing that the dynamics and interconnectedness of routines exist, military organization should be viewed from a complex adaptive systems⁴⁴⁷ perspective, where adaptiveness is the baseline, not a static standard.⁴⁴⁸ “A system is more than the sum of its parts. It may exhibit adaptive, dynamic, goal-seeking, self-preserving, and sometimes evolutionary behavior.”⁴⁴⁹ Nonlinearity, then, is the standard. Proportional effects hardly ever occur in reality, and interactions are affected by multiple factors. “So the world often surprises our linear-thinking minds.”⁴⁵⁰ As Donella Meadows asserts, while many organizational failures or mistakes are often blamed on particular actors or events, they are actually a consequence of system structure.⁴⁵¹

Linear thinking and adherence to routines has also led to institutional failures in the military. Military organizations are historically not known for their adaptive spirit. Instead, they are conventional and slow in renewal.⁴⁵² Notably, in the first months of the First World War, France “left a historical image of strategic and tactical blindness virtually unparalleled in history.”⁴⁵³ Over-reliance on existing routines, structures, and institutions left to nearly one million soldiers listed as missing, prisoner, or dead in little more than

⁴⁴⁶ Allison, 702.

⁴⁴⁷ These systems change and reorganize their component part to adapt themselves to the problems posed by their surroundings. See: John H. Holland, “Complex Adaptive Systems,” *Daedalus* 121, no. 1 (Winter 1992): 18.

⁴⁴⁸ As supported by Christopher R. Paparone, Ruth A. Anderson, and Reuben R. McDaniel, “Where Military Professionalism Meets Complexity Science,” *Armed Forces & Society* 34, no. 3 (April 1, 2008): 433–49, <https://doi.org/10.1177/0095327X07310337>.

⁴⁴⁹ Donella H. Meadows, *Thinking in Systems: A Primer* (London, UK: Earthscan, 2009), 12.

⁴⁵⁰ Meadows, 91.

⁴⁵¹ Meadows, 112.

⁴⁵² As illustrated by William Hardy McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000*, 7. Nachdr (Chicago: University of Chicago Press, 1993).

⁴⁵³ Michael Howard, “Men against Fire: The Doctrine of the Offensive in 1914,” in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, ed. Gordon A. Craig and Felix Gilbert (Princeton University Press, 1986), 510, <https://doi.org/10.2307/j.ctv8xnhvw>.

three months. Nonetheless, France did not change its routines and procedures for infantry battles until many of its units were slaughtered at the start of the First World War. Not adapting to new weapon systems, sticking to large formations and 19th-century tactics, and lacking a strategy became disastrous for the French army in 1914–1915.⁴⁵⁴

Adaptiveness and flexibility might be more important than following conventional routines. However, coping with change and remaining flexible is also a mental model or routine that can be implemented.⁴⁵⁵

The only thing harder than getting a new idea into the military mind is to get an old one out.

—Basil Liddel Hart

⁴⁵⁴ Charles Sanders Jr., “No Other Law: The French Army and the Doctrine of the Offensive” (Santa Monica, CA: RAND Corporation, March 1987), <https://www.rand.org/content/dam/rand/pubs/papers/2005/P7331.pdf>.

⁴⁵⁵ Feldman and Pentland, “Reconceptualizing Organizational Routines as a Source of Flexibility and Change.”

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VI. SYNTHESIS AND DISCUSSION

Why do individuals make suboptimal decisions? What happens in teams when they work on problems? How do people in organizations act when presented with a challenge? Exploring these questions separately and integrally provides rich insights into different kinds of behavior in organizations.

TO gain a wide range of insights into these questions, this research adopted a multi-level and multi-disciplinary approach. Where the previous chapters provided the main takeaways for each level separately, this chapter presents some overarching themes that emerged during the research. A key finding was that we would benefit from more awareness of mental models and their associated social processes, because these models often determine the routines and decision-making processes in our daily lives—although we are largely unaware of that influence. Similarly, organizations could benefit from understanding how the effective sharing of information and utilization of knowledge and experience among internal groups is the key to improved organizational performance. Considering the importance of behavioral aspects, such as the ones just mentioned, it is surprising how little attention is paid to them in military organizations.

Using relevant theories from various disciplines like psychology, sociology, and economics has proven helpful in assessing behavior in organizations. It showed that knowledge and experience play an invaluable role in organizational performance. At the individual, team, and organizational levels, all types of mental models start with ‘knowledge.’ It is owned by the individual and shared among team members, while the organization uses patterns of shared knowledge. The research also revealed that knowledge and experience are processed differently, corresponding to the different causal mechanisms at each level analyzed. Further, the way in which knowledge and experience are utilized in these causal mechanisms, from the individual to organizational level, from input to output,

significantly affects performance and has the potential to improve performance.⁴⁵⁶ In behavioral science there is no definite answer as to whether the individual or the collective is more valuable,⁴⁵⁷ and this research does not settle that debate. However, this research did find value in the required interaction between the individual and two types of collective of entities studied.

Additionally, by exploring multiple levels (individual, group, and organization) this research was able to reveal how causal mechanisms are connected horizontally and vertically in a systemic way. Analysis of just one level would have limited finding such relations. Although the findings are still conceptual, the multi-level and multi-disciplinary approach created a broader understanding than could have been gleaned from the single-level and single-discipline analysis of organizational behavior adopted by much previous research.⁴⁵⁸ This was also evident in the exploration of mental models. As Donella Meadows asserts, “everything we think we know about the world is a model.”⁴⁵⁹ While models vary in congruence and can be useful in depicting the world, they are not capable of completely or accurately representing reality. Nevertheless, the use of multiple models and theories in this research aimed to provide a broader and richer understanding and are therefore useful. To avoid ‘thinking in black boxes,’ this research examined the various parts of mental models, shared mental models, and institutions and revealed the significance of their interactions, especially for the military. Although more study on the topic is needed, this research an overview for military organizations how knowledge is used and shared, at the individual, team, and organizational levels. Such examination provides a basis (and

⁴⁵⁶ As supported by the Knowledge-based theory in strategic management, where the individual plays a significant role in the knowledge application. Teppo Felin and William S. Hesterly, “The Knowledge-Based View, Nested Heterogeneity, and New Value Creation: Philosophical Considerations on the Locus of Knowledge,” *The Academy of Management Review* 32, no. 1 (2007): 195–218, <https://www.jstor.org/stable/20159288>; Bruce Kogut and Udo Zander, “Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology,” *Organization Science* 3, no. 3 (August 1992): 383–97, <https://doi.org/10.1287/orsc.3.3.383>; Robert M. Grant, “Toward a Knowledge-Based Theory of the Firm,” *Strategic Management Journal* 17, no. S2 (1996): 109–22, <https://doi.org/10.1002/smj.4250171110>.

⁴⁵⁷ Felin and Hesterly, “The Knowledge-Based View, Nested Heterogeneity, and New Value Creation,” 195.

⁴⁵⁸ As argued by Jepperson and Meyer, “Multiple Levels of Analysis and the Limitations of Methodological Individualisms*.”

⁴⁵⁹ Meadows, *Thinking in Systems*, 87.

tool) to reconsider education, training, exercises, and knowledge management to increase or sustain fighting power.

Because the research ultimately aims at deepening the understanding of organizational performance, it highlights areas where improvements are possible and potentially needed. Using a similar process approach (input, processing, output) for all levels of analysis allows for some comparison. It shows that all levels apply knowledge and experience as input to make choices and decisions. How this knowledge becomes input depends on the context. The entity's environment (individual, group, organization) determines how the knowledge is processed. Setting knowledge and experience at the center stage implies determining how the knowledge is processed and how it is used. Unfortunately, due to the increasing social effect, that emphasizes the value of knowledge, less attention is paid to the process it undergoes. At the individual level, such knowledge and experience are still 'pure' when shared in groups, but this knowledge and experience is affected by social identities among individuals in the group and by whether it is used for team or task-oriented purposes. Within organizations, the research found that formal or informal 'ways of doing' are created around patterns of sharing knowledge. Existing patterns can become rules or norms and are established in routine actions. "The tendency to emphasize methods is an essential source of disorientation in all organizations."⁴⁶⁰ This results in managers and their institutions sometimes having narrow perspectives on their situation. They lack a sense of various possibilities for their decisions and the ability to imagine a wide range of issues, consequences, and solutions. When trapped in such a framework, of which they are only vaguely aware, "people do not always remember or learn from mistakes because they do not realize they have made mistakes."⁴⁶¹

As depicted in Figure 6, how knowledge will be processed or used is often related to the number of people who are involved in the process itself. Organizations need to balance the use of knowledge as a source compared to using knowledge processes to provide input. It seems that processes become more dominant when the amount of people

⁴⁶⁰ Selznick, *Leadership in Administration*, 12.

⁴⁶¹ Werhane, *Moral Imagination and Management Decision-Making*, 13.

or groups involved increases. In staying flexible, the benefits of applying routines for sharing and utilizing knowledge by integration should be balanced against the added value for the organization.⁴⁶² The question is whether it contributes to the best use of a valuable asset since “the ability to exploit knowledge may very well be the ultimate source of competitive advantage.”⁴⁶³ The effective use of knowledge and experience can result in competitive advantages.⁴⁶⁴ Moreover, the process by which knowledge and experience are used should be able to adapt to the changing environment. Dynamic capabilities that enable an organization “to sense and then seize new opportunities, and to reconfigure and protect knowledge assets, competencies, and complementary assets to achieve a sustained competitive advantage.”⁴⁶⁵ According to Scott, “resource-based theory recognizes the existence and importance of institutionalized elements within organizations, and points out the challenges these pose for organizational leaders: to nurture existing capabilities and to design and implement new institutional structures to meet changing challenges and opportunities.”⁴⁶⁶

⁴⁶² As discussed in the knowledge-based view of the firm. See Grant, “Toward a Knowledge-Based Theory of the Firm.”

⁴⁶³ Sidney G. Winter and Gabriel Szulanski, “Replication as Strategy,” *Organization Science* 12, no. 6 (December 2001): 742, <https://doi.org/10.1287/orsc.12.6.730.10084>.

⁴⁶⁴ The resource-based view looks inside the organization to find and leverage internal strengths and mitigate weaknesses. These resources include tangible and intangible financial, physical, human, and organizational assets. Especially the combination of valuable, rare, inimitable, and non-substitutable of resources is thought to be of the most value. See: Jay B. Barney, “Looking inside for Competitive Advantage,” *Academy of Management Executive* 9, no. 4 (November 1995): 49–61, <https://doi.org/10.5465/AME.1995.9512032192>; Jay Barney, “Firm Resources and Sustained Competitive Advantage,” *Journal of Management* 17, no. 1 (March 1991): 99, <https://www.proquest.com/docview/215258436/abstract/D84143C3AA1A4CB9PQ/1>.

⁴⁶⁵ Mie Augier and David J. Teece, “Dynamic Capabilities and the Role of Managers in Business Strategy and Economic Performance,” *Organization Science* 20, no. 2 (April 2009): 412, <https://doi.org/10.1287/orsc.1090.0424>; Teece, Pisano, and Shuen, “Dynamic Capabilities and Strategic Management.”

⁴⁶⁶ Scott, *Institutions and Organizations*, 38.

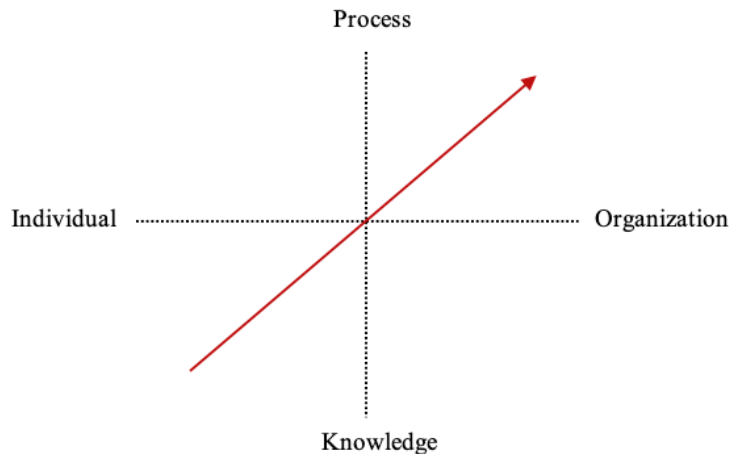


Figure 6. The conceptual relationships between the entity's size and the utility of the knowledge.

Another evident commonality is that all levels analyzed in this research comprise individuals. Although the explorations of the various levels showed that choices and decisions are products of group and organizational processes, the individual still affects those products. From a conceptual point of view, they are affected by bounded rationality. In collaboration, groups and organizations can do more than individuals acting alone, but they still face restrictions on time, availability, and information processing capacity, which stymies the formulation of optimal decisions.⁴⁶⁷ Most people know that perfect decisions are impossible. Therefore, people satisfice; they make decisions that they think meet their needs adequately,⁴⁶⁸ using heuristics when thinking about the future.⁴⁶⁹ Satisficing behavior has been shown to be influential in social settings. In fact, Simon argued for simplifying our problem formulations drastically by “apply[ing] approximate, heuristic techniques to handle the complexity that cannot be handled exactly.”⁴⁷⁰

⁴⁶⁷ Simon et al., “Decision Making and Problem Solving.”

⁴⁶⁸ Simon, “Rational Choice and the Structure of the Environment.”

⁴⁶⁹ Tversky and Kahneman, “Judgment under Uncertainty.”

⁴⁷⁰ Simon et al., “Decision Making and Problem Solving,” 13.

Further support for this view comes from systems theory which describes “cognitive maps of the causal structure of systems [... as] vastly simplified compared to the complexity of the systems themselves, and [...] thus leave us] unable to infer the dynamics of all but the simplest causal maps correctly.”⁴⁷¹ Building on simplification at the group and organizational levels can become worrying. The exploration in this research shows that similarity is often part of shared knowledge and organizational routines. On many occasions, shared knowledge is helpful and resembles reality reasonably well, but in complex conditions, such similarity can be the easy, satisficing way out, but may not be accurate. Although uncertainty is part of complex environments where there is no clear right or wrong, organizations, groups, and individuals should be cautious of adopting similar approaches when circumstances change rapidly. Continuously evaluating premises and rethinking similarity and accuracy could prove useful.

Delivering fighting power⁴⁷² is the fundamental purpose of a military organization. The structure of military organizations shows a large operating core, responsible for daily operations. Only a small part of the military organization works at the strategic and political levels to decide on developments regarding a future force. In sustaining (or gaining) a competitive advantage, the strategic and political levels hold the key to exploring and developing future capabilities. In short, there exists a distinction between the rigid functional procedures of tactical units and the required freedom to explore at the strategic and political levels. In the ‘fighting body,’ effective team performance is imperative, sometimes as a matter of life and death, and relies on constitutions. However, the business support entities should not. They should worry about two aspects, supporting the current force and preparing the future force. For the latter, imagination is a necessary ingredient in decision-making.⁴⁷³ Sticking to the past may blur views of the future. The world is full of surprises, with organizations often coming face to face with sudden and unforeseeable events, commonly referred to as “Black Swans.” These shocks can cause massive

⁴⁷¹ John Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World* (Boston: Irwin/McGraw-Hill, 2000), 27.

⁴⁷² As posted in the UK Ministry of Defence, “UK JDP 0–01.”

⁴⁷³ Werhane, *Moral Imagination and Management Decision-Making*, 6.

disruptions whose magnitude cannot be predicted based on past experiences.⁴⁷⁴ Some individuals and institutions are “trapped in the framework of history, organization, corporate culture, and tradition, of which they are only, at best, vaguely aware—potentially leading [them] to overestimating their powers and abilities.”⁴⁷⁵ Preparing the future force should not rely on the views of the entrapped.

Exploring and accepting outside perspectives goes against working in social identities or institutionalized routines. Therefore, such behavior needs institutionalization itself⁴⁷⁶ to create and encourage the use of these seemingly contradictory processes. It means not satisficing in the face of existing social and institutional pressures. The ambidextrous approach is valuable and adaptive to change.⁴⁷⁷ It questions the organizational ability to be critical and ask the right questions. By and large, these questions should focus on what is unknown. To do so, one should know what one does not know⁴⁷⁸ and realize there are things you don’t know that you don’t know (the so-called unknown-unknowns).

As military personnel mature in their military environment during their careers, they create a relatively homogenous group. Therefore, many routines, norms, or values are not challenged and remain part of social or institutional facts.

⁴⁷⁴ As explained by Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House Trade Paperbacks, 2010).

⁴⁷⁵ Werhane, *Moral Imagination and Management Decision-Making*, 11.

⁴⁷⁶ As a form on designed and responsive behavior. In accordance with Selznick, *Leadership in Administration*, 6.

⁴⁷⁷ As mentioned in the strategic management perspectives on ambidexterity, the balance between exploiting current strengths and exploring future potential. See: Zi-Lin He and Poh-Kam Wong, “Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis,” *Organization Science* 15, no. 4 (August 1, 2004): 481–94, <https://doi.org/10.1287/orsc.1040.0078>; Julian Birkinshaw, Alexander Zimmermann, and Sebastian Raisch, “How Do Firms Adapt to Discontinuous Change? Bridging the Dynamic Capabilities and Ambidexterity Perspectives,” *California Management Review* 58, no. 4 (August 1, 2016): 36–58, <https://doi.org/10.1525/cmr.2016.58.4.36>; Sebastian Raisch et al., “Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance,” *Organization Science* 20, no. 4 (August 2009): 685–95, <https://doi.org/10.1287/orsc.1090.0428>.

⁴⁷⁸ As highlighted by Adam M. Grant, *Think Again: The Power of Knowing What You Don’t Know* (New York: Viking, 2021).

When evaluating mental models for military personnel, a valuable discussion would be to assess what type of experience or knowledge suits specific roles. The distinction of knowledge and experience already provides a basis for training and educational systems, but such deeper analysis could be conducted at various levels and should provide suggestions for improving the experience and knowledge needed for developing military careers, since the distinction is often overlooked. At the tactical level, it seems there is a tendency to favor experience over knowledge. Since military units are trained in (team) tactics, techniques, and procedures (TTP), their performance relies on experience. It is also how the hierarchical military system operates. Junior personnel eventually become senior, thus being able to coach and guide the juniors. However, when climbing up the ladder to hold positions at the strategic or political level, they mostly lack the knowledge and experience to operate in this different environment.

Military organizations are one of the top employers in many nations. They are personnel-intensive organizations. However, their strategy is often concentrated on managing their technical rather than their human resources. Although often emphasizing that people come first, military strategy primarily focuses on managing hardware. Interestingly, organizations need people to manage, maintain, and utilize the hardware. This apparently misplaced focus could be due to the distinction between the fighting body and the business-support part of military organizations. The latter comprises the technostructure and support staff, often closely linked to the strategic and policy levels (the strategic apex).⁴⁷⁹ Further, weapon systems are typically expensive, and the approval or change in any of these systems regularly leads to political debates with the legislative and executive powers in governments.⁴⁸⁰ Hence, the strategic focus may be pulled in this direction.

Nevertheless, most discussion is about capital investments in material (i.e., weapon systems), often neglecting the human resources. As Mintzberg famously indicated, such

⁴⁷⁹ See Chapter V and Figure 4 for an explanation.

⁴⁸⁰ Such as Congress in the United States, Parliament in other nations, and often results in legislation to formalize such projects and its expenditure.

planning is not strategy.⁴⁸¹ Hence, one of the reasons why recruitment and retention are challenging is that military organizations struggle with investing in its personnel.

Fortunately, a lack of attention to ‘the humans’ in organizations can easily be addressed. Instead of confining itself to a technocratic system with strict rules and regulations, the military needs more space for creativity through cross-cutting silos. It would mean trade-offs with other (capital) investment plans but would ensure the most vital element of the armed forces contributes effectively to its fighting power (see Figure 3). Shifting the strategy to a more behavioral approach might be rewarding. It is likely that such a shift would improve the military’s competitive advantage and leads to more job satisfaction among personnel, and thus, higher retention rates. Behavioral strategies might be a promising approach to ensure a balance between the human and technical capital in military organizations.⁴⁸²

⁴⁸¹ Henry Mintzberg, “The Fall and Rise of Strategic Planning,” *Harvard Business Review* 72, no. 1 (January 2, 1994): 107–14.

⁴⁸² As discussed by Dan Lovallo and Olivier Sibony, “Broadening the Frame: How Behavioral Strategy Redefines Strategic Decisions,” *Strategy Science* 3, no. 4 (December 2018): 658–67, <https://doi.org/10.1287/stsc.2018.0071>.

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