No Pain, No Gain: An Examination of the Effects of Self-Threat on Creativity

by

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Abstract

This paper investigates how different forms of self-threat influences several types of creativity. It examines which forms of self-threat hinder or boost creative capacity. The author illustrates the proposition that the threat from fixed self-domain enhances convergent creativity and that threats from dynamic self-domain enhance divergent creativity. This research adds to current knowledge of creativity literature by highlighting self-threats and it differentiates effects on both divergent creativity and convergent creativity.

Key words: self-threat, creativity, divergent and convergent

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No Pain, No Gain: An Examination of the Effects of Self-Threat on Creativity

Introduction

Creativity as a factor in education and organization has been widely studied in the fields of psychology and management (e.g. Binnewies, Ohly, & Sonnentag, 2007; Lau & Li, 1996; Lim & Smith, 2008; Yang, Chattopadhyay, Zhang, & Dahl, 2012). Past studies have characterized creativity as a highly malleable attribute that is easily shaped by environmental factors such as light, sound, and temperature (Steidle & Werth, 2013; Mehta, Zhu, & Cheema, 2012; IJzerman, Leung, & Ong, 2014). In recent years, many researchers have turned their attention to the effects of self-threat, investigating whether adverse personal circumstances and negative emotions can actually boost or hinder creativity (Rios, Markman, Schroeder, & Dyczewski, 2014; Yang & Chattopadhyay, 2013; Mehta & Zhu, 2016). This research derives from the idea forwarded by West (2002) that threats, uncertainty, pressure, and related demands might stimulate the creative process through sheer necessity. Rios, Markman, Schroeder, and Dyzewski (2014) stated that under the self-threat of self-uncertainty, one's creative performance could be enhanced. There are numerous historical examples of this phenomenon in creative individuals, such as Vincent van Gogh and Ludwig van Beethoven. Both lived lives teeming with self-threat and the authors argue this was a key factor in their creative genius. However, as this correlation is purely circumstantial and there are many kinds of self-threat and creativity, it is necessary to investigate this phenomenon in further.

Not all creativity is the same. Psychologists have demonstrated that creativity is the cognitive process through which an individual comes up with an imaginative idea (Ward, Smith, & Finke, 1999). However, the different cognitive thinking processes that generate creativity has not been well discussed (Hommel, 2012). Two types of cognitive creativity,

divergent and convergent, have fundamentally different processing systems (Hommel, 2012) and thus need to be addressed differently. Divergent creativity has been well discussed in most creativity-related literatures and is defined as generating as many responses as possible to a specific task while under weak constrains (Hommel, 2012; Hommel, Colzato, Fischer, & Christoffels, 2011). Convergent creativity, on the other hand, refers to a straightforward problem-solving method where the most optimal solution is obtained while under strong constraints (Chermahini & Hommel, 2010; Colzato, Ozturk, & Hommel, 2012; Hommel, 2012; Hommel et al., 2011). Refining Rios et al's concept, not all forms of self-threat are equally effective in stimulating creativity. It was found that fixed threats, such as threats ton personality, which are more abstract and unchanging, lead to more convergent creativity. Conversely, dynamic threats, such as threats to GPA, lead to more divergent creativity.

The following research fills the gaps left by existing knowledge on the effects of different self-threats to creativity and how this knowledge can be applied to advance our understanding of the relationship between threat and creativity.

Literature Review

Creativity

The classic definition of this is the ability to produce output that is both novel and appropriate to the task at hand (R. J. Sternberg & Lubart, 1999). Many different terms and processes are associated with creativity, such as "thinking outside the box," "breaking the rules," "connecting the dots," integrative thinking, and producing unique ideas. These individual types of creativity can be divided into two broad categories: convergent and divergent. Convergent creativity is defined as a more constrained process directed at finding a single, optimal solution to a particular problem, and involves more integrative thinking. (Chermahini & Hommel, 2010; Colzato, Ozturk, & Hommel, 2012; Hommel, Colzato, Fischer, & Christoffels, 2011; Hommel,

2012; Guilford, 1950, 1967). The classic test for convergent creativity is the Remote Associates Task (RAT), developed by Mednick (1962), which presents participants with three words (e.g. rat, blue, cottage) and asks them to identify a fourth word which connects them thematically (in this case, *cheese*) (Mednick, 1962).

Conversely, divergent creativity involves generating as many solutions as possible to a given problem and is more focused on producing unique ideas than optimal answers (Hommel et al., 2011; Hommel, 2012; Bailin & Bailin, 1987; Gino & Wiltermuth, 2014; Guilford, 1950). Divergent creativity can be evaluated in terms of flexibility and fluency; it examines the number of ideas an individual can generate across multiple fields (De Dreu et al., 2008). A typical test of divergent creativity is an alternate usage task in which participants are given an object (such as a pen) and asked to come up with as many uses for that object as possible (Guilford, 1967).

In addition, convergent and divergent creativity also rely on different functional and cognitive mechanisms (Dietrich, 2004; Hommel, 2012 ; Gaither, Remedios, Sanchez, & Sommers, 2015). According to Akbari Chermahini & Hommel (2010), there is a curvilinear relationship (in the form of an inverted "U") between divergent creativity and dopamine levels, but a linear, negative relationship between convergent creativity and dopamine levels (Akbari Chermahini, Hickendorff, & Hommel, 2012). Convergent creativity is also associated with rebellious or unconventional creativity. For example, Gino and Wiltermuth found that those who tended to behave dishonestly generally scored higher on the RAT (Gino & Wiltermuth, 2014). Divergent creativity, on the other hand, requires a more concrete focus. For example, fluency of creativity was found to be higher in female participants who faced physical threats, rather those in a non-threatening environment (Kemmelmeier, Walton, Kemmelmeier, & Walton, 2016).

Self and Self-Threat

The term "self-threat" refers to events and conditions that endanger the physical or psychological self, such as being injured in a car accident or performing badly on a test (Park & Maner, 2009). Self has many self-domains and in Sherman and Conhen (2006) model, a self-system is composed of self-domains such as roles, values, identities, and beliefs (Sherman & Cohen, 2006). A threat happens when any of the self-domains are under threat. Research has shown that in certain cases, such adverse conditions, creativity can actually be stimulated. Furthermore, the resulting self-perception of one's creativity can bolster one's resilience to future self-threats (Rios et al., 2014). In this paper, we categorize threats as easier-to-change self-domains, like dynamic threats, or harder-to-change self-domains, like fixed threats. Mehta and Zhu (2016) summarized and suggested that resource constraints - a threat from an easier-to-change domain - enhance divergent creativity due to the presence of constraints that push people away from least resistance method (Mehta & Zhu, 2016). Derived from their findings, this author hypothesizes that dynamic threats will enhance divergent creativity. Gaither et al. (2015) found that priming race and social identity - two harder to change self-domains - produce more convergent creativity (Gaither et al., 2015). Derived from their findings, this author hypothesizes that fixed threat will enhance convergent creativity.

The underlying mechanism of the boosting effect of self-threat on creativity would be self-affirmation. When coping with a threat, an individual's immediate reaction is one of self-affirmation, which seeks to protect personal integrity and restore self-worth (Steele, 1988). The three main methods of self-affirmation are: revision, which is the revising of one's perceptions to accommodate the threat (e.g. accepting that one's attempt/idea is a failure) (Kuhn, 1996); reinterpretation, which is the reevaluation of a threat in order to minimize its impact (e.g. convincing oneself that a goal was unimportant anyway) (Sherman & Cohen, 2006); and affirmation, which affirms an alternative self-domain of the self-system even if the self-domain

is unrelated to the threatened self-domain (Sherman & Cohen, 2006). It refers to the "fluid compensation" in the maintenance model, which is a way to compensate for a loss of meaning (Proulx & Heine, 2014; Sherman & Cohen, 2006). With these reactions, revision is unlikely to stimulate creativity, as the individual has passively accepted their situation and has no incentive to change it. When faced with more permanent, fixed threats, such as those related to character, morality, or identity, an individual's response is more likely to be self-defensive. As the stress resulting from such situations impairs free association and other broad thought patterns, they are more likely to stimulate convergent creativity narrowly focused on solving the problem at hand. On the other hand, responding to rapidly-changing threats requires more varied, flexible, and multidisciplinary thinking; such threats will therefore more often stimulate divergent creativity.

Hypothesis

H1: Dynamic threats (measured by GPA threat) will produce more divergent creativity.

H2: Fixed threats (measured by Mortality Salience and Personality threat) will produce more convergent creativity.

Pre-test: Changeability of Self-Domains

The pre-test is aimed at identifying the most fixed self-domain and most dynamic self-domain by examining the changeability of self-domains in self-threat literature. 11 self-domains were selected from the self-threat literature, including GPA (Carroll, Shepperd, & Arkin, 2009), language skills, social relationships, intelligence, confidence, attitudes, attractiveness, competence, beliefs, personality (Critcher & Dunning, 2015), and mortality salience (acceptance of the fact that everyone dies eventually) (Cohen, Aronson, & Steele, 2000).

Method

Participants 53 students from the University of Manitoba were recruited to participate in a three-minute survey in exchange for a $1 honorarium. Participants were recruited mainly from the University Center and Drake buildings.

Procedure Participants were a laptop on which to complete the study, which asked them to evaluate the 11 self-domains listed above on a seven-point scale, from easiest to hardest to change. The order of self-domains presented to each participant was randomized.

Results and Discussion

I calculated the mean score of malleable, changeable, improbable, and fixed and found that people evaluated GPA as the easiest self-domain to change (M=5.61, SD= 0.94) and mortality salience as hardest (M=3.13, SD=1.48). Since mortality salience cannot be changed, I also selected the second hardest-to-change self-domain, personality (M= 4.71, SD=0.92), for investigation in Study 1. The pairwise T-test indicated a significant difference between mortality salience and personality ($p<0.001$) and GPA ($p<0.001$); personality and GPA was also significantly different ($p<0.001$). In the next experiments, GPA and personality were used as examples of a concrete threat and fixed threat, respectively.

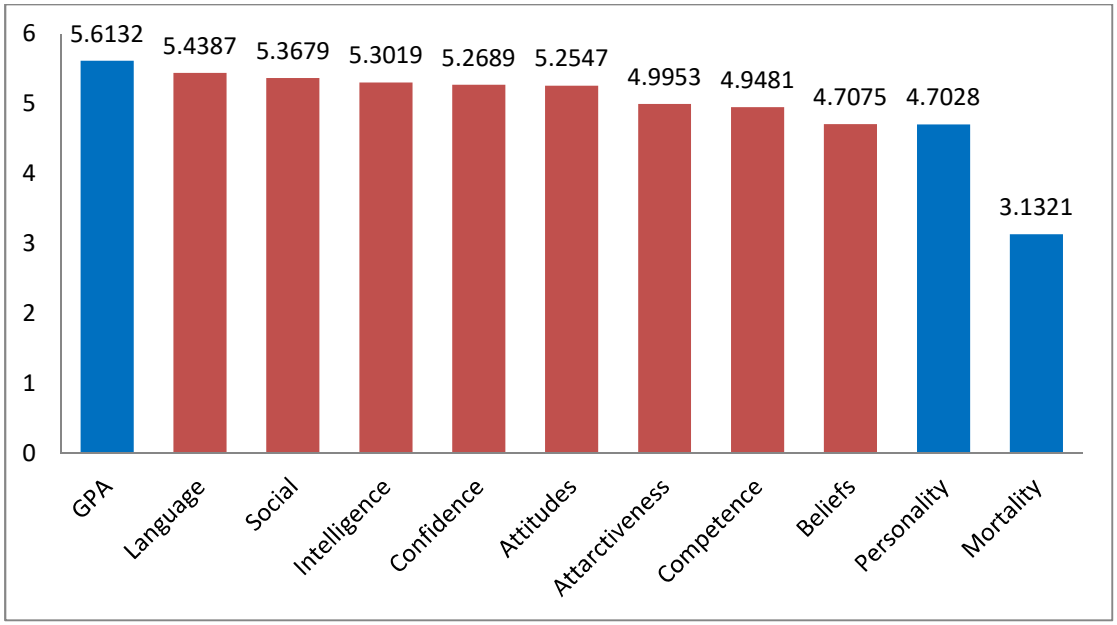

Figure 1: Changeability of 11 selected self-domains from pre-test

Experiment 1

Experiment 1 aimed to test the basic effect of whether the effect of changing creativity would appear when the threatened self-domain is different from focal domain creativity. GPA was selected as the comparison domain to test dynamic threat on divergent creativity.

Method

A total of 274 undergraduate students (112 females, M_{age}=20.35) from a large public university participated in this study.

Participants were randomly assigned to four conditions. In both GPA control condition and GPA threat, they were asked to read a masters' program description of Business Psychology at the University of British Columbia, with a brief description and a list of courses for an accelerated 12-month program (Carroll et al., 2009). Then they were provided with a list of top internship employers from large Canadian business firms and multinational corporations, such as BBDO and Toyota, followed by the program's contact information. In the control condition, participants were simply required to report their feelings regarding the attractiveness of the Business Psychology Program, while in the threat condition they were asked to compare the minimum GPA requirement with their own - which via the study design was always lower. In the creativity control condition, participants received the same stimuli as the GPA control condition. In the creativity threat condition, participants were asked to self-report their creativity score and their scores were lower than the minimum requirements, resulting in rejection decisions from UBC.

Afterwards, all participants were shown the picture of a brick and were asked to write down as many usages for it as possible (Guilford, 1967).

Results and Discussion

In order to reduce bias in the assessment of the brick usage creativity task, two independent judges were recruited to perform the data coding. First, the coders compiled a list

of all unique answers provided by participants. Each unique answer was then assigned a number and sorted into categories, such as building, weapon, etc. Based on the range of ideas within each category, each participant's responses were rated on a scale of 1-9, from least to most creative. We created two variables to measure divergent creativity. The first variable was the highest creativity rating for an individual idea (out of all the ideas) of the participant. The second variable is the averaged creativity rating of all of that participant's ideas.

A total of 274 uses for a brick were generated by the participants. In order to assess the creativity score, I averaged all the ratings for each participant (Mehta & Zhu, 2016). A one-way ANOVA test revealed that in the GPA group, participants under threatened conditions performed better than the control group ($Mthreat$=4.7119, $Mcontrol$=4.1389, p=0.037), which is consistent with hypothesis 1. With the creativity group, no significant difference was observed between the threat and control conditions ($Mthreat$=4.7608, $Mcontrol$=4.8140, p=0.841). Study 1 suggested that dynamic threats enhance diveregent creativity.

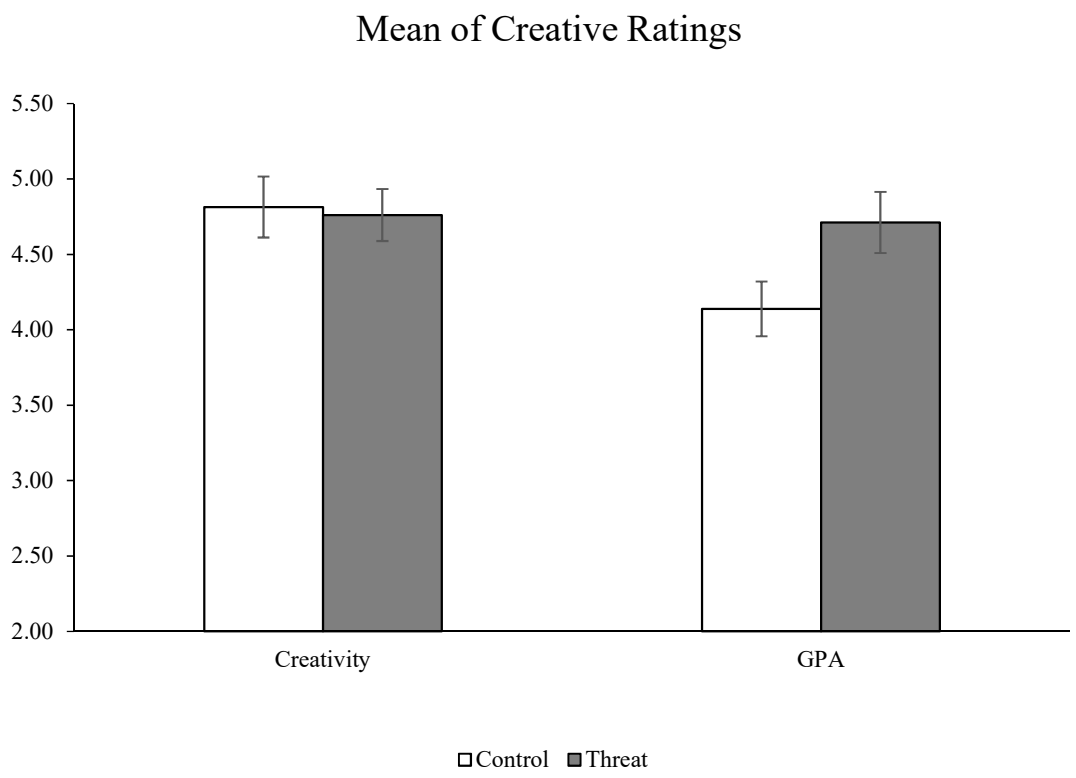

Figure 2: Mean of Creative ratings of participants in Experiment 1 (n= 274) who assigned to creativity control, creativity threat, GPA control, and GPA threat conditions. Errors bars represent the *SEM.*

Experiment 2

Experiment 2 was designed to test the relationship between the changeability of self-domain and the two types of creativity. Participants were randomly assigned to one of six simulated threat situations (three tests, three controls) centered on GPA, personality, or mortality salience, and then made to perform either a divergent or convergent creativity task. The prediction was that concrete threats will more greatly improve divergent creativity, and fixed threats convergent creativity.

Method

306 participants (160 females, *Mage*=22) were recruited to parcipate in Experiment 2. The study design was a 3 X 2 (GPA, personality, mortality salience /divergent vs. convergent creative task) between-subject model. Participants were randomly assigned one of six simulated threat situations.

GPA (Appendix 1) It is same as Study 1.

Personality (Appendix 2) The personality threat simulation was adapted from Critcher and Dunning (Critcher & Dunning, 2015). In the threat condition, participants were asked to complete a personality test and then given 36 false statements, 24 of which were negative. To reinforce this manipulation, participants were asked to write down their feelings regarding the behaviors predicted by the test. In the control condition, participants were primed for self-affirmation prior to performing the assessment task. In the self-affirmation task, they were asked to rank eight skills or values (financial success, adventure in life, sense of humor, social skills, relations with friends, religion, health, and academic success) from most to least important and then identify three reasons for selecting their top-ranked choice.

Mortality Salience (Appendix 3) The mortality salience threat simulation was adapted from Cai and Wyer (Cai & Wyer, 2015). Threat condition participants were asked to briefly describe their thoughts and emotions regarding their eventual deaths, while in the control condition the subject are centered on dental pain.

Creativity Task (Appendix 4) Remote Association Tasks (RAT; Kray, Galinsky, & Wong, 2006) were used to measure convergent creativity and the brick usage task (Guilford, 1967) was used to measure divergent creativity. During the RAT test, participants were given three words and asked to find a fourth that connects them thematically.

Results and Discussion

The author used the same method to code divergent creativity tasks as was used in Experiment 1. It was found that within the GPA group, participants under threat conditions perform better than the control group in regards to their creative rating scores (M_{threat} =4.3797 , $M_{control}$ =2.8815, p=0.009). However, as predicted, personality threat (M_{threat} =4.5029 , $M_{control}$ =3.6841, p=0.125) and mortality salient threat (M_{threat} =4.2189 , $M_{control}$ =4.0513, p=0.809) showed no significant difference between threatened group and control group.

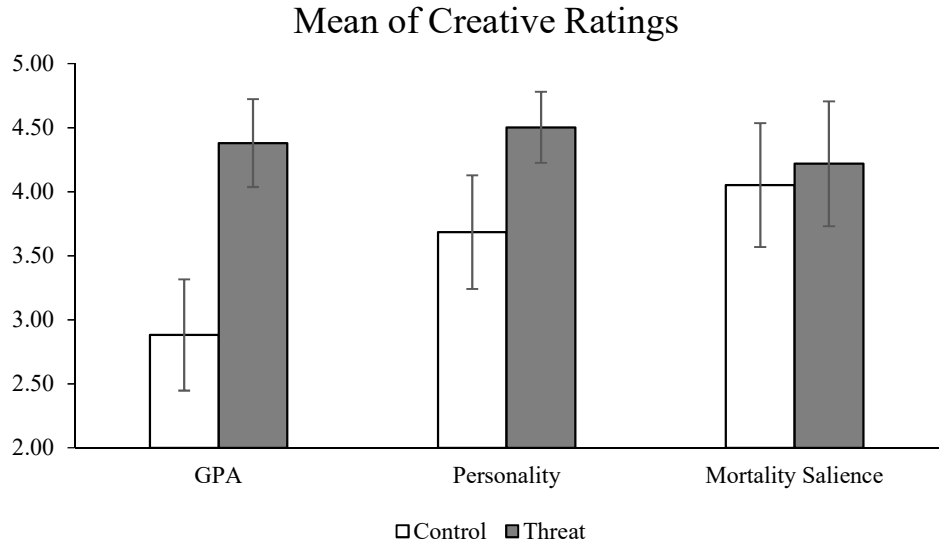

Figure 3: Mean of creative ratings generated brick usages of participants in Experiment 2 (n= 156) who assigned GPA control, GPA threat, personality control, personality threat, mortality salience control, and mortality salience threat conditions. Errors bars represent the *SEM.*

For the convergent task (see Figure 4), the author calculated the mean score of the RAT test. Incorrect answers were assigned 0 and correct answer were assigned 1 (Kray, et. al, 2006). The author found marginal significant values between the threat group and control group under personality domain (M_{threat} =0.2549, $M_{control}$ =0.1392, p=0.078), which supported Hypothesis 2. There was no difference in GPA domain (M_{threat} =0.1409, $M_{control}$ =0.2348, p=0.154). However, under the mortality salient threat, particpants performed worse than the control group (M_{threat} =0.1318, $M_{control}$ =0.2246, p=0.054).

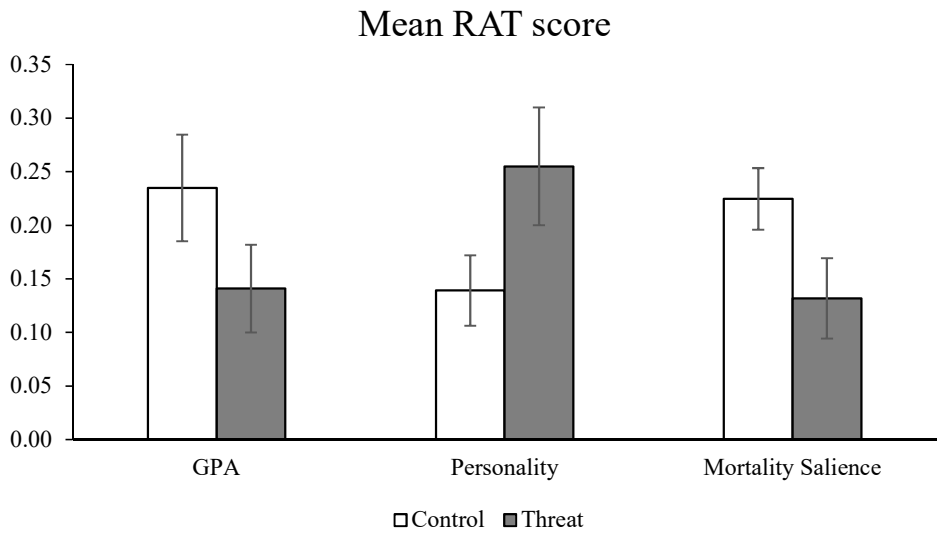

Figure 4: Mean of RAT scores of participants in Experiment 2 (n= 152) who assigned GPA control, GPA threat, personality control, personality threat, mortality salience control, and mortality salience threat conditions. Errors bars represent the *SEM.*

The threat of mortality salience was expected to dampen all forms of creativity, as the inevitability of death cannot be avoided and thus provides little catalyst for creativity, unlike

more immediate threats to one's physical and psychological wellbeing (Yang & Chattopadhyay, 2013). Persistence and its influence in creativity also shed some light on the negative result (De Dreu et al., 2008; Nijstad, De Dreu, Rietzschel, & Baas, 2010). In De Dreu et al's paper, creativity performance can be achieved through persistence and the exploration of possibilities (Nijstad et al., 2010). According to De Dreua et al., the relationship between level of arousal and creativity could be a "U" shape - that is, only a moderate level of arousal would lead to improvement in creative related task performance (De Dreu et al., 2008). Low levels of arousal would result in inactivity and neglect of information, and thus there is little chance of producing creativity (De Dreu et al., 2008). It is possible that the level of mortality salience threat is too definitive and persistent, cannot be active, and the level of arousal is extremely low.

Implication

This study contributes to the knowledge of the creative effects of self-threat by differentiating between the effects of fixed and dynamic threats on both divergent creativity and convergent creativity. The author's research also highlights the importance of different task effects of threats on creativity. Managers could stimulate convergent creativity by using fixed threats to solve tasks, such as linear mathematical problems, and to stimulate divergent creativity in order to enhance better performance of tasks, such as product development. Finally, our study yields some light for schools and art institutions regarding how to improve creativity. Very salient threats may harm creativity, but a little diversity might help.

Limitation and Future Direction

One significant limitation of the study is the exclusive use of students in the pre-testing phase. Students are more likely to view GPA as a relevant and variable source of anxiety than other demographics, introducing an important source of potential bias.

In future studies, the author would use assessment to determine the affirmation strategy that is possibly worked under self-threat on the creativity relationship. The author would also apply real work place problems in order to access both novelty and appropriateness of creativity.

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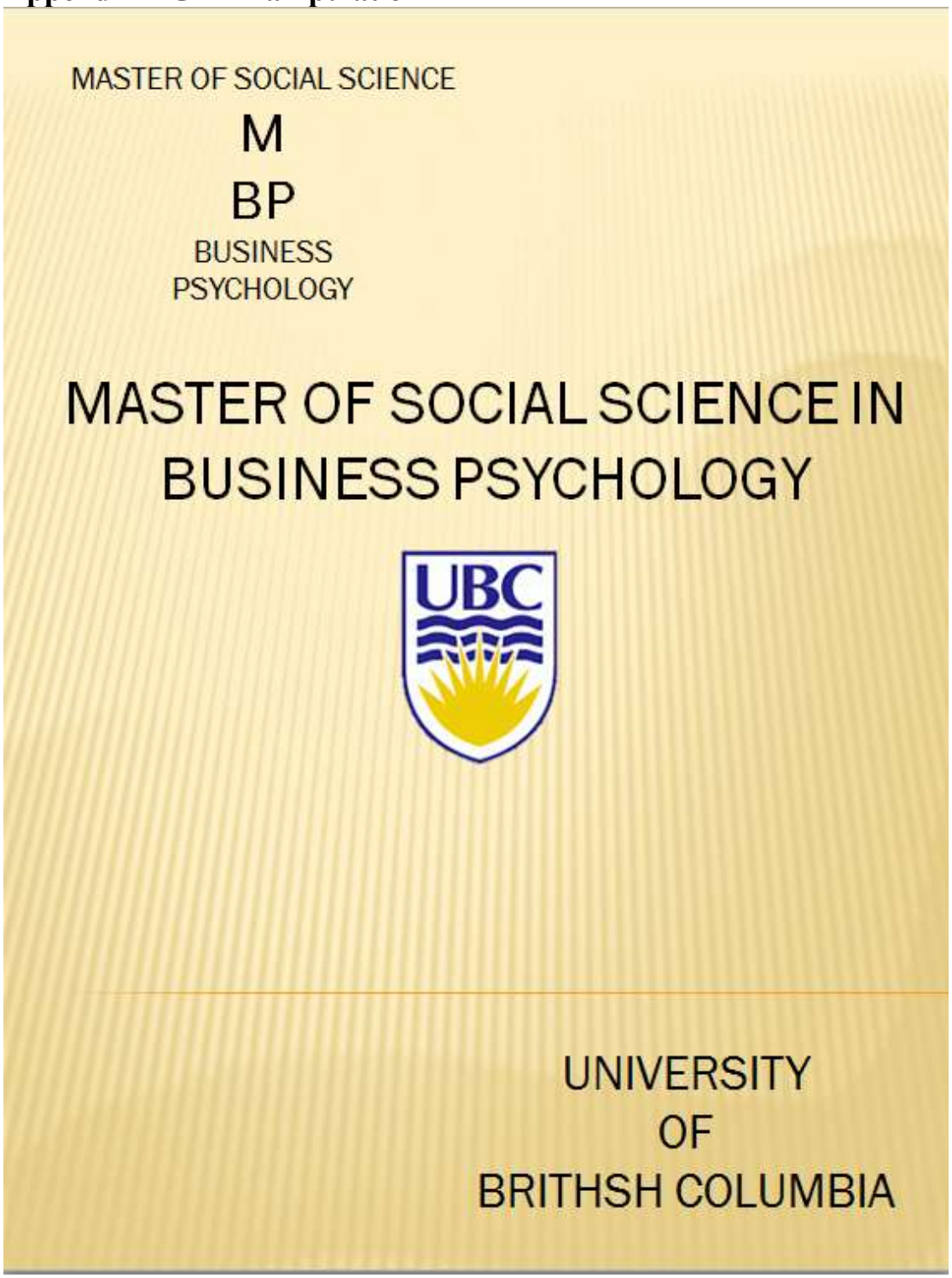
Appendix 1 GPA manipulation



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- Group Dynamics
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- Applied Behavioral Analysis

INTERNSHIP & CAREER OPPORTUNITIES

Top Internship Employers For 2004-2005:

- Anheuser Busch
- Chevron Texaco
- Exxon Mobil
- Frito-Lay
- General Electric
- Honeywell
- Kraft
- Microsoft
- Pepsi
- Raytheon
- Shell
- Toyota

Top Internship Employers For 2004-2005:

- Anheuser Busch
- Citigroup
- Darden
- U.S Dept. of Labor
- Frito-Lay
- General Electric
- General Mills
- Honeywell
- Microsoft
- Motorola
- Pepsi
- Raytheon

UNIVERSITY OF BRITISH COLUMBIA

MASTER OF SOCIAL SCIENCE

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PSYCHOLOGY

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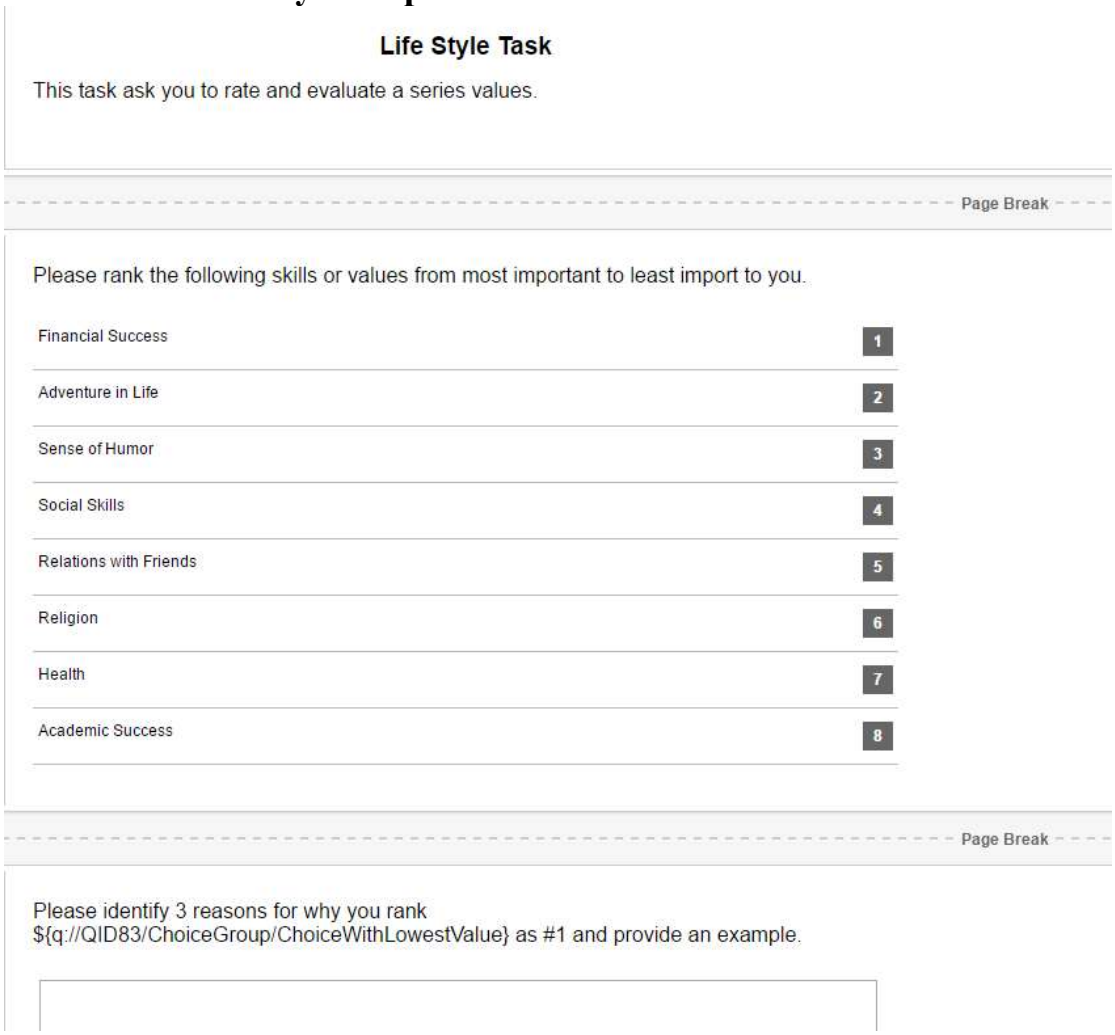
Appendix 2 Personality manipulation



Life Style Task

This task ask you to rate and evaluate a series values.

Page Break

Please rank the following skills or values from most important to least import to you.

Financial Success	1
Adventure in Life	2
Sense of Humor	3
Social Skills	4
Relations with Friends	5
Religion	6
Health	7
Academic Success	8

Page Break

Please identify 3 reasons for why you rank
${q://QID83/ChoiceGroup/ChoiceWithLowestValue} as #1 and provide an example.

Assessment of Personality

In this section we are interested in assessing your personality type. On the next page you will find a series of personality traits, please indicate the extent to which each of these traits apply to you.

Page B

I see myself as:

	Disagree strongly	Disagree moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree strongly
Extraverted, enthusiastic.	○	○	○	○	○	○	○
Critical, quarrelsome.	○	○	○	○	○	○	○
Dependable, self-disciplined.	○	○	○	○	○	○	○
Anxious, easily upset.	○	○	○	○	○	○	○
Open to new experiences, complex.	○	○	○	○	○	○	○
Reserved, quiet.	○	○	○	○	○	○	○
Sympathetic, warm.	○	○	○	○	○	○	○
Disorganized, careless.	○	○	○	○	○	○	○
Calm, emotionally stable.	○	○	○	○	○	○	○
Conventional, uncreative.	○	○	○	○	○	○	○

- You would borrow other people's belongings without their knowledge.
- You would be unfaithful when in an intimate relationship.
- You would often lie to your parents.
- An employer would not rely on you to have an important project completed by the deadline.
- You would follow through on a promise made to friends.
- A teacher would leave you alone in a room while taking a test and not be afraid that you would cheat.

- You would keep secrets when asked to.
- You would act in a condescending manner to other people.
- People would be willing to tell you embarrassing things about themselves in Confidence.
- You would take the focus off you and redirect it to others.
- You would give others the credit for a group success.
- You would never openly brag about your accomplishments.

- You would point out others' weaknesses to make you look better.
- You would talk more about you than about others.
- You would show off in front of others.
- You would let some of your achievements go by unaccredited.
- You would make fun of others because of their looks.
- You would purposely hurt someone to benefit you.

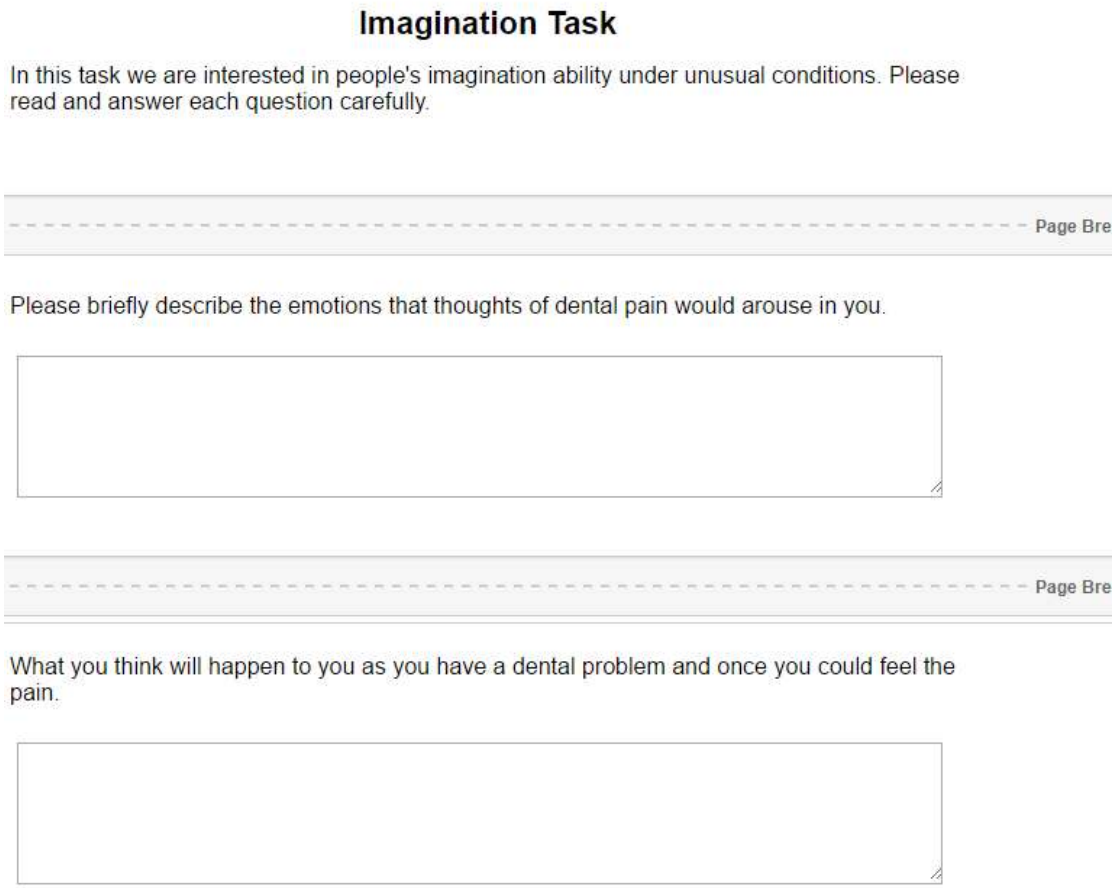
- You would refuse to lend class-notes to a friend who was ill.
- You would make an obscene gesture to an old lady.
- You would look for faults even if your life was going well.
- When you would not like to do something, you would constantlymention it.
- You constantly talk about how much stuff there is to be done.
- You pick only the bad points to describe the classes you attend.

- You would offer to care for a neighbor's child when the babysitter couldn't come.
- You would help people by opening a door if their hands were full.
- You would help a handicapped neighbor paint his or her house.
- You would volunteer time to work as a big brother or big sister to a child in need.
- Even though you had a lot of work, you would not cheat on a homework assignment.
- You would take care of a friend's pet for the entire summer.

- You rarely inform others about physical ailments.
- You overlook the bad points about a roommate.
- You minimize bad experiences when telling about them.
- You tolerate situations even when not having a good time.
- You would gossip about a good friend to other people.
- You would ignore certain types of people at a party.

Please write down a few words of how you feel about the predicted behaviors of your personality you just read

Appendix 3 Mortality Salience manipulation



Imagination Task

In this task we are interested in people's imagination ability under unusual conditions. Please read and answer each question carefully.

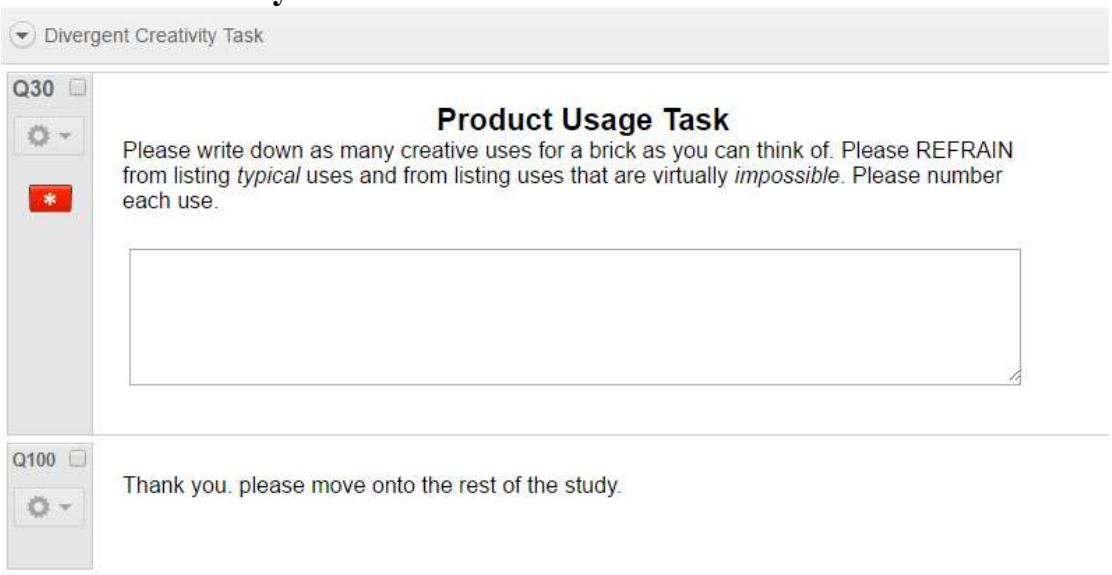
Page Bre

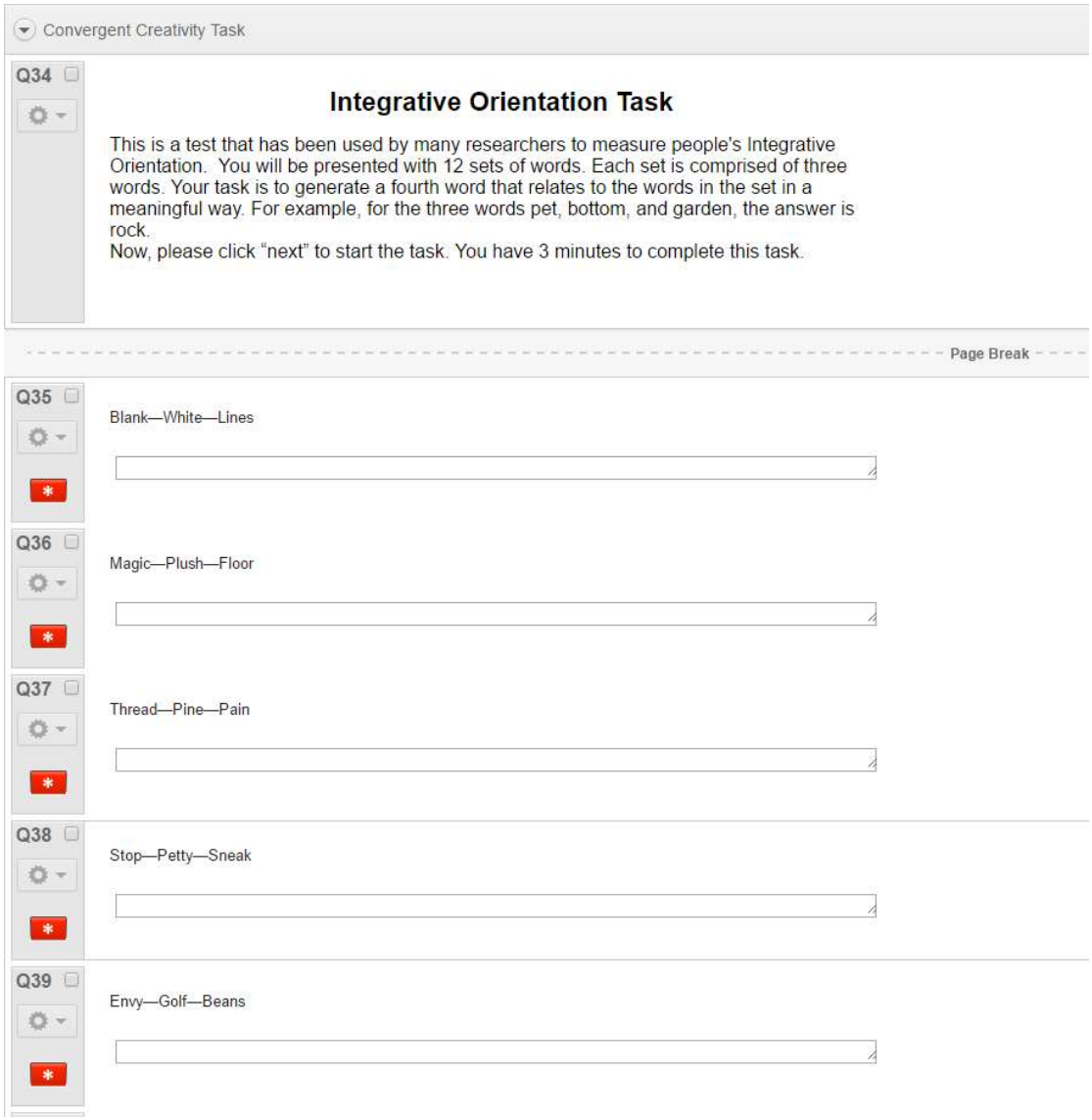
Please briefly describe the emotions that thoughts of your own death would arouse in you.

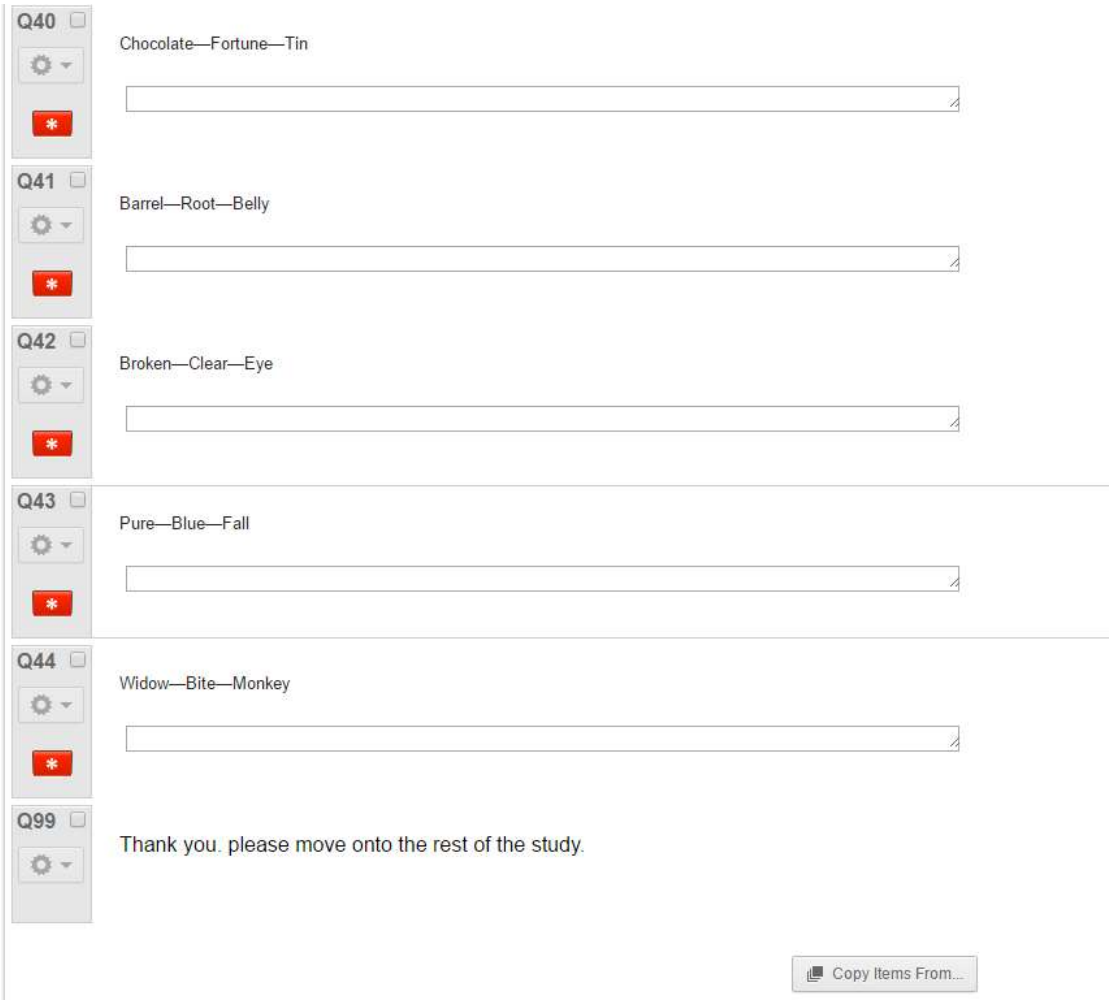
Page Bre

What do you think will happen to you as you physically die and once you are physically dead.

Appendix 4 Creativity tasks




Convergent Creativity Task
Q34
Integrative Orientation Task
This is a test that has been used by many researchers to measure people's Integrative Orientation. You will be presented with 12 sets of words. Each set is comprised of three words. Your task is to generate a fourth word that relates to the words in the set in a meaningful way. For example, for the three words pet, bottom, and garden, the answer is rock.
Now, please click "next" to start the task. You have 3 minutes to complete this task.
Page Break
Q35
Blank—White—Lines
Q36
Magic—Plush—Floor
Q37
Thread—Pine—Pain
Q38
Stop—Petty—Sneak
Q39
Envy—Golf—Beans


Q40
Chocolate—Fortune—Tin
Q41
Barrel—Root—Belly
Q42
Broken—Clear—Eye
Q43
Pure—Blue—Fall
Q44
Widow—Bite—Monkey
Q99
Thank you. please move onto the rest of the study.
Copy Items From...