The Impact of Member Personality on Group Performance

Kevin Ernst
Ohio Northern University

Kristie McHugh
Ohio Northern University

In an increasingly complex world, groups are often formed to solve complex problems on short timelines. This study examines the impact of the personality of the individual group members on the overall group's performance. Personality is assessed in terms of left vs. right brain dominance and personality type using the NERIS® model. Data is collected from 374 students participating in a Pitch Competition as part of a Principles of Entrepreneurship course. Analysis found that groups with at least one member who had moderate left-brain dominance were more likely to perform better than groups without these types of members. Groups with at least one member who was classified as a diplomat personality type were more likely to perform better than groups without these types of members.

Keywords: personality, group formation, performance

One of the challenges that managers and leaders alike face on a daily basis is determining how they can bring together groups of individuals to effectively solve complex problems. Organizations are required to complete many tasks that due to their complexity exceed the cognitive capabilities of a single individual and therefore must be completed by groups (Fischer, 1999). Organizations are composed of individuals who differ from each other in a myriad of ways and on the whole can be seen as diverse in nature. These individuals are often selected into smaller groupings to complete non-routine tasks that have short turnaround times and are critical for the organization. These ad hoc groups might be called project teams or be described as problem-solving groups. Due to the shortened timeline of these tasks and the fact that these groups are often only formed as the need arises, they are expected to produce results with limited time to form a cohesive group (getting to know each other, determining what each individual's role will be within the group, etc.). This study attempts to look at the impact of the composition of these groups on the group's performance of the task, when there are complex tasks and there is limited time to complete them.

Bowers, Pharmer, and Salas found that the advantage of heterogeneous groups was contingent on the type of task (2000). The types of tasks that were particularly suited to heterogeneous groups were complex tasks characterized by limited data which often required higher levels of creativity to perform (Bowers et al., 2000). To be successful in their endeavor, these heterogeneous groups need to be able to integrate their knowledge bases in a sensible manner by developing a shared understanding (Bittner & Leimeister, 2014), which aligns with Tuckman's third stage of group formation "norming" (Tuckman, 1965; Tuckman & Jensen, 1977). When diverse individuals come together and create a shared understanding it can lead to

new insights, ideas, and artifacts (Fischer, 1999). However, when working on projects with short timelines, groups are expected to produce results rapidly without having the time to develop shared understanding.

The question then becomes, "Are there particular facets of individual differences that we should consider when attempting to compose short-term groups?" Researchers have considered many individual differences in relation to group formation including knowledge, skills, learning styles, personality, age, gender, and IQ (Maqtary, Mohsen, & Bechkoum, 2019). One of the most commonly studied individual differences in regards to its impact on group performance is personality, with the predominant operationalization being the Big Five Framework (LePine, Buckman, Crawford, & Methot, 2011) although there has also been a fair amount of work examining student groups using the Myers-Briggs® Type Indicator (Wilde, 2009; Clinebell & Stecher, 2003). As personality is an inordinately complex construct, it can be operationalized using a variety of measures. Below we examine the impact of personality on group performance using personality measures that we believe were most salient for solving complex problems.

METHOD

Data for this study was collected from multiple sections of The Principles of Entrepreneurship: ABUS2221 course each Fall and Spring semester from 2016 to 2023, with the exception of Fall 2020 when the competition was canceled due to COVID-19 and Fall 2022 when data was lost during a conversion of learning management systems. Students who take ABUS2221 are typically first-year students enrolled in the Colleges of Pharmacy and Engineering, rather than in the College of Business in which the course is offered, completing the course as a requirement for their major rather than because they are particularly interested in the topics of entrepreneurship or business. This data was collected under the guidance of the University's Institutional Review Board (IRB) which granted the lead author's proposal, KE-BA-121119-1, exempt review status.

Two surveys were administered to students to measure different facets of their personality: (1) whether they were left or right brain dominant and (2) their personality type using the NERIS® model. The first question on each survey was regarding the student's age to ensure that no data was collected from minors. As the surveys were used as a self-learning tool and a graded assignment in the ABUS2221 course, students that were under the age of 18 were not excluded from taking the surveys for the class but are excluded from the data that this paper utilizes.

Left vs. right brain dominance was measured using the survey instrument developed by A Real Me (2016), which is based on the Nobel Prize winning work of Roger Sperry who first studied the mirroring structure of the brain and their specialized functions (1961; 1971). His research showed that the left hemisphere of the brain controls intellect that is "highly verbal and mathematical, performing with analytic, symbolic, computerlike, sequential logic" while the right controls intellect that is "spatial and mute, performing with a synthetic spatio-perceptual and mechanical kind of information processing that cannot be simulated by computers" (Sperry, 1971, p. 31). In each individual, one half of the brain is more dominant and that individual's thinking patterns make more use of the associated intellect. This instrument assigns students a percentage for which they use each half of their brains based on their answers. For analysis these results were grouped into five categories: high left included scores of 80% and greater for left-brain use, moderate left included scores 60 to 79% for left-brain use, balanced included scores below 60% for both left and right brain use, moderate right included scores 60 to 79% for right-brain use, and high right included scores of 80% and greater for right-brain use.

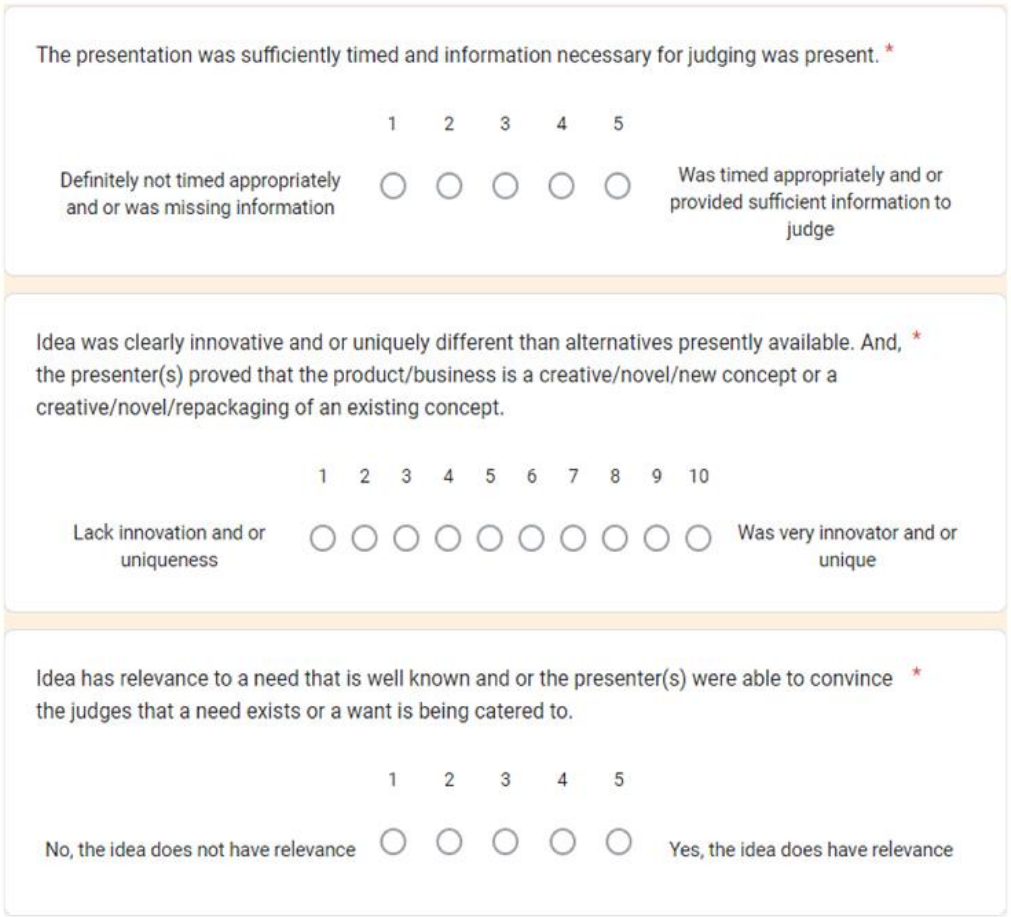
Personality type using the NERIS® model is measured using the survey instrument developed by 16 Personalities (2011), which is based on the Myers-Briggs personality typology developed by Isabel Briggs Myers and Katharine Briggs, which was itself based on the work of Carl Jung, in an attempt to identify different psychological preferences in how people perceive the world and make decisions (Murray, 1990). This instrument assigns students one of 16 types based on their scores for four traits (introversion/extroversion, observant/intuitive, thinking/feeling, and judging/prospecting) based on their answers. For analysis these sixteen personality types were grouped into four categories: analysts include intuitive and thinking personality types, diplomats include intuitive and feeling personality types, sentinels

include observant and judging personality types, and explorers include observant and prospecting personality types.

Based on student scores on the two surveys they were assigned to groups of 5-7 students with the goal of creating heterogeneous groups. This was done to the degree possible given the limiting factors posed by who had enrolled in the course sections. Student groups were required to participate in an idea pitch competition in which student groups were required to develop a new product or service idea. The competition would be the culmination of an entire semester's work and required students to solve a complex and ambiguous problem.

For the idea pitch competition, student groups presented to a panel of judges in an elevator pitch style with a maximum of two minutes to present. Due to the size of the competition each semester, students competed in multiple rooms in front of different groups of judges. Each room was assigned three judges, including a faculty member, a student, and a representative of a local business. Groups were encouraged to prepare props or other physical displays but were not permitted to use any digital media. After their presentation, judges spent two minutes asking the group questions. Judges then evaluated the groups on both their presentation and the question-and-answer session using a standardized rubric developed for the competition (see Figure 1), which judges were trained to use prior to the competition and scored student groups out of 50 points. Winners for each room were determined by the highest score in the room. Winning groups were awarded a cash prize of $50 and then advanced to the final round where the top three groups earned prizes of $1,000, $700, and $500.

FIGURE 1
IDEA PITCH COMPETITION JUDGES SCORING SHEET



The presenter(s) were able to clarify and or prove that the idea is superior to or direct substitute for what their competition is currently offering. *

	1	2	3	4	5	
No, the idea is not superior to alternatives currently available to the market	○	○	○	○	○	Yes, the idea is superior to alternatives currently available to the market

The presenter(s) demonstrated or alluded to the use of opportunity identification and or other forms of research that led to the development of their idea. *

	1	2	3	4	5	
Opportunity identification and or research were not discussed or alluded to	○	○	○	○	○	Opportunity identification and or research were discussed or alluded to in great detail

Presenter(s) demonstrated overall effective presentation skills using the available technology. The presenter(s) used appropriate technology that allowed them to present in a good tone, with expression, and were able to make eye contact with the judges. The presenter(s) did not go over allocated time. *

	1	2	3	4	5	6	7	8	9	10	
The presentation was poorly executed and or poorly developed	○	○	○	○	○	○	○	○	○	○	The presentation was very effective and made good use of available resources

Presenter(s) presentation was done in a professional manner without notes or other aids to remind them of what to say and how to present. *

	1	2	3	4	5	
The presenter(s) and or presentation was not profession in my opinion	○	○	○	○	○	The presenter(s) and or presentation was very professional in my opinion

Presenter(s) were clearly knowledgeable about the benefits the idea will provide to their intended market and were able to demonstrate that the benefit is a reasonable substitute to what is already available to the market or is such a new concept that the benefit has never been obtained via any other means. *

	1	2	3	4	5	
No, the presenter(s) were not knowledgeable about their market or the benefit their idea will have on the market	○	○	○	○	○	Yes, the presenter(s) were very knowledgeable about their market or the benefit their idea will have on the market

RESULTS

During the time period studied, an overall total of 3,456 students competed in the idea pitch competition. As the pitch competition was not limited to students enrolled in ABUS2221 who took the two surveys, the data was cleaned to only include the 204 groups who had one or more members who fit those criteria. This data included information from 374 students overall. To determine if having an individual within the group who possesses a particular personality type impacted that group's performance, we performed a series of t-tests comparing the results of groups with the personality type with those groups without the personality type. We found significant differences in these comparisons for groups with at least one moderate left member and with groups with at least one member who scores in a diplomat type: With Moderate Left (M = 0.1141, SD = .3190) and Without Moderate Left (M = 0.0364, SD = 0.1900); t(162) = 2.1299, p = 0.0347 and With Diplomat (M = 0.1529, SD = .3621) and Without Diplomat (M = 0.0504, SD = 0.2197); t(128) = 2.3228, p = 0.0218. Our analysis found that groups with at least one member who had moderate left-brain dominance were more likely to win their room than groups without these types of members (see Table 1). Groups with at least one member who was classified as a diplomat were more likely to win their room than groups without these types of members (see Table 2).

TABLE 1
COMPARISON OF GROUPS WITH AND WITHOUT MODERATE LEFT DOMINANCE

t-Test: Two-Sample Assuming Unequal Variances
Variable 1: Groups with Moderate Left Dominance
Variable 2: Groups without Moderate Left Dominance

	Variable 1	*Variable 2*
Mean	0.11409396	0.03636364
Variance	0.10175948	0.03569024
Observations	149	55
Hypothesized Mean Difference	0	
df	162	
t Stat	2.12990736	
P(T<=t) one-tail	0.01734476	
t Critical one-tail	1.65431396	
P(T<=t) two-tail	0.03468952	
t Critical two-tail	1.97471579	

TABLE 2
COMPARISON OF GROUPS WITH AND WITHOUT DIPLOMAT

t-Test: Two-Sample Assuming Unequal Variances
Variable 1: Groups with Diplomat
Variable 2: Groups without Diplomat

	Variable 1	*Variable 2*
Mean	0.15294118	0.05042017
Variance	0.13109244	0.04828372
Observations	85	119
Hypothesized Mean Difference	0	
df	128	
t Stat	2.3228295	
P(T<=t) one-tail	0.01088306	
t Critical one-tail	1.65684523	
P(T<=t) two-tail	0.02176612	
t Critical two-tail	1.97867085	

IMPLICATIONS AND CONCLUSION

The use of diverse groups has proven successful for complex tasks characterized by limited data which often required higher levels of creativity to perform, such as those in a problem-solving environment (Bowers et al., 2000). However, when groups have not had the time to form the relationship bonds necessary to work as a cohesive group, diverse membership can impede group work. As ad hoc groups are formed for short duration work, this scenario must be examined further. This study was conducted under those conditions in that the students had a short period of time to form the bonds necessary to work together and to come up with a solution that was innovative.

Given our results that groups with at least one member who had moderate left-brain dominance were more likely to win their room than groups without these types of members and that groups with at least one member who was classified as a diplomat were more likely to win their room than groups without these types of members, ad hoc groups can be formed or trained to mitigate the drawbacks of complex, time sensitive work. Both of these assessments could be used in the selection of individuals to work in short duration ad hoc groups to help managers and leaders responsible for bringing together groups of individuals to effectively solve complex problems by providing them with a simple method of group formation based on two short surveys in which their groups function more effectively than groups that are not created with such considerations. Alternatively, it may be possible to teach members of a group how to utilize their left-brain to a greater extent and how to think like an individual with diplomat attributes or perhaps to create group processes that mirror the typical thought patterns of these individuals.

Not documented in this paper were the conflicts that arose among students as they attempted to work together with others with whom their only connection was a class assignment. It is the authors' belief that this study reflects similar conditions that would exist in the workplace and society when dissimilar individuals are brought together for the purpose of forming a group that will perform at an optimal level without having the time to form strong bonds with one another. It is suggested that managers working with short-term ad hoc groups, be aware of this potential for conflict and plan accordingly for mediating these conflicts as necessary.

We hope that this study of group member diversity, focusing on left vs. right brain dominance and personality type using the NERIS® model, and its promising results, will be able to help those in managerial and leadership positions more confidently work with short-term ad hoc groups. This knowledge can be used

by managers and leaders in a variety of contexts including, but not limited to, project management, emergency response, and civic groups. Limitations of this study include the use of students as research subjects and the subsequent large volume of missing data for those that did not complete all of their assignments. Nevertheless, we believe that this research serves as a good start for future work on this topic and we look forward to future investigations that include broader samples, to replicate and extend our findings and further enhance our understanding of group member diversity and performance.

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