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Shared Leadership and Team Satisfaction: The Moderating Role of Extraversion Heterogeneity

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SHARED LEADERSHIP AND TEAM SATISFACTION:

THE MODERATING ROLE OF EXTRAVERSION HETEROGENEITY

by

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Abstract

A between-groups design experiment was conducted to examine the effect of extraversion heterogeneity as a moderator between shared leadership and team satisfaction. It was hypothesized that the relationship between shared leadership and team satisfaction would be moderated by extraversion heterogeneity, such that (a) the relationship would be positive for teams in which members are similar in their levels of extraversion, and (b) the relationship would be negative for teams in which members are dissimilar in their levels of extraversion. Data regarding extraversion, shared leadership behavior, and team satisfaction was collected from 30 teams comprised of 90 participants. The findings did not support the hypothesis, showing no interaction. However, exploratory analyses did find evidence for the moderating role of agreeableness heterogeneity in the relationship between shared leadership and team satisfaction. The findings are discussed and implications for future research are presented.

Dedication

To my parents for being very supportive and helping me through every step of the way.

Acknowledgements

I would like to express my gratitude to my committee chair, Dr. Eduardo Salas, for sharing his expertise through his insight, suggestions, and support for this research. I would also like to thank my other committee members, Dr. Wei Wang and Dr. Michael Preston, who each provided helpful perspectives of research and leadership. I'd like to thank Dr. John E. Mathieu for his contributions and permitting me to use data from the "Assessing Team Collaboration During Exploration" study. Additionally, I really appreciated the guidance and support from my mentor, Amanda Thayer, who dedicated an extensive amount of time into helping me on this project. She is a truly inspiring role model who challenged and motivated me through the whole process. The advice from Christina Lacerenza and Jennifer Feitosa was also very useful and valued. Kathryn Sullivan took time out of her spring break to help me out, which I greatly appreciated! Thank you all for your help and contributions!

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Introduction

Organizations are implementing team-based tasks as a way to be more productive and effective. It has been recognized that teamwork is a crucial aspect to produce successful outcomes in the workplace (Martinez-Fernandez, 2011). A comprehensive meta-analysis conducted by LePine and colleagues (2008) found that when a job requires workers to partake in teamwork to complete a task, team processes have a strong positive relationship with team performance and member satisfaction. Research has also found a significant correlation between group satisfaction and group effort (Lester, Meglino, & Korsgaard, 2002). A dissatisfying work experience could lead to unfavorable behaviors such as less productivity and turnover (Peeters et al., 2006). Therefore, team satisfaction in the workplace is an essential feature to examine in organizational psychology. Further research should seek to find the best combination of team members in order to produce high levels of satisfaction within the team.

As teamwork has become more commonplace, views on leadership have changed. Historically, leadership research focused mainly on the external characteristics of one individual who exerts a certain power over others. Since teamwork has become a more important focal point in research because of its contribution to team effectiveness (Zaccaro, Rittman, & Marks, 2001), it has been noticed that leadership can take many other forms. For example, rather than leadership existing solely as a hierarchy with one person in charge, it can also exist laterally, distributing leadership throughout members (e.g., shared leadership). Yammarino and collegues (2012) identify shared leadership as all members equally contributing to decision and actions. They also note that it "has been successfully applied to self-managed teas, executime teams, and democratic organizations" (Yammarino et al., 2012, p. 390). Shared leadership may be a

strategic form of leadership for organizations to implement. However, questions still remain about the relationship between shared leadership and satisfaction; which the current study seeks to address. There is a relatively small amount of research on shared leadership, so we would like to examine how extraversion heterogeneity affects the relationship between shared leadership and team satisfaction.

It is important to realize that although an individual's personality correlates to outcomes such as performance, satisfaction and design behavior (Mohammed & Angell, 2003; Judge & Mount, 2002; Peeters et al., 2006; Peeters et al., 2008), the overall team's personality may be an important variable to examine. Diversity in a team is considered with the overall team's traits; which Mathieu and colleagues have called for the use of indices beyond mean values for team research. Applying Mathieu, Tannenbaum, Donsbach, and Alliger's (2013) review and synthesis of team literature, we focused on diversity which fit the team profile model. Mathieu et al. (2013) divided team composition models into four types (i.e., traditional personnel-position fit model, personal model with teamwork considerations, relative contribution model, and team profile model) and provided suggestions for future research in these areas. Regarding the team profile model, Mathieu et al. (2013) provided research questions for further investigations of team composition, such as "What team diversity factors are related to which team processes and outcomes under what circumstances?" and "Can we define a threshold beyond which diversity is harmful to team performance? Does this depend on the attribute measured?" (p. 152). In order to partially fulfill these questions, the diversity attribute focused on in this study is heterogeneity of extraversion. The overall purpose of this study is to examine how shared leadership impacts team satisfaction, and the constructive or hindering role of team extraversion composition. We

would like to find the best individuals, or configuration of individuals that work best under certain leadership structures.

Literature Review

Team Satisfaction

Job satisfaction is the most widely studied attitude in the workplace because it is significantly correlated with important aspects of one's work such as group effort and performance (Lester, Meglino, & Korsgaard, 2002). Peeters et al. (2006) acknowledge that "it is important for researchers, and eventually, managers to know how satisfied team members are with their team because knowing this holds important consequences for the team member's future work in that specific team or for his or her future teamwork in general" (p. 187). In their study they identify team satisfaction as the pleasantness of both, the team's composition and the way the team members work together (Peeters et al., 2006). Although research on job satisfaction has yielded high correlations between emotional stability, extraversion, and conscientiousness (Judge & Mount, 2002), these past findings on satisfaction, do not identify it within a team environment. Peeters et al. (2006) recognized this gap in research and presented a study that looked at the relationship between personality traits and individual satisfaction in regards to individual, dissimilarity, and interaction.

Our research also looks at team satisfaction but we take it a step further by looking at its relationship to shared leadership as compared to hierarchical leadership. The relationship between shared leadership and team satisfaction has not yet been looked at, to my knowledge. However, Greer and van Kleef (2010) observed power and satisfaction, which found that shared power helps prevent power struggles within a group. Given these results, we can infer that shared leadership would serve as a more pleasant environment. Therefore, it is reasonable to assert that shared leadership and team satisfaction are related.

Shared Leadership

Team leadership is defined as:

> Ability to direct and coordinate the activities of other team members, assess team performance, assign tasks, develop team knowledge, skills, and abilities, motivate team members, plan and organize, and establish a positive atmosphere (Salas, Sims, & Burke, 2005, p. 560).

A developing type of team leadership is known as shared leadership. Gibb (1954) had originally proposed the idea of having leadership be focused, having one focal leader, or distributed, having more than one leader in a group. Shared leadership provides members with equally distributed influence on the team (Mehra, Smith, Dixon, & Robertson, 2006; Pearce & Sims, 2002). It is a "team process where leadership is carried out by the team as a whole, rather than solely by a single designated individual" (Ensley, Hmieleski, & Pearce, 2006, p. 220). In a review of collectivistic leadership approaches, Yammarino, Salas, Serban, Shirreffs, and Shuffler (2012) note that shared leadership has not yet been widely studied, providing only a few empirical studies. They also emphasize that shared leadership may not always be a beneficial replacement over traditional leadership approaches.

Although there is little research to date on shared leadership, we are able to draw upon studies focusing on power dispersion, which relates to leadership and how power is dispersed in a team. High group dispersion is when one member holds most of the power. According to Tiedens and Fragale (2003), people find social settings to be more pleasant when there is high power dispersion. However, contradicting findings have shown that high power dispersion creates power struggles and conflict due to feelings of unfairness (Henderson & Frederickson,

2001). In high-power teams (e.g., management teams, or expert teams) there has been data supporting the idea of shared power being positively related to conflict resolution because it allows for equal participation and collaboration with the rest of the members while avoiding power struggles (Greer & van Kleef, 2010). As such, it stands to reason that sharing of leadership responsibilities would also have an impact on team satisfaction.

For the purpose of this study, we will be observing shared leadership through disparity because it provides a more nuanced understanding of *how* leadership is shared within the team (Harrison & Klein, 2007). In particular, there may be one team member who exerts a high amount of leadership while the others do not, or they may all have a moderate level of leadership. As such, the use of team means would fail to specify the extent to which the sharing of leadership responsibilities is equally distributed. As mentioned previously, this study will use the team profile model in order to determine whether a team's level of extraversion heterogeneity facilitates or impedes the relationship between shared leadership and team satisfaction. The team profile model examines the team members' characteristics "collectively rather than as linked to individuals' position fits" (Mathieu et al., 2013, p. 139).

Extraversion

Extraverts tend to be outgoing, sociable, talkative, enthusiastic, and have more social relationships in comparison to introverts (Costa & McCrae, 1992). Highly extraverted individuals are likely to exhibit leadership behaviors and frequently contribute to group discussions (Littlepage, Schmidt, Whisler, & Frost, 1995). Conversely, introverts can be seen as more reserved individuals who prefer solitude. Since interaction is a vital part of teamwork, it is important to examine this socially oriented trait within the team context. For instance, a study

conducted by Peeters, van Tuijl, and Reymen (2006) found that "the negative of effect of dissimilarity in extraversion on individual satisfaction with the team is the strongest for team members low in individual extraversion" (p. 204).

In regards to team-level personality, previous research has found that higher variability on extraversion resulted in higher oral presentation scores and team personality diversity of extraversion was positively related to team performance (Mohammed & Angell, 2003; Neuman, et al., 1999), which suggests that heterogeneity of extraversion is beneficial to team performance. Moreover, extraversion homogeneity (i.e., team members having similar levels of extraversion) may hinder a team because when there are too many extraverts in a team, there is a chance that there will be conflict (Mazur, 1973). In contrast with these findings, Shultz, Ketrow, & Urban (1995) state that off-putting communication negatively affects the quality of group decisions; in which case, having more extraverts would be beneficial to create more communication.

Extraversion heterogeneity may positively or negatively affect the team's outcomes depending on the situation. Constructs can be typified as one of two processes: either composition or compilation. Composition looks at similarities; compilation looks at differences and "describes phenomena that comprise a common domain but are distinctively different as they emerge across levels" (Kozlowski & Klein, 2000, p. 16). Therefore, composition looks at similarities, such as shared mental models, where compilation looks at differences such as personality dissimilarities. This study uses the compilational approach to observe extraversion because it is concentrating on personality diversity.

Research Hypothesis

The current study inferred that when a group has all extraverted members and shares leadership, the members will be more satisfied than if leadership is carried out by a single individual. Theoretically, extraverts tend to be social, assertive, and dominant (Costa & McCrae, 1992). In a case where all members are extraverts and leadership is shared, extraverts can exert their sociable traits. They also enjoy working in teams, so interacting would serve as a positive experience. On the other hand, if there is only one leader, extraverts may put forth their dominant traits and become competitive in hopes of gaining equality (Barry & Stewart, 1997). Hence, extraverts do not serve as good followers (Smelser, 1961).

In regards to teams made up of solely introverted members, previous research has suggested that there may be a void of leadership (Neuman et al., 1999). However, it could be inferred that if all of the members equally contribute to the team, their level of team satisfaction may be higher than if only one steps out of his or her comfort zone to take charge. Their homogeneity may make them feel more comfortable and motivated to work together (Neuman et al., 1999).

When looking at teams with high extraversion heterogeneity, the complementary model suggests that dissimilarities may positively affect a group (Muchinsky & Monahan, 1987). An extensive amount of research has found that extraverts tend to be recognized as leaders whereas introverts prefer to be in the background (Hogan, Curphy, & Hogan, 1994; Watson & Clark, 1997; Colbert, Judge, Choi, & Wang, 2012). Since extraverts are dominant and introverts tend to make better followers, it would be assumed that when a team has extraversion heterogeneity the team will be more satisfied when the extravert serves as the focal leader, rather than sharing

leadership with members who are not as comfortable taking the position. Extraversion heterogeneity has been found to have a positive correlation between team outcomes with extraverts serving as leaders (Neuman et al., 1999; Mohammed & Angell, 2003). Accordingly, we proposed the following:

> *Hypothesis:* The relationship between shared leadership and team satisfaction will be moderated by extraversion heterogeneity, such that (a) the relationship will be positive for teams in which members are similar in their levels of extraversion, and (b) the relationship will be negative for teams in which members are dissimilar in their levels of extraversion.

The hypothesized moderating role of extraversion heterogeneity on the relationship between shared leadership and team satisfaction is illustrated in figure 1. Figure 2 demonstrates how the moderating role is hypothesized to affect the relationship.

Methods

Participants

Participants were obtained from a large southeastern university. Undergraduates who enrolled in a general psychology course were able to sign up for the first part of the study through SONA Systems, an experiment management system. Participants earned class credit for their involvement. The first portion of the study was completed individually and fully online, and the second portion was an in-person laboratory session in which they worked in a three-person team. The study accounts for a total of 90 participants comprising 30 teams, achieving 84% power at two-sided 5% significance level. Participants ranged in age from 18-36, with a mean age of 18.5. Of the sample, 56.7% of participants were female.

Procedure

The study took place in two parts. In Part 1, participants answered a series of questions online at their convenience. The online survey consisted of the personality measure known as the Big 5 which was used to determine levels of extraversion. Then participants were contacted to schedule to meet in a computer lab at the University for Part 2 of the study. At this time they were to partake in the multiplayer collaborative game Artemis, which simulates space exploration. The session consists of a training module, a practice round, and a performance round (which they are provided a guide and map with basic functions to refer to in the event that they need a reminder). The training and practice round are used for the participants to get acquainted with the system and its tools, and the latter has a scripted, unexpected event occur in order to inflict stress on the team, which is used for data collection. During the mission, the first assignment is to make it to the intermediate dock while avoiding asteroids. Once they have

made it to the dock, another ship appears which needs to be escorted to the final dock. In order to make it to the final dock, the team must destroy six abandoned bases that are blocking them.

The interdependent team is made up of three roles, each having a specific role to contribute to the team; however they can help each other with their different roles given their shared responsibilities such as systems monitoring with the long range satellite. The role of Helm is to maneuver the spaceship and take them to their destination. Engineer is in charge of distributing energy throughout the spaceship depending on what is needed at the moment. Lastly, Weapons is in charge of loading and launching missiles at abandoned bases and enemy ships. The participants were audio recorded and the screens were video recorded to allow for observational ratings afterward. Following the Artemeis game, participants completed questionnaires on their experience with the team. Data was collected from the initial and closing surveys for this study.

Measures

Extraversion. Extraversion was measured using a self-report of the Five-Factor Personality Inventory (Costa & McCrae, 1992). This instrument is widely accepted in research focused on personality and it has sufficient estimates of construct validity. The extraversion scale shows reliability, with an α coefficient of .815. The level of extraversion was measured by four items out of the twenty items in the measure. The items were scored on a 5-point Likert scale ranging from *very inaccurate* (1) to *very accurate* (5). Aggregated *standard deviations* of the results were calculated in order to measure the overall group's level of extraversion. (See appendix B for items).

Shared Leadership. Two trained research assistants watched video footage from the second phase of the game in order to rate behaviors suggestive of shared leadership. To develop a measure of shared leadership using behavioral anchors, we utilized the teamwork process facets described in Marks, Mathieu, and Zaccaro (2001). Behaviors that were indicative of each of the facets were identified and anchors were developed. These aspects align well with the theoretical construct of leadership defined earlier. Thus, in order to measure shared leadership, the BARS measure was applied to the participants individually in order to see how much leadership each participant renders in both task- and social-oriented processes. For example, the task-related facets include skills such as: strategy formulation and planning, goal specification, systems monitoring, team monitoring and backup behavior, and coordination which demonstrate task-oriented leadership. The other facets: motivating and confidence building, conflict management, and affect management, exhibit social-oriented leadership. The items were rated on a 5-point scale ranging from *hardly any skill* (1) to *complete skill* (5) (See Appendix C for items).

Interrater reliability was established amongst the raters by first developing a comparable knowledge of the BARS measure. This was done by creating real life examples of the 10 team processes facets and then applying it specifically to the Artemis game. The raters then practiced making ratings by each rating the same videos of mock study sessions, both together and separately, until they met a consensus of how to assess the behaviors. Once raters were rating reliably, raters individually evaluated sessions, with 31% of the sessions overlapping, in order to make sure that the rating was staying consistent. While coding actual sessions, the raters

compared results after a couple of sessions in order to make sure that they were maintaining reliability.

In order to determine how leadership was dispersed amongst a team, we used *disparity* (Harrison & Klein, 2007), which assesses uneven distribution of assets in the team (e.g., status, decision making, social power). To calculate disparity, we followed the measurement approach set forth by Harrison and Klein (2007) by using the following equation for *coefficient of variation*:

$$D_{SD}/D_{mean}$$

Therefore, the average of each participant's leadership score was aggregated to the team level *standard deviation* and *mean,* and then, by using the coefficient of variation as a measure of disparity, the shared leadership score was calculated. This yields results that are consist with the idea that the role of leadership should be equally dispersed in order to convey shared leadership.

Team Satisfaction. A self-report questionnaire developed by Wageman, Hackman and Lehman (2005) to evaluate perceptions of a task was used to evaluate team satisfaction. Participants answered two items pertaining to satisfaction with team relationships, in the post survey questions. One item stated, "I very much enjoy talking and working with my teammates" and was scored on a 5-point Likert scale ranging from *highly inaccurate* (1) to *highly accurate* (5) (See Appendix D for all items).

Results

With regard to measuring shared leadership behavior, 31% of the overall sessions were double-coded and then analyzed for intraclass correlation coefficient (ICC) which indicated that the raters were highly reliable ($\alpha = .89$). Individual scores for extraversion and team satisfaction means and standard deviations are reported in the following table in order to show the variance of participants observed in the study:

To examine the moderating effect of extraversion heterogeneity on the relationship between shared leadership and team satisfaction, a hierarchical multiple regression was performed on the data. The dependent variable was the aggregated mean score of the team satisfaction questions, taking into consideration the reverse coded item. In order to test the interaction between extraversion heterogeneity and shared leadership, both the extraversion heterogeneity *standard deviation* by itself and the *coefficient of variation* measuring shared leadership, were included as covariates in Model 1. Also, accounting for a possible effect of agreeableness on team satisfaction, the teams' *standard deviation* of agreeableness was included as a possible covariate in Model 1 as well. In Model 2, the interaction between extraversion heterogeneity and shared leadership was displayed.

Our hypothesis predicted that the relationship between shared leadership and team satisfaction will be moderated by extraversion heterogeneity, such that (a) the relationship will be positive for teams in which members are similar in their levels of extraversion, and (b) the relationship will be negative for teams in which members are dissimilar in their levels of extraversion. Analysis generated no significant results of the regression ($\beta = -.09$, $t(28) = -.05$, p = n.s.). Results before including agreeableness as a covariate are reported in Table 2 and results

after agreeableness was accounted for are found in Table 3. After including agreeableness as a covariate, the analysis still generated no significant results of the regression ($\beta = .49$, $t(28) = .28$, $p = .779$), also shown in table 3. Therefore, the hypothesis was not supported. Figure 3 illustrates that there is no significant interaction between extraversion heterogeneity and shared leadership on team satisfaction.

Exploratory Findings

Although the primary findings of this study did not come out significant, when accounting for agreeableness as a covariate, it was noticed that agreeableness heterogeneity may have an interaction with team satisfaction. As such, we ran a hierarchical multiple regression using the interaction between agreeableness heterogeneity with shared leadership as the predicting variable and the aggregated *standard deviation* of agreeableness as well as the *disparity* for shared leadership as covariates. The results of this analysis indicated that there was not a significant interaction between agreeableness heterogeneity and shared leadership, $\beta = 3.45$, $t(28) = 1.42$, $p = .17$, as indicated in Table 4.

To further investigate the interaction between shared leadership and agreeableness heterogeneity on team satisfaction, we took a closer look at agreeableness, once again through a one-tailed hierarchical multiple regression. However, since the results were in our hypothesized direction, we were able to cut the p-value in half. We found that there is a significant interaction between task-oriented processes of shared leadership ($\beta = 4.04$, $t(28) = 1.94$, $p = .03$). The results are presented in Table 5. Figure 4 illustrates that there is a significant interaction between agreeableness heterogeneity and task oriented shared leadership on team satisfaction.

Discussion

Theoretical Implications

This is one of the first studies to evaluate the relationship between shared leadership and team satisfaction as moderated by extraversion heterogeneity. It is contributing to research on shared leadership which is still in its developing stages of empirical findings (Yammarino, et al., 2012). To our knowledge, it is also the first to measure shared leadership by using *disparity* which seems like fitting strategy since shared leadership is the distribution of leadership in the team. Therefore, it is setting a guide for future research on the subject. Since there was an insignificant interaction between extraversion heterogeneity and shared leadership, researchers can modify the current study to reevaluate the moderating role of extraversion heterogeneity. They can also account for these results when identifying the relationship between shared leadership and team satisfaction. Also, our exploratory findings that show a significant relationship between agreeableness heterogeneity and task oriented shared leadership, can serve researchers as a factor to look into more.

Practical Implications

It is clear that employers are concerned on employees' satisfaction of working in a team because organizations are increasingly using teamwork to complete tasks. When considering how to develop a team based on employee's similarities and differences, employers may try to create a compatible team based on extraversion heterogeneity. However, based on the findings of this study, it may be inappropriate to focus on this trait regardless of the team's leadership framework. In other words, extraversion heterogeneity will not contribute to the level of team

satisfaction in neither situations of high, nor low shared leadership. Given this, employers who might normally be more prompted to hire extraverts, due to their outgoing personality, may find this research compelling. Since extraversion heterogeneity does not seem to have a moderating role on team, employers may find it useful to consider other factors such as agreeableness heterogeneity when forming teams that exhibit team satisfaction.

Strengths and Limitations

The present study had several limitations. First, it was limited by the small sample size. The experiment began running in the fall 2013 semester and due to some technical difficulties, not all of the sessions had video footage of the simulation. Also, some participants did not respond to the survey questions regarding personality, which further limited the sample size for statistical analysis. Second, the sample of participants was comprised of undergraduate students, mostly between the ages of 18-19. This constricted group of participants does not provide us with high external validity because it may not accurately represent the entire population of individuals operating in team environments.

Furthermore, the study context may have had an effect on how the team approached leadership. Teammates were separated and only communicated through a headset which may not have generated the same kind of interaction that would occur in face-to-face interaction. Extraversion might be less relevant in a computer based activity, and instead, teammates who have more experience playing video games may step up as leaders during the mission.

The study also had a number of strengths. For example, the interdependent team task was conducted in a controlled laboratory environment which provides us with internal validity. In

addition, we utilized strong methodologies which avoided a cross-sectional design. Collecting our data on separate occasions for the three variables helped us infer causality. When the participants took part in the interdependent team activity, they came in with an existing trait which we identified in the pre-survey. The outcome variable, team satisfaction, was also taken on a separate time, in which case we could easily assume that their responses had to do with the team's mission rather than factors outside of the lab.

Also, we avoided mono-method bias. In addition to the use of surveys, we also included a BARS measure, or behavioral ratings made by observers. This technique also served as a more objective view of shared leadership rather than having participants self-report their perceptions. , Participants are more likely to yield subjective judgment of their own environment; therefore, observational measures are more effective when there is a 3rd party observer. We made sure to include more than one source of data collection in order to avoid source bias. We also made sure that interrater reliability was formed before coding the behavior of real sessions. When calculating extraversion and team satisfaction, we used psychometrically sound measures that have been tested for reliability and validity.

Future Research

This research has provided several avenues for future research. Our study did not present significant findings on the interaction between extraversion heterogeneity and shared leadership. Since we cannot verify whether the limitations hindered legitimate results or whether the findings are accurate in the lack of support for the hypothesis, further studies are needed to examine this relationship. Future research can also use a more strategic measure of shared leadership. Marks and colleagues (2001) suggest that certain team processes may be better

observed through in-baskets, interviews, or self-report. Also, they recommend measuring teamwork in a longitudinal timeframe that can observe more processes that may not be shown in a short time with little activity (Marks, et al., 2001). The interdependent team activity could be completed in a maximum duration of 20 minutes. Furthermore, the participants were given specific direction during the session. Given these two aspects, participants may not have found it necessary to engage in certain processes, such as collaborating and specifying the goal. Therefore, a stronger context for teamwork with face-to-face interaction and more opportunity for strategizing may provide more observations of shared leadership and relate more to extraversion heterogeneity.

It would be beneficial to further continue research on shared leadership since it is a relatively new approach of leadership that may be an effective in team-based workplaces. For example, using the same shared leadership measurement, research can focus on its relationship to team performance and team efficacy. Furthermore, there may be other predicting variables worth looking at that may interact with shared leadership, such as team orientation and assertiveness. Additionally, given the results of our exploratory analyses, agreeableness heterogeneity should be further examined in terms of how it interacts with shared leadership and to potentially impact team performance and other relevant outcomes.

Summary

This study is contributing to nascent research on shared leadership and it is also the first to measure shared leadership by using disparity. Therefore, it is setting a guide for future research on the subject. Based on the results produced by this study, extraversion heterogeneity does not seem to moderate the relationship between shared leadership and team satisfaction.

However, exploratory findings indicate that agreeableness heterogeneity may demonstrate a moderating role in the relationship, which should be further examined. With the given finding, employers who are concerned with team satisfaction may find this information useful to know that extraversion heterogeneity is not a necessary factor to assess which can allow researchers and employers to focus on other factors, such as agreeableness heterogeneity.

Appendix A: Figures and Tables

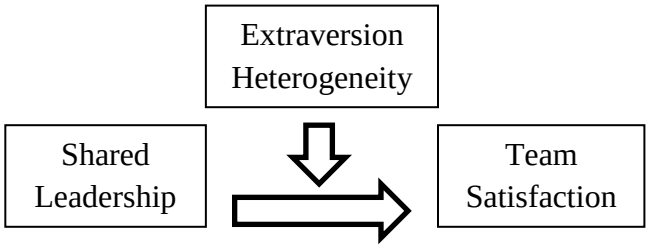

Figure 1: Hypothesized relationship between variables

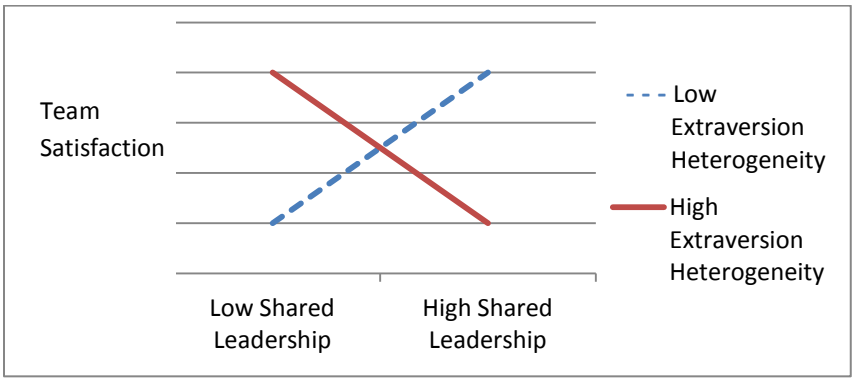

Figure 2: Hypothesized direction of the moderated relationship

Table 1

Descriptive Statistics of Participants

	N	Minimum	Maximum	Mean	Std. Deviation
Big5_E_I_Mn	90	1.50	5.00	3.3278	.89132
SatTeam_Ph2_I_Mn	90	2.50	5.00	4.1389	.65355
Valid N (listwise)	90				

Table 2

Results of Extraversion Heterogeneity and Shared Leadership Interaction on Team Satisfaction (not including agreeableness as a covariate)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.305	.181		23.818	.000
	Extraversion SD	-.102	.211	-.094	-.483	.633
	Shared Leadership	-.652	.774	-.165	-.842	.407
2	(Constant)	4.294	.290		14.811	.000
	Extraversion SD	-.085	.415	-.078	-.204	.840
	Shared Leadership	-.592	1.462	-.149	-.405	.689
	Interaction ExSL	-.089	1.808	-.027	-.049	.961

a. Dependent Variable: SatTeam_Ph2_I_Mn_mean

Table 3

Results of Extraversion Heterogeneity and Shared Leadership Interaction on Team Satisfaction (including agreeableness as a covariate)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.699	.253		18.541	.000
	Extraversion SD	-.053	.200	-.049	-.267	.792
	Agreeableness SD	-.591	.282	-.383	-2.096	.046
	Shared Leadership	-1.021	.751	-.258	-1.361	.185
2	(Constant)	4.768	.356		13.405	.000
	Extraversion SD	-.148	.392	-.137	-.378	.709
	Agreeableness SD	-.604	.291	-.391	-2.078	.048
	Shared Leadership	-1.362	1.426	-.344	-.955	.349
	Interaction ExSL	.488	1.725	.147	.283	.779

a. Dependent Variable: SatTeam_Ph2_I_Mn_mean

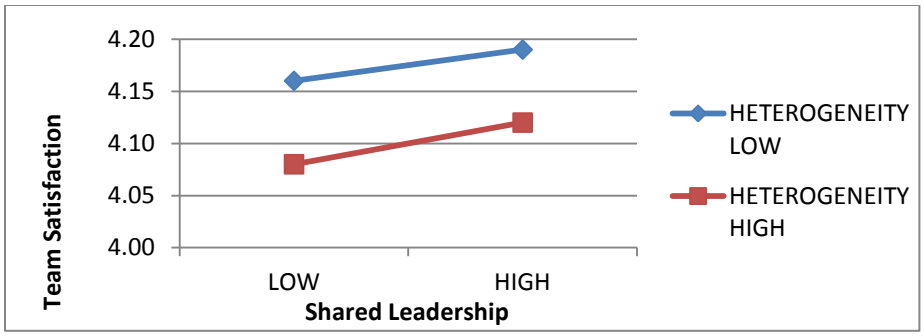

Figure 3: Extraversion Heterogeneity and Shared Leadership Interaction

Table 4

Results of Agreeableness Heterogeneity and Shared Leadership Interaction on Team Satifaction

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.674	.232		20.144	.000
	Agreeableness SD	-.599	.275	-.389	-2.179	.038
	Shared Leadership	-1.079	.706	-.272	-1.528	.138
2	(Constant)	4.998	.322		15.502	.000
	Agreeableness SD	-1.172	.485	-.760	-2.414	.024
	Shared Leadership	-2.834	1.418	-.715	-1.999	.056
	Interaction AxSL	3.445	2.427	.569	1.419	.168

a. Dependent Variable: SatTeam_Ph2_I_Mn_mean

Table 5

Results of Agreeableness Heterogeneity and Task Oriented Shared Leadership Interaction on Team Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.685	.226		20.726	.000
	Agreeableness SD	-.599	.271	-.388	-2.209	.018
	Task Shared Lead.	-.992	.582	-.300	-1.706	.050
2	(Constant)	5.142	.318		16.146	.000
	Agreeableness SD	-1.420	.495	-.921	-2.869	.004
	Task Shared Lead.	-3.002	1.173	-.907	-2.559	.009
	Interaction AxTaskSL	4.044	2.080	.794	1.944	.032

a. Dependent Variable: SatTeam_Ph2_I_Mn_mean

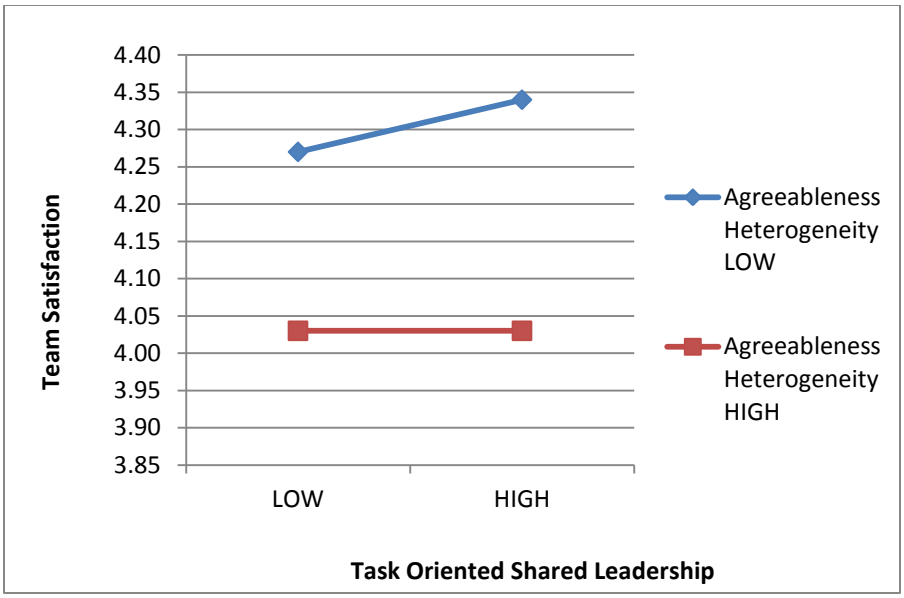

Figure 4: Results of Agreeableness Heterogeneity and Task Oriented Shared Leadership Interaction

Appendix B: Extraversion Measure

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor (Neo-FFI) Inventory professional manual.* Odessa, FL: PAR.

Five-Factor Personality Inventory:

I…

1. Am the life of the party. (E)*
2. Sympathize with others' feelings. (A)
3. Get chores done right away. (C)
4. Have frequent mood swings. (N)
5. Have a vivid imagination. (I)
6. Don't talk a lot. (r) (E)*
7. Am not interested in other people's problems. (r) (A)
8. Often forget to put things back in their proper place. (r) (C)
9. Am relaxed most of the time. (r) (N)
10. Am not interested in abstract ideas. (r) (I)
11. Talk to a lot of different people at parties. (E)*
12. Feel others' emotions. (A)
13. Like order. (C)
14. Get upset easily. (N)
15. Have difficulty understanding abstract ideas. (r) (I)
16. Keep in the background. (r) (E)*
17. Am not really interested in others. (r) (A)
18. Make a mess of things. (r) (C)
19. Seldom feel blue. (r) (N)
20. Do not have a good imagination. (r) (I)

*Items pertaining to extraversion which are the only items used in this study.

Appendix C: Shared Leadership BARS Measure

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review, 25*(3), 356-376. doi: 10.5465/AMR.2001.4845785

*Team Processes BARS Measure converted to individual level

MISSION ANALYSIS

Definition: Interpretation and evaluation of the team's mission, including identification of the mission's main tasks as well as the operative environmental conditions and team resources available for mission execution.

Examples: *Gathering Roles and Responsibilities*

- Comprehending appropriate and relevant information (e.g. how to man their individual station, recognize different terrain characteristics, the roles of each position, etc.) from the Artemis training program

- Understanding the teams' overall mission (i.e. defending the Artemis and making it from one point of the map to another designated point) and overarching goals (varied based on phase) and how to individually contribute based upon their assigned position

- Identifying main tasks and environmental contingencies (e.g. asteroids, black holes, enemy ships, etc.) of Artemis

- Prioritizing mission objectives and required tasks based on phase

Identifying Resources

- Identification of available resources (e.g. energy, weapons, etc.) for the team

Engaging in Discussion

- Communicating the team's strategy to all members

Scale:

Complete Skill (5)

- Prior to the start of playing the game, team member understood all of the team's roles and task responsibilities as taught by the training.
- Member comprehended their individual contribution to the overall mission.
- Member engaged in discussion and asking questions about what should be done during the course of their mission.
- Team member identified available resources.

Very Much Skill (4)

Adequate Skill (3)

- Member understood their team and individual roles and task responsibilities but did not understand how these things contributed to the overall mission.
- Questions asked focus on procedural issues in the game (e.g. how to move the ship, what color enemy ships are, etc.) and were rarely task-related.
- Team member was able to identify available resources but were confused as how to utilize them.

Some Skill (2)

Hardly Any Skill (1)

- Member did not understand their team and individual roles or task responsibilities nor did they understand the individual or team's contribution to the overall mission.
- Member had no idea what their mission objectives were, were confused, and did not ask any clarification questions to one another.

GOAL SPECIFICATION

Definition: Identification and prioritization of goals and subgoals for mission accomplishment.

Examples: *Agreeing upon Goals*

- Developing and assigning overall mission goals (e.g. determining the best route for the ship to take, developing a tactic for engaging with enemies in the path of the Artemis, etc.) for the team
- Developing and assigning goals for each individual in the team (e.g. conserving energy, having one team member be in charge of checking the long range map, etc.)
- Developing and assigning subgoals (e.g. strategically focusing on a specific path to go around an obstacle, focusing on destroying one enemy first because they are the most powerful, etc.) that help the team accomplish larger goals

Prioritizing Goals

- Importance of goals was discussed ~~and a shared understanding was developed by the team~~

What might be said:

- "Do you know if we need more energy for speed?"
- "So I think were supposed to go where it says intermediate dock."

Scale:

Complete Skill (5)

- Member of the team agreed upon specific long-term and short-term goals to aid in directing the action of the team.
- Goals were prioritized and understood by the team member.

Very Much Skill (4)

Adequate Skill (3)

- Member of the team prepared long-term and short-term goals to aid in directing the action of the team, but they were not specific or useful.
- Goals were not fully understood or some disagreement existed concerning whether or not the goals were useful.

Some Skill (2)

Hardly Any Skill (1)

- No long-term or short-term goals were generated by the team member.
- There was confusion concerning what the team was trying to accomplish.

STRATEGY FORMULATION & PLANNING

Definition: Formulation of strategies and courses of action for mission accomplishment. This dimension includes generic planning, contingency planning, and reactive strategic adjustment.

Examples: *Developing a Plan to Achieve Goals*

- Developing plan to destroy enemy ships without being destroyed

- Communicating the proper sequence of actions to team members

- Considering factors (e.g., environmental obstacles, need to conserve energy, etc.) that might alter their mission plan

Detecting Changes and Adapting Actions

- Adjusting team actions or responsibilities to adapt to unexpected events (i.e., environmental jolts)

- Recognizing how unplanned reactions impact the remainder of the team's plan (e.g., weapons availability, flight route, speed adjustments, etc.)

Testing and Strengthening Plans

- Engaging in contingency planning consisting of verbally walking through "what if" scenarios which might emerge while playing

What might be said:

- "Should I put the energy down for the movement speed?"
- "Maybe that would work"

Scale:

Complete Skill (5)

- Member developed a primary course of action for achieving the team's goals.
- Member was able to detect and quickly adapt/coordinate their actions to unexpected situations with appropriate actions.
- The member tested and strengthened its plan using "what if" scenarios.
- The team member was aware of and understood how their individual task responsibilities fit into the primary and secondary courses of action.

Very Much Skill (4)

Adequate Skill (3)

- Team member had difficulty developing a primary course of action for achieving the team's goals.
- The team member briefly tested its plan using "what if" scenarios.
- The team member was aware of their individual task responsibilities but might not have understood how they fit into the primary and secondary courses of action.

Some Skill (2)

Hardly Any Skill (1)

- Team member acted in such a manner that they reacted and saw what happened with no strategy.
- Team member did not develop a primary course of action for achieving the team's goals.
- The team member did not plan ahead for potential scenarios which might emerge and were unaware of and their individual task responsibilities and how they fit into the primary and secondary courses of action.

MONITORING PROGRESS TOWARDS GOALS

Definition: Tracking task and goal progress toward mission accomplishment; reporting system information in terms of what needs to be accomplished for goal attainment, transmitting team goal progress to team members.

Examples: *Tracking Progress towards Goals*

- Tracking the team's progress on goals and subgoals (e.g., targets destroyed, time expenditure, escorting within a proper distance, etc.)

- Reporting the team's progress on goals and subgoals (e.g., targets destroyed, time expenditure, escorting within a proper distance, etc.)

What might be said:

- "I'm just gonna use a homing torpedo"
- "Is that good, did that work?"
- "So close now"

Scale:

Complete Skill (5)

- Maintained awareness of and tracked progress on their primary and secondary goals throughout the mission.
- Understood which individual tasks and responsibilities were necessary for goal attainment and established benchmarks to monitor these tasks.

Very Much Skill (4)

Adequate Skill (3)

- Maintained awareness of and tracked progress on their primary and secondary goal progress throughout parts of the mission.
- Did not understand how individual tasks and team responsibilities fit into goal attainment.

Some Skill (2)

Hardly Any Skill (1)

- The team member either "monitored everything" or hardly anything at all.
- There was little connection between what the team member was monitoring and the goals that they should have been trying to accomplish.

SYSTEMS MONITORING

Definition: Tracking team resources and environmental conditions as they relate to mission accomplishment. This dimension includes internal systems monitoring and environmental monitoring.

Examples: *Monitoring Team Responsibilities*

- Tracking team related factors (e.g. weapon availability, energy levels, long range sensor information, or anything deemed relevant to the mission by the team) and ensure that these systems are operating effectively

Monitoring the External Environment

- Tracking aspects of the Artemis environment (e.g. obstacles on the map, enemy locations, neutral forces, etc.)

What might be said:

- "I tried to move it up but um it says that it's at a 120% but the energy's at 0"
- "I feel like we're just going in circles around it."
- "I'm in warp 1, impulse one hundred"

Scale:

Complete Skill (5)

- Team member effectively monitored factors related to the proper functioning of the Artemis
- Team member monitored other's individual task responsibilities and any communication generated within the team
- Member effectively monitored the external environment while keeping in mind their overarching mission.

Very Much Skill (4)

Adequate Skill (3)

- Team member, to a lesser degree monitored factors related to the proper functioning of the Artemis.
- There may have been some communication generated within the team, but they did not attend to it.
- Member effectively monitored the external environment.

Some Skill (2)

Hardly Any Skill (1)

- Team member had no idea how to monitor factors related to the proper functioning of the Artemis, each other's individual task responsibilities, and any communication generated within the team.
- Member failed to monitor the external environment.

TEAM MONITORING AND BACKUP BEHAVIOR

Definition: Assisting team members to perform their tasks. Assistance may occur by (a) providing a teammate verbal feedback or coaching, (b) by assisting a teammate behaviorally in carrying out actions, or (c) by assuming and completing a task for a teammate. This dimension includes the provision of feedback and task related support and the seeking of help from teammates when necessary.

Examples: *Monitoring Roles and Requirements*

- Keeping an eye on other teammates to determine if and when they need help

- Helping teammates with their assigned roles by telling them what to do and/or how to do it

Offering Feedback and Support

- Team members inform each other of individual progress and setbacks

- Team members offer each other feedback

- Asking for or providing help in terms of how to perform certain tasks in the game (e.g., how to raise/lower shields, what specific items on the map are, etc.)

What might be said:

- "Do you have the button at the top that says LRS?"

Scale:

Complete Skill (5)

- Team memeber monitored each other's specific roles and task requirements (e.g. ensuring that the Artemis was heading in the proper direction, checking that shields were raised during battle, etc.) to successfully complete the overall mission.
- Feedback and support was offered by team member and they were not afraid to ask for help if necessary.

Very Much Skill (4)

Adequate Skill (3)

- Team member observed and was aware of each other's specific roles and task requirements (e.g. ensuring that the Artemis is heading in the proper direction, checking that shields are raised during battle, etc.) but were more concerned with monitoring whether they themselves were enacting the appropriate role and task requirements.
- Feedback was offered by team member if necessary and they rarely asked for help.

Some Skill (2)

Hardly Any Skill (1)

- Team member did not observe and were not aware of each other's specific roles and task requirements. They really didn't even pay attention to what they were doing themselves.
- Minimal feedback was offered by the team member and did not ask for help when necessary.

COORDINATION

Definition: Orchestrating the sequence and timing of interdependent actions

Examples: *Maintaining Coordination and Synchronization*

- Organizing how and when team members will synchronize actions that require the contribution of all team members (e.g. determining energy allocation throughout the mission)

- Organizing how and when team members will synchronize actions that require the efforts of more than one team member

What might be said:

- "Okay."
- "Okay, I'm gonna use a nuke on it."
- "Maybe that would work"

Scale:

Complete Skill (5)

- Team member was in frequent contact with one another and maintained smooth coordination and synchronization of interdependent actions between individual roles and teams in accordance with the overall mission.
- Everyone's input was considered and it was clear how the team arrived at their decisions.

Very Much Skill (4)

Adequate Skill (3)

- Team member stayed in contact with the others and maintained a minimum level of coordination and synchronization of interdependent actions between individual roles and teams in accordance with the overall mission.
- The input of team members was occasionally considered during coordination.

Some Skill (2)

Hardly Any Skill (1)

- Complete lack of coordination and synchronization of interdependent actions between team members. The team was very disorganized and the team member did not knew what was going on.
- Decisions were made without the input of the team.

CONFLICT MANAGEMENT

Definition: Establishing conditions to prevent, control, or guide team conflict before it occurs. Working through task and interpersonal disagreements among team members.

Examples: *Constructively Discussing Problems*

- Making statements or offering opinions about task related issues, the way the team functions together, or personal issues, that are likely to affect subsequent team conflict.

- Attempting to work through disagreements when they arise within the team and are open to alternative ideas

Managing and Containing Disagreements

- Rules are established in dealing with interpersonal conflict

What might be said:

- "it's a better aim"

Scale:

Complete Skill (5)

- Team member openly discussed different approaches and strategies for the game without letting things get personal.
- Team member was considerate of differences and established a pleasant and cooperative working environment.
- Team member was able to constructively discuss problems.
- If conflict did occur, team member was able to manage and contain the disagreements effectively.

Very Much Skill (4)

Adequate Skill (3)

- Team member was willing to discuss different approaches and strategies for the game with relatively little ill feelings developing.
- Team member was sometimes considerate of differences and established a fair working environment.
- Team member was able to discuss some problems and resolve most types of conflict.
- Team member just "stayed out" of any disagreements which arose.

Some Skill (2)

Hardly Any Skill (1)

- Team member was inconsiderate of differences and established an unpleasant and uncooperative working environment regarding the overall mission.
- Team member argued about problems in a destructive manner and often experienced much conflict.
- Member was completely unwilling to discuss the issue at hand and had no clue how to resolve the disagreement.

MOTIVATING AND CONFIDENCE BUILDING

Definition: Generating and preserving a sense of collective confidence, motivation, and task based cohesion with regard to mission accomplishment.

Examples: *Exhibiting Strong Self Efficacy*

- Influencing the level of task cohesion of team members with respect to the mission at hand

- Team members have a shared sense that they can be successful

Motivating Team Members to be Successful

- Members push one another to work hard on the game and do well

Scale:

Complete Skill (5)

- Team member exhibited a strong sense of collective efficacy.
- There was an overall positive attitude about the overall mission, and the member tried to motivate the others through reinforcement and praise.

Very Much Skill (4)

Adequate Skill (3)

- Team member exhibited a moderate sense of self efficacy and was motivated to do well in the game.
- Member believed that they could "hold their own" and did not fold in the face of adversity.

Some Skill (2)

Hardly Any Skill (1)

- Collective efficacy was low in the team and team member seemed to be "going through the motions."
- When faced with adversity, the team member started to give up and believed that they could not recover.

AFFECT MANAGEMENT

Definition: Regulating member emotions during mission accomplishment, including (but not limited to) social cohesion, frustration, and excitement.

Examples: *Maintaining Emotional Stability*

- Influencing the positive and negative emotions of other members
- The members of the team are always ready to cooperate and help each other
- The members of the team stick together
- Relationships between members of the team are positive and rewarding

What might be said:

- "Oh sorry that's probably why"

"Oh alright."

Scale:

Complete Skill (5)

- While carrying out the mission objectives, team member effectively extinguished negative emotions and enhanced positive emotions.
- Member regulated and maintained a solid sense of emotional stability within the team.

Very Much Skill (4)

Adequate Skill (3)

- While carrying out the mission objectives, the team member extinguished their own negative emotions and retained some positive emotions.
- Regulated and maintained a moderate level of emotional stability within their team.

Some Skill (2)

Hardly Any Skill (1)

- While carrying out the mission objectives, the team member failed to extinguish negative emotions and failed to enhance positive emotions.
- Unable to regulate and maintain any sense of emotional stability within the team. If given the option, the member would walk away from the entire experience.

Appendix D: Team Satisfaction Measure

Wageman, R., Hackman, R.J., & Lehman, E. (2005). Team Diagnostic Survey: Development of an instrument. *Journal of Applied Behavioral Science, 41*, 373.

Team Satisfaction Items:

1) My relations with other team members are strained. (R)
2) I very much enjoy talking and working with my teammates.

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