THE POWER OF (TEAM)PERSONALITY

Exploring the role of extraversion diversity in enhancing team performance

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Abstract
Teams, the output of teams, and the effect of diversity continue to be at the core of most organizational questions. With an elevated focus on team collaboration, partly due to the strong AI movement and aligned with hypotheses of diversity bonuses, understanding what affects team performance is paramount. This thesis investigates how differences in extraversion within teams affect their performance in terms of outcome and perceived satisfaction. A mixed-method approach is employed, grounded in the Input-Process-Output (IPO) framework. Specifically, it examines whether teams composed of members with diverse levels of extraversion perform better than teams with less diversity. The composition of teams was created strictly in line with the seeding process of maximizing and minimizing variance. Findings indicate that teams with higher extraversion diversity show significantly enhanced performance, and demonstrate more active engagement and higher levels of problem-solving skills. This thesis aims to highlight the importance of considering personality diversity in team composition strategies for organizations. It suggests that deliberately assembling teams with a balance of extraverted and introverted members can lead to improved outcomes in team-based tasks. Furthermore, it challenges existing recruitment practices that favor extraversion, advocating for a more balanced approach to team design. This study contributes to the broader discourse on team dynamics, offering valuable insights for organizational leaders and policymakers aiming to foster more productive team environments.

Keywords: Team Performance - Diversity - Extraversion - Team Composition - Small Group Research

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Abbreviations & Definitions

Term	Abbreviation	Definition
Extraversion diversity	ED	Measured by the standard deviation, this term represents the range of extraversion levels within a team.
High extraversion diversity	HED	Indicates a condition where the standard deviation of extraversion is above 5, reflecting a wide range of extraversion levels.
Low extraversion diversity	LED	Indicates a condition where the standard deviation of extraversion is 5 or below, reflecting relatively homogeneous extraversion levels.
Extraversion score	ES	A numerical measurement quantifying the level of extraversion.
Conscientiousness score	CS	A numerical measurement quantifying the level of conscientiousness.
Independent variable	IV	The variable that is manipulated or changed in an experiment, in this thesis the standard deviation of extraversion for a group.
Dependent variable	DV	The variable that is tested and measured in an experiment, in this thesis the Tower Height.
Control variable	CV	A variable that is included in the regression model to control for potential obscuring effects
Five-Factor Model	FFM	A model that describes human personality through five broad dimensions.
Big Five Inventory	BFI	A psychological assessment tool that measures an individual's five major dimensions of personality.
Input-Process-Output	IPO	A framework describing the flow from inputs to processes to outputs in team dynamics.
Weighted Least Squares	WLS	A statistical method used for regression analysis that weighs each data point by the inverse of its variance, often used when variances are heteroscedastic.
Stockholm School of Economics	SSE	A Swedish business school located in Stockholm.

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Executive Summary

This thesis explores the impact of extraversion diversity on team performance, providing valuable insights for a range of stakeholders including managers, HR professionals, and policymakers. By employing a mixed-methods approach and the Input-Process-Output (IPO) framework, this study clarifies the nuanced role that personality trait diversity, specifically extraversion, plays in enhancing team collaboration and outcomes.

By utilizing both quantitative analyses from experimental tasks, and qualitative insights from observations and interviews, the robustness of the scientific methodology of the study is supported. Findings indicate that teams with greater extraversion diversity exhibit superior performance.

Managerial implications

- The findings suggest that teams with a higher diversity in extraversion levels perform better. Managers should consider this when forming teams since a mix of introverts and extroverts can enhance team dynamics by balancing assertive and reflective contributions, leading to more effective collaboration and decision-making.
- The study highlights a common recruitment bias favoring extroverts due to their strong interpersonal skills. Organizations are recommended to refine their hiring processes to ensure a balanced team composition that includes varied personality traits. This adjustment can prevent the formation of homogeneous groups that may lack the full spectrum of cognitive and interpersonal skills needed for high performance.
- Given the growing reliance on personality assessments in recruitment and team formation, it is imperative that these tools are utilized thoughtfully. Assessments should be validated and implemented in a way that considers both individual contributions and team-level dynamics to avoid skewing team composition towards a single trait like extraversion.

Policy implications

- This thesis presents an alternative way of adopting diversity and inclusion policies, going beyond traditional demographic factors to include psychological and cognitive diversity, which may be interesting to policymakers.
- The result could also guide organizations in adopting ethical recruitment practices that account for personality diversity. Policies could be developed to audit and adjust recruitment practices that inadvertently favor certain personality traits over others, ensuring equitable team compositions.

Ethical considerations

- The ethical implications of personality testing in workplaces are significant. Organizations must ensure that the implementation of these assessments does not infringe on personal privacy or lead to discrimination. Ethical use involves transparent communication about how these assessments are used and how they influence team composition and individual opportunities.

Recommendations for implementation

- Implement training and development programs that educate leaders and team members about the benefits of personality diversity. Such programs should include modules on effective communication, conflict resolution, and collaborative problem-solving tailored to diverse personality types.
- Organizations should periodically review team structures to ensure they are benefiting from personality diversity.
- Incorporate the principles from this thesis into leadership development programs. Training future leaders to recognize and value personality diversity can help in constructing teams that are well-equipped to meet diverse organizational challenges.

By integrating these practices, organizations can not only enhance team performance but also foster a more inclusive and dynamic work environment. The implications of this research highlight the necessity of considering personality diversity as a crucial component of organizational success in an increasingly complex and collaborative work landscape.

1. Introduction

1.1 Background

"We are, so to speak, competing more and more with the machines. There are many who are worried about that development, and that people will simply be outcompeted. What the machines are bad at is precisely the human aspects". - Lars Strannegård, 2024

Over the past three decades, teams and their utilization have become increasingly central in organizations (Hackman, 1987; Edmondson & Lei, 2014; Tannenbaum, 2020), society, and management studies. Teams are fundamental in driving development and tackling complex tasks beyond individual capabilities, and collaborative work remains one of the most valuable attributes of human society, with studies showing that individuals working in collaborative settings are 50% more effective at completing tasks (Carr & Walton, 2014).

With globalization advances and market competition intensifying, the increase in diversity within work groups adds a new dimension to team performance. Studies have shown that diverse teams can leverage their varied perspectives to achieve superior outcomes (Page, 2007). This trend has fueled extensive research exploring diversity not only in surface-level attributes like gender, age, and ethnicity, but also in deep-level characteristics such as values and personality traits (Neuman et al., 1999; Jansen & Searle, 2021).

Research has consistently indicated a significant relationship between personality traits and performance (Bell, 2007), however, with personality traits measured and evaluated on an individual basis, the dynamics of how traits interact within team settings remains less explored. This gap in understanding may undervalue cognitive diversity's role in team outcomes. This thesis focuses on the personality trait extraversion, which is pivotal in collaborative settings and profoundly influences group dynamics, which subsequently impacts team performance (Wilmot & Wanberg, 2019). Society often fosters a debate that puts extroverts against introverts, and this research seeks to move beyond this binary by exploring how a diverse range of extraversion within teams can enhance performance.

Personality traits will continue to be a fundamental factor in shaping the future. In an era dominated by technology and artificial intelligence (AI), the human aspects of teamwork are more important than ever. Human strengths lie in the emotional connections and nuanced interpersonal dynamics, fostering thriving teams. Where previous literature lacks consensus on the effect of extraversion diversity in a team and how that affects performance, this paper aims to address the pressing importance of a human-centered approach to team performance, given the elevated focus on diversity in societal settings. By measuring the standard deviation of extraversion among team members, this study assesses how diversity in personality traits contributes to team success.

1.2 Research Gap

Research on how diversity in extraversion impacts team performance is both inconsistent and limited by several factors. Researchers such as French and Kottke (2013) have noted that diversity in personality traits like extraversion can disrupt team harmony and subsequently performance, while others have reported enhanced problem-solving skills (Neuman et. al 1999).

Previous studies often adopt a broad focus, resulting in an emphasis on factors other than extraversion (Neuman et al, 1999; Peeters et al., 2006; Humphrey et al., 2007; Humphrey et al. 2011). This broad focus tends to cause inconsistencies in the sampling methods. Additionally, field studies are often constrained by lack of controlled application of seeding methods[1], and their often longitudinal design where numerous uncontrolled factors can influence team outcomes. Lastly, the prevalent use of self-assessment questionnaires for performance measures, and observers' absence during both team interactions and performance scoring further diminish the reliability of the data.

Furthermore, many studies in this area are outdated, with meta-analyses often relying on older research. This highlights the need for contemporary studies that reflect current dynamics and conditions.

[1] The first step of seeding is sorting the sample on a specific trait (e.g., extroversion). Next, a decision is made whether the variance of the trait should be minimized or maximized. If maximized, individuals with the highest scores are separated into different teams, while those with the lowest scores are distributed in reverse and placed on the same teams. If minimized, a top-down sorting process is employed, where the highest scorers form the first team, and subsequently, the following highest scorers are placed on the next team (Humphrey et al., 2007).

This thesis addresses these gaps by employing a controlled experimental design where trait variance is maximized and minimized within teams through the utilization of seeding.

1.3 Aim and Research Question

This thesis aims to investigate the effects extraversion team diversity has on team performance. The study seeks to enhance the understanding of how trait diversity influences team performance, specifically addressing the contradictory findings in existing literature.

To achieve this, the study utilizes the Five Factor Model (FFM) to measure individual extraversion which then is aggregated to get a group-level diversity score. To ensure a robust evaluation of the results, the Input-Process-Output (IPO) framework and the cognitive diversity hypothesis provide a theoretical lens. This mixed approach has the potential to challenge or support the model's applicability in diverse team settings. The outcomes are analyzed in both quantitative and qualitative measures to provide a deeper understanding of the relationship, and subsequently contribute new perspectives to the existing literature.

Furthermore, this research intends to contribute to organizational recruitment and staffing strategies, emphasizing the importance of group composition in hiring processes. We agree with Tannenbaum (2020) in his belief that *"anyone who leads a team, works on a team, or supports a team in any way should know what really drives team performance"*.

Using a concurrent mixed methods approach with cross-sectional experiments, this thesis addresses the following research question:

How does diversity in extraversion within a team impact its overall performance?

1.4 Delimitation

The sample consists of Swedish-speaking students studying at the Stockholm School of Economics (SSE). The individuals belong to different cohorts and programs, but are expected to have a relatively similar educational background, physical capabilities, and cognitive abilities.

The experiment was restricted to a time frame of 15 minutes per group due to the participants schedules and the desire of a cross-sectional data design. There were no further interactions with the groups after the experiments were held.

In this thesis:

Teams are defined in accordance with Tannenbaum (2020) as consisting of two or more people who interact with one another in situations where some members need to rely on other team members at least for some of the time, who share a common goal, and are viewed as a unit.

Team performance is evaluated using Hackman's (1987) criteria of team performance: the actual output produced by the group, the state of the group as a performing unit, and the impact of the group experience on the personal development of individual members. Due to the cross-sectional design of the study, the latter evaluation criterion was immeasurable, and the two first criteria are the only ones being employed.

2. Literature Review

2.1 Diversity

2.1.1 Defining Diversity

The definition of diversity is argued among scholars. While previous research often emphasized diversity in the form of gender, race, and other cultural categories, more recent studies have argued for a broader definition, embracing both demographic and non-demographic factors (Thomas & Ely, 1996).

One common distinction among researchers is to categorize diversity into two primary classifications: observable characteristics (surface level characteristics), including age, gender, and physical ability, and unobservable attributes, such as personality traits, beliefs, and experiences. The observable diversity is immediately apparent and quantifiable, while the unobservable (deep-level) diversity refers to the attributes not immediately visible or tangible (Milliken & Martins, 1996, Jansen & Searle, 2021, Jackson et al., 1995).

Given that this thesis aims to explore whether trait diversity in extraversion has an impact on team performance, the study will concentrate on one of the unobservable kinds of diversity, specifically variations in one personality trait. Attributed to traits are the individual's emotional responses, cognitive processes, and reactions (Alay, 2020), which evidently will affect performance.

2.1.2 Measuring Diversity

Researchers in social psychology and organizational behavior have employed different measures to understand diversity, often related to observations and questionnaires (Chaudhry, 2023). To establish conclusive scientific assertions about the functional value of group diversity, researchers often create two types of groups; one defined as diverse in a specific characteristic, and one defined as non-diverse, and explore their differences in a field setting (Peeters, 2006). To fit the purpose of this study, diversity is measured through the usage of a self-assessment questionnaire.

2.1.3 Diversity and Team Performance

The effect of team diversity has been studied extensively, and diversity has many times been found to correlate with team performance (Page, 2007; Horwitz & Horwitz, 2007; Jackson & Joshi, 2011). Recent research has explored the concept of diversity bonuses, and how these primarily exist for cognitive, non-routine tasks[2]. A diversity bonus is simply explained as an advantage stemming from diversity, with the potential and prediction of leading to higher profits, larger market shares, and faster rates of innovations for businesses. These outcomes provide compelling incentives for organizations to recruit and promote individuals possessing diverse cognitive abilities, particularly when the work involves complex tasks (Page, 2017).

2.2 Extraversion/Personality Traits

2.2.1 The Five Factor Model

The Five Factor model (FFM) is a comprehensive taxonomy of personality traits (Costa & McCrae, 1987) based on five broad dimensions; extraversion, conscientiousness, openness to experience, agreeableness, and neuroticism. Each broad dimension consists of a range of more specific traits, used in a descriptive sense. After extensive development and elaboration of the definitions for each of the five dimensions, the FFM has been proclaimed as the most reliable model to capture the commonalities among the existing systems of personality description (John & Srivastava, 1999).

Despite extensive research supporting its utility, the FFM has been critiqued on several grounds. Many researchers contend that reducing personality to five traits oversimplifies human behavior. They argue that the model fails to accurately capture the full dimension of human personality, in particular as personality variables have been proven to exist outside of the FFM domain (Feher & Vernon, 2021). Critics further argue that because the items in the inventory are transparent and thus easily faked, response distortion may occur (Rothmann & Coetzer, 2003).

[2] Tasks where no single individual possesses all the necessary tools, knowledge, or understanding to address the task independently.

There are various personality assessment tools available. The NEO personality score (Costa & McCrae, 1992) provides detailed facet scores, but is time-intensive to administrate and complete. The 16 Personality Factor Questionnaire (Cattell, 1946) was considered but the length and complexity extend beyond the scope of this thesis. Furthermore, the Myers-Briggs Type Indicator (MBTI) has, despite its popularity, been highly criticized for its lack of empirical support and reliability (Boyle, 1995). Thus, the FFM was chosen as it best fits the purpose of the study by decreasing complexity whilst offering robust empirical evidence.

2.2.2 Extraversion and Introversion

The extraversion scale is often introduced as the first dimension of the FFM. Originally described by six components (Costa & McCrae, 1992), extraversion has more recently been predominantly distinguished by five components: Activity level (energetic, active), Sociability (talkative, outgoing), Expressiveness (noisy, outspoken), Positive Emotionality (enthusiastic, spunky), and Dominance (forceful, assertive) (John & Srivastava, 1999).

Being extroverted is often associated with having a preference for companionship and social stimulation (Costa & McCrae, 1999), embracing positive feelings and emotions (Clark & Watson, 1997), and excelling in team processes (Porter et al, 2003). Conversely, individuals with low levels of extraversion, often labeled introverts, typically exhibit traits such as quietness, reservedness, and shyness (John & Srivastava, 1999). Introverts tend to recharge by spending time alone, and are often observant, reflecting deeply on their surroundings (Kahnweiler, 2013).

This study focuses on extraversion due to its strong ties to interpersonal connections, making it pivotal in exploring team diversity and performance. Furthermore, the increasing importance of collaborative work in the 21st century, rooted in societal structures and as a response to the rise of AI, highlights the need for understanding human aspects of teamwork. The nature of the trait itself supports the necessity of this exploration.

2.2.3 Extraversion and Team Performance

Extraversion is particularly relevant in team contexts, with research indicating a significant correlation with performance. At the individual level, Wilmot & Wanberg (2019) conducted a

comprehensive review, drawing on data from 97 meta-analyses to explore the influence of extraversion in workplace settings. Their research revealed that extraversion yields advantages with regard to motivation, performance, positive emotions, and interpersonal relationships.

At the team level, early studies indicate a positive relationship between the proportion of members with high extraversion and team performance (Barry & Stewart, 1997). Additionally, work teams characterized by higher mean levels of extraversion tend to receive higher ratings of team viability (Barrick et al., 1998).

2.2.4 Conscientiousness

High group levels of conscientiousness have been found to have a significant effect on performance (Barrick et al., 1998; Peeters et al., 2006; Hancock & Hill, 2022). To account for its potential effect on team performance, the variable of conscientiousness is controlled for. Due to the predetermined focus on extraversion, the variable is not further explored.

2.3 Research Intersection

Diversity in extraversion has been researched in regard to team performance in numerous studies (Poling et. al, 2004; Bell, 2007; Hardy et. al, 2020). Neuman et. al (1999) researched how the average level of specific traits within a team and the variability in these personality traits predict unique variances in job performance ratings. This research, focusing on customer service scores and teamwork effectiveness within a retail context, highlights the potential of utilizing personality composition in staffing work teams. The research concluded that there was a positive link between team performance and variance in extraversion (Neuman et. al 1999).

In 2006, a meta-analysis conducted by Peeters et al. evaluated multiple hypotheses regarding team dynamics, including one positing that team performance could be enhanced by a greater variance in extraversion among team members. Although the analysis revealed a positive association, this relationship did not achieve statistical significance, leading to the hypothesis being dismissed (Peeters et al., 2006). Subsequently, in 2007, Humphrey et al. developed a conceptual model that suggested deliberate variance in extraversion within self-managed teams to enhance performance. Their model recommended maximizing variance in extraversion, critiquing the methodological

limitations of prior studies that had only observed naturally occurring variances. The authors emphasized the importance of intentional manipulation of these variances in future investigations, highlighting that the results of previous research had been constrained by the limited range of their samples (Humphrey et al., 2007). This recommendation supports the necessity for future research to employ seeding, which enables both maximization and minimization of variances across the teams studied.

In accordance with Humphrey et al.'s recommendation, a 2011 study implemented the seeding process. The researchers manipulated team compositions among MBA students to test the influence of both conscientiousness and extraversion on team performance. The study aimed to validate the hypothesis that maximizing variance in extraversion would lead to higher team performance. However, the results did not support the hypothesis; the data indicated no significant improvement in team performance with maximized extraversion variance alone. The lack of significant findings may be attributed to the imperfect seeding process. The program director of the MBA program assembled the teams, considering nine different characteristics in their formation. This approach suggests that the variance in extraversion alone was not maximized (Humphrey et al., 2011). This highlights the importance of a precise seeding process when forming groups based on extraversion scores, something this thesis aims to adhere to.

3. Theoretical Positioning

3.1 Use of Theoretical Frameworks

This thesis investigates the influence of extraversion diversity on team performance using the Input-Process-Output (IPO) framework. Drawing from the Five Factor Model (FFM), extraversion is assessed through the Big Five Inventory (BFI) and serves as the input. The experiment is designed as a Type 8 executing task (McGrath, 1984); and serves as the process that subsequently results in the output. Additionally, the cognitive diversity hypothesis is employed to provide a more comprehensive understanding of the hypothesis formulation as well as the results.

3.1.1 Five Factor Model

In exploring the role of extraversion trait diversity on team performance, we employ the Five Factor Model (Costa & McCrae, 1987; Barrick & Mount, 1991) as the framework for assessing extraversion. Widely acknowledged as the preeminent taxonomy of personality traits (Costa & McCrae, 1999), the FFM has attracted considerable attention in the research domain. The Big Five Inventory (BFI) is a validated assessment tool designed to measure the dimensions of the FFM and allows for the collection of individual-level data (John & Srivastava, 1999). By calculating individual scores in the dimension of extraversion, the framework is used to aggregate data and consequently compose teams based on their standard deviation in the said domain.

The dimension extraversion in the FFM describes the general tendency toward sociability, assertiveness, and positive emotionality, whereas introversion often entails a tendency towards reservation in group settings (ibid). Given the description of extraversion levels (including both extroverts and introverts), it is predicted that these variations will impact overall team performance.

3.1.2 Input-Process-Output Framework

To explore the implications of how teams with high respectively low variation in the extraversion trait perform, the Input-Process-Output (IPO) framework is employed (McGrath, 1984; Hackman, 1987). The model proposes that team effectiveness is contingent upon input characteristics, and

serves as a reliable tool for examining and comprehending the processes and outcomes of team performance (Mathieu et.al, 2008). Input characteristics represent external (e.g., task characteristics, environment) and internal (e.g., member skills, composition of personalities, attitudes) factors that support the team in their execution during the process (McGrath, 1964; Hackman, 1987). The process must be a group interaction process, and the output can be measured in outcomes related to performance (e.g., quality of work, speed to solution) or other outcomes (e.g., member satisfaction, sociometric structure).

Several studies of organizational psychology are grounded in the IPO framework (Mathieu et al., 2000; Stewart, 2006), predominantly when examining the effects of team personality composition on team effectiveness. Critiques of the model often highlight its linear and static nature. However, for this cross-sectional study, it offers a structured exploratory lens and flexible understanding without demanding rigid data conformity. In this research, the model will be applied as follows:

3.1.2.1 Input

The inputs have been categorized into individual-level factors and group-level factors. To minimize the need for specific member skills, while accentuating the significance of personality dynamics, the sample was constructed to aim for homogeneity in all other aspects than extraversion. The group-level factors were held constant (number of participants per group) and if not the factors were measured to be used as a control variable (familiarity score, gender). In this study, the extraversion levels measured through the BFI will constitute the key input.

3.1.2.2 Process

Emphasizing the need for an engaging group interaction process, a new construct was established. Further details are provided in section “3.1.3 The Experiment”.

3.1.2.3 Output

The quantitative output consists of performance quality in terms of tower height. Furthermore, performance was observed and measured by idea generation, attitude towards group and task as well as through an interview where the emphasis was on e.g., participant satisfaction. The qualitative data collection includes both direct observation of team interactions and post-task interviews. Additionally, the tests were recorded to allow for further analysis.

3.1.3 The Experiment

The task type can moderate the relationship between group inputs and outcomes (McGrath, 1984), highlighting the importance of selecting an appropriate task for studying team dynamics. Given the increasing emphasis on longitudinal studies in team research (Bell, 2017; Weingart, 1997) and the dynamic nature of team processes, most researchers adopt extended timeframes to capture these dynamics comprehensively. However, due to the time constraints inherent in a bachelor thesis and the desire to contribute an additional approach to the existing literature, it was essential to design a task that offered robust insights within a single-instance setting.

3.1.3.1 Description of Task

To ensure a practical and engaging task whilst accommodating for measurability and time constraints this thesis has utilized a tower-building task. The task was conducted in a controlled experimental setting. Participants are tasked with constructing the tallest tower possible within a specified time frame of 15 minutes using only the resources provided by the researchers

The tower-building task has its origin in team-building activities, where it has been utilized as a means to foster collaboration, and it is often employed to ensure active engagement among the entirety of team members. The task is further supported by its alignment with established theoretical frameworks and empirical evidence, such as McGrath's typology of group tasks. The tower-building task is categorized as a Type 8 executing task (McGrath, 1984), where groups are required to execute a specific activity and where objectives and standards of excellence have been established.

The context of the task is further strengthened by recent research where participants were evaluated on risk-taking within a cooperative framework (Gracia-Garrido et al., 2021). Other studies (McGrath, 1995; Mathieu et al., 2008) have further solidified the effectiveness of experimental tasks categorized as hands-on and practical in evaluating team performance.

3.1.3.2 Evaluation of Team Performance

The height of the constructed tower serves as a quantitative measure of team performance, providing an objective indicator of task success.

3.1.4 Cognitive Diversity Hypothesis

This thesis adopts the cognitive diversity hypothesis as a guiding framework. In line with theories related to cognitive diversity and its implications for team performance, the hypothesis was advanced by Page (2007). The hypothesis asserts that there are team benefits from having members with varied cognitive backgrounds as it enables the team to approach tasks and problem-solving from multiple angles.

Exploring extraversion through the lens of cognitive diversity, we aim to elucidate how variance in extraversion within teams influences team performance. While extraversion primarily pertains to social behavior, its influence extends beyond interpersonal interactions to encompass broader cognitive processes and problem-solving styles (Watson & Clark, 1997). By utilizing the hypothesis as a guiding framework, this thesis aims to contribute to the supporting literature that supports the importance of diverse perspectives for enhancing team performance (Page, 2007).

3.2 Hypothesis Formulation

This thesis aims to explore the complex interplay between extraversion diversity and team performance. By leveraging the Input-Process-Output framework, the Five Factor Model, and the cognitive diversity hypothesis, we aim to explore team diversity and performance. Our hypothesis is grounded in recent research suggesting that diversity bonuses lead to improved results within organizations. Drawing from Page's cognitive diversity theory, we propose that this diversity bonus manifests when teams are engaged in executing tasks.

When forming teams in accordance with the seeding method, higher diversity in the FFM dimension of extraversion is expected to generate higher team performance in Type 8 executing tasks. Thus, the hypothesis proposed is as follows:

Hypothesis: Teams with higher diversity in the trait extraversion will perform better than teams with lower diversity in the trait extraversion

4. Method

4.1 Research Stance

This thesis adopts a pragmatic approach, evaluating theories and concepts based on their applicability to the study's context. Ontologically, the study recognizes the complex nature of personality traits within teams, allowing for both objective and subjective interpretations. To integrate these diverse perspectives, both quantitative and qualitative research methods have been utilized (Saunders et al., 2023). The quantitative data provides a broad overview, capturing general trends and correlations, while qualitative insights offer depth and context.

This thesis employed a deductive approach to predict the effects extraversion variance has on team performance. The formulation of the hypothesis was based on the cognitive diversity hypothesis in conjunction with the book Diversity Bonus: How great teams pay off in the knowledge economy (Page, 2017), and further advanced based on Humphrey et al. (2007, 2011).

4.2 Research Design

This study employs a concurrent mixed methods design to provide a comprehensive understanding of the research topic. By adopting both quantitative and qualitative data collection methods simultaneously, the approach allows for cross-referencing findings which enhances the depth of the study's conclusions (Saunders et al., 2023). The qualitative data was collected through observations and interviews, while the quantitative measures were collected through the conducted experiment.

To measure diversity in extraversion, a cross-sectional questionnaire was sent out to participants in the study, elaborated on in section 4.3.2. To be able to study change and development, a longitudinal study could have been beneficial (Saunders et al., 2023). However, a combination of the timeframe of this thesis and the necessity to mitigate the issues identified in previous studies (broad focus, inconsistent sampling, lack of controlled conditions) led to the decision to conduct cross-sectional experiments.

Additionally, anonymizing the distributed questionnaire could have benefitted the study. Research by Ong & Weiss (2000) demonstrates that anonymity has a significant impact on responses to sensitive questions, and anonymization could thus have mitigated the risk of respondents providing dishonest answers. Due to the structure of the seeding process and the subsequent experiment, it was not a feasible option.

4.3 Experiment

4.3.1 Setting

The experiment was carried out in a room owned by SSE, and rented by the Student Association at the same school. All participating groups, except one, conducted the experiment in the same room. The group that utilized a different location was excluded from the final statistical analysis due to variations in experimental conditions. Ensuring uniformity in experimental settings is essential for maintaining the internal validity of the study.

The experimental setup was standardized and highly controlled across all groups. A table was set up in the middle of the room, equipped with a jacket covering one marshmallow, 20 spaghetti strands, a thread measuring 120 cm in length, and a sheet containing instructions (Appendix A). Additionally, two 10 cm pieces of tape were positioned on the side of the table.

Upon entering the room, participants were offered coffee and pastries and instructed not to touch the table. Once all four participants were present, they were informed that the experiment would start. To maintain consistency across sessions, the instructions (Appendix B) were audibly presented using the “listen” function provided by Google Translate.

4.3.2 Questionnaire Construction

The questionnaire (Appendix C) was designed in line with the Five Factor Model through the Big Five Inventory (John & Srivastava, 1999). It consisted of 20 questions with the following structure:

- 2 questions concerning participant management

- 8 questions concerning extraversion
- 9 questions concerning conscientiousness
- 1 question regarding GDPR and collection of personal information

The conscientiousness questions were included due to the aforementioned reasons (2.2.4).

The Big Five Inventory (BFI) was conducted in English, despite the participant's native language being Swedish. Research has shown that the English version is the most widely accepted (John & Srivastava, 1999), and with all participants studying in English the risk of misunderstanding the language was mitigated.

4.3.3 Sample

The sample consisted of 108 Swedish-speaking students studying at SSE. The decision to only include Swedish speaking students was to ensure that language misunderstandings would not play a role in how the team performed.

The sample was collected using a combination of digital communication, direct interaction on campus, and a snowball sampling technique (Saunders et al., 2023). While the initial recruitment process may have included biases, such as a tendency to approach individuals known to the researchers, the snowball sampling technique helped mitigate this limitation by expanding the sample through referrals. However, it is important to acknowledge that biases may still exist in the composition of the final sample.

The selection of SSE students was driven by both practical and homogeneity-based considerations. Practically, the accessibility of the student body was a key factor, as the researchers were enrolled at SSE at the time, simplifying the process of approaching potential participants. The rationale for seeking homogeneity stemmed from minimizing variability in other factors than extraversion and conscientiousness. Given that all participants were SSE students, they likely shared somewhat similar intellectual capabilities and educational backgrounds, aligning with the objective to control for other variables as much as possible.

When contacting participants, a link to the questionnaire was distributed. Groups of four were assembled two times, first after 60 responses, and a second time after the 48 new responses. When assembling the groups, the seeding method discussed by Humphrey et al. (2007) was employed with a few exceptions:

- The aim was to have as many groups as possible with 50% females and 50% males, to limit gender from having an explanatory effect on performance (Zhang, 2020), and the gender variable trumped the extraversion variable in the setup.
- In a small number of groups, illness resulted in last-minute group composition changes.

In the cases above, the seeding process was not conducted perfectly, but the groups were still formed such that some groups had maximized diversity in extraversion, and some groups minimized (Appendix D).

4.4 Quantitative Measures

4.4.1 Independent Variable

The independent variable is the standard deviation of extraversion (SD_Extraversion). Standard deviation was selected over variance as it shares the same unit measures as the extraversion scores, providing a more comprehensive view of the extraversion spread and offering a more intuitive interpretation.

4.4.2 Dependent Variable

The dependent variable is the height of the tower (TowerHeight), measured in centimeters. This serves as a proxy for the team performance outcome.

4.4.3 Control Variables

Gender Mix (Gender_Mix): Gender was controlled as the sample group was unevenly distributed between men and women. A numerical representation was assigned to the different genders: 0 for males and 1 for females. The gender_mix score was then computed, illustrating the gender balance within a group. For instance, a group with 2 males and 2 females yielded a gender_mix score of 0.5, while a group with 3 males and 1 female resulted in a score of 0.25. The importance

of including this control variable stems from research showing a relationship between gender mix and team performance (Schneid et. al, 2015)

Conscientiousness (Avg_Conscientiousness): Previous research suggests that higher levels of conscientiousness correlate with enhanced team performance (Barrick et al., 1998; Minnigh et al., 2024). Consequently, the average conscientiousness level of each group was included.

How well participants knew each other (Familiarity): Participant familiarity was assessed by calculating a familiarity score for each group. The score was derived from summing up the responses to interview question 6 (Appendix E). For groups lacking interviewees, one member of the group was asked to answer question 6. The objective of including this variable was to mitigate the risk of familiarity being a strong predictor of team performance, in line with previous studies (Espinosa et al., 2007; Akşin et al., 2020).

Time of Day (Time): The experiments were conducted at various times of the day, ranging from 8:00 to 18:00. To control for time, each hourly block was assigned a numerical code (Appendix F). The period from 8:00 to 9:00 was coded as 1, 9:00 - 10:00 as 2, and so forth, until the 17:00 to 18:00 block, coded as 10. This variable was included to mitigate the potential effect of time, as studies have shown that cognitive functions dip in the morning (Valdez, 2019).

4.4.4 Data Analysis

The questionnaire was distributed through Google Forms, and the responses were automatically compiled into an Excel sheet. Group formation and additional coding (Appendix F) were conducted in Excel. An initial check for outliers was conducted, using the interquartile range (IQR) method.

Thereafter, the data was transferred into R version 2024.04.0+735. In R, the data was checked for homoscedasticity through a Breusch-Pagan (BP) test (Appendix G), multicollinearity through a VIF-test, and normal distribution of the error terms through a QQ-Plot (Appendix H). The BP test indicated heteroscedasticity in the data, and a correlation was observed between two of the control variables (Appendix I), further supported by a high VIF. The correlation was deemed not to

represent the broader population, and one of the control variables was excluded from the model and subsequent analyses. Subsequently, the VIF-test showed no signs of multicollinearity. The QQ-plot revealed normal distribution among the error terms.

The heteroscedasticity in the data had to be addressed comprehensively. The list of control variables was thoroughly reviewed to see if any could be excluded to reduce heteroscedasticity. However, no exclusions yielded any difference in the outcomes of the BP test. Furthermore, an Ordinary Least Squares (OLS) model was fitted to identify patterns of heteroscedasticity, but these appeared random, which was also supported by plotted diagrams (Appendix G). Since the heteroscedasticity could not be effectively mitigated using these methods, a Weighted Least Squares (WLS) regression was adopted, viewed as the most suitable approach to handle the unequal variances observed.

To test our hypothesis, the following WLS-regression was used:

$$TowerHeight_i = \alpha + \beta_1 SD_Extraversion_i + \beta_2 Avg_Conscientiousness_i + \beta_3 Gender_Mix_i + \beta_4 Time + \varepsilon_i$$

$TowerHeight_i$ represents the tower height, α represents the intercept, $\beta_1$represents the independent variable, β_2, β_3 and $\beta_4$represent the control variables, and ε_i represents the error term.

To determine the statistical significance, a p-value threshold of 0.05 was used (Di Leo & Sardanelli, 2020).

4.5 Qualitative Measures

Interviews were conducted with 16 randomly selected participants. The interview questions were designed to extract relevant insights from the perceived teamwork, group dynamics, and strategies (Appendix E). By asking open-ended questions, the interviews aimed to capture participant's subjective experiences, providing valuable data to complement the quantitative findings. Even though the questions were designed to draw out candid responses from participants, it is important to acknowledge potential biases that may have influenced participants' responses. Interviewee

biases include participants providing only a partial picture of the situation in order to be “socially desirable” (Saunders et al., 2023).

Additionally, all groups were observed and recorded by the researchers. To avoid self-fulfilling prophecy, the researchers were unaware of each group's level of extraversion diversity (LED or HED) during observations. Due to technical difficulties, recordings were not obtained for two of the groups, and they were thus removed from the analysis.

4.6 Discussion of Method

4.6.1 Ethical Considerations

Since the experiment involved human participants, ethical considerations were crucial. The design of both the experiments and the interviews ensured that participants were not subject to any form of pain, harm, material disadvantage, or embarrassment. However, the nature of the experimental setup necessitated that participants consent to the study without knowing the specific tasks or the study’s aims. This aspect poses potential ethical concerns regarding informed consent, as participants might not have been fully aware of what their involvement entailed (Saunders et al., 2023).

To address these concerns, detailed instructions were provided during the experiment and before the interviews to help participants feel informed and secure. Additionally, participants were informed that they could withdraw from the study at any time.

Furthermore, given the sensitive nature of the information gathered, the data collection process adhered to the current regulations specified by the General Data Protection Regulation (GDPR).

4.6.2 Validity of Method

The study’s limited sample size may constrain the generalisability of the findings. As such, the results of this research are primarily applicable to business students sharing the same native language.

The use of a mixed-methods design enhances confidence in the study's conclusion by mitigating method-specific biases. (Saunders et al., 2023). Furthermore, the quantitative components of the research utilized validated measures rooted in theoretical frameworks, increasing the reliability.

However, potential biases may undermine the validity of the study. Researcher bias, especially in the subjective interpretation of observed teamwork was addressed by the quantification of the tower height in the experimental task. The quantitative assessment was a significant element in the study, aligning subjective observations with empirical data. Participant bias also presented a risk to the validity of the study. The lack of anonymity in the questionnaire could have led to participants providing responses that they perceived as expected or socially acceptable, rather than genuine. This due to the identifiable nature of the responses - the researchers had access to the individual answers.

5. Empirical Data and Results

5.1 Quantitative Data

The following analysis involves descriptive statistics, correlation analysis, regression analysis, and robustness checks to examine the hypothesis.

The experiment is based on a sample comprising 27 groups, with each group composed of four individuals. Three groups were excluded from the initial sample: one group conducted the experiment in a setting different from the others, and the other two groups due to technical issues with their recordings. A fourth group was later excluded from the sample due to being an outlier, identified by the interquartile range (IQR) method.

Table 1: Sample statistics

	n
Original sample	27
Sample after excluding groups performing the experiment at another location	26
Sample after excluding groups where video recordings were not obtained	24
Sample after excluding outliers	23
Final sample	23

5.1.1 Descriptive Statistics

The descriptive statistics are categorized into two sections: individual-level statistics followed by group-level descriptive statistics. These statistics are based on data collected from the 23 remaining groups.

Table 2: Descriptive statistics, Individual-level

	N	Mean	SD	Q1	Median	Q3	Min	Max
Extraversion score	92	31.552	4.838	29.000	31.000	35.000	18.000	40.000
Conscientiousness score	92	36.063	4.013	34.000	36.000	39.000	24.000	44.000
Gender	92	0.479	0.502	0.000	0.000	1.000	0.000	1.000

The 23 remaining groups were composed of 92 individuals, of which 49% (45) were women and 51% (47) men. The individual variance in extraversion ranged from 18 to 40, with a standard deviation of 4.8. The variance in conscientiousness exhibited a range from 24 to 44, with a standard deviation of 4.0.

Histograms of extraversion scores, conscientiousness scores, and tower heights are depicted in Appendix I.

To mitigate the risk of confounding factors influencing our analysis of team performance, several control variables were also included. The 23 groups were explored by looking at the standard deviation (SD) of extraversion, average conscientiousness, gender, familiarity, and time of day. These control variables were selected based on the aforementioned theoretical considerations and empirical evidence suggesting their potential impact on team performance (discussed under method).

Table 3: Descriptive statistics, Group-level

	N	Mean	SD	Q1	Median	Q3	Min	Max
Tower Height	23	234.457	122.397	111.500	324.000	337.250	22.500	342.000
Standard Deviation Extraversion	23	5.209	1.676	3.845	5.058	6.667	2.217	8.382
Average Conscientiousness	23	36.000	1.747	33.000	36.500	39.875	32.500	40.000
Gender Diversity	23	0.489	0.141	0.500	0.500	0.500	0.000	0.750
Familiarity	23	5.435	2.107	3.500	5.000	7.000	3.000	10.000
Time of Day	23	5.870	2.160	5.000	5.000	7.500	1.000	10.000

The correlations among the variables presented in Table 3 have been tested and are thoroughly documented in Appendix H. A correlation was observed between the familiarity score and gender

mix, where groups with a male majority were generally more acquainted than the average group. This correlation, however, was deemed not representative of the broader population and influenced by specific group compositions, which constituted an error in the context of the intended model application. Consequently, the familiarity score was excluded from the model and subsequent analyses. This decision was further supported by a high VIF (12.889845 > 5) indicating substantial multicollinearity and thus compromising the reliability of the model's estimates (Appendix H).

The initial analysis involved fitting an ordinary least squares (OLS) model to identify patterns of heteroscedasticity, which justified the transition to a WLS approach.

Table 4: WLS-Regression

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	484.746	136.935	3.540	0.00234**
SD_Extraversion	34.311	6.908	4.967	0.0000997***
Avg_Conscientiousness	-10.163	3.752	-2.709	0.01438*
GenderMix	-60.443	36.925	-1.637	0.11901
Time	-5.568	3.178	-1.752	0.09678 .
Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 1.107 on 18 degrees of freedom				
Multiple R-squared: 0.6362		Adjusted R-squared: 0.5553		
F-statistic: 7.868 on 4 and 18 DF		p-value 0.0007515		

Weighted residuals:	Min	Q1	Median	Q3	Max
	-1.78445	-0.98409	-0.05076	0.98576	1.28488

The coefficient for the standard deviation of extraversion (34.311) strongly indicates that variations in extraversion are closely linked to increases in tower height, as evidenced by a very low p-value of 0.000097. The coefficient for average conscientiousness is significant ($p < 0.05$), indicating that for each one-unit increase in average conscientiousness, the predicted tower height decreases by 10.163 cm. Additionally, time of day exhibited a marginally negative impact on the predicted tower height, with a p-value just below 0.1. The remaining control variable,

GenderMix, did not show statistical significance. However, both control variables remain in the model due to their contribution to enhancing its explanatory power. Although they are not statistically significant individually, the inclusion of them resulted in an increased R-squared value, indicating that the model's overall fit improved and was not overfitted.

Several robustness checks were conducted to ensure the validity and robustness of our regression model. The results confirmed that our model assumptions were met, and detailed results are provided in Appendix H.

5.2 Qualitative Data

Since team performance in this thesis is evaluated both towards the actual output produced by the group (the tower's height) and the state of the group as a performing unit (Hackman, 1987), it is necessary to complement the analysis with qualitative data. The empirical data in the form of observations and interviews is divided into two categories: perceived teamwork as well as observed teamwork. The perceived teamwork is the interviewee's perception of how well the team worked together, including if the work enhanced the capability of members to work together on subsequent team tasks (Hackman, 1987). The observed teamwork is the researchers' observations with regard to the same factors.

In the qualitative parts, groups with a standard deviation above the 50th percentile are regarded as groups with High Extraversion Variance (HED), and groups with a standard deviation below the 50th percentile are regarded as groups with Low Extraversion Variance (LED). The HED groups had a standard deviation of $> \mathbf{5}$, while the LED groups had a standard deviation of $\leq \mathbf{5}$. This resulted in 12 groups with HED and 11 groups with LED.

5.2.1 Perceived Teamwork

The perceived teamwork was assessed through interview questions 2-5. Below, the results are presented separately for teams with HED and LED.

Teams with High Extraversion Diversity

Interviewees that had been part of a team with HED often brought up the different approaches of team members, and how that led to higher performance.

"Some people were more pushy than others, while some of us were more reflective. It proved to be good for the group's performance, if all of us had spoken ideas directly we might have gotten stuck in one of them." - HED1

"Some of us were a bit more shy, but still not afraid to state our opinions. People listened to one another which I believe led to our great solution." - HED5

It was also common for these interviewees to refer to the contribution of all group members.

"Everyone contributed to idea creation, no one felt left out." - HED6

"We worked well together and had fun at the same time, everyone contributed something." - HED2

"We worked very well as a team I think. We didn't know each other beforehand, but everyone tried to participate and suggested different ideas." - HED4

When interviewees of the groups with HED were asked to rank their group's performance on a scale from 1-5, the mean response was 4.125.

Teams with Low Extraversion Diversity

Interviewees in teams with LED were mainly positive with regards to the perceived teamwork, however, some comments regarding disagreement within the groups were stated - which was not seen in the interviews of individuals being part of a HED team.

"*We worked well together as a team, however, when Person X decided to do something out of the blue without confirming with the rest of us I felt like it would be their fault if the tower fell." - LED2*

"I'd say we worked OK as a team. We were a bit slow at the start, more thinking than execution. But the group dynamic was nice!" - LED1

Further, the interviewees from teams with LED often commented on how the team members complemented each other.

"It felt like we complemented each other in a very good way" - LED8

"Well, some of us were a bit more pragmatic and skeptical while some had more "outside the box thinking". I think it was good since it led us to see opportunities, as well as evaluate the risks with these." - LED6

From the interviews, it can be concluded that almost all interviewees enjoyed the situation at hand, regardless of being grouped in a team with LED or HED. However, two people on LED teams stated that the situation was a bit stressful.

"Surprisingly stressed by an assignment that is about building a spaghetti tower." - LED3

"Stressful… But fun!" - LED8

When interviewees of the groups with LED were asked to rank their group's performance on a scale from 1-5, the mean response was the same as for groups with HED, 4.125

5.2.2 Observed Teamwork

The researchers observed the teamwork both in real-time and by reviewing recordings.
Observations were focused on three factors: the communication between team members, the

amount of suggested solutions to the problem at hand, and the perceived satisfaction after completion of the task.

Communication between Team Members

The communication in the teams was generally respectful, and people acknowledged one another. However, there were two instances where a member of a group spoke without being acknowledged by others, both times occurring in teams with LED.

Furthermore, in teams with higher total familiarity scores, there was less communication among the team members during the experiment, independent of whether the team had HED or LED.

Suggested Solutions

Both categories of groups had on average 24 suggested solutions to the problem at hand, indicating no difference between HED/LED groups in terms of ability to generate novel solutions.

Perceived Satisfaction

Since Hackman (1987) focuses on whether the work enhanced the capability of members to work together on subsequent team tasks, the perceived satisfaction of the group members was observed. Perceived satisfaction encompasses two aspects: the engagement level of members, assessed by their observed enjoyment of the situation and activity level, and the member's perception of their own performance.

The majority of groups were active throughout the experiment, except some groups finding a solution early and sitting out the time (no distinction between HED/LED groups here). Out of the 23 groups in the final sample, 17 groups expressed that they thought their tower was the highest built so far. Out of the groups that did not express it, 4 groups had LED and 2 groups had HED.

5.3 Quantitative Results

The quantitative data show that there is statistical significance in the effect of high team extraversion variance on team performance. The hypothesis is supported with a p-value of 0.000097, and a coefficient of 34.311 indicating that for each one-unit increase in the standard

deviation of extraversion, the tower height is predicted to increase by approximately 34cm. Thus, the quantitative data supports the hypothesis proposed in this study:

Hypothesis: Teams with higher diversity in the trait extraversion will perform better than teams with lower diversity in the trait extraversion

This result aligns with the study's objective of investigating how diversity in the trait extraversion can affect team performance.

5.4 Qualitative Results

The qualitative analysis yielded the following findings:

- Members of HED teams noted that differences in team member interaction styles led to effective problem-solving.
- Members of HED teams felt that everyone contributed ideas, leading to inclusive teamwork.
- Members of HED teams described their teamwork positively, emphasizing collaboration.
- Members of LED teams described feelings of a thought-focused dynamic, where pragmatic and creative thinking was prevalent. This was generally viewed positively, however, slower starts to the task at hand were articulated.
- In LED teams, some members experienced disagreements and noted one-sided decision making which negatively affected the teamwork.
- Members of LED teams occasionally reported stress related to the task.
- Both members of LED teams and members of HED teams rated their own performance with 4.125/5 on average.
- Respectful communication was observed across all teams, though instances of unacknowledged contributions were noted primarily in teams with LED.
- No significant difference was observed in the group’s ability to generate novel solutions.
- Most groups were actively engaged throughout the experiment, however, familiarity among team members sometimes reduced communication.
- A majority of groups were satisfied with their performance and expressed the belief of having built the highest tower.

6. Analysis

This section aims to explore and explain the impact of team diversity in the extraversion trait on team performance. By offering empirical evidence, the objective is to bridge current research gaps and provide a nuanced view of the effect. The Input-Process-Output (IPO) framework (McGrath, 1984; Hackman, 1987) guides the analysis of the data.

6.1 Input-Process-Output Framework

The analysis of both quantitative and qualitative data is structured using the IPO framework. The model proposes that team effectiveness is contingent upon input characteristics, and serves as a reliable tool for examining and comprehending the processes and outcomes of team performance (McGrath, 1984; Mathei et.al, 2008). In essence, the model acknowledges that inputs influence team processes, which in turn affect outputs. The study builds on three distinct steps; the gathering and seeding of the sample and data points relevant to it, the tower building task with its team processes, and the outcomes in the form of tower heights, interviews, and post-observation evaluations.

6.1.1 Input

The input stage leverages the Big Five Inventory (BFI), to measure extraversion score (ES) and conscientiousness score (CS) which provided a robust basis for composing the groups. When analyzing the descriptive trait statistics, both the ES and CS exhibit a notable symmetry, with the mean and median scores aligning closely for both ES (31.55, 31) and CS (36.06, 36). The symmetry suggests a balanced distribution, where outliers are absent which adds to the generalizability of our findings. Furthermore, the structure of the input data adds to the literature on the FFM, supporting the robustness of the framework to capture trait variance.

Despite all participants studying at the same school, SSE, familiarity scores remained consistently low (min 3: mean 5.4: max 10), with a possible max of 15, reducing the potential for confounding variables. This reinforces the reliability of the study, as the data set was composed to create an environment that could be replicated to ensure practical and theoretical value.

The trait scores (ES, CS) were aggregated to the group level and calculated into team averages, which resulted in the extraversion standard deviation range of 2.22:8.38. This diverse spread was optimal for the seeding process and was fully utilized to create the HED and LED teams.

6.1.2 Process

In the process phase, the sole quantitative variable examined was the time of the day. This variable showed a moderate effect, with groups performing the tower building task earlier in the day on average constructing higher towers. However, the impact was relatively minor (-5.568), and in comparison with other variables the least significant overall. This observation does not have a large impact on the result and does not address the hypothesis. Interestingly, however, this finding contradicts existing cognitive research, which indicates that cognitive function, influenced by circadian rhythms, typically dips to its lowest in the early morning and does not improve until after 10:00 as attention levels increase (Valdez, 2019).

Qualitative observations reveal deeper insights into the process, highlighting differences between LED and HED teams. During the process of the experiment, HED teams displayed more active engagement and more respectful communication. This behavior supported more dynamic interactions among team members and fostered an atmosphere where everyone felt comfortable sharing their insights. The groups were also better listeners, and several members made an effort to ask clarifying questions and engage all other individuals more. This subsequently led to improved team efforts, and it was evident that the problem-solving was collective.

LED teams also displayed active engagement, and team members often noted that their dynamics complemented each other (LED6, LED8), which they viewed as beneficial. However, dominant personalities tended to lead discussions, which sometimes resulted in other ideas being overlooked or insufficiently explored. Furthermore, several instances were observed where LED teams quickly committed to a specific course of action early in the task. This early commitment often made it difficult to pivot to alternative strategies later on due to broken spaghetti, lack of tape strips, time constraints, etc. Had one member articulated an idea in a sufficiently structured way, the others were often quick to follow. This phenomenon illustrates a classic example of

groupthink, where the desire for unanimity leads to poorer decision-making outcomes (Janis, 1995).

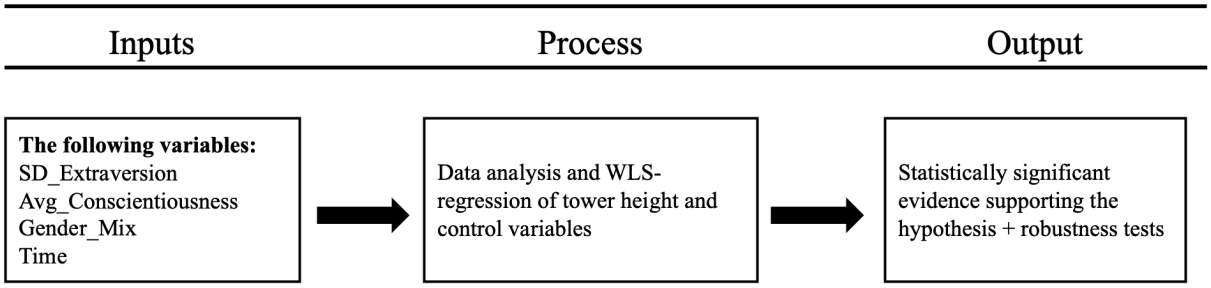
6.1.3 Output

The quantitative output consists of performance quality in terms of tower height. Furthermore, performance was observed and measured by idea generation, attitude towards group and task as well as through an interview where the emphasis was on e.g., participant satisfaction.

In line with previous research (Poling et. al, 2004; Bell, 2007; Hardy et. al, 2020), the results of the regression significantly supported our hypothesis; that a higher diversity in the level of extraversion within a team predicts better team performance in terms of output. The hypothesis is supported with a statistically significant p-value (0.000097). The coefficient of 34.311 implies a tower increase of 34cm for every one-unit increase in the standard deviation of extraversion. The result further supports several other research studies where different measures of diversity have been proven to result in an increased level of team performance (Horwitz & Horwitz, 2007; Jackson & Joshi, 2011), altogether aligning with the cognitive diversity hypothesis (Page, 2007). Thus, the actual output of the group is evidently affected by extraversion variance within teams.

Figure 1 visualizes the data analysis process through the IPO framework.

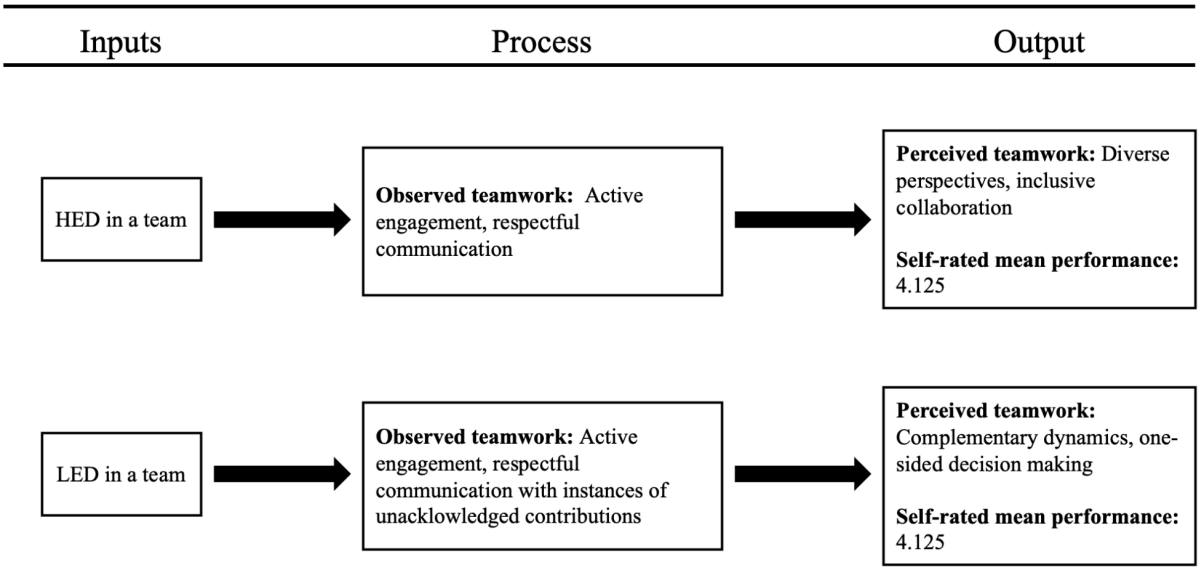
Figure 1: Input-Process-Output framework, quantitative results



The state of the group as a performing unit is assessed through various observation methods, with the results from the quantitative measures further reinforced by the qualitative data.

Figure 2 visualizes the findings from the qualitative observations and interviews, highlighting the distinct pathways through which HED and LED manifest in team processes and lead to different types of perceived teamwork. Despite these differences, both team types converge in a self-rated mean performance of 4.125.

Figure 2: Input-Process-Output framework, qualitative results



HED teams reported a highly inclusive environment, with participants frequently mentioning how the diverse perspectives were leveraged, facilitating a richer pool of ideas. This contributed to effective problem-solving and innovative approaches, as reported from several interviews. In contrast, LED teams exhibited a more uniform approach to problem-solving. This occasionally led to unchallenged ideas and missed opportunities. There were several instances where the observers had statistical proof of an idea being comparably better, but where the idea carrier was shut down or ignored due to precedent decisions within the group. Additionally, it was solely LED teams who reported experiencing stress, and out of the six groups that did not express the belief of having built the highest tower, four groups (66%) were LED teams.

Despite the differing dynamics expressed by both HED and LED teams, both categories reported a self-rated mean performance of 4.125 out of 5. This paradox could partly be explained by the presence of extroverts across all teams. According to the FFM, higher levels of extraversion are associated with a generally positive outlook, which potentially affects self-assessments towards

more favorable evaluations. The presence of extroverts may have contributed to a generally positive perception of team performance, aligning with the findings of Wilmot & Wanberg (2019). For the objectives of this thesis, the observation of the positive advantage of extroverted traits in collaborative settings should be evaluated as a means to support that diversity (including both extroverts and introverts) should be sought after.

Although the qualitative observations align with the hypothesis, they also provide insights into an unexpected dynamic within LED teams. Despite lower diversity in extraversion, LED teams reported the presence of dominant personalities. This is contrary to the expected findings where HED teams, with their higher extraversion diversity, were anticipated to show more pronounced leadership dynamics due to a wider range of dominant behaviors. Instead, the findings suggest that strong leadership can emerge in teams with LED, which can both facilitate and complicate decision-making processes. This contradiction indicates that the impact of extraversion diversity on team dynamics is more complex than initially hypothesized, and challenges the assumption that less diversity would lead to smoother team functioning (Jehn et al., 1999). While extraversion diversity generally promotes better outcomes, the effectiveness of these outcomes also depends on how leadership roles emerge and are managed.

6.1.3.1 Cognitive Diversity Hypothesis

This thesis' findings align with the hypothesis, demonstrating that diversity in extraversion significantly contributes to team performance. The quantitative data analysis provided strong evidence for the impact of extraversion diversity on the tower height, which was further supported by the qualitative analysis. It was observed that HED teams engaged in more inclusive problem-solving discussions and embraced their differences while the LED teams were somewhat more limited in their effectiveness, often reverting to groupthink. In relation to the cognitive diversity hypothesis, these results show evidence of the importance of diverse personality traits within teams.

7. Discussion

7.1 Revisiting the Research Question

This thesis set out to investigate the impact of extraversion trait (FFM) diversity on team performance, guided by the IPO model and the cognitive diversity hypothesis. Through a comprehensive study of experimental and analytical methods, the thesis addresses the following research question:

How does diversity in extraversion within a team impact its overall performance?

The findings of this research significantly state that higher extraversion trait diversity within a team improves the team's overall performance. This study is performed through a controlled experimental setting, and supported by both quantitative and qualitative measures and theories.

7.2 Contributions and Practical Implications

7.2.2 Organizational Contribution

Effective teams constitute a central pillar in most organizations (Jansen & Searle, 2021), and the outcomes of teamwork remain a central focus across organizations in various sectors. Despite the magnitude of research and managerial strategies aimed at improving team efficiency, studies show that 25% of employees express sentiments of inefficiency in their teams (Davey, 2013). Additionally, over 90% of employees (ibid) believe that effective teams are crucial for organizational success, indicating a broad consensus on the importance of optimal team composition.

This thesis presents evidence that teams with high diversity in extraversion demonstrate enhanced performance. Due to its cross-sectional approach, the findings extend beyond traditional organizational team structures, suggesting that diverse extraversion scores can improve performance in different settings such as conferences, training sessions, workshops, and other practical settings. The inclusion of both extroverts and introverts is predicted to increase

performance; with a potential effect on both problem-solving, innovative solution creation, and actual output.

The growing use of personality assessments in recruitment across all sectors also necessitates a closer look at potential biases that favor extroverts, who typically excel in interview settings due to their strong interpersonal relationships (Wilmot & Wanberg, 2019). If not carefully managed, this bias towards extroverts could lead to the formation of more homogeneous teams, reducing diversity. By highlighting the benefits of extraversion diversity, this thesis challenges the prevailing recruitment paradigms and supports the idea that both extroverts and introverts bring valuable dynamics to teams.

Furthermore, as artificial intelligence increasingly influences workplace dynamics, the role of human personality and soft skills is expected to grow in significance. Thus, there are indications that personality assessments will become more prevalent, rendering it crucial to thoroughly check the systems used for these assessments. This evaluation should consider not only individual impacts but also how they affect team dynamics.

7.2.1 Academic Contribution

This thesis contributes to theoretical advancements in understanding the relationship between team extraversion diversity and team performance. Previous studies have primarily focused on the effects of extraversion at the individual level, emphasizing personal behavior and productivity. In recent years, research has begun to explore the aggregated effects of individual traits within teams, often focusing on mean levels. This study, however, moves beyond mean levels to consider the standard deviation of extraversion within teams. Our findings significantly support the hypothesis that higher extraversion diversity within a team predicts better performance, thereby providing support for studies incorporating the cognitive diversity hypothesis.

The application of the IPO model in relation to the cognitive diversity hypothesis has provided a new mixed framework that clearly structures analysis for a more nuanced exploration of the relationship between cognitively diverse teams and performance outcomes.

A key contribution of this study lies in its methodological innovations. This thesis utilized both quantitative and qualitative data to investigate extraversion diversity and employed a controlled experimental design where group diversity was deliberately based on the extraversion trait through a strict seeding process. This is the first study where strict seeding based on the individual scoring in the FFM dimension extraversion has been implemented, which resulted in more comprehensive insights based on more reliable findings which were further amplified by the cross-sectional setting and the observer's constant presence throughout the experiment.

This research further bridges academic theory and practical application by its employment of a task stemming from teamwork-building practices but firmly grounded in theoretical frameworks. Altogether, with high statistical significance for the hypothesis this thesis builds upon the existing literature on how diversity in cognitive abilities, namely extraversion, can increase team performance.

7.3 Limitations

In this section, key constraints with the research process are acknowledged.

7.3.1 Sampling Method and Sample Characteristics

Firstly, the sampling method was not entirely random. Participation was voluntary, and thus, the study only included those who consented to participate, excluding individuals who declined.

Another important limitation is the sample size. 124 individuals answered the survey, but due to scheduling the experimental sample consisted of 108 participants. The relatively small sample leads to less reliable results and a lower generalizability of the findings.

The sample lacked minimum scorers but included a notable number of maximum scorers in extraversion, indicating a skewness that might have limited the range of extraversion explored.

7.3.2 Personality Assessment

Secondly, the personality assessments used in our study contain a degree of uncertainty. The accuracy of these tests depends on participants' honesty and the seriousness with which they approach the assessment. Anecdotal observations suggested a casual approach to the assessments by some students, which potentially affected the reliability of the data. Furthermore, with the focus being on extraversion this study disregarded the predictive power of all other traits except conscientiousness (control variable). Additionally, no further checks of physical or mental abilities were made.

7.3.3 Experiment & Interviews

The methodology of interviewing only 16 randomly selected individuals presents a limitation as it only captures the perspectives of those interviewed, potentially not representing the collective views of the entire group. Additionally, the physical constraints of the room where the experiment took place were not fully considered. There was a ceiling height that many did not realize could be circumvented by moving outside, leading to a uniformity in the results that may not accurately reflect the potential diversity in team performance. Moreover, some participants were previously familiar with the room utilized and knew that they could access a loft, an advantage that was not equally available to all groups, potentially skewing the experimental outcomes.

Another potential limitation is the task structure. Although based on task design research, it was a novel and untested model As there have been notations of the task moderating the relationship between inputs and outputs, this poses a risk to the robustness of the study. In addition, the task could potentially have been solved by one individual which could have been detrimental to the collaborative effort.

7.4 Conclusion & Suggestions for Future Research

This thesis has explored and provided an answer to the question of how extraversion variance in teams affects their performance. The findings suggest that extraversion diversity can enhance team performance, particularly in settings characterized by interdependent tasks and creative problem-solving. The study also highlights the complexity of the interactions, suggesting that

there are factors other than diversity that will correlate with team performance. Leadership dynamics, the distribution of roles within the team, and the management of these roles are essential to create diversity bonuses.

During the process of this study, several intriguing ideas for future research have developed. A key suggestion is to further explore how the variance of other FFM traits affects team performance. This would help researchers understand ideal team compositions more comprehensively. Future studies could use similar controlled experimental setups, initially focusing on one trait at a time for precise insights. Later, merging results could reveal generalized averages and correlations between traits and team performance.

Additionally, investigating the effects of extreme levels of extraversion and introversion within teams could uncover potential synergies or conflicts, aiding in the design of better-performing teams.

References

Akşin, Zeynep & Deo, Sarang & Jónasson, Jónas & Ramdas, Kamalini. (2020). Learning from Many: Partner Exposure and Team Familiarity in Fluid Teams. *Management Science*.

Alay, H. K. (2020). Understanding the dilemmas of workplace diversity: Personality perspective. *Global Journal of Management and Business Research: A Administration and Management, 20(15), Version 1.0. Global Journals. Online ISSN: 2249-4588 & Print ISSN: 0975-5853.*

Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44(1), 1.

Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998). Relating member ability and personality to work-team processes and team effectiveness. *Journal of Applied Psychology*, 83(3), 377-391.

Barry, B., & Stewart, G. L. (1997). Composition, process, and performance in self-managed groups: The role of personality. Journal of Applied Psychology, 82(1), 62-78.

Bell, Suzanne. (2007). Deep-Level Composition Variables as Predictors of Team Performance. *The Journal of applied psychology*. 92. 595-615. 10.1037/0021-9010.92.3.595.

Boyle, G. J. (1995). Myers-Briggs Type Indicator (MBTI): Some psychometric limitations. *Australian Psychologist*, 30(1), 71-74.

Cattell, R. B. Personality structure and measurement. II. The determination and utility of trait modality British Journal of Psychology 36 159–174 1946

Carr, Priyanka & Walton, Gregory. (2014). Cues of Working Together Fuel Intrinsic Motivation. Journal of Experimental Social Psychology. 53. 10.1016

Chaudhry, S. (2023). Measuring diversity, equity, and inclusion: A holistic approach. *Development and Learning in Organizations*, 37(2), 4-6.

Costa, Paul & McCrae, Robert. (1987). Validation of the Five-Factor Model of Personality Across Instruments and Observers. *Journal of personality and social psychology*. 52. 81-90. 10.1037/0022-3514.52.1.81.

Costa, P. T., Jr., & McCrae, R. R. (1992). Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual. Psychological Assessment Resources.

Costa, Paul & McCrae, R.R.. (1999). A five-factor theory of personality. The Five-Factor Model of Personality: Theoretical Perspectives. *Handbook of personality: Theory and research*, 2. 51-87.

Davey, L. (2013). You first: Inspire your team to grow up, get along, and get stuff done.

Di Leo, G., & Sardanelli, F. (2020). Statistical significance: p value, 0.05 threshold, and applications to radiomics—reasons for a conservative approach. *European Radiology Experimental,* 4(1), 18.

Edmondson, A. C., & Lei, Z. (2014). Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 23-43.

Espinosa, J. & Slaughter, Sandra & Kraut, Robert & Herbsleb, James. (2007). Familiarity, Complexity, and Team Performance in Geographically Distributed Software Development. *Organization Science*.

Feher, A., & Vernon, P. A. (2021). Looking beyond the Big Five: A selective review of alternatives to the Big Five model of personality. *Personality and Individual Differences*, 169, 110002.

French, Kimberly & Kottke, Janet. (2013). Teamwork satisfaction: Exploring the multilevel interaction of teamwork interest and group extraversion. *Active Learning in Higher Education*. 14. 189-200.

Gracia-Garrido, S., et al. (2021). Evaluating risk-taking in a cooperative context. *Human Ethology*, 36, 78-95

Hackman, J. R. (1987). The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavio*r (pp. 315-342). Prentice-Hall.

Hancock, S. A., & Hill, A. J. (2022). The effect of teammate personality on team production. *Labour Economics*, 78, 102248

Hardy, James & Benson, Alex & Boulter, Matt W.. (2020). Personality and team effectiveness. *The Routledge International Encyclopedia of Sport and Exercise Psychology: Volume 1.*

Horwitz, S. K., & Horwitz, I. B. (2007). The effects of team diversity on team outcomes: A meta-analytic review of team demography. *Journal of Management,* 33(6), 987-1015.

Humphrey, S. E., Hollenbeck, J. R., Meyer, C. J., & Ilgen, D. R. (2007). Trait configurations in self-managed teams: A conceptual examination of the use of seeding for maximizing and minimizing trait variance in teams. *Journal of Applied Psychology*, 92(3), 885-892.

Humphrey, S. E., Hollenbeck, J. R., Meyer, C. J., & Ilgen, D. R. (2011). Personality configurations in self-managed teams: A natural experiment on the effects of maximizing and minimizing variance in traits. *Journal of Applied Social Psychology,* 41(7), 1701-1732.

Jackson, S. E., & Joshi, A. (2011). Work team diversity. In S. Zedeck (Ed.), *APA handbook of industrial and organizational psychology, Vol. 1. Building and developing the organization* (pp. 651–686). American Psychological Association.

Jackson, S. E., May, K. E., & Whitney, K. (1995). Understanding the dynamics of diversity in decision-making teams. In R. A. Guzzo, E. Salas, & Associates (Eds.), *Team effectiveness and decision making in organizations* (pp. 204-261). Jossey-Bass.

Janis, I.L.. (1995). Groupthink. *Psychological Dimensions of Organizational Behavior*. 391-399.

Jansen, A. E., & Searle, B. J. (2021). Diverse effects of team diversity: A review and framework of surface and deep-level diversity. *Personnel Review,* 50(9), 1838-1853.

Jehn, K. A., Northcraft, G. B., & Neale, M. A. (1999). Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. *Administrative Science Quarterly,* 44(4), 741-763.

John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102-138). Guilford Press.

Kahnweiler, J. B. (2013). *The introverted leader: Building on your quiet strength.* Berrett-Koehler Publishers.

Mathieu, J. E., Goodwin, G. F., Heffner, T. S., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, 85(2), 273-283.

Mathieu, J., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, 34(3), 410-476

McGrath, J. E. (1984). *Groups: interaction and performance*. Prentice-Hall, Inc.

McGrath, J., Berdahl, J., & Arrow, H. (1995). Traits, expectations, culture, and clout: The dynamics of diversity in work groups. In S. E. Jackson & M. N. Ruderman (Eds.), *Diversity in work teams: Research paradigms for a changing workplace*, (pp. 17-46). American Psychological Association.

Milliken, F. J., & Martins, L. L. (1996). Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review*, 21(2), 402-433.

Minnigh, Tyler & Sanders, Jennifer & Witherell, Stephanie & Coyle, Thomas. (2024). Grit as a predictor of academic performance: Not much more than conscientiousness. *Personality and Individual Differences*. 221. 112542.

Neuman, George, Wagner, Stephen & Christiansen, Neil. (1999). The Relationship between Work-Team Personality Composition and the Job Performance of Teams. *Group & Organization Management.* 24. 28-45.

Ong, A. D., & Weiss, D. J. (2000). The impact of anonymity on responses to sensitive questions. *Journal of Applied Social Psychology*, 30, 1691-1708.

Page, S. E. (2007). *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton University Press.

Page, S. E. (2017). *Diversity bonus: How great teams pay off in the knowledge economy.* Princeton University Press.

Peeters, M. A. G., van Tuijl, H. F. J. M., Rutte, C. G., & Reymen, I. M. M. J. (2006). Personality and team performance: A meta-analysis. *European Journal of Personality*, 20(5), 377-396.

Poling, Taylor & Woehr, David & Arciniega, Luis & Gorman, C. Allen. (2004). *The Impact of Personality and Value Diversity on Team Performance*.

Porgérus, M. (Host) Strannegård, L. (Guest). (2024 February 28th). Avsnitt 87: Egenskaperna du behöver i framtiden: "Armkrok med maskinerna". *En påse pengar.* Skandia Banken.
Porter, Christopher & Hollenbeck, John & Ilgen, Daniel & Ellis, Aleksander & West, Bradley & Moon, Henry. (2003). Backing Up Behaviors in Teams: The Role of Personality and Legitimacy of Need. *The Journal of applied psychology*. 88. 391-403. 10.1037/0021-9010.88.3.391.

Rothmann, S., & Coetzer, E. P. (2003). The Big Five personality dimensions and job performance. *SA Journal of Industrial Psychology*, 29(1), 68-74.

Saunders, M., Lewis, P., & Thornhill, A. (2023). *Research methods for business students* (9th ed.). Pearson.

Schneid, Matthias & Isidor, Rodrigo & Li, Chengguang & Kabst, Rüdiger. (2015). The influence of cultural context on the relationship between gender diversity and team performance: A meta-analysis. *The International Journal of Human Resource Management*. 26. 733–756.

Stewart, G. L. (2006). "A meta-analytic review of relationships between team design features and team performance." *Journal of Management*, 32(1), 29-55.

Tannenbaum, S., & Salas, E. (2020). Teams that work: The seven drivers of team effectiveness. *Oxford University Press*.

Thomas, D. A., & Ely, R. J. (1996). Making differences matter: A new paradigm for managing diversity. *Harvard Business Review*, 74(5), 79-91.

Valdez, P. (2019). Circadian rhythms in attention. *The Yale Journal of Biology and Medicine*, 92(1), 81-92.

Watson, D., & Clark, L. A. (1997). Extraversion and its positive emotional core. R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 767-793). Academic Press.

Weingart, L. R. (1997). How did they do that? The ways and means of studying group processes. *Research in Organizational Behavior*, 19, 189-240. JAI Press Ltd.

Wilmot, M. P., Wanberg, C. R., Kammeyer-Mueller, J. D., & Ones, D. S. (2019). Extraversion advantages at work: A quantitative review and synthesis of the meta-analytic evidence. *Journal of Applied Psychology*, 104(12), 1447–1470.

Zhang, L. (2020) An Institutional Approach to Gender Diversity and Firm Performance. *Organization Science* 31(2):439-457.

Appendices

Appendix A: Experiment Instructions

The instructions were written by hand on a piece of paper in Swedish. Below follows both the original instructions as well as the English translation of it.

Swedish:

Bygg ett så högt torn som möjligt. Ni har 15 minuter på er och får enbart använda er av materialet på bordet:

- En marshmallow
- 20 spagettistrån
- En tråd
- Två tejpbitar (hänger på bordskanten)

Vi kommer att säga till när hälften av tiden har gått och när det är en minut kvar. Lycka till!

English translation:

Construct as tall a tower as possible. You have 15 minutes and may only use the material on the table:

- A marshmallow
- 20 spaghetti strands
- A thread
- Two pieces of tape (hanging on the edge of the table)

We will announce when half the time has passed and when there is one minute left. Good luck!

Appendix B: Information Message

The message was read by Google Translate in Swedish. Below follows both the original message as well as the English translation of it.

Swedish:

Tack för att ni tagit er tiden att hjälpa oss med vårt experiment. Se detta som en rolig upplevelse och prestera efter bästa förmåga.

Ni kommer alla att vara anonyma i uppsatsen. Utöver detta kommer experimentet att spelas in, då vi vill kunna gå tillbaka och göra observationer när vi skriver uppsatsen. I enlighet med GDPR-förordningen så kommer alla inspelningar att raderas direkt efter slutförandet av uppsatsen. Samtycker alla till att detta experiment spelas in?

Experimentet tar i helhet 15 minuter. Under tröjan ligger instruktioner och material, lyft försiktigt på den och sedan får ni börja.

English translation:

Thank you for taking the time to help us with our experiment. See this as a fun experience and perform to the best of your ability.

You will all be anonymous in the essay. In addition, the experiment will be recorded, as we want to be able to go back and make observations when writing the paper. In accordance with GDPR, all recordings will be deleted immediately after the completion of the essay. Does everyone consent to this experiment being recorded?

The experiment takes a total of 15 minutes. Under the shirt are instructions and materials, lift it carefully and then you can start.

Appendix C: Questionnaire

(R) denotes that the question is reversed, i.e. disagree strongly equals extrovert/highly conscientious.

Extraversion questions:

I see myself as someone who…

_ Is talkative

_ Is reversed (R)

_ Is full of energy

_ Generates a lot of enthusiasm

_ Tends to be quiet (R)

_ Has an assertive personality

_ Is sometimes shy, inhibited (R)

_ Is outgoing, sociable

Conscientiousness questions:

I see myself as someone who…

_ Does a thorough job

_ Can be somewhat careless (R)

_ Is a reliable worker

_ Tends to be disorganized (R)

_ Tends to be lazy (R)

_ Perseveres until the task is finished

_ Does things efficiently

_ Makes plans and follows through with them

_ Is easily distracted (R)

Appendix D: Groups Based on Scores

Scoring system:

Non-reversed questions:	**Reversed questions:**
Agree strongly: 5p	Agree strongly: 1p
Agree a little: 4p	Agree a little: 2p
Neither agree nor disagree: 3p	Neither agree nor disagree: 3p
Disagree a little: 2p	Disagree a little: 4p
Disagree strongly: 1p	Disagree strongly: 5p

The theoretical ranges of total scores were: 8-40 for Extraversion and 9-50 for Conscientiousness.

Group formation:

When forming the groups, all participants were assigned to an "extraversion category", either Extraversion + (35p - 40p), Extraversion - (31p-35p), Introversion + (29p-31p), or Introversion - (8p -28p). The point intervals were set based on extraversion scores so that each "extraversion category" represented one-quarter of the sample. The aim was to have one person from each category in each group, and this was employed in accordance with the seeding method during group formation. Below are the groups and the group participants' extraversion scores.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9
GM1 score	39	39	37	40	40	38	38	40	40
GM2 score	35	33	32	35	34	34	33	34	35
GM3 score	29	29	31	30	31	32	30	34	30
GM4 score	21	17	28	23	22	21	26	29	26
	Group 10	Group 11	Group 12	Group 13	Group 14	Group 15	Group 16	Group 17	Group 18
GM1 score	36	38	37	38	37	36	35	38	37
GM2 score	33	34	33	33	33	32	31	32	32
GM3 score	30	31	30	30	31	30	30	29	31
GM4 score	23	28	28	28	28	28	28	18	28
	Group 19	Group 20	Group 21	Group 22	Group 23	Group 24	Group 25	Group 26	Group 27
GM1 score	33	37	36	40	40	37	36	34	37
GM2 score	31	33	34	35	30	32	30	32	31
GM3 score	29	29	31	30	30	27	26	29	29
GM4 score	28	25	28	29	29	20	23	26	25

GM = Group Member, Score = Extraversion score

Appendix E: Interview Questions

The interview questions were asked in Swedish. Below follows both the original questions, as well as a translation of the questions to English.

Swedish:

1. Vilken var din strategi under experimentet? Beskriv hur du löste den givna uppgiften.
2. Hur fungerade ni tillsammans som ett team enligt dig? Bra eller dåligt? Beskriv varför eller varför inte.
3. Hur var atmosfären inom gruppen under experimentet?
4. Hur uppfattade du resten av gruppmedlemmarna? Var de sociala, roliga, trevliga, oförskämda, artiga etc?
5. Hur skulle du betygsätta din grupps prestation på en skala från 1-5?
6. Hur väl kände du dina lagkamrater innan experimentet på en skala från 1-5? Ge varje lagkamrat ett nummer.
7. Finns det några faktorer som påverkade din prestation idag? Om så är fallet, vilka faktorer?
8. Några ytterligare reflektioner från din erfarenhet av experimentet?

English translation:

1. During the experiment, what was your strategy? Describe how you solved the given task.
2. How did you work together as a team in your opinion? Good or bad? Describe why or why not.
3. What was the atmosphere within the group like during the experiment?
4. How did you perceive the rest of the group members? Were they social, funny, nice, rude, polite etc?
5. How would you rate your group's performance on a scale of 1-5?
6. How well did you know your teammates before the experiment on a scale of 1-5? Give each teammate a number.
7. Are there any factors that affected your performance today? If so, what factors?
8. Any additional reflections from your experience with the experiment?

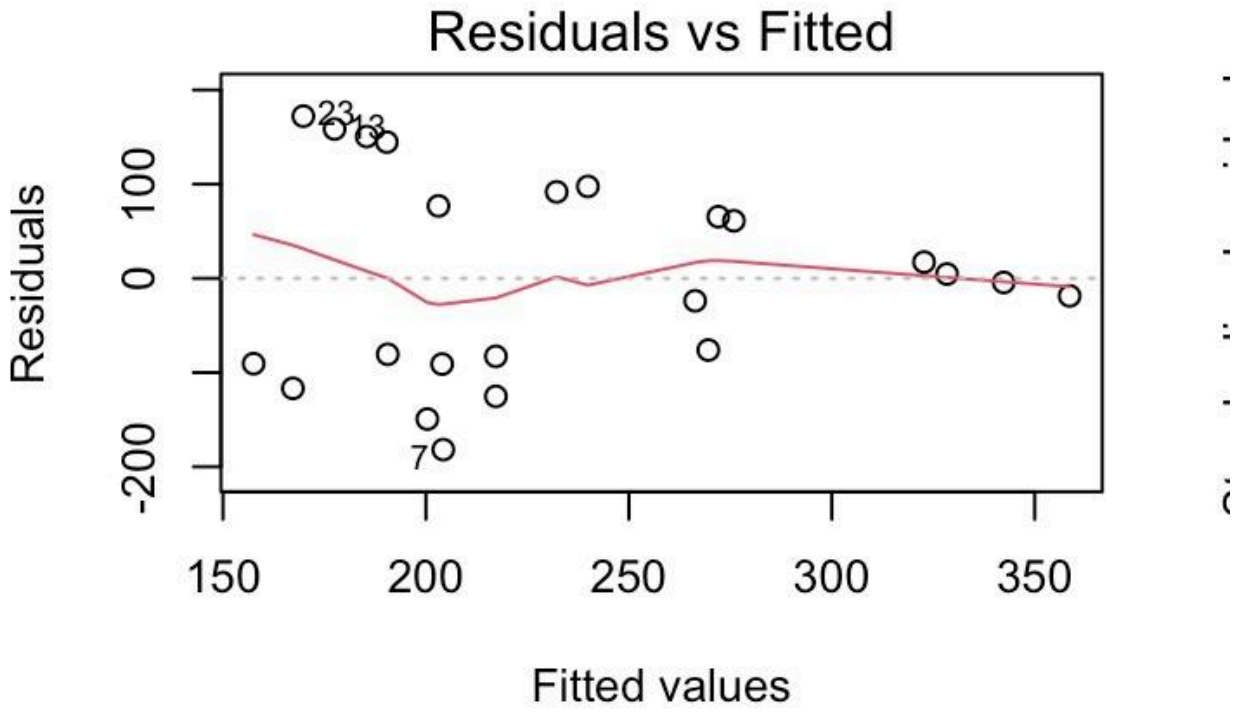
Appendix F: Coding of Variables in Excel

Variable name	**Coding**	**Variable type**
Gender	0 = Male 1 = Female	Ordinal
Time of day	8:00 - 9:00 = 1 9:00 - 10:00 = 2 10:00 - 11:00 = 3 11:00 - 12:00 = 4 12:00 - 13:00 = 5 13:00 - 14:00 = 6 14:00 - 15:00 = 7 15:00 - 16:00 = 8 16:00 - 17:00 = 9 17:00 - 18:00 = 10	Ordinal

Appendix G: Brusch-Pagan and Residual Plot

Breusch-Pagan test

Breusch-Pagan Statistic	Degrees of Freedom	p-value
12.349	5	0.03031



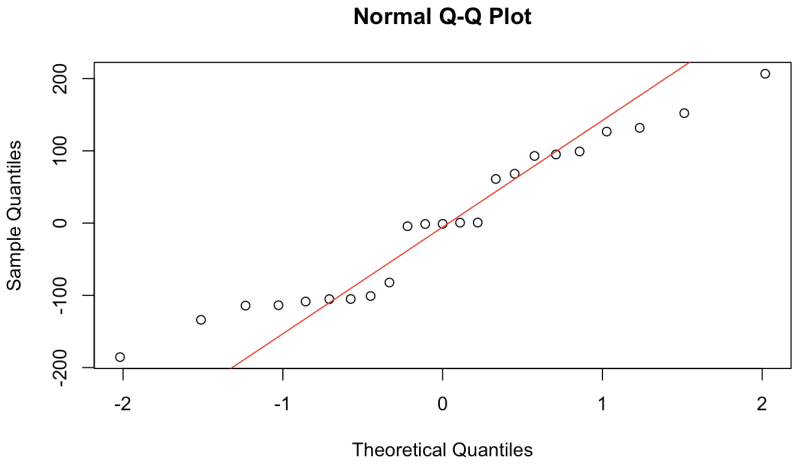
Appendix H: VIF-test and QQ-plot

VIF-test #1

Variable	VIF
Sd_Extraversion	2.250
Avg_Conscientiousness	1.386
GenderMix	10.914
Time	2.015
Familiarity	12.890

VIF-test #2

Variable	VIF
Sd_Extraversion	1.325
Avg_Conscientiousness	1.188
GenderMix	1.060
Time	1.442

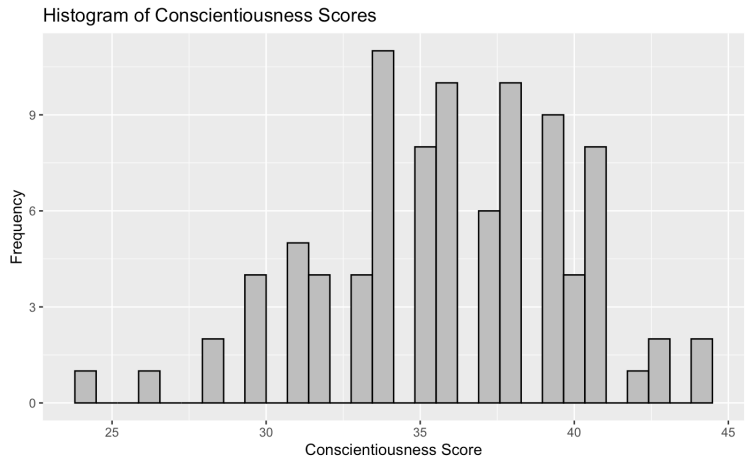


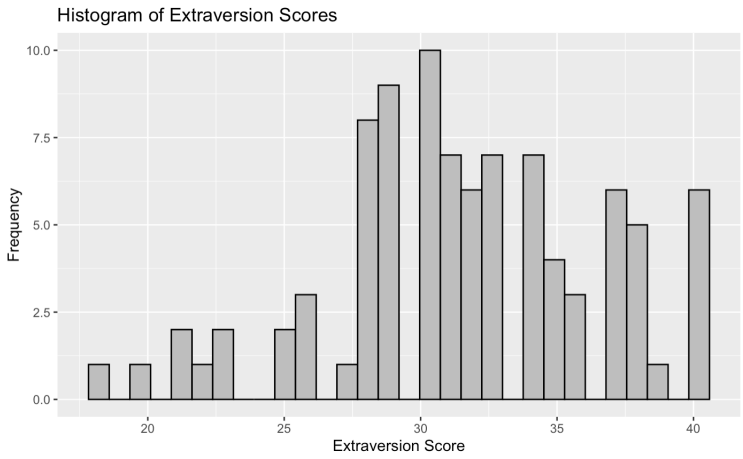
Appendix I: Correlation Matrix

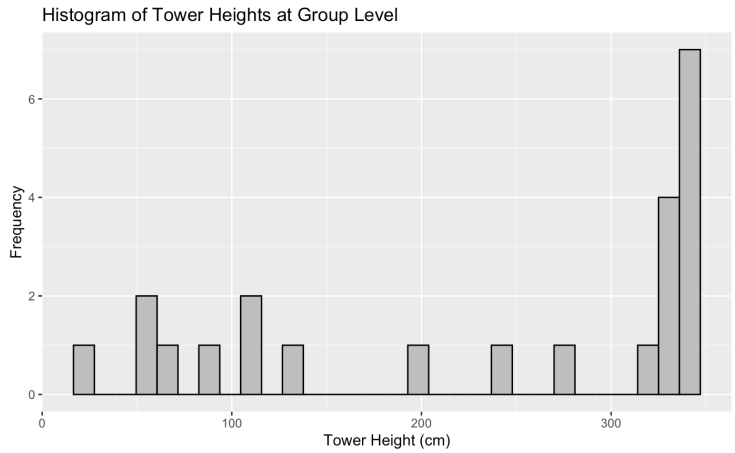
Correlation matrix

	SD_ Extraversion	Avg_ Consc.	GenderMix.	Time	Familiarity
SD_Extraversion	1.00				
Avg_Conscientiousness	0.053	1.00			
GenderMix	-0.106	-0.046	1.00		
Time	-0.144	-0.310	-0.005	1.00	
Familiarity	0.037	-0.080	-0.482	0.083	1.00

Appendix J: Histograms







Appendix K: AI Statement

In this research, generative AI tools, specifically ChatGPT versions 4.0 and 3.5, were utilized to enhance various aspects of the thesis development. ChatGPT served as a discussion partner, assisted in language translation complementing traditional dictionaries, and supported coding in R. Additionally, it was used for proofreading, as a support in referencing, and for suggesting relevant academic articles.

The benefits of using AI, such as improved efficiency in coding and refined argumentation, were accompanied by risks, including the potential reliance on inaccurate information and concerns about the originality of our work. To mitigate these risks, we cross-verified all AI-generated suggestions with peer-reviewed sources and ensured that AI was only used for preliminary ideas and basic support, keeping the core research and critical analysis independent.

Reflections from using AI tools include a significantly streamlined research process and enhanced productivity, especially during the initial stages of the thesis writing. It also prompted a deeper level of critical engagement with the literature and facilitated the integration of modern tools with traditional research methods.