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The Effects of Task Ambiguity and Individual Differences on Personal Internet Use at Work

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The Effects of Task Ambiguity and Individual Differences

on Personal Internet Use at Work

By

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The Effects of Task Ambiguity and Individual Differences on Personal Internet Use at Work

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Abstract

THE EFFECTS OF TASK AMBIGUITY AND INDIVIDUAL DIFFERENCES ON

PERSONAL INTERNET USE AT WORK

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The present study investigates the effects of task characteristics and individual

differences on personal internet use at work. Borrowing from the procrastination

research, four individual differences (i.e., self-efficacy, conscientiousness, impulsiveness,

and ambiguity tolerance) and one task characteristic (i.e., task ambiguity) were identified

as relevant variables. For this two-part study, 49 participants were recruited. The first

study consisted of an online questionnaire measuring the relevant individual differences

and demographic information. The second portion included a laboratory study measuring

peoples' procrastination behaviors during an online task. Procrastination was

operationalized as time spent on off-task activities (i.e., task-unrelated

websites/applications) and was tracked by a time tracking software, WorkTime. Results

showed that procrastination was only negatively correlated with ambiguity tolerance.

Furthermore, task ambiguity was only marginally relevant in people's procrastination

behaviors. Although inconclusive, the study underlines the importance of measuring

procrastination as behaviors rather than self-report ratings. The implications, limitations,

and future directions of the findings are discussed.

Keywords: task characteristics, individual differences, procrastination, personal

internet use at work, ambiguity, self-efficacy, conscientiousness, impulsiveness,

ambiguity tolerance

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CHAPTER I

INTRODUCTION

In 2001, researchers estimated that personal internet use at work cost U.S. companies one billion dollars per year in lost productivity (Foster, 2001). A study released in 2005 estimated the cost of internet misuse to be $178 billion (Saalfield, 2005). Today, the potential for lost productivity from personal internet use is much greater as employees are surrounded by different types of communication devices that can access the internet (e.g., desktops, laptops, tablets, e-readers, smart phones), and much of their work involves internet applications (e.g., email, web-based software, online research). In the US, 62% of all employees spend most of their time two clicks away from the internet (Fallows, 2002).

As the internet offers more and more distractions, one noteworthy trend is the increased presence of social media. According to Nielsen (2011), social networks and blog sites take up 22.5% of Americans' time spent online. This is more than twice the amount of time spent online for online games (i.e., 9.8%) and almost three times more than time spent for emails (i.e., 7.6%). Moreover, Facebook appears to be the social networking site that consumes the most time. Over 116.3 million home and work internet users spend, on average, more than seven hours per month on Facebook (Nielsen, 2010). In May 2011, a total of 53.5 billion minutes had been spent on Facebook exceeding the total time spent on other social networking and blog websites, such as Blogger, Tumbler, Twitter, and LinkedIn combined (i.e., 2.2 billion minutes) (Nielsen, 2011).

The amount of time spent on Facebook raises the concern of productivity loss. In a study with 237 employees, Nucleus Research (2009) found that 77% of the job incumbents have a Facebook account and 61% of those who have an account access it during their working hours. Of those who access it at work, 87% could not define a clear business reason for using it. Nucleus Research concluded that organizations could lose an average of 1.5% of office productivity when employees can access Facebook at work. In another study conducted in a more academic setting, Kirschner and Karpinski (2010) found that Facebook users reported lower mean GPAs and spent fewer hours studying per week than non-Facebook users.

Despite the growing concern about productivity losses owing to personal internet use, very little empirical research focuses on individual differences and the task characteristics of jobs that increase the likelihood of people getting distracted by the internet. With this in mind, the purpose of this study is to investigate personality traits and task characteristics that are associated with internet distraction on the job. In looking for predictors of internet distraction, it may be helpful to examine the research on procrastination.

Procrastination

Independent from the social networking websites, a great deal of research (e.g., Ferrari, Keane, Wolfe, & Beck, 1998; Ferrari & Tice, 2000; Gröpel & Steel, 2008; Sirois, 2004) has been conducted on procrastination. Moreover, owing to the difficulty in conceptualizing this construct, different types of procrastination have been investigated. For example, Ferrari, O'Callaghan, and Newbegin (2005) conducted research distinguishing between arousal and avoidant procrastinators. The former describes

people who wait until the last minute to engage in the task in order to experience an adrenaline-rush-like feeling, whereas the latter group may use procrastination as an excuse to hide one's lack of ability. In a more recent study, Steel (2010) meta-analytically and factor-analytically investigated the validity of the arousal, avoidant, and decisional procrastination (i.e., putting off decisions) concepts and showed that the results did not support such a model. Rather, he defined procrastination as "to voluntarily delay an intended course of action despite expecting to be worse off for the delay" (Steel, 2007, p. 66) and integrated the different existing types into a single irrational behavior to put tasks off despite being aware of the potential consequences.

Procrastination has also been studied in the context of internet use (e.g., Odaci, 2011; Vitak, Crouse, & LaRose, 2011). In particular, Lim (2002) termed internet procrastination at the workplace as 'cyberloafing.' The researcher identified it as a form of production deviance and stated that cyberloafing is easily disguised owing to the appearance of being engaged in work. Lavoie and Pychyl (2001) argued that internet users may be susceptible to procrastination owing to the prevalence of enjoyable, online distractions. Results showed that there was a moderately strong correlation between trait procrastination and a self-reported measure of internet procrastination.

Situational Determinants of Internet Distraction

What situational characteristics—besides the possession of a computer with internet—encourage employees to procrastinate using the internet? Tasks with certain characteristics appear to be easier to put off than others. For example, Harris and Sutton (1983) provided a theoretical framework of task characteristics based on four criteria: difficulty, appeal, ambiguity, and deadline pressure. They argued that these variables

play a role in predicting one's degree of procrastination. In a more recent study, Ackerman and Gross (2005) investigated a number of homework-related characteristics and found that less academic procrastination took place when students perceived the assignment as interesting and received clear instructions (i.e., the opposite of ambiguity) from the instructor. Procrastination, however, was not affected by perceived task difficulty or deadline pressure. Therefore, the present study will focus only on one of the variables (i.e., ambiguity) to allow for more meaningful inferences about task characteristics.

Individual Differences in Susceptibility to Internet Distraction

A great deal of research (e.g., Klassen, Krawchuk, & Rajani, 2008; Schouwenburg & Lay, 1995; Steel, Brothen, & Wambach, 2001) has focused on tying procrastination to specific individual traits. One individual variable which has been found to be a strong correlate is impulsiveness. This variable indicates "spontaneity and a tendency to act upon whims and inclinations" (Steel, 2007, p. 69), and this is consistent with the notion that procrastinators readily give in to temptations (e.g., Steel, 2010). On a theoretical basis, this variable plays an integral role in Steel and König's (2006) temporal motivation theory representing individuals' sensitivity to delay. In other words, distant goals become less valuable to individuals and more immediate opportunities for gratification gain in importance. Dewitte and Schouwenburg (2002) also found similar patterns in their study and concluded that procrastinators were more likely to delay their intentions in order to engage in more enjoyable activities. In a meta-analysis, Steel (2007) found that the correlation of impulsiveness with procrastination was .52.

Another individual trait which has been linked to procrastination is self-efficacy. As defined by Bandura (1997), self-efficacy is a person's belief in one's capabilities. Research (e.g., Odaci, 2011; Sirois, 2004; van Eerde, 2003) has shown that such beliefs affect how much one procrastinates. For example, Klassen et al. (2008) found that self-efficacy for self-regulation was the best predictor of procrastination tendencies. Steel's (2007) meta-analysis showed that self-efficacy has a strong negative correlation with procrastination of -.46.

As part of the Big Five constructs, conscientiousness has been found to have an inverse relationship with procrastination as well (e.g., van Eerde, 2003). Research (e.g., Lee & Klein, 2002; Martocchio & Judge, 1997) has supported the relationship of conscientiousness to learning, and as this variable deals with the idea of self-control (Costa & McCrae, 1992), the relationship to procrastination becomes more apparent. Furthermore, conscientiousness can be broken down into multiple facets which show strong correlations with procrastination as well. For example, Schouwenburg and Lay (1995) showed that procrastination was negatively correlated with the six facets of conscientiousness (i.e., competence, order, dutifulness, achievement-striving, self-discipline, & deliberation). In a more recent study, Steel's (2007) meta-analysis confirmed their findings with a strong negative correlation of -.75.

When considering the task characteristic of ambiguity, another individual difference that may affect the present study is the concept of ambiguity tolerance (AT). Furnham and Tracy (1995) defined AT as a way individuals perceive and process information when facing unfamiliar, complex, or incongruent cues. Individuals with low AT are more likely to avoid ambiguous stimuli. In other words, they are more likely to

procrastinate. Furthermore, Endres, Chowdhury, and Milner (2009) found that tolerance of ambiguity moderated the relationship between task complexity and self-efficacy. Their results indicated that individuals high on AT have increased perceived ability to succeed in highly complex decision-making situations.

Interaction between Situational Determinants and Individual Differences

Not a great deal of empirical research has been conducted on investigating the interaction between individual difference variables and situational determinants. Although theoretical frameworks for such interactions have been emerging—the temporal motivation theory (Steel & König, 2006) combining impulsiveness, time pressure, expectancy, and value—much more attention can be given to how individual and situational characteristics affect individuals' procrastination behavior.

Present Study

Previous research on procrastination has consistently identified a number of individual differences which are associated with procrastination behaviors. However, that knowledge has not been applied to research on internet distraction and procrastination. The present study will investigate whether a number of individual differences and a task characteristic (i.e., ambiguity) affect people's procrastination habits online. The present research predicts that individual characteristics will affect the amount of time spent off-task when assigned an ambiguous task. Furthermore, this research predicts that there will be an interaction between the individual traits and the task characteristic on the amount of time spent procrastinating.

H1: Scores on a procrastination scale will correlate with the actual amount of time spent off-task using the internet.

H2A: Self-efficacy will be negatively correlated with participants' procrastination behavior.

H2B: Conscientiousness will be negatively correlated with participants' procrastination behavior.

H2C: Impulsiveness will be positively correlated with participants' procrastination behavior.

H2D: Ambiguity tolerance will be negatively correlated with participants' procrastination behavior.

H3: Participants performing an ambiguous task will procrastinate more than participants performing a less ambiguous task.

H4A: There will be an interaction between participants' level of self-efficacy and ambiguity of the situation, such that in the ambiguous situation, participants with higher levels of self-efficacy will procrastinate less than participants with lower levels of self-efficacy, whereas in the less ambiguous situation, participants' procrastination behavior will not differ.

H4B: There will be an interaction between participants' level of conscientiousness and ambiguity of the situation, such that in the ambiguous situation, participants with higher levels of conscientiousness will procrastinate less than participants with lower levels of conscientiousness, whereas in the less ambiguous situation, participants' procrastination behaviors will not differ.

H4C: There will be an interaction between participants' level of impulsiveness and ambiguity of the situation, such that in the ambiguous situation, participants with higher levels of impulsiveness will procrastinate more than participants with lower levels of

impulsiveness, whereas in the less ambiguous situation, participants' procrastination behaviors will not differ.

H4D: There will be an interaction between participants' level of ambiguity tolerance and ambiguity of the situation, such that in the ambiguous situation, participants with higher levels of ambiguity tolerance will procrastinate less than participants with lower levels of ambiguity tolerance, whereas in the less ambiguous situation, participants' procrastination behaviors will not differ.

CHAPTER II

METHODS

Participants

For the present study, 49 participants (44 women and 5 men) were recruited

through the SONA system, a human subject pool management software. Undergraduate

students from Minnesota State University, Mankato who are associated with the

Psychology department are registered in the system and can participate in studies in

exchange for extra-credit.

Measures

Participants completed the following measures, responding to items on a 5-point

Likert scale:

Self-efficacy. A four-item task-specific self-efficacy scale was developed to

measure participants' level of self-efficacy, particularly related to one's belief to be able

to navigate through websites. Some example items include "When I get on a new

website, I can navigate my way through" and "I feel confident comparing the user-

friendliness of any two websites."

Conscientiousness. The International Personality Item Pool (IPIP; Goldberg,

1999), that is a representation of Costa and McCrae's (1992) conscientiousness scale, was

used. The IPIP scale was designed to measure constructs similar to NEO-PI-R. The

Cronbach's alphas for the six facets of conscientiousness range from .71 to .85 (Goldberg,

1999). Furthermore, the correlation coefficients of those six facets corrected for

unreliability between IPIP and NEO range from .87 to .95 (Goldberg, 1999). Some example items include: self-efficacy ("I complete tasks successfully," "I know how to get things done."); orderliness ("I like order," "I do things according to a plan."); dutifulness ("I try to follow rules," "I do the opposite of what is asked (reverse-coded)."); achievement-striving ("I go straight for the goal," "I set high standards for myself and others."); self-discipline ("I get chores done right away," "I find it difficult to get down to work (reverse-coded)."); and cautiousness ("I avoid mistakes," "I act without thinking (reverse-coded).").

Impulsiveness. Steel (2002 as cited in Steel, 2010) developed the Susceptibility to Temptation Scale, an 11-item questionnaire measuring people's proneness to distractions. Steel (2009) showed that this scale did not correlate with harm avoidance (-.04), but did so with order (-.43) and play (.43), hence establishing the divergent and convergent validity (as cited in Steel, 2010). Some example items include: "I feel irresistibly drawn to anything interesting, entertaining, or enjoyable," "When an attractive diversion comes my way, I am easily swayed," "When a task is tedious, again and again I find myself pleasantly daydreaming rather than focusing."

Ambiguity tolerance. The Multiple Stimulus Types Ambiguity Tolerance Scale-II (MSTAT-II; McLain, 2009) is a 13-item questionnaire assessing individuals' ambiguity tolerance. The MSTAT-II has a Cronbach's alpha of .83 and a convergent validity of .41 with previously validated ambiguity scales (McLain, 2009). Low scores on the MSTAT-II indicate ambiguity aversion whereas high scores indicate liking for ambiguity (McLain, 2009). Some example items include "I don't tolerate ambiguous

situations well (reverse-coded)," "Problems that cannot be considered from just one point of view are a little threatening (reverse-coded)."

Procrastination scale. The Pure Procrastination Scale (PPS; Steel, 2010) is a 12-item questionnaire which conceptualizes procrastination as an irrational delay. Steel showed that the scale has a Cronbach's alpha of .92. Furthermore, the researcher established the convergent validity with a procrastination scale (.87), impulsiveness scale (.69), and subjective well-being (-.41). Some example items of the PPS are "I delay making decisions until it's too late," "I often find myself performing tasks that I had intended to do days before," and "I am continually saying 'I'll do it tomorrow.'"

Procedure

After taking the online questionnaire (see Appendix A), participants were invited to the laboratory, where they were informed that the study would focus on the usability of websites. Once they signed the consent form, participants were guided to take a seat at the computer, which was on screen-saver mode. Upon cancelling the screen-saver, participants saw an open web-browser displaying the Facebook login page. Participants were told to close the browser and hinted that it was most likely used by the previous participant. Then, the researcher proceeded, "You have 45 minutes to do this task. The instructions are on the desktop in the PDF file. I will come and get you when the 45 minutes are over." After the instructions were given, the researcher left the laboratory and closed the door behind him or her.

The main task consisted of comparing two websites (i.e., www.bizrate.com and www.nextag.com). Both websites allow consumers to compare prices and shop for products including computers, home and garden, clothing and accessories, and jewelry.

There were two conditions in this study. In the ambiguous task condition, the PDF file contained the following instructions:

"You have 45 minutes to evaluate two websites and compare how user-friendly they are. The two websites are www.bizrate.com and www.nextag.com. Both websites allow users to compare prices across similar categories (e.g., computers, home & garden, etc.). Compare these two websites on user-friendliness, and draw your own conclusion about which site is the better website. Provide your evaluation and conclusion in a Microsoft Word document. Pilot studies have shown that it takes participants, on average, about 25 minutes to complete this task."

In the less ambiguous condition, the PDF file included the following instructions: "You have 45 minutes to evaluate two websites and compare how user-friendly they are. The two websites are www.bizrate.com and www.nextag.com. Both websites allow users to compare prices across similar categories (e.g., computers, home & garden, etc.). When evaluating the two websites, consider the following aspects:

1. How easy is it to find the information you are looking for on the websites?

2. How visually appealing are the websites?

3. How up-to-date is the content on the websites?

4. Based on your experience, how would you rate the quality of the websites?

5. How satisfied are you with the overall experience on the websites?

Compare these two websites on user-friendliness, and draw your own conclusion about which site is the better website. Provide your evaluation and conclusion in a Microsoft Word document. Pilot studies have shown that it takes participants, on average, about 25 minutes to complete this task."

During the study, the time tracking software, WorkTime, tracked their internet and computer activities. It provided a spreadsheet for each participant listing what kind of applications were run and which internet websites were visited. The software also recorded how much time was spent on the selected window. The dependent variable was the total time spent engaging in activities that are unrelated to their evaluation process.

After the 45 minutes had passed, the researcher reentered the room and asked the participants to fill out an evaluation sheet for the laboratory study rating all four task characteristics. Upon completion, participants were debriefed and thanked for their participation.

CHAPTER III

RESULTS

The reliability coefficients of the individual differences ranged from .75 to .91

and were all acceptable. Table 1 includes the means, standard deviations, and reliability

coefficients for task-specific self-efficacy, all six facets of conscientiousness,

impulsiveness, ambiguity tolerance, procrastination, and time spent on unrelated

websites/applications. Because participants had varying total times spent in the

laboratory, a proportion was calculated indicating participants' time spent off-task over

total time spent in the laboratory.

Table 1
Means, standard deviations, and reliability coefficients

Variable	M	SD	α
Age	20.78	3.98	—
Self-efficacy	3.94	.59	.75
C1: Self-efficacy	3.95	.52	.88
C2: Orderliness	3.66	.53	.91
C3: Dutifulness	4.00	.51	.88
C4: Achievement-striving	3.99	.70	.85
C5: Self-discipline	3.38	.63	.91
C6: Cautiousness	3.34	.63	.86
Conscientiousness (Overall)	3.72	.49	.96
Impulsiveness	3.16	.63	.85
Ambiguity tolerance	3.15	.47	.83
Procrastination	2.68	.68	.89
Proportion of time spent off-task over total time	.135	.177	—

Table 2 displays the means and standard deviations for the task characteristic

ratings. This manipulation check revealed that task ambiguity was not successfully

manipulated. Moreover, participants rated the task in the ambiguous condition as more

interesting than the task in the less ambiguous condition, $t(42.82) = 2.13$, $p < .05$. In

addition, participants seemed to feel more time pressure in the less ambiguous condition than in the ambiguous condition, $t(47) = -2.45$, $p < .05$.

Table 2
Means and standard deviations for task characteristics

	Ambiguous *M* (*SD*)	Less Ambiguous *M* (*SD*)
Difficulty	1.88 (.88)	1.63 (.77)
Appeal*	3.96 (.35)	3.71 (.46)
Ambiguity	2.28 (.79)	2.50 (1.06)
Time Pressure*	1.44 (.71)	2.00 (.89)

Note. * = $p < .05$

According to the correlational analysis, there was no significant relationship between the score on the PPS (Steel, 2010) and the proportion of time spent off-task over total time, $r = -.178$, $p = .220$ (Hypothesis 1 was not supported). Furthermore, there was no significant correlation between time spent on unrelated websites and/or applications and self-efficacy, conscientiousness, or impulsiveness (Hypotheses 2A – 2C were not supported). However, there was a positive correlation between the off-task proportion and ambiguity tolerance, $r = .31$, $p < .05$. This relationship was significant in the opposite direction than hypothesized. There was also no significant difference between the ambiguous condition (*M* = .182; *SD* = .183) and the less ambiguous condition (*M* = .086; *SD* = .159) in the proportion of time spent off-task to laboratory time, $t(47) = 1.96$, $p = .056$ (Hypothesis 3 was not supported). Furthermore, the results for the moderated regression analyses (Hypotheses 4A – 4D) are displayed in Table 3 – 6. No significant interaction was found. Moreover, out of all four regression analyses, only the task ambiguity condition in the regression analysis with impulsiveness was significant (Table 4).

Table 3

Regression analysis with task ambiguity, self-efficacy, and the interaction

Variable	β	*p*
Condition	-.279	.058
Self-efficacy	.031	.830
Condition*Self-efficacy	.087	.545

Note. R^2 = .085, p = .259

Table 4

Regression analysis with task ambiguity, conscientiousness, and the interaction

Variable	β	*p*
Condition	-.289	.051
Conscientiousness	.098	.505
Condition*Conscientiousness	-.029	.842

Note. R^2 = .087, p = .247

Table 5

Regression analysis with task ambiguity, impulsiveness, and the interaction

Variable	β	*p*
Condition	-.277	.049
Impulsiveness	-.097	.491
Condition*Impulsiveness	.252	.077

Note. R^2 = .157, p = .051

Table 6

Regression analysis with task ambiguity, AT, and the interaction

Variable	B	*p*
Condition	-.192	.191
Ambiguity Tolerance	.257	.084
Condition*Ambiguity Tolerance	-.177	.202

Note. R^2 = .16, p < .05

Exploratory Analyses

The researcher decided to conduct analyses that were not included in the main

hypotheses but still appeared to be worth investigating. In particular, it was speculated

that someone's procrastination behavior might not be reflected in their use of time but

instead in the quality of the work produced. Furthermore, the researcher was interested in

the difference of results when correlating the individual differences with the self-report

measure of procrastination rather than the procrastination behavior (i.e., actual time spent

off-task). Last, the researcher investigated whether impulsiveness may positively correlate with a person's number of "switches" between task-related and task-unrelated websites/applications.

Written material as dependent variable

Because each laboratory participant had to write their answer in a Word document, the researcher analyzed the written materials on content. In particular, four raters went through a rater training and coded the Word documents on quality. Intraclass correlation coefficient revealed that raters showed high inter-rater reliability (.88), p < .001.

There was no positive correlation between a person's score on the PPS (Steel, 2010) and the quality of work produced, $r = -.08$, $p = .606$. Furthermore, there was no significant correlation between the written material and self-efficacy, impulsiveness, or ambiguity tolerance. However, there was a positive correlation between the written document and conscientiousness, $r = .298$, $p < .05$, such that people with higher levels of conscientiousness wrote a more high-quality document. Moreover, there was no significant difference between the quality of work produced in the ambiguous condition ($M = 3.35$; $SD = 1.15$) and the less ambiguous condition ($M = 3.27$; $SD = 1.16$), $t(47) = .24$, $p = .811$.

Correlation between all self-report measures and procrastination score

Table 7 depicts the correlation coefficients between the individual differences and the procrastination score. As shown in the table, except for self-efficacy, all individual differences are significantly correlated with someone's procrastination ratings. Furthermore, except for ambiguity tolerance, all significant relationships are in the same direction as hypothesized (Hypotheses 2B & 2C).

Table 7

Correlation coefficient matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. SE	1													
2. C1	.193	1												
3. C2	-.01	.56***	1											
4. C3	.07	.75***	.37*	1										
5. C4	.01	.75***	.49***	.67***	1									
6. C5	.16	.73***	.46**	.67***	.66***	1								
7. C6	.07	.49***	.31*	.73***	.49***	.59***	1							
8. C (All)	.01	.88***	.69***	.85***	.82***	.85***	.74***	1						
9. Imp.	.01	-.47**	-.12	-.62***	-.54***	-.54***	-.66***	-.60***	1					
10. AT	.22	.18	-.17	.30*	.01	.17	.23	.14	-.23	1				
11. Prop.	.00	.04	-.05	.07	.11	.17	-.03	.06	-.14	.31*	1			
12. Word	.06	.34*	.17	.24	.33	.19	.20	.30*	-.18	-.13	-.09	1		
13. NoI	-.12	-.03	-.02	.05	.01	.03	-.09	-.01	.02	.32*	.53***	-.14	1	
14. P	-.15	-.60***	-.31*	-.71***	-.53***	-.74***	-.56*	-.71***	.60***	-.30*	-.18	-.08	-.03	1

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$; SE = Self-efficacy, C = Conscientiousness, Imp. = Impulsiveness, AT = Ambiguity Tolerance, Prop. = Proportion of time spent on unrelated activities to total time, Word = Word document ratings, NoI = Number of interruptions, P = Procrastination measured by Pure Procrastination Scale (Steel, 2010)

Correlation between impulsiveness measure and behavior

There was no significant correlation between someone's impulsiveness score and actual behavior of switching between task-related and task-unrelated websites/applications, $r = .019$, $p = .90$.

CHAPTER IV

DISCUSSION

The purpose of the present study was to investigate whether task ambiguity, individual differences (i.e., self-efficacy, conscientiousness, impulsiveness, and ambiguity tolerance), or their interactions affect online procrastination behavior. As the results have shown, there was no correlation between a person's procrastination score and actual time procrastinating in the laboratory. There are a number of factors that might have affected these results. First, because the study was conducted in a laboratory setting, the unnatural environment might have hindered participants from behaving naturally. Although the present study attempted to induce the social norm that Facebook (i.e., a task-unrelated activity) had been used by another participant, procrastination may be something that occurs more often in familiar environments. Second, it is possible that participants may have been procrastinating but it was not detectable by the tracking software. Because WorkTime only tracks the time of the application run and internet website visited, a participant's level of engagement with the task cannot be determined. Similarly, a participant might have been procrastinating by spending more time on the websites relevant to the study without the intention of comparing them on user-friendliness. For example, WorkTime revealed that a few participants had spent time doing searches on the websites before the laboratory study ended without documenting anything in written form. In other words, those participants might have been wasting time on the designated websites.

Hypotheses 2A – 2C were also not supported. Similar to the reasons mentioned above, participants' procrastination behavior in the laboratory setting might have deviated from their usual behavioral patterns and hence, lowered the detectable effect. Nevertheless, there was a significant, positive correlation between participants' tolerance of ambiguity and their procrastination behavior. Originally, the present study hypothesized that people who do not tolerate ambiguous situations well would avoid ambiguous stimuli and hence, procrastinate on the laboratory task. The results showed that the more participants had a preference towards ambiguous situations, the more they procrastinated.

One possible explanation for this may be found in understanding the 13-item ambiguity tolerance questionnaire (MSTAT-II; McLain, 2009). McLain states that high scores on this scale indicate liking for ambiguity and low scores indicate aversion. Hence, the scale measures liking and aversion towards all ambiguous situations (e.g., "I don't tolerate ambiguous situations well (reverse-coded)," "I try to avoid situations that are ambiguous (reverse-coded)"). Nevertheless, similar to self-efficacy, ambiguity may be something that needs to be measured specific to the task, as well. Although someone may score lower on the scale than another person, this difference may be dependent on the type of situation or task the person is facing. For example, participants in the laboratory study were asked to compare two websites. In other words, the study did not introduce a task people were unfamiliar with. Even if someone displayed aversion towards ambiguous stimuli, comparing two websites may still be tolerable owing to previous experience of surfing the internet.

Although marginally approaching significance, the proportion of time spent on unrelated tasks to total time spent in the laboratory did not differ between the two conditions. Nevertheless, the marginally significant difference appears unusual despite the perceived ambiguity between the conditions being rated similar (Table 2). Possibly, some of the participants were confused about the task characteristic ratings. For instance, one participant expressed in the debriefing that the laboratory task was ambiguous even though she had rated a two on a five-point Likert scale (i.e., disagreed that the task was ambiguous) some moments ago. Similarly, more participants might have failed to rate the ambiguity of the task according to their true perceptions.

There was also no interaction found between the individual differences and task ambiguity. Only the task ambiguity in Table 5 seemed to affect people's procrastination behaviors. This seems to indicate that the type of task may play a role in how much people will procrastinate. Although it cannot be concluded whether this influence is stronger, weaker, or equal to the effect of individual differences on procrastination, continuing to investigate the relationship between the task characteristic and personality may be worthwhile in the procrastination research.

Future directions

Despite many results being not significant, attempting to measure procrastination on a behavioral level is important. As the exploratory analyses have shown, conscientiousness and impulsiveness highly correlate with the procrastination propensity but not the behavior. These results indicate that procrastination research solely based on self-report measures may be prone to method biases. Therefore, more studies (e.g., Ferrari & Tice, 2000) with behavioral components are needed for this line of research.

Furthermore, although the present study is inconclusive about how the task characteristic and personality traits may interact with each other, this study seems to underline the complexity of the procrastination research. Owing to the nature of a laboratory, collecting behavioral procrastination data requires creativity and will continue to be a challenge to those who wish to deviate from self-report measures.

Once procrastination research overcomes these measurement issues, organizations can draw more meaningful inferences from the findings. As technological advancement is likely to continue and faster communication devices are likely to deepen the connectedness between people, the decision and choice to procrastinate will become increasingly easier. Gaining a deeper understanding about this field can potentially help organizations select future employees who are less prone to these temptations, address possible development areas of current employees, and positively affect their businesses.

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Appendix A

Online Questionnaire

Demographic Information

What is your gender?

( ) Male

( ) Female

What is your age?

Please rate your level of agreement with the following statements on a 5-point Likert scale (1=Strongly disagree; 5=Strongly agree).

Task-specific self-efficacy scale

1. When I get on a new website, I can navigate my way through.
2. I am good at analyzing the user-friendliness of websites.
3. It usually takes me a long time until I understand how to use a website.
4. I feel confident comparing the user-friendliness of any two websites.

Conscientiousness

C1: Self-efficacy

1. I complete tasks successfully.
2. I excel in what I do.
3. I handle tasks smoothly.
4. I am sure of my ground.
5. I come up with good solutions.
6. I know how to get things done.
7. I misjudge situations. (R)
8. I don't understand things. (R)
9. I have little to contribute. (R)
10. I don't see the consequences of things. (R)

C2: Orderliness

1. I like order.
2. I like to tidy up.
3. I want everything to be "just right."
4. I love order and regularity.
5. I do things according to a plan.
6. I often forget to put things back in their proper place. (R)
7. I leave a mess in my room. (R)
8. I leave my belongings around. (R)
9. I am not bothered by messy people. (R)
10. I am not bothered by disorder. (R)

C3: Dutifulness

1. I try to follow the rules.
2. I keep my promises.
3. I pay my bills on time.
4. I tell the truth.
5. I listen to my conscience.
6. I break rules. (R)
7. I break my promises. (R)
8. I get others to do my duties. (R)
9. I do the opposite of what is asked. (R)
10. I misrepresent the facts. (R)

C4: Achievement-striving
1. I go straight for the goal.
2. I work hard.
3. I turn plans into actions.
4. I plunge into tasks with all my heart.
5. I do more than what's expected of me.
6. I set high standards for myself and others.
7. I demand quality.
8. I am not highly motivated to succeed. (R)
9. I do just enough work to get by. (R)
10. I put little time and effort into my work. (R)

C5: Self-discipline
1. I get chores done right away.
2. I am always prepared.
3. I start tasks right away.
4. I get to work at once.
5. I carry out my plans.
6. I find it difficult to get down to work. (R)
7. I waste my time. (R)
8. I need a push to get started. (R)
9. I have difficulty starting tasks. (R)
10. I postpone decisions. (R)

C6: Cautiousness
1. I avoid mistakes.
2. I choose my words with care.
3. I stick to my chosen path.
4. I jump into things without thinking. (R)
5. I make rash decision. (R)
6. I like to act on a whim. (R)
7. I rush into things. (R)
8. I do crazy things. (R)
9. I act without thinking. (R)
10. I often make last-minute plans. (R)

Susceptibility to Temptation Scale
1. I will crave a pleasurable diversion so sharply that I find it increasingly hard to stay on track.
2. I feel irresistibly drawn to anything interesting, entertaining, or enjoyable.
3. I have a hard time postponing pleasurable opportunities as they gradually crop up.
4. When an attractive diversion comes my way, I am easily swayed.
5. My actions and words satisfy my short-term pleasures rather than my long-term goals.
6. I get into jams because I will get entranced by some temporarily delightful activity.
7. It takes a lot for me to delay gratification.
8. When a task is tedious, again and again I find myself pleasantly daydreaming rather than focusing.
9. When a temptation is right before me, the craving can be intense.
10. I choose smaller but more immediate pleasures over those larger but more delayed.
11. I take on new tasks that seem fun at first without thinking through the repercussions.

Multiple Stimulus Types Ambiguity Tolerance Scale-II
1. I don't tolerate ambiguous situations well. (R)
2. I would rather avoid solving a problem that must be viewed from several different perspectives. (R)
3. I try to avoid situations that are ambiguous. (R)
4. I prefer familiar situations to new ones. (R)
5. Problems that cannot be considered from just one point of view are a little threatening. (R)
6. I avoid situations that are too complicated for me to easily understand. (R)
7. I am tolerant of ambiguous situations.
8. I enjoy tackling problems that are complex enough to be ambiguous.
9. I try to avoid problems that don't seem to have only one "best" solution. (R)
10. I generally prefer novelty over familiarity.
11. I dislike ambiguous situations. (R)
12. I find it hard to make a choice when the outcome is uncertain. (R)
13. I prefer a situation in which there is some ambiguity.

Pure Procrastination Scale
1. I delay making decisions until it's too late.
2. Even after I make a decision I delay acting upon it.
3. I waste a lot of time on trivial matters before getting to the final decisions
4. In preparation for some deadlines, I often waste time by doing others things.
5. Even jobs that require little else except sitting down and doing them, I find that they seldom get done for days.
6. I often find myself performing tasks that I had intended to do days before.
7. I am continually saying "I'll do it tomorrow."
8. I generally delay before starting on work I have to do.
9. I find myself running out of time.

10. I don't get things done on time.
11. I am not very good at meeting deadlines.
12. Putting things off till the last minute has cost me money in the past.

Appendix B

Laboratory Study Evaluation

Evaluator: _____
Condition: 1 / 2

1. Have you ever used any of these two websites before? If yes, which one(s)?

    a. Yes   (Bizrate or Nextag or Both)
    b. No

2. Did you use any other devices (e.g., smartphone, mp3 player, etc.) during the study?

    a. Yes
    b. No

3. The task given in the laboratory study was difficult (i.e., degree to which the task is hard to complete).

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

4. The task given in the laboratory study was interesting.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

5. The task given in the laboratory study was ambiguous (i.e., There were unclear expectations about how one should carry out the task).

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

6. I felt there was a time pressure to complete the task given in the laboratory study.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree