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The Role of Schema (in)Consistency on Idea Generation:

Does Personal Need of Structure moderate this

relationship?

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Acknowledgements

Dear reader,

Before you start reading this thesis, you must know that lots of blood was shed, many tears were dropped, and many sleepless nights were spent in order to provide this study to your noble presence. The journey of writing my thesis was quite challenging. There were times that I was close to losing my hope as it seemed like this journey would never end. However, I was lucky enough to have people who reminded me that the journey of a thousand miles starts with one single step. Thanks to those people, now I am able to write these sentences as I arrived at the thousandth mile. Firstly, I would like to thank my parents Özlem and Erkan Hiçyılmaz for their infinite mental and financial support. Secondly, I want to mention how glad I am to have Cemre Doğru, Jesse van Dijk, and Necati Alp Çelebi as my friends considering they were always there to support me during this journey. Thirdly, I really appreciate my colleagues Ryon Matton and Evripidis Thymelis for their support and collaboration. Furthermore, another thanks go to my supervisor Simone Ritter as she supported me with her feedbacks and helped me to improve my academical writing skills. Lastly, special thanks to Serra Şalom as she was my lighthouse to reach the thousandth mile and she guided me when I felt lost.

ABSTRACT

Customer co-creation is a vital process for new product development. An efficient way of gathering ideas from customers is through internet as it allows firms to reach people from all over the world. By using internet, companies organize online idea contest to encourage customers to co-create with the firm and come up with a creative idea. However, it is not always easy for firms to gather creative ideas from the customers. Prior research shows that exposure to schema (in)consistencies enhance the creativeness and flexibility of ideas. Specifically, this study investigates the role of schema (in)consistencies on the quality (creativeness and flexibility) and quantity (number of ideas generated) of idea generation. Moreover, Personal Need of Structure (PNS) of the customers is taken into account as a moderator of the relationship between schema exposure and idea generation for new product development. The results of this study indicate that there is no effect of schema (in)consistent pictures on idea generation. Furthermore, no moderation effect was found for PNS. However, it was found that PNS has a main effect on flexibility and the number of ideas generated. Thus, customers with low PNS are able to generate more flexible and higher number of ideas. An important implication of the results of this study is that customers with low PNS can bring additional value during the co-creation process.

1. INTRODUCTION

Nowadays organizations are performing and competing in a highly complex and challenging global environment (Friedman, 2005; Friedman, 2011). In order to acquire a superior position in this environment and obtain competitive advantage, firms need to focus on innovation (Ramadani & Gerguri, 2011). Thus, innovativeness of the firm plays a vital role in achieving greater performance (Gronum, Verreynne, & Kastelle, 2012). Although the significance of discovering promising ideas is well recognized, firms still fail to utilize all of the established idea sources in their innovation process (Witell, Kristensson, Gustafsson, & Löfgren, 2011). Specifically, firms often delegate the idea generation task to manufacturers (Lilien, Morrison, Searls, Sonnack, & von Hippel, 2003), even though consumers are also capable and willing to generate novel ideas that can satisfy the unmet needs of the market and improve existing goods and services (Ernst, Hoyer, Krafft, & Soll, 2010).

Co-creation allows organizations to involve consumers in generating innovative and novel ideas. Co-creation process takes place in the Fuzzy Front End of new product development in which idea generation and idea screening are executed (Filieri, 2013). Fuzzy front end of new product development is one of the most challenging processes to manage due to the high level of uncertainty and lack of information (Tidd & Bessant, 2009). By providing active communication between consumers and firms, co-creation allows the exchange and transfer of knowledge regarding the needs of consumers that otherwise might be hard to detect (Gustafsson, Kristensson, & Wittel, 2012). Therefore, co-creation is one of the keys that unlock new sources of competitive advantage (Prahalad & Ramaswamy, 2004). The process of co-creation, requires a shift from the firm's manufacturing-active approach to a customer-active approach (von Hippel, 2005) and it is a method that establishes active, social and creative cooperation between customers and enterprises during the new product development process (Roser, Samson, Humphreys & Crez-Valdivieso, 2009; Piller, Ihl & Vossen, 2011). Furthermore, participation of customers in the new product development process can enhance the quality of goods, decrease risk and increase market acceptance (Business Wire, 2001).

The introduction of internet and social media provided a unique advantage to marketers for involving consumers in the idea and information sharing process compared to the traditional marketing research techniques (Mahr, 2011; von Hippel, 2005; Hamel & Prahalad, 1994). Most importantly, this development allowed marketers to access highly creative and knowledgeable people around the globe in a cost and time efficient manner (Füller, Hutter, & Faullant, 2011). One of the most frequently used methods to achieve consumer involvement via internet is

online idea contests. These contests help firms to increase the loyalty of their customers as they help the firm to be perceived as innovative and customer oriented (Pfeil & Zaphiris, 2009). In general, idea contests focus on integrating people with creative mindsets in the operation of generating novel and innovative ideas (Blohm, Bretschnedier, Leimeister, & Krcmar, 2011; Füller et al., 2011). This can only be achieved if consumers can come up with ideas that display out-of-the-box thinking.

Considering consumers only know the products and services that they have been exposed to, they often experience difficulties when imagining emergent technologies, new materials and alike (Ulwick, 2002). In order to think outside of the box and tackle problems, creativity is essential (Goclowska, Baas, Crisp, & De Dreu, 2014). However, creativity is hard to achieve when consumers tend to think in existing schemas. Thus, generating ideas based on existing schemas can hamper creative thinking and provoke individuals to come up with common ideas (Goclowska et al., 2014). Forcing individuals to go beyond their schematic and stereotypic knowledge can elicit and increase their creativity and improve out-of-the-box thinking (Förster, Friedman, Butterbach, & Sassenberg, 2005; Sassenberg & Moskowitz, 2005). An interesting way to do this is through environmental clues that are incongruent with individuals' expectations (Maddux, Adam, & Galinsky, 2010; Ritter et al., 2012; Wan & Chiu, 2002). An example of going against the expectations of the consumers is the purple ketchup case of Heinz. Contradictory to its expected red color, Heinz released a ketchup with the color of purple. By doing so, Heinz presented a product that is inconsistent with consumers' schemas as the color red represented the schematic expectation individuals had on the main ingredient of ketchup (Taylor & Noseworthy, 2019). Yet, not everyone has the same reaction to inconsistent schemas as some people don't like their stereotypes to be challenged and people's likes and dislikes can have a powerful impact on creativity (De Dreu, Baas, & Nijstad, 2008; Zenasni & Lubart, 2011).

In summary, there is a consensus on the necessity of understanding consumer needs during the new product development process (Hauser, Tellis, & Griffin, 2006). Employing an interactive communication can help firms achieve this and fulfill the needs of the consumers. (Witell, Löfgren, & Gustafsson, 2011). Co-creation plays a vital role in new product development (Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010) and allows companies to efficiently adjust to changing needs of the consumers (Etgar, 2008). Considering the growing power of internet, online idea contests are important platforms for creative idea generation (Füller et al., 2011) and innovative consumers can play an important role in generating new product ideas (Lüthje, 2004). However, thinking in existing schemas can hamper the creativity

of the consumers (Goclowska et al., 2014). Prior literature claimed that forcing individuals out of their existing schemas can enhance their creativity. (Förster et al.,2005; Sassenberg, & Moskowitz, 2005). This research aims to examine how to make the co-creation process more efficient by increasing consumer's out-of-the-box thinking. In order to stimulate creative idea generation during the consumer co-creation process, this study focuses on online idea contests and examines whether exposure to (in)consistent schemas influences idea generation of consumers. It is hypothesized that schema inconsistencies have a positive impact on quality (creativity, flexibility) and quantity (number of ideas generated) of idea generation. Therefore, this study will probe the answer to the following main research question:

"Does stimulating a schema-inconsistent mindset in consumers who participate in online idea contests increase the quality and quantity of idea generation during customer co-creation?"

Furthermore, one of the key factors that affects an individual's reaction to inconsistent schemas is Personal Need for Structure (PNS). PNS can be defined as a chronic aversion to inconsistent structured circumstances and a desire to predictability and certainty (Thompson, Naccarato, Parker, & Moskowitz, 2001). Individuals with high levels of PNS, structure the information they receive based on cognitive structures like stereotypes (Neuberg & Newsom, 1993; Schaller, Boyd, Yohannes, & O'Brien, 1995) and have a preference towards following a certain structure and rules during the task execution (Goclowska et al., 2014). As an example, when asked to generate different uses of a brick, people can draw from a wide base of semantic categories: their ideas could have to do with building something, using the brick as a weight, or with using it for the purpose of violence. When generating ideas, a person with a low PNS would have a divergent thinking and quickly alternate between different categories ("use it to hit someone," "build a wall," "use as a doorstep"), while someone with a high PNS would have a convergent thinking and tend to focus on exploiting the same semantic category for an extended time ("to build a house," "to build a wall," "to build a kitchen cabinet")" (Goclowska et al., 2014). Moreover, individuals with low PNS may be able to ignore inconsistencies with ease, whilst the ones with high PNS may struggle with those stereotypic inconsistencies and dislike the task as it would challenge their expectations (Hutter, Crisp, Humphreys, Waters, & Moffitt, 2009). Thus, disliking a task can hamper creativity (Isen & Daubman, 1984; Zenasni & Lubart, 2011). Previous literature has found that individuals who are seeking simple structures tend to organize information in less complex ways and are more likely to implement

their prior social categories to new circumstances (Neuberg & Newsom, 1993). Furthermore, Goclowska et al. (2014) found that schema inconsistencies decrease the creativity of the individuals with high PNS and enhance the creativity of the individuals who possess low PNS.

This study examines co-creation with a managerial perspective, specifically whether exposing consumers to inconsistent schemas in idea contests facilitates idea generation and how the existence of PNS affects this process. The study proposes that schema inconsistencies have positive impact on quality and quantity of idea generation and the relationship between the two is moderated by PNS. Therefore, this study will also answer the following question:

"What is the effect of PNS on the relationship between schema (in)consistencies and quality and quantity of idea generation during customer co-creation?"

Conducting this research will help firms enhance the creative idea generation of consumers during the co-creation process. Thus, understanding this process could increase the efficiency of customer co-creation which could help firms be more cost and time efficient during new product development. Furthermore, companies can achieve competitive advantage in the market by obtaining innovative products, services, advertisements and alike through this process.

This study aims to contribute to the existing literature by conducting a quantitative empirical research. Prior literature claimed that environmental clues that are incongruent with individuals' expectations can enhance creativity (Maddux et al., 2010; Ritter et al., 2012; Wan & Chiu, 2002) and personal need for structure of the individuals impacts the effect of schema inconsistencies on creativity (Goclowska et al., 2014). This study contributes to the existing literature and especially the managerial perspective by investigating the effect of schema inconsistencies on creative idea generation during the costumer co-creation process of new product development. In addition, the role of PNS in online idea contests is further examined. Although, previous research on idea generation techniques in idea contests exists (Hackbert, 2009; Piller, Ihl, & Vossen, 2006), there is no study on the impact of PNS on the relationship between schema inconsistencies and idea generation of customers during online idea contests.

This paper will proceed as follows: The following chapter will conceptualize the main constructs of the study, along with the existing theories, different definitions and viewpoints on these constructs to gain a better understanding of the study. Next, the methods section will detail the strategy and the sample of the study, along with the procedure and the materials used in the online experiment. The operationalization and measurement of the independent and

dependent variables, and the analysis method of the study will be followed by the description of the ethics of this research. Subsequently, the results and the discussion will be presented, including the main findings, theoretical implications, practical implications, limitations and future research suggestions of the study. Finally, the conclusion of the study will be provided.

2. Literature Review

The purpose of this chapter is to clarify the concepts and discuss the literature used in this study. Therefore, this section will elaborate the current state of research on each construct of the thesis. First, new product development process will be detailed, followed by customer co-creation. Next, the mechanisms of schemas and Personal Need for Structure will be provided, along with the detailed explanation of proposed hypothesis.

2.1 New Product Development

New product development process is defined as planning or thoughts which occur in the beginning phase of idea generation, and continue until the market launching (Kim, Park & Sawng, 2016). The purpose of new product development (NPD) is to obtain a product with greater consumer value that can fulfill the needs of the consumers (Slater & Narver, 2000). Traditionally, companies have pursued various forms of marketing research in order to understand the needs of their customers (O'Hern & Rindfleisch, 2009). It is well established in the literature that "successful innovation rests on first understanding customer needs and then developing products to meet those needs" (Hauser, Tellis, & Griffin 2006, p. 3). However, needs of customers are often idiosyncratic and therefore, they are hard to measure (Franke & Piller, 2004; Simonson, 2005).

NPD process consists of four basic stages. The first stage is opportunity identification, during which firms try to understand consumer needs. The second stage is development. The third stage is optimization in which products are tested before they are launched in the market, and the final stage is product launch (van Kleef, van Trijp & Luning, 2005). The first stage of the NPD process is also called Fuzzy Front End which is described as the earliest phase of the NPD process beginning with opportunity identification and finalizing by the decision of go or no go for developing a new product (Eling & Herstatt, 2017; van den Ende, Frederiksen, & Prencipe, 2015). There are several reasons of why front end is considered "fuzzy" such as uncertainties and the enigmas regarding to what consumers want and need (Zhang, Cao, & Doll, 2019).

Traditional view of NPD considers consumers as passive entities who rely on firms to fulfill their needs (Carpenter, Glazer, & Nakamoto, 1994). Nowadays, technology allows consumers to access the information they seek and provides them a capability to communicate with companies all over the world (Hoyer et. al, 2010). This latent position of the consumers empowered them to be more active and to play a greater role in their relationship with the companies (Ernst et al., 2010). Therefore, in today's market, consumers are better able to, and willing to contribute to the value creation (Hoyer et al., 2010). Understanding the needs of the consumers is specifically critical during the fuzzy front end of NPD as customer co-creation contributes ideas with high success potentials and enables goods to be produced with more certainty to fulfill the customer needs (Flint, 2002). NPD process can be seen as the co-creation between companies and consumers (Prahalad & Ramaswamy, 2004).

2.2 Customer Co-Creation

Customer co-creation is a collaboration process between manufacturers and customers, governed by the firms (Piller et al., 2011) and it enables consumers to actively engage in the NPD process (Piller et al., 2011). Consumers are able to contribute to the innovation process of firms when they take part in co-creation activities. This is an essential process to ensure that the needs of the consumers are fulfilled, so that the failure of a new product can be avoided (Ogawa & Piller, 2006).

The meaning of customer co-creation is sometimes misunderstood. Regarding this fact, Prahalad and Ramaswamy (2004) defined customer co-creation as a mutual value creation process between the customer and the firm. It is not an effort for pleasing customers, nor it is a customer centric process in which customers are the kings. Instead, during co-creation, firms try to organize an environment where an active communication and personalized user experience can be accomplished. Customer co-creation's aim is to identify problems and solve these problems with the participation of the firm and the customer. It is not a process in which customers take decisions by themselves as product managers.

Customer co-creation leads to many advantages for firms. First, it can help firms to hold a sustainable competitive advantage in the market (Prahalad & Ramaswamy, 2004). Furthermore, it can also enable firms to reduce cost by minimizing the need of employees and suppliers, while providing enhanced product performance through better built customer relationships and understanding of needs (Hoyer et al., 2010). In addition, Lundkvist and Yakhlef (2004) inspected co-creation based on resource dependency and environmental

contingency, and they found out that co-creation increases new product performance, leading to a sustainable competitive advantage in the market (Prahalad & Ramaswamy, 2004).

As mentioned before, customer co-creation is vital, especially in the early stages of the NPD process. NPD literature claims that there are two crucial tasks to accomplish during the early phases of NPD: 1) generating creative ideas and concepts and 2) determination of which of the creative concepts and ideas to go after (Kahn, 2005). There are several different methods that can be used during the customer co-creation process. The most common methods are 1) Category appraisal, 2-) Conjoint analysis, 3-) Empathic design, 4-) Focus group, 5-) Free elicitation, 6-) Information acceleration, 7-) Kelly reportery grid, 8-) Laddering, 9-) Lead user technique, 10-) Zaltman metaphor elicitation technique (ZMET) (van Kleef, van Triip, & Lunning, 2005).

There are many different co-creation methods that firms can choose from during the NPD process. Considering the level of freedom given to the consumer, idea generation is a task that allows a greater level of creativity and it is much more accessible than the traditional method of asking for predefined ideas from customers (Piller et al., 2011). To elaborate, when a firm asks consumers to choose the best from already defined ideas, they are not given the power of freedom. With idea generation, the consumer can actually come up with a truly creative idea that could help the firm achieve competitive advantage. A commonly used form of idea generation during co-creation is idea contests. These contests are the invitations of firms sent to the public or to their customers, in order to contribute to a specific matter under a certain time limitation and they are organized for ideas rather than for technical solutions (Piller, Vossen, & Ihl, 2012). Idea contests aim to achieve novel ideas and concepts (Piller & Walcher, 2006; Ebner, Leimesiter & Krcmar, 2009). Technological advances such as the emergence of internet, made the online execution of these contests and other open innovation contests possible (Archak & Sundararajan, 2009; Terwiesch & Ulrich, 2009; Yang, Chen, & Pavlov, 2009). Online idea contests allow firms to reach people from all over the world, which can make great contributions to firms (Yang. et al., 2009).

The creativity of idea contribution by the customers was questioned by several researchers (Leonard & Raypord, 1997; Schulze & Hoegl, 2008; Ulrich & Eppinger, 2008). In order to answer these criticisms, Poetz and Schreier (2012) examined if users (consumers) are able to generate more innovative ideas than the professionals working in the firms. In order to conduct their research, they collaborated with a firm that is in the baby product market. The firm organized an idea generation contest and asked their consumers and working professionals to come up with new ways to make additive food consumption of babies more appropriate for

parents and babies. The results of their research showed that ideas of the consumers were at least on the same level with the ideas of the professional employees of the firm. Consumers have even generated much better ideas in terms of creativity.

On the other hand, there have been contradicting ideas with respect to the actual creativity that comes out of consumers. Bennett and Cooper (1981, p. 54) stated that creative ideas for new products are generally "out of the scope of the normal experience of the consumer". Consumers might be too used to the current state of product consumption which can hamper their ability to come up with new innovative ideas to form the future (Leonard & Rayport, 1997). Therefore, there is need for further research to identify productive methods that can provoke consumers to come up with out-of-the-box, creative ideas. This thesis aims to examine such methods that can be used in order to induce consumers to come up with out-of-the-box ideas during the NPD process.

2.3 Schemas

Schemas are cognitive frameworks that reside in part of reflections of determined stimulus domain and contain general intelligence regarding specific characteristics, and interactions of these characteristics of the stimulus domain (Taylor & Crocker, 1981). In a nutshell, individuals' social lives comprise of pre-acquainted knowledge concerning different circumstances, and this pre-acquainted knowledge is defined as schema (Nishida, 1999). Schemas reflect cognitive forms of objects, contents, people and messages (Nishida, 1999). They are a necessary framework in order to comprehend the environment and regulate behavior based on the conditions of this environment (Fiske & Linville, 1980; Schank & Abelson, 1977). However, when individuals receive information that is not consistent with their existing schemas, the fluency of processing information decreases (Rubin, Paolini, & Crisp, 2013). Thus, this type of information can be perceived as threatening (Mendes, Blascovich, Hunter, Lickel, & Jost, 2007). Similarly, exposing unanticipated violations of socially accepted norms negatively affects the amount of creative ideas generated (Porath & Erez, 2009).

On the other hand, contradictory to above, schema inconsistencies can also have a positive influence on creative idea generation (Goclowska et al., 2014). For instance, the research conducted by Wan and Chiu (2002) found out that schema inconsistencies actually increase creative thinking. In their research, participants were exposed to schema inconsistent (e.g., What is computer that is also a teacup? Or, what is a cooking stove that is also kind of a bicycle) and schema consistent questions (e.g., What is the food that is also kind of animal? Or, what is a bird that is also kind of pet?) in order to solve a set of combination problems. The

creative performance of the participants who were primed with schema inconsistent combinations was much higher compared to the performance of the participants who were primed with schema consistent combinations. Furthermore, Förster et al. (2005) found out that exposing participants to artwork depicting deviancy caused higher creative idea generation than exposing them to the artwork that depicts conformity. Another research exposed participants to complex and surprising occasions by using virtual reality and asked them to generate ideas about "What makes sound?" in the first experiment (Ritter et al., 2012). In the second experiment participants were randomly allocated to four experimental conditions (Active-Schema-Violation, Active-Schema-Normal, Vicarious-Schema-Violation and Vicarious-Schema Violation). After being exposed to those four experimental conditions, participants were asked to complete two versions of Unusual Uses Task. The results of the two experiments demonstrated that exposure of Active-Unexpected-Event and Active-Schema-Violation increases cognitive flexibility.

Furthermore, it was found that exposure to paradoxical frames enhances creativity (Miron-Spektor, Gino, & Argote, 2011), as paradoxical frames can enable uncovering the links between contradictions and elicit new idea generation (Luscher & Lewis, 2008). As it was mentioned, customers need to think outside the box in order to come up with a creative idea and to do so, they should be more creative. Prior researchers claimed that schema inconsistencies enhance creative idea generation (Förstel et al., 2005; Sassenberg & Moskowitz, 2005; Maddux, Adam, & Galinsky, 2010; Ritter et al., 2012; Wan & Chiu, 2002). Therefore, considering the positive effect of schema inconsistencies on idea generation, this study analyzes the following hypotheses:

Hypothesis 1: Exposure to schema inconsistencies leads to more creative idea generation than exposure to consistent schemas or no schemas.

Hypothesis 2: Exposure to schema inconsistencies leads to a higher number of ideas than exposure to consistent schemas, or no exposure to schemas.

## 2.4 Personal Need for Structure (PNS)

Personal need for structure (PNS) is the desire of individuals for structure and certainty (Thompson, Naccarato, Parker, & Moskowitz, 2001). In other words, PNS is a constant will for firm and a source of explicit knowledge regarding the concerned subject (Bar-Tal, Kishon-Rabin, & Tabak, 1997).

Individuals with high PNS level tend to avoid ambiguity and try to clarify their environment (Slijkhuis, Rietzschel, & Yperen, 2013). For instance, Neuberg and Newsom (1993) observed that participants with high PNS had more tendency to use stereotypes and more simple representations while categorizing a stimulus. Thompson, Roman, Moskowitz, Chaiken and Bargh (1994) found that people with high PNS tend to hesitate and freeze on the first thought that comes to their mind to explain something, they are more confident in taking decisions and they tend not to look for substitute explanations.

There have been several studies conducted to find the effects of PNS. The level of PNS affects how individuals execute the tasks, namely, individuals with high levels of PNS prefer to execute their tasks based on fixed rules and procedures (Goclowska et al., 2014). For instance, when participants were given two options (based on structured guidelines, or without any guidelines) to draw picture of an alien, the higher percentage of participants with high PNS chose to follow structured guidelines compared to the ones with low PNS (Slijkhuis, 2012). Another research showed that schema inconsistent experiences resulted with enhancing low PNS (individuals who are open to new experiences) individuals' divergent thoughts (Neuberg & Newson, 1993). Goclowska et al. (2014) found that individual's creativity increased when they were exposed to schema inconsistent pictures. However, the participants with high PNS generated fewer creative ideas compare to the ones with low PNS. In other words, participants with high PNS generated more creative ideas when they were exposed to schema consistent images but less creative ideas when they were exposed to schema inconsistent images. On the other hand, participants with less PNS generated more creative ideas when they were exposed to schema inconsistent images and generated fewer creative ideas when they were exposed to schema consistent images.

Prior literature claimed that PNS level of individuals determine the way they approach their environment and individuals with high PNS prefer to follow certain structures and schemas while individuals with low PNS don't have preference to follow a certain framework or structure. This study proposes that when exposed to schema (in)consistencies the PNS level of individuals will affect the creativity of ideas generated. Therefore, the following hypothesis is formulated:

Hypothesis 3: The relationship between schema (in)consistency and Idea generation for New Product Development is moderated by Personal Need for Structure (PNS).
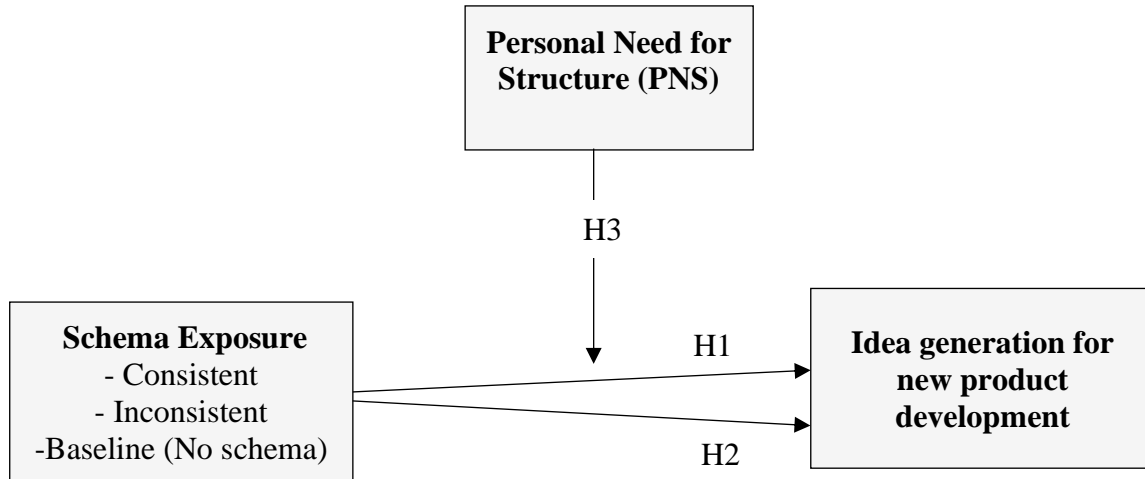
3. METHODS

The following chapter details the methodology of the thesis. First, the research strategy will be explained, followed by the description of the sample. Next, the procedure of the experiment, the materials used, and the operationalization of each variable will be provided. The section will end with the explanation of the method of analysis and the research ethics.

3.1 Research Strategy

An experiment was chosen as the research method of this study due to its appropriateness to find out the effect of (in)consistent schemas on the quantity and creativity of ideas generated by consumers during online idea contests. Additionally, the experiment was administered online as this research focuses on online idea contests. Moreover, there are several other reasons behind why this decision was made. To start with, the number of people using internet is expanding every day, and running an online experiment allows people from all over the world to access the experiment (Birnbaum, 2004). Furthermore, in online experiments it is possible to automate the experimental procedures which enables reducing the costs and time spent on conducting the experiment (Reips, 2002). In addition, online experiments can be conducted without the existence of a proper lab environment (Reips, 2000) and they are accessible 24 hours a day (Reips, 2002), which enhances the comfort of the participants (Salgado & Moscoso, 2003). Furthermore, online accessibility enables targeting specific groups via mailing lists and newsgroups (Reips, 2000). Moreover, due to the corona virus outbreak, no face to face experiment could have been conducted. Therefore, executing an online experiment was the proper option in the current conditions.

In order to test the differences between conditions, a between-subject design was used. In more detail, the independent variable of schema exposure consisted of three conditions. The conditions that were compared in the between-subject design of this study were as follows: exposure to schema consistent pictures, exposure to schema inconsistent pictures, and exposure to no pictures (the baseline condition).

The dependent variable of this study is idea generation for new product development. In this study, the dependent variable has three levels which are (1) number, (2) flexibility in thinking while generating ideas, and (3) creativity of ideas generated. In order to measure the aforementioned topics, participants were required to complete two tasks. In the first task, participants were instructed to come up with new pasta names for a pasta brand and in the second task, they were instructed to generate new ways of using pasta. The following Materials section will provide further details regarding the two tasks.

Furthermore, Personal Need for Structure (PNS) was used as a moderating variable in the research. PNS was considered to have an impact on the results of the experiment. Specifically, participants with low PNS were expected to generate higher amount of creative ideas compared to the participants with high PNS. PNS of the participants was measured by using the PNS questionnaires of Neuberg and Newsom (1993).

3.2 Sample

Participants of this research were chosen among the personal networks of the researcher. Social media applications such as Facebook, Instagram and Twitter were used as a platform to reach potential participants. In addition, there were some requirements to participate in this study. Most importantly, the online experiment was conducted in English. Thus, in order to participate the experiment, one had to comprehend English. Also, all the participants had to participate voluntarily and agree with the terms of the online experiment. In total, 217 people participated in the experiment, while 21 participants' attempts to participate was considered invalid as twenty of them stated that they did not speak English and one of them did not agree with the terms of participation. Thus, 196 people were successful to complete the experiment.

The participants of this experiment consisted of 75 males (38%), 116 females (59%) and one other (1%). The remaining four people did not want to provide information about their sex (2%). In this experiment, 130 participants were between 21 and 30 years old corresponding to 66%, 32 participants (16%) were of an age under 21 years old, fifteen (8%) of them were between 31-40 years old , six (3%) of them were between 41 and 50 years old and lastly thirteen (7%) of them were between 51 and 65 years old. Moreover, 80 (41%) of the participants of this

experiment held a bachelor's degree, 38 (19%) of the participants a master's degree, two (1%) of them a PhD degree, thirteen (7%) of them an Associate degree, 53(27%) of them a Highschool degree and ten (5%) of them an education level which is lower than a Highschool degree.

There was a diversification regarding the nationalities of the participants. The biggest part of the pie belonged to the Netherlands as there were 88 (45%) Dutch participants. The second biggest piece belonged to Greece with 50 (14%) Greek participants and the third largely represented nationality was Turkey with 27 (14%) Turkish participants. The remaining 31 (16%) participants belonged to other nationalities, such as Italian, French, German, American, Columbian, Brazilian and Indian.

3.3 Procedure

The experiment was conducted via Qualtrics. In order to participate in the experiment, participants were required to fill in and agree with the terms and conditions of the experiment. In order to participate in the experiment, potential participants needed to confirm that they were involving in this experiment voluntarily and that they spoke English. Furthermore, they were informed that their participation would be treated confidential and their personal information would not be shared. After they provided all the necessary requirements, they obtained access to the experiment.

In Task 1, participants were required to provide as many pasta names as possible for the pasta brand ClassyPasta and they were given some examples of the new pasta names which were already thought by ClassyPasta. In the beginning of the task, participants received instructions regarding the execution of the task, and they were informed whether a set of pictures would be presented for one minute or whether they just needed to wait for one minute and think about the new pasta names without any pictures. Participants were randomly assigned to one of the three schema (in)consistency conditions, so some were exposed to schema consistent pictures, some to schema inconsistent pictures and some to no pictures in this one-minute time period. After exposing the participants to four pictures that represented one of the three conditions for one minute, participants were required to provide ideas.

The second part of the experiment started after a short break of 45 seconds. First, the necessary information for executing Task 2 was provided. This time, participants were asked to generate ideas for new ways to use pasta and as an example, a picture of pasta used as a form of art was presented. Following the information, four pictures were displayed under a minute again considering the conditions of schema consistent, schema inconsistent and no schema

exposure. After one minute, participants were required to generate as many ideas for new ways to use pasta as possible.

When Task 2 was finished, the participants were directed to a questionnaire about Personal Need of Structure (PNS). During the PNS questionnaire, participants were exposed to twelve statements. Additionally, participants were able to express their opinion on the statements by clicking the six options that indicated the level of agreement with each statement. Furthermore, completing the PNS questionnaire led to some questions regarding the demographics of the participants. When the demographics data was collected, the experiment was officially over.

3.4 Materials

The Experiment starts with Task 1 concerning the "ClassyPasta" case. The participants were informed that the brand ClassyPasta developed a new type of pasta and they were asked to provide as many new pasta names as possible for the new product. Five examples of the new pasta names generated by the producer of ClassyPasta was given in the question part: Lunghi, Tubuli, Cerchi, Piazzi, and Retani. All the examples of new pasta names ended with the letter "i". Those examples with certain structures were provided to observe if participants would be able to come up with new names that deviated from the provided examples (ended up with a different letter than "i"). The new names which deviated from the example indicated to have higher creative quality. This stimulation method was based on the study of Dijksterhuis and Meurs (2006). After the instructions and the example pasta names were provided, participants were given one minute to think of pasta names. During this break participants were shown schema consistent images or schema inconsistent images or no images at all. For the schema consistent condition, four schema consistent pictures were presented: 1-) Camel in a desert, 2-) Penguin in the poles, 3-) Boat on the sea and 4-) Car on the land. In schema inconsistent condition four schema inconsistent pictures were presented: 1-) Camel in the poles, 2-) Penguin in the desert, 3-) Car in the sea, 4-) Boat on the land. The pictures were taken from the research of Goclowska et al. (2014). In the baseline condition, participants were just given time to think about possible new ideas without being exposed to any pictures. After thinking for one minute, another minute was given to participants to write down the ideas which they had generated.

In Task 2, participants were shown examples of using pasta as a form of art and they were asked to come up with new ways they could use pasta. After the instructions, they were given one minute to think of possible answers during which they were exposed to one of the

above schema conditions as well. After seeing the pictures and thinking about possible answers, they were given one minute to write down their ideas.

When the experiment was over, participants were asked to answer three different questionnaires. The first questionnaire was the Creative Achievement Questionnaire which was set to assess the creativity of the participants (part of a colleague's study). The second questionnaire was the Personal Need for Structure Questionnaire (Neuberg & Newsom, 1993) which evaluated an individual's PNS (e.g. It upsets me to go into a situation without knowing what I can expect from it.) by using a six-point scale (1 = *strongly disagree* to 6 = *strongly agree*). The third and the final questionnaire was the Need for Closure Questionnaire (part of a colleague's study). After finishing all the questionnaires, participants were required to fill in a demographic form and the experiment was completed.

3.5 Operationalization and Measurement

Idea Generation for New Product Development (NPD). The method of this study is based on the study of Dijksterhuis and Meurs (2006). In this study, there were three measures of interest. Those measures were: (1) the number of ideas generated, (2) flexibility in thinking while generating ideas, (3) the creativity of ideas generated. The experiment consisted of two tasks. In Task 1, total number of ideas generated per participant and number of ideas deviating from the example (the example which was provided by the study) were assessed to measure the dependent variable. The assessment was executed by counting the total ideas generated per participant and the number of ideas which deviated (ended up with a different letter than i) from the example provided by the study (five new pasta names that ends up with the letter i).

In Task 2, flexibility in thinking while generating ideas (flexibility), total number of ideas generated per participant (fluency) and creativity of ideas generated were again measured. In order to measure the flexibility and the creativity of the ideas, two raters were involved. The raters were the individuals with a sufficient academical background to evaluate the creativity and flexibility of the ideas. They received a training that provides elaborate explanation about the experiment in order to comprehend the concept of creativity (Sawyer, 2006). Furthermore, all generated ideas were assigned into categories (See Appendix A) and each of the categories had a certain creativity scale that was determined by the raters. Flexibility of the ideas was assessed by the number of different categories used per idea. For assessing the creativity of ideas generated, all the ideas were evaluated by the raters concerning on a five-

point scale (1 = *not at all creative*, to 5 = *extremely creative*). The mean of raters' score per idea was taken. Thus, in this way the creativity of ideas was determined.

The inter-rater reliability of both the flexibility and the creativity of ideas generated was high. For assessment of flexibility of ideas generated the inter-rater reliability was extremely high ($a = 0.94$). Moreover, the inter-rater reliability for creativity of ideas generated was high ($a = 0.76$). In order to make it certain that the participants' creativity scores had no dependence on flexibility of thinking while generating ideas, and the number of the ideas generated, the total score was divided by the number of ideas generated by the participants.

Personal Need for Structure (PNS). The method of analyzing personal need for structure is based on the study of Neuberg and Newsom (1993). Participants were given twelve statements to which they had to respond on a six-point scale (see Appendix B). Scale items evaluated personal preferences towards structure. Higher scores for the items corresponded to a greater need for simple structure. The results were used to understand if the individuals with less need for structure generated more creative ideas compared to individuals with a higher need for structure.

Schema Exposure. The method used for schema exposure is based on the study of Goclowska et al. (2014). During the experiment, participants were exposed to three schema conditions which were: schema consistent, schema inconsistent, and baseline (exposure of no pictures). Those conditions were operationalized by the demonstration of eight pictures, four pictures for schema consistent and four for inconsistent conditions as explained in the above section. The pictures were taken from the study of Goclowska et al. (2014). There were no pictures displayed for the baseline condition.

3.6 Analysis

For the first task, MANCOVA was used. As the dependent variables were highly correlated ($r = .48$, $p < .001$), the number of generated ideas and the number of deviated ideas could not be treated as distinguishable constructs. For this reason, a one-way MANCOVA was performed.

For the second task, again a correlation test was performed in order to verify whether it was suitable to perform one MANCOVA, meaning that the dependent variables would correlate. However, not all of the dependent variables were correlated. For this reason, it was decided to perform separate ANCOVAs.

3.7 Research ethics

Potential participants were selected from the personal networks of the researchers and they were reached via WhatsApp, E-mail, Facebook and Instagram. Before starting the experiment, they were informed that the participation was voluntary. For ensuring objectivity, participants were not informed about the goal of the research. It was considered that revealing the goal of the research could lead to biased results as some participants could have focused the displayed schema (in)consistent pictures differently. Moreover, they were asked if they speak English to confirm that they can comprehend the tasks they were requested to do.

The information regarding the estimated length of the experiment was provided to the participants, which was predicted to be 10 minutes. Furthermore, participants were told that their personal information would not be shared. The data of the participants was held securely with no access for other parties. E- mail addresses of the researchers were provided for the participants in case they had any questions regarding the experiment. Participants were able to leave the experiment whenever they wanted, and the ones who left the experiment without completing the requested tasks were counted as invalid.

4. RESULTS

This chapter presents the results of the analytical procedure. The results of Task 1 will be followed by the results of Task 2. Next, the exploratory analyses will be explained.

4.1 Task 1

Data inspection. Firstly, all variables, except the variable number of deviating ideas, were normally distributed. Instead, the variable number of deviating ideas appeared to be positively skewed with 1.25. Secondly, the linearity of the data was checked by using a scatter plot. There was a linear relationship between the variables of interest, as assessed by visual inspection of a scatter plot. There was also a linear relationship between the covariate, PNS score, and each of the dependent variables for each schema exposure group as assessed by visual inspection of a scatter plot. Thirdly, the assumption of homogeneity of the standardized residuals was assessed. Both the PP-plot and the QQ-plot indicated that this assumption was met. In addition, the assumption of outliers was determined by the Mahalanobis, the Cook's distance and the Leverage. Since there were three schema exposure categories ($k = 3$), a Mahalanobis distance below 16 ($10 + 2 * k = 16$) was acceptable, which was the case. In addition, the Cook's distance

was below 1 and thus also acceptable. Furthermore, a Leverage (3 * (3 + 1) / 196) below 0.06 was met.

Descriptives. There were no major differences between the conditions, in their means of number of generated ideas, number of ideas deviated from the example and PNS which is presented in Table 1 and 2.

Table 1. Descriptive Statistics of PNS for Task 1

	N	M	SD
Total sample	196	4.01	.50
Consistent	65	4.02	.54
Inconsistent	65	3.92	.47
Baseline	66	4.08	.48

Table 2. Descriptive Statistics of Number of Deviating Ideas per Condition for Task 1

	N	M	SD
Total sample	196	1.48	1.54
Consistent	65	1.46	1.75
Inconsistent	65	1.46	1.36
Baseline	66	1.53	1.52

Table 3. Descriptive Statistics of Number of Ideas per Condition for Task 1

	N	M	SD
Total sample	196	3.57	1.92
Consistent	65	3.63	1.89
Inconsistent	65	3.57	1.87
Baseline	66	3.52	2.05

MANCOVA. As the dependent variables were highly correlated ($r = .48$, $p < .001$), the number of generated ideas and the number of deviated ideas could not be treated as distinguishable constructs. For this reason, a one-way MANCOVA was performed. It was expected that the schema exposure groups would differ in their number of ideas generated and number of ideas deviated from the example, and that this effect is moderated by their PNS. However, no support was found for these hypotheses. Namely, results do not indicate that the groups differ in their number of generated ($F(2, 195) = 0.70$, $p = .489$) or deviated ($F(2, 195) = 0.42$, $p = .657$) ideas. In addition, no significant moderation effect was found related to the number of ideas generated ($F(2, 195) = 0.72$, $p = .487$) or deviated ($F(2, 195) = 0.40$, $p = .671$). Furthermore, no significant main effect was found for PNS on the number of generated ($F(1, 195) = 1.48$, $p = .226$) or deviated ($F(1, 195) = 0.71$, $p = .402$) ideas. Finally, these models explained little variance (R^2 for number of generated ideas = .02; R^2 for number of deviated ideas = .01).

4.2 Task 2

Data inspection. All the variables except Average Creativity Score were normally distributed. Instead, the variable Average Creativity Score was highly peaked with 5.10 (i.e. leptokurtic). When the linearity of the data was checked by using a scatter plot, it was observed that the assumption of linearity was met. Furthermore, the assumption of homogeneity of the standardized residuals was assessed. When the assumption of standardized residuals was assessed, both the PP-plot and the QQ-plot indicated that this assumption was met. Moreover, the assumption of the outliers was determined by the Mahalanobis, the Cook's distance and the Leverage. The results indicated that there were no outliers as the Mahalanobis distance ($10 + 2 * 3$) was below 16, the Cook's distance was below 1 and the leverage was ($3 * (3 + 1) / 196$) below 0.06.

Descriptives. When the means of the dependent variables were observed within the descriptive statistics, there was no big difference between the dependent variables. Please see Tables 4, 5, 6 and 7 for an overview of the means, the standard deviations and the number of participants.

Table 4. Descriptive Statistics of Number of Ideas per Condition for Task 2

	N	M	SD
Total sample	196	3.34	1.83
Consistent	65	3.74	1.89
Inconsistent	65	3.26	1.85
Baseline	66	3.03	1.70

Table 5. Descriptive Statistics of Average Flexibility Score per Condition for Task 2

	N	M	SD
Total sample	196	2.75	1.33
Consistent	65	2.87	1.19
Inconsistent	65	2.86	1.41
Baseline	66	2.53	1.35

Table 6. Descriptive Statistics of Average Creativity Score per Condition for Task 2

	N	M	SD
Total sample	196	2.37	.58
Consistent	65	2.36	.65
Inconsistent	65	2.39	.52
Baseline	66	2.35	.58

Table 7. Descriptive Statistics of Average PNS per Condition for Task 2

	N	*M*	*SD*
Total sample	196	4.01	.50
Consistent	65	4.02	.54
Inconsistent	65	3.92	.47
Baseline	66	4.08	.48

ANCOVAs. Firstly, a correlation test was performed in order to verify whether it was suitable to perform one MANCOVA, meaning that the dependent variables should correlate. However, not all of the dependent variables were correlated. In detail, the average flexibility score was correlated with average creativity score ($r = .84$, $p < .001$) and number of ideas generated ($r = .15$, $p < .001$). However, the average creativity score and the number of ideas generated did not correlate ($r = .14$, $p = .051$). For this reason, it was decided to perform separate ANCOVAs.

The first ANCOVA measured whether there was a relationship between the schema exposure conditions and the number of ideas generated, as moderated by average PNS. Overall, no significant results were found, and the variance explained was low ($R^2 = .05$). To start, no significant main effect was found between the conditions and the number of ideas generated ($F(2, 195) = 0.248$, $p = .781$). In addition, no significant moderation effect was found ($F(2, 195) = 0.479$, $p = .620$). Finally, also no significant main effect was found between the average PNS and the number of ideas generated ($F(1, 195) = 3.76$, $p = .054$).

Concerning the Average Flexibility Score as outcome, no significant main effect was found between the conditions and the Average Flexibility Score ($F(2, 195) = 1.25$, $p = 289$). In addition, no significant moderation effect was found ($F(2, 195) = 1.32$, $p = .271$). Finally, also no significant main effect was found between the average PNS and the Average Flexibility Score ($F(1, 195) = 2.56$, $p = .111$).

Finally, no significant main effect was found between the conditions and the Average Creativity Score ($F(2, 195) = .126$, $p = .882$). As an addition, no significant moderation effect was found ($F(2, 195) = .127$, $p = .881$). Finally, also no significant main effect was found between the average PNS and the Average Creativity ($F(1, 195) = 1.20$, $p = .275$).

4.3 Exploratory Analyses

In Task 1, there were several participants who did not provide any names for the new type of pasta. It might be possible that those participants did not fully comprehend what was asked from them in Task 1 or they did not take the experiment seriously. Nevertheless, after removing the participants who violated these rules of the experiment, the results did not show any difference. This indicates that those participants had no distinctive effect on the dataset. Therefore, there was no reason to exclude those participants from the dataset. Also, the results of the assumptions of Mahalonobis Distance, Cook's Distance, Leverage, Linearity, Homogeneity of Standardized Residuals remained the same. As an addition, the number of ideas generated was still positively skewed.

In Task 2, there were several participants who violated the rules of the experiment by providing food related answers while generating ideas for different ways of using pasta. Also here removing the participants that did not fully participate did not make a change in the results. However, when participants who violated the rules of the experiment from the data set were removed, the Average Creativity Score became negatively skewed with -1.28 and leptokurtic with 5.44 and for the rest there were no assumptions violated concerning the Mahalonobis Distance, Cook's Distance, Leverage, Linearity, Homogeneity of Standardized Residuals.

All the dependent variables were significantly correlated. To elaborate, the Average Flexibility Score was again correlated with the Number of Ideas Generated ($r = .86$, $p < .001$) and with the Average Creativity Score ($r = .24$, $p = .001$). However, this time the Number of Ideas Generated was also correlated with the Average Creativity Score ($r = .25$, $p < .001$). Therefore, One-Way MANCOVA was allowed to be performed as all of the dependent variables were correlated.

After MANCOVA was applied, the main effect of the conditions on the dependent variables remained the same. To elaborate, there was no significant relationship between the Schema Exposure conditions and the Number of Ideas Generated ($F(2, 195) = 0.09$, $p = .910$), the Average Flexibility Score ($F(2, 195) = 1.22$, $p = .298$), and the Average Creativity Score ($F(2, 195) = 0.25$, $p = .779$). Furthermore, there was no significant moderation effect of PNS on the Number of Ideas Generated ($F(2, 195) = 0.10$, $p = .904$), the Average Flexibility Score ($F(2, 195) = 1.14$, $p = .321$), the Average Creativity Score ($F(2, 195) = 0.27$, $p = .765$). However, interestingly there was significant main effect of the Average PNS Score on the Number of Ideas Generated ($b = -0.62$, $F(1, 195) = 8.76$, $p = .003$) and also on the Average Flexibility Score ($b = -0.27$, $F(1, 195) = 5.27$, $p = .023$). This means that lower the PNS Score is, the higher the number of ideas generated and the higher the flexibility of thinking while

generating ideas. Nonetheless, there were no significant main effects of the Average PNS score on the Average Creativity Score ($b = -0.17$, $F(1, 195) = 0.73$, $p = .396$), which might have occurred due to the violation of the skewness and kurtosis.

5. DISCUSSION

In the following chapter, main findings of this thesis will be explained and the contributions to both theory and practice will be detailed. Next, the limitations will be provided, followed by possible directions for future research in this area.

5.1 Main Findings and Theoretical Implications

Overall, results of the two tasks of the experiment in which all participants were included indicated that there was no effect of schema exposure (consistent, inconsistent and baseline) on the creativity of idea generation in New Product Development (NPD). Thus, hypothesis 1 cannot be supported. In addition, there was no effect found on the relationship between schema exposure and number of ideas generated during NPD. Therefore, there was no support for hypothesis 2. Furthermore, no support was found for hypothesis 3. This means that PNS does not affect the strength of a relationship between schema exposure and idea generation during NPD. Thus, the findings of this study were not in line with prior studies. For instance, the study of Wan and Chiu (2002) showed that schema inconsistencies increased creative thinking. Similarly, Ritter, van Baaren, and Dijksterhuis (2012) found that exposure of Active-Unexpected-Event and Active-Schema-Violation increases cognitive flexibility. However, the results of this study did not indicate such similar findings.

There might be several other reasons for these findings. One of them can be the effect of time pressure. In the research of Baer and Oldham (2006) it was found that experiencing time pressure has a negative effect on individuals' creativity. Considering the fact that participants were required to finish each of the tasks within one minute, it might be possible that they have experienced time pressure. Although, there is no certainty considering the effect of time pressure was not investigated in this study.

Another reason might be that participants of the experiment did not take the experiment seriously as they were not monitored. The experiments of Wan and Chiu (2002) and Ritter et al. (2012) were conducted in the lab environment. Thus, using an online environment to conduct this study might be one of the reasons for not finding any significant results. Another potential explanation for these non-significant results could have been that some participants did not understand the purpose of the task. Therefore, the participants who did not provide

answers for the new pasta names were excluded. However, after the exclusion still no significant difference was observed. Interestingly, in Task 2 the participants who gave food related answers were extracted and after the extraction the new results indicated that the PNS level of the participants has a significant negative effect on the Number of Ideas Generated and the Flexibility of thinking while generating ideas. In more detail, when people feel less need for structure, they generate more ideas and the more flexible this works (i.e. more different categories). Perhaps, these participants did not understand the purpose of the task and that had an impact on the non-significant results, while in fact a relation existed (false-negative).

However, people's personal need for structure does not impact their creativity. This could be due to the fact that creativity is negatively skewed and leptokurtic. Another explanation is the unmeasured effect of Personal Fear of Invalidity (PFI; the concern about making the wrong decision). According to Rietzschel et al. (2007), The effect of PNS on creative idea generation depends on PFI. More importantly, researchers found that under the low PFI PNS has a positive effect on creativity.

5.2 Practical implications

This study was conducted in order to find out if schema (in)consistencies induce customers during the co-creation process to generate more creative and higher amount of ideas. The main findings of the results indicate that there is no use of exposing consumers to schema (in)consistent pictures during online idea contests.

Thus, if firms aim to induce customers to generate creative ideas, it is not helpful for them to use this type of schema exposure by using pictures. However, the findings after extracting the participants that violated the rules of the online experiment by providing food related answers reveal that Personal Need for Structure (PNS) has a main effect on the number of ideas generated and the flexibility of thinking while generating ideas. Managers can benefit from this research by considering PNS of the participants during the idea generation of customer co-creation process. Moreover, there was a negative relationship between the level of PNS and the number of ideas generated and flexibility of thinking while generating ideas. It was found that lower PNS is linked with higher number of ideas generated and flexibility of thinking while generating ideas. Knowing this can help managers come up with the interventions that can lower the PNS of the participants with interventions. Future researchers can investigate different kinds of interventions that can be used for this purpose. Furthermore, firms can consider only including participants with low PNS in their co-creation process. Thus,

firms can use the PNS questionnaire to measure the PNS of the customers and choose the customers with low PNS.

5.3 Limitations and future directions

Several limitations were faced when conducting this research. To begin with, considering the experiment was executed online, it was hard to be certain that the participants fully understood and followed the instructions given by the experiment. It might be possible that some participants did not comprehend what was required in the tasks due to a moderate level of English considering none of the participants did not speak English as their mother tongue. Although the effect of comprehension was not explicitly tested in the experiment.

Another limitation was that the experiment was not conducted in a lab, and it was hard to monitor the participants. For instance, participants were instructed to look at their screen for one minute during the schema (in)consistent pictures were put on display and it is possible that instead of paying attention to their screen, participants spent their minute concerning something else or they were distracted by the third parties. Thus, the hypothesized effects of schema exposure were not observed.

Moreover, it was observed that some participants did not fill the answer boxes with their ideas in Task 1. It was expected that not filling the answer boxes would hamper acquiring significant results as this behavior was contradictory to instructions and making it less valid. However, extracting those participants from the dataset did not result in any significant difference. Thus, the expected change in effect of this action was not accomplished. Also, a violation of the experiment rules was observed in Task 2 when participants that were instructed to provide uses of pasta other than eating, provided food related answers. Deleting those answers resulted in a significant main effect of PNS.

Furthermore, there was no limitation regarding the number of participants and other concerns. However, the fact that most of the participants were selected from personal networks of the researcher causes a limitation regarding the age diversification among the participants. Most of the participants were under 30 years old. Thus, there was no sufficient data gathered about the effect of exposure to schema (in)consistency on the participants who are older than 30, which limits the generalizability of this research.

Future research can be conducted with participants who have age diversification among them to make sure the research is not biased to a certain age group. Moreover, the same study can be implemented in a lab environment to enable monitoring of the participants during the experiment. Future researchers could also use a test to understand the English comprehension

level of participants. Furthermore, this study did not take Personal Fear of Invalidity (PFI) into account while assessing the effect of PNS on idea generation during the new product development process. Therefore, it might be interesting to consider the relationship of PFI and PNS while assessing the effect of PNS.

Additionally, the time pressure could have hampered creativity which could be an explanation of the non-significant results. Knowing that the time limitation of this experiment was one minute, a longer time limitation can be set to decrease the possible pressure. However, it is important to note that the effect of time pressure was not investigated in this study. Therefore, it would be interesting to consider it in a future study.

6. CONCLUSION

Online idea contests are important forms of customer co-creation during new product development (NPD) process since it is vital for firms to gather creative ideas from the customers. Thus, as a way of gathering creative ideas, the effect of schema exposure on idea generation was investigated. This thesis examined if schema (in)consistencies could be used to induce customers to generate more creative and higher amount of ideas during the NPD process. The results of this research showed no significant effect of schema exposure on idea generation for new product development. Considering that schema (in)consistent pictures did not create the expected stimuli, it can be interesting to repeat this study by using different schema exposure methods other than using schema (in)consistent pictures.

In addition, this study also investigated the role of personal need of structure (PNS) of the participants as the moderator of the relationship between schema (in)consistencies and idea generation for new product development. There was no significant moderator effect found for PNS observed on this relationship. However, when the main effect of PNS was analyzed, it was found that PNS had a main effect on the flexibility and the quantity of idea generation, but not the creativity. Considering that previous studies have demonstrated that the relationship between PNS and creative idea generation is affected by Personal Fear of Invalidity (PFI), future researchers can take PFI into account when examining the effect of PNS on idea generation.

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APPENDIX A

Table 8. Categorization of ideas by the raters

CATEGORIES	New ways of using pasta
A	Personal decoration
B	Games
C	Home decoration
D	Food combination
E	Food related usage
F	Charity
G	Art
H	Construction
I	Religion
J	Sports
K	Science
L	Fun
M	Tool
N	Measure
O	Transport
P	Other

APPENDIX B

Table 9. Personal Need for Structure (PNS) Questionnaires from the study of Neuberg and Newsom (1993)

Nr.	Questions for supplier orientation
1.	It upsets me to go into a situation without knowing what I can expect from it.
2.	I'm not bothered by things that interrupt my daily routine
3.	I enjoy having a clear and structured mode of life
4.	I like to have a place for everything and everything in its place.
5.	I enjoy being spontaneous.
6.	I find that a well-ordered life with regular hours makes my life tedious.
7.	I don't like situations that are uncertain.
8.	I hate to change my plans at the last minute.
9.	I hate to be with people who are unpredictable.
10.	I find that a consistent routine enables me to enjoy life more.
11.	I enjoy the exhilaration of being in unpredictable situations.
12.	I become uncomfortable when the rules in a situation are not clear.

1 = strongly disagree 2 = moderately disagree 3 = slightly disagree 4 = slightly agree 5 = moderately agree 6 = strongly agree

Research Integrity Form - Master thesis

Name: Arif Serdar Hiçyılmaz	Student number: 1042708
RU e-mail address: Serdar.Hicyilmaz@student.ru.nl	Master specialisation: Marketing

Thesis title: *The Role of Schema (in)Consistency on Idea Generation: Does Personal Need of Structure moderate this relationship?*
Brief description of the study: Customer co-creation is a vital process for new product development. An efficient way of gathering ideas from customers is through internet as it allows firms to reach people from all over the world. By using internet, companies organize online idea contest to encourage customers to co-create with the firm and come up with a creative idea. However, it is not always easy for firms to gather creative ideas from the customers. Prior research shows that exposure to schema (in)consistencies enhance the creativeness and flexibility of ideas. Specifically, this study investigates the role of schema (in)consistencies on the quality (number of ideas) and quantity (creativeness) of idea generation. Moreover, Personal Need of Structure (PNS) of the customers is taken into account as a moderator of the relationship between schema exposure and idea generation for new product development. The results of this study indicate that there is no effect of schema (in)consistent pictures on idea generation. Furthermore, no moderation effect was found for PNS. However, it was found that PNS has a main effect on flexibility and the number of ideas generated. Thus, customers with low PNS are able to generate more flexible and higher number of ideas. An important implication of the results of this study is that customers with low PNS can bring additional value during the co-creation process.

It is my responsibility to follow the university's code of academic integrity and any relevant academic or professional guidelines in the conduct of my study. This includes:

- providing original work or proper use of references;
- providing appropriate information to all involved in my study;
- requesting informed consent from participants;
- transparency in the way data is processed and represented;
- ensuring confidentiality in the storage and use of data;

If there is any significant change in the question, design or conduct over the course of the research, I will complete another Research Integrity Form.

Breaches of the code of conduct with respect to academic integrity (as described / referred to in the thesis handbook) should and will be forwarded to the examination board. Acting contrary to the code of conduct can result in declaring the thesis invalid

Student's Signature: _____**Date:**

To be signed by supervisor

I have instructed the student about ethical issues related to their specific study. I hereby declare that I will challenge him / her on ethical aspects through their investigation and to act on any violations that I may encounter.

Supervisor's Signature: _____**Date:**

Consent Form for submitting a thesis in the Radboud thesis Repository

Radboud University Nijmegen (hereafter Radboud University) has set up a thesis repository. The purpose of this repository is twofold:

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2. Wherever possible and allowed, make theses available to potential users inside and outside Radboud University.

This supports the process of creation, acquisition and sharing of knowledge in the educational setting.

The repository serves as an archive in which all theses will be included. This consent form serves to also enable the publication of those theses.

By submission and publication in the theses repository copyright is not transferred. Therefore, students can at any time revoke their consent for publication.

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- The student grants Radboud University the right to change the accessibility of the thesis and limit it if compelling reasons exist.

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As a consequence of this consent form a user of the theses repository may use the thesis for private study and/or educational and research purposes, in accordance with the provisions of the Copyright Act (Auteurswet), with full mention of the name of the student and the location of the thesis.

Student number : 1042708

Student name   : Arif Serdar Hiçyılmaz

Thesis title   : *The Role of Schema (in)Consistency on Idea Generation: Does Personal Need of Structure moderate this relationship?*

☒ Yes, I grant permission to make available my thesis with the above title in the Radboud thesis Repository.

☐ No, I do <u>not</u> grant permission to make available my thesis with the above title in the Radboud thesis Repository, but the thesis is allowed to make available with effect from …………………………………………… (temporary embargo).

☐ No, I do <u>not</u> grant permission to make available my thesis with the above title in the Radboud thesis Repository (permanent embargo).

Signature: Date: 12.08.2020