

Correlation of Prominent Intelligence Type & Coworker Relations

Ashley Moulton¹, Joseph Rasmus¹

¹ Williamston High School, MI, USA

SUMMARY

When most individuals think of learning types, they think of three categories: visual, auditory, and kinesthetic. However, in the mid-1980s, researchers expanded on the idea of how humans discover and process information with the Multiple Intelligence Theory. At first, the theory only contained six categories (Interpersonal, Intrapersonal, Visual-Spatial, Body-Kinesthetic, Linguistic, and Logical) but has now grown to nine categories with the addition of Existential, Naturalistic, and Musical. In practice, the Multiple Intelligence Theory has proven to be controversial in its acceptance, with many scholars citing its lack of empirical support while others note its efficacy for modern educational settings and the workplace. In this study, we focused on further discovering whether there is a correlation between the intelligence types most prominent in an individual and the intelligence types most prominent in the coworker they find they work with most efficiently. To do so, data was collected from a variety of businesses (restaurants, bookstores, etc.) in the cities of Okemos and Williamston, Michigan in two steps. First, we performed an assessment that determines which intelligence type is most prominent in the participant, and second, we used an anonymous survey for the individual to express the three people they feel they work with best. With fifty-six total participants, and using the chi-square goodness of fit test, we found that there may not actually be a correlation between these categorical types when it comes to workplace atmosphere and project efficiency.

INTRODUCTION

The Multiple Intelligence Theory (MIT) was first proposed by Howard Gardner to broaden our understanding of how people learn and process information. Its validity is contentious within the psychology community, but some believe the incorporation of MIT in education and workplace settings can improve the efficiency of learning new subjects and cooperation between peers. According to this theory, there are nine types of intelligence: linguistic, logical, musical, bodily-kinesthetic, visual-spatial, interpersonal, intrapersonal, naturalistic, and existential which are defined in **Table 1**.

Gardner established MIT with the purpose of improving the development of educational curriculums, instruction

planning, selecting course activities for specific individuals, as well as identifying their strengths and weaknesses when it comes to learning (1). In past studies, there has been a correlation between Multiple Intelligence (MI) (and similarly, Emotional Intelligence) and qualities such as organizational effectiveness in the workplace (2). Because of this, there may also be a correlation between prominent intelligence types and the effectiveness of coworker pairings since it is an adjacent concept. Not only could this be important in regard to the efficiency of an employee's work completion, but also lead to an overall improved workplace environment when these correlations are implemented into future work pairings. Since Multiple Intelligence categories relate to how an individual processes and expresses information that they have learned, the communication between certain types may conflict, slowing the completion and affecting the quality of work involving multiple employees, thus leading to possible tension between them. The purposeful groupings of compatible intelligence types could help avoid these issues and help maintain a positive and efficient work environment. This study examines the independence (or lack thereof) of an individual's prominent intelligence type and the prominent intelligence type of their most preferred coworkers.

Based on previous research on the MIT, we hypothesized that at least one categorical intelligence type would correlate with another, but there was not enough preceding evidence to try and anticipate which specific types could be dependent. For this study, we had participants take an assessment to determine their most prominent intelligences, then an anonymous survey to share the coworkers they feel like they work most efficiently with (since we also have the prominent intelligence types of those individuals). Considering MIT is an abstraction with not much previous research, this study could also set a precedent on how to go about further research in the future. Although we did not find a substantial correlation on the original topic, we did discover a potential relationship between gender and MIT that could eventually be expanded on.

RESULTS

In this study, we are searching for a correlation between the prominent intelligence types of an individual employee and the prominent intelligence types of the coworker they feel like they work most efficiently with. If a correlation is found, it could be implemented into a business' workplace pairings to

Table 1: The Nine Intelligence Types Defined by Gardner's MIT Theory (2)

Linguistic Intelligence	Sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. This intelligence includes the ability to effectively use language to express oneself rhetorically or poetically and language as a means to remember information. Writers, poets, lawyers and speakers are among those that Howard Gardner sees as having high linguistic intelligence.
Logical Intelligence	Consists of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. In Howard Gardner's words, it entails the ability to detect patterns, reason deductively and think logically. This intelligence is most often associated with scientific and mathematical thinking.
Musical Intelligence	Skill in the performance, composition, and appreciation of musical patterns. It encompasses the capacity to recognize and compose musical pitches, tones, and rhythms. According to Howard Gardner, musical intelligence runs in an almost structural parallel to linguistic intelligence.
Bodily-Kinesthetic Intelligence	The potential of using one's whole body or parts of the body to solve problems. It is the ability to use mental abilities to coordinate bodily movements. Howard Gardner sees mental and physical activity as related.
Visual-Spatial Intelligence	The potential to recognize and use the patterns of wide space and more confined areas.
Interpersonal Intelligence	Concerned with the capacity to understand the intentions, motivations and desires of other people. It allows people to work effectively with others. Educators, salespeople, religious and political leaders and counselors all need a well-developed interpersonal intelligence.
Intrapersonal Intelligence	The capacity to understand oneself, to appreciate one's feelings, fears and motivations. In Howard Gardner's view it involves having an effective working model of ourselves, and to be able to use such information to regulate our lives.
Naturalistic Intelligence	Designates the human ability to discriminate among living things (plants, animals) as well as sensitivity to other features of the natural world (clouds, rock configurations).
Existential Intelligence	Sensitivity and capacity to tackle deep questions about human existence, such as the meaning of life, why do we die, and how did we get here.

improve efficiency in production as well as the relationships within this environment. First, we assessed our participants on their most prominent intelligence types using a test mixed with agree/disagree and multiple-choice questions. Then, we surveyed those same participants on which of their coworkers

they feel like they work most efficiently with. Lastly, we used chi-square hypothesis testing on each intelligence type category to see if there was any correlation between each type. The independent variables of this study were the nine intelligence types (three which were invalid due to a lack of data) that could be prominent in an individual participant. The dependent p-values were all above 0.05 (the alpha level of significance), which signifies that none of these categorical variables strongly correlate to one another based on a 95% confidence interval. Based on our tallied data (Table 2), as well as both the calculated chi-square values and p-values (Table 3), we discovered that for the remaining six valid intelligence types, there was no correlation between them in the context of workplace relations and efficiency.

In terms of participant demographics, we had both a wide range of ages and levels of education in our data. There was also a good balance of participants who were married or single, as well as having children or not. However, there was no real diversity in terms of race or ethnicity, and there were almost four times as many women participants compared to men (Figure 1).

It is also interesting to note that out of the twelve men who

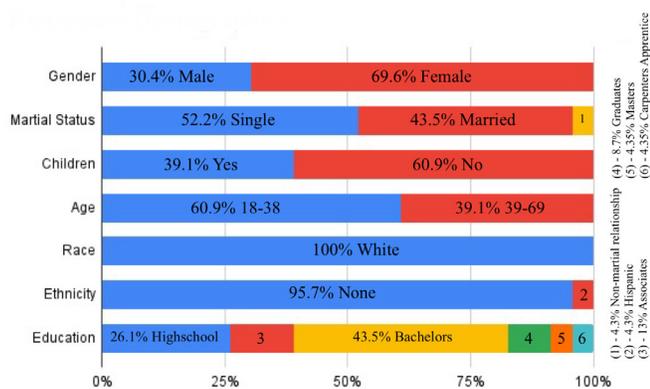


Figure 1: Participant Demographics. Graphical display of the breakdown of participant's gender, marital status, whether they had children, age, race, ethnicity, and education level.

Table 2: The Final Tallied Intelligence Categories (rows) and the Intelligence Categories of their preferred coworkers (columns).

	Logical	Linguistic	Visual-Spatial	Intrapersonal	Bodily-Kinesthetic
Logical	9	4	5	5	12
Linguistic	6	6	4	6	15
Visual-Spatial	5	1	1	0	6
Bodily-Kinesthetic	8	6	3	6	11
Naturalistic	8	2	4	4	10
Interpersonal	1	3	1	2	3
Intrapersonal	6	6	2	6	13
Existential	4	1	3	1	7
Musical	6	5	2	4	11
	Musical	Existential	Naturalistic	Interpersonal	Expected (Total/Types)
Logical	7	3	6	5	56/9 = 6.22
Linguistic	6	4	6	6	59/9 = 6.56
Visual-Spatial	3	3	3	2	24/9 = 2.67
Bodily-Kinesthetic	6	5	5	7	57/9 = 6.33
Naturalistic	4	5	5	4	46/9 = 5.11
Interpersonal	3	3	0	2	18/9 = 2
Intrapersonal	5	2	5	5	50/9 = 5.56
Existential	3	5	4	2	30/9 = 3.33
Musical	3	3	6	7	47/9 = 5.22

Invalid

Valid

took the assessment, ten had Bodily-Kinesthetic Intelligence in their top three prominent categories and seven of them had this intelligence type as their most prominent type. The female participants, in contrast, showed a much more equal variety of intelligence types in their prominent trio (**Figure 2**). This was not related to the topic of research, but it could be interesting to see if this reflects similarly in a larger, more

diverse population. This finding could also lead to more development in regard to the biological and psychological aspects of the MIT.

DISCUSSION

In this study, we investigated the possible correlation between the prominent intelligence types in an employee and

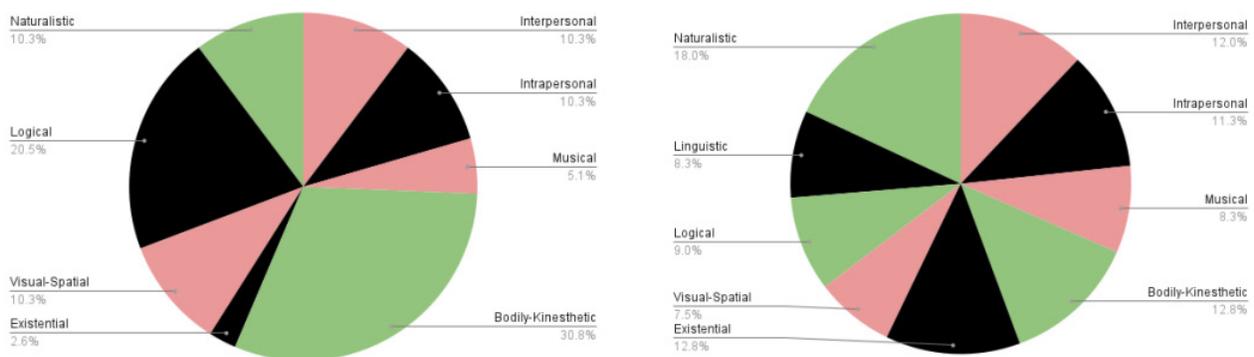


Figure 2: The Intelligence Demographics between Male and Female Participants. Participants reported intelligence types separated by participants gender with male on left and female on right.

Table 3. Final Calculated Chi-Square values and p-values based on the Chi-Square Goodness of Fit Hypothesis Test

a= p < 0.05	p-value	
Logical	9.9	0.27
Linguistic	13.14	0.11
Visual-Spatial	-	-
Bodily-Kines- thetic	6.32	0.61
Naturalistic	9.18	0.33
Interpersonal	-	-
Intrapersonal	14.79	0.06
Existential	-	0
Musical	11.41	0.18

the prominent intelligence types in their preferred coworker. In order to do so, we tested individuals who work at businesses in the Williamston-Okemos area to discover their prominent intelligence types, as well as survey them about the coworkers they feel like they work most efficiently with. Based on the chi-square goodness of fit hypothesis testing on the population that participated, we found no clear significant correlation. Thus, we were unable to reject the null hypothesis.

Since this topic is largely under-researched, it is possible that the lack of correlation was due to an insufficient knowledge on the acceptable amount of data, or the accessibility of that data considering the recent events of the pandemic. Another obstacle we experienced was the unwillingness of individuals to participate (likely because of the pandemic, but also because it was optional), especially in the anonymous survey compared to the intelligence type assessment (twenty-two vs. fifty-six) since they were given in separate parts. This left a lot of data unusable since our analysis required paired data. If this study were to be conducted a second time, over a longer period and with more participants, the results may differ and would likely be able to include all intelligence types (in regard to the Visual, Existential, and Interpersonal intelligence type data, which were excluded from this research since the data did not meet the restriction set with the chi-goodness of fit test).

Another limitation of our study was the lack of racial diversity in the demographic of the participants. Everyone who participated in this study was white, the only disparity being a single person of Hispanic heritage. It is possible that with more diversity in certain aspects of participant demographics, there would be a clearer correlation between intelligence types.

Overall, it will be intriguing to see how this theory develops in the future, in terms of reliability and topic discussion. While we recognize that MI may have no correlation in the workplace, there may be significant correlations in other settings such as classrooms or neighborhoods, or nowhere at

all. This research, as well as its general ideas, can hopefully contribute to the discourse regarding this theory and its authenticity.

MATERIALS AND METHODS

To determine the intelligence types most prominent in the participants of this study, an assessment and survey was developed to form a two-step process for individual employees to complete. Both were created in google forms. The assessment consisted of forty-five agree/disagree questions (five corresponding to a specific intelligence type) and three multiple-choice questions at the end (each with nine answers, also correlated with a specific intelligence type). Based on the responses to each question, a participant was given several points for each type of intelligence: two for strongly agree, one for agree, zero for neutral, negative one for disagree, and negative two for strongly disagree. A singular point was given for each of the three multiple choice questions to the intelligence type corresponding to the answer they chose. After completion, the points were tallied, and the three intelligence types with the most points were determined to be "most prominent." Next, each employee was sent an anonymous survey, where they were asked their most prominent intelligence types (which they received in an email along with the survey), the three co-workers they feel like they work most efficiently with, and other demographic information.

This data was collected for four months from all businesses in the Okemos and Williamston area of Michigan who were willing to participate. Data was then tallied at the end. Prior to using the chi-square goodness of fit test, the expected value was calculated for each category of prominent employee intelligence types. This was found by dividing the total number of employees tallied for a single type by the number of categorical types found in their preferred co-worker (nine). This number of expected individuals must be greater than five, otherwise the data is no longer valid for interpretation through the chi-square goodness of fit test. Based on this restriction, only six out of the nine types of intelligence were valid to use for the rest of this research.

Next, each observed and expected value were applied to the chi-square goodness of fit calculator, along with the degrees of freedom. Using this calculator, the χ^2 , p-value, and significant contributors were identified. If the p-value was less than 0.05, then there was a statistically significant impact on that specific category from the nine other intelligence types. The significant contributors that were larger than the expected values were then concluded to correlate with that intelligence type.

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