

Preliminary Master Thesis Report

Title:

“To what extent is cognitive style related to task performance and is this relation influenced by the social transmission of overconfidence?”

Study Program:

Master of Science – Leadership and Organizational Psychology

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1.0 Introduction

As part of the Master of Science programs in Leadership and Organizational Psychology at BI Norwegian Business School, we are required to write a Master Thesis on an academic topic of interest. This report will detail the purpose for our investigation, the key relevant theory, the research model, and the research methods as part of the process leading up to our final Master Thesis.

2.0 Motivation for the study

People exhibit individual characteristics that make them behave differently. In addition to such individual differences, there are also a number of psychological biases, fallacies, and illusions that impact the way people behave. We quickly decided that these themes are of interest to us after taking several classes in our master's degree. We believe that if we can gain a greater knowledge of both individual differences and psychological biases, we will be better able to understand why they might lead to varied outcomes in human behavior.

From the perspective of organizational psychology, we are mainly interested in investigating how individual characteristics and psychological biases might emerge in a work environment setting. Researchers in this discipline may make a significant contribution to managers, human resource departments, consultants, and anyone striving to make businesses more efficient. Because many firms now arrange their personnel in teams, the goal of our research is to investigate these processes at the group level in order to learn more about team – and/or group dynamics.

When solving complex tasks, people use different approaches when acquiring and processing information (Hanfmann, 1941). Such individual differences are often called cognitive style, and a common distinction is the two contrasting types referring to intuitive versus analytical cognitive style. Several studies have found relations between cognitive style and differences in decision making, problem-solving, learning, and so on. In our study, we are interested in examining how cognitive style might impact how well teams perform. Additionally, we would like to see if this potential relationship can be explained by how individuals in teams are affected by each other's biases.

Overconfidence is described as one of the most powerful, widespread, and intriguing of biases (Johnson & Fowler, 2011; Kahneman, 2011), and is therefore of great interest to us in our research. Because of its importance, research on overconfidence has been broadly influential both inside and outside of psychology. Many scholars argue that overconfidence is a source of errors (Kahneman, 2011; Smith, 1776), while others argue that overconfidence is essential to success as it boosts, for instance, morale, ambition, and resilience (Johnson & Fowler, 2011; Tenney et al., 2019). These perspectives motivate us to investigate the impacts of this further.

Additionally, referring to our interest in teams and group dynamics, we are interested in understanding whether individuals are affected by others' overconfidence. If it is correct that overconfidence is a cause of mistakes, we should be aware of whether individuals are influenced by the overconfidence of others when working in teams. According to recent research by Cheng et al. (2021), there is limited knowledge of the mechanisms that lead to the social clustering of overconfidence, which is part of our motivation for additional investigation.

Through an extensive literature search as elaborated in this report, we suspect that the relationship between cognitive style and how well one performs is affected by whether individuals are affected by each other's overconfidence. Hence, we would like to study the effect of social transmission of overconfidence on the potential correlation between cognitive style and task performance. This leads us to the following preliminary research question:

“To what extent is cognitive style related to task performance and is this relation influenced by the social transmission of overconfidence?”

3.0 Theory

In relation to the process of creating our research model and main hypothesis, we have conducted a thorough literature review within the following topics: *social transmission, cognitive bias, overconfidence, cultural learning, social learning, cognitive style, job performance, task performance*, and related search strings. This process has resulted in an interest in thoroughly investigating tree topics that will be relevant to our research. The part that follows will offer an outline of the primary theories that we believe are important to our master's thesis.

3.1 Cognitive style

During the 1940s, studies examining individual differences in cognitive task solving revealed that individuals use different approaches when acquiring and processing information (Hanfmann, 1941). Klein (1951) found that some individuals tend to notice contrasts, and others tend to notice similarities when making judgments about changes in perceptual stimuli.

Other researchers confirmed similar findings, discovering that individual differences in completing perceptual tasks were persistent over time and across tasks (Witkin et al., 1954). This culminated in the concept of cognitive style (formerly known as "perceptual attitudes"), which was followed by a large number of studies on various style types.

A common distinction within the research on cognitive style has been the two contrasting types of intuitive individuals and reflective individuals (Kagan, 1966). These two dimensions refer to respectively a preference for making responses quickly versus pausing and focusing on error reduction. As the interest for cognitive style grew from early 1980, focusing on cognitive styles in relation to decision making, problem-solving, learning, and other life events (Kozhevnikov, 2007), other terms describing these similar dimensions were introduced. In literature we might hear for instance *adaptors* and *innovators* (Kirton, 1976). Nevertheless, despite different definitions, the two contrasting dimensions related to *analytical* cognitive style versus *intuitive* cognitive style have received lots of attention (Allinson & Hayes, 1996; Hunt et al., 1989; Kickul et al., 2009). Analytical individuals encounter problem-solving by breaking things down into bits and utilizing quantitative procedures, whereas intuitive people prefer more unstructured settings and depend more on intuition in decision-making.

Since cognitive style is argued to be a relatively stable individual characteristic, it has been of interest to scholars to examine which practical consequences differences in cognitive styles in individuals might have. For instance, some researchers have been interested in examining cognitive style in relation to different types of measures of performance. Riding and Douglas (1993) investigated cognitive style in connection to learning performance, Armstrong (2000) investigated cognitive style's effect on performance in management education, and Witkin (1973) investigated cognitive style's function in academic achievement.

All studies found that there was a relationship between cognitive style and performance in one way or another. Inspired by these results, and the interests for what role cognitive style can play in performance, we propose to further examine this effect on our study.

3.2 Social transmission of overconfidence

In general, social transmission theory refers to the spread of information or behaviors across a group of organisms. Information sharing involves the transference and acquisition of attitudes, values, beliefs, and behaviors between individuals and groups (Cavalli-Sforza & Feldman, 1981). Communication has been exhibited in animal behavior throughout history and in nature, for example, birds calling to each other to signal a new food source or a new predator (Nicol, 1995). In human psychology, social transmission can be understood as verbal and nonverbal communication, actions, behaviors, knowledge, and beliefs transmitted by social interaction and the media. Social transmission can explain both similarities within groups and differences between them.

The overconfidence bias is arguably one of the most consistent, powerful, and widespread psychological biases in humans (Johnson & Fowler, 2011; Kahneman, 2011) and has also been broadly influential outside of psychology due to its generality and importance (Moore and Healy, 2008). The notion that peoples are biased by overconfidence is a common issue that has been debated for decades in literature. The Wealth of Nations (1776) by Adam Smith shed light on the harmful effects of overconfidence, noting that exaggerating one's own skills is an "*ancient evil*" on which philosophers and moralists have commented for generations (p. 109). According to Kahneman (2011), overconfidence is a human tendency to exaggerate the degree to which our abilities and talents exceed those of others. As an example, research conducted by Gabriel et al. (1994) found that both male and female college students overestimate their ability to learn in college. It is also known as an error in judgment or decision-making (Kahneman, 2011) because it overwhelms one's capabilities and/or underrates an opponent, a task's difficulty, or potential risk (Johnson & Fowler, 2011). In recent years, some authors have suggested that overconfidence has led to faulty assessments, unrealistic expectations, and dangerous decisions, and has been blamed for crises like the Vietnam War, the 2008 financial crisis, and climate change (Johnson & Fowler,

2011). Berner and Graber (2008) argue that all of these occurrences are the result of incorrect decision-making driven by an excessive sense of superiority. In response, many contemporary philosophers agree with Adam Smith's "ancient evil" theory, and Kahneman, for instance, has emphasized his aim of eliminating overconfidence in human psychology (Shariatmadari, 2015). However, it has also been suggested that overconfidence is an essential component to success in a variety of areas, including job performance and mental health, as well as sports, business, and conflict management (Johnson & Fowler, 2011). Overconfidence can be beneficial since it promotes ambition, morale, resolve, resilience, or the credibility of bluffing, thereby creating a self-fulfilling prophecy in which apparent confidence actually enhances success (Tenney et al., 2019).

Overestimation, overplacement, and overprecision are three separate ways in which overconfidence may be distinguished. In an article authored by Moore and Healy (2008), the researchers establish the first term as overestimation which is the *overestimation* of one's true competence, performance, degree of control, or possibility of success. The second occurs when people feel they are better than others, also known as better-than-average, and is explained by Larrick et al. (2007) as *overplacement*. The third is *overprecision*, which is the correctness of one's opinions. The importance of separating these three methods for assessing overconfidence is argued by research because of three key issues. First, the most frequent research paradigm confounds overestimation with overprecision. Second, there is a high prevalence of underconfidence, and finally, there is a contradiction between overestimation and overplacement: domains with the highest overestimation generally have the highest underplacement, and opposite (Moore & Healy, 2008, p. 502).

3.3 Task performance

In relation to performance, in particular job performance, scholars have through time tried to map the construct by examining criterion for performance (Campbell, 1990). To define job performance might be challenging, due to the many contributions to this term in literature. Motowidlo (2003, p. 92) defines job performance as "*the total expected value to the organization of the discrete behavioral episodes that an individual carries out over a standard period of time*".

One important distinction that seems to be confirmed through many studies is the distinction between task performance and contextual performance (Borman & Motowidlo., 1997; Motowidlo & Scotter., 1994). During recent years, the interest for a third dimension, often called adaptive performance, has grown as a consequence of an increasingly dynamic working environment (LePine, 2005; Pulakos et al., 2000).

Task performance, as a predictor for job performance, refers to behavior that contributes to the so-called technical core of the organization, referring to the process of transforming materials into organizational products (Borman & Motowidlo, 1997). Measures of task performance might be, for instance, closing sales, time management or product knowledge.

Since job performance is related to the expected value to organizations, measuring what causes changes in job performance is of obvious research interest. There are studies examining relations between, for instance, cognitive ability and performance and personality and performance (Hunter., 1986; (Schmidt et al., 1986); Borman et al., 1991). Research indicates that individual differences can explain changes in job performance. Because job performance has a great impact and influence on organizations expected value, we are interested in involving task performance as a variable in our study.

3.4 Other theory

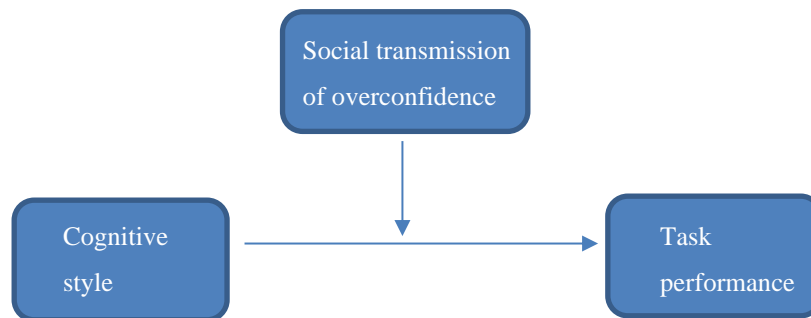
There might be additional related theories to human psychology that are worth investigating. During our literature review, we looked at various behavioral economics, such as other theories on biases or other perspectives at the mechanisms of social transmission. We must thoroughly examine the Mindlab data in order to comprehend the experiment's mechanics and see whether there is a deeper theory that can be reconciled with our current notion. We further propose continuous examination of other potentially relevant theories to further strengthen or elaborate the topics of interest. Further research into theories of social learning or cultural transmission, for example, might lead to a better understanding of the idea of social transmission.

4.0 Conceptual model

As stated earlier, based on an extensive literature review and our motivation for the study, we have formulated the following preliminary research question:

“To what extent is cognitive style related to task performance and is this relation influenced by the social transmission of overconfidence?”

For clarity, we wish to provide a conceptual model that illustrates the variables we would like to include in our research, and the relationships we want to explore:



5.0 Research method

Before conducting a study, the researchers must choose which research design is best suited for achieving the study's purpose. A research design is the structure and rules that are used to collect and analyze data (Bell et al., 2019, p. 45). To collect data in our study, we find it most useful to conduct data through an experiment to be able to establish relationships between variables. We propose to utilize data collected through a laboratory experiment, more specifically an experiment conducted by Mindlab, which we will further elaborate below. A laboratory experiment implies that the data was obtained in a laboratory setting. In such an experiment, the setting in which the data is obtained is artificial, and the circumstances are therefore easily controlled (Bell et al, 2019, p. 53).

5.1 Experiment and data collection

The Mindlab experiment involves participants being placed in a simulated situation where they are to play a computer game towards a common goal. In advance of the experiment, each participant watches a video explaining the experiment in detail. The game consists of an artificial crisis management scenario, where players must defend oil rigs in the North Sea against terrorist attacks. The participants are provided with information from Norway's Intelligence Service, stating that the platforms are under attack, although it is unknown which or by whom they might be attacked. Participants are being randomly assigned to teams consisting of three individuals and are provided with a mission delivered by the Norwegian's Intelligence Service headquarter to guard the platforms against attack. Time constraints and team coordination are part of the game, which was designed to simplify reality by requiring only a few minutes of instruction before participants can begin the experiment.

Upon entering the lab, the participants have the opportunity to practice a training scenario for 10-15 minutes. The training is meant to ensure the participants understanding of functionalities and ask questions to reduce the likelihood of misunderstandings throughout the game. The game is designed to simplify reality by requiring only a few minutes of instructions before participants can begin the experiment.

Following the training, the real scenarios begin. In teams of three, one will operate an airplane named Orion, another will control a patrol boat, and the third commands a frigate. There are distinct qualities for each role: the aircraft is the team's eyes, thus it must be alert to spot attackers. One of the Orion's characteristics is its broad radar and its fast speed. The patrol boat is the fastest boat, moving slower than the plain but faster than the frigate. In addition, it has a border radar than the frigate, and is meant to navigate near to a detected boat and undertake information searches, since it is the only one equipped to do so. The frigate is distinguished by its ability to shoot and attack the enemy. It does, however, travel slowly and has the smallest radar. In terms of communication, participants are able to communicate with one another by composing messages in an integrated inbox. Because the different roles have diverse traits, the team members become dependent on one another and need to cooperate to perform well.

The players play two scenarios and are given the opportunity to discuss between each scenario. When finishing both the first and last scenario, participants are asked to fill out questionnaires which serve as the foundation for collecting data in relation to different variables, such as participants cognitive style and overconfidence.

When the game is over, the participants are given a total score that comprises a score for the number of detected things, a score for the number of information searches performed, and a score for the number of actual terrorists they targeted. Assaulting the wrong vessel results in a minus score but attacking terrorist results in a point. The overall purpose of the game is to offer participants experience with organizational mechanisms, as well as collect data to use in research.

5.2 Ethics

During the experiment, no videos or photos are taken, the data is made anonymous and only members of the research team have access to it, and it is optional to submit the data to research.

5.3 Measures

5.3.1 Cognitive style and task performance

In our experiment, cognitive style is measured per individual player through Epstein et al. (1999) Rational Experimental Inventory (REI), considered one of the most important measures of individual differences in processing style. REI is a self-report measure that consists of subscales to measure individual differences in analytic and intuitive processing. Epstein and colleagues (1999) found that this measure, REI, and the two processing styles (intuitive and analytical) are independent, which is important when discussing the measures' validity. During recent years, other researchers have confirmed the adequacy of the structural validity of the REI (Björklund & Bäckström, 2008), as well as its predictive validity (Sánchez et al., 2012), however, we propose to further elaborate limitations of the predictive capacity of REI as a limitation to our research.

Task performance will in our study be reflected by the total score of the individual players and the total team score. The total score reflects both corporation, effectiveness, and other criteria for solving the particular task.

5.3.2 Social transmission and ICC

In relation to social transmission of overconfidence, we propose that if the variance of overconfidence within-group units is more homogenous than the variance of overconfidence across group units, we can argue that social transmission of overconfidence has occurred. Further, we propose to apply intraclass correlation coefficients (ICCs) as a statistical measure of the mediating variable of social transmission of overconfidence.

Intraclass correlation coefficients (ICCs) are often used in behavioral measurement (McGraw & Wong, 1996). ICCs are statistical measures for homogeneity for larger sets of measurements and are traditionally found based on analysis of variance and the estimation of various variance components (Bartko, 1966; Koo & Li, 2016, p. 3). ICC can be used when measurements are made on units that are organized into groups (Koo & Li, 2016) and describe how strongly units in the same groups resemble each other. The value of ICC is often reflected in reliability, which reflects not only the degree of correlation but also agreements between measures (Koo & Li, 2016, pp. 156-158). ICC values range from 0 to 1, where values between 0.50 and 0.75 are considered moderate reliability, values between 0.75 and 0.90 are considered good reliability, and measures more than 0.90 indicate excellent reliability.

According to McGraw and Wong (1996), there are several forms of ICCs, and researchers should therefore be aware that these might lead to different interpretations and should specify the ICC form that we will use in our calculations (Koo & Li, 2016). When analyzing our data, we will follow Koo and Li's (2016, p. 159) flowchart to select the correct ICC.

6.0 Prosess plan

Task	Desember	January	February	March	April	May	June	July
Present conceptual model								
Preliminary for feedback								
Deliver preliminary								
Analyse quantitative research data								
Find and read relevant literature								
Finish writing thesis								
Improvements based on feedback								
Deliver thesis								

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