Selective Anonymity as a New Brainstorming Method

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ABSTRACT

Organisations are dependent on continuously generating innovative ideas. Prior research has found limitations (free riding and evaluation apprehension) in anonymous and non-anonymous brainstorming, which cause a decrease in creative performance. This study presents a new brainstorming method called selective anonymous brainstorming, which combines anonymous and non-anonymous brainstorming to prevent the current limitations. It investigates whether selective anonymous brainstorming creates more and better ideas than the other two methods. It also examines whether free riding and evaluation apprehension mediate the effect of selective anonymity on creative performance and whether creative self-efficacy moderates this effect. The study defines selective anonymity brainstorming as a process in which the identity of an idea's creator is only revealed if the idea is ranked among the top 10%.

To test whether selective anonymity leads to higher creative performance, I conduct an experiment comparing the three brainstorming methods (anonymity, non-anonymity and selective anonymity). The 105 participants were randomly assigned to one of the three brainstorming treatments and asked to generate ideas for new product concepts in the field of sports and fitness products for a student-based market. Linear regression analyses analyse the results. They show that selective anonymity does not result in higher creative performance than anonymity or non-anonymity. All three methods show the same amount of free riding and evaluation apprehension, where both mediators decrease creative performance. The analyses also show no moderation effect of creative self-efficacy.

The results suggest that all three brainstorming methods produce the same creative performance. Free riding and evaluation apprehension are not affected by the degree of anonymity. Therefore, selective anonymity cannot address both mediators to increase performance. On this basis, the brainstorming setup should decrease free riding and evaluation apprehension; however, the degree of anonymity is not the solution.

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Keywords

Brainstorming, Creativity, Selective Anonymity, Anonymity, Idea Generation, Free Riding, Evaluation Apprehension, Creative Self-Efficacy

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1. INTRODUCTION

Organisations today are faced with a fast-growing and changing environment. Organisations must continuously innovate their products and business models to stay in business. To develop innovative ideas, organisations implement brainstorming sessions in which participants generate new ideas for products and processes. Therefore, organisations benefit from understanding which brainstorming method yields the highest performance.

After various studies show that individuals generate more ideas during brainstorming sessions than groups (Diehl & Stroebe, 1987; Lamm & Trommsdorff, 1973; Mullen et al., 1991) research looked further into individual brainstorming. As a result, studies started comparing anonymous and non-anonymous brainstorming, expecting anonymity in brainstorming to yield the highest performance. However, research on the effectiveness of anonymity in individual brainstorming is inconclusive. By comparing anonymous and non-anonymous brainstorming performance, researchers find different results. Connolly et al. (1990) find that anonymous groups perform better than non-anonymous groups, whereas other studies find no difference in performance between both groups (Dennis & Valacich, 1993; Valacich et al., 1992). Both brainstorming methods have their limitations. Anonymous brainstorming should perform better since it avoids evaluation apprehension (Lamm & Trommsdorff, 1973) however, it causes free riding (Albanese & Fleet, 1985; Diehl & Stroebe, 1987). Conversely, non-anonymous brainstorming should avoid free riding but causes evaluation apprehension (Diehl & Stroebe, 1987). Both free riding and evaluation apprehension decrease creative performance (Albanese & Fleet, 1985; Diehl & Stroebe, 1987).

Previous research has found that anonymity and non-anonymity brainstorming have their limitations, and existing studies are inconclusive on which method yields the highest performance during the brainstorming process. Therefore, this paper intends to provide a new brainstorming method that combines both methods' advantages and prevents the limitations caused by anonymity and non-anonymity in brainstorming. The new method is called selective anonymous brainstorming. Selective anonymity describes a process in which the identity of the idea creator is only revealed after evaluation if the creator's idea is one of the top-rated ideas. Through a brainstorming experiment where all three brainstorming methods (anonymity, non-anonymity, and selective anonymity) are applied, I investigate whether selective anonymous brainstorming yields the highest creative performance. Creative performance is composed of the components of productivity and idea quality.

This study also shows how free riding and evaluation apprehensions mediate the relationship between selective anonymity and creative performance. Furthermore, I explain how creative self-efficacy plays a role in this model. Given the focus on using brainstorming in the business context to generate innovative ideas, this study aims at providing organisations with a new opportunity to improve their brainstorming process to make it as efficient as possible.

This paper intends to answer the following three research questions:

1. **What impact does selective anonymous brainstorming have on creative performance?**
2. **Does selective anonymity predict free riding and evaluation apprehension, which in turn predict creative performance?**
3. **How does creative self-efficacy moderate the relationship between selective anonymous brainstorming and creative performance?**

2. LITERATURE REVIEW

2.1 The Origin and Development of Brainstorming:

Osborn (1953) was the first to introduce the brainstorming technique in his book "Applied Imagination". In his definition, brainstorming intends to be performed by groups of 5-12 people. Additionally, he describes four rules the brainstorming groups should apply to achieve the highest level of effectiveness. First, the brainstorming process aims to generate as many ideas as possible. Therefore, Osborn (1953) prioritises quantity rather than the quality of ideas. Second, ideas proposed by a group member should not be criticised by another. Third, members are encouraged to present extraordinary ideas. Fourth, the members should combine their ideas and improve them as much as possible.

Taylor et al. (1958) were the first to test Osborn's brainstorming theory of the superiority of group brainstorming. They conducted an experiment in which they compared the productivity of groups and individuals in brainstorming sessions. They concluded that nominal groups (groups consisting of individuals who worked alone during brainstorming) generate nearly twice the number of ideas as real groups (Taylor et al., 1958). Many studies followed, adding to the research of Taylor et al. (1958) that individuals perform better in brainstorming sessions than groups (e.g. Diehl and Stroebe (1987); Lamm and Trommsdorff (1973); Mullen et al. (1991)).

Due to the superiority of nominal groups in creative performance, researchers started investigating reasons behind the suboptimal performance of real group brainstorming, which Diehl and Stroebe (1987) termed "productivity loss in brainstorming groups". Researchers find numerous reasons for productivity loss in brainstorming, but the following three reasons receive a lot of attention. The first reason for the poor performance of groups is evaluation apprehension (Camacho & Paulus, 1995; Diehl & Stroebe, 1987). Although Osborn (1953) proposes that members should not criticise each other, members still feel like others evaluate them. Participants of nominal groups are also faced with evaluation apprehension when they know judges will evaluate their ideas (Diehl & Stroebe, 1987). The consequence is reduced productivity. The second reason is free riding, causing group members to lose motivation because they do not think that their performance will be crucial to the group performance (Kerr & Bruun, 1983). The third reason Diehl and Stroebe (1987) found is production blocking in groups. Group members must take turns speaking during brainstorming. Therefore, members must wait for their turn to speak and pay attention to what the other members are proposing. Paying attention to others can cause members to forget the ideas they want to propose, and it does not give members enough time to think of new ideas. Related to this is the theory suggested by Smith (2003) of fixation on previously stated ideas which can block other members from producing ideas unrelated to the previously stated ideas. Nominal groups are not faced with production blocking or fixation on previous ideas.

2.2 Anonymity in Brainstorming

After realising that individuals are outperforming groups in brainstorming, research moved on from focusing on group brainstorming to concentrating on individual brainstorming.

Studies started investigating the effect of anonymity in brainstorming on creative performance to further improve individual brainstorming. Recent studies assume that anonymity increases creative performance because it reduces inhibition and offers participants a secure environment to generate non-conventional ideas (Pissarra & Jesuino, 2005). The theory of anonymous interaction states that anonymity weakens external social controls leading to reduced internal constraints on participants' behaviour (Jessup, 1989). Participants behave differently in an anonymous environment than in an identified environment. However, Jessup (1989) also states that this behaviour resulting from excluded social controls can have a positive or negative effect. Positive effects might be expressing unusual ideas, while adverse effects might be to free ride. These opposite implications of anonymity are represented in previous research. Studies comparing anonymous groups with identified groups in several experiments show that anonymity reduces inhibition and fear of participation (Connolly et al., 1990; Jessup et al., 1990; Jessup & Tansik, 1991). Connolly et al. (1990) find that anonymous groups generate more ideas than identified groups. However, other studies do not find the same superiority (Dennis & Valacich, 1993; Sosik et al., 1998; Valacich et al., 1992). Therefore, there is no agreement on whether anonymous groups perform better than non-anonymous groups. Recent research explains that the reason for the different results is that both methods have their limitations. Consequently, both methods cannot yield the highest brainstorming performance. In the next section, I elaborate on the limitations of anonymity and non-anonymity brainstorming found in existing studies.

3. THEORY

3.1 Disadvantages of Anonymity and Non-Anonymity Brainstorming

In their review, Lamm and Trommsdorff (1973) explain that social inhibition (also known as evaluation apprehension) is one reason non-anonymous brainstorming creates fewer ideas than anonymous brainstorming. Social inhibition describes the fear of expressing ideas that might be unusual because of the potential criticism (Camacho & Paulus, 1995). Diehl and Stroebe (1987) reveal that evaluation apprehension causes individuals to hold back ideas, decreasing brainstorming productivity. Performing in an anonymous setting where the names of the individuals are not revealed should help reduce evaluation apprehension. They might alone come up with unusual ideas that they would not have suggested in a non-anonymous setting because their name remains unknown, protecting them from being judged if the idea faces disapproval (Cooper et al., 1998). Aiken et al. (1995) were able to find that participants performing anonymously were confronted with little to no evaluation apprehension.

On the contrary to this is the problem of free riding, which occurs in anonymity brainstorming. Free riding refers to the behaviour of an individual relying on other individuals to complete a task without contributing to the process (Albanese & Fleet, 1985; Diehl & Stroebe, 1987). In anonymous brainstorming, the performance of individuals is not revealed; therefore, individuals are not motivated to contribute to the idea generation and rely on others to generate ideas (Diehl & Stroebe, 1987). They hide behind their anonymity and do not work to their full potential. Therefore, free riding reduces creative performance because individuals limit their contribution.

Both anonymous and non-anonymous brainstorming have their limitations. Anonymity in brainstorming can cause free riding, which reduces productivity. Non-anonymity, on the other hand, increases social inhibition; therefore, individuals hold back ideas for fear of being criticised.

3.2 Advantages of Selective Anonymity

Selective anonymity is a combination of anonymous and non-anonymous brainstorming. The generated ideas are ranked anonymously, but the information of the idea creator will be revealed if the idea is one of the top-rated ones. Therefore, selective anonymity should decrease free riding and evaluation apprehension.

To mitigate evaluation apprehension, selective anonymity includes anonymity features. By ensuring that the names of individuals stay anonymous during evaluation, the evaluator has no opportunity to judge or criticise individuals for their ideas. Additionally, the names of individuals will not be revealed if the idea is not rated as a high-quality idea which guarantees that other individuals will not know who generated low-quality ideas. This should motivate individuals to come up with unusual ideas which they would not have suggested in a non-anonymous setting (Cooper et al., 1998).

Maaravi et al. (2021) suggest implementing social comparison to mitigate free riding during brainstorming. McLeod (2011) includes public recognition as one motivational aspect in brainstorming sessions. Public recognition in brainstorming means that other individuals acknowledge an individual's exceptional performance. This causes individuals to perform better because they want others to recognise that they work well or even better than others. Shepherd et al. (1995) found that individuals performing under the expectation that their performance will be socially compared with others were more productive than individuals with no basis for social comparison. Selective anonymity includes social comparison by revealing the identity of idea creators after evaluation if their idea is ranked in the top 10%. Therefore, participants should be motivated to perform to their full potential in the brainstorming task since they are socially recognised if their idea is one of the top 10%. This should reduce the risk of free riding because people strive for social recognition (Shepherd et al., 1995)

3.2.1 Productivity

Selective anonymity brainstorming was created to overcome the limitations of anonymous and non-anonymous brainstorming, and therefore I expect it to perform better than anonymous and non-anonymous brainstorming. Consequently, I expect participants in selective anonymous brainstorming to generate more ideas than the participants in the other two methods.

H_1: Selective anonymous brainstorming will generate more ideas than anonymous and non-anonymous brainstorming.

3.2.2 Idea Quality

For the quality of ideas generated, the "goal is usually to maximise the quality of the best idea or the few best ideas "(Girotra et al., 2010, p. 593). Since, for organisations, it is essential to create a few good ideas for potential innovations instead of many ideas with no innovation potential, only the quality of the best idea per participant will be considered in this study. The same reasoning for increased productivity in selective anonymous brainstorming applies to the expectations of better-quality ideas: selective anonymity eliminates the limitations of the other methods, and therefore selective anonymity should yield the best results in idea quality.

H_2: Selective anonymous brainstorming will generate better quality ideas than anonymous and non-anonymous brainstorming.

3.2.3 Free riding

Previous research has revealed that anonymous brainstorming causes individuals to free ride, which means hiding behind their anonymity and not contributing to their full potential since they rely on others to generate ideas (Albanese & Fleet, 1985; Diehl & Stroebe, 1987). Therefore, I expect free riding to mediate the relationship between selective anonymity and productivity and idea quality. This means selective anonymity predicts free riding, and free riding predicts productivity and idea quality. This presents an indirect effect of selective anonymity on productivity and idea quality, with free riding mediating the relationship. Since I expect selective anonymity to decrease free riding, I state the following hypotheses:

H_{3a}: Selective anonymous brainstorming, as opposed to anonymous brainstorming, decreases free riding, and decreased free riding increases productivity.

H_{3b}: Selective anonymous brainstorming, as opposed to anonymous brainstorming, decreases free riding, and decreased free riding increases the idea quality.

3.2.4 Evaluation Apprehension

Evaluation Apprehension is expected to decrease performance since individuals hold back their ideas for fear of judgment and criticism (Lamm & Trommsdorff, 1973). I expect selective anonymity to decrease evaluation apprehension due to its anonymity feature. Therefore, I expect evaluation apprehension to mediate the relationship between selective anonymity, productivity, and idea quality. Selective anonymity predicts evaluation apprehension, and evaluation apprehension predicts productivity and idea quality. This presents a second indirect effect of selective anonymity on the productivity and idea quality, with evaluation apprehension mediating the relationship

H_{4a}: Selective anonymous brainstorming, as opposed to non-anonymous brainstorming, decreases evaluation apprehension, and decreased evaluation apprehension increases productivity.

H_{4b}: Selective anonymous brainstorming, as opposed to non-anonymous brainstorming, decreases evaluation apprehension, and decreased evaluation apprehension increases idea quality.

3.3 Creative Self-Efficacy:

Creative self-efficacy is "the belief one can produce creative outcomes "(Tierney & Farmer, 2002, p. 1138). Tierney and Farmer (2002) experimented with manufacturing and an operations division employee to see how self-efficacy influences the employees' creative performance. They found that creative self-efficacy predicted the supervisors' ratings of employee creativity and has, therefore, a positive influence on creative performance. Also, other scholars found similar evidence about the positive relationship between creative self-efficacy and creative performance (Brockhus et al., 2014; Gong et al., 2009; Mathisen & Bronnick, 2009). Creative self-efficacy is derived from self-efficacy, which Bandura (1977) defines as an individual's belief that they can perform in a particular setting. Therefore, self-efficacy can be applied to every setting, whereas creative self-efficacy relates to activities that require creative performance. Bandura (1977) explains that an individual's belief in their effectiveness will influence the individual's choice of behaviour, which means their decision on whether to cope with the situation or not. "The stronger the perceived self-efficacy, the more active the efforts" (Bandura, 1977, p. 194). High levels of self-efficacy motivate individuals to cope with the situation and increase their performance in the task. However, with low levels of self-efficacy, individuals perceive the situation as exceeding their skills, leading to a low effort in participating in the activities.

Prior studies demonstrate that creative self-efficacy predicts creative performance because individuals' belief in their creative capabilities influences the amount of effort they put into a task. I expect individuals with high creative self-efficacy to be confident in coping with the brainstorming situation. When faced with selective anonymity with the possibility of being rewarded and socially acknowledged by others, I expect these individuals to be highly motivated to perform to their highest standard. Individuals with low creative self-efficacy, on the other side, are already not confident about their abilities to cope with a situation. Public recognition will create additional pressure on these individuals leading them to decrease their efforts. Therefore, I expect that creative self-efficacy moderates the relationship between selective anonymity and creative performance. Higher creative self-efficacy strengthens the relationship, while low creative self-efficacy weakens the relationship.

H_{5a}: The impact of selective anonymity on productivity, as opposed to anonymous and non-anonymous brainstorming, will increase with high levels of creative self-efficacy.

H_{5b}: The impact of selective anonymity, as opposed to anonymous and non-anonymous brainstorming, on the idea quality will increase with high levels of creative self-efficacy.

3.4 Theoretical Framework

Based on the literature and the developed hypotheses, the following theoretical framework (Figure 1) represents the estimation of the positive relationship between selective anonymous brainstorming and creative performance, which includes the productivity and the idea quality of the best ideas. Additionally, it estimates a positive moderating effect of creative self-efficacy on the relationship and the mediation effects of free riding and evaluation apprehension.

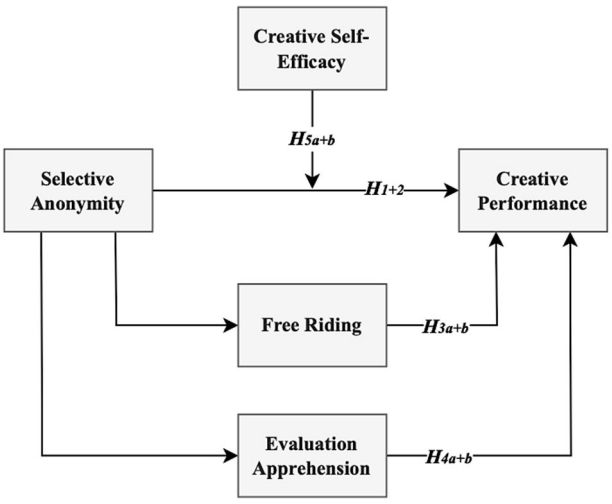

Figure 1: Theoretical Framework

4. EXPERIMENTAL DESIGN

To answer the research questions and investigate the hypotheses, I collected data through an experiment. The experiment represents a between-subject experimental design in which each participant is exposed to only one treatment (Charnessa et al.,

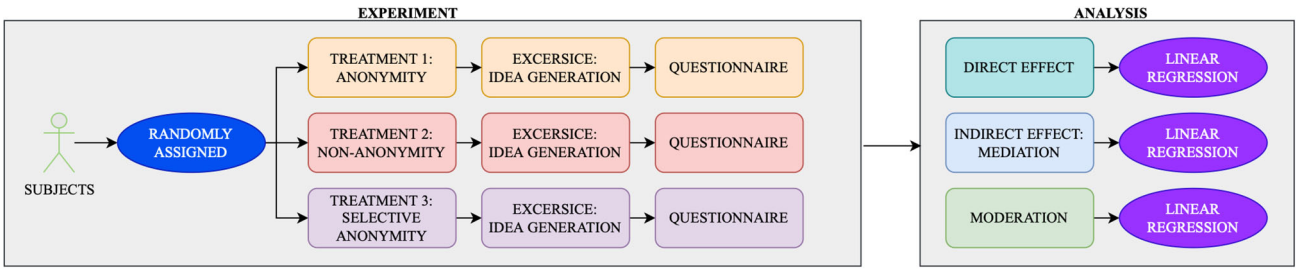

Figure 2: Experimental & Analysis Design

2012). This design provides a data collection that helps to compare "the behaviour of those in one experimental condition with the behaviour of those in another "(Charnessa et al., 2012, p. 1). Since a comparison of the performance of each brainstorming method is needed to determine whether selective anonymity brainstorming yields the highest performance, a between-subject experiment is suitable. Figure 2 illustrates the experimental design.

4.1 Subjects

One hundred five subjects participated in the experiment. The subjects are students recruited from the University of Twente.

4.2 Treatments

The experiment uses three treatments for the brainstorming exercise: anonymity, non-anonymity, and selective anonymity. These treatments illustrate the three brainstorming methods that I need to compare to judge whether selective anonymity generates the highest creative performance. The subjects randomly receive one of the three treatments. The evaluation and ranking of the ideas of each treatment group are anonymous; however, the information shared after the evaluation differs in each group. This information includes the description of each idea, the overall rank and evaluation score, and the name of each idea's creator. The first group undergoes an anonymous brainstorming treatment in which no information about the brainstorming challenge is revealed after the evaluation. The second group performs in a non-anonymous setting, implying that all information about the brainstorming challenge is disclosed after the evaluation. The last group receives a selective anonymity treatment where the information of the brainstorming challenge is only revealed for those ideas that rank among the top 10% of all ideas.

4.3 Experiment

The experiment is conducted online through a link which enables the subjects to access the experiment. During the brainstorming experiment, all subjects of every treatment group are asked to complete the same exercise. This exercise entails generating ideas for new product concepts in the field of sports and fitness products for the student market. The participants are asked to take 5-10 minutes for this exercise and are allowed to enter up to ten ideas.

After the exercise, the subjects must fill in a post-experimental questionnaire. In the questionnaire, the subjects are confronted with statements about their personality traits, creative self-efficacy, evaluation apprehension and freeriding. A scale of 1 ("I fully disagree") to 7 ("I fully agree") allows subjects to indicate their agreeableness with the statements. Additionally, the questionnaire entails a question about the subjects' gender and a manipulation check that asks the subjects which treatments they had received. This manipulation check validates whether the subjects understand under which treatment they perform and, therefore, whether I can use the answers.

5. MEASUREMENT OF PERFORMANCE

As described in the theory section, this paper aims to determine whether selective anonymity brainstorming yields the most outstanding performance. Creative performance contains productivity and idea quality. Figure 2 illustrates the tools used to analyse the performance of the three treatments. I set the significance level to 0.05 for all analyses.

5.1 Direct effect

5.1.1 Productivity

To measure the productivity of each group, I count the number of ideas each participant generated. To determine whether the difference in the number of ideas generated is statistically significant between the three treatments, I perform a linear regression analysis. The linear regression analysis determines whether there is a significant relationship between variables. The independent variable is the dummy variable of selective anonymity (selective anonymity coded as 1, other two treatments coded as 0), and the dependent variable is the productivity.

5.1.2 Idea Quality

To determine the quality of each idea, I use the consensual assessment technique developed by Amabile (1982), which judges the creativity of an idea. She defines an idea as creative when "appropriate observers independently agree it is creative" (Amabile, 1982, p. 1001). Seven students are the evaluators who judge the quality of the ideas. To generate a reliable assessment, the evaluators must fulfil the requirements prescribed by Amabile (1982). Firstly, the judges should have particular experience within the domain. Since the judges are students and the exercise is concerned with new product concepts targeted at students, the evaluators meet this requirement. Secondly, the evaluators should make their judgments independently; therefore, the judges should evaluate all ideas in isolation. Thirdly, the judges should "rate the products relative to one another on the dimensions in question rather than rating them against some absolute standards they might have "(Amabile, 1982, p. 1002). Finally, I should present the ideas to the judges in a different random order. The dimensions on which the judges rate the quality of the ideas should also be in a different order for each judge.

The dimensions on which the evaluators rank the ideas during the assessment include three dimensions:

1. **Novelty:** This dimension answers the question of how novel the idea is. It investigates whether the product idea is already on the market and can be bought or not.
2. **Use value:** This dimension investigates how beneficial and valuable the idea is for users and its advantages over alternative products on the market.

3. **Purchase intent:** This dimension answers the question of the likelihood that the evaluator would buy this product.

The evaluators rank each of the three dimensions on a scale from 1 (lowest score) to 7 (highest score). The total quality score of each idea is calculated by adding up the three scores of the three dimensions and dividing the sum by three. If the majority of evaluators (four from a total of seven) did not rate an idea, I must take out the idea of the data since it indicates that the idea is not rateable. Since having a few best ideas is crucial instead of many bad ideas (Girotra et al., 2010), I only consider each participant's best idea (highest total quality score).

As for the productivity, I conduct a linear regression analysis to analyse whether the difference in idea quality (dependent variable) between the three treatments (independent variable) is statistically significant.

5.2 Indirect Effect:

5.2.1 Mediator Effect of Free riding

During the survey, the participants must rate four statements about potential free riding on a scale of 1 ("I fully disagree") to 7 ("I fully agree"). First, "I feel I participated a great deal in this idea generation session", second, "I am satisfied with my own performance on this task", third, "I was very motivated to generate quality ideas", and fourth, "I really took this task seriously". To measure the indirect effect of selective anonymity on productivity and idea quality, I use the model of Hayes (2018). The model prescribes investigating the indirect effect of an independent variable on a dependent variable mediated by a mediator variable through linear regression analyses. First, a linear regression analysis analyses whether the independent variable significantly affects the mediator. Next, a second analysis tests the impact of the mediator on the dependent variable. Hayes (2018) multiplies both coefficients when both effects are significant to display the indirect effect. The first regression analysis examines the effect of selective anonymity (independent variable) on the level of free riding (dependent variable), the second analysis the effect of free riding (independent variable) on the productivity (dependent variable) and the third analysis the effect of free riding (independent variable) on the idea quality (dependent variable).

5.2.2 Mediator Effect of Evaluation Apprehension

As for free riding, the participants are asked to rate four statements about potential evaluation apprehension on a scale of 1 ("I fully disagree") to 7 ("I fully agree") during the survey. First, "I felt apprehensive and uneasy generating and sharing ideas", second, "I was not at ease during the idea generation", third, "I was worried that others would criticise my ideas", and fourth, "I didn't express all of my ideas because I didn't want others to think I was weird or crazy". For measuring the indirect effect of selective anonymity on productivity and idea quality mediated by evaluation apprehension, I use the same model as for the mediator effect of free riding. The first regression analysis investigates the effect of selective anonymity (independent variable) on the level of evaluation apprehension (dependent variable), the second analysis the effect of evaluation apprehension (independent variable) on the productivity (dependent variable) and the third analysis the effect of evaluation apprehension (independent variable) on the idea quality (dependent variable).

5.3 Moderation Effect of Creative Self-Efficacy

In the last step of the experiment, the participants are asked to rate three statements about their creative self-efficacy on a scale of 1 ("I fully disagree") to 7 ("I fully agree"). First, "I have confidence in my ability to solve a problem creatively", second, "I feel that I am good at generating novel ideas", and third, "I am good at finding creative ways to solve problems". To test H_{3a} and H_{3b}, I will perform a linear regression analysis estimating creative self-efficacy's moderation effect on the relationship between selective anonymity and productivity and idea quality. I create the moderation variable by multiplying the dummy of selective anonymity and the variable of creative self-efficacy. The independent variables are the dummy variable of selective anonymity, creative self-efficacy and the interaction effect of selective anonymity and creative self-efficacy. The dependent variable is in the first analysis, productivity and idea quality in the second analysis.

6. RESULTS

6.1 Direct Effect

6.1.1 Productivity

The participants came up with a total of 451 ideas. I conduct a regression analysis, analysing the effect of selective anonymity on productivity of each participant. Table 1 displays the results of the regression analysis. The analysis reveals no significant effect of selective anonymity on the number of ideas generated, meaning that selective anonymity does not influence the subjects to create more or fewer ideas than anonymity and non-anonymity (F (1,103) = 0.119, p = 0.731). To illustrate the outcome of the analysis, Figure 3 compares the average number of ideas the participants generated in each treatment. All participants performing in an anonymous (M = 4.17, SD = 2.55), non-anonymous (M = 4.39, SD = 2.22) or selective anonymous setting (M = 4.43, SD = 2.18) generated on average roughly the same number of ideas. Since the effect of selective anonymity on productivity was insignificant ($p > 0.05$), I must reject the previously stated hypothesis that selective anonymity creates significantly more ideas than anonymity and non-anonymity.

Table 1: Regression Analysis - Effect of Selective Anonymity on Productivity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.635	1	0.635	0.119	,731[b]
	Residual	548.698	103	5.327		
	Total	549.333	104			

a. Dependent Variable: productivity

b. Predictors: (Constant), treatment=Selective Anonymity

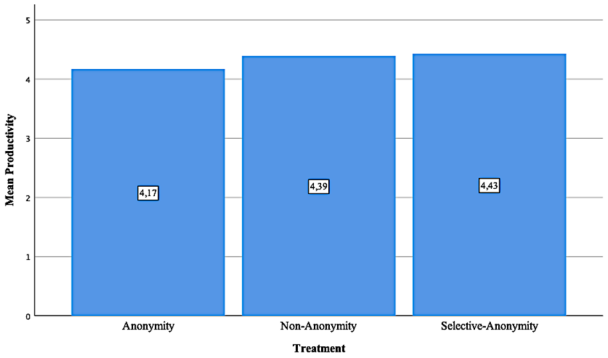

Figure 3: Mean Productivity per Treatment

6.1.2 *Idea Quality*

To analyse the best ideas' quality, I only selected the best idea of each of the 105 participants. Table 2 shows the results of the regression analysis. Selective anonymity has no significant effect on the quality of the best ideas generated (F (1,103) = 0.075, p = 0.785). Selective anonymity does not positively or negatively affect the quality of the participants' best ideas. The average total quality of the best ideas in each treatment is presented in Figure 4, illustrating the nonsignificant effect of selective anonymity on the quality of the best ideas. Selective anonymity (M = 4.14, SD = 0.58) creates the same idea quality as anonymity (M = 4.13, SD = 0.50) and non-anonymity (M = 4.10, SD = 0.53). Therefore, I must reject the hypothesis that selective anonymity creates significantly better-quality ideas than anonymity and non-anonymity. Since the total quality of the best ideas does not differ significantly between the three treatments, I perform separate analyses for the quality dimensions of novelty, user value and purchase intent to identify possible hidden differences between the groups.

Table 2: Regression Analysis - Effect of Selective Anonymity on Idea Quality

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.022	1	0.022	0.075	,785[b]
	Residual	29.753	103	0.289		
	Total	29.774	104			

a. Dependent Variable: idea_quality

b. Predictors: (Constant), treatment=Selective Anonymity

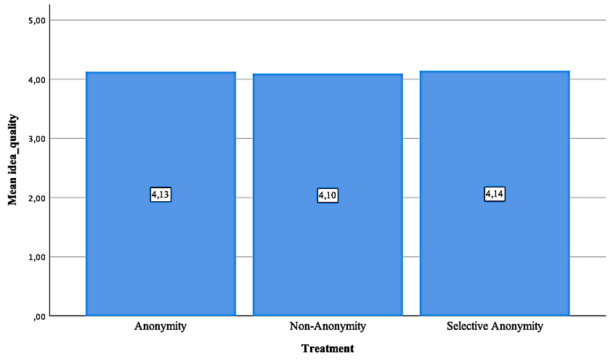

Figure 4: Mean Idea Quality per Treatment

6.1.2.1 *Novelty*

The regression analysis does not reveal a significant effect of selective anonymity on the novelty degree of the best ideas (F (1,103) = 0.094, p = 0.76) (Table 3). The novelty score for the best idea of each participant does not differ significantly between anonymity (M = 3.59, SD = 1.29), non-anonymity (M = 3.75, SD = 1.30) and selective anonymity (M = 3.58, SD = 1.30). The participants' best ideas have, on average, the same novelty score in each group.

Table 3: Regression Analysis - Effect of Selective Anonymity on the three Quality Dimensions

Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Novelty	0.157	1	0.157	0.094	,760[b]
User Value	0.001	1	0.001	0.001	,969[b]
Purchase Intent	0.740	1	0.740	1.555	,215[b]

b. Predictors: (Constant), treatment=Selective Anonymity

6.1.2.2 *User Value*

As for the quality aspect of novelty the regression analysis shows no significant effect of selective anonymity on the user value of the best ideas (F (1,103) = 0.001, p = 0.969) (Table 3). Participants generating ideas under the selective anonymity treatment (M = 4.76, SD = 0.65) do not produce ideas with a higher user value than participants under the anonymity (M = 4.79, SD = 0.58) or non-anonymity treatment (M = 4.74, SD = 0.45).

6.1.2.3 *Purchase Intent*

The purchase intent for the best ideas is not significantly affected by selective anonymity (F (1,103) = 1.55, p = 0.215) (Table 3). Selective anonymity (M = 4.08, SD = 0.74) does not cause participants to produce ideas with a higher purchase intent than anonymity (M = 4.00, SD = 0.69) and non-anonymity (M = 3.80, SD = 0.61).

6.2 Indirect Effect

6.2.1 *Mediator Effect of Free Riding*

After not finding a significant direct effect of selective anonymity on the number and quality of ideas, I conduct a regression analysis to identify a potential indirect effect of selective anonymity. Tables 4 and 5 report the results of the regression analyses. The first analysis identifies whether selective anonymity affects free riding or not. Selective anonymity has no significant effect on the level of free riding (F (1,103) = 1.138, p = 0.288), meaning that selective anonymity does not influence the level of free riding. Figure 5 compares the mean free riding scores in each treatment. It might suggest that non-anonymity has the lowest score for free riding; however, this difference is not significantly different (p>0.05) from the other treatments indicating that all treatments have a similar average free riding score.

Next, I use a regression analysis to investigate whether free riding affects productivity and idea quality. Free riding has a significant effect on productivity (F (1,103) = 21.48, p <0.001), predicting 17.3% of the variance, which represents a weak variance explanation. For every one-unit increase in free riding, the participants generated 0.946 fewer ideas. Additionally, free riding has a significant effect on the quality of the best ideas (F (1,103) = 12.147, p = 0.001). The model predicts 10.5% of the variance. The analysis displays a 0.172 decrease in the quality score for every one-unit increase in free riding. Following the model from Hayes (2018) the indirect effect of selective anonymity on productivity and idea quality is the product of the coefficients. Since there was no significant effect of selective anonymity on the level of free riding, I must conclude that there is no indirect effect of selective anonymity on the productivity or idea quality mediated by free riding. Therefore, I must reject H_{3a} and H_{3b}.

Table 4: Regression Analysis - Effect of Selective Anonymity on Free Riding

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.157	1	1.157	1.138	,288[b]
	Residual	104.690	103	1.016		
	Total	105.848	104			

a. Dependent Variable: freeriding

b. Predictors: (Constant), treatment=Selective Anonymity

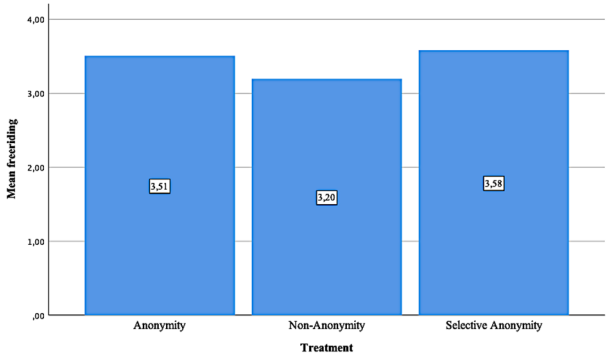

Figure 5: Mean Free Riding per Treatment

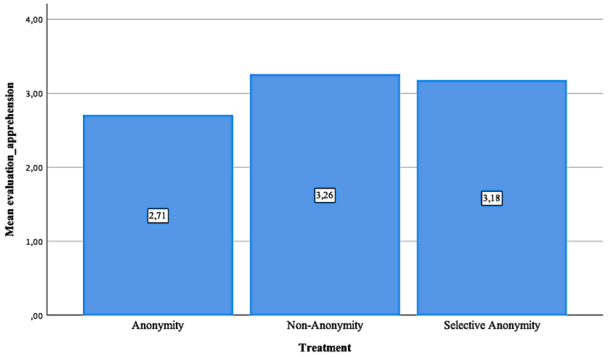

Figure 6: Mean Evaluation Apprehension per Treatment

Table 5: Regression Analysis - Effect of Free Riding on Productivity and Idea Quality

Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Productivity	94.791	1	94.791	21.480	,000[b]
Idea Quality	3.141	1	3.141	12.147	,001[b]

b. Predictors: (Constant), freeriding

Table 7: Regression Analysis - Effect of Evaluation Apprehension on Productivity and Idea Quality

Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Productivity	29.510	1	29.510	5.847	,017[b]
Idea Quality	0.545	1	0.545	1.922	,169[b]

b. Predictors: (Constant), evaluation_apprehension

6.2.2 Mediator Effect of Evaluation Apprehension

Additional to the analysis about freeriding as a mediator, I conducted a regression analysis analysing the indirect effect of selective anonymity on productivity and idea quality mediated by evaluation apprehension. The first linear regression analysis shows that selective anonymity has no significant effect on evaluation apprehension (F (1,103) = 0.818, p = 0.368) (Table 6). Figure 6 displays the mean evaluation apprehension score in each of the three treatments. The figure might suggest that anonymity has the lowest score for evaluation apprehension; however, this difference is not statistically significant. The nonsignificant difference means that evaluation apprehension occurs in all treatments with about the same strength.

The regression analysis investigating the effect of evaluation apprehension on productivity reveals a significant relationship (F (1,103) = 5.847, p = 0.017) (Table 7), explaining 5.4% of the variance. With every one-unit increase in evaluation apprehension, the participants generated 0.425 fewer ideas. Contrary to that is the finding of the effect of evaluation apprehension on the quality of the best ideas. The analysis does not support a significant relationship between both variables (F (1, 103) = 1.922, p = 0.169) (Table 7). Evaluation apprehension does not influence the quality of the best ideas.

Since the regression analysis examining the effect of selective anonymity on evaluation apprehension does not find a significant effect, I cannot find an indirect effect of selective anonymity on productivity or idea quality through evaluation apprehension as a mediator. Therefore, I must reject H_{4a} and H_{4b}.

Table 6: Regression Analysis - Effect of Selective Anonymity on Evaluation Apprehension

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.289	1	1.289	0.818	,368[b]
	Residual	162.393	103	1.577		
	Total	163.682	104			

a. Dependent Variable: evaluation_apprehension

b. Predictors: (Constant), treatment=Selective Anonymity

6.3 Moderation Effect of Creative Self-Efficacy

6.3.1 Productivity

Table 8 summarises the results of the moderation analysis. The overall model is not significant (F(3, 101) = 1.018, p = 0.388). Furthermore, a deeper analysis reveals that creative self-efficacy does not significantly moderate the effect between selective anonymity and productivity (B = *0.380*, p = 0.327). After not finding a significant moderation effect, Hayes (2018) recommends dropping the interaction effect from the model, resulting in a new simple effects model analysing the effect of creative self-efficacy on the number of ideas. This new model does not reveal a significant relationship between creative self-efficacy and the number of ideas generated (B = *0.262*, p = 0.164). High creative self-efficacy does not lead participants to produce more ideas than participants with low creative self-efficacy. Therefore, I must reject the hypothesis (H_{5a}) that the relationship between selective anonymity and the number of ideas generated is stronger when creative self-efficacy is high.

Table 8: Regression Analysis - Moderation Effect of Creative Self-Efficacy on the Relationship of Selective Anonymity and Productivity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.122	3	5.374	1.018	,388[b]
	Residual	533.211	101	5.279		
	Total	549.333	104			

a. Dependent Variable: productivity

b. Predictors: (Constant), interaction_effect, creative_self_efficacy, treatment=selektive-anonymity

6.3.2 Idea Quality

The regression analysis does not find the model for the moderation effect of creative self-efficacy on the relationship between selective anonymity and idea quality to be significant (F (3,101) = 1.755, p = 0.161) (Table 9). It also displays that creative self-efficacy has no significant moderation effect on the relationship between selective anonymity and idea quality (B = *0.143*, p = 0.111). After dropping the interaction effect from the

model, the regression analysis does not find a significant relationship between creative self-efficacy and idea quality ($B = 0.069$, $p = 0.113$). Therefore, high creative self-efficacy does not increase idea quality. I must reject the hypothesis (H_{5b}) that high creative self-efficacy increases the impact of selective anonymity on idea quality.

Table 9: Regression Analysis - Moderation Effect of Creative Self-Efficacy on the Relationship of Selective Anonymity and Idea Quality

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.475	3	0.492	1.755	,161[b]
	Residual	28.299	101	0.280		
	Total	29.774	104			

a. Dependent Variable: idea_quality

b. Predictors: (Constant), interaction_effect, creative_self_efficacy, treatment=Selective Anonymity

7. DISCUSSION AND IMPLICATIONS

7.1 Direct Effect

The results of the previous sections indicate that selective anonymity in brainstorming does not generate more or better-quality ideas than anonymous and non-anonymous brainstorming. Additionally, the results show no significant difference in productivity and idea quality between anonymity and non-anonymity. The participants generated, on average roughly, the same number of ideas no matter the treatment they were presented with. Their best ideas did also not differ in quality.

These findings are contrary to Connolly et al. (1990) who suggest that anonymity is superior to non-anonymity. However, the results are similar to other research, which does not find a performance difference between anonymous and non-anonymous brainstorming (Dennis & Valacich, 1993; Valacich et al., 1992). Therefore, the findings contribute to the theory that productivity and idea quality does not differ in anonymous and non-anonymous brainstorming. The different treatments do not affect the participants' performance, indicating that they do not adjust their performance to whether their name stays anonymous or is revealed. Despite the ambiguous findings in previous research, I expected that creative performance in anonymous and non-anonymous brainstorming does not differ since both methods have either the risk of free riding or evaluation apprehension. The results support my expectation of equal performance.

Furthermore, I expected selective anonymous brainstorming reduces risks of free riding and evaluation apprehension resulting in the highest performance. However, the findings cannot support this expectation. To find an explanation for the underperformance of selective anonymity, I analyse the mediators free riding and evaluation apprehension in more detail.

7.2 Indirect Effect

The analyses do not support the expectations of selective anonymity being the new superior brainstorming method that creates the most and best quality ideas. Therefore, I analyse the indirect effect of selective anonymity on productivity and idea quality, with free riding and evaluation apprehension being the mediator variables.

7.2.1 Free Riding

The analysis reveals no significant effect of selective anonymity on free riding. The expectation was that selective anonymity decreases the risk of free riding since the names of the idea generators are only revealed if their idea is ranked in the top 10%. However, the results show that selective anonymity does not influence free riding and has, on average, the same free riding score as anonymity and non-anonymity. The results contradict the claim of Diehl and Stroebe (1987) that free riding happens in anonymous brainstorming because individuals hide behind their anonymity and do not contribute to their full potential. The results, however, might suggest that anonymity in brainstorming does not cause free riding. Therefore, the foundation of the argumentation that selective anonymity decreases free riding due to its mix of anonymity and non-anonymity does not hold up. Another factor not addressed by selective anonymity might be responsible for causing free riding.

Further analysis shows that free riding influences productivity and idea quality. The higher a participant's score for free riding, the fewer and low-quality ideas they generated. These results support previous findings on the negative effect of free riding on brainstorming performance (Albanese & Fleet, 1985; Diehl & Stroebe, 1987).

These findings support the basic idea of attempting to improve brainstorming performance by decreasing free riding. Existing studies find anonymity to be the cause of free riding; however, this study provides new insights into the problem of free riding in brainstorming. The results might suggest that anonymity is not the cause for individuals to not contribute to their full potential. Selective anonymous brainstorming does not address the risk of free riding because it assumes that anonymity causes free riding. Further research is needed to examine the brainstorming aspects leading to free riding. After finding those aspects, researchers can establish a brainstorming method, reducing free riding and increasing creative performance. However, free riding only predicts 17.5% of the variations in productivity and 10.5% in idea quality, suggesting that other aspects might affect the participants' performance. Therefore, researchers must investigate which other factors influence creative performance.

7.2.2 Evaluation Apprehension

The regression analysis does not find a significant effect of selective anonymity on evaluation apprehension, meaning that there is no indirect effect of selective anonymity on the productivity or idea quality mediated by evaluation apprehension. All three treatments have roughly the same occurrence of evaluation apprehension on average. This contradicts the claim of Diehl and Stroebe (1987) that anonymity decreases evaluation apprehension because the participants feel protected from judgment and criticism. I build selective anonymity on the assumption that non-anonymity causes evaluation apprehension. Therefore, it includes anonymity aspects to decrease evaluation apprehensions potentially. Since the results do not support the theory of non-anonymity causing evaluation apprehension, Selective anonymity is not able to address the problem of evaluation apprehension.

Further analysis reveals that increased evaluation apprehension decreases the productivity of the participant. Participants generated 0.425 fewer ideas with every one-unit increase in evaluation apprehension. The same effect was found in existing research (Diehl & Stroebe, 1987; Lamm & Trommsdorff, 1973). I do not find the same effect for the impact of evaluation apprehension on the quality of the best ideas. There is no significant effect, meaning that evaluation apprehension does not positively or negatively affect the quality of the best ideas. Diehl and Stroebe (1987) only investigate the negative effect of evaluation apprehension on productivity; therefore, my findings add to their theory.

The results for productivity support the idea of increasing creative performance by decreasing evaluation apprehension. As for free riding, the findings contradict the current findings on the cause of evaluation apprehension. The results suggest another reason causing evaluation apprehension than non-anonymity. Further research should investigate the factors in brainstorming leading to evaluation apprehension to increase creative performance in brainstorming. Evaluation apprehension only explains 5.4% of the variation in productivity. Therefore, other aspects than free riding and evaluation apprehension might influence productivity.

I build the expectation of selective anonymity being the new superior brainstorming method producing the most and best quality ideas on the wrong assumptions. This study provides new insights into the relationship between the degree of anonymity and the performance inhibitors free riding and evaluation apprehension. The results do not find the degree of anonymity causing free riding or evaluation apprehension. Therefore, selective anonymity does not address the two mediators affecting individuals' creative performance. Further studies should consider these findings and find the right features that a brainstorming method should contain to increase creative performance. These features should decrease free riding and evaluation apprehension. However, since both mediators could only explain a small proportion of variance in the performance, researchers should consider additional aspects influencing the performance.

7.3 Moderation Effect

The moderation effect of creative self-efficacy on the relationship between selective anonymity and creative performance did not show the effect which I expected.

The regression analysis reveals no overall significant model for the moderation effect on productivity. I do not find a significant moderation effect of creative self-efficacy. This means that the effect of selective anonymity on productivity does not differ with different levels of creative self-efficacy. The second analysis shows that creative self-efficacy as an independent variable has no direct significant positive impact on productivity. This contrary to existing research which finds that creative self-efficacy positively affects creative performance (Brockhus et al., 2014; Gong et al., 2009; Mathisen & Bronnick, 2009; Tierney & Farmer, 2002).

An explanation for the nonsignificant moderation effect could be that contrary to my expectation, public recognition does not motivate individuals with high creative self-efficacy more than individuals with low creative self-efficacy. The most surprising finding is that participants with high creative self-efficacy created the same number of ideas as participants with low creative self-efficacy. An explanation could be that participants might have overestimated or underestimated their abilities. Creative self-efficacy is the belief in one's abilities, but a belief might be unrealistic. Participants overestimating their abilities might be confident in their abilities but produce a medium number of ideas. On the other side, participants underestimating their abilities might think they are not creative and cannot create many ideas but generate the same number of ideas as participants with high creative self-efficacy. This could explain why productivity does not differ for different levels of creative self-efficacy. Overestimating and underestimating the abilities might have led participants with high and low creative self-efficacy to generate the same number of ideas. Their belief in their abilities might not match their actual skills. Further research should investigate if creative self-efficacy affects productivity since previous research finds a relationship between creative self-efficacy and creative performance. This could also show whether creative self-efficacy is a realistic or unrealistic belief.

The analysis of the moderation effect on the quality of the best ideas could not reveal a significant effect. The impact of selective anonymity on idea quality does not differ with different levels of creative self-efficacy. The same explanation as for the effect on productivity can be applied here. Public recognition does not increasingly motivate individuals with high creative self-efficacy in contrast to individuals with low creative self-efficacy. Additionally, creative self-efficacy as an independent variable had no significant direct effect on the idea quality. High creative self-efficacy does not directly improve the idea quality. This does not meet my expectations and previous studies conducted by other researchers. The theory that creative self-efficacy positively affects creative performance (Brockhus et al., 2014; Gong et al., 2009; Mathisen & Bronnick, 2009; Tierney & Farmer, 2002) cannot be applied to these findings. This raises questions about why individuals with high confidence in their abilities to produce creative outcomes do not create ideas with high quality. The quality dimensions on which the ideas were rated might not fit the moderation model. A creative idea might be novel, but it might be so creative that the raters cannot imagine it being useful and would not buy it. Therefore, the idea might be very creative but still get a low-quality score. Future studies should investigate the ideas of individuals with different creative self-efficacy scores and determine on which dimensions the ideas differ. Further research should also discuss which brainstorming method might be beneficial for different creative self-efficacy levels to get the best out of each individual.

7.4 Practical Implications

I expected selective anonymous brainstorming to provide organisations with a new brainstorming method to maximise creative performance. However, as discussed above, selective anonymity does not show greater creative performance than anonymous and non-anonymous brainstorming. This study does not guide managers on which brainstorming method to use. This might lead to the assumption that managers can use any brainstorming method to achieve the same performance. Nevertheless, this study's findings still help organisations to increase creative performance in brainstorming. The findings show that free riding and evaluation apprehension decrease creative performance. Therefore, this study allows managers to understand which factors they must pay attention to in order to increase creative performance during brainstorming. By being aware of both performance inhibiting factors, organisations can prevent them from occurring. Managers might find strategies to decrease both factors. As a result, organisations might be able to create a brainstorming method that increases creative performance. Additionally, managers should not be blinded by high creative self-efficacy. Including only people with high creative self-efficacy will not increase performance. Since participants with high and low creative self-efficacy generated the same number of ideas, managers should include participants with both levels to get the highest chance for generating innovative ideas.

8. CONCLUSION

This study investigates selective anonymous brainstorming as a new brainstorming method expecting it to generate more and better-quality ideas than the existing anonymous and non-anonymous brainstorming.

The findings reveal that selective anonymity does not generate more or better-quality ideas in brainstorming sessions than anonymity and non-anonymity. The analysis does also not find

an indirect effect of selective anonymity on the productivity and idea quality through the mediators free riding and evaluation apprehension. Free riding and evaluation apprehension negatively affect the creative performance of participants; however, the results show that the degree of anonymity does not affect the degree of free riding or evaluation apprehension, contrary to previous research. Since selective anonymity was created assuming that non-anonymity decreases free riding and anonymity decreases evaluation apprehension, it does not address the mediators to minimise them. Lastly, I do not find a moderation effect of creative self-efficacy on the relationship between selective anonymity, productivity and idea quality. Creative self-efficacy does not increase the impact of selective anonymity on productivity or idea quality.

Even though I reject all hypotheses, the research provides new insights into potential improvements in brainstorming. Future research should establish a clearer picture of brainstorming features that decrease free riding and evaluation apprehension. Furthermore, the results indicate that other factors might influence individuals' creative performance. Therefore, future research might find new factors influencing creative performance in brainstorming apart from free riding and evaluation apprehension

9. LIMITATIONS AND FURTHER RESEARCH

The first limitation concerns the participants. Only western-European students participated in the experiment. The future application of selective anonymous brainstorming should not be reduced to students but should help organisations generate innovative ideas. Therefore, reducing the experiment to only students as participants will not indicate whether selective brainstorming might work in the business world. Future experiments should include subjects from different occupations and ethical backgrounds to help make the results generalisable.

The second limitation concerns the design of the experiment. The experiment was conducted through an online link asking the participants to generate ideas and fill in a survey. The participants did not know the other participants, which could have caused a bias in the results. Since the treatments either protect the participants from being criticised (anonymity) or motivate them by being socially recognised (non-anonymity and selective anonymity), the participants must know each other. For further research, the experiment should be repeated in groups where the members know each other and benefit from being anonymous during the idea generation process and socially recognised when their ideas are under the top 10%.

The third limitation concerns the exercise during the experiment. The participants were asked to generate product ideas for only one business sector. It might be possible that for sporting goods for students, there is already a lot on the market, so generating innovative ideas that are novel, useful and likely to be bought might be difficult. Additionally, participants were not able to include a description of their ideas. They were asked to write down their ideas with no further explanation of what the idea entails. This might have led to misunderstandings between the participants' ideas and the interpretation of the evaluators. Future research could include the experiment with different exercises differing in complexity, ensuring participants get the chance to work to their full potential. Participants should also be asked to describe their ideas, stating what the idea is and what it entails to exclude misunderstandings between the participants and the evaluators.

The fourth limitation concerns the sample size of the experiment. The final data includes 105 participants, from which 40 participants receive the anonymity treatment, 29 the non-anonymity treatment and 44 the selective anonymity treatment. The sample sizes for each treatment are not the same, which could influence the interpretation of the results. Further research should include at least 300 participants, 100 for each treatment, to get a meaningful result which can be generalised.

Further research should take the limitations into account. The experimental design should ensure that the findings can be generalised. As mentioned in the Discussion section, future studies are needed to establish the brainstorming features leading to free riding and evaluation apprehension. Additionally, further research should investigate other factors influencing creative performance. This might lead to the creation of a new brainstorming method, increasing creative performance. Furthermore, research should investigate if creative self-efficacy affects the productivity and show whether creative self-efficacy is a realistic or unrealistic belief. Further research should explore the ideas of individuals with different creative self-efficacy scores and determine on which dimensions the ideas differ. A conclusion should be drawn on which brainstorming method might be beneficial for different creative self-efficacy levels to get the best out of each individual.

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APPENDIX

Appendix 1: Experiment Outline:

A001

Thank you for taking part in the brainstorming study in the field of sports and fitness products. The study is a joint research project of the University of Twente, the University of Stuttgart, and the University Erlangen-Nürnberg. The study lasts approximately 15 minutes. During the study, you will be asked to generate ideas. Some of these ideas may be shared with the research team and other students from this experiment, with your names and an idea evaluation score attached to them.

This research project has been reviewed and approved by the BMS Ethics Committee.

Your data will be collected and processed. Your names and ideas may be shared with the research team and other UT students from this experiment (in form of email after the experiment). You will be informed about the mode of idea and name revealing. Your ideas may be shared in anonymous form with idea evaluators. Your names will be anonymized after the experiment by using a random number instead of your name for the further course of the research project and a potential publication. At any point you have the right to request access to and rectification or erasure of your data.

That data will be stored on the University Erlangen-Nürnberg. The anonymized data will be processed by research project members of the University of Twente, the University of Stuttgart, and the University Erlangen-Nürnberg. Your data will not be used commercially and is for research and teaching purposes only. You retain full rights over your ideas. Data about idea quality and the number of ideas (but not the ideas itself) may be hosted in a public idea repository in anonymized form.

If you have questions about your rights as a research participant or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-bms@utwente.nl.

If you want to withdraw from the study or have any other questions about the study or the research project, don't hesitate to contact t.g.schweisfurth@utwente.nl.

Please consent to all points below to proceed with the study.

- [ ] I have read and understood the study information.
- [ ] I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.
- [ ] I understand that information I provide will be used for scientific research, teaching, and publication.
- [ ] I understand that personal information collected about me that can identify me, such as my name and my ideas provided, will not be shared beyond the study team and the other participants of this course.
- [ ] I give permission for the anonymous data that I provide to be archived so it can be used for future research and learning.

text('CT11')

Rules for brainstorming

- If you provide ideas, your ideas will be evaluated and ranked anonymously.
- After the evaluation, **NO information** from this brainstorming challenge **will be revealed** to other participants, i.e.
  - The description of each idea will **not be revealed.**
  - The overall rank and evaluation score of each idea will **not be revealed.**
  - The name of each idea's creator will **not be revealed.**

text('CT12')

Rules for brainstorming

- If you provide ideas, your ideas will be evaluated and ranked anonymously.
- After the evaluation, **ALL information** from this brainstorming challenge **will be revealed** to other participants, i.e.
  - The description of each idea **will be revealed.**
  - The overall rank and evaluation score of each idea **will be revealed.**
  - The name of each idea's creator **will be revealed.**

text('CT13')

Rules for brainstorming

- If you provide ideas, your ideas will be evaluated and ranked anonymously.
- After the evaluation, **information** from this brainstorming challenge **will be revealed** to other participants **only if the idea ranks among the top 10% of all ideas**, i.e.
- The description of each idea **will be revealed only if the idea ranked among the top 10% .**
- The overall rank and evaluation score of each idea **will be revealed only if the idea is ranked among the top 10%.**
- The name of each idea's creator **will be revealed only if the idea is ranked among the top 10%.**

Brainstorming Task

Your brainstorming task CT08

You have been retained by a **manufacturer of sports and fitness products** to identify **new product concepts for the student market**. The manufacturer is interested in any product that might be sold to students in a sporting goods retailer. The manufacturer is particularly interested in products likely to be appealing to students. These products might be solutions to unmet needs or improved solutions to existing needs.

Please come up with ideas for new product concepts in the field of **sports and fitness products for the student market**.

Please enter your idea(s) here. CT15

- Please enter one idea per field.
- Please take ca. 5-10 minutes for this part of the brainstorming challenge.
- You can enter up to 10 ideas.

Idea 01:
Idea 02:
Idea 03:
Idea 04:
Idea 05:
Idea 06:
Idea 07:
Idea 08:
Idea 09:
Idea 10:

Please describe in what form your idea, name, and idea rank will be shared with other participants. M103

- ◯ After the evaluation, NO information from this brainstorming challenge will be revealed to other participants.
- ◯ After the evaluation, **ALL** information from this brainstorming challenge will be revealed to other participants.
- ◯ After the evaluation, information from this brainstorming challenge will be revealed to other participants only if the idea ranks among the top 10% of all ideas.

Please answer the following questions.

Please indicate to what extent do you agree to the following statements. M101

	I fully DISagree. ◯ ◯ ◯ ◯ ◯ ◯ ◯ I fully agree.
During the brainstorming, ...	
I felt apprehensive and uneasy generating and sharing ideas.	
I was not at ease during the idea generation.	
I was worried that others would criticize my ideas.	
I didn't express all of my ideas because I didn't want others to think I was weird or crazy.	

Please indicate to what extent do you agree to the following statements. M102

	I fully DISagree. ◯ ◯ ◯ ◯ ◯ ◯ ◯ I fully agree.
During the brainstorming, ...	
I feel I participated a great deal in this idea generation session.	
I am satisfied with my own performance on this task.	
I was very motivated to generate quality ideas.	
I really took this task seriously.	

Please answer the following questions about yourself.

Please indicate to what extent do you agree to the following statements.

P103

	I fully DISagree.						I fully agree.
I have confidence in my ability to solve problems creatively.	○	○	○	○	○	○	○
I feel that I am good at generating novel ideas.	○	○	○	○	○	○	○
I am good at finding creative ways to solve problems.	○	○	○	○	○	○	○

Please indicate to what extent do you agree to the following statements.

P102

I see myself as someone who ...	I fully DISagree.						I fully agree.
is reserved.	○	○	○	○	○	○	○
is generally trusting.	○	○	○	○	○	○	○
tends to be lazy.	○	○	○	○	○	○	○
is relaxed, handles stress well.	○	○	○	○	○	○	○
has few artistic interests.	○	○	○	○	○	○	○
is outgoing, sociable.	○	○	○	○	○	○	○
tends to find fault with others.	○	○	○	○	○	○	○
is thorough.	○	○	○	○	○	○	○
gets nervous easily.	○	○	○	○	○	○	○
has an active imagination.	○	○	○	○	○	○	○

1. Please indicate your gender.

P101

- ○ Female
- ○ Male
- ○ Divers
- ○ Other
- ○ Prefer not to say

Last Page

Thank you for completing this questionnaire!

We would like to thank you very much for helping us.

Your answers were transmitted, you may close the browser window or tab now.

At any point you have the right to request access to and rectification or erasure of your data.

Please contact t.g.schweisfurth@utwente.nl for these and any other requests such as comments and feedback.