The effect of social acceptance on approach motivation, arousal, cognitive flexibility and creative performance in ideation

Koen Bos

SNR: 2051542 // U: 422307

Master Thesis

Communication & Information Sciences

School of Humanities and Digital Sciences

Tilburg University, Tilburg

Supervisor: Dr. Alwin de Rooij

Second Reader: Dr. Simone Ashby

August 2021

Abstract

Creativity is widely recognized as the key determinant of human advancement and is rapidly becoming the most desirable competency in today's society. Therefore, research into how creativity can be enhanced is essential - as it can help to better understand and support the crucial role of creativity in society. The prevalence of collaborative idea generation (i.e., ideation) sessions in organizations has caused many studies to investigate how social influences affect creative performance. Few studies, however, have attempted to provide a comprehensive explanation of how social influences affect the minds of individuals in collaborative ideation and, consequently, how this affects their individual creative performance. Based on recent findings, this study aims to do just that by investigating whether social acceptance cues (e.g., 'belong', 'we,', 'friendly'), mediated by (a shift toward) approach motivation, arousal and cognitive flexibility, can benefit creative performance in collaborative ideation. Furthermore, the differences between the gained, constant, lost and no social acceptance conditions were compared for the dependent variables of creative performance, consisting of originality (novelty) and fluency (number of ideas). To advance methodological innovation, an online experiment with a mixed within-between subjects design was conducted, where a chatbot manipulated social acceptance and 'collaborated' with the participants ($N = 122$) in an ideation task. The results of the serial multiple mediation analyses indicated some effect on creative performance, but this effect does not follow the hypothesized process. Despite having to reject the majority of the hypotheses, the present study still contributes to the knowledge on the enhancement of creative performance in ideation by transparently describing limitations and unexpected results, and linking these to suggestions for future research.

Keywords: creativity, social acceptance, approach motivation, arousal, cognitive flexibility, collaborative idea generation, chatbot

Table of Contents

1. Introduction

Creativity is often described as the single most important determinant for our progress as a species (Gabora & Kaufman, 2010). De Dreu, Baas & Nijstad (2008, p. 739) combine interpretations from previous studies to define creativity as "the generation of ideas, insights, or problem solutions that are new and meant to be useful". Creative problem-solving and the ability to generate new ideas is currently increasingly recognized as a highly valued skill in professionals (Blok, 2020). It is expected that creativity, or creative thinking as a competency, will become one of the most sought-after skills on the job market in the near future (PricewaterhouseCoopers, 2019). Considering that creativity is crucial for the advancement of society, research into how creativity can be enhanced can produce universally valuable implications.

Convergent and divergent thinking are two modes of thought that each have a different effect on the creative process, which is generally described to consist of four phases: understanding the problem, idea generation, idea evaluation and (steps toward) implementation (Mumford & McIntosh, 2017). Convergent thinking may support the idea evaluation phase by converging information (e.g. various ideas) into the one most useful solution (Mumford & McIntosh, 2017). Divergent thinking is the formation of various unforeseen connections and combinations to produce novel information (Cropley, 2006a). This mode of thought, characterized by making remote associations to generate original ideas, may increase creative performance during the idea generation (i.e., ideation) phase (Zabelina et al., 2016). De Dreu, Baas & Nijstad (2008) state that creative performance in the ideation phase is often assessed by looking at creative fluency (the number of insights or ideas) and originality (subjective novelty) of ideas. The production of many original ideas during the ideation phase is crucial to the creative process, as this significantly raises the chance that

there are enough suitable ideas to consider during the idea evaluation phase (De Dreu, Baas & Nijstad, 2008).

Group ideation sessions are a common and widespread phenomenon in today's society. For instance, most large organizations require teams to engage in creative brainstorming sessions to come up with innovative ideas (Paulus & Yang, 2000). Some have even argued that creativity is inherently social, and that the phenomenon would not exist without social agreement (Cropley, 2006b). Social acceptance cues are expressions of social agreement, such as signs of validation, understanding and support of an interaction partner's needs (Lucas et al., 2010; Nikitin & Freund, 2018; Park & Baumeister, 2015). For instance, textual cues that are characterized as socially accepting are words such as 'belong', 'we,', 'friendly' and 'together'. Social acceptance cues can cause a person to be more likely to endeavor in risk-taking (c.f. risk-averse) social behavior, which is associated with a certain motivational orientation (Lucas et al. 2010).

Motivation orientation theory dictates that a person's motivation can be predominately approach (e.g., gains and non gains) or avoidance (e.g., losses and non losses) oriented (Friedman & Förster, 2001). Each orientation affects creative performance in their own way, but only approach motivation is within the scope of this study. Cudo et al. (2018, p. 4) describe approach motivation as "the impulse to go toward stimuli". Exposure to social acceptance is associated with higher approach motivation, and lower avoidance motivation (Nikitin & Freund, 2019). Leone, Perugini & Bagozzi (2005) state that approach motivated people enjoy the benefits of their orientation through increased anticipation of gaining something desired and faith in a positive outcome. Approach motivation supports creative performance in ideation by adopting a mindset that is characterized by a focus on positive outcomes, openness and a flexible processing style (Hao et al., 2020).

Cognitive flexibility, associated with approach motivation, increases creative performance through enhanced divergent thinking ability in ideation according to the Dual Pathway Model by De Dreu, Baas & Nijstad (2008). In other words, approach motivation benefits originality through cognitive flexibility, by facilitating the formation of more distant associative thoughts (Gabora, 2010). Pan & Yu (2018) state that, in addition to shifting between thoughts to make remote associations (cognitive flexibility), there are other forms of cognitive shifting that have been known to benefit creativity (e.g., between moods or focal state). Shifts in motivational orientation are reported to occur (e.g., Park & Baumeister, 2015; Watling et al., 2012). The combined insights of studies reviewed in this thesis suggest that a shift toward approach motivation, caused by social acceptance cues, benefits creative performance in ideation. Whether and how this shift affects creative performance remains speculative, however, some mediating variables have been described.

Some studies suggest that a shift toward approach motivation may come with a degree of arousal, such as Cudo et al. (2018), who argue that the anticipation of a potential gain (in this case, social acceptance) results in increased levels of arousal (defined as a state of excitement in response to a stimulus). Baas, De Dreu & Nijstad (2008), describe that arousal benefits creative performance through increased effort investment, causing individuals to continue generating ideas for an extended time. Furthermore, arousal during ideation is known to enable cognitive flexibility (Baas, De Dreu & Nijstad, 2008; Cudo et al., 2018). Specifically, aroused individuals generate more diverse ideas for an extended period of time through the flexible pathway during ideation (De Dreu, Baas & Nijstad, 2008). This suggests that arousal may play a mediating role in cognitive flexibility to affect originality. In other words, social acceptance cues during ideation may influence the link between approach motivation and flexibility, particularly when it brings about a shift in motivational orientation causing increased levels of arousal, to benefit creative performance.

In summary, the main arguments that are discussed in this section thus far are outlined. Social acceptance cues may cause a person to shift towards approach motivation (Lucas et al, 2010; Nikitin & Freund, 2018; Park & Baumeister, 2015). Approach motivation is associated with cognitive flexibility (De Dreu, Baas & Nijstad, 2008) and approach motivation has been associated with increased arousal (Cudo, 2018). Arousal comes with a certain degree of effort investment (Baas, De Dreu & Nijstad, 2008) that allows individuals to generate more diverse ideas through the flexible pathway for longer (De Dreu, Baas & Nijstad, 2008). This thesis examines if social acceptance can affect creative performance, and whether approach motivation, arousal and cognitive flexibility have a mediating role in this process. Additionally, this thesis investigates whether gained social acceptance is a stronger predictor of a shift toward approach motivation compared to constantly provided or lost social acceptance. The aim of this study is to advance knowledge on this topic and to describe how these insights may be used to enhance creative performance, consequently, the following research question is formulated:

RQ: "*Can social acceptance, mediated by approach motivation, arousal and cognitive flexibility, affect creative fluency and originality in ideation and does it matter whether social acceptance is gained, constant or lost?*"

1. Theoretical Framework

2.1 Creativity & Creative Performance

Creativity is widely recognized as the driving force behind our ability to compose symphonies, decipher the workings of our bodies, shape the world around us and visit other planets. Gabora & Kaufman (2010) argue that creativity may be the single most important determinant for our progress as a species. Humans are inherently social creatures and are able to convey and build upon the ideas of others, therefore, the potential of what a creative idea can bring about is arguably limitless (Gabora & Kaufman, 2010). Many studies have focused on the field of creativity in the past decades and although many valuable contributions have been made, the significance of creativity for society means there is still much to investigate. The importance of creativity is increasingly acknowledged in business and as a topic of research, and has even been named the primary economic asset of this century (Kaufman & Beghetto, 2009). Creative problem-solving and the ability to generate new ideas is an exceedingly sought-after skill in the labor market (Blok, 2020; PricewaterhouseCoopers, 2019).

The creative process and factors that aid or impair creativity have been described by researchers in various models throughout history. Wallas (1926) portrayed this process as comprising out of four phases, namely preparation (developing comprehension of the problem or task at hand), incubation (the subconscious processing of the matter), illumination (the "eureka" moment), and verification (reflection and improvement). Guilford (1957) developed a model of the creative process where a more optimal solution is sooner or later reached by shifting between divergent and convergent thinking. In order to be effective, the creative process necessitates going through the steps while continually (re-)evaluating to reach the best solution (Mumford & McIntosh, 2017). Convergent and divergent thinking both have advantages depending on which phase of the creative process is at hand. Convergent thinking

can benefit the process of taking a number of different ideas and merging them into a solution, divergent thinking can aid in the formation of various unforeseen connections and combinations to produce novel information (Cropley, 2006a). Zabelina et al. (2016) state that because divergent thinking enhances the ability to make remote associations to generate original ideas, it is often described as the preferred thought mode during the ideation phase. The result of an ideation phase is often expressed by the amount of unique ideas (i.e., creative fluency) and the novelty (i.e., originality) of the ideas, this is considered creative performance (De Dreu, Baas & Nijstad, 2008). This is important, because when there are many original ideas to choose from, the chance that an optimal solution can be developed based on ideas increases (De Dreu, Baas & Nijstad, 2008; Zabelina et al., 2016). This study focuses on creative performance in the ideation phase of the creative process.

The ideation phase, often referred to as brainstorming sessions, is a common occurrence in society. There are various incentives to come up with innovative solutions to societal challenges (e.g., financial success and esteem), therefore, many organizations assemble expert teams to engage in group ideation sessions (Paulus & Yang, 2000). The reasoning behind this is that a group of people may generate larger amounts of original ideas than lone individuals (Cropley, 2006b). Paulus & Yang (2000) confirm the benefits of group ideation and state that social factors (e.g., listening attentively to others' ideas) may be crucial in enhancing the effectiveness of group ideation. Cropley (2006b) argues that creativity may even be considered inherently social due to its tendency to be subjective to social agreement (e.g., agreement on what is considered an original thought). Additionally, Croply (2006b) states that creativity is aided by a friendly social environment, one where a person feels accepted and their needs as an interaction partner are met (e.g., validation, support, understanding).

2.2 Social Acceptance

Social acceptance cues are expressions of social agreement and there are varying definitions of social acceptance cues in recent literature (Lucas et al, 2010; Nikitin & Freund, 2018; Park & Baumeister, 2015). In this study, an adapted version of the definition of social acceptance cues by Nikitin & Freund (2018) and Lucas et al. (2010) is used, namely: 'social acceptance cues are signs of validation, understanding and support of an interaction partner's needs'. For instance, textual cues that are characterized as socially accepting (prosocial) are words such as 'belong', 'we,', 'friendly' and 'together' (Pennebaker et al., 2015). Humans seem to be particularly susceptible to these social cues.

When put into the perspective of the alternative, it becomes clear why humans have such a keen eye and strong need for social acceptance. Otten, Schaafsma & Jansen (2018) state that social exclusion can have serious implications for an individual's well-being and can even be a threat to survival. Historically, being an accepted member of a group increases the chances of successful food providence, reproduction and safety. Therefore, humans have developed an acute ability to detect subtle social cues (Otten, Schaafsma & Jansen, 2018). DeWall, Baumeister & Vohs (2008) confirmed (through seven different experiments) that people are quite perceptive of belongingness and social acceptance cues, even when the cues are very subtle, and that denying a person of social acceptance may intensify their need for it.

An intensified need may cause a person to feel more motivated, and take more risks, to gain what they desire. Molden et al. (2009) confirmed that the need for social acceptance intensifies following an experience of social exclusion, but that people react differently to explicit (i.e., direct rejection) than to implicit (i.e., being ignored) exclusion. Explicitly rejected individuals may behave in a passive and risk-averse manner to prevent further social loss and ignored individuals may react by investing more effort into (re-)gaining social acceptance (Molden et al., 2009). On the other hand, DeWall, Baumeister & Vohs (2008)

argue that satiating individuals with acceptance may temporarily lessen their desire for it. Lucas et al. (2010) found that social acceptance cues cause both lonely (whose drive for social acceptance was considered stronger) and nonlonely individuals to engage in risk-taking social behavior. In other words, social acceptance causes individuals to feel motivated to achieve further (social) gain, which is associated with a type of motivational orientation known as approach motivation (Lucas et al. 2010; Nikitin & Freund, 2019).

2.3 Approach Motivation

Motivation orientation theory is otherwise known as regulatory focus theory, and has been a topic of many studies in the last decades. Friedman & Förster (2001) described that a person's motivation can be predominately approach (e.g., gains and nongains) or avoidance (e.g., losses and nonlosses) oriented and that each affect creative performance in their own way. Positive social experiences such as social acceptance are found to be associated with people with higher approach motivation, and lower avoidance motivation (Nikitin & Freund, 2019). This means that approach motivated individuals are more likely to see an anticipated social encounter as a potential positive experience and feel the need to realize this positive outcome.

Leone, Perugini & Bagozzi (2005) report that the anticipation of gaining something desired, in addition to faith in a positive outcome, is relatively high in predominately approach motivated individuals. Cudo et al. (2018 p.4) state that approach motivation orientation directs mental focus to potential gains (e.g., signs of social acceptance) and is described as "the impulse to go toward stimuli". Consequently, approach motivation has been linked to the brain's motivation processing (e.g., dopamine, noradrenalin) systems (Cudo et al., 2018). Additionally, approach motivated individuals generally enjoy traits that are beneficial to the generation of original ideas, such as optimistic perspectives and an open mind (Hao et al., 2020).

2.4 Cognitive Flexibility & Shifting

Cognitive flexibility, associated with approach motivation, increases creative performance through enhanced divergent thinking ability in ideation according to the Dual Pathway Model by De Dreu, Baas & Nijstad (2008). Gabora (2010) states that divergent thinking increases creative performance in ideation by temporarily escaping mental fixation, which is a feature of cognitive flexibility (i.e., flexible cognitive pathway) that allows for more distant associative thought (e.g., original ideas) compared to the more fixed-focus convergent thinking mode associated with cognitive persistence (i.e., the persistent cognitive pathway). Succinctly put, approach motivated individuals have a tendency to keep an open mind (i.e., broader attentional scope) because they are on the lookout for potential gains (Hao et al., 2020; Lucas et al., 2010). This openness facilitates cognitive flexibility and thereby the ability to smoothly shift between thoughts to make more remote associations and more original ideas (Baas, De Dreu & Nijstad, 2008).

In addition to shifting between thoughts or mode of thought, other forms of shifting have been described to influence creative performance. For instance, an affective shift (e.g., from a negative to a positive mood state) is reported to have a positive effect on creative performance (de Rooij, Corr & Jones, 2017). The mental activity of shifting, for example between a focused and defocused state, is referred to as cognitive shifting and is shown to benefit the formation of original thought (Pan & Yu, 2018).

Shifts in motivational orientation, such as from avoidance to approach motivation (Watling et al., 2012), and from approach to avoidance (Park & Baumeister, 2015) have been described to occur in individuals after exposure to social stimuli. This shift toward approach motivation, particularly when joined by the "orientation-congruent aim" of a gain, may explain how social acceptance affects creative performance in ideation (Leone, Perugini & Bagozzi, 2005). Lucas et al., (2010) describe that approach motivated individuals are more

eager to take a risk and gain further social acceptance. However, DeWall, Baumeister & Vohs (2008) state that the motivation to gain social acceptance may diminish when an individual is satiated with it. In other words, suddenly gaining social acceptance may have added benefits over constant exposure to social acceptance (because of satiation). These insights suggest that the suddenness or unexpectedness of the shift may be a stimulus that individuals react to and that this process may mediate the effect on creative performance. Baas, De Dreu and Nijstad, (2008) suggest that the role of arousal needs to be investigated in order to gain a deeper understanding of these workings.

2.5 Arousal

The role of arousal in creativity has been a topic of debate in academia and there have been few studies that have focused on arousal in relation to (shifts toward) approach motivation. Therefore, reports about arousal in association to other forms of shifting are reviewed. Watts et al. (2019) describe that a sudden (but mild) positive shift in affect (i.e., from sad to happy) comes with moderately increased arousal (e.g., excitement) that benefits creative performance in ideation. Leone, Perugini & Bagozzi (2005) state that even anticipated gain may cause moderate excitement in individuals with approach motivation because they have faith in a positive outcome. In other words, approach motivated individuals may be more likely to experience the rewarding feeling of achieving their goal before actually achieving it, causing arousal. Cudo et al. (2018) substantiate this theory and state that a shift toward approach motivation comes with a degree of arousal due to a physiological link. Arousal is defined as a state of excitement in response to a stimulus, it can either be the reaction to the emergence of an expected stimulus or the actual stimulus itself, and approach motivated individuals are more susceptive to arousal because they are open to it (Cudo et al., 2018). Succinctly put, a person's motivation to approach something they desire can cause anticipation of a potential gain and this results in increased levels of arousal. Insights from the

previously mentioned studies suggest that social acceptance that is 'gained' instead of 'given' (i.e., constant) may be more approach motivation congruent. Similarly, Because approach motivated individuals are focused on reaching a potential gain that may cause added arousal, it may be interesting to differentiate between constantly provided, lost, and gained social acceptance.

It is important to note that all changes in the levels of arousal expressed in this study (even when referred to as high or low) are relatively moderate fluctuations. Extremely high or low levels of arousal (e.g., during a state of either deliriousness or depression) are known to be detrimental to cognitive control (Cudo et al., 2018). The relatively mild cognitive shifts discussed here (e.g., in motivation orientation when one feels accepted) have been linked to moderate (c.f., extreme) changes in arousal (Watts et al., 2019). This suggests that a shift toward approach motivation comes with a degree of arousal that does not reduce but rather benefits cognitive control, and that the suddenness or unexpectedness of this shift may counter how satiation affects this process.

Arousal causes increases in dopamine and noradrenaline levels that benefit creativity through improved cognitive control (i.e., working memory), which facilitates cognitive flexibility (Cudo et al., 2018). According to De Dreu, Baas & Nijstad (2008), arousal benefits creative performance through increased effort investment toward the task, which causes individuals to continue generating ideas through the flexible cognitive pathway for a longer time. In other words, cognitive flexibility may not lead to increased creative performance without increased levels of arousal. This suggests that social acceptance may benefit creative fluency and originality during ideation by influencing the links between approach motivation and flexibility, particularly when it brings about a shift toward approach motivation causing increased levels of arousal.

2.6 The present study

Collectively, the studies reviewed in this section suggest that social acceptance may positively affect creative performance through a serial process of (a shift toward) approach motivation, causing arousal and facilitating cognitive flexibility. Therefore, these relationships are investigated in a stepwise manner (i.e., serial) to gain distinguishable insights of whether and how they affect the process. The hypotheses are briefly substantiated by insights from the discussed literature and are concisely formulated and visualized in the conceptual model (see Figure 1).

Social acceptance cues cause individuals to shift toward approach motivation (Lucas et al., 2010; Nikitin & Freund, 2018; Park & Baumeister, 2015). The keen perceptiveness of social stimuli in humans may cause arousal when exposed to social acceptance (DeWall, Baumeister & Vohs, 2008). Although there is currently no evidence that substantiates a direct link, the relationship between social acceptance with cognitive flexibility is also investigated. If an unexpected effect is found, it may provide for an interesting topic for future studies. Hayes (2014 p. 145) advocates exploring unsubstantiated causal relationships because "if it does not (exist), the data will tell you so, but if it does, you have learned something you might not have otherwise learned". Additionally, there is preliminary evidence that gained social acceptance (compared to constant or lost) is a stronger predictor of approach motivation and arousal (Cudo et al., 2018; DeWall, Baumeister & Vohs, 2008; Leone, Perugini & Bagozzi, 2005). Therefore, the following hypothesis is formulated.

H1: *Social acceptance positively predicts approach motivation (a), arousal (b) and cognitive flexibility (c), and gained social acceptance is a stronger predictor compared to constant or lost social acceptance (d, e, f).*

Approach motivation is associated with (relatively higher levels of) arousal, which allows individuals to generate more diverse ideas through cognitive flexibility for longer,

benefiting creative fluency and originality (Baas, De Dreu & Nijstad, 2008; De Dreu, Baas & Nijstad, 2008; Hao et al., 2020; Watts et al., 2019). To gain comprehensive insights into this process, it is investigated whether approach motivation, arousal and cognitive flexibility have a direct and/or mediated positive effect on fluency and originality. Consequently, the following hypotheses are formulated.

H2: *Approach motivation (a, d), arousal (b, e) and cognitive flexibility (c, f) positively predict creative fluency and originality.*

H3: Approach motivation positively predicts arousal (a) and cognitive flexibility (b), and arousal positively predicts cognitive flexibility (c).

If the first three hypotheses are supported, this suggests that social acceptance may positively predict creative performance (composed of fluency and originality), and that there may be a direct and/or mediated effect at work. The following hypothesis is formulated to investigate these relationships and whether they differ when social acceptance is gained, constant or lost.

H4: *Social acceptance positively predicts creative fluency (a) and originality (b), and gained social acceptance is a stronger predictor compared to constant or lost social acceptance (c, d).*

Figure 1

Conceptual model of social acceptance, approach motivation, arousal & creative

performance
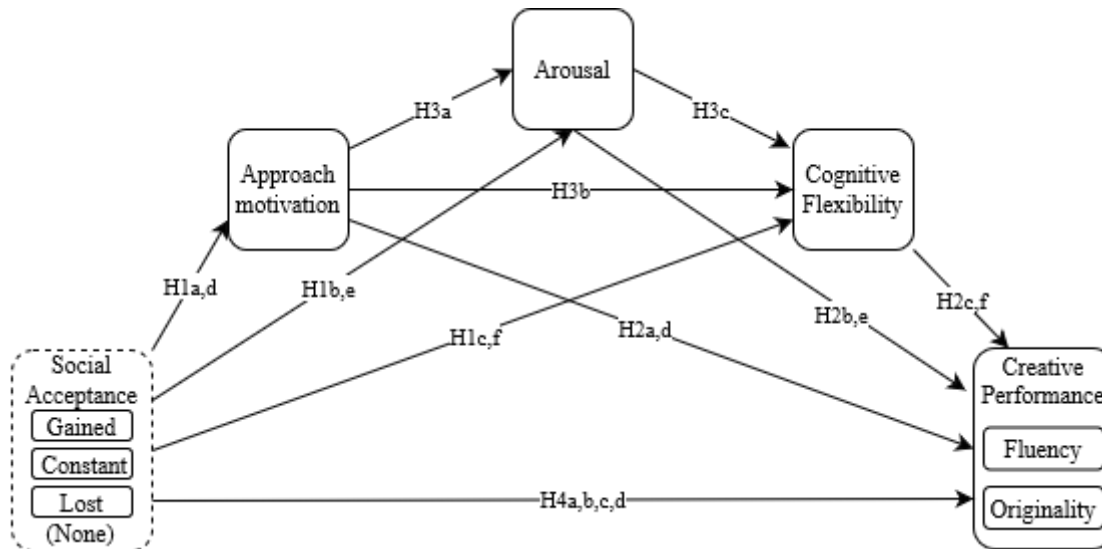
Note. The conceptual model was created in likeness of the statistical model of serial multiple

mediation (see method and results sections), in order to aim for high comprehensibility.

This study attempts to gain comprehensive insights into the described process by

testing the aforementioned hypotheses and obtain an answer to the following research

question.

RQ: "Can social acceptance, mediated by approach motivation, arousal and cognitive

flexibility, affect creative fluency and originality in ideation and does it matter whether social

acceptance is gained, constant or lost?"

3. Method

3.1 Design

This study set out to investigate whether social acceptance cues may cause a shift towards approach motivation that, mediated by arousal and cognitive flexibility, affects creative performance. In order to test the aforementioned hypotheses, an online experiment was conducted which involved a 4-minute ideation task guided by a chatbot that was programmed to manipulate social acceptance cues. Firstly, participants were randomly assigned to one of four *social acceptance* conditions (*gained, lost, constant* and *control*) in a between-subjects design. For the sake of brevity, the gained and lost conditions are frequently referred to as the SAG (social acceptance gained) and SAL (social acceptance lost) conditions in this chapter. Secondly, the dependent variable was creative performance which was determined by assessing the creative output of participants by *fluency* (counting ideas) and *originality* (scoring ideas by novelty). Thirdly, *approach motivation* was measured twice through self-report, once before the task and once directly after, in order to determine a possible shift. Lastly, *arousal* was determined by conducting within-subjects measurements based on self-reports and *cognitive flexibility* was assessed by analyzing the distribution of ideas over various categories. The mean differences between the repeated measures of every participant were then used to compare the conditions in a between-subjects design.

3.2 Participants

All participants were recruited by the method of convenience sampling through online channels such as the researcher's personal social environment and the scientific survey platform Prolific. Prolific is an online platform that was especially created for scientists and businesses to recruit reliable participants for various studies (Prolific, 2021). Participants are guaranteed fair treatment and pay for their efforts in exchange for delivering reliable data of the highest quality, in order to aim for high ethical standards in research (Prolific, 2021;

Damer, 2021). The compensation that participants received was determined based on the following factors.

This study, including the ideation task and the input that was required by the participants, was written in the English language. The Prolific platform (2021) describes several guidelines and best practices in order to aim for a positive experience for researchers and participants alike. For researchers, Prolific (2021) cautions that participants' insufficient language comprehension may result in biased data. Therefore, in order to decrease the chances of unusable or unreliable data due to a language barrier (and to prevent a possible unfair advantage in creative performance caused by a native speaker's superior linguistic ability) the recruited prolific participants were required to be fluent in the English language. In accordance with the ethical principles of the Prolific platform, the participants that were recruited using Prolific received fair or above average compensation for their participation. Taking into account that individuals of various nationalities (with varying perspectives on what is considered fair compensation) were allowed to participate, the wages were determined by consulting the work by Whiting, Hugh & Bernstein (2019) and adjusting for inflation. Consequently, based on the previously mentioned study and the wage calculation tool by Prolific (2021), the compensation for this study was set slightly above the highest possible minimum wage (out of the potential countries that a participant could be recruited from). Aside from the Prolific participants, all other participants took part in this study voluntarily without compensation. Furthermore, a participant was only allowed to participate once.

A total of 162 participants were recruited and, after initial examination of the data, 29 participants were excluded because a severe lack of responses made their data unfit for analyses. The remaining 133 participants completed the experiment and entered a sufficient amount of responses to be analysed. After preliminary analyses, the data of another 11 participants was excluded because manipulation checks revealed that the chatbot (see next

section) erred and regrettably failed to expose the participants to any experimental conditions.

The sample ($N = 122$) mainly consisted of participants from the United Kingdom ($n = 47$),

Portugal ($n = 23$), and Poland ($n = 11$). Additional insight into the sample, the current

residential countries of the remaining participants can be seen in Table 1. The mean age of

participants was 30 ($SD = 12,05$) and 59 of the participants identified as female and 3

preferred not to disclose their gender or did not identify as male or female.

Table 1

Participants per country of residence

Country	Participants	% of Total
UK	47	38,50%
Portugal	23	18,90%
Poland	11	9,00%
Greece	5	4,10%
Ireland	5	4,10%
Netherlands	5	4,10%
South Africa	4	4,10%
United States	5	4,10%
Italy	4	3,30%
Spain	3	2,50%
Canada	2	1,60%
Israel	2	1,60%
Mexico	2	1,60%
Belgium	1	0,80%
Czech Republic	1	0,80%
Finland	1	0,80%
Luxembourg	1	0,80%
Total	122	100%

3.3 Measures & Materials

3.3.1 Chatbot

Technological innovation has been a driving force behind advancement in many areas and has consequently provided new opportunities for scientific studies as well. In the field of creativity for instance, de Rooij, Corr & Jones (2017) successfully developed an interactive system that provides feedback in real-time about the originality of a user's ideas. In the last decade, several studies investigate the use of interactive systems such as chatbots (i.e., virtual agents) as a research topic, or as an alternative or complement to traditional research materials. This form of methodological innovation seems like a logical step in evolution of experiments as chatbots are increasingly pervasive in today's society (de Gennaro, Krumhuber & Lucas, 2020; Krämer et al., 2018). Research by de Gennaro, Krumhuber & Lucas (2020) showed that chatbots who have been programmed to be emphatic can be used to evoke feelings of social acceptance. Even more so, Krämer et al. (2018) found that interacting with chatbots can evoke similar feelings of acceptance as when reading a message from a loved one. It is clear that the anthropomorphic abilities of chatbots have developed rapidly in recent years to the point that they may even be able to act as a believable human research assistant. If this is indeed the case, this methodological innovation could be used to automate certain procedures that were previously only executable with the aid of a human agent. In other words, this development may make it possible to study social effects on creativity with larger samples and less resources. In this study, the use of a chatbot to simulate a collaborative ideation situation was chosen as an alternative to a human research assistant, and to the repetitively used self-report online questionnaires, in hopes of advancing methodological innovation in scientific research.

This study used a chatbot during an experiment to manipulate the social acceptance cues. The chatbot was purposefully developed by university personnel for experiments similar

to the one conducted in this study. In accordance with the grateful author of this paper, the chatbot was scrupulously tailored for this study by the academic developer and very kindly made available for use in this experiment during approximately two weeks (including pre-testing). The chatbot itself was programmed in Node.js, the conversational logs were saved in MongoDB and it ran via a HTTPS secured connection on the academic developer's specially assigned Raspberry Pi.

The chatbot conversational capacity was limited to pre-programmed script of social acceptance cues (i.e., fixed timing, order, content). In other words, the chatbot had to appear human without actually having the capacity for personalized interactional responses. Considering that the chatbot had the challenging task of acting as a human that was capable of evoking feelings of social acceptance, the work by Chaves & Gerosa (2020) on best-practices of chatbot interaction design was consulted. In order to increase the chatbot's social believability and human-likeness, several strategies that were congruent to the task and manipulation were utilized (e.g., politeness, consistent style, taking a natural amount of time to "type"). The frequency and volume of cues were difficult to determine as these factors are generally highly contextual. Chaves & Gerosa (2020) stated that longer conversations (i.e., 10 or more turns) are necessary for empathetic cues such as social acceptance or belongingness to take effect. As such, a total of 20 cues were dispersed over a task time of 240 seconds (4 minutes) with intervals ranging from 9 to 15 seconds. This meant that there were 10 cues equally divided over each half (120 seconds) of the task, which was important for the SAG and SAL conditions. This was deemed a sufficient amount of time between cues to mimic natural interaction and still prevent untimely and irrelevant messages that may evoke annoyance and suspicion (Chaves & Gerosa, 2020). In order to further increase the perceived interactiveness of a chatbot under these conditions, the cue of '...' appeared right before a textual cue, indicating 'your conversation partner is typing'. Chaves & Gerosa (2020) state

that a chatbot comes across as more human-like when it appears that they need time to type a sentence, and that this may be achieved by utilizing the '...' indicator with a delay of one or two seconds. Accordingly, this feature was included in the chatbot script. To test whether the chatbot made effective use of the aforementioned tactics, it was subjected to various tests prior to the experiment.

In order to assess the chatbot's ability to impersonate a human assistant while guiding participants through the ideation task and adequately manipulate social acceptance (see next sections), a pre-test was conducted with a pool of 20 participants. During the pre-test and the experiment itself, every participants' interaction log with the chatbot was stored anonymously on a secured laptop and, after data was checked and organized, this dataset was used for conducting the analyses in SPSS. In addition to conducting an analysis of the pre-test data, several participants were requested to retake the survey and provide imagery (see Figure 2) of their experiences in order to identify anything unintended that may have been overlooked.

Figure 2

Image of a conversation between the pre-test participant and the chatbot within the Qualtrics

survey environment.
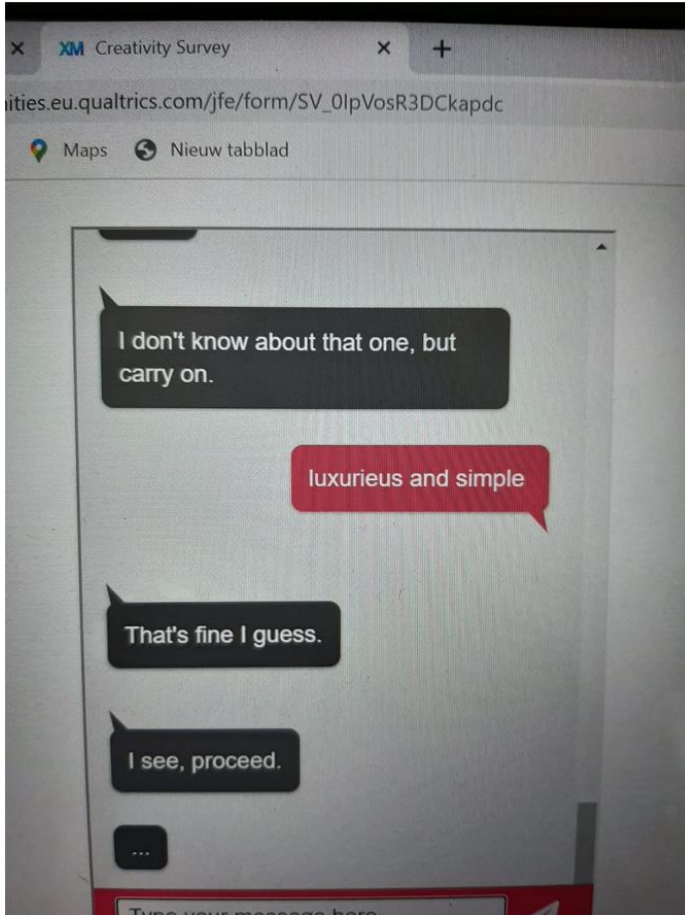
The pre-test analyses and imagery provided confidence that the chatbot and the entire procedure was working as intended. The pre-test participants were recruited through convenience sampling and were excluded from the main experiment. The results of the social acceptance cues analysis, the pretest of the cues and chatbot and the full chatbot text-based script were added as an appendix (see Appendix A), in order to aim for transparency and reproducibility. This section concisely described how the chatbot was utilized to manipulate social acceptance. More specific information is further described in the ensuing sections and in the appendices (e.g., Appendix A - Chatbot Script, Pretest & Analyses).

3.3.2 Ideation Task

The 4-minute ideation task required participants to type in as many original ideas as they could into the chatbot input field. This was deemed a sufficient amount of time to allow for displays of effort investment (Baas, De Dreu & Nijstad, 2008), and was comparable to the length of the ideation task in the study on approach motivation and creativity by Shao, Nijstad & Täuber (2018). Watts et al. (2019) demonstrated the importance of aligning an experimental creative task to be congruent with the situational context of the research. Therefore, the ideation task was designed to be more congruent with the simulated collaborative setting and chatbot environment, in order to facilitate effort investment, social acceptance and approach motivation. The chatbot, disguised as a research assistant, requested participants to engage in a collaborative client-agency ideation session in a business-like setting. This task required participants to type in as many alternative uses to interact with other people as they could, by solely using an ordinary object in the form of a newspaper (a more detailed description of the task was provided in the procedure section of this paper). This is a type of divergent thinking task that was slightly altered for the purpose of this study. This type of alteration to fit the context of experiment was also utilized in the study on approach motivation and malevolent creativity by Hao et al. (2020). However, Hao et al. (2020) admitted in their discussion that their creative task may have been too context-congruent and would therefore not be directly comparable to 'regular' creative tasks. Consequently, a tried and tested divergent thinking task that was appropriated to the situational (social) context was deemed to be the best fit for the current study. An alternative uses task (AUT) is commonly used in creativity research to simulate the idea generation phase of the creative process (Silvia et al., 2008). Additionally, this type of divergent thinking task has been shown to be feasible and reliable in an online setting (Hass, 2015). Although this divergent thinking task was slightly appropriated to fit the context of this study, the

aforementioned studies provided the confidence that the use of these particular AUT tasks were sufficiently substantiated in order to adequately perform the experiment as intended.

The task itself was framed in a pleasant tone (i.e., focus more on enjoyment rather than raw output) with not too much emphasis on creative performance. Based on the study by Watts et al. (2019), it was presumed that too much emphasis on performance would drive participants into utilizing the cognitive persistence pathway. Additionally, emphasizing goal achievement may positively influence creative output for avoidance-minded individuals through cognitive effort (Roskes, De Dreu & Nijstad, 2012). Watts et al. (2019) discussed that the way the task is framed in congruency with affect may influence creative output. A task that is framed as having high stakes with a focus on performance may be facilitated by high-arousal negative affect. Whereas a task that is framed to be less weighty (e.g., low to moderate stakes) may be more congruent with moderate-arousal positive affect (Watts et al., 2019). The aim of this study was to investigate whether creative performance could benefit from a shift to approach motivation (i.e., through the flexible cognitive pathway) induced by social acceptance cues (which are generally described in relation to positive affect). Therefore, driving participants toward utilizing the persistent cognitive pathway by framing the task in terms of performance (and risk hindering ideation through the flexible pathway) was deemed less desirable. Consequently, the task was situated in a business-like setting but framed to have less emphasis on performance with low to moderate stakes.

3.3.3 Social Acceptance Cues

The definition of social acceptance cues was established by reviewing recent literature and consequently adapting a definition by Nikitin & Freund (2018) and Lucas et al. (2010). In this study, social acceptance cues were defined as signs of validation, understanding and support of an interaction partner's needs. Similar to the acceptance sentences in the study by Lucas et al. (2010), words that were characterized as socially accepting (e.g., belong, we,

friendly, together) were included into the chatbot vocabulary. In order to verify whether these words adequately represented social acceptance, the latest version of the Linguistics Inquiry and Word Count (LIWC) dictionary was consulted. The LIWC2015 is a text-analysis software program that was especially developed by and for the scientific community. It conducts analyses based on a database of (stems of) words and their psychometric properties and was proven to provide valid results by many independent studies according to the creators (Pennebaker et al., 2015). Using the LIWC2015, words that had the highest psychometric value associated with social acceptance were selected. In order to determine the optimal word count for the desired social acceptance manipulation, the prosocial categories (e.g., Social processes, Personal pronouns) in the word count table were consulted. Pennebaker et al. (2015) stated that the word count is largely dependent on the context and should be taken as an estimate. Therefore, a word count roughly between 2 (Affiliation drive category) and 10 (Social processes category) was deemed adequate. Additionally, the textual social acceptance (responsiveness) cues as used in the study by Nikitin & Freund (2018) were utilized by having the chatbot provide feedback the participants' ideas in a manner that was positively toned and encouraging (e.g., "we think that's a great idea!"). It was anticipated that the combined utilization of these social acceptance cues, substantiated by the LIWC2015 dictionary, would provide for a strong operationalization of text-based acceptance cues (particularly in the absence of other cues such as physical or vocal gestures). This was deemed necessary because several recent studies on the topic of chatbots and social acceptance used avatars supported by facial and vocal expressions to induce feelings of social acceptance (Chaves & Gerosa, 2020; Lucas et al., 2019). Due to limited availability of time and resources, a text-based type of social acceptance cues was the most viable option of operationalization for this study. Despite this possible limitation, chatbots have shown to be capable of inducing feelings of social acceptance through textual cues that were indistinguishable from human agents (Krämer et

al., 2018). Additionally, it was found that virtual agents do not underperform compared to humans when it comes to the effective use of social influence tactics (Krämer et al., 2018). When it came to exerting normative social influence (e.g., social acceptance), there was no difference in persuasiveness when people were aware or unaware that they were interacting with a virtual agent (Lucas et al., 2019). In other words, chatbots are able to evoke a desire to gain social acceptance in their human interaction partners (Krämer et al., 2018).

In establishing whether the textual cues can consistently convey the desired social acceptance or neutral manipulation, the cues were subjected to rigorous testing. The cues were analysed for sentimental, semantic and emotional meaning through four separate textual analysis software providers (i.e., Meaningcloud, Text2Data, Komprehend and Paralleldots). The cues were analysed and altered based on the results, and analysed again. This process was repeated multiple times until at least three out of four (but mostly four) analysis software providers confirmed a high score on either neutral or social acceptance. The neutral cues proved significantly harder to verify than the social acceptance cues because it was difficult to determine what exactly is neutral in semantic, emotional and sentimental terms. Moreover, the cues could not consist of just any random words, they had to form coherent sentences of 2-10 words long that also made sense within the context of the task. A particularly high scoring neutral cue (i.e., "Okay, fine.") was eventually chosen to be used twice in order to replace a lower scoring cue and conserve time. Despite this challenge, cues with relatively high scores on neutrality were ultimately ascertained. To substantiate that the cues delivered the desired result even further, the aforementioned pre-test with 20 participants was conducted and delivered satisfactory results (see Appendix A A). Supported by the results of the analyses, the pre-test and aforementioned studies, there was confidence in the chatbot's ability to mimic as a human research assistant and successfully establish the following social acceptance conditions.

Social Acceptance Gained (SAG) condition. The chatbot responded with neutral cues to the participant's ideas in the first 2 minutes of the ideation task, and the participant "gained" social acceptance cues during the second 2 minutes of the ideation task. Participants in this condition were expected to experience a shift toward approach motivation and increased levels of arousal due to suddenly gaining social acceptance.

Social Acceptance Lost (SAL) condition. The chatbot provided social acceptance cues during the first 2 minutes and then switched to neutral cues during the second 2 minutes of the ideation task. Hence, the social acceptance that participants were exposed to was "lost". Neutral cues were chosen because an absence of cues was deemed as conceptually not the opposite of social acceptance, and may cause a participant to feel as if they were being ignored. It was considered unethical to expose the participants to the opposite of social acceptance (i.e., social exclusion cues), because this construct was not under investigation during this study. The literature was inconclusive on what happens in the event of a sudden absence of social acceptance in this situation. DeWall, Baumeister & Vohs (2008) stated that denying a person of social acceptance may intensify the desire for it. Molden et al. (2009) described that certain individuals may still react as if they were ignored (and possibly invest more effort, thereby increasing creative performance) and some would sense rejection (and become less active, more risk-averse and thereby lowering creative performance). However, if social acceptance cues cause a shift toward approach motivation and this stimulus suddenly stops, it may cause a shift away from approach motivation, causing less arousal, flexibility and creative performance.

Constant Social Acceptance condition. The chatbot provided a constant level of social acceptance cues during the entire 4 minutes of the ideation task. The individuals in this condition were expected to also experience approach motivation, however, they were deemed to react differently than the individuals in the SAG condition. The absence of a sudden

exposure of social acceptance was expected to cause lower levels of arousal (i.e., due to the absence of a shift), causing individuals to generate somewhat less diverse ideas for a slightly shorter time. In addition to lower arousal levels, satiating participants with social acceptance cues was also considered to lead to lessened desire to gain social acceptance and cause a decrease in effort investment and, consequently, reduced creative performance (DeWall, Baumeister & Vohs, 2008).

Control condition. The chatbot did not provide any cues associated with social acceptance during the 4 minutes of the ideation task. The control condition was deemed necessary in order to monitor changes in motivation orientation, arousal or cognitive flexibility without the social acceptance manipulation. By comparing any unexpected results with the control condition, they could possibly be explained by factors other than the social acceptance manipulation such as the ideation task or the interaction with the chatbot. The participants in the control condition were purposefully subjected to neutral cues as opposed to no cues. If cues were absent, it could be argued that the presence of the cues themselves and not the specific social acceptance manipulation was the reason for any effect.

3.3.4 Creative performance

The dependent variable creative performance was reflected by *fluency* and *originality* and was measured by adopting the methodology of Study 1 in the work by De Dreu, Baas & Nijstad (2008).

Fluency. Fluency was measured by counting the number of unique ideas per participant. Every idea in the dataset was provided with a timestamp, this made it possible to assess if the idea was entered in the first or second half of the task. Additionally, the ideas were also counted per 2 minutes of the task to be able to assess the differences per condition.

Originality. Originality was determined by having three independent raters (blind to all data but the ideas) rate every single idea in the dataset for originality (i.e., novelty within

the context of the task, see previous chapter). The raters were recruited through convenience

sampling and given comprehensive instructions. Raters were instructed to be wary of entries

that were not ideas (e.g., "Hello?", "…", "longest four minutes ever" and "I'm finished"),

these entries were to be assigned to separate categories and were later re-evaluated. If all

raters were in agreement about the invalidity of the idea in terms of the task, the idea was

excluded from any further analyses (including fluency). Including these entries was deemed

unfair to participants who put serious effort into the task. Consequently, this approach was

considered to most adequately assess the creative performance of participants and produce the

most accurate results (De Dreu, Baas & Nijstad, 2008).

The 122 participants provided a total of 967 entries. After invalid entries were

excluded from the dataset based on the aforementioned criteria, a total of 904 remaining ideas

were given a rating for originality (and categories, see next section). A codebook was

developed to provide the raters with the same guidelines for rating ideas in terms of

originality (see Appendix D – Codebook & Ratings Ideas). The codebook stated that ideas

were to be given a rating on a 1-5 scale, 1 being not original at all and 5 being very original

(identical to how originality ratings were established in the study by De Dreu, Baas & Nijstad,

2008). After three independent raters coded a subset of 50 ideas, the interrater agreement was

found to be of good consistency (k = .87, $p < .001$, 95% CI [0.835, 0.916]) and two raters

proceeded to rate all remaining ideas for originality (k = .78, $p < .001$, 95% CI [0.692,

0.866]). The average of the two ratings for each idea was then taken as the score for each idea

to increase the chance of establishing an originality score that was reasonably robust to the

risk of a single rater's bias. Finally, the participants' total originality rating and rating per 2

minutes of the task was then determined by calculating average scores.

3.3.5 Cognitive flexibility

Using the cognitive pathway model by De Dreu, Baas & Nijstad (2008), the ideas that were generated during the first versus the second part of the task were analyzed to see if a possible shift in motivation orientation coincided with cognitive flexibility. This study used social acceptance cues to manipulate motivation orientation, in a similar manner to Lucas et al. (2010), Nikitin & Freund (2018) and Park & Baumeister (2015). The social acceptance manipulation was adapted to fit within the 4-minute ideation task (see 3.3.2 Ideation task) and the digital environment of the chatbot (see 3.3.1 Chatbot). As described in 3.3.2, the ideation task differs between the first and second part in the SAG and SAL conditions. This means that during the SAG condition, the social acceptance cues that were gained in the second part of the ideation task should therefore mainly lead to ideas that were spread over more categories (a sign of cognitive flexibility). In other words, cognitive flexibility was measured by comparing the number of categories of the ideas in the first versus the second part of the task.

To assess whether the flexible cognitive pathway was used by participants in the ideation task, the methods of analysis used in this study were similar to those of De Dreu, Baas & Nijstad (2008), whom developed the dual-pathway model of creativity. In order to determine which cognitive pathway the participants used during the ideation task, their ideas were assigned to one of eight categories based on semantic difference according to the LIWC2015 dictionary (e.g., weapons & destruction, clothing & decoration, etc.). An indication of cognitive flexibility is when the ideas of participants are mainly spread across multiple categories and a more persistent cognitive pathway is reflected by within-category fluency (i.e., the number of ideas divided by the number of categories they originate from). Similar to the method in the study by Shao, Nijstad & Täuber (2018), three independent raters assessed flexibility by assigning categories in a subset of 50 ideas. After interrater agreement was determined to be good (k = .82, $p < .001$, 95% CI [0.720, 0.892], two raters proceeded to

assess all ideas for flexibility. After all ideas were rated individually, the dissimilar ratings were discussed amongst the raters and made congruous after agreement. In rare cases where the raters disagreed on which category to assign an idea, a third rater was consulted as a tiebreaker.

3.3.6 Motivational orientation

The motivational state of the participants was measured twice, once before the ideation task to set the standard and once after the task, in order to determine any changes in motivation orientation. Taber's (2018) article on the utilization and reporting of Cronbach's Alpha advises against solely using the alpha statistic to indicate reliability in research instruments. The article recommends that in the case of previously developed scales, providing context of earlier utilization in addition to reporting Cronbach's Alpha is preferable in terms of substantiating scale reliability and may be considered good research conduct. The items that were used to assess approach and avoidance motivation in the study by Shao, Nijstad & Täuber (2018) were similar to the items selected and utilized in this study. All of these items originate from the Behavioral Inhibition System (BIS) and Behavioral Activation System (BAS) scales by Carver & White (1994) and were described to have acceptable to good internal consistency. Eight items on a seven-point Likert scale (1 = not at all, 7 = very much) were ultimately adopted. The participants were asked to indicate whether they agree or disagree with statements such as "I feel worried when I think I have performed poorly at something", "When I want something, I usually go all-out to get it" and "I crave for excitement and new sensations".

The motivational orientation scale used in this study scored similarly in terms of reliability compared to the previously mentioned studies. It was successfully used in previous studies to measure approach motivation and may therefore be considered to be of acceptable to good internal consistency ($\alpha = .73$) according to Taber (2018).

3.3.7 Arousal

Arousal was measured by self-reports directly after the ideation task with three items that were adopted from Russell's (1980) Circumplex Model of Affect. The items were presented as a 7-point semantic differential scale, in which participants could indicate if they felt more *sleepy* (1) or *aroused* (7), more *bored (1)* or *excited (7)* and if they felt more *relaxed* (1) or *tense* (7). These three items were selected because they were described to most closely represent semantically opposed terms associated with arousal on the unidimensional scale of affect in A Circumplex Model of Affect by Russel (1980, pp. 1169). Participants were requested to answer once for the first two minutes of the ideation task and once for the second two minutes in order to be able to analyze if there was any relation between arousal and a shift in motivation orientation. Additionally, a manipulation check of arousal was added: "Did you feel a difference in your level of arousal between before and after the brainstorming role-playing game?". Participants were hereby provided with three options, namely, "*I felt more aroused in the first two minutes*", "*I felt more aroused in the second two minutes*", or "*my level of arousal did not change during the ideation task*".

Reliability testing on the collected data revealed that the third item, the Tense-Relaxed semantic differential scale, was not consistent with the other two scales ($\alpha = .45$). The values of this scale were compared with the manipulation check item and scrupulously investigated for (re)coding errors. After the manipulation check provided questionable congruence with the item and an absence of errors in the values was confirmed, the item was removed from the arousal scale. After excluding this item the scale was found to be of acceptable internal consistency ($\alpha = .67$) according to the guidelines as described by Taber (2018).

3.3.8 Additional measurements

Anthropomorphic likeness. A basic anthropomorphic characteristics and interaction measurements scale was added in the last part of the experiment. The scale was developed for

this study and was liberally based on the work on chatbot best practices by Chaves & Gerosa (2020). Through simple 'yes' or 'no' statements, it measured how the participant experienced the interaction with the chatbot based on a list of various characteristics (e.g., pleasant, natural, supportive). These items were added for several reasons: As additional manipulation checks for chatbot or survey software errors, to assess whether the chatbot was able to influence social acceptance, to cross-reference literature about chatbots with possible unexpected outcomes and, more importantly, in order to provide a small contribution to the knowledge on using chatbots as an innovative methodological tool in research.

   Manipulation checks and other measures. Additional items were added concerning the noticeability of the motivation orientation shift in an attempt to be able to further elaborate on the phenomenon. Several manipulation checks were also added, such as a direct inquiry of social acceptance (c.f. rejected). These questions were presented on a 7-point semantic differential scale, namely: "Do you feel you were successful (c.f. unsuccessful) at the ideation task?", "Did you feel socially accepted by the chatbot during the exercise?", "Were you sufficiently invested (c.f. indifferent) with the task at hand?". Additionally, open questions were added such as "Did anything hinder you from generating original ideas during the exercise?" and "How did you experience the interaction during the ideation task?", and multiple choice questions such as "Did you feel you were interacting with a Human (1) or Virtual (2) agent, or did you feel it could be Either (3)?" and "Did you sense a higher level arousal before (1) or after (3) the task, or was there no noticeable difference (2)?". In addition to shedding more light on a potential shift, these items were added to increase the possibility of linking any less expected findings to existing literature.

3.4 Procedure

   Participants were asked to click on a link that led them to a digital chat environment where they could interact with a research assistant and who was there to guide them through

the experiment. In reality, they clicked on a hyperlink that led to the chatbot environment that was especially created for this experiment. The chatbot first introduced itself as the research assistant and explained that it was there to help participants and guide them through the experiment. After informing participants about the terms of the study and acquiring their consent, the participants were asked to provide some general socio-demographic information (e.g., age, gender, country). The motivational state of the participants was then determined by conducting a self-report questionnaire of eight items. Unknowingly, the participants were randomly assigned to one of four social acceptance conditions (with conditions being presented randomly but equally to keep similarly sized groups). The participants were then provided instructions regarding the ideation task. This task consisted of a role play situation of a collaborative client-agency ideation session, similar to how real-life creative collaborations in a business-like setting are established (Emich & Vincent, 2020). Participants had to imagine being in the shoes of a content developer of a creative agency that engaged in an ideation session with a potential English client, a large newspaper. The large English newspaper aspired to keep up with the current times and wished they could engage into more of a dialog with their audience. They tasked the creative agency to come up with a large amount of creative ideas, which would serve as input for their strategy meeting in a later stage. The participant was told that they were assigned to engage in an ideation session with this client. In addition to generating creative ideas, the instruction was to take the relationship with the client into consideration as well, similar to how one would treat a client in an actual business-like setting. This was done in order to evoke a degree of task and social investment in the participants, similar to how Hao et al. (2018) designed their task. The content developer was then tasked to pitch as many creative ideas of interacting with other people by solely using a newspaper. During the ideation task, the chatbot (that was now posing as a human research assistant playing the role of the client) provided social acceptance cues (or not) as

described in the aforementioned sections. In other words, the client (i.e., chatbot) provided real-time (though pre-programmed) feedback to the creative ideas of the content developer (i.e., participant). Other than the social acceptance cue manipulations, the procedure was identical for all participants. Immediately following the ideation task the participants were asked to report their level of arousal as described in section 3.3.7. Motivational state was then measured for a second time in order to determine if any shift had occurred. The additional measures as formulated in section 3.3.8 were conducted. Then the researcher's contact information was provided should they have any questions, remarks, or in the event that they would like to receive findings after the study was concluded. The experiment was concluded by debriefing participants and thanking them wholeheartedly for their participation. The individuals that participated through the Prolific platform received their completion code, which they used to verify their participation and receive payment.

3.5 Analyses

Prior to any statistical testing, all data were explored, any errors were checked and corrected and scales were reverse coded where necessary. Internal consistency and interrater agreement were reported in the previous sections. This section describes how the variables, consisting of within-subjects measures that were compared in a between-subjects design, were prepared for the intended tests, the serial multiple mediation analyses (Hayes, 2014).

To summarize, the variables consisted of two within-subject self-reported measures (before and after the task) of *motivational orientation* and *arousal,* the participants' ideas were evaluated resulting in two within-subject measures for *originality*, *fluency*, and *cognitive flexibility*. The complexity of the current mixed (between-subjects of within-subjects repeated measures) design limited the number of suitable statistical analyses. Field (2018) describes that several analyses of (co)variances (ANCOVA) may be conducted sequentially in order to test such a model, however, caution is advised because this approach increases a risk of

inflated Type 1 errors (i.e., false positive significant results). In the current study, with three supposed mediators, this would mean multiple Bonferroni adjustments to counter significance inflation. Field (2018) suggests that, with multiple mediators and a multicategorical independent variable, a more suitable alternative is to conduct a mediation analysis with difference scores. In order to allow for an adequate between-subjects comparison of the conceptual model, the difference scores (i.e., the difference between measures before-after task and first-second half of the task for each participant) was calculated. To illustrate, the difference score for motivational orientation was calculated by subtracting the after from the before task score (*MotiOri_Aft_Tot - MotiOri_Bef_Tot = Motivation Orientation Difference*), meaning that a high score indicates a shift toward approach motivation. The use of difference scores has been under scrutiny in the past, however, Thomas & Zumbo (2012) found that this criticism was often unwarranted and that difference scores may be used, provided that there is a large enough sample size. According to Field (2018), when the results show small effect sizes, a mediation analysis with a multicategorical independent variable (further explained below) can produce equally valid results compared to an analysis of variances test, provided that there is a large enough sample size. Field (2018) suggests that, when it concerns a categorical predictor in Hayes' mediation analysis, 30 cases per category is generally advised in order to obtain valid results. The aforementioned studies provided confidence that a meditation analysis was the most appropriate statistical test for the current study and would produce accurate results with the current sample size. Hayes and Preacher (2014) confirmed that a mediation analysis with a multicategorical independent variable is the mathematical equivalent of an analysis of (co)variances, producing equally accurate estimations of effect between groups (i.e., one condition relative to another condition).

The conceptual model (see Figure 1) was tested with a mediation analysis by using Hayes' PROCESS model 6B (see Figure 2) twice, once with fluency and once with originality as a dependent variable.

Figure 2

Serial multiple mediation analysis, model 6B
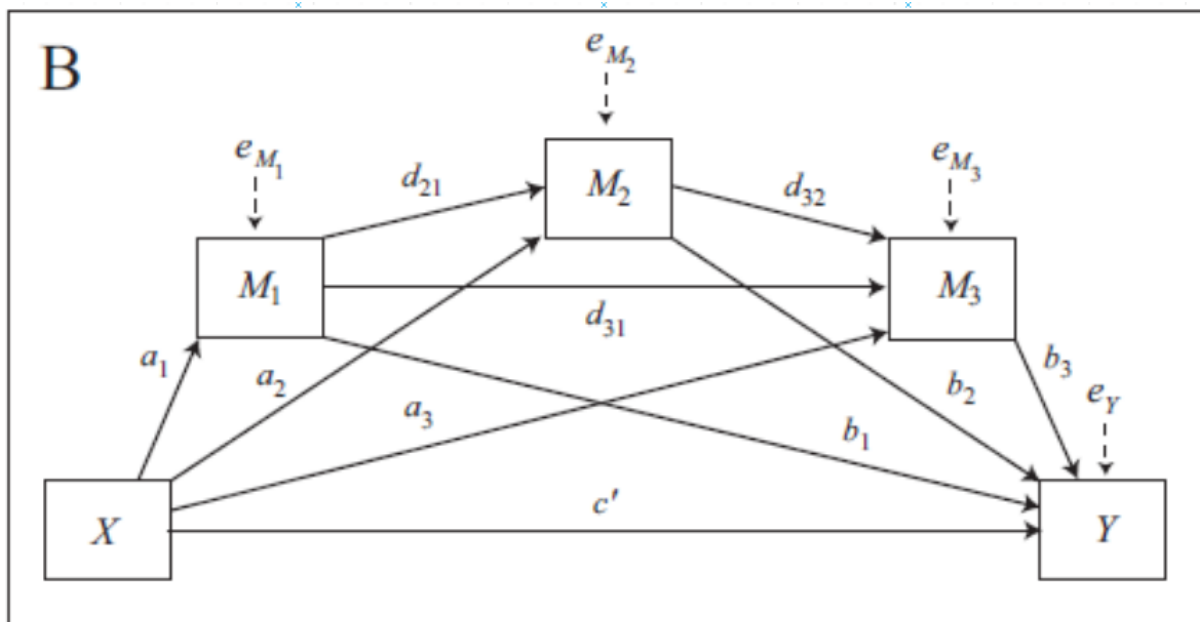
Note. Adapted from *Introduction to Mediation, Moderation, and Conditional Process Analysis, First Edition: A Regression-Based Approach (Methodology in the Social Sciences), by* A. F. Hayes, 2014, The Guilford Press.

Field (2018) states that a control group is commonly used in studies (e.g., clinical) as a baseline to compare with the experimental condition in the PROCESS mediation analysis. Hayes and Montaya (2017) suggest and even encourage that, when conducting a mediation analysis with a multicategorical independent variable, any condition of interest may be used as a comparison (i.e., indicator) against other conditions. As described earlier, there is preliminary evidence that gained social acceptance may have added beneficial effects on creative performance compared to constant, lost and no (control) social acceptance (i.e., social acceptance is a multicategorical independent variable with four conditions). Consequently, the group where social acceptance was *gained* was compared (i.e., used as an indicator in the

mediation analysis) to the *constant*, *lost* and *control* groups. Dummy coding of the variables was not necessary as the version of the PROCESS plugin (version 3.5.3) for SPSS, the software that was used for statistical analyses, includes an option that automates this coding process. In summary, when the results of comparisons between groups are presented in the next chapter, it concerns the results of the relative comparisons of *gained-constant*, *gained-lost* and *gained-control*.

All required assumption checks were performed prior to the analyses and were only reported when these assumptions were not met. Conclusively, the conditions were represented by roughly equal sample sizes and roughly equal variances and the data was normally distributed (see Appendix E - Checks and Additional Analyses).

4. Results

4.1 Descriptive statistics

A Pearson correlations matrix (see Table 2) was generated in order to gain general insights into the variables and the relationships between them. Furthermore, the means and standard deviations for every social acceptance condition was presented for every mediating and dependent variable (see Table 3), in order to provide preliminary insights into differences between the conditions. As established earlier, the difference scores represent the difference between the within-participants repeated measures (i.e., before vs. after task, and first half vs. second half of the task). Consequently, the mean difference scores per group suggest that gained social acceptance is a stronger positive predictor of fluency ($M = 1.17$, $SD = 2.33$) and originality ($M = 0.08$, $SD = 0.86$) compared to constant ($M = 1.17$, $SD = 2.33$, $M = 0.49$, $SD = 0.97$), lost ($M = -1.23$, $SD = 3.11$, $M = -0.44$, $SD = 0.91$) and no social acceptance ($M = -0.18$, $SD = 3.91$, $M = -0.16$, $SD = 0.85$), respectively. The results of the mediation analyses (see next sections) were interpreted to verify whether any effects and/or differences between groups were statistically significant. Age, gender and country had no significant correlation with the other variables and were not included in the results or further analyses.

Table 2a

Descriptive statistics and correlation matrix

	M (SD)	Fluency First Half	Fluency Second Half	Fluency Difference	Originality First Half	Originality Second Half	Originality Difference
Fluency First Half	3,96 (3,21)	-					
Fluency Second Half	3,96 (3,5)	,486**	-				
Fluency Difference	-14,52 (54,22)	-0,062	,673**	-			
Originality First Half	1,45 (0,68)	0,037	0,060	0,041	-		
Originality Second Half	1,25 (0,78)	,185*	,472**	,701**	,229*	-	
Originality Difference	-0,21 (0,91)	0,131	,361**	,570**	-,549**	,688**	-
Cognitive Flexibility First Half	2,41 (1,44)	,828**	,434**	-0,031	0,069	0,178	0,101
Cognitive Flexibility Second Half	2,25 (1,66)	,472**	,852**	,691**	0,132	,590**	,409**
Cognitive Flexibility Difference	-15,2 (54,37)	-0,008	,594**	,917**	0,077	,725**	,565**
Approach Motivation Before	4,07 (0,77)	-0,051	-0,055	-0,055	0,098	0,031	-0,046
Approach Motivation After	4,08 (0,83)	-0,115	-0,018	0,050	0,117	0,156	0,047
Approach Motivation Difference	0,01 (0,7)	-0,081	0,039	0,120	0,031	0,151	0,107
Arousal Before	3,49 (1,07)	-0,048	-0,142	-0,074	0,144	0,062	-0,054
Arousal After	3,64 (1,33)	-0,106	-0,051	0,040	0,155	,206*	0,061
Arousal Difference	0,16 (1,33)	-0,068	0,062	0,100	0,040	0,156	0,104

Notes. * $p < .05$ level (2-tailed). ** $p < .01$ level (2-tailed).

Table 2b

Descriptive statistics and correlation matrix

	Cognitive Flexibility First Half	Cognitive Flexibility Second Half	Cognitive Flexibility Difference	Approach Motivation Before	Approach Motivation After	Approach Motivation Difference	Arousal Before	Arousal After	Arousal Difference
Fluency First Half									
Fluency Second Half									
Fluency Difference									
Originality First Half									
Originality Second Half									
Originality Difference									
Cognitive Flexibility First Half	-								
Cognitive Flexibility Second Half	,460**	-							
Cognitive Flexibility Difference	-0,120	,730**	-						
Approach Motivation Before	-0,013	-0,039	-0,044	-					
Approach Motivation After	-0,065	0,028	0,076	,622**	-				
Approach Motivation Difference	-0,063	0,075	0,138	-,368**	,500**	-			
Arousal Before	-0,053	-0,165	-0,056	,188*	0,071	-0,123	-		
Arousal After	-0,072	-0,074	0,023	0,169	,400**	,287**	,397**	-	
Arousal Difference	-0,030	0,058	0,068	0,019	,342**	,385**	-,402**	,680**	-

Notes. * $p < .05$ level (2-tailed). ** $p < .01$ level (2-tailed).

Table 3

The means and standard deviations of the social acceptance conditions' difference scores for every mediating and dependent variable.

		Approach Motivation	Arousal	Cognitive Flexibility	Fluency	Originality
Social Acceptance	N	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Gained	31	0.2 (0.64)	0.63 (1.52)	0.2 (1.19)	1.17 (2.33)	0.08 (0.86)
Constant	27	0.1 (0.64)	0.25 (1.42)	-0.04 (1.43)	0.49 (3.83)	-0.28 (0.97)
Lost	35	-0.27 (0.85)	-0.2 (1.43)	-0.49 (1.84)	-1.23 (3.11)	-0.44 (0.91)
None (Control)	29	0.02 (0.48)	-0.02 (0.6)	-0.25 (1.86)	-0.18 (3.91)	-0.16 (0.85)

4.2 Manipulation checks

The results of the manipulation check of social acceptance compared by condition (see Appendix E) revealed that individuals who gained ($M = 4.61$, $SD = 1.05$) or were constantly ($M = 4.48$, $SD = 1.31$) exposed to social acceptance cues indicated higher social acceptance scores than those that lost ($M = 3.60$, $SD = 1.61$) or were not exposed to social acceptance ($M = 4.03$, $SD = 1.09$). Furthermore, social acceptance correlated significantly with the difference scores for motivational orientation, $r(122) = .224$, $p = .013$, and arousal, $r(122) = .385$, $p < .001$. This suggests that people who experienced social acceptance also experienced increased motivational orientation and arousal. Social acceptance also correlated significantly with the difference scores for cognitive flexibility, $r(122) = .184$, $p = .043$, and fluency, $r(122) = .183$, $p = .044$, but not for originality, $r(122) = .156$, $p = .086$. This suggests that people who

experienced social acceptance scored higher on cognitive flexibility and fluency, but not significantly higher on originality. The results of the social acceptance manipulation checks, the checks on whether the chatbot was a human or virtual agent, and the binary statements on anthropomorphic likeness, suggest that the chatbot effectively performed the social acceptance manipulation during the experiment. Additionally, the relatively successful manipulation of social acceptance, in combination with the chatbot checks, revealed that the earlier described chatbot conversation best practices were effective. For instance, although just 4 participants thought that they were chatting with a human agent, 34 out of the 122 participants indicated that it could have been either a human or virtual agent. Considering that the chatbot exclusively used textual cues and was not capable of any real interaction, the results showed that, on average, over one-third of participants indicated that the chatbot showed anthropomorphic likeness. The results of this test and the other checks and analyses that were performed were included in the appendices (see Appendix E). The results of the manipulation checks suggested that the (chatbot-induced) social acceptance manipulation had the intended effect on the participants.

The results of the hypothesis tests are in the next section. To test the hypotheses, two multiple mediation analyses were conducted (once for fluency and once for originality) by using Hayes' PROCESS model 6b (Hayes, 2014). Significant results were visualized in the conceptual model (see Figure 3).

4.3 Hypothesis tests

4.3.1 Social acceptance positively predicts approach motivation (a), arousal (b) and cognitive flexibility (c), and gained social acceptance is a stronger predictor compared to constant or lost social acceptance (d, e, f).

The first hypothesis states that social acceptance has a positive effect on the mediating variables of approach motivation, arousal and cognitive flexibility, and that this effect is

stronger when it is gained compared to when social acceptance is constant or lost. The results presented in Table 3 provide preliminary insights into differences between the social acceptance conditions for each of the mediating and dependent variables. These results suggest that gained social acceptance is more positively related to approach motivation ($M =$ 0.2, SD = 0.64), arousal (M = 0.63, SD = 1.52) and cognitive flexibility (M = 0.2, SD = 1.19), compared to constant (M = 0.1, SD = 0.64, M = 0.25, SD = 1.42, M = -0.04, SD = 1.43), lost (M = -0.27, SD = 0.85, M = -0.2, SD = 1.43, M = -0.49, SD = 1.84) and no social acceptance (M = 0.02, SD = 0.48, M = -0.02, SD = 0.6, M = -0.25, SD = 1.86) respectively.

In order to test the first hypothesis, the group that gained social acceptance was compared relative to the groups that were exposed to constant, lost and no (i.e., control) social acceptance. A mediation analysis was conducted to find out if social acceptance positively predicted approach motivation (H1a), arousal (H1b) and cognitive flexibility (H1c), and whether gained social acceptance is a stronger predictor of these variables compared to the other groups (H1d, H1e, H1f). The results presented in Table 4 show that, relative to lost social acceptance, gained social acceptance is positively related to approach motivation (b = -.46, SE = 0.17, p < .001) and cognitive flexibility (b = -1.36, SE = 0.59, p = .022). There was no significant effect of gained social acceptance on approach motivation or cognitive flexibility relative to constant or no social acceptance. Additionally, gained social acceptance did not significantly affect arousal when compared to the other groups. This suggests that individuals that gained social acceptance experienced a shift towards approach motivation and increased cognitive flexibility when compared to individuals that lost social acceptance. However, the individuals that gained social acceptance did not experience a shift toward approach motivation, increased arousal or increased cognitive flexibility any more than the individuals that were exposed to constant or no social acceptance. Considering that gained social acceptance did not lead to a positive effect compared to an absence of social acceptance

(i.e., control), this suggests that gaining social acceptance during ideation does not particularly lead to approach motivation, increased arousal or cognitive flexibility. To verify whether this is indeed the case, two additional mediation analyses were conducted with the lost social acceptance group as a reference group (i.e., indicator, to be compared with the other conditions) and one with the control group (no social acceptance) as an indicator. The results of the analysis with the control group indicator confirmed that there were no significant differences between the groups, and the analysis with the lost group as an indicator confirmed the significant lost-gained differences that were earlier described. Despite the fact that gained or lost social acceptance do not significantly differ from no social acceptance, the significant differences between gained and lost social acceptance provide initial evidence of a shift towards (or away from) approach motivation. The results show that gained social acceptance does not significantly differ from constant or lost, therefore, the first hypothesis was rejected.

Table 4

Relative direct effects of social acceptance on approach motivation, arousal and cognitive flexibility

	Social Acceptance			
	Constant	Lost	Control	
Hypothesis	($N = 27$)	($N = 35$)	($N = 29$)	Result
H1a	$b = -.10$, $SE = 0.18$, $p = .103$	$b = -.46$, $SE = 0.17$, $p < .001*$	$b = -.18$, $SE = 0.18$, $p = .303$	Partially Rejected
H1b	$b = -.10$, $SE = 0.32$, $p = .323$	$b = -.10$, $SE = 0.31$, $p = .106$	$b = -.52$, $SE = 0.32$, $p = .107$	Rejected
H1c	$b = -.31$, $SE = 0.61$, $p = .622$	$b = -1.36$, $SE = 0.59$, $p = .023*$	$b = -.64$, $SE = 0.60$, $p = .292$	Partially Rejected

Note. * Indicates significance at the < .05 level, social acceptance group comparison with gained as a reference group.

4.3.2 Approach motivation (a, d), arousal (b, e) and cognitive flexibility (c, f) positively predict creative fluency and originality.

A mediation analysis was performed to test the effect of social acceptance on fluency (a, b, and c) and originality (d, e, and f) mediated by either approach motivation (H2a, H2d), arousal (H2b, H2e) or cognitive flexibility (H2c, H2f). The results show that increased approach motivation and arousal have no significant direct effect on fluency and originality (see Table 5) and these hypotheses were rejected.

A significant positive direct effect of cognitive flexibility on both fluency ($b = 1.50$, $SE = 0.13$, $p < .001$) and originality ($b = 0.17$, $SE = 0.50$, $p < .001$) was found. This suggests that cognitive flexibility positively predicts fluency and originality. In other words, these results indicate that individuals that experienced increased cognitive flexibility showed increased creative fluency and originality (more ideas and more original ideas). Therefore, these hypotheses (H2c, H2f) are supported.

Table 5

Results of the direct effects of approach motivation, arousal or cognitive flexibility on fluency

and originality.

Hypothesis	Outcome	Result
H2a	$b = -0.18, p = .591$	Rejected
H2b	$b = 0.12, p = .501$	Rejected
H2c	$b = 1.50, p < .001*$	Supported
H2d	$b = 0.02, p = .847$	Rejected
H2e	$b = 0.03, p = .672$	Rejected
H2f	$b = 0.17, p < .001*$	Supported

Note. * Indicates significance at the $< .05$ level

4.3.3: Approach motivation positively predicts arousal (a) and cognitive flexibility (b), and arousal positively predicts cognitive flexibility (c).

The results of the mediation analyses show no significant direct or indirect effect of approach motivation on cognitive flexibility, and no direct effect of arousal on cognitive flexibility (see Table 7). Considering that the analyses were conducted based on difference scores, this suggests that an increase in approach motivation (H3b) or arousal (H3c) do not positively predict increased cognitive flexibility, and these hypotheses were rejected. A significant positive direct effect of approach motivation on arousal was found ($b = .68, SE = 0.17, p < .001$), indicating that increased approach motivation positively is related to

increased arousal. These results suggest that individuals that experienced a shift toward approach motivation also experienced increased arousal. Therefore, this hypothesis (H3a) was supported.

Table 6

Relative direct effect of approach motivation on arousal and cognitive flexibility

Hypothesis	Outcome	Result
H3a	$b = .68, p < .001*$	Supported
H3b	$b = .02, p = .358$	Rejected
H3c	$b = .02\ p = .855$	Rejected

Note. *Indicates significance at the $< .05$ level

4.3.4: Social acceptance positively predicts creative fluency (a) and originality (b), and gained social acceptance is a stronger predictor compared to constant or lost social acceptance (c, d).

The mediation analyses showed significant relative total effects of gained social acceptance on both fluency ($b = -.1.36$, $SE = 0.59$, $p = .024$) and originality ($b = -.52$, $SE = .23$, $p = .022$). This suggests that the individuals that gained social acceptance did experience some kind of beneficial effect that resulted in increased creative performance compared to the other groups. However, aside from the significant total effects for the gained-lost group comparisons, no other significant direct or indirect effects were found (see Table 7). The additional mediation analyses with the control and lost groups as an indicator show no significant effects. These results suggest that gained social acceptance has a positive effect on

originality, however, that this effect may not be caused by the proposed mediated process. These results indicate that, overall, social acceptance does not positively predict fluency and originality, therefore, hypothesis 4 was rejected.

Table 7

Results of the direct effect of gained, constant and social acceptance on fluency and originality

	Social Acceptance			
	Constant	Lost	Control	
Hypothesis	($N = 27$)	($N = 35$)	($N = 29$)	Result
H4a,c	$b = -.31, p = .185$	$b = -1.36, p = .024*$	$b = -.14, p = .535$	Partially Rejected
H4b,d	$b = -.31, p = .615$	$b = -.52, p = .022*$	$b = -.64, p = .293$	Rejected

Note. * Indicates significance at the $< .05$ level

Figure 3

Significant results of the mediation analyses visualized in the conceptual model
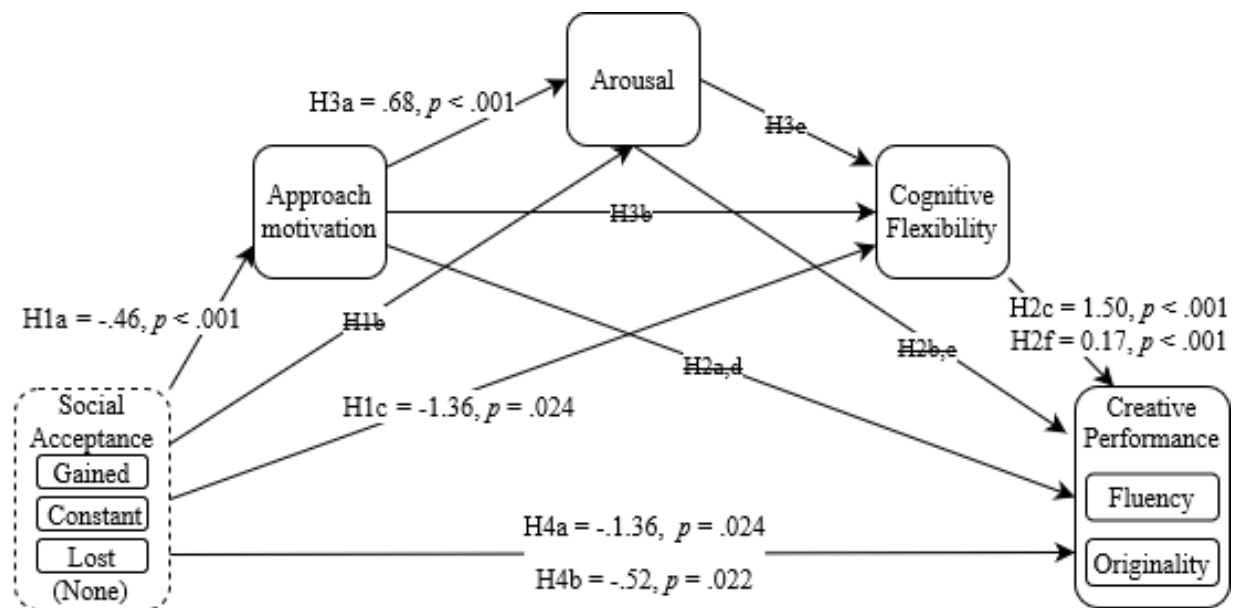
5. Discussion & Conclusion

The aim of this thesis was to examine whether social acceptance, mediated by approach motivation, arousal and cognitive flexibility, affects creative performance (composed of fluency and originality). Another aim was to investigate whether gained social acceptance is a stronger predictor of approach motivation, arousal, cognitive flexibility and creative performance compared to constantly provided or lost social acceptance. By answering this question, this thesis aims to advance knowledge on this topic and to describe how these insights may be used to enhance creative performance. In an online experiment conducted among 122 participants, divided across four roughly equal groups, a chatbot provided either social acceptance or neutral cues during a 4-minute ideation task. The chatbot provided social acceptance cues for either the duration of the task (constant), only in the first 2 minutes (lost), only the second 2 minutes (gained) or only neutral cues (control).

5.1 Main findings

The results of the experiment show that social acceptance does not affect approach motivation, arousal, cognitive flexibility, fluency or originality. However, this study was able to produce initial evidence that social acceptance cues cause (a shift toward) approach motivation, in accordance with the findings of Lucas et al. (2010), Nikitin and Freund (2018), and Park and Baumeister (2015). In general, this study was unable to confirm a significant positive effect of gained social acceptance, except for when compared to lost, which was anticipated because of increased arousal and congruence with approach motivation (Cudo et al., 2018; DeWall, Baumeister & Vohs, 2008; Leone, Perugini & Bagozzi, 2005). This suggests that social acceptance cues are not particularly better than neutral cues in ideation, but that gained social acceptance may cause a shift towards approach motivation, and lost social acceptance causes a shift away from it. Interestingly, despite the absence of all other hypothesized relation or effects, the individuals that gained social acceptance did show

increased creative performance. This suggests that the experiment did have an effect on the participants, but that the suggested mediation model is perhaps not the correct causal process. Contrary to previous work, no evidence was found for the link between approach motivation and cognitive flexibility (Cudo et al., 2018; Leone, Perugini & Bagozzi, 2005). In accordance with previous findings, approach motivation was positively related to arousal and cognitive flexibility had a positive effect on both creative fluency and originality, however, contrarily, the (mediated) effect of arousal on cognitive flexibility or creative performance was not found (Baas, De Dreu & Nijstad, 2008; De Dreu, Baas & Nijstad, 2008; Hao et al., 2020; Watts et al., 2019).

5.2 Limitations and future work

The results show several inconsistencies compared to the findings from previous studies. Despite this, there is still a high level of confidence in the methodological choices that were made, save one exception. The role of arousal has been considerable in earlier work, therefore, the absence of any effect is surprising. In fact, the results would be consistent with most of the work mentioned in the former section if there was an effect of arousal on cognitive flexibility. Some possible explanations are provided.

One explanation may originate from the reliability of the arousal scale, which was questionable, even after removing 1 of the 3 items to increase internal consistency. This unreliability was unexpected, as an often utilized arousal semantic differential scale was used, which was shown to provide reliable results by Russel (1980). A pretest could have revealed any reliability issues of the scale before the experiment, and would have made me choose a different scale.

The combined insights suggest that there may also be some theoretical explanation, as the results indicate that approach motivation has a positive effect on arousal (within relatively normal levels). An increase in arousal may be caused by an 'actual shift in motivation

orientation', by the suddenness or unexpectedness of a cognitive shift (i.e., as a reaction to a stimulus) or from the anticipation of the gain (caused by social acceptance from the standpoint as an essential human need). Although these options are conceptually slightly different, the theoretical outcome may be considered important. It may be interesting for future studies to further investigate this topic, provided that they have a reliable scale for measuring arousal.

In hindsight, I am fairly confident that there is no other methodological reason to question internal validity. For instance, I stand by my choice to use neutral (vs. no) cues to compare with social acceptance. Substantiated by Chaves and Gerosa's (2018) elaborate description of factors that can influence chatbot conversation, I am convinced that an absence of cues would have resulted in an absence of valid causal relationships. I am confident that the operationalization of social acceptance (and neutral) cues was adequately established (see Appendix A), however, the effect of textual cues may still be too subtle. This may explain why most recent studies utilize other cues in addition to text (Chaves & Gerosa, 2020; Lucas et al., 2019). Chatbots have been reported to evoke strong feelings in humans (Krämer et al., 2018) and do not necessarily underperform when it comes to evoking social acceptance (Lucas et al., 2019). Based on the chatbot conversation best practices by Chaves & Gerosa (2020) the chatbot made optimal use of the available resources (e.g., interactiveness, human-likeness) Nevertheless, the chatbot may have just not been sufficiently capable to evoke social acceptance, or at least not relative to a neutral baseline. In this case, Hayes' mediation model required a categorical predictor of three or more groups to be compared against a baseline, therefore, as recommended by Field (2018), the control group was chosen as a baseline for social acceptance. If time was a more plentiful resource for this researcher, it would have been interesting to use the data of excluded participants (where the chatbot failed to provide any cues) as an alternative control group.

In addition to the chatbot, there may have been limitations regarding the task. Although the literature is unclear about this, the way the task was formulated may not have been congruent with approach motivation. Based on the study by Watts et al. (2019), it was presumed that too much emphasis on performance would drive participants into utilizing the cognitive persistence pathway, congruent with avoidance motivation (i.e., the opposite of the intended manipulation). Conversely, putting more emphasis on the goal of the task may also be congruent with approach motivated individuals through a focus on an anticipated gain (Leone, Perugini & Bagozzi, 2005). It may be interesting for future studies on ideation to examine whether a task that is formulated in congruence with motivation orientation can enhance creativity.

5.3 Implications

In conclusion, this study is one of the first to examine the relation between social acceptance, approach motivation, cognitive flexibility and arousal, and their effect on creative performance. The findings confirm that a shift toward approach motivation comes with increased levels of arousal. Additionally, the findings align with previous studies and show that cognitive flexibility is beneficial to creative fluency and originality in ideation. Lastly, this study contributes to methodological innovations in academia by showing that chatbots may be used to establish experimental conditions.

Preregistration

The methods and research question of this research study were pre registered before data collection took place. Through preregistration of this study, the author aims to contribute to transparency and reproducibility in academia. The author declares that this preregistration was established at the Center for Open Science on June 12th, 2021, before data collection and analyses were conducted (DOI: 10.17605/OSF.IO/P4WEU). Additionally, the preregistration entry and hyperlinks were added as appendix to this paper (see Appendix C - Preregistration COS 120621).

Potential Conflict of Interest

No potential conflict of interest was reported by the author of this paper.

Acknowledgements

References

Baas, M., Roskes, M., Sligte, D., Nijstad, B. A., & De Dreu, C. K. (2013). Personality and creativity: The dual pathway to creativity model and a research agenda. *Social and Personality Psychology Compass*, *7*(10), 732-748.

Blok, B. Z. (2020). creatIef, Creatiever, creaTiefst? Onderzoek naar het belang en de werking van creativiteitstraining bij Bachelor of ICT-studenten. *Research in Organizational Behavior*, *36*, 157-183.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. *Journal of personality and social psychology*, *67*(2), 319.

Cropley, A. (2006a). In praise of convergent thinking. *Creativity Research Journal, 18*, 391–404.

Cropley, A. (2006b). Creativity: A social approach. *Roeper Review*, *28*(3), 125-130.

Cudo, A., Francuz, P., Augustynowicz, P., & Stróżak, P. (2018). The effects of arousal and approach motivated positive affect on cognitive control. An ERP study. *Frontiers in human neuroscience*, *12*, 320.

Damer, E. (2021, May 9). Stop using MTurk for research. Prolific. https://blog.prolific.co/stop-using-mturk-for-research/

De Dreu, C. K., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the mood-creativity link: toward a dual pathway to creativity model. *Journal of personality and social psychology*, *94*(5), 739.

De Gennaro, M., Krumhuber, E. G., & Lucas, G. (2020). Effectiveness of an empathic chatbot in combating adverse effects of social exclusion on mood. *Frontiers in psychology, 10*, 3061.

DeWall, C. N., Baumeister, R. F., & Vohs, K. D. (2008). Satiated with belongingness? Effects of acceptance, rejection, and task framing on self-regulatory performance. *Journal of personality and social psychology, 95*(6), 1367.

Emich, K. J., & Vincent, L. C. (2020). Shifting focus: The influence of affective diversity on team creativity. *Organizational Behavior and Human Decision Processes*, *156*, 24-37.

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage edge.

Friedman, R. S., & Förster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of personality and social psychology*, *81*(6), 1001.

Gabora, L. (2010). Revenge of the "neurds": Characterizing creative thought in terms of the structure and dynamics of memory. *Creativity Research Journal*, *22*(1), 1-13.

Gabora, L., & Kaufman, S. B. (2010). Evolutionary approaches to creativity.

Hayes, A. F. (2014). *Introduction to Mediation, Moderation, and Conditional Process Analysis, First Edition: A Regression-Based Approach (Methodology in the Social Sciences).* The Guilford Press.

Hayes, A. F., & Montoya, A. K. (2017). A tutorial on testing, visualizing, and probing an interaction involving a multicategorical variable in linear regression analysis. *Communication Methods and Measures, 11*(1), 1-30.

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British journal of mathematical and statistical psychology*, *67*(3), 451-470.

Hao, N., Qiao, X., Cheng, R., Lu, K., Tang, M., & Runco, M. A. (2020). Approach motivational orientation enhances malevolent creativity. *Acta psychologica*, *203*, 102985.

Hass, R. W. (2015). Feasibility of online divergent thinking assessment. *Computers in Human Behavior*, *46*, 85-93.

Krämer, N. C., Lucas, G., Schmitt, L., & Gratch, J. (2018). Social snacking with a virtual agent–On the interrelation of need to belong and effects of social responsiveness when interacting with artificial entities. *International Journal of Human-Computer Studies*, *109*, 112-121.

Leone, L., Perugini, M., & Bagozzi, R. (2005). Emotions and decision making: Regulatory focus moderates the influence of anticipated emotions on action evaluations. *Cognition & Emotion*, *19*(8), 1175-1198.

Lucas, G. M., Lehr, J., Krämer, N., & Gratch, J. (2019, July). The effectiveness of social influence tactics when used by a virtual agent. *In Proceedings of the 19th ACM International Conference on Intelligent Virtual Agents* (pp. 22-29).

Lucas, G. M., Knowles, M. L., Gardner, W. L., Molden, D. C., & Jefferis, V. E. (2010). Increasing social engagement among lonely individuals: The role of acceptance cues and promotion motivations. *Personality and Social Psychology Bulletin*, *36*(10), 1346-1359.

Molden, D. C., Lucas, G. M., Gardner, W. L., Dean, K., & Knowles, M. L. (2009). Motivations for prevention or promotion following social exclusion: being rejected versus being ignored. *Journal of personality and social psychology*, *96*(2), 415.

Mumford, M. D., & McIntosh, T. (2017). Creative thinking processes: The past and the future. *The Journal of Creative Behavior*, *51*(4), 317-322.

Otten, S., Schaafsma, J., & Jansen, W. S. (2018). Inclusion as a pathway to peace: The psychological experience of exclusion and inclusion in culturally diverse social settings. *Peace ethology: Behavioral processes and systems of peace,* 35.

Pan, X., & Yu, H. (2018). Different effects of cognitive shifting and intelligence on creativity. *The Journal of Creative Behavior*, *52*(3), 212-225.

Park, J., & Baumeister, R. F. (2015). Social exclusion causes a shift toward prevention motivation. *Journal of Experimental Social Psychology*, *56*, 153-159.

Paulus, P. B., & Yang, H. C. (2000). Idea generation in groups: A basis for creativity in organizations. *Organizational behavior and human decision processes*, *82*(1), 76-87.

Pennebaker, J. W., Boyd, R. L., Jordan, K., & Blackburn, K. (2015). *The development and psychometric properties of LIWC2015*.

PricewaterhouseCoopers. (2019). *De verschuiving van vaardigheden: een analyse van de evolutie van onze competenties*. https://www.pwc.nl/nl/assets/documents/de-tektoniek-van-vaardigheden.pdf

Prolific | *Online participant recruitment for surveys and market research*. (2021). Prolific. https://www.prolific.co/

Roskes, M., De Dreu, C. K., & Nijstad, B. A. (2012). Necessity is the mother of invention: avoidance motivation stimulates creativity through cognitive effort. *Journal of personality and social psychology*, *103*(2), 242.

de Rooij, A., Corr, P. J., & Jones, S. (2017, June). Creativity and emotion: Enhancing creative thinking by the manipulation of computational feedback to determine emotional intensity. In *Proceedings of the 2017 ACM SIGCHI Conference on Creativity and Cognition* (pp. 148-157).

Russell, J. A. (1980). A circumplex model of affect. *Journal of personality and social psychology*, *39*(6), 1161.

Shao, Y., Nijstad, B. A., & Täuber, S. (2018). Linking self-construal to creativity: The role of approach motivation and cognitive flexibility. *Frontiers in psychology*, *9*, 1929.

Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., ... & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: exploring the

reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts, 2*(2), 68.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. Research in science education, 48(6), 1273-1296.

Thomas, D. R., & Zumbo, B. D. (2012). Difference scores from the point of view of reliability and repeated-measures ANOVA: In defense of difference scores for data analysis. *Educational and Psychological Measurement*, *72*(1), 37-43.

Wallas, G. (1926). *The art of thought*. London, UK: Jonathan Cape

Watling, C., Driessen, E., van der Vleuten, C. P., Vanstone, M., & Lingard, L. (2012). Understanding responses to feedback: the potential and limitations of regulatory focus theory. *Medical education*, *46*(6), 593-603.

Watts, L. L., McIntosh, T. J., Gibson, C., Mulhearn, T. J., Medeiros, K. E., Mecca, J. T., & Cohen-Charash, Y. (2020). Mild affective shifts and creativity: Effects on idea generation, evaluation, and implementation planning. *The Journal of Creative Behavior*, *54*(4), 985-1001.

Whiting, M. E., Hugh, G., & Bernstein, M. S. (2019, October). Fair work: Crowd work minimum wage with one line of code. In *Proceedings of the AAAI Conference on Human Computation and Crowdsourcing* (Vol. 7, No. 1, pp. 197-206)

Zabelina, D. L., Colzato, L., Beeman, M., & Hommel, B. (2016). Dopamine and the creative mind: Individual differences in creativity are predicted by interactions between dopamine genes DAT and COMT. *PloS one*, *11*(1), e0146768.

Appendices

Appendix A – Chatbot Script, Pretest & Analyses

Hyperlink to attachment or Google Drive

Appendix B - Instructions & Consent Form

Hyperlink to attachment or Google Drive

Appendix C - Preregistration COS 120621

Hyperlink to attachment or Google Drive

Appendix D – Codebook & Ratings Ideas

Hyperlink to attachment or Google Drive

Appendix E - Checks and Additional Analyses

Hyperlink to attachment or Google Drive