Personality as a factor for knowledge sharing behaviour in novices.

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ABSTRACT

Knowledge sharing is at the core of any good organisation or team, and has become an elaborate field of study (Alavi & Leidner, 2001). Moser & Wodzicki (2017) studied under what condition experts shared their knowledge in groups. In this study we turn it around and investigate if novices dare to share a different opinion than an expert in a student environment, and if their knowledge sharing behaviour can be predicted by personality traits. The study is conducted through a survey, containing a personality questionnaire and a thought experiment. Participants were split up in two groups (1) an experimental condition that placed participants with an expert and (2) a control condition that placed participants with peers. Chi-square test was used to check for significant differences but none were found $p = .08$. Distribution was heavily in favour of sharing critical knowledge that contradicted the experts opinion. The only significant predictor found for not going against the expert was the personality trait Agreeableness $p = .045$.

INTRODUCTION

Almost everyone has done at least a few group projects during their school career. If you were lucky, you could find a partner yourself and team up with someone you liked. If you were not lucky, the teams for the group projects were already made. You had to pray to god that you got teamed up with people that cared enough to put in some effort. If you had bad luck, you were teamed up with a free-rider. A free-rider, in economic terms, is an individual that is striving to obtain the benefits of a good without contributing to the cost (Passour 1981). Or put simply, a team member that doesn't do anything, but still gets the grade. I found these people the most frustrating to work with if there was a lot at stake. Occasionaly though, I caught myself free-riding on other people's ideas. In highschool I had a bad grade at management and organisation. We had to do a group project and I got teamed up with someone that I knew got straight A's for this course. He pitched his idea and I just went along with it. I had my doubts and sometimes disagreed with him, but in my eyes he was the expert and so I trusted his judgement. Luckily for me, my partner did know what he was doing and we got a good grade. But in the feedback I found that some of my own ideas that I doubted, turned out to be correct after all. If only I told him about my doubts. We could have adjusted the plan a little and have gotten an higher grade. If I didn't free-ride, the result would have probably been better. This isn't just true for me

in highschool, this is true for many teams today (Davenport & Prusak, 1998). Several studies have shown that criticality and recognition of the contribution and responsibility for the group are important factors for knowledge sharing (De Cremer & Van Dijk, 2002. Bunderson, 2003). Moser (2017) did research on how these factors influence the knowledge sharing of experts. In this paper, we are interested in the knowledge sharing behaviour of the novice. This paper investigates if novices dare to share a different opinion than an expert in a student environment, and if their knowledge sharing behaviour can be predicted by personality traits.

First, some background information will be given about knowledge sharing and the development of human society as a knowledge sharing society. Next, personality traits will be discussed to analyze and hypothesize which personality traits could potentially predict certain types of knowledge sharing behaviour. Finally, the hypotheses will be given and the conducted research analyzed and discussed.

BACKGROUND

Development of sharing behaviour

When people share there are different motivations for them to do so. A populair way of explaining people's motivation is self-interest (Miller & Ratner, 1996). Self-interested people tend to go for the options in life that benefit them most. This self-interest motive is one of the most influential theories of human behavior (Miller, 1999). Mesoudi (2011) challenges this self-interest theory, stating that human behaviour is not solely guided by ones own economic payoff. His main argument comes from the theory of cultural group selection (Boyd & Richerson, 1985). This theory states that the tendencies to cooperate with each other and to punish free riders arose in our evolutionary past. Cultural groups in which people cooperate with one another, and where free-riders get punished, often outcompeted cultural groups where this was not the case. And so, groups where sharing and cooperation were abundand kept growing and this became a norm in society as we know it today. At the same time, this is an argument for how altruism came to be. Free-riders got punished and shunned, but by sharing and cooperating people got included in groups. This behaviour got learned and passed on to the next generations.

Knowledge sharing

Knowledge sharing is at the core of any good organisation or team, and has become an elaborate field of study (Alavi & Leidner, 2001). In a recent article, Moser (2017) used the framework of a classic public goods dilemma to understand the motivation to share or withhold expertise. A public goods game is an economic game where participants get a certain amount of goods. They are then asked to put goods into the public pot. The goods in the pot are then multiplied by a factor between 1 and the amount of players. The payoff of the goods is then redistributed evenly among the players (Gunnthorsdottir, Houser & McCabe, 2007). The decision to contribute to the common good is purely economical in a public goods game. When we transform the public goods game into a knowledge sharing game, motivations to cooperate or compete shift. There is no longer just an economical motivation. In knowledge sharing games, the decision to share knowledge depends on perceived costs and benefits of knowledge sharing for the group member. There can be a difference of what the individual team member wants to achieve and what the team as a whole wants to achieve (Balliet, Parks, & Joireman, 2009). For example; the

member that wants to share knowledge finds out that he will get little credit for his contribution when he shares the idea. He may then decide not to share his idea, so he can use it later on his own and get full credit.

Moser (2017) found experts to be *"an especially challenging and interesting case in knowledge management because for them, the conflict between collective and individual interests is particularly pronounced as their expertise already gives them a clear competitive advantage over others and also a certain power within an organisation.".* Several studies have shown that a group member is more likely to contribute their knowledge if their contribution is of importance to the groups success (De Cremer & van Dijk, 2002). Not only does perceived criticallity produce higher public goods contributions, it also increases the sense of responsibility for the group. This is why experts should contribute more if they are aware that they are the only expert in the group (De Cremer & van Dijk 2002). Another factor for knowledge sharing is the recognition a person gets when they contribute their knowledge to the group (Bunderson, 2003). Moser (2017) proposed that experts would be more likely to cooperate if they received "*status benefits and reputational gains for their contributions to the collective good"* and conducted two studies to test this. In her first study she used a scenario design for student group work as used by Moser & Wodzicki (2007). In the second study they simulated a virtual team that shared knowledge via a database system. Both studies found that experts contributed more than novices if they knew that they were the only expert. In the same study, novices showed a different pattern. Novices were reluctant to share knowledge if others in the group had more expertise and decreased their contributions if performance feedback was individual instead of on group level (Moser, 2017). This implies that novices didn't want their ideas to be exposed as bad ideas when being compared to the expert.

Both studies conducted by Moser (2017) were aimed at trying to identify the factors that make experts share more knowledge. It is important for experts to share their knowledge, because it is often the experts that do vital contributions to the team. However, situations may occur in which a novice has an important contribution to make. But what happens if the contribution of the novice is contradictory to the contribution the expert made. Is the novice still willing to voice his opinion, or are there factors preventing him from daring to do so?

Moser's research doesn't answer this question, but gives a good starting point. The research shows that when novices and experts are asked to cooperate in an anonymous work group, and do not get feedback on their contribution, novices and experts share almost the same amount of knowledge. But this study was done in an anonymous setting, without regard for personality traits. In real life situations, different people with different personalities have different priorities. Some prioritize a friendly relationship with people, and do not want to cause friction within groups. Others strive for achievement no matter what. This research intends to explore if the presence of an expert influences the sharing behaviour of a novice, and how this is related to personality.

Personality

The first version of the personality dimensions was coined by Tupes & Christal (1961). This model was later taken by Digman (1990) and Goldberg (1993) to be refined as we know the Big Five model today. The big five personality traits are: Neuroticism, Openness to Experience, Extraversion, Agreeableness and

Conscientiousness. These traits have been used to predict individual differences in many settings (Costa, 1991; Barry & Stewart, 1997; Mount & Barrick, 1995).

Extraversion and introversion were terms coined by Carl Jung (1921). People who score high on this spectrum tend to be very energetic, talkative and confident in social situations. These aspects of the spectrum tend to facilitate succes and achievement through demonstrating competence according to social values. People who score low on this spectrum tend to be more oriented inwards, and show more solitary behaviour (Roccas, Sagiv, Schwarts & Knafo, 2002). Overall, people who score high on Extraversion are expected to share more according to psychological models (Roccas, 2002).

The spectrum of Agreeableness concerns itself with how well people get along with others. While Extraversion is more about energy and pursuit of interaction, Agreeableness is more about how likable you are. People who score high on Agreeableness tend to be good-natured, compliant, modest , gentle and cooperative (Roccas, 2002). Low scorers tend to be irritable, ruthless, suspicious and inflexible (Roccas, 2002). High scorers are benevolent people, very concerned for the welfare of people with whom they interact. Agreeableness is also compatible with acting according to norms, refraining from upsetting others and following traditional values. The word agreeableness implies the tendency to agree with others, which incorrectly seems to imply submissiveness. Submissiveness is more closely related to the spectrum of Extraversion (John & Srivastava, 1999). So it could be expected that someone who scores high on the spectrum of Agreeableness keeps their opinion to themselves when someone voices a conflicting opinion. This is not due to being submissive, but because he or she doesn't want to create conflict.

Openness to Experience describes the breadth, depth, originality, and complexity of an individual's mental and experiential life (John & Srivastava, 1999). People who score high on this dimension have a tendency to be intellectual, imaginative, sensitive and open-minded. Those who score low tend to be down-to-earth, insensitive and conventional (Roccas, 2002). Openness to Experience is in conflict with conformity, tradition and security. These are traits which are aimed at perserving balance and avoiding new things (Roccas, 2002). Scoring high on Openness to Experience has been linked to finding leadership positions, which is likely because of the ability to come up with new ideas and think outside of the box (Judge, Bono, Ilies & Gerhardt, 2002). It seems to be likely that someone who scores high on Openness to Experience would be willing to voice his or her opinion even if they are not sure whether their opinion is correct or not.

Conscientiousness implies that someone is conscious of his or her acts. McCrae and John (1992) found that Conscientiousness consists of two aspects, a proactive and an inhibitive aspect. The inhibitive aspect of Conscientiousness is one that holds impulsive behaviour in check. The proactive aspect concerns the will to achieve. This is the aspect that organizes and directs behaviour. People who score high on Conscientiousness tend to be careful, thorough, responsible and organized (Roccas, 2002). Conscientious people tend to not focus on stimulation or excitement, instead they value order, achievement and self-discipline (Roccas, 2002). Roccas (2002) found in their study that Conscientiousness correlated positively with achievement (.22) and conformity values (.16). At the same time Conscientiousness correlated significantly with security (.22) and stimulation (-.24) values. Security value means that someone values the maintainance of good relationships with other people. The negative correlation with stimulation means that people with high Conscientiousness tend to avoid risks. It is therefore not so clear what someone with

a high Conscientiousness would do when confronted with the option to go against an expert. On the one hand he or she would try to maintain good interpersonal relationships, and disrupt the order. On the other hand he or she values achievement, and would thus want to discuss all available options. I hypothesize that someone with high Conscientiousness would voice his or her opinion, but would do so with care. This to maintain order, but also to be able to achieve the best result.

Neuroticism is the personality trait with the least debate around it. Neuroticism is about how people experience stress, and how they cope with it (McCrae & John, 1992). Traits that are most often associated with Neuroticism are being pessimistic, awkward, unconfident and self-critical (McCrae & Costa, 1987). These traits have chronic negative affects on the person (Watson & Clark, 1984) which in turn tend to result in a various psychiatric disorders (Whittington & Huppert, 1998). It would be a safe assumption that someone who scores high on the trait Neuroticism wouldn't share a conflicting opinion as fast as someone who scores low on Neuroticism. Being pessimistic, unconfident and self-critical would most likely lead to dismissing their idea as true.

Following these definitons of the big five personality traits, we could conclude that people who score high on Openness to Experience and Extraversion would have a higher tendency to share knowledge. People who score high on Neuroticism and Agreeableness would generally be less likely to share knowledge. People who score high on Conscientiousness could be on either side of the spectrum, but the research by Roccas (2002) suggest high Conscientious people would be more inclined to share knowledge than not.

Hypotheses

My first hypothesis is that the novice will share his critical information, since this is in line with the experimental findings of the research done by Moser (2017), and de Cremer en van Dijk (2002).

I also suspect that for each answer possibility different personality traits will be predictors.

My second hypothesis is that for answer possibility 1 *"You think this is a important addition, but it conflicts with the contribution of the (expert/fellow) student"* high Openness to Experience, Conscientiousness and Extraversion combined with low Neuroticism and Agreeableness to be significant predictors.

My third hypothesis is that for both answer possibility 2 *"You think this would be a minor addition to the project, it does not conflict with any of the others' ideas."* and 3 *"You think this would be a minor addition to the project, but it coincides with the idea of one of your team members."* high Agreeabless and Neuroticism combined with low Openness to Experience, Conscientiousness and Extraversion.

METHOD AND DESIGN

There were two versions of the questionnaire; a Dutch and an English one. Participants were asked to choose in which language they wanted to complete the survey and if they completed an education. When these question were positively answered participants were asked to fill out the informed consent. Before the thought experiment conducted, a personality questionnaire had to be filled. This was the 44 item Big Five Inventory (BFI) as described by John and Srivastava (1999).

After the BFI was conducted, participants had to read and respond to a scenario that put them in the shoes of a student as inspired by Moser (2017) has

done. This is so the participants can relate, as all participants have been students at some point in their life. Combined with the experiment of Steinel, Utz and Koning (2010) the ideas presented in the experiment are made abstract, so that it's not so much about the content of the idea, but more about the implications of the idea.

For the experiment I divided participants into two groups: a control and experimental group. The control group was grouped up with only students of equal knowledge, and the experimental group was grouped up with people from different study directions. For example: one of the experimental scenario's described that the participant had to write an interdisciplinary paper. He or she had to partner up with a Medicine student and a Artificial Intelligence student to write a paper about artificial intelligence in hospitals. The group of students had agreed to all contribute one idea to the paper. The fellow students of the participants had already sent their ideas to the participant, and he only needed to add his. It was specifically mentioned that it is not too late to make alterations to the paper. So that when the student submits a conflicting idea, a discussion could be had.

After doing some research the student had come up with three ideas: One idea that he thought was important, two ideas that he thought were of minor importance. After comparing his ideas with the ideas of his fellow students he came to the following conclusions: (1) "*The important idea conflicts with the one the Artificial Intelligence student has submitted."* (2) "*One minor idea that doesn't conflict with any of the contributions*", and (3) "*minor idea coincides with the idea of one of your team members."*. The participant then had to choose which idea he would send in. If the participant was intimidated by the expert status, he would be expected to choose either answer 2 or 3. If the participant was not he or she would choose answer 1. The hypothesised difference between answer 2 and 3 is the Agreeableness trait. A participant choosing answer 2 would still submit an idea that does not go along with one of the students, while answer possibility 3 simply goes along with another student.

The control group gets to answer nearly the same scenario, the difference is that the participant is grouped up with fellow students from the same study, and they simply have to write "a paper". No expert is thus involved. In this scenario the answer options are the same except for answer possibility 1, which is changed to: (1) *"The important idea conflicts with one of your team members".*

RESULTS AND ANALYSIS

Quantitative results

In total, 124 participants responded to the survey. Out of these 124 participants 92 remained after correcting the database for incomplete responses. Out of these 92 responses, 43 respondents completed the survey in Dutch and the other 49 completed the survey in English. Distribution of groups and answers chosen is shown below in Table 1.

The experimental group consisted out of 38 participants and the control group consisted out of 54 participants. In the experimental group 31 participants chose the answer that goes against the expert, 7 that doesn't go against the expert and 0 the answer that goes along with a team member. In the control group 36 participants chose the answer that goes against the expert, 12 that doesn't go against the expert and 6 the answer that goes along with a team member (Table 2)

		N	Percentage
Answer	Against	67	72.8%
	Not Against	19	20.7%
	Go Along	6	6.5%
Group	Experiment	38	41.3%
	Control	54	58.7%
Total		92	

Table 1: Distribution of groups and answers chosen.

Group				
		Experiment	Control	Total
Answer	Against	31 (81%)	36 (66.6%)	67
	Not Against	7 (19%)	12 (22.2%)	19
	Go Along	0	6 (11.1%)	6
Total		38	54	92

Table 2: Distribution of answer choices in the experimental and control condition.

A chi-square test could not be performed because the assumption that cells need an expected count of 5 or more had been violated. Instead Freeman and Halton's (1951) application of the Fisher's Exact test has been performed to check for a difference between groups. Results showed no statistical significant difference $\chi^2(N = 92) = 5.028$, $p = .078$.

To check for multicolinearity Pearson's Correlation was calculated to check for significant correlations between the Big 5 personality traits. Significant correlations at the 0.01 and the 0.05 level were found between Extraversion and Agreeableness (r = .297, n = 92, p = 0.004), Extraversion and Neuroticism (r = -.422, n = 92, p = 0.000), Extraversion and Openness (r = .207, n = 92, p = 0.048), Agreeableness and Conscientiousness (r = .238, n = 92, p = 0.022) and Agreeableness and Neuroticism (r = -.308, n = 92, p = 0.003). For a quick overview of all the correlations see Table 3.

The results in table 3 suggest there may be multicollinearity. To identify if this was the case Variance Inflation Factors were calculated. These are reported in Table 4. As seen in the table below, all VIF measurements are a little above 1, and thus multicollinearity should not be a problem.

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Extraversion	x	.279**	.152	-.422**	.207*
Agreeableness		x	.238*	-.308*	.101
Conscientiousness			x	-.075	-.051
Neuroticism				x	-.155
Openness					x

Table 3: Pearson Correlations between Big 5 personality traits

**. Correlation is significant at the 0.01 level.

*. Correlation is significant at the 0.05 level.

	Tolerance	VIF
Extraversion	.764	1.309
Agreeableness	.832	1.202
Conscientiousness	.927	1.079
Neuroticism	.751	1.281
Openness	.943	1.061

Table 3: Collinearity Statistics

After checking for multicollinearity, a check was done for internal consistency. Cronbach's alpha was calculated for each scale of the big 5 and for each language seperately. Measurements for Cronbach's α can be found in table 4. Agreeableness scored below the 0.7 treshold that is commonly acceptable for Cronbachs α (Santos, 1999) on both the Dutch and the English version. Cronbach's α did not rise above 0.7 after items were deleted, so no items were deleted to increase the α level.

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
English	.892	.618	.742	.860	.777
Dutch	.778	.674	.738	.831	.788

Table 4: Cronbachs α for each of the Big 5 personality traits per language.

After checking if all assumptions held, a multinomial logistic regression was performed to model the relationship between the chosen answer, the five personality traits and the control and experiment group. The three answer options were (1) to against (2) not to go against (3) to go along, these were set as de dependent variable. The reference category was set as (1) to go against. The (1) experiment and (2) control group were set as the factors. Finally, the big five dimenions (1) Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness were set as Covariates. Results can be seen in table 4.

The traditional .05 level of statisitical significance was used for all tests. $\chi^2(12, N = 92) = 17.990$, Nagelkerke $R^2 = .231$, $p = .116$. The only significant predictor found was Agreeableness with $p = .045$, B = 1.952 and Exp(B) = 7.041.

		B	Std. Error	Df	Sig.	Exp(B)
(2) To go against	Extraversion	.110	.377	1	.771	1.116
	Agreeableness	.798	.537	1	.137	2.222
	Conscientiousness	-.576	.485	1	.235	.562
	Neuroticism	.397	.361	1	.272	1.487
	Openness	-.434	.441	1	.325	.648
	Group = 1	-.537	.583	1	.357	.584
(3) To go along	Extraversion	-.279	.707	1	.693	.757
	Agreeableness	1.952	.976	1	**.045**	7.041
	Conscientiousness	-.619	.880	1	.482	.539
	Neuroticism	-.276	.635	1	.663	.759
	Openness	-1.151	.948	1	.225	.316
	Group = 2	-20.728	.000	1	.	9.952E-10

Table 5: Results of multiple regression analysis. Reference category is (1) to go against.

Qualitative results and discussion

All motivations as given by participants are listed in the Appendix. In this section, the most iconic motivations for each answer possibility will be discussed, followed by the abnormal motivations. Abnormal motivations are motivations that do not motivate the given answer choice in a way that was expected, but instead show that the participant misinterpreted the question. Some answers were given in Dutch, and will be translated as closely as possible. All motivations are discussed per answer possiblity.

Answer possibility 1

Numbered by condition, where 1 is the experimental and 2 is the control condition, the following motivations were given for answer possibilty 1:

- 1. *"Conflict sparks discussion, discussion leads to understanding and thought, and those are prequisites for innovation, productivity and growth."*

- 1. *"I won't let a potential conflict hold me back if I think I have an important idea that could add to a project."*

- 2. *"You can discuss this idea with the other students. It is possible that this would result in a better subject and better paper."*

- 2. *"It feels right. To write a paper isn't about making friends or to fit in the group, but about making the best of it. Besides, it could be that my "co-writer" is right. Either way, I'm expanding my knowledge"*

Motivations show that people who chose answer possibility 1 are generally people who want to achieve the best result possible. They motivate this by arguing that discussion is a vital part of any group project and leads to a much better result. People who choose this answer tend not to be afraid to confront others and to face a potential conflict. The motivations did not show any big differences between the control and experimental group.

Answer possibility 2

There were only two people who chose answer possibility 2 in the experimental condition, of which one will be listed as an abnormality. Numbered by condition, where 1 is the experimental and 2 is the control condition, the following motivations were given for answer possibilty 2:

- 1. "*The chosen answer does not cause a conflict*."

- 2. "*While not being an inconvience to my group, I still bring something new to the table*."

- 2. "*Because this is a group project, I feel it is important to have an idea that coordinates with everyone else's*."

- 2. "*Compromise, to be as efficient as possible with the least effort.* "

The similarities between the two conditions is that people who chose answer 2 report that they do not want to cause conflict. In the control condition a red line in the motivations is that they do not want to deviate from the norm set by the other two team members. Motivations state that they do not want to be an inconvenience and that they want to coordinate with others.

Answer possibility 3
Only people in the control condition chose answer possibility 3.

- 2. "*I adapt easily"*

- 2. "*To have more ideas of differend ppl is beter."*

There were little motivations to analyse for option 3. But the red line in the motivations is that the people who chose this answer adapt to what others want and avoid conflict. The second motivation listed above argued that he or she opted for possibility three for diversity in ideas. However, answer possibility one was also a different idea from the others. This participant scored 4 out of 5 on Agreeableness. The results showed that Agreeableness is a significant predictor for choosing answer possibility 3. This participant is a good example of this, because instead of choosing the answer that might cause an inter-personal problem, the participant chose to avoid this.

Abnormalities
Abnormalities are not listed in any specific order.

- 1. *"I don't like to have conflict with a group I have to write papers with. I think I would first go for option 1 and first discuss this with the psych. student. But If it's going to be a conflict, I will avoid it."*

- 2. *"If you would have wanted to add something that conflicts with the contribution of your team member, you should have come up with it earlier to be able to engage in discussion / peer review"*

- 3. *"I want one that works with the other topics so it seems like we collaborated more than we did."*

- 4. *"Three is right out because it might seem unoriginal. One would be preferred, but the phrasing didn't leave me a non-confrontational way to do it."*

The first abnormality shows a misinterpretation of the question. This motivation clearly shows that the participant would first discuss his or her conflicting idea with the other team member. Even if it does not cause a conflict, it still implies that he or she would perform the action described in answer possibility 1, but she chose answer possibility 2. As argued in the previous paragraph, this might also be an interpretation of the participant, where the mind adapts the thought experiment to his or her personality. Nevertheless, it is good to take this into account.

The second abnormality shows a misinterpretation of the thought experiment. Despite the best efforts to avoid having people think that discussion was not option, one of the participants clearly reported thinking it was. On the last line of the thought experiment it was added that *“It is not too late for your group to make changes to the paper after you submit your idea.”* . In and iteration of this experiment it should be made more clear that discussion is an option.

The third abnormality shows that the thought experiment should be formulated differently. The participant implies that he or she thinks that there was little collaboration between group members. This was not the intention of the thought experiment. A reformulation of the though experiment is necessary in following experiments, where the idea of collaboration and discussion is encouraged.

The fourth motivation shows that a thought experiment is very sensitive to interpretation and formulation. The participant had the feeling that when choosing option 1, a confrontation was inevitable. However, with the right interpersonal skills someone could voice a different opinion than an expert in a non-confrontational manner. This participant thought that when voicing an idea that conflicts with another idea it would lead to a confrontation. However, having conflicting opinions does not always have to lead to inter-personal conflict. The thought process of this particular participant is a good example of how personal experiences and personality lead to a certain interpretation. From this, we can also deduce that thought experiments can provide valueable insights in how personality traits relate to certain choices. But it is still important to keep formulations of answers as neutral as possible. With neutral phrasings, people have the oppurtunity to fill in the nuances according to their thoughts and beliefs, and thus show their personality.

GENERAL DISCUSSION

Experimental versus control group

One of the most surprising results is that no one in the experimental condition chose answer 3, while 11% of participants in the control condition did choose option 3. The big difference in choices is surprising because it was expected that the distribution of answers would be the same in both conditions. Instead, more people went against the idea of their group member when the group member was an expert. Since data did not yield a significant result, the first hypothesis has to be accepted. However, the p value was very low, and near the significance treshold. Combining this with the low amount of participants in the experiomental group compared to the amount of participants in the control group, I strongly believe that if the experimental group had the same amount of participants as the control group, the result would be signficant.

This effect is strange, because the data suggests that people are more inclined to go against the expert, instead of holding back when being confronted with an expert. The qualitative results give no clear explanation for this effect. It could be that some participants gained a “nothing to lose” attitude when grouped with an expert. The participant can rely on the expertise of the expert to either confirm or deny their idea. If we combine this possible effect with the will to achieve, it could be an explanation for participants choosing option 1 more in the experimental condition than in the control condition. When grouped with peers this is most likely not the case, since it is suggested the participant has nearly the same knowledge as his or her group members.

Personality as predictors

Of all personality traits only Agreeableness showed a significant result when comparing answer choice 3 to 2. When comparing answer choice 1 to 2, the p value for Agreeableness is .137. This value could be considered low, and might be even lower when increasing the amount of participants in the experimental condition. Because there are no significant results, the second hypothesis has to be rejected. The third hypothesis has to be partially rejected as only Agreeableness is a significant predictor. People who score high on Agreeableness tend to go along with the group and choose the third answer. An interesting find is that the descriptions given by participants are in line with the findings of Roccas et al. (2002). Roccas et al. found that Agreeableness correlated negatively with achievement. Most people that chose answer 1 described that they chose this answer for a better quality paper, for the best achievement. So it makes sense that scoring high on agreeableness, makes you less likely to choose answer 1, and more likely to choose answer 3 or 2.

Thought experiment

From the qualitative analysis we can conclude that not everyone fully understood the thought experiment. For future testing it would be best to emphasize even more that it is possible to discuss the ideas given, and that they are not final. I believe that more people would then choose answer possibility 1. It is also likely that with a less skewed distribution of participants between groups, there would be more variance in the experimental condition. The experiment itself was a thought experiment, so it is hard to check what kind of situation people imagined and how they imagined their relationship with the group members. It could be a mediating factor that some participants have bad experiences with group projects, but the comments do not show this.

The formulation of the thought experiment is another important aspect of this research. Subtle differences in formulation could make people choose a different answer. The first line in the experimental condition read the following:

- "*You are told the university is experimenting with interdisciplinary assignments. The reason is to see how students fare when they have to cooperate on subjects they do not know a lot about. You are the first group they are trialing this on."*
-

When we compare this to the control condition:

- "*It is your first year in university and the professor hands out a new assignment. You are told that you have to write a paper and give a presentation with two other students from your education. You agreed with your fellow students that each team member would contribute one idea to the paper."*

There is a clear difference in tone. When reading the introduction to the experimental condition, phrases like *"the University is experimenting"* and *"You are the first group they are trialing this on"* could put the participant in a more achieving mindset than the more neutral phrasing of the control experiment. This is a possible explanation for the difference in answer choice between the experimental and control condition. When iterating this experiment, the introduction should be homogeneous in the way of giving people incentive to achieve.

Conclusion

This research shows that there seems to be a difference in how novices respond to the presence of an expert when sharing critical knowledge, but not in the way that we expected. It is surprising that people are more open to sharing conflicting ideas with an expert, it seems that intimidation is not a factor. The relationship is quite the opposite. Why people go against the expert more than against peers is unclear. It might be that they feel safer when teamed up with an expert, because the expert can either reject or accept their idea. It may also be that when people are teamed up with peers, the will to achieve is less than when they are teamed up with an expert. The expert could also be a catalyst for success, inspiring people to achieve the best. For a definitive answer to this, more research is needed.

This research has found some positive results for interdisciplinary teams. It seems that the novices are more inclined to share their ideas on fields they know little about as opposed to when they are teamed up with peers. The research also shows that when working in teams with people that have different personalities, it is good to be aware of people who show the traits of agreeableness. Asking these people for their opinion might sometimes give valueable insights, that may have otherwise kept to themselves, afraid to spark conflict.

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APPENDIX

Comments of people sorted by answer choice and condition.
Not all answers are included here, either because participants did not fill in the field or the answer didn’t make sense.
Not all answers are direct quotes, some have been edited because of incorrect English.

English Comments

Experimental Condition	
1	To invite discussion in our group and learn from eachother
	A research paper is meant to view some different aspects of the subject, so it gives an opportunity to add a counter argument within the same paper for better explanation.
	Because we hadn't started working and can always change our plans
	Conflict sparks discussion, discussion leads to understanding and thought, and those are prequisites for innovation, productivity and growth.
	It benefits the team
	You can add two conflicting ideas in one paper as long as you argue it well, it adds a different perspective and shows you put in research to investigate any weaknesses in your other viewpoints. You can probably rewrite it to fit into the paper as a whole.
	I won't let a potential conflict hold me back if I think I have an important idea that could add to a project.
	it is to important in my view
	Of you have good arguments for an idea, it is important to add to the study
	Because the AI student might have multiple ideas aswell, but he just chose this one. He might be willing to alter his piece to improve the overall quality of the paper.
	I chos for this answer becasue it is a better part for the paper and is an improvement. But I would not do it before talking it over with the other students.
	Just a feeling
	When my answer is conflicting it will result in discussion. Discussion is a valuable learning source
2	The chosen answer does not cause a conflict.
	I don't like to have conflict with a group I have to write papers with. I think I would first go for option 1 and first discuss this with the psych. student. But If it's going to be a conflict, I will avoid it.

Control Condition	
1	Better result
	Conflict may lead to greatness
	Doing something you think is right is better then addapting to others.
	Good to explore everything even if conflicting. Creates discussion
	I don’t take decisions unless I am absolutely sure I am right.
	If something is better, than pick the best choice
	Improvement is key.
	It feels right. To write a paper isn't about making friends or to fit in the group, but about making the best of it. Besides, it could be that my "co-writer" is right. Either way, I'm expanding my knowlodge
	It is important to do the best you can, even if that means more work or conflict with other people.
	It would probably get a better grade to have contrasting viewpoints.
	Never duck and dive. Personality is the differences, not in the similarities.
	Normally I will think through my idea with strong arguments/evidence, so if I consider the idea important but contradictory to others, I would like to bring it to the table and have a discussion about it.
	The assignment can still be discussed with my fellow students and since it is an important addition it will affect our assignment in a positive way.
	The idea of the other student can be admitted
	Then we discuss about the problems and how we can fix it
	To get the highest score
	You can discuss this idea with the other students. It is possible that this would result in a better subject and better paper.
2	Because this is a group project, I feel it is important to have an idea that coordinates with everyone else's
	Follow the leader but be open to other thoughts
	I prefer to reduce difficulties for fellow people. If I can choose another above myself, I will.
	I want one that works with the other topics so it seems like we collaborated more than we did.
	If you would have wanted to add something that conflicts with the contribution of your team member, you should have come up with it earlier to be able to engage in discussion / peer review
	It was my first thought
	suits my work ethics best
	While not being an inconvience to my group, I still bring something new to the table
	Three is right out because it might seem unoriginal. One would be preferred, but the phrasing didn't leave me a non-confrontational way to do it.
3	To have more ideas of differend ppl is beter.

Dutch Comment

Experimental Condition	
1	Belangrijk idee draagt bij aan kwaliteit van groepsprestatie
	toevoeging is, vind ik dat je dat uit moet kunnen leggen. Zonder je belemmert te voelen
	De toevoeging wordt niet minder belangrijk omdat het strijdig is met een andere medestudent. Wel is belangrijk om samen in overleg te gaan om de strijdige stukken te bespreken
	Mijn bevindingen zijn ergens op gebaseerd en belangrijk genoeg om te benoemen in de paper. Ik zou proberen het gesprek aan te gaan met de student die het stuk geschreven heeft die haaks ligt t.o.v. die van mij.
	Neem mee wat je kunt gebruiken maar houd het hoofddoel in de gaten
	Van verschillende kanten naar zo'n onderwerp kijken lijkt mij sowieso een toevoeging. Juist omdat het in strijd is met de stukken van de andere studenten denk ik dat het een belangrijke aanvulling is.
	Ik zou in de introductie en in beide stukken (ervan uitgaande dat we uiteindelijk gezamenlijk het paper nog editten) de tegenstrijd benoemen zodat lezers zien dat de auteurs zich er bewust van zijn. Daarnaast beargumenteren waarom beide ideeen (dat van mijn medestudent en dat van mij) juist wel genoemd moeten worden. Wanneer mijn idee echt kaarsrecht tegenover dat van de andere student staat, zou ik wel altijd een originele invalshoek proberen te kiezen, zodat het niet zo is dat twee stukken zich tegenspreken. Ik wil dat het paper een rond verhaal blijft en het duidelijk is dat de de auteurs samen een stuk hebben geschreven waarin een verhaal gewoon van meerder kanten belicht wordt. Natuurlijk overleg ik dit wel met mijn groepsgenoten. Als dit echt niet mogelijk is, zou ik niet dit idee kiezen want dat zou de kwaliteit van het totaalwerk misschien verlagen. Als ik totaal niet achter stukken van groepsgenoten sta, zou ik dit altijd noemen en een gesprek aangaan met de anderen. Dit is wel eens gebeurd en mensen zijn ook wel eens naar mij toegekomen. Ik moet zeggen dat het me weinig meer gebeurt omdat ik de werkwijze 'we schrijven allemaal een hoofdstuk en dat proppen we bij elkaar' zo veel mogelijk vermijd. Het liefst bespreek ik van tevoren de verschillende invalshoeken.
	Opent mogelijke nieuwe dicussies
	Als ik denk dat mijn toevoeging dusdanig belangrijk is dat het de kwaliteit van het paper bevorderd, dan wil ik het in het paper en zou ik mijn groepsgenoten ervan moeten kunnen overtuigen waarom deze toevoeging zo belangrijk is.
	Dit zal zorgen voor een beter cijfer. Het voorkomt dat we het overnieuw moeten doen.
	Als het iets kan toevoegen, dan breng ik het idee in. Er kan altijd nog overlegt worden welk idee beter is of een middenweg in gevonden worden.
	Er valt nog te overleggen met de andere student. Bij hem dus informeren wat de rede is om het idee op te schrijven en of daar nog aanpassingen in mogelijk zijn.
	Als het een goed idee is maakt het niet uit als het niet matched met de andere ideeen.
	Beter goede verschillende tegenstrijdig ideeen gebruiken, dan minder goede overeenstemmende ideeen
	Breedte leidt tot diepgang. Aanvankelijke verschillen leiden na discussie tot een kwalitatief betere overeenstemming!
	Ik kies voor m'n eigen overtuiging

Experimental Condition	
2	je hebt meer kans op slagen als het idee met meerdere overeen komt.
	Wanneer de andere studenten meer verstand hebben van kunstmatige intelligentie, is het verstandig om in te stemmen met de leerling die hier het meeste over weet. Je kan zelf wel ideeën hebben, maar wanneer iemand duidelijk meer kennis bezit hierover is de keuze snel gemaakt.
	Door dit te doen hoeft niemand zijn werk opnieuw te doen, ben je niet in tegenstrijd met elkaar en heb je alsnog een beetje een belangrijke toevoeging

Control Condition	
1	Alles om het gemiddelde cijfer op te krikken, maar uiteraard wel in overleg.
	Als het belangrijk is voor de opdracht is het ook belangrijk voor jouw opleiding. En die doe je uiteindelijk individueel.
	Als het een belangrijk idee is moet dat naar voren worden gebracht
	Als ik het een belangrijke toevoeging vind, dan is het dat waard om een plaats te krijgen in de papier. Wellicht brengt dit mijn medestudenten op andere ideeën.
	Draagt bij aan ern beter eindresultaat vermoedelijk dus is het waard om minimaal met de anderen tr bespreken en de inbreng goed op elkaar afstemmen
	Er is nog genoeg tijd en ik lever graag werk van hoger niveau in.
	Het beste idee verdient aandacht voor overweging bij de anderen en er is tijd.
	Het zou voor mij zo belangrijk kunnen zijn dat ik minder gauw wil inschikken
	Ik probeer altijd voor het beste resultaat te gaan. Ook al betekend dit dat een groepsgenoot iets anders in gedachten had
	Ik zou in de presentatie de strijdigheid van de ideeën toelichten aangezien dat soms de realiteit is.
	Ik zou mijn groepsgenoten bellen om dit te bespreken. Als zij het niet met me eens zijn zou ik alsnog voor optie 2 kiezen
	Ik zou proberen de andere twee te overtuigen waarom mijn idee zo belangrijk is.
	Met tegengestelde ideeen kun je in een presentatie dilemmas naar voren brengen. Ook al is het tegengesteld dan nog kun je het presenteren en mensen zelf laten nadenken over de ideeen.
	Samen naar een beter resultaat.
	Tegenstrijdigheid hoeft niet erg te zijn. Kan op verschillende manieren naar iets kijken
	Verschil van mening kan tot nieuwe inzichten leiden
	Wellicht kunnen je de anderen ervan overtuigen dat dit belangrijk is om toe te voegen. Miss.dat n ander zijn idee wilt aanpassen.
2	compromis, zo veel mogelijk effectiviteit met zo min mogelijk moeite
	Mijn toevoegingen zijn allen goed bruikbaar
	Wel een belangrijke toevoeging, rekening houdend met de rest van de groep
3	Waarschijnlijk geen zin in conflict
	Pas me makkelijk aan
	Het is geen belangrijk idee en helaas heeft één van mijn groepsleden het ook al bedacht. Ik zal met een betere toevoeging moeten komen. Beter niet aandragen dus, of overleggen met degene met hetzelfde idee.