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Time orientation, rational choice and deterrence – an information systems perspective

By

Michael Brian Pope

A Dissertation  
Submitted to the Faculty of  
Mississippi State University  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy  
in Business Administration  
in the Department of Management and Information Systems

Mississippi State, Mississippi

August 2013

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2013

Time orientation, rational choice and deterrence – an information systems perspective

By

Michael Brian Pope

Approved:

---

Merrill Warkentin  
Professor and Graduate Coordinator of  
Management and Information Systems  
(Major Professor)

---

Robert F. Otondo  
Associate Professor of Management and  
Information Systems  
(Committee Member)

---

Kent Marett  
Associate Professor of Management and  
Information Systems  
(Committee Member)

---

Robert E. Crossler  
Assistant Professor of Management and  
Information Systems  
(Committee Member)

---

Joe Sullivan  
Professor of Marketing, Quantitative  
Analysis, and Business Law  
(Committee Member)

---

Sharon Oswald  
Dean of the College of Business

Name: Michael Brian Pope

Date of Degree: August 17, 2013

Institution: Mississippi State University

Major Field: Business Administration

Major Professor: Merrill Warkentin

Title of Study: Time orientation, rational choice and deterrence – an information systems perspective

Pages in Study: 193

Candidate for Degree of Doctor of Philosophy

The present study examines General Deterrence Theory (GDT) and its "parent," Rational Choice Theory (RCT), in an information security setting, assessing the behavioral intent to violate organizational policy under varying levels of certainty, severity and celerity of negative sanction. Also assessed is the individual computer user's time orientation, as measured by the Consideration of Future Consequences (CFC) instrument (Strathman et. al, 1994). How does rational consideration of violation rewards influence the impact of sanctions on individuals? How does time orientation impact intent to violate security policy? How do these operate in an IS context? These questions are examined by assessing the responses of university students (N = 443) to experimental manipulations of sanctions and rewards. Answering vignettes with the factorial survey method, intent to violate is assessed in a setting of Internet piracy of electronic textbooks while being monitored by computer security systems. Findings show that, although traditional GDT variables and reward impact intent to violate, CFC does not cause the hypothesized moderating effect on these variables. However, post-hoc analysis reveals a direct effect of time orientation on behavioral intent, as well as a weak

moderating effect opposite of the hypotheses, indicating increased time orientation positively moderates, rather than negatively moderates, the impact of reward on intent to violate. Implications for theory and practice, and future research directions, are discussed.

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## LIST OF ACRONYMS AND NOTATION

| <b>Acronym/Symbol</b> | <b>Meaning</b>                                                |
|-----------------------|---------------------------------------------------------------|
| $\beta_i$             | Coefficient for variable $i$ in hypothetical regression model |
| $bi$                  | Coefficient for variable $i$ as estimated by regression       |
| $\epsilon$            | Error term in hypothetical regression model                   |
| $e$                   | Error term in estimated regression model                      |
| $X_i$                 | Independent variable $i$ in regression model                  |
| $Y$                   | Hypothetical dependent variable in a regression model         |
| $\hat{Y}$             | Estimated dependent variable in a regression model            |
| BLUE                  | Best Linear Unbiased Estimate                                 |
| CFA                   | Confirmatory Factor Analysis                                  |
| CFC                   | Consideration of Future Consequences                          |
| CMB                   | Common Methods Bias                                           |
| CMV                   | Common Methods Variance                                       |
| FA                    | Factor Analysis                                               |
| GDT                   | General Deterrence Theory                                     |
| IS                    | Information Systems                                           |
| IT                    | Information Technology                                        |
| OLS                   | Ordinary Least Squares                                        |
| PMT                   | Protection Motivation Theory                                  |
| RCT                   | Rational Choice Theory                                        |
| SCADA                 | Supervisory Control and Data Acquisition                      |
| SETA                  | Security Education, Training and Awareness                    |
| TO                    | Time Orientation                                              |
| TP                    | Time Perspective                                              |
| ZTPI                  | Zimbardo Time Perspective Inventory                           |

## CHAPTER I

### OVERVIEW

#### **Introduction**

In 1980, the world had just begun deploying the first personal computers more sophisticated than toys, with enough working memory to store a few pages of text and a slow interface capable of displaying letters and numbers. In the 30 years that have followed, these simplistic personal computers have led to a massive evolution and revolution of the standards and capabilities of technology and the infrastructure that supports it. Tribesmen in Africa with little electricity carry cellular phones with more computational power than what was used to land on the Moon. Computerized simulations allow world weather patterns to be simulated with unprecedented detail. Data sets so large as to be inconceivable to use are now routinely analyzed in parallel by thousands of processors to yield invaluable models and solutions to many scientific problems. A single computer with a connection to the Internet has access to more information than the largest libraries on Earth, and tools to search it within seconds.

The evolution, deployment, and understanding of information systems have been responsible for these developments. As business and industry glean increasing productivity gains, the feedback loop that results perpetuates these advances. Despite what may appear to be insurmountable physical engineering limitations, systems grow



more numerous and powerful, handling virtually every aspect of our day-to-day lives, with our data held on remote servers to facilitate these apparently miraculous capabilities.

However, it has been said that the price for freedom is eternal vigilance, and this saying has never been as apt as with computer systems. Computer crime has skyrocketed. Where disaffected adolescents once wrote computer viruses to display obscene language, professional criminals now design viruses to steal the life savings or identity of anyone hapless enough to get caught in their net. Systems that are always on can be attacked non-stop, including those very systems that run our infrastructure and economy. Even products that most would have once considered almost inherently off-line, such as automobiles, now incorporate computers deep in their systems, where they could be exploited by those with malicious intentions. Many of these crimes can be perpetrated from someone sitting comfortably at home with a computer terminal, or even a cellular phone. Never before has the world's infrastructure been so powerful – or so vulnerable – to a foe with such innocuous equipment and resources.

Although these are great dangers, one must not forget the numerous, and far more likely, smaller dangers that occur every day. Organizational malfeasance, for instance, may result in thefts that consist of a few dollars here or there, but add up to millions over the years. Privacy breaches can also occur, potentially leading to future damage for victims. We must not only look to the larger picture of the government and the world at large, but also far closer to us, in the organizations that we serve or that service us – and perhaps this is even more vital, considering that so much of it can be done simply by sitting in front of a computer with the right knowledge.

The exact costs of cyber-crime are difficult to estimate accurately, but it seems clear that they are already high, and they are still rising. Cyber-crime does not simply impact the victim directly; indirect costs also mount, as well as increases in costs to defend against further violations, combining to a much higher aggregated social cost (Anderson, Barton, Bohme, Clayton, van Eeten, Levi, Moore & Savage, 2012). Obvious costs can include repairs for damage, strengthening security systems, training, and lost or damaged business. But other costs may also need to be accounted for, many of which may be subtle but substantial, such as the computer time and power that is essentially stolen for the use of criminally-operated botnets illicitly operating on the machines of unsuspecting users via malware, and the psychological costs of having to keep such complicated systems secure even by end users. The end result is many billions of dollars in damage worldwide. AT&T executive Ed Amoroso stated in official Congressional testimony that over \$1 trillion in profit was generated by cyber-crime (United States Senate, 2009). Although staggering on a macro-level, the impact to an individual business can also be sobering. A study funded by computer firm Hewlett-Packard sampled 56 large organizations within the United States (Ponemon Institute, 2012). Of these organizations, the average cost of cyber crime for 2012 was estimated at \$8.9 million for 2012, constituting an increase of 6% from 2011, and 38% from 2012. Others have attempted to quantify the damage sustained by private citizens, and have found unenviable statistics as well; Symantec, a major computer software firm with specialties in security, estimated around \$20.7 billion was lost by U.S. Customers, averaging out to about \$290 per person, in 2011 (Osborne, 2012).

The abundance of vulnerabilities serves only to compound the issue, making cyber-crime the province of anyone who can use programs written to automate their exploitation. A recent study noted that in 2011, 96% of breaches were not considered highly difficult, and most targets were chosen by opportunity (Verizon, 2012). Many attacks are conducted in a low-yield, high-volume manner, meaning that numerous attacks are being executed to gain a little data from many targets, showing the profusion of lax security. Entire movements have sprung up around these vulnerabilities. Detection and investigation of breaches may take up to three years, giving infiltrators ample time to cause great damage with their ill-gained data (Trustwave, 2012). Activists using information security breaches, or "hacktivists," have shown just how frail security is with over 100 million users affected in 2011 according to industry analysis (Verizon, 2012). The effects that a single breach can have are made painfully clear when one considers one of the largest and costliest incidents to date, the 2011 Playstation Network outage (BBC, 2011). The resulting data leaks were massive: 77 million people are thought to have had their personal information, including credit card numbers, exposed, and an outage of 23 days for the service (BBC, 2011; Good, 2011).

Unfortunately, these numbers can only be an educated estimate. Disclosing the existence of some types of security breaches can have negative consequences such as a market backlash (Campbell, Gordon, Loeb & Zhou, 2003), giving incentives for organizations to avoid reporting them when possible. This worsens the problem, as the literature suggests that many firms sharing security breach information may help the overall level of information system security in the greater information technology community (Gordon, Loeb & Lucyshyn, 2003). Additionally, security breaches that are

never discovered will likely never be reported, though their impact will remain just as real.

Given these conditions, the need to determine what makes individuals turn to computer crime, like all crime, is vital. Indeed, it is increasingly important as information exchange becomes more ubiquitous and voluminous. Going with this is an understanding of how one deters potential criminals from going down this path. Our criminal and organizational justice systems as they are may be suboptimal in this pursuit. Greater understanding of how we might prevent these problems will serve to strengthen prevention. This is especially important, as the psychological benefit from cyber-crime may be very great, and the psychological costs may be particularly small for cyber-criminals, requiring an optimal comprehension of the dynamics involved in order to maximize prevention and attempt to close this alluring gap (Kshetri, 2006). Interesting findings in this regard, such as the effectiveness of IS training as a deterrent, already warrant further investigation (D'Arcy & Hovav, 2007), particularly in light of the tremendous opportunities for security breaches presented to individuals with “inside” access, or affiliations with an organization that permit them to bypass standard security provisions to privileged parts of the system. The purpose of this study is to further research and understanding in this area.

### **Information Security**

Information has always been vital to human society. Julius Caesar knew this well when he invented early forms of cryptography and steganography by inventing what is known as the Caesar cipher to encode his messages, delivering them using concealed tattoos on slaves. (Kahn, 1996; Pope, Warkentin, Bekkering & Schmidt, 2012) The

value of information has increased since then, with protected data regarding everything from simple consumer devices to entire fleets of thermonuclear weaponry sufficient to end life on Earth within minutes. With the increase of information has come an increase in ways to access and manipulate it. Cyclically, this has in turn made it possible to generate even more information, which allowed it to be used in more versatile and previously unviable ways.

However, with both of these increases has come an increased incentive to intercept, corrupt, or destroy this information, and predictably, forces have arisen to do exactly that. Some of these involve particularly critical systems. Security issues regarding Supervisory Control and Data Acquisition (SCADA) networks are particularly concerning (Igre, Laughter & Williams, 2006). SCADA networks are those that control industrial and infrastructural systems. These are particularly important to the economy and basic day-to-day life in most developed countries, as they are the primary control mechanism for equipment and resources that allow for modern technology to operate. Power plants, water distribution systems, manufacturing equipment, and transportation communication systems are all examples of major infrastructural technology typically involving SCADA networks. SCADA networks are increasingly interconnected, allowing for a great deal more versatility. However, many SCADA systems were developed before proper security protocols were even considered, let alone implemented, and as such their networks are particularly vulnerable (Shaw, 2004). This poses a serious problem should someone with sufficient technical knowledge manage to gain access to one. Potential abuses may result in massive power outages, loss of water control, destruction of valuable equipment or property, deliberate release of dangerous or toxic

substances into the environment, or other threats to life, limb and property, potentially with very long-lasting results.

More mundane, but more frequent, examples of this include a growing trend towards identity theft. Identity theft is the impersonation of another individual (LoPucki, 2001). In practice, this usually involves obtaining personal information, such as birth dates, credit card numbers, social security numbers, and anything else that can be used to uniquely identify a person. The information is then used when dealing with identity-centric, often sensitive matters, such as banking or credit accounts. By using this information, it is possible to break into computer records, or to defraud individuals who secure these resources, and thereby misappropriate funds and credit or otherwise abuse this ill-gotten access. These security breaches can be particularly troubling, as the personal information used often remains the same throughout a person's life. Identity theft has been declining in recent years, though precise numbers have been difficult to gather, owing to its imprecise definitions (Piquero, Cohen & Piquero, 2011). Further, despite the recent drop, it has increased overall as computers have become more intertwined with everyday life (Thomas, Quinn, Robinson & James, 2011). Identity theft often results in considerable hassle for its victims to clear up problems, with 17% of victims spending over a month resolving the issues and over 2/3rds suffering monetary losses of some kind (Piquero, Cohen & Piquero, 2011). Although identity theft can often be traced back to carelessness by individuals, such as failing to destroy sensitive documents before discarding them and subsequent theft from waste receptacles, it can also be a result of attacks against companies that hold that information. If a bank, for instance, were to have its database compromised, a great deal of sensitive data could be

stolen and reused elsewhere, with little recourse – and it may even go undetected for some time. Users of websites with less obvious sensitivity, such as Facebook, may also find themselves compromised – sometimes with information they themselves make public (Nosko, Wood & Molema, 2010).

### **Insider Abuse**

Numerous Information System (IS) security threats are encountered by most people on a daily basis. The security literature is rife with studies and information regarding defending organizational IS from external threats, and most technical tools are oriented towards this end. However, there is one area that is much more difficult to defend against, and one for which technology alone is likely not enough – the threat from inside (Bidgoli, 2006). An internal threat, in fact, can be far more damaging than an external threat (Warkentin & Willison, 2009). An FBI study determined that the average cost of an attack by an outside entity was approximately \$56,000 (Bidgoli, 2006). An attack from an insider, however, resulted in an average cost of \$2.5 million. This is likely due to knowledge of sensitive areas and data in the systems, such as unpatched routers and firewalls or the server address where sensitive information is stored, as well as more routine points of vulnerability such as passwords to sensitive accounts. The threats are compounded when one considers that the concept of an insider may be relative – for instance, temporary contractors that may have access to organizational computers during their work. Particularly given the granularity of permissions often required by security schemes, this makes the potential pool of insiders much larger (Bishop, 2006).

Insider abuse is part of a broader category of wrongdoing known as workplace deviance. Workplace deviance is voluntary behavior deviating from organizational

norms that threaten the well-being of the organization and/or organizational members, and involves members that become motivated to violate expected norms, or lack motivation to sustain them (Bennett & Robinson, 2000). It can take the form of relatively innocuous acts, such as stealing office supplies, or can be far greater, such as large-scale embezzlement or industrial espionage. In the information age, this can go further, resulting in greater, potentially crippling ramifications for both the organization and anyone who relies on it.

Insider abuse can and does take a physical form, such as using physical keys to steal confidential documents. However, as IS use increases in organizations, so does the potential for IS abuse. Usually this includes places an insider can come into contact with potential vulnerabilities. Insider abuse can include both malicious acts, as well as those that are due to carelessness, indifference, or accidents (Stanton, Stam, Mastrangelom & Jolton, 2005). Threats due to carelessness itself are a tremendous problem, and may exacerbate malicious insider abuse by allowing misfeasors to take advantage of known gaps and non-compliant personnel (Pahnila, Siponen & Mahmood, 2007). Attacks can be executed by those with sophisticated technical knowledge, as well as those with little technical knowledge. For example, a compromised password can be used by nearly anyone with basic computer literacy, but a more sophisticated attempt may use a technique such as custom packet sniffers, allowing network eavesdropping and possibly being overlooked due to an assumption that the program is supposed to be there. Table 1.1 illustrates a two-dimensional taxonomy of security behaviors executed by users.



Table 1.1 A taxonomy of security behaviors, adapted from (Stanton, Stam, Mastrangelom & Jolton, 2005; Taneja, 2006)

|            |            | Expertise          |                         |
|------------|------------|--------------------|-------------------------|
|            |            | Low                | High                    |
| Intentions | Malicious  | Detrimental Misuse | Intentional Destruction |
|            | Neutral    | Naïve Mistakes     | Dangerous Tinkering     |
|            | Beneficial | Basic Hygiene      | Aware Assurance         |

Despite appearing grim, the situation is far from hopeless. A number of countermeasures can be taken to help to curb or prevent insider abuse. Some approaches are highly technological. One example is the “honey pot,” which is a cache of faux data that is made to appear valuable, and although normally applied to external threats, with care, it can also be used to detect internal threats (Sptizer, 2003). However, overall, technology is not nearly as effective regarding preventing illegitimate user behavior (Ng, Kankanhalli & Xu, 2009). It is unlikely that technology will provide a complete solution to this problem in the foreseeable future. Secure data must typically be handled or manipulated in some way by personnel to realize its potential value, and theoretically anyone is capable of insider abuse. As such, efforts must also be extended towards psychological and behavioral realms involving the employees themselves.

Behavioral controls can also be of help, particularly against inadvertent internal abuses. One example is training. Many employees fail to comply with security procedures because they view them as a hassle or a hindrance to their actual jobs, and they doubt how much good it or they can do against an opponent, or the likelihood that

their carelessness will be exploited in a security violation (Ng, Kankanhalli & Xu, 2009; Adams & Sase, 1999). Training can help employees to increase their self-efficacy and realize the effectiveness and critical nature of compliance with security protocols.

Another important technique is profiling, which is determining how likely a particular employee is to actually attempt a security violation (Shaw, Post & Ruby, 2002). Profiling can be useful in a number of ways. First, it can help with training effectiveness by customizing the training to some degree to match the user's individual personality and propensities, which can also help with security training for employees in general (McBride, Carter & Warkentin, 2012; Warkentin, McBride, Carter & Johnston, 2012). This relates in part to the general concept of security preparations incorporating local elements as part of an overall plan (Straub & Welke, 1998; Furnell, Gennatou & Dowland, 2002). This customization may be a particularly important component of maximizing the effectiveness of training. Training is helpful at deterring technology abuse (D'Arcy & Hovav, 2007). However, there is less impact from training programs on those already familiar with the technology (D'Arcy & Hovav, 2009). This in turn suggests that additional training, or at least alternative training, may be warranted for these advanced users. Another way profiling can be useful is that it may help determine who is likely to be trustworthy and who is likely to cause insider abuse, particularly should the employee become disgruntled, terminated, or be recruited for an exploit (Ho & Warkentin, 2013). This may, in turn, be used to determine whether or not particular employees can be granted access to the secured information. It may also be used in consideration of disciplinary steps, such as punishment for abuse of IS, and what will and will not be effective. This method may be particularly important, as it would help

determine how best to keep trustworthy employees trustworthy by deterring them from violations. As the old saying goes, “a locked door keeps an honest man honest.”

However, empirical studies are necessary to examine how behavioral aspects, including issues regarding disciplinary measures, factor into employee security compliance. Current trends in behavioral information security research indicate that compliance is a critical area for future studies, emphasizing the importance of both encouraging employees to follow policy, and discouraging them from actively violating policy (Crossler, Johnston, Lowry, Hu, Warkentin & Baskerville, 2013). In particular, recent literature has advocated paying more attention towards malicious, intentional acts, as opposed to those of negligence, such as expanding action cycle models of security (Willison & Warkentin, 2010). Thus, it is important to learn what may deter employees from malfeasance. This is not dissimilar from other psychological study – in particular, the criminology literature, which also deals with attempts to profile and discourage potential criminals before a violation can be committed.

### **General Deterrence Theory**

General Deterrence Theory (GDT) is a defining theory in criminology. Entwined with Rational Choice Theory (RCT), it was one of the major postulated aspects of early studies of crime. Although under considerable scrutiny, GDT has nevertheless sustained enough empirical evidence and general consideration to continue to receive considerable attention in the literature.

General Deterrence Theory and Rational Choice Theory trace their origins back several centuries to the 1700s, with classical authors such as Hobbs, Beccaria and Bentham, although they stepped out of primarily philosophical treatment and into

empirical literature in the 1960s and 1970s. This was particularly due to the work of Becker (1968), regarding crime and punishment more as a marketplace with supply and demand as opposed to a more amorphous, contemplative subject with little to no quantitative component, better suited to philosophers than scientists. The theory itself was fleshed out in its modern form by Gibbs (1975), who provided the multi-dimensional model that is currently the form used in the vast majority of empirical work directly on, or tangential to, deterrence.

General Deterrence Theory influences fields beyond criminology. An example exists in political science, which deals with concepts relating to deterrence between countries to prevent situations such as nuclear war (Slocombe, 1981). On a smaller scale, other examples are found in compliance with athletic regulation to deter the use of performance-enhancing drugs (Strelan & Boeckmann, 2006). Behavior that may be considered partially related to crime, but also partially involving self-interest, such as drunk driving, can also be influenced by GDT, including approaches to the topic that may involve multiple vectors, such as stiffer penalties combined with higher taxes related to the undesirable behavior (Evans, Neville & Graham, 1991). Some fields, such as education, find interest in GDT in relation to academic dishonesty (Haines, Diekhoff, LaBeff & Clark, 1986). Workplace deviance is another field which has found interest in GDT, with studies of insider abuse lending themselves towards this construct in particular. With the connection of insider abuse to pressing issues of information security, as well as the myriad of other potential abuses of information with modern technology, GDT has come to the attention of the IS academic community.

The IS literature has been interested in GDT for a considerable period of time. Some of the earliest IS literature dealing with behavioral security helped to define the field by harnessing the wealth of knowledge from GDT studies (Straub, 1990), which have contributed to it considerably since then (Peace, Galletta & Thong, 2003; D'Arcy, Hovav & Galletta, 2009; Straub & Welke, 1998; Vance, Siponen & Warkentin, 2011; Vance & Siponen, 2012; D'Arcy & Hovav, 2007). At its foundation, GDT draws from Rational Choice Theory, postulating that a potential offender will balance costs and benefits, or more generally, pain and pleasure, and act accordingly. The more defined multi-dimensional model generally posits that would-be offenders are deterred by three main variables: celerity, the speed at which one may be punished, certainty, the likelihood that someone will be punished, and severity, the intensity of punishment. These all have a direct relationship to an individual's intent to violate an established code. Most typically in the criminology literature, this is a legal code, although other codes, such as security policies, may also be applied. GDT is particularly interesting in that, in the many decades that it has been studied, it has never been absolutely determined to be a definitive model of the role that potential punishment may play in intent to offend, with numerous studies attacking the problem from a variety of directions, reviewing old studies for methodological errors, and attempting to introduce new aspects into the model, including those that are context-specific (D'Arcy, Hovav & Galletta, 2009; D'Arcy & Herath, 2011). However, in a field as diverse as criminology, working with other highly diverse fields, such as IS and psychology, many instruments, scales, constructs and artifacts have not been examined with GDT yet.

## **Time Orientation**

All human beings have a finite amount of time, either for a particular subject, or regarding their entire lives. It is, in a sense, a resource not entirely unlike finances, and vital despite its intangibility. In fact, much of economic theory derives from currency symbolically representing the value of time, resulting in psychological phenomena such as discounting (Green, Myerson, Lichtman, Rosen & Fry, 1996). As such, we must allocate this resource, as we must allocate tangible resources. Further, just as with other resources, allocation can be oriented towards different types of expenditures. This leads individuals to be preoccupied with certain time frames mentally. This is often referred to as the individual's "time orientation" (Strathman, Gleicher, Boninger & Edwards, 1994).

Known under several names, such as "time preference," and "time perspective," time orientation has been studied for many years, resulting in multiple scales (Zimbardo & Boyd, 1999; Strathman, Gleicher, Boninger & Edwards, 1994; Calabresi & Cohen, 1968; Lindquist & Kaufman-Scarborough, 2007). Interest in analysis of related constructs has also continued (Strathman, Gleicher, Boninger & Edwards, 1994; Petrocelli, 2003; Joireman, 1999; Joireman, Anderson & Strathman, 2003; Joireman, Balliet, Sprout, Spangenberg & Schultz, 2008), illustrating its continued importance. Aspects have been studied not only at the individual level, but at that of organizations and societies, illustrating its influence as a sociological phenomenon in addition to psychological implications (Hall & Hall, 1990; Hofstede, 2001). Time orientation sits at a nexus of several different behavioral constructs. These include impulsivity, which has been related to crime, and more generally tendencies towards risky behavior, as well as

temporal discounting, relating to how an individual perceives a reward with a time-value trade-off.

As one might imagine with involvement with such constructs, subjective differences in the passage and perception of time have great influence in how we behave, often being correlated with many facets of life. One aspect that is well-studied is that of healthy behaviors, with those with a longer time-orientation tending towards behaviors more likely to extend their life in the long run (Ortendahl & Fries, 2005). Political aspects can also be included in this category, such as those involved in environmental debates (Strathman, Gleicher, Boninger & Edwards, 1994). Tendencies towards risky behaviors may also be impacted, such as those involved with safe driving (Zimbardo, Keough & Boyd, 1997).

Criminal or otherwise forbidden behavior is influenced by time orientation (Brennan, Moore & Shepherd, 2010). Those individuals who have a shorter-term time orientation are more likely to look at the immediate benefits of a crime rather than the long-term ramifications. For example, an individual with shorter-term time orientation may “feel good” about striking someone who has angered him, or be pleased with the immediate infusion of cash from robbing a convenience store, despite possible consequences after the fact. Those with a longer-term time orientation would not be so concerned with what will happen immediately after an event, but days, months, and years beyond (Willison & Warkentin, 2013). As such, they may be more likely to consider that their offense may result in imprisonment for several years, and in a permanent record that will follow them for their entire lives.

This is a noteworthy distinction in that it relates directly to how deterrence is supposed to work – the thinking individual theoretically considers the likely outcome of the offense and decides against that behavior. As many modern penalties are in fact long-term in nature, ranging from a loss of employment to payment of a fine to years in prison and a permanent record, this relates to the fundamental nature of General Deterrence Theory. As such, a possible relationship between the effectiveness of GDT and the time orientation of the subject in question becomes worthy of consideration. However, literary review has found little to no examination of a potential relationship between temporal orientation and GDT, leaving this particular area unexplored.

With these aspects considered together, the possibility emerges that time orientation may be a useful avenue of exploration. It may help to advance GDT scholarship, and in turn enhance its understanding for related fields, such as criminology. It may also help to further understanding of IS security as a whole. This is especially important in an era where knowledge of facets of IS security is in demand in nearly any and all facets, where additional work on behavioral aspects is vital. As such, the following question is posited:

**Research Question: What is the impact of time orientation on deterrence in an information systems context?**

### **Contributions**

Security knowledge is lacking in many areas, as stated previously. This work directly addresses a particular aspect of this within the IS security field. Given previous interest in GDT (Straub, 1990) as well as continuing examination (Straub & Welke, 1998; Peace, Galletta & Thong, 2003; Lee, Lee & Yoo, 2004; Vance, Siponen &



Warkentin, 2011; McBride, Carter & Warkentin, 2012; Willison & Warkentin, 2013), we provide additional evidence as to the level of efficacy found in GDT in an IS security context.

However, the crux of this study relies on an additional construct – time orientation. With time orientation taken into consideration, it may be possible to better differentiate how individuals react to deterrence. Time orientation is a construct that has been examined for a considerable length of time in the psychology literature, and there are a number of instruments and scales that help to quantify it from several different perspectives (Strathman, Gleicher, Boninger & Edwards, 1994; Zimbardo & Boyd, 1999; Calabresi & Cohen, 1968; Lindquist & Kaufmen-Scarborough, 2007). We hope to provide evidence for a link between the likelihood of an individual’s security violation and time orientation, providing avenues for future research into this area. It is also hoped that this will provide impetus for further study not only in IS, but also into psychology, sociology, and criminology regarding time orientation and General Deterrence Theory. Furthermore, this study may encourage further examination of these areas for additional links between the two constructs, and encourage more thorough explanation of potential avenues of influence on GDT, particularly given the erratic nature of results gleaned from its study thus far.

### **Organization of this Study**

This study is separated into five chapters, as well as relevant appendices.

Chapter 1 is introductory in nature. With a basic overview of the scope, aims, and contributions, it lays out the groundwork for the rest of the study and provides a basic overview of its structure.

Chapter 2 consists of the literary and academic background of the topic and concerned constructs. Additionally it provides the logic for the hypotheses central to the study, as well as the hypotheses themselves.

Chapter 3 contains a description of the methods used. This includes both the basic form of the instruments used to gather the relevant data, as well as a summary of the statistical and analytical methods to be used to examine the data in detail.

Chapter 4 consists of the actual results of the study. In addition to statistical tables and a description of the results, it includes an analysis and commentary on precisely what was found and its relations to the concerned constructs.

Chapter 5 is the conclusion. In addition to some further discussion, it contains the implications of the study, suggested directions for future research into this area, and concluding remarks.

The appendices consist of relevant materials too large to fit into the primary text. Appendix A consists of the basic Consideration of Future Consequences (Strathman, Gleicher, Boninger & Edwards, 1994) instrument, as well as the instrument as adapted for this study. Appendix B consists of the vignette skeletal structure used in the present study, along with examples of possible combinations presented to subjects.

## CHAPTER II

### BACKGROUND AND HYPOTHESES

#### **Introduction**

This chapter describes the study and its background in more detail. We begin by explaining the constructs utilized for the empirical and hypothetical research. In particular, we focus on General Deterrence Theory (GDT), Rational Choice Theory (RCT), and Time Orientation.. We then link these constructs together. Next, we propose our hypotheses. Finally, the overall hypothetical research model is presented at the end of the chapter, to lead into chapter 3, which details the empirical methods used for the study.

#### **Background and Theory**

General Deterrence Theory is a classic theory regarding the reaction of individuals to punishment (Paternoster, 2010). Very early intellectual resources regarding its basic principles include the 1764 essay, *On Crimes and Punishment*, by Cesare Beccaria. A more thorough foundation for criminological theory with GDT as its centerpiece was laid out in 1789 by Jeremy Bentham, in his work, *An Introduction to the Principles of Morals and Legislation*. This laid out the foundation for a rational choice based theory of crime, with a potential criminal considered in the position of a rational actor.

General Deterrence Theory has its basis in Rational Choice Theory, and comes from the same philosophical line. RCT is considered an important normative description of human behavior (Hernstein, 1990). Modern RCT in sociology and criminology finds its roots in Becker (1968), who examined crime from an economic perspective. The basic premise of RCT is that a decision-maker, referred to as an "actor," will examine a situation or choice before him (Friedman, 1953), calculate the costs and benefits of each postulated course of action, and select the course of action most likely to minimize costs and maximize benefits (Ulen, 1999). An actor can exist at multiple levels, ranging from a single individual, to much larger social structures and organizations (Hechter & Kanazawa, 1997). In this way, RCT relates to the classical theory of the economic man, in that the rational choice for the economic man tends to be that which will maximize benefits and minimize costs, as is appropriate to the context of the decision.

With this apparently simple premise, a myriad of different disciplines are affected by RCT. Medicine, sociology, criminology, information systems, marketing, economics, political theory, military strategy and psychology are but a few possible areas so involved. A particularly important aspect that goes together with RCT is decision-making. Algorithms for decision-making have been of practical value in many settings, such as business intelligence, which can base decisions on such models, even if not used in a fully literal manner (Shim, Warkentin, Courtney, Power, Sharda & Carlsson, 2002). One of the best known models of decision-making is that of (Simon, 1955), proposing a decision-making model which helped inspire numerous other models for this process:

1. Intelligence – gathering information on the current state of affairs and the decision(s) at hand, akin to military intelligence.

2. Design – Designing and developing different potential courses of action and determining their likely outcome.
3. Choice – The ultimate choice of action.
4. Implementation – Implementation of that choice.
5. Review – Evaluation of the results of the action, cycling back (if necessary) to the Intelligence phase to react to this new information.

Many implementations of basic decision support theory rest on this process (Gorry & Scott-Morton, 1971), making it highly prevalent in mechanized systems to assist humans in decision-making processes and in business environments. Expansions on the process may be cyclical, allowing future decisions to be developed iteratively, which in turn supports the process of learning.

RCT relies on several assumptions. It is important to note that there are numerous models for RCT, all of which may have their own individual assumptions. The most important division between these are likely those models considered "thin," which do not take into account individual values and characteristics, and "thick" models, which do (Ferejohn, 1991). Some of the most important are summarized in (McCarthy, 2002):

1. Actors have preferences for outcomes, such as goods, services, or mental states.
2. These preferences are complete, transitive and stable. Completeness refers to that all (known) possible outcomes being enumerated and ordered from most to least valued. Transitivity is taken from its mathematical definition, e.g. if an actor prefers outcome A to outcome B, and outcome B to outcome C, he implicitly also prefers A to C. Stability means

unchanging over time, although most theories simply leave these as unchanging over the course of a particular situation, as most actors do find their preferences changing over the course of a lifetime.

3. The preferences of an actor are balanced between current and future outcomes using their time preference; for instance, if an actor is oriented towards immediate gratification (as one may be if he indulges in dangerous drugs), he may well be unconcerned with potential future results, such as potential mental and physiological consequences.
4. Most outcomes are uncertain, and as such, every action carries with it some level of risk or improbability, lending itself to the expected utility function, wherein the ultimate value of an outcome is computed by the perceived value of the outcome alongside the chances that it will actually be realized.
5. Decisions are based on information gathered. Gathering and processing information may also be considered a cost, as, although it may not have strict economic costs, it also requires time, energy and cognitive capacity.
6. A rational decision is a decision made that is consistent with these assumptions.
7. A rational approach to making choices and decisions does not eliminate the possibility that an actor may also behave irrationally. For instance, an actor may make a decision based on their own beliefs, such as refusing an otherwise beneficial medical procedure because he believes it is immoral or sacrilegious (March, 1978).

8. Choices can be examined from a decision theory approach, wherein the outcome is based on the actions of one actor and the environment, or by game theory, wherein multiple actors are participating and may have conflicting goals in order to maximize the realization of their interests over those of others.

It is important to note that in practice, an actor is assumed to be constrained by bounded rationality. Bounded rationality is the principle that an actor is only able to act in a rational manner within the confines of the knowledge that he possesses and consider truthful (Simon, 1955; Petersen, 1994). This is the result of the fact that, in almost all situations taking place in reality instead of the theoretical realm, actors having imperfect knowledge with which to base their decisions. It is not perfectly possible to guarantee all possible outcomes for a given choice. For instance, one might be a manager at a software firm and be aware of the capabilities of his development team, and take on a project, but be unaware that the project requires a particular task that the entire team is bad at, hobbling the software development process. A more extreme example is that of an undiscovered fault line in property purchased in an area with previously reliably high land value, with that fault line eventually causing an earthquake that destroys the entire area and renders the investment useless.

Like all highly influential theories, Rational Choice Theory has criticisms and potential weak points that have been explored in academic discourse. Among these are assertions that many of the models used are primarily of theoretical interest, with relatively few contributions to the literature of an empirical nature (Hechter & Kanazawa, 1997). Included in these criticisms are that thick models are too specific to model any

kind of realistic behavior of value, and thin models, which some consider to be so devoid of substance that almost any kind of behavior may be applied to them, causing them to be far too generalized. Many of these models can be criticized for being untested (Ferejohn, 1991; Green & Shapiro, 1994).

However, RCT is highly influential despite critics, and has had considerable contribution to the field of criminology, with additional impetus to (Becker, 1968) provided by (Cornish & Clarke, 1986), which more directly linked the concept of the “marketplace.” While it may not be optimal in all realistic situations, it acts as an effective normative model and basis on which to examine other theories. Furthermore, it is possible that RCT applies to situations that do not, at first glance, seem to be “instrumental,” or processed with careful thought (Boudon, 1998). These situations may in fact be instrumental on a deeper level, due to beliefs held by the subject, derived from self-interest. This would considerably increase the theory's applicability, albeit in a non-obvious, and possibly indirect, manner, giving rise to the possibility that it may be the core of a richer understanding of human behavior and decision-making contexts. Moreover, RCT may be considered a particularly important normative model, which can be compared to more complex theories of behavior and behavioral context, requiring further study so as to better understand both the properties of RCT and, by comparison, the properties of any future theories involving it (Hernstein, 1990). Finally, it has been suggested, after extensive literary examination, that RCT is misunderstood by many of those who raise objection to it, and is an excellent way of unifying findings from many different research areas, and when tested directly it is often in situations where models become over-complicated or over-simplified (Hechter & Kanazawa, 1997).



## **General Deterrence Theory**

To increase the practical value of Rational Choice Theory, it is beneficial to extend it to more specific contexts and situations. General Deterrence Theory is one of these extensions (Conrad, Cox, Allen & Hanser, 2007). GDT is one of the major manifestations of RCT in criminology and related studies in sociology. Academic discourse for GDT continued for some time after the works of Bentham and Beccaria. However, GDT suffered from a critical lack of empirical evidence in its support; as a result, over time, it was slowly pushed aside, and attention in the literature dwindled to barely enough to keep academia reminded of its existence (Paternoster, 2010).

Two major contributions were instrumental in a major revival of deterrence discourse (Paternoster, 2010). In (Becker, 1968), the economics of crime and rational choice theory were examined. However, by extension, also evaluated was deterrence as a phenomenon with similar parallels to markets; under this model, crime and sanctions acted as a market system and deterrence acted on it much as market forces act on buying and selling of goods and services in traditional economics. This fresh viewpoint allowed for new perspectives to begin developing on GDT in order to better understand its phenomena from an empirical perspective.

This paradigm shift was augmented several years later with an empirical examination of GDT phenomena, which the literature had been sorely lacking, often focusing primarily on ideological or philosophical reasoning as opposed to solidly analyzed data (Gibbs, 1975). GDT was examined as form of communication – in particular, communication between the criminal element and societal values as a whole (Paternoster, 2010). Analyzing GDT as a construct with several dimensions, Gibbs

postulated that in states where homicide was punished more severely and certainly, there would be fewer perpetrated, and empirical analysis bore out support for this model (Gibbs, 1975). The result of this study provided the currently favored dimensions of perceived certainty of sanction, perceived celerity of sanction, and perceived severity of sanction, and touched off a dialog in the literature that continues to this very day, including, arguably, this piece of research.

As an extension of Rational Choice Theory, General Deterrence Theory starts by assuming its premise. Continuing from this, if the context in question is one where there are socially deviant or undesirable acts (ranging from general criminal behavior to workplace deviance), then a reliable way to reduce or prevent deviant behavior is to raise its cost, thus modifying the internal calculus outcome in possible offenders. This takes the form of sanctions. Sanctions can be positive (such as a raise, a promotion, or positive public acknowledgment) for good conduct, although most sanctions are negative (such as fines, prison time, or execution) for bad conduct, resulting in punitive conditions for violations (Warkentin, Malimage & Malimage, 2012). Sanctions may be further divided into formal and informal categories, or when oriented towards criminal justice, legal and extralegal (Nagin & Pogarsky, 2001). Formal sanctions are those that are enforced by the applicable hierarchy, such as prosecution and imprisonment by the state for criminal activity or company-centric punishments for violations of company policy. Informal sanctions are more subtle. These often involve public knowledge of an offense and are imposed by the offender's peers of their own volition, with results such as public shame and social alienation, but may also involve self-imposed penalties such as guilt and embarrassment, even if the offenses remain undiscovered. However, they may also come

internally, through shame, personal guilt, embarrassment, and other emotions and experiences. GDT is distinguished from specific deterrence in that specific deterrence pertains to an individual's experiences with deterrence, and as such pertains to those who have already offended in some way (Piquero & Pogarsky, 2002). The theoretical model is graphically summarized in Figure 2.1.

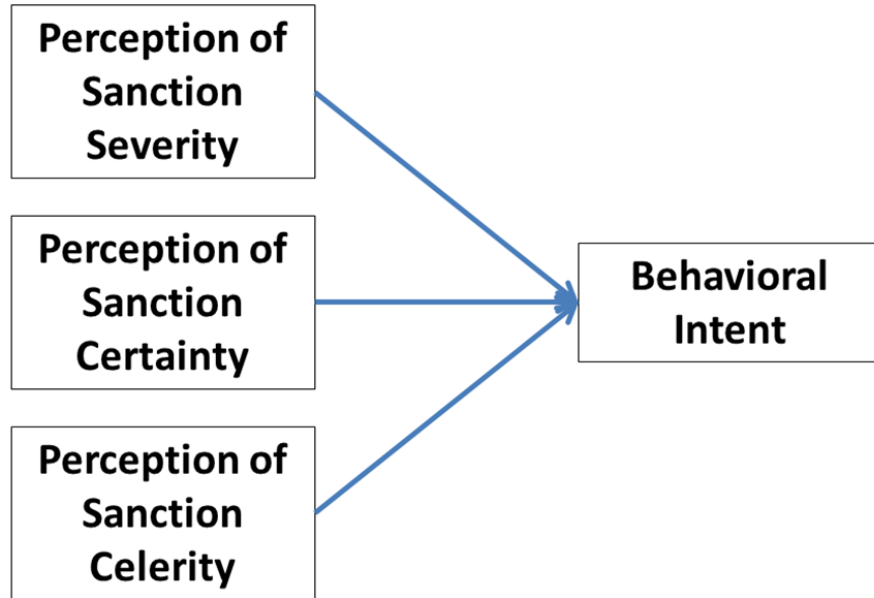


Figure 2.1 General Deterrence Theory (GDT)

General Deterrence Theory is generally regarded to have three dimensions – perception of sanction severity, perception of sanction certainty, and perception of sanction celerity, all of which directly influence behavioral intent. However, there is contention as to just how much impact each dimension has, and in some cases, whether or not a particular dimension has any bearing at all; thus far, analysis of the data has been inconclusive with results widely varying between studies (D'Arcy , Hovav & Galletta, 2009; D'Arcy & Herath, 2011).

Of the GDT dimensions, perception of severity may seem the most obvious, particularly given political emphasis on the severity of punishment in criminal justice, and questions as to whether a particular punishment goes too far or not far enough. It is how severe the actor perceives the sanctions to be; that is to say, how high the estimated perceived cost is (Gibbs, 1979). For example, a one year prison sentence is considered by most to be much less severe than a 20 year prison sentence. If the punishment is worse, then the perception of severity will likely be greater; if the perception of severity is greater, then the cost of the action increases, and, by RCT, the cost-benefit calculation shifts away from the likelihood of offense. The efficacy of severity, however, is questionable in the literature, and may not be significant (Paternoster, 2010; Nagin & Pogarsky, 2003). In fact, some studies have shown little to no distinguishable differences of perception of severity of punishment by increase of actual severity (Kleck, Sever, Li & Gertz, 2005). There may be additional factors impacting the effectiveness of severity, such as impulsivity; empirical findings suggest that the more impulsive an actor, the less impact the severity of a sanction will have, likely due to a lack of foresight (Nagin & Pogarsky, 2001), as well as tendencies towards increased risky behavior (Baumann & Odum 2012).

Perception of certainty is the perception of the likelihood that a sanction will actually be imposed; in short, how likely it is the offender will be caught and punished (Gibbs, 1979). The more likely that an actor is actually going to be punished for the violation, the higher the cost. In the resulting mental calculus, expected utility functions come into play, where the potential reward for success is computed along with the actual likelihood of success, and compared similarly against failure and other possible

outcomes. For instance, if a corporation had a 25% chance of being caught in a crime and being fined \$1,000,000, with the crime paying \$800,000, unscrupulous management might compute the cost as being 25% of \$1,000,000, which is \$250,000, and thus conclude that it is more rational to commit the crime. The literature generally regards perception of certainty to be the most significant element of GDT in influence on behavioral intent. Even in early works such as Beccaria's, it was recognized that certainty was likely to be the most compelling factor in deterring the intent to offend (Paternoster, 2010). More recent empirical studies have shown that the data bear out this notion (Nagin & Pogarsky, 2001; Paternoster, 2010).

Perception of celerity is the perception of the speed of the imposition of a sanction, if imposed (Gibbs, 1979). In theory, the swifter the sanction, the higher the cost to the actor. This follows with the economic theory of discounting, that a dollar now is worth more than a dollar tomorrow; if one is likely to be punished immediately the cost will be greater than if one will be punished a year from now. Furthermore, celerity also follows the general idea of classic, or Pavlovian, conditioning, wherein a subject, if punished shortly after an action, will be less inclined to perform that action at subsequent opportunities (Nagin & Pogarsky, 2001). Despite this consistency with established economic and psychological theory, perception of celerity is often left out of empirical work testing GDT, due to many academics considering it to be the dimension with the weakest link (Gibbs, 1975). Some empirical findings may back this position (Nagin & Pogarsky, 2001). However, another line of thought argues that celerity may be of particular importance to individuals who may be otherwise unaffected by GDT, those who are highly impulsive; these individuals might not react to a punishment that might

come in a month, regardless of the perceived severity of sanction, but might be given pause at the prospect of punishment – or at least, discovery of the violation – in hours or minutes after the offense. There may be empirical evidence that this has some effect in at least some situations (Yu, 1994). Additionally, celerity may actually be a very powerful component, but difficulty in creating effective experiments to study it has hindered its examination in the literature; recent, ambitious programs provide some evidence for this position (Blumstein, 2011).

General Deterrence Theory has been used by many disciplines in efforts to both study and control deviance. Criminology is likely the most obvious, and perhaps most prevalent, field to employ its use, but far from the only one. Political science has harnessed GDT, although at times indirectly in constructing “second wave” models, particularly for situations involving military strategy, as well as diplomacy in the age of potential nuclear warfare (Glaser, 1992). The legal field has an interest in GDT in non-criminal matters, such as in copyright law (Schultz, 2006) or contract law (Merle, 2000), particularly as it pertains to civil court cases. More benign situations also employ it for theoretical reasoning, such as situations involving workplace deviance (Grasmick & Kobayashi, 2002), which can be associated with IS when considered in the context of policy breaches in organizations by employees. Deviant behavior involving information systems is closely linked to GDT, and has been for decades (Straub, 1990). It has also taken some innovative steps with the classic model, such as extending it by integration with the Theory of Reasoned Action and Protection Motivation Theory (Siponen, Pahnla & Mahmood, 2007). Education is another field which employs GDT, amid the continuing effort to prevent bullying, cheating, and other non-criminal infractions (Bray

& Del Favero, 2005). Other areas further removed from conventional notions of misconduct have also taken an interest in GDT, such as determining factors likely to influence athletes into taking illegal, performance-enhancing drugs (Strelan & Boeckmann, 2006).

As may be expected for a highly-studied theory, the relationship between GDT and other psychological and sociological constructs has been analyzed in detail. Some of the most important among these are those that deal with constructs relating to self-control. One important example of this is impulsivity, mentioned previously. Impulsivity pertains to the present-oriented thinking of an individual – whether or not he thinks about the consequences of his actions, or simply act as his internal impulses dictate. Impulsivity has been found in several studies to be correlated with a lack of effectiveness of deterrence; this is particularly pronounced as the impact of perception of sanction severity drastically declines with impulsivity (Nagin & Pogarsky, 2001). This is consistent with tangential findings that GDT has less of an effect on some demographics than others (Pogarsky, 2007). For instance, those who are highly moral are far less likely to commit an offense in the first place, as they do not consider the deviant behavior to be a viable course of action at all (Pogarsky, 2002; Myyry, Siponen, Pahlila, Vartiainen & Vance, 2009). Here, the impact of GDT is significantly weakened if not entirely removed, because in some ways the decision is already made for these actors, whether or not a punishment may accompany the offense.

GDT may be an important influence in situations where dealing with potential offenders is not the primary goal. Trust is one such situation. Deterrence-based trust, sometimes referred to as calculus-based trust, is a particular type of trust wherein the

participants assume that other involved parties will behave as prescribed out of consideration of potential consequences for violations (Sheppard & Sherman, 1998). This sort of deterrence comes up often in our daily lives; we may encounter it in simple shopping, knowing that if a merchant acts in bad faith, he may face consequences. In some cases, both formal and informal sanctions may take hold for violating trust – before modern health codes evolved, if poorly cooked meals were chronic at a particular restaurant, the community might reject the establishment, resulting in the business shutting down. This kind of deterrence is especially important in electronic commerce, which is still relatively young and lacks many social interactions and exchanges of information that are traditionally involved when the transaction is personal, especially when it is clear how easily the situation can be abused (Ratnasingham, 1998). Identity theft and violation of privacy are both serious possibilities among others, and legislation regulating both provides formal sanctions to back the deterrence based model, helping individuals and organizations to trust online merchants. If deterrence-based trust works, then the shallow relationship based on deterrence may evolve to a deeper dependence between the business and customer (Salam, Iyer, Palvia & Singh, 2005).

Like Rational Choice Theory, General Deterrence Theory has critics. Empirical results have been mixed and the exact role that GDT plays in criminal behavior remains unclear. An example of this was found by Braithwaite and Makkai, finding only limited support for the applicability of GDT to corporate crime (Braithwaite & Makkai, 1991; Makkai & Braithwaite, 1994). As early as 1938, it was observed that there are those for whom conventional deterrence has little to no effect (von Hentig, 1938). Because of this, it was historically held with some disdain and has not always enjoyed the popularity – or



at least, attention – that it has today (Paternoster, 2010). The view of the literature in terms of the actual presence of GDT as an actual factor in decision-making, as well as its interaction with other factors, is inconclusive, with evidence pointing in both directions. This has often been attributed to weak or faulty methods employed in studies (Williams & Hawkins, 1986), which may reflect the difficulty of practical measures of the decision processes involved in calculating intent to offend, given the myriad of potential variable, highly dynamic and varied contexts, such as sample population (Wright, Caspi, Moffitt & Paternoster, 2004), which may confound analysis. Paternoster, who has contributed extensively to this literature, has suggested that there is little robust evidence, with most of the empirically significant aspects having moderate effect sizes, at best. (Paternoster, 2010)

However, General Deterrence Theory has not been ruled out. On the contrary, it continues to be the subject of considerable research. In contrast to studies suggesting GDT is of marginal value, others have indicated high applicability, particularly on criminally-prone populations (Wright, Caspi, Moffitt & Paternoster, 2004). Indications of the applicability of GDT may also be hampered by the "deterability" of certain subjects (Pogarsky, 2002). Some, deemed "acute conformists," will not violate under any circumstances, due to, for example, strong scruples or profound religious conviction. Others, deemed "incorrigibles," will violate if they see fit regardless of the consequences (D'arcy & Hearth, 2011). Many early studies may have been especially deeply flawed. (Erickson, Gibbs & Jenson, 1977) criticized these for a fundamental misunderstanding in that they did not study it as a psychological theory, excluding consideration of factors such as perception of risk.

The very nature of the hypothetical offense may also be to blame – many people are unwilling to report their own socially undesirable behavior, such as criminal or organizational offenses (Tourangeau & Yan, 2007). However, deterrence can also impact other types of behavior, including lesser offenses or possibly even mundane situations, such as crossing a busy street (Ford & Schroeder, 2011). Even GDT critics agree there may be more than meets the eye. (Patternoster, 2010), for instance, suggests that there may be additional elements in play to account for an apparent lack of response, assuming criminals are rational beings. A few researchers also believe there may be problems with some statistical analyses for deterrence research (Mendes & McDonald, 2001).

Offenses have been examined as two types – expressive and instrumental – and these may play a role in how strong a presence GDT is in the decision-making process (Chambliss, 1967). Expressive crimes are those considered to be in the "heat of the moment," such as someone punching another who has insulted him. Instrumental crimes, on the other hand, involve more careful thought and preplanning. They are a means to an end, and not necessarily an end onto themselves. An example would be killing a security guard to get to valuables a perpetrator wishes to steal.

Both types of crime are thought to be impacted by GDT. Expressive crimes, for instance, which may seem to happen too quickly for reasoned thought to take place, may demonstrate effective deterrence as the perpetrators respond more readily to the prospect of simple punishment, with basic reward versus cost computations more easily processed than more complicated morality and foresight. However, instrumental crimes are the product of individuals who take the time to at least partially plan them. This will presumably often include consideration as to what the consequences may be should they

be caught (Willison & Warkentin, 2013; Loughran, Paternoster, Piquero & Pogarsky, 2011; Brown, Esbensen & Geis, 2011; Long & Hiltz, 2012).

That said, while the nature of the crime should be considered, it is far from the only element in play. Many scholars question how much distinction actually exists between the two, and believe that such division is greatly overstated in the literature - for instance, allowing for more consideration of consequences for perpetrators of expressive crimes than would readily be apparent from the time delay (Loughran, Paternoster, Piquero & Pogarsky, 2011; Boudon, 1998).

### **General Deterrence Theory and Information Systems**

With the nature of information systems being what it is – sophisticated interacting systems requiring great expertise to build, maintain, and often use effectively – the vast majority of information technology crimes are instrumental in nature. This does not discount the possibility of expressive crimes. For instance, it is quite possible that some individuals may keep viruses or exploit programs ready at a few keystrokes to exact revenge in seconds. However, in practice this is very difficult, and would be far from the norm, in addition to requiring circumstances to be exactly right. Most crimes of this type require a good deal of thought simply to implement them, as opposed to, for instance, striking an individual. During this longer interval, the vast majority of people would likely have to strategize extensively, and during this period there is ample time and thought for deterrence to manifest, should it do so for the would-be perpetrator.

It is important to note, however, that the distinction between instrumental and expressive crimes is, in practice, blurry at best, with no way to classify specific crimes as either instrumental or expressive (Willison & Warkentin, 2013). Although it is generally

believed by the IS community that instrumental crimes are more easily deterred due to the fact that rationality is implicitly easier to access, there is still a lack of empirical evidence with specific conclusions for this belief (Nagin, 1998), and with this in mind, although instrumental and expressive crimes are useful to describe as ends of a continuum, actually attempting to classify any crime as purely one or the other, and therefore immune to the aspects of the other crime type, is rarely tenable.

Academic consideration of General Deterrence Theory in securing IS resources is far from unprecedented, and when it was introduced to the literature, behavioral computer security was in its infancy (Straub, 1990). GDT and IS interact in many security scenarios, most notably when they involve workplace deviance, where damage can be done to an organization through abuse of IS resources. They also interact in more general criminology, with criminal acts perpetuated by and through computer systems. Given the high propensity of IS to be abused and the increase of computerized systems in all facets of life, the necessity for strong security has grown far more critical. IS abuse now has the potential to cause billions of dollars in damage and place thousands of lives in jeopardy. There are thousands of points of potential abuse in our infrastructure, including private, public, governmental and military aspects, lending weight to the importance of keeping information assets secure from theft, sabotage and negligence. By extension, it heightens the need to understand GDT and how it might be used to prevent IS violations to prevent financial ruin, tragedy, or both. As early as 2005, the United Nations has estimated that tens of billions of dollars have been lost to violations of IS resources (United Nations, 2005), and that number has only increased since then.

General Deterrence Theory was seen in the early IS security literature as a highly influential factor in successful security policies; one of the earliest studies cited administrative deterrent measures, combined with user education as critical to successful information security plans (Straub, 1990). Further work by Straub led to the Goodhue-Straub IS Security Model, which features deterrence as a key part, both in the main pathway of IS abuse as well as the feedback loop wherein IS problems, once dealt with, help to contribute to deterrence (Goodhue & Straub, 1991). Given the great risk of internal abuse, and the necessity of user awareness of countermeasures to promote sanction fear (D'Arcy, Hovav & Galletta, 2009), refinement and extension of this research has been of continued interest. Further understanding of the applicability of GDT and other behavioral theories to IS security is vital in demonstrating the effectiveness of these policies to reluctant executives. Convincing managers of the importance of IS security procedures has long been considered a critical goal, as it has often been ignored by organizational leadership (Straub & Welke, 1998). Often, members of management are loathe to subject themselves and their employees to draconian, expensive, and perhaps seemingly useless rituals in the name of security against a threat they regard as an unlikely, ill-defined boogey-man (Kankanhalli, Teo, Tan & Wee, 2003).

Managerial reluctance may be particularly relevant in situations where security behaviors are viewed by users as, in fact, interfering with designated job tasks (Post & Kagan, 2007). Reaching reluctant managers and users may be especially vital, as proper user education and training would likely increase both user self-efficacy with security

compliance, as well as bolstering the perception of the response efficacy of the deterrence part of the security plan (Johnston & Warkentin, 2010; Witte, 1994).

IS security pertains to several risks and threats. One is workplace deviance (Shropshire, 2009), which is handled in terms of internal company issues. Another involves criminal liability, such as the traditional “hacker” penetrating corporate networks, although there are many other ways security breaches may land in the criminal realm, such as stealing computerized plans and data and selling them to opposing corporations or governments. Yet another is civil liability. (Straub & Collins, 1990; Moores & Dhillon, 2000) Imprisonment for crimes of this nature is atypical. These are, however, common offenses, manifest in the millions of pieces of intellectual property illegally shared through the Internet on a daily basis.

Workplace deviance is particularly well-studied in the IS literature, as the business-oriented base of most IS research would directly deal with potential malfeasance and negligence in an organizational setting. Security training programs, for example, are usually proposed in the context of the workplace, or at least in an organization. Research in this area has proven fruitful, both with the demonstrated efficacy of training programs in deterring IS abuse (Straub, 1990), as well as the use of tools such as codes of conduct to encourage informal sanctions for offenders, thereby increasing deterrent effects (Harrington, 1996). Deviance need not be outright malicious; it can be simple negligence, sometimes committed unintentionally. Employees who view their jobs as hindered by security behaviors may try to forego them (Post & Kagan, 2007). However, this negligence often leaves the system vulnerable to future abuse by more malicious entities, or in some cases other external factors that may inadvertently destroy

computational capabilities or data, thus resulting in indirect harm to company resources. However, not unlike mainstream General Deterrence Theory research, IS research involving GDT and its derived constructs has found mixed results in the literature, including some studies which find that sanctions have little effect on IS security policy compliance, emphasizing the need for better understanding of GDT in the IS context, as well as in general (Pahnila, Siponen & Mahmood, 2007).

Insider abuse, or the abuse of privileged access by members or employees of an organization, is another deviance issue highly relevant to IS (Whitman, 2003). This is particularly so since the entrance of computer technology into the workplace, making it an important medium for deviance acts. Its very nature overlaps greatly with workplace deviance, as relatively benign violations (such as writing a password on a notecard) coexist with violations that are far more malicious in nature (such as stealing projects and reselling them as an act of corporate espionage). It also touches on the criminological aspects of GDT, given the potential for insider abuse to become outright illegal in either a civil or criminal form.

Since the increase of copyright infringement on the Internet, civil liability aspects of IS have taken up more attention, particularly given disputes of how much economic damage it actually causes. This is a critical point, given the debate in both the literature and pending legislation worldwide (Smith & Telang, 2009). General Deterrence Theory has figured prominently in several of these studies (Morton & Koufteros, 2008; Kwong & Lee, 2002; Higgins, 2007; Higgins, Wilson & Fell, 2005). This particular situation is somewhat different from most GDT scenarios, wherein the “law is the law;” rather, copyright law itself is in flux and general perception of whether or not piracy is

acceptable or immoral is highly debated, with some individuals engaging in piracy without even being aware of its illegality (Beekman, 2001). As such, the moral component of the assessment of behavioral intention is considerably different than, for instance, what one would find with more major crimes, such as murder or robbery, which are generally considered extremely immoral, or deviance in the workplace, such as exhibiting poor security measures, which, while not necessarily overly immoral, many recognize as at least poor practice. It has, in fact, been characterized as a “low intensity” moral issue, and may not have much to do with conventional perceptions of ethical behavior (Logsdon, Thompson & Reid, 1994). Given the increase of copyright infringement as the Internet is integrated deep into daily lives, particularly among younger generations, understanding the implications of GDT on this behavior continues to increase in importance.

While these examples are instrumental in illustrating the economic implications of deviance of IS security policy, other aspects can be affected as well – some in far more grievous ways. With current technology, a few individuals with the correct access can be devastatingly powerful. An example lies with the root servers of the Domain Name System (DNS), one of the most important auxiliary services on the Internet (Pope, Warkentin, Mutchler & Luo, 2012). These crucial servers act as the directory to translate human-readable Internet names, such as [www.google.com](http://www.google.com), into the numeric addresses that are useful for computers to directly work with. An individual with high-level access could easily execute a few commands and do grave harm – even a few minutes of a server being configured to, for instance, direct all users of Google’s services towards harmful malware could cause considerable damage to property and even loss of life. The



increasing interconnection of infrastructural systems is another concern (Igre, Laughter & Williams, 2006). Systems controlling key infrastructure assets, such as nuclear power plants, are already frighteningly vulnerable and undergoing transitions from 1980s-style modem technology to modern Internet-based technology at the time of this writing. However, as with other IT-dependent organizations, power companies may be vulnerable to attacks not only from external sources, but also internal sources, which may cripple large parts of the power grid should the necessary access be obtained and exploited. With all of these factors in mind, the need for a greater understanding of the interaction between IS and GDT is clear, both for larger situations such as power plants and key communications links, as well as smaller matters on an organizational scale.

Simply knowing more about General Deterrence Theory may help it to have a greater impact, as is illustrated by Protection Motivation Theory (PMT). PMT deals with the assessment of both the probability and severity of a potential threat, and possible options and ability to counter that threat. PMT, having been examined in an IS context several times before (Malimage & Warkentin, 2010), illustrates several ways that GDT could be used to assist PMT-based security efforts. For instance, the coping appraisal component of PMT, which includes an assessment of self-efficacy in the necessary protection tasks, could counter perceptions that GDT-based security initiatives are hopeless. This would help both managers and users alike in implementing them, leading to better security by helping them believe that they can do something about their vulnerabilities. More directly, appraisal of severity, another variable in the PMT framework, is closely related to perception of severity in GDT, allowing a better understood GDT to work in concert with PMT so that literature examining both theories

might grow, both in an IS context and in general. This may also help with situations that do not involve direct policy violations but might help from an analysis from a GDT perspective - for instance, improving the likelihood that users will back up their hard drives as recommended (Malimage & Warkentin, 2010).

Studying how general deterrence theory operates in the context of information systems offenses may be particularly important. This kind of offense may, in fact, be psychologically unlike most other crimes studied prior to the profusion of computer systems into day-to-day life. Many, for instance, can be conducted from thousands of miles from the target, often from the comfort of one's own home. As vast geographical gaps can be closed in seconds, cross-cultural aspects of the impact of GDT may take on a particular dimension of importance, as one may literally be dealing with, and attempting to deter, potential violators on entirely different continents, some with vastly different considerations and ethics, such as privacy expectations (Luo, Warkentin & Johnston, 2009). Others can use sophisticated schemes and third-party services such as proxies and botnets to obfuscate their trail and force investigators to attempt costly and difficult international proceedings to get the evidence they may need, which may result in uncertain attempts at extradition. Still others may seem to their perpetrators like they are not crimes at all, because, for example, copying data may not be like stealing a binder from an office, as no actual physical removal of material has occurred. As such, it may well be that information systems may have particular nuances which deterrence must take into account in order to be used to optimal effectiveness in preventing IS crimes. In this light, it behooves us in particular to attempt to examine the situation and context in great

detail in hopes of teasing out valuable tendencies and information that give us a more complete and useful picture of the situation, and how best to address it.

### **Time Orientation and Perspective**

Time orientation<sup>1</sup> is a general psychological and sociological construct pertaining to how time is perceived, which in turn influences behavior. Although from a purely objective viewpoint, time and its passage are physically objective (albeit to some extent varying) elements in the universe (Einstein, 1939), the actual mental processing and consideration of that time can vary greatly between actors. Zimbardo Keough & Boyd (1997) define time orientation as:

“...the manner in which individuals, and cultures, partition the flow of human experience into the distinct temporal categories of past, present, and future. The boundaries, salience, and utilization of any of these categories may vary considerably as a function of learned preferences that become stabilized into a functional cognitive style, and also as a consequence of situational, structural, and task demands.”

For example, someone whose time perspective is more towards the present may not plan for the future, someone whose time perspective is towards the future may let

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<sup>1</sup> For clarity, the nomenclature warrants further explanation. Time perspective, time perception, time orientation and time preference are muddled in their distinctions, where they exist at all. This problem has been present for decades, such that much earlier literature cites it as an impediment to study (Wallace & Rabin, 1960). Time perception and time perspective are the most easily differentiated; time perception is more immediate and tends more towards describing an individual's inclination towards seconds and minutes. Examples of this are persistent in the literature – recent studies such as (Ferrari & Diaz-Morales, 2007), in fact, use the definition of time perspective from (Zimbardo & Boyd, 1999) for time orientation. Indeed, it has been shown that time orientation and actual perception of the passage of time may be rather psychologically distinct (Lennings & Burns, 1998; Davids & Sidman, 1962). Time orientation is suggested to be a larger construct that contains time perception as a sub-construct along with others, with time orientation itself a subconstruct of "temporal personality" (Ancona, Okhuysen & Perlow, 2001). Due to lack of clear distinctions, with the terms being used interchangeably even within single well-known studies defining popular and pertinent instruments (Strathman, Gleicher, Boninger & Edwards, 1994; Zimbardo & Boyd, 1999), the terms "time perspective," "time orientation," and "time preference" will be used interchangeably, relying on the definition provided by (Zimbardo, Keough & Boyd, 1997) where possible, with particular interest paid to future time orientation, or an actor's orientation towards events that will happen in the future.

himself suffer in the present if he believes it pertains to his future planning, and someone whose time perspective is towards the past may spend a great deal of time attempting to determine what went wrong in the past, or to somehow fix it.

The psychology literature suggests two particularly important distinctions in attributes to personality – the trait and the state (Pervin, 1994). A trait is a relatively stable personality characteristic. Once the personality is fully formed in an adult, a trait generally does not change a great deal in the future (Schaie & Parham, 1976). A state, on the other hand, is much more variable and relates more deeply to a person's immediate experiences (Clark, Vittengl, Kraft & Jarret, 2003). Time orientation is generally viewed as a stable personality trait, though one that is subject to changes, such as altered social status (Zimbardo & Boyd, 1999). However, the evidence is not unequivocal, and some debate this assertion (Hodgins & Engel, 2002).

Time orientation is often considered a moderator in behavioral research (Apostolidis, Fieulaine, Simonin & Rolland, 2006; Tangari, Folse, Burton & Kees, 2010; de Lange, Bal, Van der Heijden, de Jong & Schaufeli, 2011; Joireman, Lasane, Bennett, Richards & Solaimani, 2001; Orbell & Hagger, 2006; Kovač & Rise, 2007). This means that, while it is not necessarily a direct influence on factors such as behavioral intent, it influences the impact of those more directly related. For instance, an inclination to be concerned with one's physical comfort might directly link to behavioral intent to seek medical consultation or treatment. This may be enhanced by having a future time orientation, which would mean that the individual would tend to be more likely to act if he knew the potential long-term benefits of action, as well as preventing long-term disadvantages.

Time perspective can be examined on the level of the individual as well as that of the society as a whole (Zimbardo, Keough & Boyd, 1997). Societal time perspective is perhaps best characterized by (Hofstede, 2001). First posited in the anthropology literature, he expounds five dimensions on which cultures can be rated, including long-term orientation. Also known as “Confucian dynamism,” a high score on this scale indicates that a society is more likely to defer rewards to the future and embrace tradition heavily. A low score indicates that the culture is unlikely to defer gratification and may be more inclined to discount or disregard tradition.

However, multiple constructs can assess the individual or societal conception of time, allowing it to be explored from different contexts. Hall demonstrates this by demonstrating a divide between cultures that view time as either “monochronistic” or “polychronistic” (Hall & Hall, 1990; Li, Gupta, Luo & Warkentin, 2011). Those cultures with a monochronistic time structure tend to focus on a single task. Individuals in cultures that structure their time in a polychronistic manner, however, tend to prefer multitasking behavior, or focus on multiple tasks simultaneously. The evaluation demonstrates the many levels with which time perspective can be evaluated, by examining several different dimensions for the analysis, including how personal time taken by individuals is seen, tendencies in activity coordination, and how organizations are perceived.

Time perspective for individuals has different implications and is often measured using instruments specific to this context, although some aspects generally applied to groups, such as monochronistic/polychronistic tendencies, are also applicable when evaluating an individual’s characteristics of time orientation (Li, Gupta, Luo &

Warkentin, 2011). Time perspective is a complicated construct, and as one might expect, multiple scales and instruments exist to examine the variety of aspects and dimensions. The Zimbardo Time Perspective Inventory (ZTPI) (Zimbardo, Keough & Boyd, 1997) is a particularly well-known instrument for this purpose. It is an instrument that measures time perspective and divides it into five different general perspective factors, exemplifying the different ways in which it may be regarded (Zimbardo & Boyd, 1999):

- Past-Negative – a negative view of the past, where the actor centers on bad things that he has experienced, perceived mistakes made, or on the good things they may have missed out on. This may be due to actual or reconstructed perception of events.
- Past-Positive – a view that is more nostalgic and sentimental towards the past, wherein actors concentrate mostly on how good things were.
- Present-Hedonistic – a risk-taking perspective that focuses on living on the “now,” as well as risk-taking, and having little concern for future consequences, focusing primarily on immediate benefits.
- Present-Fatalistic – representing a “fatalistic, helpless and hopeless attitude toward the future and life” (Zimbardo & Boyd, 1999). This factor represents thoughts and feelings that the course of an actor’s life is influenced by forces beyond his control and that planning for the future is largely an exercise in futility.
- Future – this factor is oriented towards making the future better for oneself and others. This represents deferring gratification in hopes of future

payoff – for instance, going to school in hopes of better employment in the future. It also represents making steady progress towards a goal.

This scale has enjoyed popularity in the literature, with numerous studies incorporating it in whole or in part, either by itself or with other constructs to assess inter-construct reliability.

The ZTPI is comprehensive, considering it covers past, present and future. It also illustrates that there are several different facets of time orientation that can be studied. However, there is a particular interest regarding how an individual views the present and future, due to its particular importance in decision-making and behavioral intent. Consequently, constructs concerning only these aspects appear in the literature, along with instruments to analyze them.

Time orientation instruments, while often measuring slightly different psychometric properties and offering different perspectives into the same general phenomena, often correlate with each other and can be used in order to help validate new instruments. This is the case with the Consideration of Future Consequences (CFC) instrument (Strathman, Gleicher, Boninger & Edwards, 1994). The CFC has been used with increasing frequency in recent years, having been validated in a number of studies and shown to correlate with other scales. Of particular note is its relationship with ZTPI – specifically the “future time perspective” dimension, which has been shown to have significant correlation and a very statistically significant relationship (Zimbardo & Boyd, 1999).

Consideration of Future Consequences, as indicated by its name, is concerned with the level of consideration that an actor gives to consequences in the future from

actions (or postulated actions) in the present (Strathman, Gleicher, Boninger & Edwards, 1994). A high score indicates an actor that is thoughtful and considers the consequences and impact of possible courses of action carefully, or at least makes an attempt to do so when possible. A low score, on the other hand, indicates an actor that does not make such considerations much, if at all. While it is important to note that any specific decision may call for different behavior, the intention of the construct is to capture the general trends for an actor, and as such capture this aspect of his temporal orientation. The precise composition of CFC will be discussed in chapter 3.

Several studies have used Consideration of Future Consequences as a measure of time orientation, often in concert with other measures for a more diverse selection of psychometric qualities for analysis. This research originates in a diverse range of fields. An example is in health care. One study examined the tendency of individuals to respond to communications involving cancer screenings. (Orbell, Perugini & Rakow, 2004) The findings indicated that high CFC individuals tend to be more responsive when negative consequences are short term and positive consequences were long term (such as improved long-term health), but low CFC individuals tend to be more responsive when negative consequences are long-term and positive consequences were short term. Studies regarding diabetes screening show similar results (Orbell & Hagggar, 2006). Academic environments have also found uses for the CFC instrument, examining the correlation between high CFC and high GPA, as one might expect is necessary for success in college when faced with the decision of studying for a future benefit versus immediate benefits often available to college students (Joireman, 1999). Studies regarding political and environmental beliefs have found uses for CFC-oriented studies as well, finding high



scores correlated with pro-environmental political behavior, suggesting that a long-term view of current behaviors influences one's social values and perspective of political and policy preferences (Joireman, Lasane, Bennett, Richards & Solaimani, 2001).

CFC has been shown to relate to important behavior such as spending as well as important health maintenance (Joireman, Kees & Sprott, 2010; Orbell, Perugini & Rakow, 2004). These actions may be in part explained due to the tendency of an actor with a time perspective that is not oriented towards the future to be impulsive (Joireman, Anderson & Strathman, 2003). As impulsivity is used to describe the “present-mindedness” of an actor (Nagin & Pogarsky, 2001), this seems to intuitively relate itself to constructs such as CFC. For instance, an impulsive individual can be said to act rashly, with little to no thought as to the consequences. Instead, the impulsive actor does not think much about the situation at all, moving mostly on present instinct, desires, or, in general, impulses, ignoring any inhibitions he may have towards his impulsive act. As one may imagine, possible interaction between CFC and impulsiveness have been discussed in the literature before; in fact, empirical analysis has suggested that CFC may act as a mediator between impulsiveness and aggressive-hostility (Joireman, Anderson & Strathman, 2003).

As impulsivity relates to an actor's present-mindedness, it is important to distinguish between time orientation and impulsivity - or rather, what opposes impulsivity, impulse control. On the surface, both seem to be highly related to one another, and negative correlations between time orientation and impulsivity have been found (Joireman, Anderson & Strathman, 2003). However, they are conceptually different entities.

The literature is not conclusive on the precise definition of impulsivity (Arce & Santisteban, 2006), despite considerable academic interest in it, particularly related to other disorders such as attention deficit hyperactivity disorder (Alqaryouti, Abu Hilal & Ibrahim, 2011). A generalized definition may best be thought of as impulsivity being the tendency to act instantly with little to no conscious thought or demonstration of rational choice, and impulse control is the control one has over these tendencies. For instance, if an individual is verbally attacked, he may have an impulse to strike the guilty party. If the impulse is stronger than his impulse control, he may in fact act, even if he is aware of potentially negative, perhaps even grave, consequences. Impulsivity could be thought of as the tendency of an individual to follow his urges despite a potential rational desire not to do so, and impulse control being his ability to refrain from doing what he (intellectually) may not wish to do.

Impulsivity involves a wide variety of psychological and biological systems, leading to several models and theories as to what comprises it (Arce & Santisteban, 2006). This also yields many angles to study it from - for instance, examining potential origins in fight-or-flight responses, or the precise cognition (or lack thereof) that happens in an impulsive individual. Recent research, such as the controversial concept of “ego depletion,” wherein willpower against urges and impulses is believed to be a finite resource due to neurochemistry, is particularly relevant to impulsivity from a physiological perspective (Job, Dweck & Walton, 2010). Further support for this hypothesis may come from biological factors such as brain activity, including compromised neurological structures.

The differentiation between time orientation and impulsivity/impulse control comes from the structure of the constructs. Time orientation is primarily cognitive, a factor in the thought process. Impulsivity, on the other hand, while drawing on time orientation, includes the actual act, and impulse control involves refraining from that act. It can be inferred that, although they are definitely correlated, it would be possible to have strong impulse control despite being more oriented towards the present and near future, as well as being possible to have a long-term orientation but impulsivity that overwhelms an actor's impulse control, leaving him unable to stop himself in the face of dire repercussions. CFC and impulsivity also do not necessarily act as predictors for the same constructs – for example, CFC acts as a predictor for Aggression-Hostility when controlled for impulsivity, but impulsivity does not act as a predictor for Aggression-Hostility when controlled for CFC (Joireman, Anderson & Strathman, 2003).

In a broader sense, general time orientation may also be linked with riskier behavior in general. Risky behavior has been associated with impulsiveness (Lejeuz, Read, Kahler, Richards, Ramsey, Stuart, Strong & Brown, 2002). Considering the potential of a lengthy loss of freedom, loss of employment, fines, injunctions, and in extreme cases execution, crime and violation of security policies can be considered risky to at least some extent in most situations. These tendencies include behavior that would be considered instrumental in nature – for example, in gambling situations, impulsivity has been linked with a tendency to take risks (Upton, Bishara, Ahn & Stout, 2012).

The association between time orientation and risk has also been seen in the literature (Baumann & Odum, 2012). For instance, it has been observed in sexual behaviors, where those with a future time orientation tend to have less sexual experience,

likely due to greater regard for the potential dangers of AIDS and other diseases, and the possibility of an unwanted pregnancy (Rothspan & Read, 1996). In particular, the literature suggests that this may relate to the tendency of delinquent youth to have significantly different "possible selves," or perception of themselves in the future, than those that are not delinquent (Oyserman & Markus, 1990). Specifically, those without "well-developed" selves have a higher likelihood of delinquency.

The association between time orientation and risky behavior extends to offenses, including severe offenses. Temporal discounting has been noted in individuals who spend their formative years in relatively hostile environments (Wilson & Daly, 1997). This has been linked to proclivity towards severe offense, such as homicides, due to severe temporal discounting. In other words, if someone lives in a hostile environment, his time orientation is shorter; as such, he does not look far into the future, and severe penalties for severe offenses have less sway over him than someone in a more benign environment. In a less extreme setting, and one not so directly impacted by deterrence, temporal discounting has also been found to be impacted by the presence of attractive women around men (Wilson & Daly, 2004). In this study, when attractive women are present, men tend to exhibit riskier behavior, as measured by changes in temporal discounting; as such, their time orientation has, relatively speaking, become more short-term oriented, likely in hopes of gaining an evolutionary advantage.

### **Study Hypotheses**

Given the link between aspects of time perspective and impulsivity (Joireman, Anderson & Strathman, 2003), and impulsivity and General Deterrence Theory (Nagin & Pogarsky, 2001), it is logical to conjecture that there may be a correlation between time

perspective and GDT. This is consistent with postulated theory by (Paternoster & Bushway, 2009), suggesting that time preference is an important aspect of desisting offending activity. There has been limited work done in this area, notably examination of GDT and its correlation to an individual's reaction to discount rates, using this economic aspect as a representation of a "present-oriented" propensity (Nagin & Pogarsky, 2001; Nagin & Pogarsky, 2003; Nagin & Pogarsky, 2004). However, what is present is primarily concentrated on examination of juvenile offenders and their development (Davids, Kidder & Reich, 1962; Davids & Falkof, 1975).

Additional motivation comes from the recent emphasis in security in IS, due to the rise in computer crime. While this includes the sheer number of violations and crimes, it also takes into account the increasing stakes and possible forfeitures should security systems and safeguards fail. Of particular note are Internet-based theft and fraud, as well as a need for a greater understanding of the implications of GDT and its interaction with actors, IS policy, and the computer systems that may be used to deter potential violators, as well as those that may be subject to abuse.

Given these two motivating factors, it is beneficial to evaluate what factor, if any, time orientation has on the behavior of information system users regarding offenses of information security policy, both at organizational and legal levels. The literature, fortunately, provides some suggestion as to the proper positioning of time orientation in relation to the traditional deterrence variables influencing behavioral intent. As cited frequently, time orientation is often found to act in a moderating capacity in behavioral models where it is incorporated (Apostolidis, Fieulaine, Simonin & Rolland, 2006; Tangari, Folse, Burton & Kees, 2010; de Lange, Bal, Van der Heijden, de Jong &

Schaufeli, 2011; Joireman, Lasane, Bennett, Richards & Solaimani, 2001; Orbell & Hagger, 2006; Kovač & Rise, 2007). In line with the existing suggestions of the literature, it is worthwhile to posit that the interaction between time orientation and GDT may be in the form of a moderator on the three variables influencing behavioral intention to commit an offense. In this manner, they would essentially accentuate the effects of each of these. For instance, an individual with long-term time orientation, having a tendency to think about potential consequences for his actions, may consider the potential severity of the punishment for offense – for instance, a lengthy prison sentence – to be a matter with considerably more weight than a similar individual with short-term time orientation.

In order to test for potential moderating effects of time orientation on the deterrent effect, we must first establish the existence of the deterrent effect in the given context, both in terms of the specific scenario presented, as well as information systems in general. Furthermore, as the literature does not provide unequivocal evidence for or against the effect of deterrence, it is helpful to provide evidence from another context. Because we are testing the effect of time orientation, it is relevant to provide a situation where the length of the sanction is in question. It stands to reason that an actor oriented towards the long-term would be more deterred by a long-term punishment than a short-term one. However, if severity – measured as the length of the sanction – does indeed influence behavioral intent, it also stands to reason that the difference of the effect between a long-term and a short-term sanction would be less under the condition of a long-term deterrent. While Nagin & Pogarsky (2001) note that sanction severity and certainty are the most commonly-tested factors, celerity is also part of the classical

model. Celerity may in fact have thus-far undiscovered importance due to the difficulty of experimentally deriving its strength, a notion suggested by some of the limited empirical evidence available regarding its impact in GDT effects (Blumstein, 2011). As such, we hypothesize:

H1: Perceived sanction severity is negatively associated with intent to offend.

H2: Perceived sanction certainty is negatively associated with intent to offend.

H3: Perceived sanction celerity is negatively associated with intent to offend.

General Deterrence Theory hinges on Rational Choice Theory, which, in turn, gives rise to the concept of utility functions, which are the essence of the cost-benefit calculation postulated to occur in the mind of a rational being. However, classical GDT does not typically include the benefits directly, only the cost. Nevertheless, the potential benefit given to the perpetrator is of great importance - one who may commit murder for \$1,000,000 may not find the risk worthwhile if the reward is instead \$1,000. GDT focuses on costs - namely, the punishment, formal and informal, risked by violating legal or political stipulations. As such, for a more well-rounded perception, it is beneficial to include reward for violation in the model as well. Surprisingly, the role of perceived benefit has received relatively little attention in the literature, although this has been changing recently (Baker & Piquero, 2010). As such, we posit:

H4: Perceived reward for violation of policy is positively associated with behavioral intent to violate.

Previous research has suggested that there are individual factors and traits within individuals that might influence the effect of deterrence beyond those from Security,

Education, Training and Awareness (SETA) programs, monitoring and policies (D'Arcy & Hovav, 2007a). Time orientation, as a personal attribute, would fit into this description. As discussed earlier, time orientation is related to impulsivity. Impulsivity, in turn, has been found to be related to deterrence. Numerous studies consider time orientation and related constructs as they relate to behaviors and traits linked to offending, such as risk-taking and aggression (Apostolidis, Fieulaine, Simonin & Rolland, 2006; Von Wagner, Semmler, Power & Good, 2010; Davids & Sidman, 1962; Lomranz, Shmotkin & Katznelson, 1983). Often, this relationship is found in the form of a moderating effect (Apostolidis, Fieulaine, Simonin & Rolland, 2006; Tangari, Folse, Burton & Kees, 2010; de Lange, Bal, Van der Heijden, de Jong & Schaufeli, 2011; Joireman, Lasane, Bennett, Richards & Solaimani, 2001; Orbell & Hagger, 2006; Kovač & Rise, 2007).

These differences can even be found in some groups of children, where higher-achieving individuals are more oriented towards the future, and underachievers are not, despite being of similar intelligence (Davids & Sidman, 1962). Time perspective has also been linked to delayed gratification, which also may play a role in deviance, as offenders may view themselves to be immediately entitled to the reward in question as opposed to being willing to wait for or earn it otherwise (Lomranz, Shmotkin & Katznelson, 1983). These have also shown a statistical relationship with social class, which is also a factor in offense, and it has been suggested that this may be particularly influential on the relationship between delayed gratification and time orientation (Lomranz, Shmotkin & Katznelson, 1983). It has even been suggested that risky behaviors and a shorter-term time orientation might be linked due to evolutionary



pressures, encouraging individuals in more hostile environments to adapt by taking larger risks in hopes of gaining larger rewards (Kruger, Reischl & Zimmerman, 2008). This behavior may in some ways be reflected in certain aspects of temporal discounting, wherein homicide may be a result of a very steep discounting phenomenon (Kruger, Reischl & Zimmerman, 2008; Wilson & Daly, 1997).

Logically, these findings would imply that a potential offender may temper his behavior due to his time orientation; someone who looks more to the future would likely incorporate possible prison sentences in his decision-making and be deterred more readily when faced with potential sanctions for his misconduct. In some cases it might extend to traits that may make it more difficult to make decisions on the spot, such as impulsivity, wherein the potential offender, aware of his impulsive tendencies, may leverage his longer-term time orientation to make decisions that will keep him from ending up in situations where he may fall victim to these tendencies. Furthermore, it stands to reason that a long-term oriented individual may be more deterred by high celerity as he would have much less time to attempt to escape punishment – for instance, creating alibis or preparation to talk his way out of punishment. As such, we hypothesize:

H5: Future time orientation positively moderates the association between perceived sanction severity and intent to offend.

H6: Future time orientation positively moderates the association between perceived sanction certainty and intent to offend.

H7: Future time orientation positively moderates the association between perceived sanction celerity and intent to offend.

Part of the intent of this study is to help provide a more complete context in which GDT resides, and thus model the reward for violation (and therefore motive to take the

risk of possible sanctions) to complete the cost-benefit calculation. It stands to reason, then, that time orientation may affect this as well. This is particularly important given that impulsivity is usually associated with a desire for immediate gratification and a resulting immediate reward. Thus, that the greater the reward, the greater the intent to offend, but this linkage would necessarily be weakened by longer time-orientation making the perceived long-term cost (potential sanctions in the future) a greater burden than the perceived benefit (violation) may provide. As such, we posit:

H<sub>8</sub>: Future time orientation negatively moderates the relationship between violation reward and the intent to offend.

The research model, as reflected in these hypotheses, is provided in Figure 2.2, combining time orientation, perceived benefit of offense, and General Deterrence Theory. The hypotheses are summarized in Table 2.1.

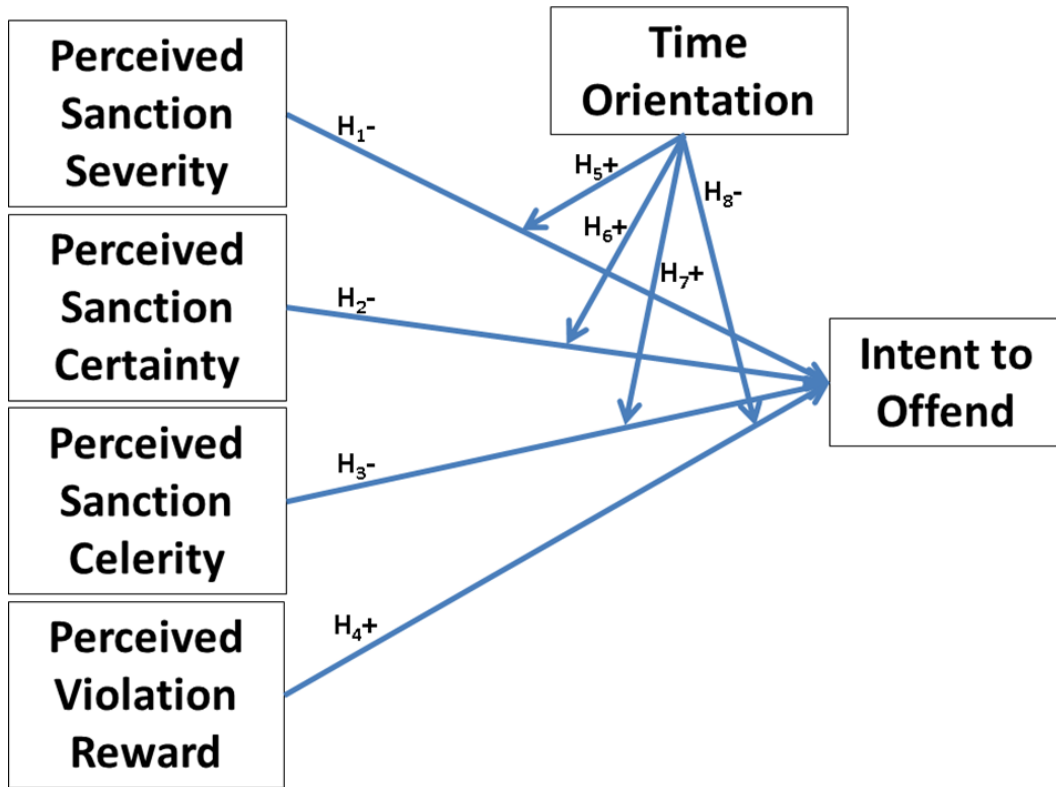


Figure 2.2 Model for the present study

Table 2.1 Study Hypotheses.

| # | Hypothesis                                                                                                              |
|---|-------------------------------------------------------------------------------------------------------------------------|
| 1 | Perceived sanction severity is negatively associated with intent to offend.                                             |
| 2 | Perceived sanction certainty is negatively associated with intent to offend.                                            |
| 3 | Perceived sanction celerity is negatively associated with intent to offend.                                             |
| 4 | Perceived reward for violation of policy is positively associated with behavioral intent to violate.                    |
| 5 | Future time orientation positively moderates the association between perceived sanction severity and intent to offend.  |
| 6 | Future time orientation positively moderates the association between perceived sanction certainty and intent to offend. |
| 7 | Future time orientation positively moderates the association between perceived sanction celerity and intent to offend.  |
| 8 | Future time orientation negatively moderates the relationship between violation reward and the intent to offend.        |

### **Conclusion**

This chapter has examined the background of the study and the experimental questions. A literary review of general deterrence theory, rational choice theory, and time orientation was discussed, examining the present scholarship that surrounds them and several issues regarding their place in academic inquiry. Once this was taken into account, the hypotheses, as well as the rationale and concerns surrounding them, were posited. Finally, a study model was provided, elaborating the proposed hypothetical relationships the variables have with one another.

In the next chapter, the details and plans of how the empirical phase of the study was conducted are detailed. The specific methods used in the study are examined and discussed, as well as the construction process for the experimental instrument itself. The results of the actual execution of these plans and use of the instrument are discussed in detail in chapter 4.

## CHAPTER III

### RESEARCH AND ANALYTICAL PLAN

#### **Introduction**

This chapter outlines and details the research plan employed in this study. The experimental strategy involves showing each participant several vignettes of a hypothetical policy violation, as is specified by the factorial survey method. Each of these vignettes has a specific set level of a deterrent aspect (severity, celerity, certainty), as well as the reward for offense. Given these scenarios, the respondent's behavioral intent towards the hypothetical offense is recorded. The respondent's time orientation is also measured, using the Consideration of Future Consequences (CFC) instrument, as adapted for this study.

#### **Research Plan**

The research plan for this study involved a rigorous, factorial survey-based analysis. It used an instrument derived from several other validated instruments from existing literature sources, developed consistently with conventional guidelines (Churchill, 1979).

Instrument development began with a thorough literature review and theory development. Literary sources were used to derive the instruments that would best represent the constructs involved in the theoretical model, while at the same time the

model itself was iterated several times. The initial model formation and instrument were then subjected to iterative panel review, which improved and refined the instrument with input from both subject and methods experts, as recommended by (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). The resulting instrument was then pilot tested, with the data used for convergent and discriminant validity. Once this test proved successful, the main study commenced, which was followed by a thorough statistical analysis according to conventional factorial survey methods (Jasso, 2006), using Ordinary Least Squares (OLS) regression. Finally, the results were analyzed and presented, resulting in this document. The remainder of this chapter further details this process, as well as the methods and instruments involved.

### **Ordinary Least Squares Regression**

Regression analysis is a staple statistical technique. It is powerful, easily understood, and flexible, with numerous variations available for both univariate and multivariate situations of many types. The present study made extensive use of Ordinary Least Squares (OLS) regression, which will be explained here.

Regression is used to analyze the relationship between one dependent variable (DV), and one or more independent variables (IV) (Tabachnick & Fidell, 2007; Teal, 2012). For example, a simple situation wherein regression might be useful would be the number of years of experience an employee might have, versus his productivity. In this case, the education would most likely be treated as an IV, whereas the productivity would be treated as a DV. The basic equation for regression involving multiple independent variables, or “multiple” regression, is illustrated in Equation 3.1.

$$Y = \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \beta_0 + \epsilon \quad (3.1)$$

In this equation, each  $X$  is an independent variable,  $Y$  is the dependent variable,  $n$  is the total number of independent variables,  $\epsilon$  represents the error term, and  $\beta$  is "beta," or the coefficient derived from reality which is calculated against the corresponding independent variable to produce the DV.  $\beta_0$  acts as the intercept, or the value of  $Y$  when all IVs are 0. The  $\beta$  coefficient corresponds with the change in  $Y$  per unit increase of each independent variable.

However, in research it is extremely rare to be able to compute or obtain the true beta. Regression attempts to estimate this number, resulting in an equation of the form shown in Equation 3.2.

$$Y' = b_1 X_1 + b_2 X_2 + \dots + b_n X_n + b_0 + e \quad (3.2)$$

In this equation, each  $X$  is an independent variable,  $Y'$  is the estimate for the dependent variable,  $n$  is the number of independent variables,  $e$  represents the error term, and  $b$  is the estimate of  $\beta$  for each corresponding independent variable.  $b_0$  acts as the estimate of the intercept, the model result when all independent variables are 0. This equation with estimates is the regression model, which is then compared against the data and assessed with the available information (Tabachnick & Fidell, 2007). In a typical regression situation, most data points will not fall perfectly on any single linear equation. The difference between a regression line and the data point on the  $Y$  axis is called the error. Each of these error points is squared and their total combined to calculate the Sum of Square Error ( $SS_{\text{Error}}$ ). Regression calculates each  $b$  in such a manner to minimize  $SS_{\text{Error}}$ , which is where the name, Least Squares, is derived from.



Regression is computationally similar to another technique, ANalysis Of VAriance (ANOVA) (Tabachnick & Fidell, 2007). The two are often used in conjunction with one another. Some statistical packages provide an ANOVA alongside regression output by default.

Although a regression model can be useful for attempting to predict the response of a system, it is also useful for attempting to obtain evidence for or against a hypothesis, which is used in turn to determine the effectiveness of a model (Tabachnick & Fidell, 2007). It follows the rules of traditional hypothesis testing. In this situation, two hypotheses are used: a "null" hypothesis, or assumed default of whatever is relevant to the experiment, and the test hypothesis, which is the hypothesis we are typically interested in. This is tested using the statistical significance, or p-value, of the model, which is a number between 0 and 1. The p-value is the probability that the null hypothesis will be rejected when it is not proper to do so. Statistical software generates a p-value for the significance of the model overall, as well as individual variables within the model. These p-values are compared against an "alpha" value, or threshold. Alpha is also specified between 0 and 1, and represents the likelihood that the findings are spurious. For instance, if we specify alpha at .05, then we want a situation where there is at least a 95% chance that the findings are not spurious. The p-value, accordingly, indicates the chance that the findings are spurious. If the p-value is below the alpha value, then it has passed the threshold established for significance for the analysis. The model, or variable within, can be said to be statistically significant for the specified value of alpha, and the null hypothesis is rejected. This usually implies, but does not necessarily confirm, that the test hypothesis is correct. If the p-value is above the alpha

value, the model or variable are said to not be statistically significant, and the null hypothesis is not rejected, which implies that, given the data and alpha value, the test hypothesis is not accepted. A smaller alpha value results in a more rigorous test of the hypothesis. A typical alpha value is 0.05 (Teal, 2012), although this can vary between studies and disciplines.

Although a regression variable can be said to be significant with a sufficiently low p-value, this does not mean that the effect is large, merely that the evidence that a relationship exists is strong. (Tabachnick & Fidell, 2007) In order to determine the effect size of a specific variable, one must compare the coefficient produced for that particular variable and compare it against those of other variables. If the coefficient of one variable has a greater absolute value than that of a second variable, the first variable is said to have a greater effect size. For example, in the previous example, if we put the years of experience a worker might have, and the years of education a worker had, as the IVs, and the DV is his productivity, both experience and education may prove to be significant. However, it is possible that the experience may have a large effect size, but education has little effect size. It must be noted that a large effect size does not imply a small p-value, nor does a small effect size imply a larger p-value. As such, it is possible that experience may have a much larger coefficient than education, but also have a much larger p-value, and thus less statistical significance.

Assessing the overall model is important in regression. The correlation coefficient,  $R$ , helps in this (Tabachnick & Fidell, 2007). The computation of  $R$  is provided in Equation 3.3, using two values from ANOVA.

$$R = \frac{SS_{Reg}}{SS_T} \quad (3.3)$$

In this equation,  $SS_{Reg}$  is the Sum of Squares Regression from the model, and  $SS_T$  is Sum of Squares Total, which is the result adding  $SS_{Reg}$  and  $SS_{Error}$ . Generally,  $R$  is squared, producing a value between 0 and 1. This provides an estimated percentage of how much variation in the data set is explained by the model. In general, a higher  $R^2$  is indicative of a stronger relationship for the model overall. However, it is worth noting that a low  $R^2$  does not mean that the model is useless; it may still have utility, and may indicate that more research or examination of the model properties will be necessary to obtain a clearer picture of the situation, which is typical in research, given its iterative nature.

### **Factorial Survey Method**

The factorial survey method is generally considered to have been pioneered in its present form with (Rossi & Nick, 1982). It is a powerful survey technique departing from traditional survey instrument design. As opposed to a simple set of questions, the participants are asked to role play in pre-written vignettes, adopting the role of a scenario character for a short period and being asked about his actions or beliefs in the fictitious context. The vignettes are constructed from a basic skeleton. The skeleton incorporates specific portions that vary depending on what the researcher is testing. The different possible portions represent embedded variables, which can be used in statistical analysis as independent variables when evaluating responses. The vignettes provide a wide array of possible permutations of the instrument scenario. Embedded variables provide context

to differentiate decisions and situations. This allows for multiple data points to be gathered from a single participant.

In the words of (Rossi & Nock, 1982), the factorial survey method can be summarized as thus:

“Factorial surveys consist of providing individuals with contrived hypothetical situations/objects which are to be evaluated according to some process being studied. The construction of such situations/objects follows factorial experimental protocols which ensure the orthogonality of all components of the situations/objects. Individuals then respond to a sample of all possible situations/objects.”

The factorial survey method has been used in numerous studies (Byers & Zeller, 1998; Wallander, 2009). Continued interest has led to improvements to the technique (Jasso, 2006; Wallander, 2009), enabling it to more fully address a wide range of possible scholarly problems. It offers several advantages over traditional surveys. First, and perhaps most obvious, it increases the likelihood of a high number of data points by allowing subjects to participate multiple times in a single sitting, providing answers related to several “individuals” (as discussed later in this section), as a single participant can provide multiple data points by answering multiple permutations of the instrument. This provides great statistical power at a relatively small cost in terms of participant recruitment. Second, it helps to ensure orthogonally between variables, which reduces multicollinearity and interaction effects by evenly distributing the potential scenario variable levels throughout the population (Rossi & Nock, 1982). Third, it is particularly helpful at ensuring internal validity.

The factorial survey method is useful for assessing the beliefs of individuals regarding specific situations and constructs, thus producing data for further analysis. For more theoretical specificity, it may help to illustrate precisely how positive and normative beliefs empirically relate to reality. Reality is described with what (Jasso, 2006) refers to as “Type I” equations. These are illustrated in the abstract in Equation 3.4.

$$Y_j = \beta_0 + \sum \beta_k X_{kj} + \epsilon_j \quad (3.4)$$

This equation includes “true” betas – an ultimate coefficient theoretically found in reality – although in most situations, these are generally considered to be unknowable. Most statistical analyses, including those employed in empirical social research, attempt to accurately estimate these unknowns in hopes of better understanding or predicting natural phenomena.

Individuals also have internal estimates of how such systems work, or positive beliefs, and, while not represented in terms of absolute equations, can be approximated by Type II equations (Jasso, 2006), which are abstractly summarized in Equation 3.5.

$$Y_{ij}^{POS} = \beta_{0i} + \sum \beta_{ki} X_{kj} + \epsilon_{ij} \quad (3.5)$$

In this equation, the  $i$  subscript denotes the individual observer, also referred to in (Jasso, 2006) as a “lay scientist,” or an individual attempting to understand natural phenomena as a relatively casual observer. This lay scientist would construct estimates based primarily on personal observations, internal contemplation, and other knowledge obtained in a non-scholarly way (e.g. recalled anecdotes), as opposed to utilizing a familiarity with scholarly literature and theory typically applied by academicians in formal work.

Further, individuals also hold normative beliefs, which are how the individual believes things ought to be ideally, and are represented with Type III equations. (Jasso, 2006) These can reflect some aspects of an individual that a Type II equation cannot. For instance, personal moral viewpoints can usually be better estimated by considering it a normative belief as opposed to a positive belief, as reality often differs greatly from personal moral judgment. Type III equations are illustrated in the abstract in Equation 3.6.

$$Y_{ij}^{NOR} = \beta_{0i} + \sum \beta_{ki} X_{kj} + \epsilon_{ij} \quad (3.6)$$

Note, once again, the use of subscript  $i$  to indicate the parameter estimates and error term are those applicable to the individual lay scientist.

Factorial survey analysis is particularly adept at yielding estimates for the intercepts and slopes of these Type II and Type III equations, from which more generalized conclusions can be drawn via statistical analysis of the data. (Jasso, 2006) In some situations, these can be considered Best Linear Unbiased Estimates (BLUE). In the case of BLUE, a third statistical component can be derived – a consistent estimate of the  $R^2$  of the equation of interest to the investigation.

A summary of the factorial survey method is provided by (Jasso, 2006):

1. Selection of input factors and vignette characteristics.
2. Measurement of input factors and vignette characteristics.
3. Generation of full factorial vignette population – This step consists of actual generation of all possible vignettes, referred to as the full factorial population. The full factorial design ensures an intercorrelation of 0

among vignette characteristics, and can potentially produce millions of “individuals,” each with their own unique characteristics.

4. Deletion of logically impossible vignettes – While the variables may coexist in the theoretical domain, some levels of variation may be mutually exclusive in practice. These vignettes must be removed from the population, albeit at the cost of intercorrelation deviating from zero. This step may not always be strictly necessary, depending on whether the variables in the vignettes can be mutually exclusive or otherwise considered impossible.
5. Drawing random samples – A specific set of samples is randomly chosen from the vignettes available, typically between 40 and 60 of the potential population members. The result is called the “vignette pack.” If the number of vignettes is relatively low, this step may not be necessary, with the pack consisting of all available vignette combinations.
6. Shuffling the pack – not unlike a deck of cards, the vignette pack is shuffled to prevent order effects, although a record must be kept of the order so that serial correlation can be detected.
7. Administration of the survey to the participants.

As with all survey methods, the factorial survey approach has disadvantages. One of these is that it is felt that respondents can only make judgments limited to their “competence” to evaluate them (Wallander, 2009; Wagenaar, Denk, Hannan, Chen & Harwood, 2001). As such, a vignette must be tailored with this in mind, and may necessarily limit the scope of what can be examined using this method. For instance, it

may be difficult for a lay person to make an adequate judgment about medical ethics when his primary information comes from the general media, which may distort or misstate many important facts that a practitioner would be aware of. Furthermore, some scholars believe that factorial surveys have been underused in the literature (Lauder, 2002). In fact, although considered a highly valuable method, it is rarely discussed in standard textbooks in sociology, much to the surprise and dismay of those who embrace it (Wallander, 2009). While not a weakness per se, it does indicate that it has not benefitted from the level of refinement of more traditional survey methods, simply due to having less attention and scholastic scrutiny. Consequently, it may not be as well understood as more traditional survey methods.

Not all studies fall perfectly into a pre-defined template for a survey analysis scenario, and this study is among them. The research design for the present study differs from the basic factorial survey design in the following ways:

- No set of variables had mutually exclusive values. As such, no deletion was necessary to avoid logical inconsistencies or impossible scenarios. This has the additional benefit of allowing intercorrelations to remain 0, aiding analytical procedures.
- The total number of vignettes was  $2^4 = 16$ , far smaller than the potential millions of combinations or permutations postulated in the literature, and possible in some studies. As a result, there was no need to randomly select vignettes to include or exclude, and the entire vignette population remained in the pack.



- It was deemed unlikely that subjects would have the patience or interest to answer numerous vignettes, and that answer quality would be highest if respondents did not become fatigued; as such, each subject was given only four vignettes in total. In order to address concerns about potential ordering effects (Lauder, 2002), the exact vignettes, and their order, were randomly selected without replacement.

Analysis in the factorial survey method is typically based on regression analysis. With the data thus gleaned and the instrument validated, data analysis commenced. This was conducted using the standard statistical package SPSS.

The factorial survey method was considered optimal for the present study for several reasons. It is commonly used in criminological studies, which allows it to be more easily compared with their results (Wallander, 2009). Further, it has recently been of interest in the information security literature (Warkentin, Willison & Johnston, 2011; Vance, 2010). It can also help with certain biases, most notably social desirability (Podsakoff, MacKenzie, Lee & Podsakoff, 2003), which may color the responses of participants towards more "socially acceptable" behaviors. The vignette design allows the participant to assess the behavior of the fictitious character, and not his own. An additional advantage is gleaned from the considerable amount of data that can be gathered relative to the number of participants; as each vignette answered is a hypothetical individual, a single subject provides many results, each of which can be analyzed as a separate data point.

## **Consideration of Future Consequences**

Given the importance of time orientation to the present study, a measure of subject time orientation was vital. Consistent with the stated goal of using previously-validated scales where possible, the literature review yielded the Consideration of Future Consequences (CFC) instrument (Strathman, Gleicher, Boninger & Edwards, 1994).

The precise composition of CFC has been debated. Originally, it was conceived as a single, unidimensional, bipolar scale (Strathman, Gleicher, Boninger & Edwards, 1994; Jaireman, Anderson & Strathman, 2003). However, further analysis has been conducted that indicates that it may in fact be at least two factors, which was first hypothesized as a consequence of an attempt to isolate the items necessary to create a “short form” of the CFC instrument, with the resulting factor analysis indicating a possible second factor from those items not selected (Petrocelli, 2003). Further analysis bore this hypothesis out, postulating two different dimensions, CFC-Immediate and CFC-Present (Jaireman, Balliet, Sprott, Sprangenberg & Schultz, 2008). However, more recent research indicates that this may in fact be incorrect, and the original postulation of CFC may be the accurate one, with the differing factors apparently having been introduced into the statistical analysis by methodological artifacts (Hevey, Pertl, Thomas, Maher, Craig & Ni Chuinneagain, 2010). As such, there is no current consensus on the precise dimensionality of the construct, although the most recent research to date at the time of this writing indicates a primarily unidimensional structure. However, CFC has been frequently used in the literature as a measure of future time perspective (Petrocelli, 2003).

Consistent with many opinions about time orientation and its status as a personality trait, CFC is believed to be stable over time (Toepoel, 2010). A longitudinal study was performed in a non-academic setting in order to help determine this stability, with a sample frame intended to be representative of the Dutch population in late adolescence and adulthood. In particular, no significant change was found when the instrument was used over a single year; however, over a longer period of time, differences may arise. That said, it was found to generally be consistent over the years. It has been speculated that, although an individual's CFC may tend to remain the same, specific effects may influence this in individuals. (Strathman, Gleicher, Boninger & Edwards, 1994; Toepoel, 2010) However, (Toepoel, 2010) indicated that a larger number of responses than was available would be necessary to accurately evaluate this speculation.

Demographics seem to have a limited impact on the results of the Consideration of Future Consequences instrument. Findings indicated that the higher the education of an individual, the higher the CFC, but (Toepoel, 2010) does not comment on whether this may be due to the influence of education itself, or because individuals high in CFC tend to seek out and acquire more education. Further examination from (Toepoel, 2010) found that, in univariate (but not joint) analysis, gender, age, and income had a significant effect, but joint analysis did not provide support for these findings. Although such evidence suggests that income and age do not have significant influence, the results are not unequivocal, at least for gender. Although at least one previous study (Zimbardo, Keough & Boyd, 1997) found no significant influence for gender on CFC scores, which is in concurrence with joint analysis from (Toepoel, 2010), one other study found

significant results, with males scoring significantly lower on CFC than females (Petrocelli, 2003).

CFC has not only been used in experiments as a measure for time orientation, but has also been used to provide support for other instruments. CFC has been shown to correlate with a number of other psychological constructs. It was considered to be sufficiently reliable that it has been used to help lend credibility to the ZTPI (Zimbardo, Keough & Boyd, 1997). CFC has been used to validate instruments rooted in different constructs as well – for example, the General Confidence Scale (Keller, Siegrist, Earle & Gutscher, 2011) used CFC alongside trust scales to assist in asserting its validity. Given the considerable amount of work used involving the construct and its favor in studies regarding time orientation, as well as its focused structure relating to the future versus the present, CFC is a highly appropriate instrument for this study, hence its selection.

### **Sample Frame Demographics**

University students were the primary demographic for the present study, and were considered a good source of data. Students have been found to be a source of robust data in some elements of information security research (Johnston & Warkentin, 2010; Choi & Lee, 2003; Compeau, Marcolin, Kelley & Higgins, 2012; Safeena, Date & Kammani, 2011). Furthermore, some studies have found that, in fact, the use of student samples can be generalized to larger populations, in particular when the students are familiar with the subject (Niederman & DeSanctis, 1995; Dickson, DeSanctis & McBride, 1986). They can even be a particularly valuable source of data for piracy in particular (Sims, Cheng & Teegen, 1996; Hinduja, 2003). This is helped with the fact that they are unlikely to have extensive indoctrination in security policies, allowing the sample to be less influenced by

previous training. Although there is a small amount of copyright information often disseminated in student orientations in universities in recent years, the vast majority will not have much awareness of following security policies. As a large part of the benefit of examining GDT in an information systems-related context is to aid with training issues, this population, free of such influences, allows for gathering data that may be of maximum utility for this purpose, as it has had little intervention by previous organizational affiliations. As many university students will be knowledge workers in the future, it behooves the academic and practitioner communities to consider the needs of those who are soon to join their ranks.

Aside from exposure to copyright infringement, students may be particularly useful due to experiences common to their age bracket and demographic. Johnston & Warkentin (2010) cite for their study the importance of surveying a population, such as students, with a high proclivity towards technology and familiarity with computer systems. This means that due both to previous exposure and the likelihood that a university graduate will be positioned more closely to sensitive technology than a non-graduate (e.g. through more rapid promotion to management by way of a business degree), they are more likely to readily grasp the nuances of interaction with computer systems. They are also more representative of the highly computer literate workforce that will be taking over much of the corporate world in the coming decades, giving an important insight into the mindset of future business leaders.

Although some researchers have cited concerns about student populations, particularly regarding generalizability, these concerns may be somewhat questionable. Greenberg (1987) in particular states that students as viable as other potential subjects

when examining decision-making processes. It may be more useful for theoretical research to concentrate efforts towards rigor and validity (Greenberg, 1987), as well as instrument quality (Kacmar, Ratliff & Ferris, 1989), rather than obtaining a perfect demographic. This is particularly important, as even a population with apparently ideal demographics may not be able to produce sufficiently generalizable results, assuming such a sample can be identified in the first place (Greenberg, 1987). Additionally, the present study followed several guidelines for the use of students for IS research, emphasizing specific nuances often overlooked in similar studies, such as justification for the sample, found in this chapter, and discussion of the limitations of a student sample, discussed in chapter 5 (Compeau, Marcolin, Kelley & Higgins, 2012).

### **Instrument Pre-Testing Procedure**

The present study used an instrument constructed specifically to measure the necessary variables in a relevant context. Although much was taken from previously validated instruments in the literature, some components – most notably the vignettes – were custom-made. Additionally, the instrument had yet to be validated in context as a whole, as is advocated by (Straub, 1989). A pre-test was executed to ensure that the chosen scenario and questions were reasonable and realistic. The main pre-test activity took the form of a review panel, which included several subject matter experts, as well as experienced survey researchers, to better validate the instrument. Similar techniques using expert groups have been recommended in the literature to help ensure content validity in factorial survey studies and other studies involving the use of researcher-written vignettes (Lanza, 1988; Lauder, 2002).

The panel took place as a real-time, face-to-face meeting. At the panel meeting, a preliminary version of the instrument was handed out, with the factorial survey design concept explained in brief. Of particular concern was whether or not the scenario and vignettes were realistic. Further concerns that warranted investigation included whether the items were unambiguous and answerable from the perspective of potential study participants, the wording of all aspects was clear and easy to understand, and any other matters which they deemed necessary to examine or considered candidates for improvement. Other aspects examined included the proper structure of the instrument and any non-obvious cues that may unfairly bias a participant, such as wording that might sway a respondent to view one position or another as morally correct in context, and consistency between the items.

The panel could make suggestions for both major and minor changes. Major changes would likely involve large rewrites of the scenario and/or items, particularly simultaneously, and would then be required to return to panel review for further validation. However, minor changes could also be proposed. An instrument requiring only minor changes would be considered to have validity provided once these changes were incorporated into the final version, requiring no further direct panel oversight, although most major changes would require another iteration of panel review.

### **Instrument Development Cycle**

The instrument was patterned on standard factorial vignettes. To prevent responses from bias due to morally extreme scenarios (such as murder), the vignettes were engineered such that there was sufficient moral ambiguity that participants might more easily consider taking the “right” or “wrong” action. The subject of copyright

infringement, or “piracy,” was chosen due to its contemporary relevance, high relevance to information systems, and the moral ambiguity perceived by many to surround it (Jackson & Vimwala, 2011). University students also experience a relatively high prevalence of piracy among them (Cronan, Foltz & Jones, 2006) despite not having high levels of more traditional violations (Wright, Caspi, Moffitt & Paternoster, 2004). Financial pressures often faced by university students were also a consideration leading to the use of this demographic. In order to better facilitate realism, the instrument scenario underwent several revisions to produce a compelling, yet realistic punishment, given the proliferation of technology into everyday life and recent legislative and judicial actions pertinent to intellectual property. To help subject role immersion, the name of “Pat” was deliberately chosen as a gender-neutral name. Care was taken in the phrasing to avoid all gender pronouns, allowing the respondent to determine what gender Pat may have been for his or her own frame of reference. Appendix B contains the framework of the survey instrument, as well as some examples of possible combinations.

The prototype instrument was then subject to pre-pilot panel review. The panel consisted of method and subject matter experts, and initially required two sessions where the instrument was assessed for realism and clarity. The first of these sessions mandated a major revision to the instrument, due to misunderstandings regarding elements of the base structure. This required a near-complete reworking of many of the items, as well as several changes to the wording of the vignette, with particular emphasis towards portraying a realistic and clear scenario.

Of particular note was the finding of the panel that a specific modification to the CFC was necessary in the form of rewriting reverse-coded items to make their coding



similar to other items. Reverse-coding involves inverting a Likert scale in order to make each end mean the opposite of what it does in the rest of the survey. For instance, if most of the items in a survey have a Likert scale ranging from 1 to 5, with 1 being “low” and 5 being “high” for the relevant variable, a reverse-coded item would have 1 represent “high” and 5 represent “low.” It is introduced into surveys in order to encourage the respondent to slow down and think about his answers as opposed to simply blanket-answering many questions with little thought. Despite its intent, (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) indicates that this practice may have a deleterious effect on the data. Respondents may acquire a sense of patterns in instrument items, and when reverse-coded items are encountered, it produces a conflict, which may lead to method bias. Further research (Hughes, 2009) corroborates this and indicates statistical significance. The original CFC, as well as subsequent modifications for further study, implements several reverse-coded items. The applicable items were reworded to remove the reverse coding, and then reincorporated into the instrument.

Thus revised, the instrument underwent a second panel review, which found minor revisions to the wording necessary, lending additional realism and clarity. A particular point of interest was the modified CFC. Some of the items were awkward and difficult to follow when staying as close as possible to the original item. These were slightly rewritten to address these concerns. With these changes incorporated, the instrument was established as valid by panel approval.

Following panel review, further steps were taken to verify clarity and realism directly from the sample frame. A random polling of six members of the student body reviewed sample versions of the vignette, as well as the questions, to validate the clarity

of the instrument, and found it clear, comprehensible, and realistic. An additional two members of the sample frame viewed the web instrument in its completed form and found no problem with realism, clarity or comprehension, resulting in no further changes. These successful “spot checks” with actual members of the sample frame lend additional verification to the instrument’s content and face validity.

After committee review, slight adjustments to the instrument were made, fine-tuning perceptual questions and instrument context. This occurred across two further panel review rounds, as well as the examination of two more members of the student body. Combined, the instrument was deemed sufficiently validated, final fine turning was conducted as per panel recommendations, and the instrument emerged ready for its pilot study, with a number of perceptual items incorporated for analysis during the pilot test.

### **Pilot Test**

Pilot testing was conducted as per recommendations by Churchill (1979). The pilot test was conducted to ensure instrument validity before the full survey was administered. The pilot test was conducted after the instrument was revised to incorporate all relevant changes suggested by the panel, and after approval of the instrument from the Institutional Review Board (IRB).

Test subjects were volunteers drawn from the sample frame of university students. The test was administered in an online format, using the same software and general template as the final survey, ensuring that such environmental nuances would be approximately identical between both the pilot test instrument and final study instrument. It was also helpful to prevent any inconsistencies between the pilot test and main study

that may be introduced by a change in format, such as switching from a web-based survey to a paper-based format.

Once data had been gathered, the next step was Confirmatory Factor Analysis (CFA) (Bagozzi, Youjae & Phillips, 1991) to determine construct validity. Convergent and discriminant validity were established, with the perception items loading cleanly on one another. Computation was performed using Maximum Likelihood extraction method, which was then subjected to Varimax rotation.

Following validation of the four factor measurement, the instrument was subsequently truncated. The primary change was the removal of perceptual questions focusing on celerity, certainty, severity and value. This left the three items representing behavioral intent as the measurements collected from the participants for each scenario, alongside a realism check question. Along with minor wording modifications, primarily to the disclaimer and associated text helping to inform the participant more thoroughly that their responses were anonymous, the survey was manifest in its final form.

### **Survey Administration**

The survey was administered to students at a major university in the southeastern United States. It was coded into Qualtrics, a major survey platform. Qualtrics' tools are designed to deliver large-scale surveys on the World Wide Web, collecting the data and partially preprocessing it for further analysis. This method allows the survey to be taken from any computer connected to the Internet, and also to stop and restart the survey at a later time, permitting maximum flexibility for subjects. It also has anonymity options which help to guard a participant's privacy.

Announcements were made in several classes, offering extra credit in exchange for participation. Records of who participated were decoupled from responses; as such, while it was possible to determine who had participated, and all answers were recorded, it was impossible to match a participant with his answers. Prior to the survey, subjects were informed that participation was completely voluntary and that all responses were anonymous. This was repeated on an introductory screen wherein subjects indicated their consent before proceeding to the main survey itself.

Once the participant indicated understanding and consent, the main survey began. The instrument consisted of three parts. First, the modified long-form Consideration of Future Consequences instrument (Strathman, Gleicher, Boninger & Edwards, 1994) was administered, but with modifications as per panel recommendation. The second part consisted of four iterations of the vignette. Each combination was constructed with randomly selected values for the embedded variables, without replacement. Respondents received a four-question manipulation check with binary variables, in order to determine if the respondent was paying attention to and understood the vignette, and to assist in data scrubbing efforts during analysis. After each set of manipulation checks, a set of four three-item scales were presented, in order to evaluate the perceptions of severity, certainty, celerity, and reward for violation as the subject perceived them.

A three-question assessment of behavioral intent followed, along with a question that inquired as to the respondent's perception of the realism of the situation (to assist with assessing content validity among individual respondents regarding each data point). A "question," asking the respondent to mark a specific answer, was included to avoid random data input from participants disinterested in providing valid data. Behavioral

intent was measured on a 5 point Likert scale, with the vignette using the standard narrative technique of concluding that the character had committed the violation, and with intent items written to ask for responses in relation to this. After this, the final part asked the subject simple demographic questions, specifically gender, age, and academy rank in the university (e.g. freshman, sophomore, etc.). Participants were then notified that the survey had been completed, were thanked for their assistance, and offered an opportunity to register participation to collect extra credit.

The vignette embedded several binary variables, with the specific context and wording elaborated on in Appendix B. These were:

- Certainty of punishment, rated by determining whether the logs were monitored by hand occasionally (low), or by a dedicated information system constantly scanning network traffic (high).
- Celerity of punishment, rated as either slow (low) or rapid (high) reaction by campus network security officials.
- Severity of punishment, rated in the length of suspension from Internet privileges, varying between a week (low) or a semester (high) of lost Internet access.
- Reward value for violation – either a single textbook obtained (low), or all textbooks needed by the hypothetical student throughout the entire semester (high).

The instrument is described in greater detail in Appendix B. All participant responses were stored in the Qualtrics database. Once all data was gathered, the data was downloaded, the relevant files merged, and then reprocessed for use with SPSS.

## Confirmatory Factor Analysis

As implicit in the name of the technique, Confirmatory Factor Analysis (CFA) is a factor analysis technique that helps to isolate items in an instrument, and to correlate them in such a manner that they match a construct, in order to assist in validation. The present study incorporated CFA to establish two types of validity: convergent and discriminant. The use of CFA for this kind of instrument validation is suggested and endorsed by (Bagozzi, Youjae & Phillips, 1991). Convergent validity asserts that all items intended to represent a particular construct “load,” or are associated with, a particular factor. All items that represent a particular construct load together to form that factor. The result is that they converge on the same factor. If the applicable items on an instrument all load on an intended construct, they are said to have convergent validity and are representative of that construct, indicating that it is likely that the instrument measures what is intended.

Discriminant validity, as opposed to convergent validity, measures a similar, but distinct, concept – the differences between constructs. It is intended to make certain that each factor represents one construct, and *only* one construct. It is also intended to make certain the items load on only one factor, thus making a clean separation. It is, in short, an attempt to demonstrate that the factors are distinctive, consisting of the desired items, and to lend credibility to the analysis, as well as the researchers’ interpretation of the involved constructs and their relationships with one another. Both convergent and divergent validity, while demonstrating two different concepts, are intended with one goal in mind – to show that the instrument is measuring what we want it to measure,

providing credibility for the study in question, as well as further studies that may reuse the instrument. CFA was used on the resulting pilot study data.

### **Validation Concerns**

With most research, there are potential sources of bias or validity that may arise from the experimental design. This study is no different. Here, the ways that concerns over validation are handled are discussed. In particular, problems regarding Common Methods Bias (CMB) are examined.

Also known by other names such as Common Methods Variance (CMV), Common Methods Bias is often a concern in research and stems from flaws in the data gathering method. Examples include acquiescence, where subjects attempt to agree with a statement regardless of content; social desirability, where the subjects attempt to give whatever response they believe to be is most acceptable socially and grouping; and context-induced mood, where the first item induces a mood for response for the remainder of the instrument (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). While a single incident is unlikely to be of significance in a very large data set, and may be unavoidable, many incidents are far more likely to introduce serious problems in the results with many analytical methods.

The best way to solve many problems in many contexts is avoiding having them in the first place. Research is no exception. With this in mind, several a priori measures were taken from the literature to ensure that the instrument was protected against CMB concerns while being developed. An example of a possible CMB issue that may be handled during instrument design is that of the positioning of items, or “item context,” (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) which may bias the data due to the

position in which the item is placed. One example of this is “item priming,” also known as the “halo effect,” wherein a subject may believe the positioning of items relative to one another may imply relationships, impacting results. A simple example of this would be the case where three measures of the same construct would be placed together. The subject might carry meaning, position or causation over between the items, or “clumping,” which might cause response patterns to be established. Additional problems of this variety may result from the similarity of the scenarios at a glance.

Care was taken to defend against these potential faults – first, items representing the same construct were not placed together during the scenario portion of the instrument. Second, a response set check question was inserted into the questionnaire (Rennie, 1982; Warkentin, Johnston & Shropshire, 2011). A response set is the tendency of a subject to respond automatically, regardless of the actual content of the item (Andrich, 1978; Kerlinger, 1973). The check is inserted to make certain that a participant is not simply giving a single response repeatedly. In this case, the respondent was given specific instructions to follow (e.g. “select ‘Disagree’ for this question”), and if he did not follow them, we can assume that the participant was not paying adequate attention. Third, the differences between the scenarios were highlighted by underlining the points where the embedded variables changed the text, drawing attention to these alterations.

Anonymity, so frequently found in surveys, is not just a convention, but a critical tool to prevent Common Methods Bias. (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) advocates the use of this in order to encourage more truthful responses, as subjects who feel that answers may be attached to them are likely to respond in what they deem to be a more socially desirable manner. This is particularly important in studies such as this one,



where the subject is asked about hypothetical wrongdoing, which he may be particularly disinclined to answer in full honesty for concern of potential consequences. It may also help to alleviate concerns participants may have that there may be an ulterior motive to such a survey, such as gathering information on a specific person, leading them to be biased against the survey or the source, which are potential problems by themselves (MacKenzie & Podsakoff, 2012).

Although these and other measures were taken to design the instrument to prevent CMB as much as possible, mathematical tests were also employed to attempt to discern its existence. Given the design of the instrument itself, Harman's Single Factor Test was the most viable option (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) and was executed on the data. The test centers on a factor analysis on the items in a survey to determine the factors that arise; a single factor strongly suggests the presence of CMB.

Additional measures were undertaken to otherwise increase the validity of the instrument. For instance, increasing depersonalization is considered helpful in a factorial survey due to the role-playing element. As such, (Jasso, 2006) suggests that studies involving vignettes allow participants to answer in any order that they choose. As such, an additional level of depersonalization was introduced in the basic survey design, allowing the participant to answer more truthfully as he perceives the character in the scenario would, as opposed to considering the responses to be responses for himself. Subjects were not experiencing the survey in a single, one-way manner as they might a temporal phenomenon, but instead were able to evaluate it from a more personally objective standpoint by removing the personal temporal experience from their participation. Further assistance in this regard was provided by the name of the scenario

character, “Pat,” which does not, by itself, denote a specific gender, and was supported with careful wording and gender-neutral pronouns.

Perhaps the most elaborate activity used to assist in instrument validation was the use of expert panels in an iterative process described earlier in this chapter. Several goals were accomplished by this – making certain multiple perspectives were considered, searching for nuances the authors might miss, having multiple readers compare their interpretations and suggest clarification, and making certain that items were sufficiently distinct, yet still corresponding to their appropriate constructs. The additional security of these measures is helpful in research to let scholars be certain that the data that they believe they are obtaining is in fact what they are obtaining, and that the questions they intend to ask are in fact what they are asking.

### **Conclusion**

This chapter has examined the ways in which the study was conducted from a practical standpoint. Data was collected via factorial survey method, with the pilot test examining for validity via factor analysis. Literature recommendations from Churchill (1979) were used in instrument development, including oversight from iterations of expert panel review. The main data analysis was conducted using ordinary least squares regression. Common Methods Bias will be avoided via design of the instrument combined with use of Harman’s Single Factor Test.

In the next chapter, the findings are discussed in detail, along with interpretation and some implications. These are, in turn, discussed in greater detail in chapter 5.

## CHAPTER IV

### ANALYSIS

#### **Introduction**

This chapter is dedicated to the presentation and analysis of the results of the study. It begins with an examination of the results of the pilot test, which was examined for validity with confirmatory factor analysis (CFA). A reliability analysis was then run to determine the Cronbach alpha of the scales used. The main study then obtained data, analyzed primarily using ordinary least squares (OLS) regression. Results from Harman's Single Factor Test are then presented, as is a chi-squared test to assess the possibility of order effects on the data. Finally, the results are interpreted and analyzed, and applicable results regarding the hypotheses in question are rendered.

#### **Pilot Test**

This section examines the demographics, context, characteristics and results of the pilot test. The pilot test was conducted primarily to test the instrument itself. It was also to allow convergent and discriminant validity to be established.

#### **Sample Characteristics**

The raw sample of participants was 88. Of these, 53 (60.2%) were male, 29 (33.0%) were female, and 6 (6.8%) declined to state. Class participation has 0 (0.0%) Freshmen, 5 (5.7%) Sophomores, 21 (23.9%) Juniors, 44 (50%) Seniors, 9 (10.2%)

graduate students, 3 (3.4%) non-classified students, and 6 (6.8%) who declined to state their class. 40 (45.5%) were between the ages of 18 and 21, 31 (35.2%) were between the ages of 22 and 25, 8 (9.1%) were between the ages of 26 and 45, 3 (3.4%) were at or above the age of 46, and 6 (6.8%) declined to state their age. In total, there were 339 scenarios in the data. Unfiltered demographics information is summarized in Table 4.1.

The data were filtered to remove all individuals with missing CFC or demographic information, or who failed a response set check. Individual scenarios were filtered out where a manipulation check was missed, an item was not completed, or when the realism test was failed by the participant (McBride, Carter & Warkentin, 2012). This left 62 total participants giving one or more valid data points. Of these, 23 (37.1%) were male, and 39 (62.9%) were female. 0 (0.0%) were Freshmen, 3 (4.8%) were Sophomores, 19 (30.6%) were Juniors, 28 (45.2%) were Seniors, 9 (14.5%) were graduate students, and 3 (4.8%) were unclassified. 31 (50%) were between the ages of 18 and 21, 22 (35.5%) were between the ages of 22 and 25, 7 (11.3%) were between the ages of 26 and 45, and 2 (3.2%) were at or above the age of 46. Filtered demographics information is summarized in Table 4.2.

Table 4.1 Pilot Test Demographics (Unfiltered)

|        |                  | N  | %    |
|--------|------------------|----|------|
| Class  | Freshmen         | 0  | 0    |
|        | Sophomores       | 5  | 5.7  |
|        | Juniors          | 21 | 23.9 |
|        | Seniors          | 44 | 50   |
|        | Graduates        | 9  | 10.2 |
|        | Other            | 3  | 3.4  |
|        | Decline to State | 6  | 6.8  |
| Age    | 18-21            | 40 | 45.5 |
|        | 22-25            | 31 | 35.2 |
|        | 26-45            | 8  | 9.1  |
|        | 46 and up        | 3  | 3.4  |
|        | Decline to State | 6  | 6.8  |
| Gender | Male             | 53 | 60.2 |
|        | Female           | 29 | 33.0 |
|        | Decline to State | 6  | 6.8  |
| Total  | Participants     |    | 88   |
|        | Data Points      |    | 339  |

Table 4.2 Pilot Test Demographics (After Filtering)

|        |                  | N  | %    |
|--------|------------------|----|------|
| Class  |                  |    |      |
|        | Freshmen         | 0  | 0    |
|        | Sophomores       | 3  | 4.8  |
|        | Juniors          | 19 | 30.6 |
|        | Seniors          | 28 | 45.2 |
|        | Graduates        | 9  | 14.5 |
|        | Other            | 3  | 4.8  |
|        | Decline to State | 0  | 0    |
| Age    |                  |    |      |
|        | 18-21            | 31 | 50   |
|        | 22-25            | 22 | 35.5 |
|        | 26-45            | 7  | 11.3 |
|        | 46 and up        | 2  | 3.2  |
|        | Decline to State | 0  | 0    |
| Gender |                  |    |      |
|        | Male             | 23 | 37.1 |
|        | Female           | 39 | 62.9 |
|        | Decline to State | 0  | 0    |
| Total  |                  |    |      |
|        | Participants     |    | 62   |
|        | Data Points      |    | 204  |

### Validity Testing

Use of factor analysis to confirm convergent and divergent validity is a technique advocated by (Churchill, 1979). It is intended to examine whether the items successfully converge on one another to form specific dimensions, and groups of items diverge sufficiently such that they measure separate dimensions. Factor Analysis (FA) was used in this study to determine whether the embedded variables represented the corresponding constructs according to the perception of the respondent. As such, twelve items were added - three for each embedded variable - which each asked for the respondent's perception of the "high" or "low" condition on a five-point Likert scale.

Figure 4.1 shows the scree plot, which strongly suggests the existence of five factors, as would be expected. Correspondingly, Table 4.3, the rotated factor matrix, shows the loadings of each item. These loadings indicate very strong convergent and divergent validity within and between items, appropriately representing the desired constructs. This title includes behavioral intent as its own construct, which is also measured in three items for every scenario. A separate set of calculations, Principle Components Analysis (PCA), was also run, showing similar results. N = 204 data points was considered acceptable for factor analysis by Gorsuch (1983) and Kline (1979), advocating 100 minimum, and Guilford (1954), advocating 200 minimum.

Table 4.3 Rotated factor matrix – pilot study validation testing

|            | Factor |       |       |       |       |
|------------|--------|-------|-------|-------|-------|
|            | 1      | 2     | 3     | 4     | 5     |
| BI1        | .936   | -.147 | -.151 | .161  | .003  |
| BI2        | .938   | -.135 | -.182 | .170  | -.007 |
| BI3        | .934   | -.107 | -.107 | .175  | -.010 |
| Certainty1 | -.161  | .078  | .713  | .015  | .294  |
| Certainty2 | -.180  | .075  | .806  | -.078 | .308  |
| Certainty3 | .102   | .121  | .947  | -.055 | .131  |
| Severity1  | -.096  | .866  | .072  | .037  | .032  |
| Severity2  | -.131  | .909  | .132  | -.056 | .033  |
| Severity3  | -.118  | .954  | .049  | .052  | .098  |
| Celerity1  | .002   | .029  | .168  | -.047 | .788  |
| Celerity2  | -.007  | .071  | .194  | -.018 | .836  |
| Celerity3  | .005   | .043  | .198  | .095  | .704  |
| Reward1    | .057   | .013  | -.029 | .869  | -.038 |
| Reward2    | .239   | .015  | -.009 | .757  | .056  |
| Reward3    | .140   | .005  | -.056 | .850  | .014  |

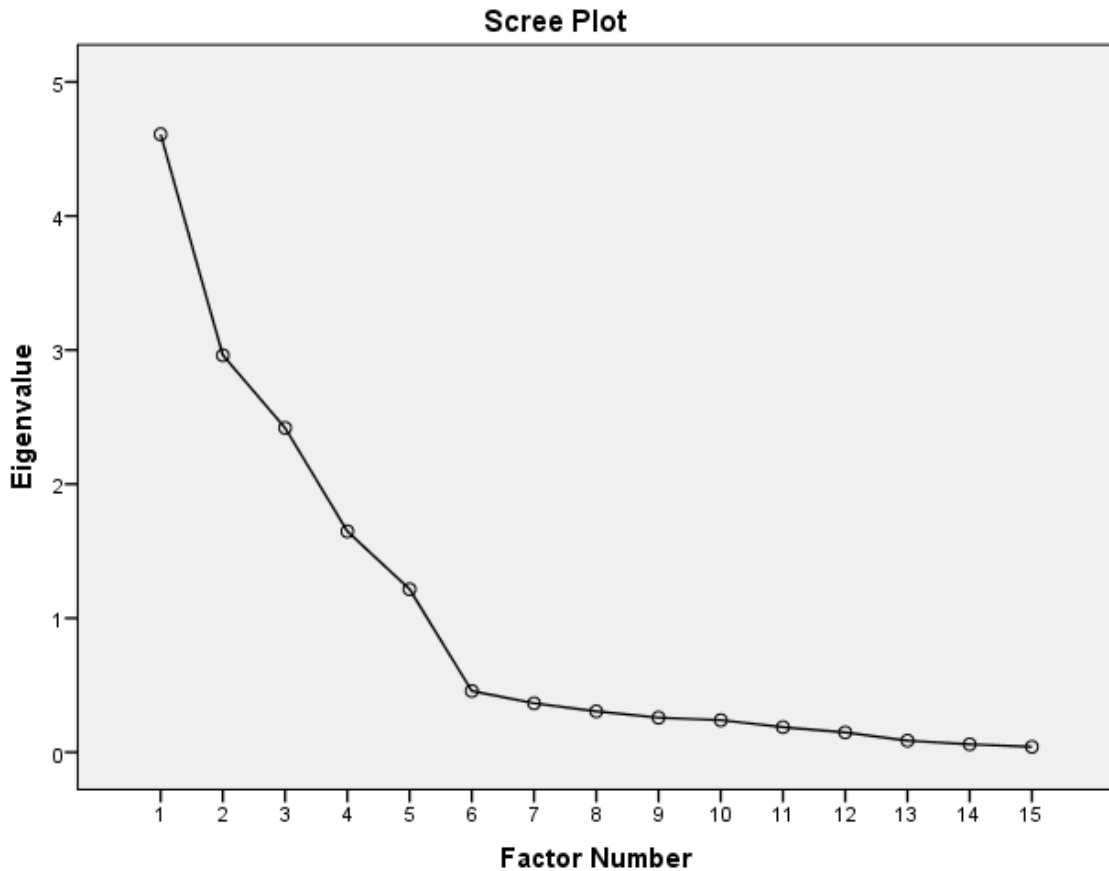


Figure 4.1 Validation testing scree plot

### Main Study

This section examines the results of the main study. First, the sample characteristics are described in detail in order to provide a better context for the analysis. Following this, the analytical procedure is examined in detail, and analytical results are presented.

### Sample Characteristics

Raw data captured from the survey across all runs yielded 681 total participants, yielding 2,724 points of data. Of the initial 681 participants, 342 (50.2%) were male, 298



(43.8%) were female, and 41 (6%) declined to specify a gender. 482 (70.8%) were between the ages of 18 and 21, 134 (19.7%) were between the ages of 22 and 25, 22 (3.2%) were between the ages of 26 and 45, 3 (0.4%) were age 46 and above, and 40 (5.9%) declined to specify their age. For class level, 137 (20.1%) were Freshmen, 121 (17.8%) were Sophomores, 201 (29.5%) were Juniors, 150 (22.0%) were Seniors, 33 (4.8%) were graduate students, and 1 (0.1%) was not traditionally classified, with 38 (5.6%) providing no class ranking. Table 4.4 provides a summary of the raw, unfiltered demographics.

All individuals who failed a response set item, omitted one or more items on the Consideration of Future Consequences instrument, or omitted one or more demographic items were removed, which voided all four data points they provided (one data point for each scenario they read). All vignette responses that failed a manipulation check or omitted one or more items were then removed. This resulted in 446 individuals who provided data that passed through filtration to the next stage of processing, outlier analysis.

Outlier analysis was executed by calculating the Mahalanobis distance for each combination of respondent-level data (CFC, demographics) and corresponding vignette-response data. This distance was compared to a chi-square figure ( $\chi^2 = 63.570$ ), with any distance above the critical value indicating an outlier. Out of these, ten responses by three participants were removed. These respondents comprised the entire age group of 46+ individuals, as well as the sole non-traditionally classified student, and as such eliminated these two demographic groups from the data set entirely. The total number of usable data points was 1,540, from 443 respondents. Of these, 240 (54.2%) were male,

and 203 (45.8%) were female. In terms of age, 332 (74.9%) were between the ages of 18 and 21, 94 (21.2%) were between the ages of 22 and 25, 17 (3.8%) were between the ages of 26 and 45, and outlier analysis removed all members of the age group of 46 years and older. Respondent class levels were 100 (22.6%) Freshmen, 84 (19.0%) Sophomores, 127 (28.7%) Juniors, 108 (24.4%) Seniors, and 24 (5.4%) graduate students, with outlier analysis removing all students considered non-classified. Table 4.5 provides a summary of the filtered study demographics. Table 4.6 provides descriptive statistics for the filtered study data. Note that BI and CFC are compiled from all items used to measure their respective construct; these figures also reflect changes made due to instrument reliability analysis, which is discussed in the next section.

Table 4.4 Main Study – Unfiltered Demographics

|        |                  | N   | %    |
|--------|------------------|-----|------|
| Class  |                  |     |      |
|        | Freshmen         | 137 | 20.1 |
|        | Sophomores       | 121 | 17.8 |
|        | Juniors          | 201 | 29.5 |
|        | Seniors          | 150 | 22.0 |
|        | Graduates        | 33  | 4.8  |
|        | Other            | 1   | 0.1  |
|        | Decline to State | 38  | 5.6  |
| Age    |                  |     |      |
|        | 18-21            | 482 | 70.8 |
|        | 22-25            | 134 | 19.7 |
|        | 26-45            | 22  | 3.2  |
|        | 46 and up        | 3   | 0.4  |
|        | Decline to State | 40  | 5.9  |
| Gender |                  |     |      |
|        | Male             | 342 | 50.2 |
|        | Female           | 298 | 43.8 |
|        | Decline to State | 41  | 6    |
| Total  |                  |     |      |
|        | Participants     |     | 681  |
|        | Data Points      |     | 2724 |

Table 4.5 Main Study – Filtered Demographics

|        |                  | N   | %    |
|--------|------------------|-----|------|
| Class  |                  |     |      |
|        | Freshmen         | 100 | 22.6 |
|        | Sophomores       | 84  | 19.0 |
|        | Juniors          | 127 | 28.7 |
|        | Seniors          | 108 | 24.4 |
|        | Graduates        | 24  | 5.4  |
|        | Other            | 0   | 0    |
|        | Decline to State | 0   | 0    |
| Age    |                  |     |      |
|        | 18-21            | 332 | 74.9 |
|        | 22-25            | 94  | 21.2 |
|        | 26-45            | 17  | 3.8  |
|        | 46 and up        | 0   | 0    |
|        | Decline to State | 0   | 0    |
| Gender |                  |     |      |
|        | Male             | 203 | 45.8 |
|        | Female           | 240 | 54.2 |
|        | Decline to State | 0   | 0    |
| Total  |                  |     |      |
|        | Participants     |     | 443  |
|        | Data Points      |     | 1540 |

Table 4.6 Descriptive statistics for filtered main study data.

|       | N    | Min  | Max  | Mean   | Std. Deviation | Skewness  |            | Kurtosis  |            |
|-------|------|------|------|--------|----------------|-----------|------------|-----------|------------|
|       |      |      |      |        |                | Statistic | Std. Error | Statistic | Std. Error |
| CFC1  | 1540 | 1    | 5    | 4.07   | .744           | -.658     | .062       | .696      | .125       |
| CFC2  | 1540 | 1    | 5    | 3.55   | .909           | -.562     | .062       | .214      | .125       |
| CFC3  | 1540 | 1    | 5    | 3.74   | .839           | -.581     | .062       | .354      | .125       |
| CFC4  | 1540 | 1    | 5    | 3.51   | .864           | -.335     | .062       | -.187     | .125       |
| CFC5  | 1540 | 1    | 5    | 3.02   | .900           | .103      | .062       | -.335     | .125       |
| CFC6  | 1540 | 1    | 5    | 3.54   | .965           | -.494     | .062       | -.153     | .125       |
| CFC7  | 1540 | 1    | 5    | 3.99   | .798           | -.740     | .062       | .590      | .125       |
| CFC8  | 1540 | 1    | 5    | 3.29   | .792           | -.068     | .062       | .006      | .125       |
| CFC9  | 1540 | 1    | 5    | 4.00   | .777           | -.773     | .062       | 1.039     | .125       |
| CFC10 | 1540 | 1    | 5    | 4.00   | .763           | -.679     | .062       | .690      | .125       |
| CFC11 | 1540 | 1    | 5    | 3.68   | .770           | -.550     | .062       | .383      | .125       |
| CFC12 | 1540 | 1    | 5    | 2.83   | .871           | .337      | .062       | -.201     | .125       |
| BI1   | 1540 | 1    | 5    | 2.04   | 1.100          | .919      | .062       | -.083     | .125       |
| BI2   | 1540 | 1    | 5    | 2.08   | 1.094          | .867      | .062       | -.133     | .125       |
| BI3   | 1540 | 1    | 5    | 2.08   | 1.089          | .833      | .062       | -.228     | .125       |
| CFC   | 1540 | 1.90 | 5.00 | 3.7359 | .48872         | -.260     | .062       | .651      | .125       |
| BI    | 1540 | 1.00 | 5.00 | 2.0652 | 1.06967        | .880      | .062       | -.127     | .125       |

### Instrument Reliability

Two parts of the instrument – the adapted Consideration of Future Consequences portion, and the behavioral intention items for the vignettes – were scales and required analysis to determine their reliability. These were subject to standard reliability analysis to determine their Cronbach alpha (Cronbach, 1951). According to standards, a Cronbach alpha of .7 or above is acceptable, with a higher score indicative of greater reliability, and particularly desirable results in the range of .9 or greater (Peterson, 1994; Nunnally, 1978). Table 4.7 illustrates the results of these analyses.

Table 4.7 Initial Reliability Analysis for Consideration of Future Consequences

| Cronbach's Alpha |                            |                                | N of Items                       |                                  |
|------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| .774             |                            |                                | 12                               |                                  |
| Item             | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| CFC1             | 39.19                      | 24.655                         | .493                             | .751                             |
| CFC2             | 39.69                      | 24.206                         | .428                             | .756                             |
| CFC3             | 39.51                      | 23.988                         | .510                             | .747                             |
| CFC4             | 39.74                      | 23.457                         | .557                             | .742                             |
| CFC5             | 40.22                      | 25.999                         | .223                             | .780                             |
| CFC6             | 39.70                      | 23.910                         | .424                             | .757                             |
| CFC7             | 39.26                      | 24.808                         | .437                             | .756                             |
| CFC8             | 39.95                      | 25.233                         | .378                             | .762                             |
| CFC9             | 39.25                      | 24.940                         | .433                             | .756                             |
| CFC10            | 39.25                      | 24.581                         | .498                             | .750                             |
| CFC11            | 39.56                      | 24.970                         | .439                             | .756                             |
| CFC12            | 40.39                      | 26.519                         | .180                             | .783                             |

The Cronbach's Alpha for the entire range of CFC items is .774. This is considered to be within the previously mentioned reliability parameters. However, further optimization is possible. Calculations indicated that the removal of items 5 and 12 would increase the Cronbach Alpha, and as such, a second analysis was done with these items removed. These calculations are summarized in Table 4.8.

Table 4.8 Revised Reliability Analysis for Consideration of Future Consequences

| Cronbach's Alpha |                            |                                | N of Items                       |                                  |
|------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| .793             |                            |                                | 10                               |                                  |
| Item             | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| CFC1             | 33.30                      | 19.755                         | .521                             | .769                             |
| CFC2             | 33.81                      | 19.514                         | .426                             | .780                             |
| CFC3             | 33.62                      | 19.122                         | .541                             | .766                             |
| CFC4             | 33.85                      | 18.736                         | .573                             | .761                             |
| CFC6             | 33.82                      | 19.423                         | .400                             | .785                             |
| CFC7             | 33.38                      | 19.919                         | .459                             | .776                             |
| CFC8             | 34.07                      | 20.629                         | .350                             | .788                             |
| CFC9             | 33.37                      | 19.949                         | .469                             | .775                             |
| CFC10            | 33.37                      | 19.852                         | .500                             | .771                             |
| CFC11            | 33.68                      | 20.258                         | .431                             | .779                             |

At this point, the adapted CFC is nearly at the .8 mark. This indicates reliability that is considerably above .70, and that it is well within the acceptable range (Peterson, 1994; Nunnally, 1978).

Behavioral Intent, the other scale requiring reliability analysis, was also examined. Table 4.9 summarizes the results of this analysis. Cronbach's Alpha was extremely high, indicating high reliability (Peterson, 1994; Nunnally, 1978). As such, these items were used in their entirety with no changes.

Table 4.9 Behavioral Intent Reliability Analysis

| Cronbach's Alpha |                            |                                | N of Items                       |                                  |
|------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| .976             |                            |                                | 3                                |                                  |
| Item             | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| BI1              | 4.16                       | 4.627                          | .942                             | .970                             |
| BI2              | 4.12                       | 4.592                          | .961                             | .956                             |
| BI3              | 4.12                       | 4.673                          | .943                             | .969                             |

### Order Effects

The nature of the factorial survey makes it possible that order effects will manifest (Jasso, 2006). Order effects are biases or abnormalities in the data that come from the order in which items and instrument parts are presented and completed. In this particular case, they would most likely come from the order in which the scenarios were presented. For instance, someone may be paying more attention to the first scenario than he would the fourth scenario that he was presented. Conversely, if a participant felt there was ambiguity in the questions asked, he might understand the instructions and prompt better after taking it multiple times, thus leading to more accurate data in scenarios presented later.

Although it is possible to minimize order effects by randomizing the order in which vignettes are presented (Jasso, 2006), testing may reveal valuable information on the data set. The present study relies on a chi-square test focusing on the accuracy of the response set to search for evidence of an order effect. As the survey progresses and survey fatigue and subject disinterest increases, it is likely that an order effect would result in an increase in response set check failures in scenarios presented later in the survey process than those presented early in the survey process. Table 4.10 illustrates a



cross-tabulation of these failures as compared to the order that each applicable scenario was administered. A graphical examination of the percentage passing or failing is illustrated in Figure 4.2. A chi-squared test on these results is provided in Table 4.11.

Table 4.10 Order effect cross-tabulation

|             |   | Order |     |     |     | Total |
|-------------|---|-------|-----|-----|-----|-------|
|             |   | 1     | 2   | 3   | 4   |       |
| PassRSCheck | 0 | 137   | 126 | 116 | 130 | 509   |
|             | 1 | 544   | 555 | 565 | 551 | 2215  |
| Total       |   | 681   | 681 | 681 | 681 | 2724  |

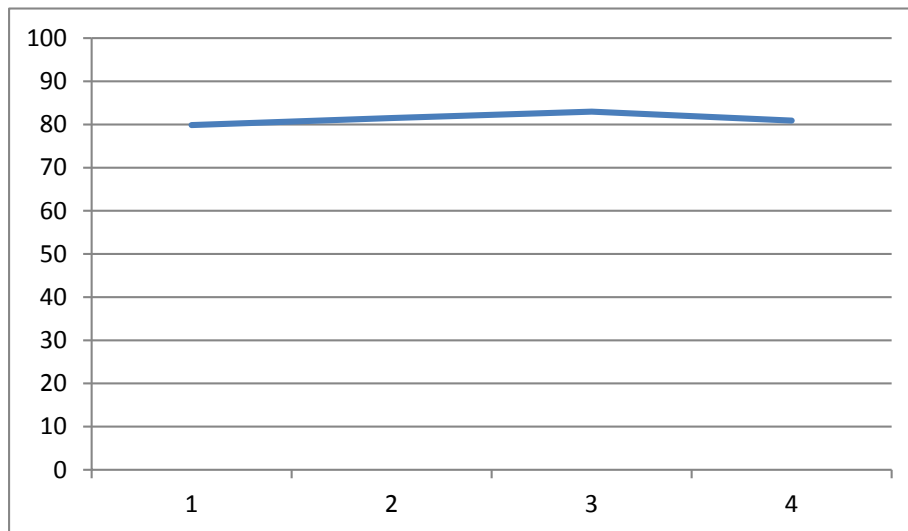


Figure 4.2 Percentage of participants passing order effect check, as compared to the order vignettes were administered in.

Table 4.11 Chi-Square test on response set check order

|                    | Value | df | Asymp. Sig. (2-sided) |
|--------------------|-------|----|-----------------------|
| Pearson Chi-Square | 2.23  | 3  | .526                  |
| N of Valid Cases   | 2724  |    |                       |

The chi-square test indicates a significance of .526. As such, it is well above any value normally considered reasonable for alpha. Thus, no evidence has been found indicating the presence of an order effect.

### **Harman's Single Factor Test**

In chapter 3, we outlined the considerable work done to proactively prevent Common Methods Bias (CMB) from affecting the study. Activities such as extensive panel testing and pilot testing were employed as rigorous, preventative measures, resulting in a data set that is well-protected against these effects. However, additional rigor was considered useful, and an empirical test can add this for additional insurance to determine if the data set is affected. Harman's Single Factor Test (Podsakoff, MacKenzie, Lee & Podsakoff, 2003), discussed earlier, was determined to be the most viable statistical test for evidence of CMB for this data set. The procedure consists of entering all variables in the survey in an unrotated factor analysis. Evidence for CMB is indicated by the presence of a single factor that explains the majority of variance.

The results of the factor analysis are in Table 4.12. The factor analysis was performed to extract only a single factor. This resulting factor explains 19.967% of the variance. This is well below the 50% threshold necessary to consider the test as evidence for CMB. As such, by the Harman test, there is no evidence that it is present in this data set.

Table 4.12 Factor Analysis – Harman’s Single Factor Test

| Factor | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|--------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
|        | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1      | 3.699               | 24.660        | 24.660       | 2.995                               | 19.967        | 19.967       |
| 2      | 1.686               | 11.240        | 35.901       |                                     |               |              |
| 3      | 1.279               | 8.528         | 44.429       |                                     |               |              |
| 4      | 1.138               | 7.586         | 52.015       |                                     |               |              |
| 5      | 1.000               | 6.665         | 58.680       |                                     |               |              |
| 6      | .942                | 6.278         | 64.958       |                                     |               |              |
| 7      | .833                | 5.552         | 70.509       |                                     |               |              |
| 8      | .766                | 5.107         | 75.617       |                                     |               |              |
| 9      | .666                | 4.440         | 80.056       |                                     |               |              |
| 10     | .627                | 4.179         | 84.236       |                                     |               |              |
| 11     | .587                | 3.910         | 88.146       |                                     |               |              |
| 12     | .525                | 3.498         | 91.644       |                                     |               |              |
| 13     | .482                | 3.211         | 94.854       |                                     |               |              |
| 14     | .407                | 2.716         | 97.571       |                                     |               |              |
| 15     | .364                | 2.429         | 100.000      |                                     |               |              |

### Ordinary Least Squares Regression Analysis

Ordinary Least Squares (OLS) regression lies at the heart of the main analysis. This method is frequently used for factorial survey analysis (Jasso, 2006). To compare the effect of the control variables to the theoretical model, the variables were entered into the model in two blocks. Model 1 uses age, class level, and gender, to analyze their effect on behavioral intent. Model 2 introduces the theoretical variables – certainty, severity, celerity and reward – as well as a moderation effect on all four variables by Consideration of Future Consequences.

Moderation effects were represented mathematically by multiplying centered versions of the relevant variables (Baron & Kenny, 1986; Tabachnick & Fidell, 2007).

Ordinal variables were transformed into dummy binary variables. The class level of Freshman was assumed as the default. The 18-21 years of age bracket was assumed the default for the age of the subject. Default gender was assumed to be female. Colinearity was measured in terms of the standard VIF calculation, with all variables being within generally accepted parameters (Mason & Perreault, 1991). Behavioral intent was the dependent variable, with higher values associated with higher intent to violate security policy as per the scenario.

The basic model summary is given in Table 4.13. The  $R^2$  of the first model, which contained only control variables, was .041. The second variable, which introduced moderation effects of CFC, as well as the embedded variables of certainty, severity, and celerity of punishment, and reward for violation, resulted in a higher  $R^2$  of .100, accounting for approximately 10% of the variance in the model.

Table 4.13 OLS model summary and  $R^2$  of hypothetical model

| Model | R    | R <sup>2</sup> | Adjusted R <sup>2</sup> | Std. Error of the Estimate |
|-------|------|----------------|-------------------------|----------------------------|
| 1     | .202 | .041           | .037                    | 1.049953                   |
| 2     | .317 | .100           | .092                    | 1.019497                   |

Table 4.14 OLS hypothetical model coefficient and variable summary

| Model |              | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Colinearity Statistics |       |
|-------|--------------|-----------------------------|------------|---------------------------|--------|-------|------------------------|-------|
|       |              | B                           | Std. Error | Beta                      |        |       | Tolerance              | VIF   |
| 1     | (Constant)   | 1.818                       | .062       |                           | 29.377 | <.001 |                        |       |
|       | Yrs_22_to_25 | .206                        | .086       | .080                      | 2.393  | .017  | .561                   | 1.783 |
|       | Yrs_25_to_46 | -.312                       | .150       | -.056                     | -2.084 | .037  | .854                   | 1.171 |
|       | IsSophomore  | .001                        | .084       | .000                      | .015   | .988  | .656                   | 1.524 |
|       | IsJunior     | .187                        | .077       | .079                      | 2.431  | .015  | .597                   | 1.676 |
|       | IsSenior     | .259                        | .093       | .104                      | 2.794  | .005  | .450                   | 2.223 |
|       | IsGraduate   | -.045                       | .149       | -.010                     | -.303  | .762  | .590                   | 1.696 |
|       | IsMale       | .219                        | .055       | .102                      | 4.019  | <.001 | .968                   | 1.033 |
| 2     | (Constant)   | 2.140                       | .079       |                           | 27.019 | <.001 |                        |       |
|       | Yrs_22_to_25 | .221                        | .084       | .085                      | 2.629  | .009  | .558                   | 1.791 |
|       | Yrs_25_to_46 | -.330                       | .145       | -.060                     | -2.268 | .023  | .853                   | 1.172 |
|       | IsSophomore  | -.019                       | .081       | -.007                     | -.231  | .817  | .655                   | 1.528 |
|       | IsJunior     | .170                        | .075       | .072                      | 2.272  | .023  | .595                   | 1.681 |
|       | IsSenior     | .244                        | .090       | .098                      | 2.707  | .007  | .448                   | 2.233 |
|       | IsGraduate   | -.048                       | .145       | -.010                     | -.329  | .742  | .589                   | 1.699 |
|       | IsMale       | .221                        | .053       | .103                      | 4.163  | <.001 | .967                   | 1.035 |
|       | reward       | .149                        | .052       | .070                      | 2.856  | .004  | .993                   | 1.007 |
|       | certainty    | -.204                       | .052       | -.095                     | -3.913 | <.001 | .995                   | 1.005 |
|       | severity     | -.409                       | .052       | -.191                     | -7.835 | <.001 | .991                   | 1.009 |
|       | celerity     | -.167                       | .052       | -.078                     | -3.199 | .001  | .996                   | 1.004 |
|       | rewardCFC    | .180                        | .107       | .041                      | 1.683  | .093  | .990                   | 1.010 |
|       | certaintyCFC | .074                        | .107       | .017                      | .690   | .491  | .992                   | 1.008 |
|       | severityCFC  | .096                        | .107       | .022                      | .899   | .369  | .990                   | 1.010 |
|       | celerityCFC  | .061                        | .107       | .014                      | .575   | .566  | .995                   | 1.005 |

Table 4.14 illustrates a summary of the individual variables in the model. The significance, or p-value, was used to determine the statistical significance of each variable. In the initial, control-only model, at .001 level of significance, IsMale (whether the subject is male or not) was found to be statistically significant in whether or not the subject had a behavioral intent to violate policy. At the .05 level of significance,

IsJunior, IsSenior, and both age brackets had a significant relationship with the intent to violate policy. IsSophomore and IsGraduate were both statistically insignificant, indicating no significant linkage between the individual being a sophomore or graduate student and whether the intent to violate policy is present as compared to Freshmen.

The second model introduced the experimental variables and moderation effects. Certainty of punishment and severity of punishment were found to be statistically significant at the .001 level. At the .01 level of significance, the celerity of punishment and the reward for violation of offense were found to be statistically significant. The moderating interaction between CFC and certainty, severity and celerity of punishment was found to be statistically insignificant for any reasonable level of significance. Although the interaction between reward and CFC was found to be weakly statistically significant at the 0.1 level, the slope was positive whereas a negative slope was expected. As such, no hypotheses in the study regarding moderation effects were found to be supported, although the hypotheses regarding direct effects from reward on behavioral intent, and on the traditional GDT variables on behavioral intent, found sufficient support to reject the null hypothesis. The summary of the hypotheses and their respective findings is found in Table 4.15 . Figure 4.3 illustrates the findings for the hypothetical model.

Figure 4.3 Post-Analysis Findings in Hypothetical Model

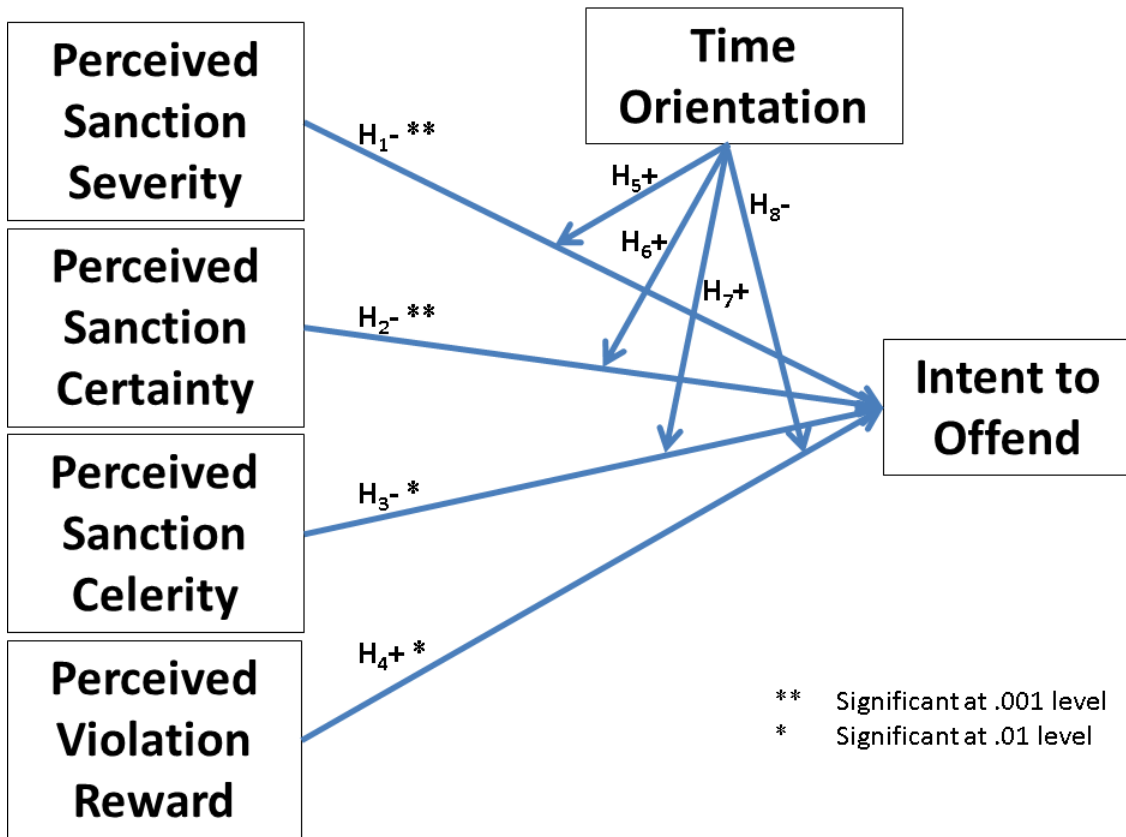


Table 4.15 Summary of study hypotheses and results

| # | Hypothesis                                                                                                              | $\alpha = .001$ | $\alpha = .01$ |
|---|-------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|
| 1 | Perceived sanction severity is negatively associated with intent to offend.                                             | Supported       | Supported      |
| 2 | Perceived sanction certainty is negatively associated with intent to offend.                                            | Supported       | Supported      |
| 3 | Perceived sanction celerity is negatively associated with intent to offend.                                             | Not supported   | Supported      |
| 4 | Perceived reward for violation of policy is positively associated with behavioral intent to violate.                    | Not supported   | Supported      |
| 5 | Future time orientation positively moderates the association between perceived sanction severity and intent to offend.  | Not supported   | Not supported  |
| 6 | Future time orientation positively moderates the association between perceived sanction certainty and intent to offend. | Not supported   | Not supported  |
| 7 | Future time orientation positively moderates the association between perceived sanction celerity and intent to offend.  | Not supported   | Not supported  |
| 8 | Future time orientation negatively moderates the relationship between violation reward and the intent to offend.        | Not supported   | Not supported  |

A number of alternative analytical strategies within the bounds of OLS were attempted, such as the use of natural logarithms and exponentiation of variables. Further attempts to use multiple dimensions as per the suggestions of (Petrocelli, 2001) were also explored. However, none produced any significant improvements of note, and as such this remains the final version of the main study analysis.



### **Post-Hoc Analysis – Consideration of Future Consequences**

There was no evidence found in the data set to support the relationships between time orientation and general deterrence theory postulated in hypotheses H<sub>5</sub>-H<sub>8</sub>. However, a moderating effect on the link between BI and the traditional variables is not the only way that time orientation and GDT may interact. A fairly straightforward way is by direct effect, calculating a correlating effect between CFC and behavioral intent.

Future time orientation has been found to have a direct effect on certain contexts involving decision-making, such as academic success early in the career of a university student (Horstmanshof & Zimitat, 2007), health-related behaviors (Crockett, Weinman, Hankins & Marteau, 2009), drug use (Petry, Bickel & Arnett, 2002), and compulsive buying tendencies (Joireman, Kees & Sprott, 2010). It has also been found to be positively correlated with safer practices for sexual intercourse (Burns & Dillon, 2005), negatively correlated with risk attitude (van der Pol, 2010), and associated with certain potentially risky recreational preferences (Shores & Scott, 2007). While only a few of these examples are highly related to policy or criminal violation, they nevertheless show the variety of contexts in which time orientation and behavioral intent, or variables related to behavioral intent, may be linked. Drug use and risk-taking are of particular note in this case, due to both the illegal and self-destructive results of drug use and the links between risk-taking and tendency to offend. Furthermore, temporal discounting, which is a phenomenon closely related to time orientation, is correlated with serious offenses (Wilson & Daly, 1997).

With this possible alternate interpretation in mind, it was deemed possible that time orientation, and by extension its representation in this study, Consideration of Future

Consequences, may have a direct effect on behavioral intent, if it does not have a moderating effect. In this light, a post-hoc hypothesis is posited:

H<sub>p</sub>: Future time orientation is negatively correlated with behavioral intent to offend, such that an individual with high future time orientation is less inclined to commit an offense of security policy.

The post-hoc analytical model is illustrated in Figure 4.4. A regression analysis was conducted without moderation terms and instead examining a possible direct link between behavioral intent and Consideration of Future Consequences. The model is summarized in Table 4.16, with a breakdown of variable coefficients and p-values in Table 4.17. Again, the model was examined in two blocks – first with the control variables, and second with the experimental variables added.

Figure 4.4 Post-hoc analytical model

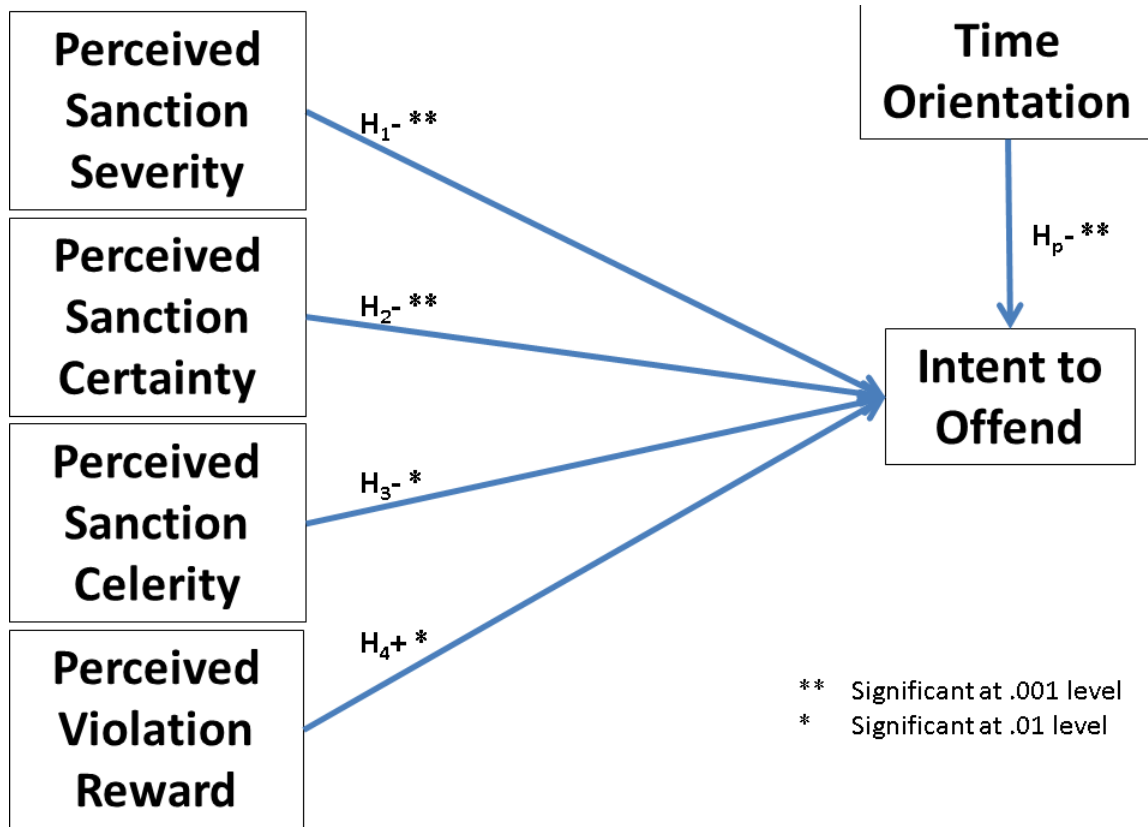


Table 4.16 OLS model summary and R<sup>2</sup> of post-hoc model

| Model | R     | R2   | Adjusted R2 | Std. Error of the Estimate |
|-------|-------|------|-------------|----------------------------|
| 1     | 0.202 | .041 | .037        | 1.049953                   |
| 2     | 0.334 | .112 | .105        | 1.012042                   |

Table 4.17 OLS post-hoc model with CFC coefficient and variable summary

| Model |              | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |       |
|-------|--------------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|-------|
|       |              | B                           | Std. Error | Beta                      |        |       | Tolerance               | VIF   |
| 1     | (Constant)   | 1.818                       | .062       |                           | 29.377 | <.001 |                         |       |
|       | Yrs_22_to_25 | .206                        | .086       | .080                      | 2.393  | .017  | .561                    | 1.783 |
|       | Yrs_25_to_46 | -.312                       | .150       | -.056                     | -2.084 | .037  | .854                    | 1.171 |
|       | IsSophomore  | .001                        | .084       | .000                      | .015   | .988  | .656                    | 1.524 |
|       | IsJunior     | .187                        | .077       | .079                      | 2.431  | .015  | .597                    | 1.676 |
|       | IsSenior     | .259                        | .093       | .104                      | 2.794  | .005  | .450                    | 2.223 |
|       | IsGraduate   | -.045                       | .149       | -.010                     | -.303  | .762  | .590                    | 1.696 |
|       | IsMale       | .219                        | .055       | .102                      | 4.019  | <.001 | .968                    | 1.033 |
| 2     | (Constant)   | 3.110                       | .214       |                           | 14.533 | <.001 |                         |       |
|       | Yrs_22_to_25 | .224                        | .083       | .087                      | 2.696  | .007  | .559                    | 1.788 |
|       | Yrs_26_to_45 | -.299                       | .144       | -.054                     | -2.074 | .038  | .852                    | 1.174 |
|       | IsSophomore  | -.011                       | .081       | -.004                     | -.138  | .891  | .655                    | 1.527 |
|       | IsJunior     | .156                        | .074       | .066                      | 2.109  | .035  | .594                    | 1.682 |
|       | IsSenior     | .239                        | .089       | .096                      | 2.676  | .008  | .448                    | 2.232 |
|       | IsGraduate   | -.033                       | .144       | -.007                     | -.227  | .820  | .589                    | 1.698 |
|       | IsMale       | .223                        | .053       | .104                      | 4.237  | <.001 | .967                    | 1.034 |
|       | reward       | .140                        | .052       | .065                      | 2.701  | .007  | .993                    | 1.007 |
|       | certainty    | -.200                       | .052       | -.094                     | -3.882 | <.001 | .997                    | 1.003 |
|       | severity     | -.404                       | .052       | -.189                     | -7.803 | <.001 | .991                    | 1.009 |
|       | celerity     | -.173                       | .052       | -.081                     | -3.345 | .001  | .996                    | 1.005 |
|       | CFC          | -.259                       | .053       | -.118                     | -4.883 | <.001 | .990                    | 1.010 |

As the table illustrates, Consideration of Future Consequences demonstrates a high level of statistical significance at the .001 level. Its effect size is also comparable to traditional deterrence factors, and the direction of the effect indicates that an increase in CFC decreases the intent to offend. Furthermore, it has an effect on the  $R^2$  that is significant, given the overall  $R^2$  change of the model when incorporating standard deterrence factors. As such, there is evidence to support the post-hoc hypothesis  $H_p$ , that

Consideration of Future Consequences is negatively correlated with behavioral intent to offend, such that when one has a greater future time orientation, one is less inclined to commit an offense.

### **Interpretation**

With these analyses available, it is possible to evaluate the hypotheses originally postulated for this study. For the first two hypotheses, at the 0.001 level of significance, there was sufficient evidence to reject the null hypothesis. These hypotheses dealt with the traditional link between perception of certainty and severity with behavioral intent in GDT. The third and fourth hypothesis regarded a link between behavioral intent and perception of celerity, and behavioral intent and reward, and was found to be significant at the .01 level. This means that, according to the experimental results, an increased perception of certainty, severity and celerity of punishment results in a decreased inclination towards an intention of committing an offense. Again, according to the results, this also means that an increase in reward results in an increased inclination of committing an offense.

Of the remaining four hypotheses, regarding the moderating effect of CFC on the relationship between the classical deterrence factors and reward with behavioral intent, none were found to have statistical significance. As such, they failed to reject the null hypothesis. However, the final hypothesis, H<sub>8</sub>, had an unexpected interaction. Although weakly statistically significant at the .10 level, it nevertheless showed that the direction of moderation was the opposite of what had been hypothesized. That is to say, according to the data, the higher one's CFC is, the more the reward is likely to incline an individual to have a greater intent to offend.

Post-hoc analysis has indicated evidence of a direct effect not originally hypothesized. CFC was found to correlate negatively with behavioral intent. This fits well with recent research involving a more holistic approach towards deterrence, which incorporates differences in individuals such as dispositional traits, as well as those incorporating perception of the offense (Willison & Warkentin, 2013; Piquero, Paternoster, Pogarsky & Loughran, 2011; Pogarsky, 2006). This helps to explain effects that might be otherwise difficult to reconcile – for instance, how an incorrigible offender (D'arcy & Hearsh, 2011) might be undeterred no matter how severe, swift or likely the punishment is to be imposed on him, or how an acute conformist might have moral beliefs which make it impossible to deter him further because he cannot be convinced to commit the offense under any circumstances. This link, however, is not guaranteed, as it is possible that CFC may be reacting in conjunction with other variables latent to the model. For instance, high CFC individuals may tend to have higher levels of honesty or moral conviction than low CFC individuals, inclining them against committing an offense, with no direct link. Further, it is also possible that CFC may actually have its relationship mediated with behavioral intent by another construct. CFC has been shown to behave in this manner with its relationship with anger partially mediated by hostility (Joireman, Anderson & Strathman, 2003). However, given the data available to the study, it is relevant that this correlation be considered for use in future practice and research.

The reward-CFC moderating effect warrants further discussion. Given the thought that one might be less inclined to commit an offense if he was future-oriented, this might be a puzzling result, particularly given the results of the post-hoc analysis.

However, it is possible that this may in fact be accurate if one takes into account expected utility. As the CFC of the subject rises, more value may be seen in a good college education. In order to have that, one usually needs basic class materials, such as books. It may be that high CFC individuals are more willing to risk loss of Internet access in order to ensure a good grade. However, like the post-hoc findings, there may be factors latent to the model. High CFC has been correlated with better academic performance (Peters, Joireman & Ridgway, 2005), which may indicate a higher value put on education. This may, in this particular instance, make the reward considerably more tempting to individuals who also tend to have a high CFC, but is not caused by a directly mediating effect on the link between reward perception and behavioral intent.

Of the remaining four hypotheses, regarding the moderating effect of CFC on the relationships regarded in the first four hypotheses, three showed no statistical significance. These were those dealing with classical deterrence. The results of the experiment indicate that we cannot reject the null hypothesis, that there is no moderating effect for CFC, in the relationship between perception of celerity and behavioral intent to offend, perception of severity and behavioral intent to offend, and perception of certainty and behavioral intent to offend. The model had a relatively modest impact on the overall  $R^2$  of the model, but this is consistent with other literature regarding the impact of GDT (Paternoster, 2010).

### **Conclusion**

In this chapter, the results of the statistical analysis of the study were examined. Instrument validity was confirmed via standard factor analysis techniques during the pilot test. This was followed by the main study, which verified the reliability of the instrument

using Cronbach's alpha. Ordinary Least Squares (OLS) regression was used in order to analyze the model and variables involved. Of the hypotheses, H<sub>1</sub> and H<sub>2</sub> rejected the null hypothesis at the .001 level of significance. H<sub>3</sub> and H<sub>4</sub> rejected the null hypothesis at the .01 level of significance. H<sub>5</sub>, H<sub>6</sub>, H<sub>7</sub> and H<sub>8</sub> failed to reject the null hypothesis at any level of significance used in this study. However, the mediation effect described by H<sub>8</sub>, that of reward and CFC, was found to be statistically significant in the opposite direction of that which was originally hypothesized. Additionally, several demographic variables were found to correlate directly with behavioral intent. Post-hoc analysis indicated that CFC is negatively correlated with behavioral intent.

In the next chapter, the implications of these results are discussed, along with possible interpretation and meaning for the variables found to be of additional significance in the model. Study limitations and future research possibilities are discussed, and the study is concluded.



## CHAPTER V

### CONCLUSION

#### **Introduction**

This chapter examines the results of the present study. First, the implications and impact of the study and experimental results are discussed as they relate to both practice and theoretical matters. Next, the limitations of the study are examined. Following this, possible directions for future research are explored, as well as ways that these future studies might improve on the knowledge base built on this study. Finally, the chapter and study are concluded.

#### **Discussion**

Of the eight hypotheses originally discussed, four were supported. These included the three hypotheses pertaining to general deterrence theory in general: that increasing certainty of sanction, severity of sanction, and celerity of sanction decreased behavioral intent to violate security policy. A new variable and fourth hypothesis, reflecting rational choice theory, was added regarding the effect of reward on behavioral intent to offend, postulating that an increased reward would cause an increase in behavioral intent to violate.

The remaining four hypotheses, positing a moderating effect of Consideration of Future Consequences (CFC) increasing the effect of certainty of sanction, severity of

sanction, and celerity of sanction, as well as decreasing the effect of reward for violation of security policy, on behavioral intent, all failed to find support in the data. However, evidence was found for a weakly significant moderating effect opposite of that which was originally posited in H<sub>8</sub>, with the results indicating that longer-term time orientation enhanced the link between reward and behavioral intent to violate security policy. Furthermore, post hoc analysis indicated that time orientation was negatively correlated with behavioral intent to violate security policy. The remainder of this chapter examines these findings as they pertain to information systems theory and practice.

### **Implications For Practice**

This study was primarily oriented towards basic science, in order to produce building blocks for future research in IS. Unlike more practical studies, such as those that might examine the characteristics of good passwords and user interface design, the present study addresses constructs found in criminology and sociology research and their relationships with information systems at a more fundamental level. Nevertheless, the study and its results provide insight that may be used for practical purposes. These include, and are particularly helpful for, Security Education, Training and Awareness (SETA) programs.

Perhaps the most useful - and readily obvious - aspect of these is the role of time orientation. As stated earlier, some of the most valuable use that might be gleaned from this research is to assist with profiling (McBride, Carter & Warkentin, 2012). Profiling has already been examined in the literature as a potentially useful tool in security policy design and enforcement (Shaw, Post & Ruby, 2002; McBride, Carter & Warkentin, 2012). It would, for instance, make it possible to customize security training for a

particular individual. It may also serve as a guideline for the risk factor that may be evident for an individual who may be exposed to sensitive information that might have an incentive to compromise its secrecy or integrity. In military and highly sensitive corporate settings, this type of foresight could easily be the difference between continued operation and disaster. In particular, future time orientation was examined in the context of the study. With consideration for context-specific needs that may exist, such as specific concerns that may arise regarding military secrets, the Consideration of Future Consequences instrument could be adapted as part of a more generalized profiling instrument in order to ascertain a candidate's time orientation. In conjunction with other variables, it may give a better sense as to a risk factor for the person in question.

Additional utility comes from the examination of the relationship between reward and intent to offend. Reward is much less often examined in regard to deterrence than any of the three primary dimensions of traditional general deterrence theory, although there have been recent trends in research to correct this (Baker & Piquero, 2010). As such, examination of the stakes involved, both in terms of potential punishment and potential benefit, will be insightful, especially as it more closely segues into the idea of expected utility functions which have been used in economics for many years. Applying the reward element to deterrence research in information security stands to enrich our understanding of the role it plays in context. It is particularly useful as there may be ways wherein we can change the intent to offend not simply by increasing or altering the context for sanctions, but also by manipulating and reducing the potential reward for that violation. Although there are a variety of ways to do this, information systems may be particularly agile and versatile in some aspects of this potential defense. For instance,

one cannot reduce the market value of the gold one is carrying. However, one way that the context might be altered is to make access to sensitive information more finely granulated, and with this granulation allocate access with greater care and precision. A practical example can be found with an employee of a firm contracted to assist the military in a project that involves access to nuclear weapon plans. The access granted would much less useful for misuse if he is allowed to only view specific parts of the guidance system that he is involved in, rather than the entire guidance system, or the weapon as a whole. While some of this might be considered common sense, incorporating aspects of security such as allowing information on a need-to-know basis, it provides greater incentive to restrict access further, and also to use other information, such as personality variables, to determine the level of restriction necessary.

The unanticipated relationship between reward and time orientation, resulting in a positive moderating effect with longer-term time orientation, yields practical value, and lends itself to further examination to study its nuances and implications. Should it bear out in further study, this is indicative of a heightened level of likelihood of offense if a reward is sufficiently appealing under certain conditions. The relevance of this finding lends itself to the concept of instrumental crime. Instrumental crime is crime that is a means to an end, and typically considered in a calculated manner (Willison & Warkentin, 2013). On the opposite end of the spectrum are expressive crimes, which are usually committed for their own sake without much (if any) thought before the act. A simple example might be a fraud scheme, which would be instrumental, as opposed to assault and battery induced by rage. Instrumental crimes are considered to be more deterrable as

they usually require more thought and contemplation, allowing for the thought processes posited by rational choice theory to manifest.

With this in mind, specific individuals may find themselves particularly interested in specific types of information and security violations. In some cases they would find the reward sufficiently tempting, and their personal goals relating to it sufficiently paramount, that higher future time orientation will actually incline them to offend. Consider an employee for a firm that does consultant work. This firm may establish a relationship wherein it does work for a larger corporation with politically controversial methods of operation. The employee for the consulting firm might have high future time orientation, and also be politically opposed to the larger company's actions. As this employee may consider himself to have more foresight towards the future as a whole rather than his independent goals, he may believe he has a greater incentive to breach confidentiality and cripple the larger, controversial firm than if he was simply attempting to embezzle funds or otherwise violate for purely personal gain. This is, of course, a very extreme example of the situation. Nevertheless, it demonstrates the way long-term time orientation can encourage violations it might otherwise discourage. It also shows how this research has practical implications, at least in conjunction with future research into how personality variables interact with the rest of the deterrence framework. It also serves a role that is less pragmatic, but nevertheless important - to underscore the flaws that exist in our understanding. Unexpected results can and do arise, and profiling can never be perfect. Adhering too closely to what is believed to be true may exclude brilliant talent, and simply going on instinct may invite great danger. A balance between

the two is needed in order to promote optimal security, optimal performance, and a beneficial relationship between employee, organization, and customer.

The use of reward, while having its uses in terms of profiling for wrongdoing, also has more positive potential applications. Studies have thus far shown that reward has little effect on compliance with information security policy (Siponen, Pahnla & Mahmood, 2010). However, there are many types of rewards for many individuals. Just as some might be more motivated by praise from a superior or the appreciation of coworkers, another might be motivated by more material gain. It stands to reason that if a reward is especially pertinent to a particular employee, whether it be material or otherwise, then it might well be possible to enhance employee compliance with these specialized rewards. This may be an important part of potential profiling programs. It may also be helpful in another sense – some employees may be uncomfortable with the increased profiling. Should there be provisions for rewards as well as training, it would help assure the intent is for a mutually beneficial outcome, as opposed to simply the overbearing enforcement of a seemingly draconian system administration team. The information gleaned from attempting to determine desirable rewards may also be used to obtain further information on potentially appealing rewards for violation that might be unwise to expose particular employees to. Of course, this somewhat duplicitous purpose may have troubling ethical and legal ramifications. However, in certain situations – particularly high-security military situations such as those involving exposure to sensitive strategies or weapons of mass destruction – the gravity of the situation may justify this kind of analysis.

Situations may arise in which it may be particularly advantageous to employ profiling incorporating elements of the findings of the present study. An example can be found in the particularly noteworthy and important aspect of the relationship between time orientation and GDT, as well as that of time orientation and reward, as it relates to the recently common practice of off-shoring. By its very name, off-shoring implies the movement of work to foreign countries, and by doing so, important organizational data and assets are necessarily exposed to access by other cultures, some of which may be radically different than those of the parent organization. As many of these operations hire thousands of individuals, it is entirely possible that some may have malicious intentions, or may be coerced into the service of other organizations for espionage or sabotage purposes. In this sense, GDT becomes extremely important, as it may be very difficult to seek recompense in foreign legal systems, especially if the action was sanctioned by the local government. Hall (1983) divided time orientation into two different poles – monochronic and polychronic. Monochronic time is more concerned with specific times and views time much more linearly, whereas polychronic time is more concerned with group affiliations, and is much less concerned with “wall clock” time. These differences in how an individual perceives time may reveal different methods of gain for both oneself and one’s social groups (Li, Gupta, Luo & Warkentin, 2011). For instance, a polychronic individual may consider himself more readily affiliated with the company as a whole, and considers time in a more fluid manner and is less pressed with immediate compensation. A monochronic individual, on the other hand, may be much more oriented towards immediate compensation, and if he feels that he has been slighted, would decide that he must act in order to attain what he believes what is rightfully his.

Hofstede (2001), in his cross-cultural studies, observed that these two different poles tended to occur on cultural levels as well as organizational levels. Individuals in countries such as China tended to be polychronic, and citizens of countries such as the United States tended to be monochronic (Cohen, 2004). With this in mind, organizations may need to adopt different policies and profiling techniques for units operating in different countries, in order to better deter employees from misconduct.

Considering the results of the present study, it stands to reason that if the time orientation of an individual has an impact on the effect of a reward and his intent to violate policy, then the time orientation of his society may also have an impact. For example, a monochronic society may place a higher value on graduation at a certain point in time. As such, an individual from such a society would have an increased propensity towards taking the textbooks as in the experimental scenario. This may be particularly valuable in situations where cross-cultural concerns may make profiling difficult or inaccurate. By assisting in anticipating possible cultural considerations, examination of cultural time orientation in relation to the time orientation of individuals may help to provide guidance as to security training and policies as organizations expand to other countries, ensuring a robust security infrastructure in terms of both technology and personnel, particularly when initial foreign operations are conducted.

The combined influence of both profiling and cultural accounting may not merely help in regards to time orientation and rewards, however. GDT has three antecedent variables – certainty, severity and celerity of sanctions – and as such, according to the concept of differential deterrence, which will be discussed more thoroughly in the next section, a similar approach would likely help with these as well. Some employees might,



for instance, find one particular punishment to be particularly intolerable, such as loss of arbitrary Internet access at their workstation. Others may care little about Internet access, but be considerably more concerned about pay being penalized. Similarly, some might be concerned about the celerity of being caught. In these employees, more frequent surveillance might be a great deterrent, whereas those who are concerned about being caught and sanctioned at all might not need such frequent checks. This would allow organizational resources to be distributed accordingly – for instance, frequent audits of logs for those deterred by celerity, versus more thorough audits of logs for those most deterred by certainty. In this manner, with the use of careful profiling, both positive sanctions for compliance could be maximized, and negative sanctions can be arranged by the meticulous and cautious employer for the highest level of deterrence, allowing for both aspects of the IS policy experience to be customized for every employee. This may, however, be problematic in some countries due to legal concerns. However, some of the benefit could still be gained by changes to the training program to emphasize aspects of both positive and negative sanctions most likely to appeal to each employee, with corresponding, follow-on reminders that are composed for each individual.

It may be that there are organizations that cannot afford to implement company-wide, comprehensive schemes that implement safeguards such as these. However, this information may still prove to be of value. It is possible that, no matter what the size of the organization, some members may be inclined towards violation of policy, and as such, it is always possible that an investigation may need to be conducted. If profiling information is available on file, it may be possible to determine what kind of rewards a particular employee might be inclined towards, and what sanction characteristics might

be most motivating to that employee. In some cases particular aspects of violation sanctions in policy may be weak; for instance, the severity of sanction may not be sufficiently strong, at least as considered by the employees in question. Employees who respond most strongly to severity may therefore be less deterred. In others, sensitive ideological considerations may be in play, and potential rewards that may involve such may be difficult for ideologically-oriented employees with long-term time orientation to resist. Factors such as these may help to narrow down a list of individuals to watch. In a less serious situation wherein discipline is not necessarily needed, but it is more important that the violations simply stop, reminders may be sent to employees company-wide. These reminders may particularly emphasize the aspects of deterrence that the suspected employees may respond most strongly to, in hopes of enhancing the deterrence effect.

In some instances, profiling may prove to be impractical, or perhaps even undesirable if it may somehow it may cause problems. In these cases, it would still be possible to glean some of the benefit if demographic information can be obtained. A profile of a “typical” employee in a particular industry could be conducted with instruments such as CFC and vignettes with realistic scenarios specific to the industry or company in question. These could then be used to construct a security plan, which would guide resource allocation for security programs. For example, if some rewards for violation were particularly enticing for a typical employee in a specific industry, then care could be taken to place additional safeguards around it, lest it prove to be too great a temptation. Similarly, if the employee demographic seems particularly concerned about celerity, review of security logs could be done on a daily basis, or even more frequently,

ensuring that the perpetrators would realize that sanctions may only be hours away from the time of violation.

In a situation where even demographic profiling is unviable, it might even be possible to infer a possible profile for a typical employee from other methods of examination, such as personality measures, which may correlate with variables such as those examined in the present study, as well as GDT in general. As discussed later in this chapter, time orientation itself tends to correlate with certain aspects of personality. It is not a stretch that preference for specific types of reward might correlate as well – for instance, a particularly conscientious individual may be highly interested in his education, and by extension might be more tempted by obtaining textbooks in violation of security policy, as in the current study’s experimental scenario. Conscientious individuals also tend to have higher levels of future time orientation (Zimbardo & Boyd, 1999). Through this, a similar scheme could be devised in order to construct a profile for a typical employee, and, in a manner as described before, attempt to address the specific nuances of the employee demographic as a whole to better deter potential violations. While each step taken that departs from the individual employee reduces the accuracy of such inferences, under some conditions this may be the only practical way in which to obtain some benefits of profiling schemes.

### **Implications For Theory**

The present study stands to inform theory in the disciplines of information systems, criminology, sociology and psychology. In particular, it pertains to the general phenomenology that surrounds general deterrence theory and its role in maintaining information security. However, it acts as more than simply adding hypotheses that are

supported or unsupported by the study data. Potential implications for the base theory that information security explores are numerous, as are potential avenues for research regarding it.

Rather, it directly relates to deterrence in light of a fuller context with consideration beyond the simple three dimensions traditionally linked with it. Recent studies have found particular interest in pushing beyond these classical vectors and their study in different contexts, or debating whether or not they have any relevance. Instead, they attempt to take GDT and fit it into a more complicated, more nuanced, and, it is hoped, more realistic and usable framework that also incorporates the person who is the postulated offender (Piquero, Paternoster, Pogarsky & Loughran, 2011). This provides a much broader scope and much richer dynamic that incorporates the differences in an individual's experiences and personality, including not only the changes this may have on his perception, but also the mind in which these decisions are to take place, as well as the preexisting inclinations of that mind. Taken as a whole, these studies examine what is known as "differential deterrence" - literally the effect of the differences between people on the traditional deterrence model.

Differential deterrence may seem to be almost intuitive, and indeed has been examined in the literature before (Piquero, Paternoster, Pogarsky & Loughran, 2011; Andenæs, 1974). However, particular interest has recently come to rest on this facet of GDT scholarship (Thomas, Loughran & Piquero, 2013; Piquero, Paternoster, Pogarsky & Loughran, 2011; Pogarsky, 2006). This has also included work in information security (Willison & Warkentin, 2013; D'Arcy & Hovav, 2009). As the information security literature has shown great interest in GDT, it stands to enhance its understanding and

efficacy considerably by considering and fully exploring the ramifications of differential deterrence.

Differential deterrence, focusing on the differences between individuals and their differing reactions to elements of deterrence, necessarily relies on personality, which is a large part of how individuals differ from one another psychologically (Neill, 2007). As such, a greater understanding of the personality factors in play can be informative. The traditional perspective on personality is the dispositional, or trait, approach. It emphasizes the differences between individuals, as well as inherent qualities of character. The emphasis of this approach relies on personality traits. Traits are stable aspects of a personality that usually do not change significantly over time once fully formed as an adult. This is in opposition to the state, which is a more temporary condition that relates to the current or recent conditions the person is facing. Both the person's traits and states come together to influence his behavior. For instance, an individual may have a disposition that is generally positive, with traits that tend one towards an optimistic view of life. However, that person's state may be one of grief if someone close to him has recently died, significantly changing his behavior for a limited period of time. Eventually, his state would change as he overcame his grief. The influence of such a state on his behavior would gradually decline as his traits would regain predominant influence.

Traits are of particular interest to personality researchers, due to their relative lack of change over time and their centrality to a person's behavior. A number of research efforts have assessed these attempts. As a particular point of interest in personality research is how traits define and change a person's behavior, it is a natural extension that

GDT research is also interested in these factors, as the major dependent variable in the GDT model is behavioral intent. This interaction is a core interest of differential deterrence literature.

The most popular model of personality traits recently is the Five-Factor Model (FFM), also known as the "Big Five," which defines five major personality traits (Neill, 2007). These consist of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Recent research has suggested, however, that this is not necessarily the optimal arrangement of traits. The HEXACO model (Lee & Ashton, 2010) proposes changes to the trait components, or facets, contained in agreeableness and emotionality. It also adds a sixth trait, honesty-humility. FFM and HEXACO have been of interest to GDT researchers (Van Gelder & de Vries, 2012), including some work regarding GDT in an information systems context (McBride, Carter & Warkentin, 2012). It has also been of interest to time orientation researchers (Zimbardo & Boyd, 1999), in particular, finding correlation between specific factors in the FFM and different dimensions of time orientation. For instance, the future factor in the Zimbardo Time-Perspective Inventory correlated positively with the FFM conscientiousness factor, which suggests that conscientious individuals tend to look ahead towards the future. However, just as there has been little research involving deterrence and time orientation, there is accordingly a great deal to be studied on the interaction of personality, time orientation and deterrence. As the literature suggests HEXACO is more effective at assessing workplace deviance than the traditional FFM (Lee, Ashton & de Vries, 2005), it lends credence to particular interest in this construct for assessing deterrence for an information systems context within an organization.

As such, the application of differential deterrence would be novel to the interactions central to the findings of the present study. While the tendencies of the model data do not bear out several of the initially hypothesized relationships in general, it is possible that they may become statistically significant when taking into account personality factors. The additional aspect of reward in the model for the present study also gives additional sophistication and possibility for interaction. For instance, an individual who is high in time orientation, as well as the agreeableness personality trait, might commit a crime because he wishes to be accepted by his peers, when the reward for violation is approval by the group. He may be encouraged to offend by a belief that the acceptance will last into the future. As another example, a neurotic individual with high time orientation may be considerably more discouraged from committing a crime, as he may anticipate anxiety that may follow him in anticipation or fear of being caught and sanctioned. Under these circumstances, moderating influences of time orientation may become statistically significant. As such, these examples illustrate how the differential deterrence aspect may bring relevance to what appear to be irrelevant paths in the present hypothetical model, and suggest how other factors may manifest in other experimental models.

Additional application and venues of study could come from studying the state of an individual, as well. While someone may be inclined or disinclined towards violation as a result of his traits, his current state could change his behavior in such a manner that he could be more easily deterred, or alternatively extremely unlikely to be deterred. For instance, an individual whose traits incline him towards theft may find himself deterred more easily if he has recently managed to steal something of great value. The potential

loss of the newly-found assets through arrest and conviction, and the increased severity of the sanction if both crimes were discovered, would make alter the results of the deterrence calculation to disincline him from offending as opposed to what he might normally consider. Inversely, an individual who has a great deal of long-term time orientation may be so incensed at the loss of a potential promotion that his rage may make the reward of vengeance worth it, and he may carry out some violation in an act of retribution and spite, regardless of the potential (or even near-certain) costs to himself. In these ways, the traits and the states that come with personality make the assessment of a subject's disposition and current state of mind of considerable importance.

However, differential deterrence, while emphasizing personality, also works with other factors unique to the individual, as well as to the situation (D'Arcy & Hovav, 2009). The constructs that may be brought into play are numerous and come from a wide array of sociological, psychological and criminological areas. Some of these include social bonds (D'Arcy & Hovav, 2009), informal sanction threat (D'Arcy & Herath, 2011), drug use (Pogarsky, 2007), self-control, and temporal discounting (Piquero, Cohen & Piquero, 2011).

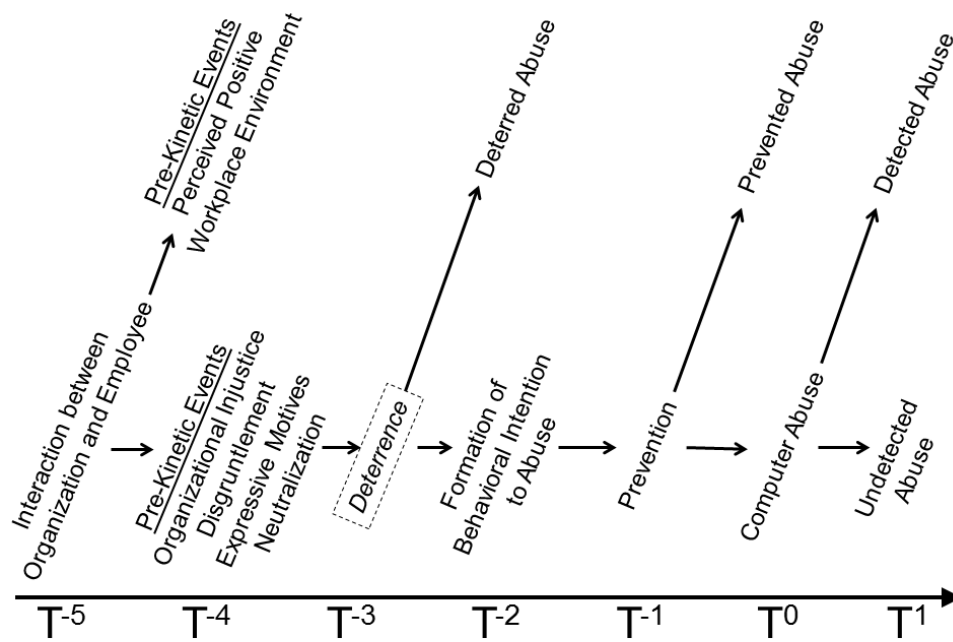
In particular, the present study speaks to the temporal discounting phenomenon. Piquero et. al (2011) comment that temporal discounting, related to time orientation, may be a moderating factor in deterrence research, akin to what was originally hypothesized for the present study in terms of moderating factors. The present study found no significant moderating effect on the traditional GDT variables by time orientation. It also found a new influence wherein time orientation – or indeed temporal-related constructs - may have an influence, that being more with direct interaction with behavioral intent



itself. This may mean that time orientation has less of an impact in how one perceives the certainty, severity and celerity of an act, but perhaps has a more direct effect as a predispositional factor, inclining or disinclining someone towards offense where punishment may be involved. This also introduces the possibility that time orientation may be partially mediated or moderated by other variables, such as aggression, honesty, or hostility, in its interactions with GDT. This link may be explored more thoroughly in subsequent studies and structural examination. Additionally, the very weak interaction between time orientation and reward, enhancing the appeal of the reward to influence behavioral intent towards offense in future-oriented individuals, may in itself be revelatory. A variable in differential deterrence may not need to be relevant at all times; it may come into play under special circumstances, such as "fringe" cases, wherein something is particularly unusual about the would-be offender, such as his desire for the long-term benefit of the reward that may override the potential punitive consequences.

The information systems contributions to this area are also worth examination. Deterrence is a significant step in both the security action cycle (Straub & Welke, 1998), and the more recently researched extended security action cycle (Willison & Warkentin, 2013). However, it is by no means the only step. As differential deterrence applies to the disposition and personality of the offender to be, studying more about the offender allows us to determine not only what may or may not deter him, but also what kinds of offenders may proceed through to the next step in the cycle. For instance, according to the expanded security action cycle (Willison & Warkentin, 2013), illustrated in Figure 5.1 as a timeline from the beginning of consideration of an offense to after the offense, deterrence occurs at T-3, meaning that it is three steps away from the actual security

breach at T0, and leads on to T-2 with the formation of the intent to offend, and is preceded by T-4, which has events leading to where the would-be offender would be motivated to act. Once the level of deterrence has been reached, one of several phenomena has occurred, such as employee disgruntlement or neutralization. If we examine deterrence from simply the perspective of certainty, severity and celerity, that tells us very little about the surrounding circumstances.



(adapted from Straub and Welke, 1998)

Figure 5.1 The Extended Security Action Cycle (Willison & Warkentin, 2013)

Let us suppose that a potential offender has used neutralization (Sykes & Matza, 1957) to consider whether or not it is correct to perpetrate an offense. This offender may be a long-term employee, and feel that, balanced against a long, faithful career to his employer, what he views as a relatively small offense is balanced out by his previous

fidelity. If his motivation is especially strong, such as feeling as though he has been passed over for a long-desired promotion or raise, this may give important information. Considering that he is indeed a long-term employee, it is not unreasonable to suppose high levels of future time orientation. As such, his time orientation may give us important indications about the offender and his motives. For instance, if he progresses through T-3 and arrives at T-2 without being deterred, the formation of the intent to offend, and has long-term time orientation, it might be that his motive is of sufficient strength that it is nearly undeterrable. This may be of vital importance in high-security, high-stakes situations, especially wherein an offender may be willing to sacrifice his freedom, or even life, to accomplish the offense.

While the specific link with time orientation is likely too new and unexplored to be able to make such inferences with the present study alone, future work may help provide a more thorough understanding of who does and does not offend, and in what circumstances he would do so - especially in cases where someone who would otherwise never offend might be pushed past his limits. Additionally we might be able to help determine certain combinations of traits that might cause individuals to act, such as those proposed by (Willison & Warkentin, 2013). For instance, highly emotional individuals who are not future time oriented may be more prone towards violation. Studying how the relevant personality traits and facets interrelate within one another may be of value as well, in order to see how it interacts with GDT as part of a larger system, and relates with different levels in the expanded security action cycle.

Exploration of traits may also be helpful in alternative approaches to deterrence through somewhat indirect measures, such as fostering social bonds. It is believed that a

lack of social bonds and other societal contexts may diminish the effectiveness of deterrence, and it has been proposed that social solutions be used to help discourage computer abuse (Lee & Lee, 2002). To that end, it may be possible to help identify certain personality groups which may be isolated, that may benefit from team-building exercises, placement with other organizational members who have similar personalities, or placement with other organizational members with supportive dispositions, using traits such as time orientation as a starting point for these assignments. Time orientation may be a useful trait in that context, considering those with strongly opposing time orientation levels might have a difficult time coexisting, as well as possibly helping with cultural considerations (Hofstede, 2001).

The differential deterrence perspective also introduces an avenue for an important aspect of deterrence - the difference between behavioral intention and actual behavior (Stutton, 1998), as is examined in the Theory of Planned Behavior (TPB) (Ajzen, 1991). TPB is an expansion of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), which itself examines a model based on rational thought. However, TRA is similar to conventional deterrence in that it ends at behavioral intent, with little room for any alteration between intent and action. As models such as the extended security action cycle have illustrated, however, different "levels" of interaction may well not be as isolated as they may seem in a model, and outside effects may impose themselves on a system. Thus, much as it was necessary for TRA to move beyond a simple model into a more complicated model taking more of the context in for more accurate prediction, it may also be necessary that GDT must move beyond its simple model to progress towards a more sophisticated, TPB-like model. Given evidence for variables such as time

orientation having an effect on behavioral intent, it may be worth examining their potential effect on actual behavior, or on the link between behavioral intent and behavior, to see how they interrelate to both GDT and the link between GDT and violation.

An integrated framework that may serve as an example to inform future efforts in integration of deterrence with dispositional and personality factors, as well as integration of deterrence to different levels in the extended security action cycle, is provided by Herath & Rao (2009). It also provides another example of theory that could benefit from such an integrative approach, as it meshes general deterrence theory with protection motivation theory (PMT). PMT pertains to the process an individual undergoes when faced with a threat, both assessing the magnitude and likelihood of the threat itself, as well as the potential coping capabilities should that threat arise. The result of these analyses proceeds to influence behavioral intent regarding the threat, if such is deemed practical and necessary. The proposed framework is illustrated in Figure 5.2. This framework also incorporates other important behavioral theories such as the Theory of Planned Behavior (Ajzen, 1991) and the Theory of Reasoned Action (Ajzen & Fishbein, 1980).

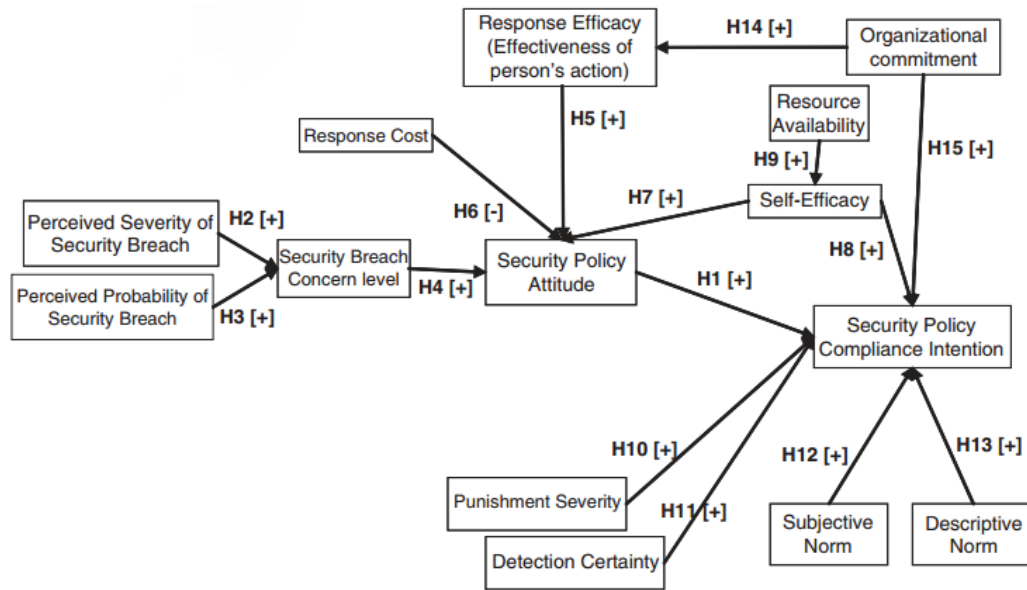


Figure 5.2 Example integrated security framework incorporating PMT, GDT, TRA and TPB, adapted from (Herath & Rao, 2009).

In this particular framework, time orientation could fit in a number of ways. It could have a direct effect on intention to comply with security policy. Other dimensions or measures of time orientation might also have the originally hypothesized moderating effect. Future time orientation could impact the security breach concern level, either via moderating the antecedent links, or a direct effect, or similarly with security policy attitude. As such, these are but a few ways that multiple levels of the security action cycle could be integrated to provide the benefits of a differential deterrence perspective as well as inform other relevant theories to form a larger model. This larger model, although likely to lose parsimony, would nevertheless be more valuable for practical use. It would also provide more context when broken into components to study individual parts more easily, in hopes of furthering discoveries in a more accurate and expeditious manner.

Other implications for theory include those involving the nature of society and its relation to time orientation. As noted earlier, different cultures have different norms for their overall time orientation (Hofstede, 2001). While this does not mean that every individual in a society has a particular time orientation, it does mean that on average a member of a given society is more likely to be inclined towards a particular time orientation. This may mean that the impact of time orientation may be greater or lesser on members of a particular society, in comparison to members of another society, or that a particular time orientation may have a particularly important role in the likelihood of violation or being deterred from violation. More indirectly, the time orientation tendencies may make particular rewards especially tempting (or alternatively less tempting), which may accentuate or mitigate the reward-time orientation moderation effect. As such, future studies in deterrence may wish to incorporate time orientation as well as nationality in order to help control for - or experiment with - the different potential results of these variables and cross-cultural aspects.

Additionally, it may be worth considering that a personal trait that many come into contact with on a daily basis may link time orientation and security policy compliance – patience. Many employees reject security measures because they find them frustrating and that they impede their work (Ng, Kankanhalli & Xu, 2009). This is an issue that the literature has addressed before. However, a future time oriented individual may be more willing to sit through a slow login sequence, realizing that there may be greater stakes than a minute here or there in the future, such as an unsecured terminal compromising the company's critical databases. As such, patience may be an important factor in profiling for employee compliance. It may also be possible for system resource

allocation to somehow be used to allow impatient employees to have access more quickly or more easily in some way. Although this may paradoxically encourage employees to “be more impatient,” it is possible that profiling may allow for the use of subtle changes in system efficiencies, or even alterations to the user interface to make it seem as though access is being granted more quickly (Quesenbery, 2003).

Reward has also shown to be a particularly interesting variable in this study. The relationship between time orientation and reward, having a moderating effect, is not without implications. The precise nature of this relationship needs more research to understand its characteristics, but it is not unreasonable to suppose that this may be at least partially motivated by the end goal – an improved college education – making the reward especially enticing to future oriented individuals. As such, it is important to consider not only time orientation, but other variables which may have an impact on this linkage. For instance, personal values may place some level of honor or fidelity to a particular goal or ideal above all other considerations. Conversely, an individual may also have such a self-centric attitude that such concerns are generally disregarded to the extent of leaving little room for incentives other than direct, material gain that can be monetized. As such, while it is possible to regard reward in simplistic terms in many situations, these will not suffice to be fully generalizable, suggesting the possibility that perception of reward may have a wide variety of potential influences, which themselves may have special considerations in an information systems context. This is particularly true if the goods themselves are held within information systems – for instance, specific information contained in a company database, or virtual goods such as software or e-books.



In an area with somewhat more positive implications, the time orientation-reward link, though tenuous, suggests that there may be additional input in the line of thought regarding encouraging security policy compliance and the role of rewards for positive behavior, as mentioned earlier. Previous research (Siponen, Pahnla & Mahmood, 2010) suggests that rewards have very little impact on employee behavior in this regard, and also notes that reward perception tends to be individual. Just as differential deterrence suggests that individual perceptions and traits may have an impact on negative sanctions, it is not unreasonable to suppose that different rewards for employees with different traits may well be regarded differently. For a very simple example involving temporal discounting, suppose that a manager gave bonuses out to employees who had verifiably been following security policy. A present-oriented employee might be rewarded a bonus to his pay for compliance for a week. A future-oriented employee, however, might instead be offered a bonus for a month's worth of compliance, and this lump sum might be worth more than the four weeks of bonus a short-term employee might get in the same time. The reactions of the two employees could be very different in this case, as it customizes the reward for each employee. Considering the increasing value of information and access that rely on employee defense, rewarding employee compliance and cooperation may well be far cheaper than dealing with the consequences of a breach, giving good reason to pursue this avenue of thought, and fully explore the potential in this area. It may additionally broach into topics broader than deterring employees from committing violations and from neglecting security policy stipulations – it may link parts of GDT to the more general concept of workplace performance, in how best to motivate individual employees.

## **Study Limitations**

All research has limitations. This study is no different. Although numerous steps have been taken to ensure that the process, documentation, and results are as useful as possible, it is infeasible to remove all limitations. As such, we discuss these limitations in this section.

The demographics of the study are necessarily limited. Although the use of university students has been explained earlier to be an excellent source of data for the research question and vignettes provided, the concerns surrounding their use are not unfounded. College students, for instance, have higher self-efficacy for technology, which has an adverse effect on the potency of deterrence factors (D'Arcy & Hovav, 2009), and although they are quite popular for GDT studies, have a lower inclination towards traditional crime than the general population (Ford & Schroeder, 2011). These and other nuances are not the same as either the general population of office workers, or the general population at large. As such, the generalizability of these findings, without further confirmation from additional studies exploring and comparing other demographics, is correspondingly limited.

Relating to the demographics are the limiting aspects of the reward used in the study. The reward, textbooks, is rather context-specific to this particular demographic and has special value other than the cash sale price; further, as the data suggest, this may in fact have an increase in perceived value with an increase in future time orientation. The results may be different if the reward is somewhat more standardized, e.g. something with obvious cash value. This limits generalizability.

Also relating to the demographic and the reward is the fact that the crime is copyright infringement, or piracy. Different demographics, particularly age-related, may have different capabilities regarding information technology. This necessarily alters the availability of pirated goods – after all, one who can barely activate a computer is not likely to make use of sophisticated file sharing software, and may find little use for what can be pirated. Additionally, although there has not been much research to date regarding book piracy, books are not software, which is one of the more studied and popular categories of copyright infringement. There may be differences regarding how individuals consider treating software piracy versus books, especially given that books have a considerable material presence in terms of a tangible object, which are still very common despite the surge of popularity for e-books, which might indicate differences in results.

The statistical methods used by this study, though robust and consistent with conventional application of the factorial survey method, may not fully explore the relationship between the variables. The use of Structured Equation Modeling (SEM) is a technique which is designed specifically to determine these relationships, as well as help to extrapolate latent variables for further investigation and follow-on work, including further post-hoc analysis (Petter, Straub & Rai, 2007). The design of the study is not highly conducive to SEM analysis, due to the structure of the variables, including their binary-oriented nature, which limits the use of certain techniques such as factor analysis (Kubinger, 2003). Furthermore, although ordinary least squares regression is the traditional and most often used method of analyzing data gleaned from factorial survey,

other means have been discussed, which may help improve precision and compensate for any shortcomings in OLS (Hox, Kreft, & Hermkens, 1991).

In that vein, the ability to detect Common Methods Bias is somewhat limited with the current study structure (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). SEM analysis techniques have a wider range of options to detect and mitigate CMB, should the need arise. Although several precautions were taken to prevent it in the design of the study and instrument, the regression-based approach considerably limited those techniques which could be used to directly deal with CMB.

The factorial survey method itself, though abundant in its strengths, is not perfect. Despite considerable use in some fields, it is not used as often as many more conventional survey techniques, and as such has not reached their level of maturity (Ludwick & Zeller, 2001). Additionally, repeatedly asking participants similar questions may, in some cases, have caused their own subtle biases. As such, it is possible that a more traditional instrument, or an instrument that only asks one vignette of one participant, may be able to circumvent some of these issues, albeit at the same time losing some advantages of the factorial survey method. Furthermore, vignette research has been criticized in some fields as presenting merely hypothetical cases, which may limit its generalizability; given its reliance on vignettes, this applies directly to the factorial survey method (Ludwick & Zeller, 2001; Ludwick, Wright, Zeller, Dowding, Lauder & Winchell, 2004). Additionally, the results of a factorial survey are limited by the “competence” of those who are asked to evaluate the vignettes, regarding whatever the subject matter may be (Wallander, 2009; Wagenaar, Denk, Hannan, Chen & Harwood, 2001).

A classic problem in much behavioral research is the fact that what is ultimately analyzed is the intention to commit an act, not an act itself (Ajzen, 1991). While the factorial survey method may assist in diluting this effect by making the focus a hypothetical individual as opposed to inquiring what the respondent might do (which could cause, for instance, dishonest answers to behavioral intent due to social desirability issues (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) ), ultimately behavioral intent is not the actual commission of an act. As such, there will often be a disparity between the intention to commit an offense, and the actual commission of an offense if a similar individual was placed in a similar situation, as well as imperfection in predicting such tendencies.

The GDT variables of certainty, severity and celerity of sanction, and the reward variable, are all binary. Furthermore, they are evenly distributed throughout the sample population. Aside from this being a limiting assumption by itself, it also produces a situation in which they are decided by the random number generator in the survey software as opposed to a more natural context wherein they may interact. The resulting variables are, in effect, artificially orthogonal. For an extreme but easily demonstrable example, suppose that a crime involved digging up a buried cache of gold which was normally unwatched. If the perpetrator removes the gold and knows that it is unlikely that the deed will be discovered for many months, it is unlikely he will perceive high celerity for their crime, and certainty may be diminished as well. The potential variable interaction may therefore have an impact that is not accounted for in this research design.

## **Future Work**

The present study is largely an initial foray into the question of the effect of time orientation on general deterrence. As such, there is a great deal of work that can be added using this study as its base. A number of possibilities exist that would not only overcome its shortcomings and limitations, but also help expand beyond its findings and in turn aid in a better understanding of deterrence.

Time orientation is one area that may be expanded on. Future time orientation is an obvious candidate for factoring into rational choice. After all, an awareness of what the consequences of an action would be would be evidence of having fully executed a rational analysis of that behavior. However, there are a number of other dimensions to the concept. Although, as noted in chapter 2, the concept of "time orientation" can be ill-defined at times, Zimbardo and Boyd (1999) have indicated there are at least five dimensions, which are represented in the Zimbardo Time Perspective Inventory. This longer instrument would allow time orientation to be examined from all five of these perspectives, and related to the standard GDT model. Because of this, there are additional time scales, including the aforementioned ZTPI, as well as the Time Reference Inventory (Roos & Albers, 1965) and the Circles Test (Cottle, 1967). The sum contribution of a comparative study would serve both to further elucidate the relationship between time orientation and deterrence in information systems, but also contribute to the literature of time orientation and how the different measures interrelate in this specific context.

A comparison to additional time characteristics may provide similar benefits on a larger scale, such as the assessment of temporal personality and its impact on GDT.

Temporal personality is the sum of how an actor interacts with time (Ancona, Okhuysen & Perlow, 2001). It involves both cognitive and behavioral dispositions, and is unique to each actor. Temporal orientation is one variable that falls into this, which includes both time orientation as defined in the present study. It also includes time perception, which is an objective, neurophysiological phenomenon relating to how each actor perceives time and its passage, and the actor's conception of time, such as linear versus cyclical.

Additionally it includes temporal style (Butler, 1995), which is the explanation and understanding of time for an actor, and how an actor reacts to time. It may also include other variables that span categories of time-related constructs, such as time personality (Hall, 1983). Time personality is the preference of an individual for polychronistic time, wherein the individual spreads focus across many tasks at once, and monochronicity, wherein the actor tends to focus on a single task. Although the polychronistic versus monochronistic comparison is often compared to cultures, it is also applicable to individuals, who are generally influenced by their culture's conception of time, and as such illustrates a point wherein cultural and individual temporal influences overlap.

Perception variables are another area that warrant further investigation. Presently, the certainty, severity, and celerity of sanction, and the reward for offense, were treated in a strictly binary manner. This improved instrument clarity, but not without cost, leaving room for a more nuanced continuation. Although the instrument was designed to clearly indicate what constituted a “high” value or “low” value, there are nevertheless other ways of measuring perceptions. Standard Likert scales of 1-5 would provide a richer perspective and allow for a more thorough examination by providing ordinal variables for analysis. This information may allow for alternative statistical techniques to be

employed more readily, such as greater use of factor analysis, as well as greater applicability of SEM. Additionally, this strategy might capture nuanced personal perception more readily, allowing for individual differences to be more easily illustrated. Arguably there may be difficulties in differentiating the different levels of punishment; for example, one participant might think that the lowest possible level of punishment severity is at the extreme end of the best-to-worst scale. One way this might be alleviated would be to rank the levels of punishment at the beginning of the instrument for a comparative understanding, both for empirical analysis, as well as to communicate the possible range of severity for the purposes of the vignette.

The finding that CFC is linked with behavioral intent in GDT itself warrants a more detailed exploration. While the correlation has been established, the causal link is not necessarily unequivocal. As such, additional venues for inquiry may be found by acquiring data on a number of dispositional traits in order to get a full perspective on precisely what is transpiring in the minds of these individuals. There have been at least a few cases wherein CFC was hypothesized to be correlated with a change in a dependent variable, but in practice, while CFC was correlated with the proven independent variable, no correlation was found between CFC and the dependent variable directly (Sirois, 2004). It is possible that a similar confounding variable may be in play here. For instance, it may be that honesty is correlated with CFC. It is likely that honesty would intuitively disincline an individual from desiring to commit offenses. A false link might be detected in a model which does not include honesty, but does include CFC. Conversely, it is also possible that time orientation has a moderating effect on one or more of these other variables, considering that it often takes a moderating role (Apostolidis, Fieulaine,



Simonin & Rolland, 2006; Tangari, Folse, Burton & Kees, 2010; de Lange, Bal, Van der Heijden, de Jong & Schaufeli, 2011; Joireman, Lasane, Bennett, Richards & Solaimani, 2001; Orbell & Hagger, 2006; Kovac & Rise, 2007), or that it might be mediated by another variable, such as impulsivity (Joireman, Anderson & Strathman, 2003).

Regardless of the outcome, a study with a larger examination of the personality and disposition of an individual as a whole, and subsequent examination of the interrelation of traits along with the GDT model, would likely inform the literature a great deal about the concept of differential deterrence in general, and itself act as a base for considerable future study.

There are number of options for expanding the demographics for this study to aid in generalization of the results. As students are generally not yet high-level office workers, comparing their results with those of current office workers may be valuable in order to determine the differences between those who are currently in positions with sensitive access, and those who will soon be in those same positions. In this regard, it would be valuable to sample multiple organizations and compare the differences, both in the same industry and different industries. Self-efficacy has been shown to diminish deterrence in an IS context (D'Arcy & Hovav, 2009). It may be, for instance, that managers in computer organizations, already versed in the internal functioning of such systems, may find themselves less deterred by potential safeguards or training than those involved with other work that is less intimately connected with such pragmatics. Of particular interest would be polling based on the security training to determine if this has had an impact on workers, possibly introducing new variables for modeling.

In the same vein as additional demographics, additional vignette patterns may be used in follow-on studies. The current vignettes are tailored to a fairly specific situation. As stated, these may in fact have much to do with the moderation between reward and CFC resulting in increased reward correlating with increased intent to offend. Vignettes that involve somewhat more clear-cut situations that involve more regular, monetarily-oriented rewards, may be valuable, alongside situations that might be considered more general to office workers, or other situations in which members of the relevant demographics may find themselves in. An example might include copying a program off a co-worker's hard drive for the personal use of the hypothetical violator, or misappropriation of corporate resources, such as bypassing security filters to freely browse the web on company time. Conversely, it may also be enlightening to further restrict the target demographics. Unusual nuances and situations may arise from highly restricted situations which may provide insight as to "fringe" cases, particularly if follow-on studies confirm that these are not spurious findings. Slightly more broadly, specific industries may have specific nuances that are worth examination, such as those that relate to engineering and computer science, which might have special parameters due to their intimate knowledge of information system operations and construction.

Piracy is a relatively common phenomenon, and as such it is a good choice for a potential offense that is not generally considered a serious crime, but is considered an offense of organizational policy. However, although piracy is a fairly common scenario, it may be more enlightening to provide vignettes that are more custom-tailored to a situation a particular worker may find himself in. For instance, a bank worker may be more likely to be able to misappropriate access in order to transfer funds between

accounts. A more appropriate scenario might be something that might tease this information out. This may be, in fact, more applicable to workers who are former blank employees, lest concern about social desirability or legal concerns interfere with accurate answers. Specific parts of the scenario could be tailored for different demographic groups. For example, vignettes dealing with potential fraud against an Internet retailer may involve potential rewards such as video games, which might be more interesting to those who are younger, or things that are likely to be valued more by an older audience, such as antiques that might be valuable for resale, to help determine the proclivity of particular age groups, and chart tendencies at different positions in the life course.

Vignettes tailored to specific organizations may be useful as well, in order to learn details about the specific nuances in play in context – for instance, the vignettes might vary what part of the company the violation would take place in. Perhaps a server is known to be particularly poorly secured, and as such the certainty of sanction drops severely; situations such as this may help determine not only the temperament and disposition of the workers, but in this case would find a rather specific flaw in the electronic armor of a business, perhaps bringing it to light to management in a way that would be difficult in political or practical terms.

Types of rewards not commonly encountered with traditional deterrence theory may also be examined for in such a strategy. Access to a specific place or system was not likely high on the list of potential incentives for those who initially conceived of rational choice theory. However, simply accessing some technology-based services, such as the Internet or cable, are now of considerable value. As such, pirating cable or Internet access may be considered incentive to violate legal or corporate policy, as such man act

might be considered an end onto itself. However, over time, the variables involved in deterrence would likely change – for instance, regular access to a system would probably raise the probability of the certainty of sanction, due to simply being present and committing the violation more often, resulting in more exposure to surveillance. Various dimensions of time orientation may be of particular value in this area, considering the changes in variables. Considering the increasing availability and interest in non-traditional goods such as this, it would be of particular value to examine this avenue of research.

With this in mind, and in consideration of differential deterrence, it may be desirable to attempt similar scenarios, but controlling for other variables that may fit well into a holistic model of GDT incorporating both the traditional variables as well as dispositional and personality traits, and other elements from the extended security action cycle (Willison & Warkentin, 2013). Neutralization (Sykes & Matza, 1957) and variables associated with it may be a good candidate, as it has been examined in conjunction with piracy and has been found to frequently be used to "allow" individuals to download files illegally where otherwise they might not engage in such legal or regulatory breaches (Siponen, Vance & Willison, 2010). It may be, for instance, that certain levels of time orientation or certain perceptions of reward (or other GDT variables) may be particularly associated with certain types of neutralization techniques, which may in turn lead to better targeting via training to discourage such psychological processes. Construct development techniques suggested by MacKenzie, Podsakoff & Podsakoff (2011) may be helpful in this in order to better represent and understand the constructs and variables in play, as well as to assess possible latent constructs that could

be points wherein other elements of theory might be integrated, as per differential deterrence.

Comparison with of the effect of deterrence and time orientation on different cultures would serve to contribute to the literature, particularly in matters related to the aforementioned concept of dealing with deterrence in cross-cultural organizations. Hofstede (2001) indicated that different societies had different expectations for their cultural time orientation, and although these do not universally apply to their individual members, they do increase the general societal expectations and the inclinations of an average member. As such, in different cultures, there may be a greater or lesser effect on time orientation, or there may be a greater or lesser impact on specific levels of time orientation. These levels drew on monochronic and polychronic time as considered by Hall (1983). Comparative studies against different groups from different cultural backgrounds may be beneficial here, especially in helping to determine what rewards might be particularly tempting to members of particular cultures, and how they may relate to the cultural time orientation. Awareness of how these different cultures actually relate with GDT with their culture's perspectives accounted for will be informative towards a greater understanding of the impact of information systems and culture, as well as provide guidance for practical matters such as cross-cultural management.

With an indication that time orientation may have a role in an important aspect of information security, it may be worthwhile to explore its potential role in conjunction with other constructs, such as privacy. It stands to reason that an employee who is aware of the potential risks of distributing personal information and who is deterred from such is likely aware of, and concerned with, potential problems months or years in the future.

Links such as these may help indicate likelihood for compliance with policies for reasons outside of deterrence, such as heightened awareness of potential security problems, and the implications for potential security breaches, should they be exploited. This may assist further in determining what sorts of training are appropriate for certain classifications of employees.

The reward-CFC interaction adds another possible avenue of inquiry - the examination of subjective value in the reward. When studied, rewards are often characterized in terms more directly equated to liquid assets. However, it is possible that incentives other than money may tempt potential offenders that would be resistant to more material gains. In the case of the present study, as mentioned before, it is possible that the interaction is due to high CFC individuals seeing sufficient value in maximizing the likelihood of graduation or enhancing the quality of their education to consider it worth the sanction risk to pirate needed textbooks. It is hardly inconceivable that other rewards, such as political or ideological, might be possible for some individuals or demographics. In some cases, rewards could involve emotional goals, resulting in deterrence being nearly entirely ineffective – for instance, an employee who feels he has been treated extremely unjustly by an employer may attempt to exact revenge out of emotion no matter how great the cost he faces. In these situations, personality factors and states may be of particular interest, helping to establish relative measures where different measures may come into play for different personalities. Attempting to extract more information from this possible linkage, as well as determining whether or not it truly exists, would be worthwhile to explore for future contributions to GDT scholarship. Even if it is not present, the possibility remains that many factors, such as personality and

dispositional traits, as well as immediate and anticipated long-term needs, may influence the perception of a reward. As such, continuation in this stream of research segues into economic theory, linking together GDT and value theory, with the possibility of returning vital contextual information to inform the IS literature.

### **Conclusion**

Threats from criminal organizations, lone offenders, nation states, workplace deviance, simple negligence, and other sources ensure that the study of computer security has a vital place in information systems academics for the foreseeable future. As such, care must be taken to examine all elements that are or may be involved, whether they are internal or external, or whether the jurisdiction is legal or organizational. While this includes technological aspects such as sophisticated encryption and biometrics, it also includes behavioral factors, such as understanding the potential offender and how to deter him from acting in the first place. Because of this, studying constructs such as traditional deterrence theory and time orientation is highly valuable.

The present study is another step in attaining an ever-greater understanding of the dynamics in which humans and technology interact to compromise the sophisticated information systems of our day. Yielding a better understanding of the interplay of the many relevant constructs and artifacts at hand, it joins many other studies like it, all incrementally building to an ever-greater knowledge base in both academic literature and practice. With perseverance and continued work from dedicated scholars, these efforts will continue to provide us with greater insight into ourselves, our technology, and our future.

## REFERENCES

- Adams, A. & Sase, M. A. (1999) Users are not the enemy. *Communications of the ACM*, 42(12), pp. 41-46.
- Alqaryouti, I. A., Abu Hilal, M. M. & Ibrahim, M. M. (2011) Validity and Reliability of an Attention Deficit and Hyperactivity Disorder - Measure for a Sample of Omani Children. *Electronic Journal of Research in Educational Psychology*, 9(2), pp. 911-930.
- Ancona, D. G. Okhuysen, G. A. & Perlow, L. A. (2001) Taking time to integrate temporal research. *Academy of Management Review*, 26(4), pp. 512-529.
- Andenæs, J. (1974) *Punishment and Deterrence*. Ann Arbor: University of Michigan Press.
- Anderson, R., Barton, C., Bohme, R., Clayton, R., van Eeten, M. J. G., Levi, M., Moore, T. & Savage, S. (2012) Measuring the Cost of Cybercrime. 11<sup>th</sup> Annual Workshop on the Economics of Information Security (WEIS 2012), Berlin, Germany, 25-26 June 2012, pp. 1-31.
- Andrich, D. (1978) A Rating Formulation for Ordered Response Categories. *Psychometrika*, 43(4), pp. 561-573.
- Apostolidis, T., Fieulaine, N., Simonin, L. & Rolland, G. (2006) Cannabis Use, Time Perspective and Risk Perception: Evidence of a Moderating Effect. *Psychology & Health*, 21(5), pp. 571-592.
- Arce, E. & Santisteban, C. (2006) Impulsivity: a review. *Psicothema*, 18(2), pp. 213-220.
- Ajzen, I. (1991) The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50(2), pp. 179-211.
- Ajzen, I. & Fishbein, M. (1980) *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Bagozzi, R. P., Youjae, Y. & Phillips, L. W. (1991) Assessing Construct Validity in Organizational Research. *Administrative Science Quarterly*, 36(3), pp. 421-458.
- Baker, T. & Piquero, A. R. (2010) Assessing the perceived benefits-criminal offending relationship. *Journal of Criminal Justice*, 38(5), pp. 981-987.



- Baron, R. M. & Kenny, D.A. (1986) The moderator-mediator variable distinction in social psychology research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), pp. 1173-1182.
- Baumann, A. A., Odum, A. L. (2012) Impulsivity, Risk Taking, and Timing. *Behavioral Processes*, 90(3), pp. 408-414.
- BBC. (2011) Sony faces legal action over attack on PlayStation network. BBC News. Retrieved December 18, 2012 from <http://www.bbc.co.uk/news/technology-13192359>.
- Becker, G. (1968) Crime and Punishment: An Economic Approach. *Journal of Political Economy*, 76(2), pp. 169-217.
- Beekman, G. (2001) *Computer Confluence*. New York, NY : Prentice Hall.
- Bennett, R. J. & Robinson, S. L. (2000) Development of a Measure of Workplace Deviance. *Journal of Applied Psychology*, 85(3), pp. 349-360.
- Bidgoli, H. (2006) *Handbook of Information Security, Volume 3*. Wiley.
- Bishop, M. (2005) Position: Insider is relative. *Proceedings of the New Security Paradigms Workshop*, pp. 77-78, Lake Arrowhead, California.
- Blumstein, A. (2011) Approaches to reducing both imprisonment and crime. *Criminology and Public Policy*, 10(1), pp. 93-102.
- Boudon, R. (1998) Limitations of Rational Choice Theory. *American Journal of Sociology*, 104(3), pp. 817-828.
- Braithwaite, J. & Makkai, T. (1991) Testing an Expected Utility Model of Corporate Deterrence. *Law and Society Review*, 25(1), pp. 7-39.
- Bray, N. J. & Del Favero, M. (2004) Sociological explanations for faculty and student classroom incivilities. *New Directions for Teaching and Learning*, 99, pp. 9-19.
- Brennan, I. R., Moore, S. C. & Shepherd, J. P. (2010) Aggression and attitudes to time and risk in weapon-using violent offenders. *Psychiatry Research*, 178(3), pp. 536-539.
- Brown, S., Esbensen, F. & Geis, G. (2011) *Criminology: Explaining crime and its context*. Cincinnati: Anderson.
- Burns, M. J. & Dillon, F. R. (2005) AIDS Health Locus of Control, Self-Efficacy for Safer Sexual Practices, and Future Time Orientation as Predictors of Condom Use in African American College Students. *The Journal of Black Psychology*, 31(2), pp. 172-188.

- Butler, R. (1995) Time in organizations: Its Experience, Explanations and Effects. *Organization studies*, 16(6), pp. 925-950.
- Byers, B. & Zeller, R. A. (1998) Measuring *Subgroup Variation in Social Judgment Research: A Factorial Survey Approach*. *Social Science Research*, 27(1), pp. 73-84.
- Calabresi, R. & Cohen, J. (1968) Personality and Time Attitudes. *Journal of Abnormal Psychology*, 73(5), pp. 431-439.
- Campbell, K., Gordon, L. A., Loeb, M. P. & Zhou, L. (2003) The economic cost of publicly announced information security breaches: empirical evidence from the stock market. *Journal of Computer Security*, 11(3), pp. 431-448.
- Chambliss, W. J. (1967) Types of Deviance and the Effectiveness of Legal Sanctions. *Wisconsin Law Review*, Summer, pp. 703-719.
- Choi, J. & Lee, K. H. (2003) Risk Perception and E-Shopping: A Cross-Cultural Study. *Journal of Fashion Marketing and Management*, 7(1), pp. 49-64.
- Churchill, G. A. (1979) A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, 16(1), pp. 64-73.
- Clark, L. A., Vittengl, J., Kraft, D., Jarrett, R. B. (2003) Separate Personality Traits From states to Predict Depression. *Journal of Personality Disorders*, 17(2), pp. 152-172.
- Cohen, R. (2004) *Negotiating across cultures: International communication in an interdependent world*. Washington, D.C. : United States Institute of Peace.
- Compeau, D., Marcolin, B., Kelley, H. & Higgins, C. (2012) Generalizability of Information Systems Research Using Student Subjects – A Reflection on Our Practices and Recommendations for Future Research. *Information Systems Research*, 23(4), pp. 1093-1109.
- Conrad, J. J., Cox, S., Allen, J. & Hanser, R. D. (2007) *Juvenile Justice: A Guide to Theory, Policy and Practice*, 6th ed. Sage.
- Cook, J. D., Hepworth, S. J., Wall, T. D. & Warr, P. B. (1981) *The experience of work*. San Diego: Academic Press.
- Cornish, D. B. & Clarke, R. V. (1986) *The Reasoning Criminal: Rational Choice Perspectives on Offending*. New York, NY : Springer-Verlag.
- Cottle, T. J. The Circles Test: An Investigation of Perceptions of Temporal Relatedness and Dominance. *Journal of Projective Techniques and Personality Assessment*, 31(5), pp. 58-71.

- Crockett, R. A., Weinman, J., Hankins, M. & Marteau, T. (2009) Time orientation and health-related behaviour: Measurement in general population samples. *Psychology and health*, 24(3), pp. 333-350.
- Cronan, T., Foltz, C. B. & Jones, T. W. (2006) Piracy, computer crime, and IS misuse at the university. *Communications of the ACM - Hacking and innovation*, 49(6), pp. 84-90.
- Cronbach, L. J. (1951) Coefficient Alpha and the Internal Structure of Tests. *Psychometrika*, 16(3), pp. 297-334.
- Crossler, R. E., Johnston, A. C., Lowry, P. B., Hu, Q., Warkentin, M. & Baskerville, R. (2013) Future directions for behavioral information security research. *Computers & Security*, 32, pp. 90-101.
- D'Arcy, J. & Herath, T. (2011) A review and analysis of deterrence theory in the IS security literature: making sense of the disparate findings. *European Journal of Information Systems*, 20(6), pp. 643-658.
- D'Arcy, J. & Hovav, A. (2007) Deterring Internal Information Systems Misuse. *Communications of the ACM*, 50(10), pp. 113-117.
- D'Arcy, J. & Hovav, A. (2007a) Towards a Best Fit Between Organizational Security Countermeasures and Information Systems Misuse Behaviors. *Journal of Information Systems Security*, 3(2), pp. 3-30.
- D'Arcy, J. & Hovav, A. (2009) Does One Size Fit All? Examining the Differential Effects of IS Security Countermeasures. *Journal of Business Ethics*, 89, pp. 59-71.
- D'Arcy, J., Hovav, A. & Galletta, D. (2009) User Awareness of Security Countermeasures and Its Impact on Information Systems Misuse: A Deterrence Approach. *Information Systems Research*, 20(1), pp. 79-98.
- Davids, A. & Falkof, B. (1975) Juvenile Delinquents Then and Now: Comparisons of Findings from 1959 and 1974. *Journal of Abnormal Psychology*, 84(2), pp. 161-164.
- Davids, A., Kidder, C., Reich, M. (1962) Time orientation in male and female juvenile delinquents. *The Journal of Abnormal and Social Psychology*, 64(3), pp. 239-240.
- Davids, A. & Sidman, J. (1962) A pilot study: Impulsivity, time orientation, and delayed gratification in future scientists and in under-achieving high school students. *Exceptional Children*, 29(4), pp. 170-174.

- de Lange, A. H., Bal, P. M., Van der Heijden, B. I. J. M., de Jong, N. & Schaufeli, W. B. (2011) When I'm 64: Psychological contract breach, work motivation and the moderating roles of future time perspective and regulatory focus. *Work & Stress: An International Journal of Work, Health & Organizations*, 25(4), pp. 338-354.
- Dickson, G. W., DeSanctis, G. & McBride, D.J. (1986) Understanding the Effectiveness of Computer Graphics for Decision Support: A Cumulative Experimental Approach. *Communications of the ACM*, 29(1), pp. 40-47.
- Einstein, A. (1931) *Relativity: The special and general theory*. (R. W. Lawson, Trans.). New York, NY : Crown .
- Erickson, M. L., Gibbs, J. P. & Jensen, G. F. (1977) The Deterrence Doctrine and the Perceived Certainty of Legal Punishments. *American Sociological Review*, 42(2), pp. 305-317.
- Evans, W. N., Neville, D. & Graham, J. D. (1991) General Deterrence of Drunk Driving: Evaluation of Recent American Policies. *Risk Analysis*, 11(2), pp.279-290.
- Ferrari, J. R. & Diaz-Moarles, J. F. Procrastination: Different time orientations reflect different motives. *Journal of Research in Personality*, 41(3), pp. 707-714.
- Ferejohn, J.A. (1991) Rationality and interpretation: Parliamentary elections in early Stuart England. In: *The Economic Approach to Politics: A Critical Reassessment of the Theory of Rational Action* (Monroe, K.R. ed.), pp. 279-305. New York: HarperCollins.
- Ford, J. A. & Schroeder, R. D. (2011) Higher Education and Criminal Offending Over the Life Course. *Sociological Spectrum*, 31, pp. 32-58.
- Friedman, M. (1953) *The methodology of positive economics*. Essays in Positive Economics, pp. 3-43, University of Chicago Press.
- Furnell, S. M., Gennatou, M. & Dowland, P. S. (2002) A prototype tool for information security awareness and training. *Logistics Information Management*, 15(5/6), pp. 352-357.
- Gibbs, J. P. (1975) *Crime, punishment, and deterrence*. New York: Elsevier.
- Gibbs, J. P. & Firebaugh, G. (1990) The Artifact Issue in Deterrence Research. *Criminology*, 28(2), pp. 347-367.
- Gibbs, J. P. (1979) Assessing the Deterrence Doctrine: A Challenge for the Social and Behavioral Sciences. *American Behavioral Scientist*, 22(6), pp. 653-677.
- Glaser, C. L. (1992) Political Consequences of Military Strategy: Expanding and Refining the Spiral and Deterrence Models. *World Politics*, 44(4), pp. 497-538.

- Gordon, L. A., Loeb, M. P. & Lucyshyn, W. (2003) Sharing information on computer systems security: An economic analysis. *Journal of Accounting and Public Policy*, 22(6), pp. 461-486.
- Gorsuch, R. L. (1983) *Factor Analysis, 2<sup>nd</sup> ed.* Hillsdale, NJ: Erlbaum.
- Good, O. (2011) Welcome Back PSN: The Winners. *Kotaku*. Retrieved December 18, 2012 from <http://kotaku.com/5804318/>.
- Goodhue, D. L. & Straub, D. W. (1991) Security Concerns of System Users: A Study of Perceptions of the Adequacy of Security Measures. *Information & Management*, 20(1), pp. 13-27.
- Gorry, G. A. & Scott-Morton, M. S. (1971) A Framework for Management Information Systems. *Sloan Management Review*, 13(1), pp. 56-79.
- Grasmick, H. G. & Kobayashi, E. (2002) Workplace Deviance in Japan: Applying an Extended Model of Deterrence. *Deviant Behavior*, 23(1), pp. 21-43.
- Green, D. P. & Shapiro, I. (1994) *Pathologies of Rational Choice Theory: A Critique of Applications in Political Science*. New Haven: Yale University Press.
- Green, L., Myerson, J., Lichtman, D., Rosen, S. & Fry, A. (1996) Temporal Discounting in Choice Between Delayed Rewards: The Role of Age and Income. *Psychology and Aging*, 11(1), pp. 79-84.
- Greenberg, J. (1987) The College Sophomore as Guinea Pig: Setting the Record Straight. *Academy of Management Review*, 12(1), pp. 157-159.
- Guilford, J. P. (1954) *Psychometric methods (2nd ed.)* New York: McGraw-Hill.
- Haines, V. J., Diekhoff, G. M., LaBeff, E. E. & Clark, R. E. (1986) College Cheating: Immaturity, Lack of Commitment, and the Neutralizing Attitude. *Research in Higher Education*, 25(4), pp. 342-354.
- Hall, E. T. (1983) *The Dance of Life: The Other Dimension of Time*. New York, NY : Doubleday.
- Hall, E. T. & Hall, M. R. (1990) *Understanding Cultural Differences*. Intercultural Press
- Harrington, S. (1996) The Effect of Codes of Ethics and Personal Denial of Responsibility on Computer Abuse Judgments and Intentions, *MIS Quarterly*, 20(3), pp. 257-278.
- Herath, T. & Rao, H. R. (2009) Protection motivation and deterrence: a framework for security policy compliance in organisations. *European Journal of Information Systems*, 18(2), pp. 106-125.

- Hernstein, R. J. (1990) Rational Choice Theory - Necessary but Not Sufficient. *The American Psychologist*, 45(3), pp. 356-367.
- Hechter, M. & Kanazawa, S. (1997) Sociological Rational Choice Theory. *Annual Review of Sociology*, 23, pp. 191-214.
- Hevey, D., Pertl, M., Thomas, K., Maher, L., Craig, A. & Ni Chuinneagain, S. (2010) Consideration of future consequences scale: Confirmatory Factor Analysis. *Personality and Individual Differences*, 48(5), pp. 654-657.
- Higgins, G. E. (2007) Digital Piracy, Self-Control Theory, and Rational Choice: An Examination of the Role of Value. *International Journal of Cyber Criminology*, 1(1), pp. 33-55.
- Higgins, G. E., Wilson, A. L. & Fell, B. D. (2005) An application of deterrence theory to software piracy. *Journal of Criminal Justice and Popular Culture*, 12(3), pp. 166-184.
- Hinduja, S. (2003) Trends and patterns among online software pirates. *Ethics and Information Technology*, 5(1), pp. 49-61.
- Hinkin, T. R. (1995) A Review of Scale Development Practices in the Study of Organizations. *Journal of Management*, 21(5), pp. 967-988.
- Ho, S. M. & Warkentin, M. (2013) Insider Threat Early Warning Systems: An Application of the Leader's Dilemma Game. *Decision Support Systems*, under review.
- Hodgins, D. C. & Engel, A. B. (2002) Future Time Perspective in Pathological Gamblers. *Journal of Nervous & Mental Disease*, 190(11), pp. 775-780.
- Hofstede, G. (2001) *Culture's Consequences*. Sage Publications.
- Horstmanshof, L. & Zimitat, C. (2007) Future time orientation predicts academic engagement among first-year students. *British Journal of Educational Psychology*, 77(3), pp. 703-718.
- Hox, J. J., Kreft, I. G. G. & Hermkens, P. L. J. (1991) The Analysis of Factorial Surveys. *Sociological Methods Research*, 19(4), pp. 493-510.
- Hu, Q., Xu, Z., Dinev, T. & Ling, H. (2010) The centrality of low self-control in internal computer offenses. *The Dewald Roode Information Security Workshop*, pp. 316-346, 8-9 October, Boston, Massachusetts.
- Hughes, G. D. (2009) The Impact of Incorrect Responses to Reverse-Coded Survey Items. *Research in the Schools*, 16(2), pp. 76-88.

- Igure, V. M., Laughter, S. A. & Williams, R. D. (2006) Security issues in SCADA networks. *Computers & Security*, 25(7), pp. 498-506.
- Jackson, S. J. & Vimawala, A. (2011) Tightening the Net: Intellectual Property micro-regimes and peer-to-peer practice in higher education networks. *First Monday*, 16(11).
- Jasso, G. (2006) Factorial Survey Method for Studying Beliefs and Judgments. *Sociological Methods & Research*, 34(3), pp. 334-423.
- Job, V., Dweck, C. S. & Walton, G. M. (2010) Ego Depletion - Is It All In Your Head? Implicit Theories About Willpower Affect Self-Regulation. *Psychological Science*, 21(11), pp. 1686-1693.
- Johnston, A. & Warkentin, M. (2010) Fear Appeals and Information Security Behaviors: An Empirical Study. *MIS Quarterly*, 34(3), pp. 549-566.
- Joireman, J. A. (1999) Additional evidence for validity of the consideration of future consequences scale in an academic setting. *Psychological Reports*, 84(3c), pp. 1171-1172.
- Joireman, J. A., Lasane, T. P., Bennett, J., Richards, D. & Solaimani, S. (2001) Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behavior. *British Journal of Social Psychology*, 40(1), pp. 133-155.
- Joireman, J. A., Anderson, J. & Strathman, A. (2003) The Aggression Paradox: Understanding Links Among Aggression, Sensation Seeking, and the Consideration of Future Consequences. *Journal of Personality and Social Psychology*, 84(6), pp. 1287-1302.
- Joireman, J., Balliet, D., Sprott, D., Spangenberg, E. & Schultz, J. (2008) Consideration of future consequences, ego-depletion, and self-control: Support for distinguishing between CFC-Immediate and CFC-Future sub-scales. *Personality and Individual Differences*, 45(1), pp. 15-21.
- Joireman, J., Kees, J. & Sprott, D. (2010) Concern with Immediate Consequences Magnifies the Impact of Compulsive Buying Tendencies on College Students' Credit Card Debt. *Journal of Consumer Affairs*, 44(1), pp. 155-178.
- Kacmar, K. M., Ratcliff, S. L. & Ferris, G. R. (1989) Employment Interview Research: Internal and External Validity. In: *The Employment Interview : Theory, Research, and Practice*. 1<sup>st</sup> ed., (R. W. Eder & Ferris G. R., eds.), pp. 32-41, Newbury Park, CA : Sage.

- Kankanhalli, A., Teo, H. H., Tan, B. C. Y. & Wei, K. K. (2003) An integrative study of information systems security effectiveness. *International Journal of Information Management*, 23(2), pp. 139-154.
- Keller, C., Siegrist, M., Earle, T. C. & Gutscher, H. (2011) The General Confidence Scale: Coping with Environmental Uncertainty and Threat. *Journal of Applied Social Psychology*, 41(9), pp. 2200-2229.
- Kerlinger, F. N. (1973) *Foundations of Behavioral Research, 2nd ed.* London, UK: Holt Reinhart & Winston.
- Khan, D. (1996) *The Codebreakers: The Comprehensive History of Secret Communicaton from Ancient Times to the Internet.* New York, NY: Macmillian Company.
- Kleck, G., Sever, B., Li, S. & Gertz, M. (2005) The Missing Link in General Deterrence Research. *Criminology*, 43(3), pp. 623-660.
- Kline, P. (1979) *Psychometrics and psychology.* London, UK : Academic Press.
- Kovač, V. B. and Rise, J. (2007) The Relation Between Past Behavior, Intention, Planning, and Quitting Smoking: The Moderating Effect of Future Orientation. *Journal of Applied Biobehavioral Research*, 12(2), pp. 82-100.
- Kruger, D. J., Reischl, T. & Zimmerman, M. A. (2008) Time Perspective as a Mechanism For Functional Developmental Adaptation. *Journal of Social, Evolutionary, and Cultural Psychology*, 2(1), pp. 1-22.
- Kshetri, N. (2006) The Simple Economics of Cybercrimes. *IEEE Security & Privacy*, 4(1), pp. 33-39.
- Kubinger, K. D. (2003). On artificial results due to using factor analysis for dichotomous variables. *Psychology Science*, 45(1), 106-110
- Kwong, T. C. H. & Lee, M. K. O. (2002) Behavioral Intention Model for the Exchange Mode Internet Music Piracy. *Proceedings of the 35th Hawaii International Conference on System Sciences*, pp. 2481-2490, 7-10 January, Big Island, Hawaii, IEEE.
- Lanza, M. L. (1988) Technical notes – Development of a vignette: A data collection instrument about patient assault. *Western Journal of Nursing Research*, 10(3), pp. 346-351.
- Lauder, W. (2002) Factorial survey methods: A valuable but under-utilized research method in nursing research? *Nursing Times Research*, 7(1), pp. 35-43.



- Lee, K. & Ashton, M. C. (2010) Psychometric Properties of the HEXACO Personality Inventory. *Multivariate Behavioral Research*, 39(2), pp. 329-358.
- Lee, K., Ashton, M. C. & de Vries, R. (2005) Predicting Workplace Delinquency and Integrity with the HEXACO and Five-Factor Models of Personality Structure. *Human Performance*, 18(2), pp. 179-197.
- Lee, S. M., Lee, S. G. & Yoo, S. (2004) An integrative model of computer abuse based on social control and general deterrence theories. *Information & Management*, 41, pp. 707-718.
- Lejeuz, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., Strong, D. R. & Brown, R.A. (2002) Evaluation of a behavioral measure of risk taking: the Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology: Applied*, 8(2), pp. 75-84.
- Lennings, C. J. & Burns, A. M. (1998) Time Perspective: Temporal Extension, Time Estimation, and Impulsivity. *The Journal of Psychology*, 132(4), pp. 367-380.
- Li, H., Gupta, A., Luo, X. & Warkentin, M. (2011) Exploring the impact of instant messaging on subjective task complexity and user satisfaction. *European Journal of Information Systems*, 20, pp. 139-155.
- Lindquist, J. D. & Kaufman-Scarborough, C. (2007) The Polychronic-Monochronic Tendency Model - PMTS scale development and validation. *Time & Society*, 16(2-3), pp. 253-285.
- Logsdon, J. M., Thompson, J. K. & Reid, R. A. (1994) Software Piracy: Is it Related to Level of Moral Judgment? *Journal of Business Ethics*, 13(2), pp. 849-857.
- Lomranz, J., Shmotkin, D. & Katznelson, D. B. (1983) Coherence as a measure of future time perspective in children and its relationship to delay of gratification and social class. *International Journal of Psychology*, 18(1-4), pp. 407-413.
- Long, B. & Hiltz, K. (2012) Social Safety Net or Social Hammock? Applying Deterrence Theory to Reduce the Severity of the Food Stamp Fraud Crisis in America. *Internet Journal of Criminology*. Retrieved January 2, 2013 from [http://www.internetjournalofcriminology.com/Long\\_Hiltz\\_Deterrence\\_Theory\\_Social\\_Safety\\_Net\\_or\\_Social\\_Hammock\\_IJC\\_Feb\\_2012.pdf](http://www.internetjournalofcriminology.com/Long_Hiltz_Deterrence_Theory_Social_Safety_Net_or_Social_Hammock_IJC_Feb_2012.pdf).
- LoPucki, L. (2001) Human Identification Theory and the Identity Theft Problem. *Texas Law Review*, 80(1), pp. 89-135.
- Loughran, T. A., Paternoster, R., Piquero, A. R. & Pogarsky, G. (2011) On Ambiguity in Perceptions of Risk: Implications for Criminal Decision Making and Deterrence. *Criminology*, 49(4), pp. 1029-1061.

- Loughran, T., Piquero, A. R., Fagan, J. & Mulvey, E. P. (2012) Differential deterrence: Studying heterogeneity and changes in perceptual deterrence among serious youthful offenders. *Crime & Delinquency*, 58(1), pp. 3-27.
- Ludwick, R. & Zeller, R. A. (2001) The Factorial Survey: An Experimental Method to Replicate Real World Problems. *Nursing Research*, 50(2), pp. 129-133.
- Ludwick, R., Wright, M. E., Zeller, R. A., Dowding, D. W., Lauder, W., Winchell, J. (2004) An Improved Methodology for Advancing Nursing Research. *Advances in Nursing Science*, 27(3), pp. 224-238.
- Luo, X., Warkentin, M. & Johnston, A. C. (2009) The Impact of National Culture on Workplace Privacy Expectations in the Context of Information Security Assurance. *Proceedings of the Fifteenth Americas Conference on Information Systems*, pp. 1-6, August 6-9, San Francisco, California.
- MacKenzie, S. B., Podsakoff, P. M. & Podsakoff, N. P. (2011) Construct Measurement and Validation Procedures in MIS and Behavioral Research: Integrating New and Existing Techniques. *MIS Quarterly*, 35(2), pp. 293-334.
- MacKenzie, S. B. & Podsakoff, P. M. (2012) Common Methods Bias in Marketing: Causes, Mechanisms, and Procedural Remedies. *Journal of Retailing*, 88(4), pp. 542-555.
- Makkai, T., & Braithwaite, J. (1994) The dialectics of corporate crime. *Journal of Research in Crime and Delinquency*, 31(4), pp. 347-373.
- Malimage, K. and Warkentin, W. (2010) "Data Loss from Storage Device Failure: An Empirical Study of Protection Motivation," *Workshop on Information Security and Privacy (WISP)*, Dec. 12.
- March, J. G. (1978) Bounded Rationality, Ambiguity, and the Engineering of Choice. *The Bell Journal of Economics*, 9(2), pp. 587-608.
- Mason, C. & Perreault Jr., W. (1991) Colinearity, Power, and Interpretation of Multiple Regression Analysis. *Journal of Marketing Research*, 28(3), pp. 268-280.
- McBride, M., Carter, L. & Warkentin, M. (2012) *Exploring the Role of Individual Employee Characteristics and Personality on Employee Compliance with Cybersecurity Policies*. RTI International - Institute for Homeland Security Solutions.
- McCarthy, B. (2002) New Economics of Sociological Criminology. *Annual Review of Sociology*, 28, pp. 417-42.
- Mendes, S. M. & McDonald, M. D. (2001) Putting Severity of Punishment Back in the Deterrence Package. *Policy Studies Journal*, 29(4), pp. 588-610.

- Merle, J. (2000) A Kantian Critique of Kant's Theory of Punishment. *Law and Philosophy*, 19, pp. 311-338.
- Moore, T. & Dhillon, G. (2000) Software Piracy: A View from Hong Kong. *Communications of the ACM*, 43(12), pp. 88-93.
- Morton, N. A. & Koufteros, X. (2008) Intention to Commit Online Music Piracy and Its Antecedents: An Empirical Investigation. *Structural Equation Modeling : A Multidisciplinary Journal*, 15(3), pp. 491-512.
- Myyry, L., Siponen, M., Pahlila, S., Vartiainen, T. & Vance, A. (2009) What Levels of Moral Reasoning and Values Explain Adherence to Information Security Rules? An Empirical study. *European Journal of Information Systems*, 18(2), pp. 126-139.
- Nagin, D. S. (1998) Criminal Deterrence Research at the Outset of the Twenty-First Century. In: *Crime and Justice: A Review of Research*, (M. Tonry, M., ed.), 23, pp. 1-42. Chicago: The University of Chicago Press,
- Nagin, D. S. & Pogarsky, G. (2001) Integrating Celerity, Impulsivity and Extralegal Sanction Threats into a Model of General Deterrence : Theory and Evidence. *Criminology*, 39(4), pp. 865-891.
- Nagin, D. S. & Pogarsky, G. (2003) An Experimental Investigation of Deterrence: Cheating, Self-Serving Bias, and Impulsivity. *Criminology*, 41(1), pp. 167-194.
- Nagin, D. S. & Pogarsky, G. (2004) Time and Punishment: Delayed Consequences and Criminal Behavior. *Journal of Quantitative Criminology*, 24(4), pp. 295-317.
- Neil, J. (2007) *Personality & Individual Differences : An undergraduate psychology course*. Retrieved March 30, 2013 from <http://wilderdom.com/personality/>
- Ng, B. Y., Kankanhalli, A. & Xu, Y. (2009) Studying users' computer security behavior: A health belief perspective. *Decision Support Systems*, 46(4), pp. 815-825.
- Niederman, F. & DeSanctis, G. (1995) The Impact of a Structured-Argument Approach on Group Problem Formulation. *Decision Sciences*, 26(4), pp. 451-474.
- Nosko, A., Wood, E. & Molema, S. (2010) All about me: Disclosure in online social networking profiles: The case of FACEBOOK. *Computers in Human Behavior*, 26(3), pp. 406-418.
- Nunnally, J. C. (1978) *Psychometric Theory*, 2d ed. New York, NY: McGraw-Hill.
- Orbell, S. & Hagger, M. (2006) Temporal framing and the decision to take part in type 2 diabetes screening: Effects of individual differences in consideration of future consequences on persuasion. *Health Psychology*, 25(4), pp. 537-548.

- Orbell, S., Perugini, M. & Rakow, T. (2004) Individual Differences in Sensitivity to Health Communications: Consideration of Future Consequences. *Health Psychology*, 23(4), pp. 388-396.
- Ortendahl, M. & Fries, J. F. (2005) Framing Health Messages Based on Anomalies in Time Preference. *Medical Science Monitor*, 11(8), pp. 253-256.
- Osborne, C. (2012) Cybercrime costs U.S. consumers \$20.7 billion. CNet. Retrieved November 8, 2012 from [http://news.cnet.com/8301-1009\\_3-57506216-83/cybercrime-costs-u.s-consumers-\\$20.7-billion/](http://news.cnet.com/8301-1009_3-57506216-83/cybercrime-costs-u.s-consumers-$20.7-billion/)
- Oyserman, D. & Markus, H. M. (1990) Possible Selves and Delinquency. *Journal of Personality and Social Psychology*, 59(1), pp. 112-125.
- Pahnila, S., Siponen, M. & Mahmood, A. (2007) Employees' Behavior towards IS Security Policy Compliance. *Proceedings of the 40th Hawaii International Conference on System Sciences*, January 3-6, Big Island, HI.
- Paternoster, R. & Bushway, S. (2008) Desistance and the "Feared Self": Toward an Identity Theory of Criminal Desistance. *Journal of Criminal Law & Criminology*, 99(4), pp. 1103-1157.
- Paternoster, R. & Pogarsky, G. (2009) Rational Choice, Agency and Thoughtfully Reflective Decision Making: The Short and Long-Term Consequences of Making Good Choices. *Journal of Quantitative Criminology*, 25(2), pp. 103-127.
- Paternoster, R. (2010) How Much Do We Really Know About Criminal Deterrence? *The Journal of Criminal Law & Criminology*, 100(5), pp. 765-823.
- Peace, A. G., Galletta, D. F. and Thong, J. Y. L. (2003) Software Piracy in the Workplace: A Model and Empirical Test. *Journal of Management Information Systems*, 20(1), pp. 153-177.
- Pervin, L. A. (1994) A Critical Analysis of Current Trait Theory. *Psychological Inquiry*, 5(2), pp. 103-113.
- Peters, B. R., Joireman, J. & Ridgway, R. L. (2005) Individual Differences in the Consideration of Future Consequences Scale Correlate with Sleep Habits, Sleep Quality, and GPA in University Students. *Psychological Reports*, 96(3), pp. 817-824.
- Peterson, R. A. (1994) A Meta-analysis of Cronbach's Coefficient Alpha. *Journal of Consumer Research*, 21(2), pp. 381-391.
- Petersen, T. (1994) On the promise of game theory in sociology. *Contemporary Sociology*, 23(4), pp. 498-502.

- Petrocelli, J. V. (2003) Factor Validation of the Consideration of Future Consequences Scale: Evidence for a Short Version. *Journal of Social Psychology*, 143(4), pp. 405-413.
- Petry, N. M., Bickel, W. K. & Arnett, M. (1998) Shortened time horizons and insensitivity to future consequences in heroin addicts. *Addiction*, 93(5), pp. 729-738.
- Petter, S., Straub, D., & Rai, A. (2007) Specifying Formative Constructs in Information Systems Research. *MIS Quarterly*, 31(4), pp. 623-656.
- Pogarsky, G. (2006) Deterrence and Individual Differences Among Convicted Offenders. *Journal of Quantitative Criminology*, 25(1), pp. 59-74.
- Piquero, A. R., Paternoster, R., Pogarsky, G. & Loughran, T. A. (2011) Elaborating the individual difference component in deterrence theory. *Annual Review of Law and Social Science*, 7, pp. 335-360.
- Piquero, A. R. & Pogarsky, G. (2002) Beyond Stafford and Warr's Reconceptualization of Deterrence: Personal and Vicarious Experiences, Impulsivity, and Offending Behavior. *The Journal of Research in Crime and Delinquency*, 39(2), pp. 153-186.
- Piquero, N. L., Cohen, M. A. & Piquero, A. R. (2011) How Much is the Public Willing to Pay to be Protected from Identity Theft? *Justice Quarterly*, 28(3), pp. 437-459.
- Podsakoff, P., MacKenzie, S. B., Lee, J.Y. & Podsakoff, N. P. (2003) Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), pp. 879-903.
- Pogarsky, G. (2002) Identifying “deterable” offenders: Implications for research on deterrence. *Justice Quarterly*, 19(3), pp. 431-452.
- Pogarsky, G. (2002) Identifying “Deterable” Offenders: Implications for Research on Deterrence. *Justice Quarterly*, 19(3), pp. 431-452.
- Pogarsky, G. (2007) Deterrence and Individual Differences Among Convicted Offenders. *Journal of Quantitative Criminology*, 23, pp. 59-74.
- Ponemon Institute. (2012) *The 2012 Cost of Cybercrime*. Ponemon Institute.
- Pope, M. B., Warkentin, M., Bekkering, E. & Schmidt, M. B. (2012) Digital Steganography - An Introduction to Techniques and Tools. *Communications of the Association for Information Systems*, 30(22), pp. 347-366.

- Pope, M. B., Warkentin, M., Mutchler, L. A. & Luo, X. R. (2012) The Domain Name System – Past, Present, and Future. *Communications of the Association for Information Systems*, 30(1), pp. 329-346.
- Post, G. V. & Kagan, A. (2007) Evaluating information security tradeoffs: Restricting access can interfere with user tasks. *Computers & Security*, 26(3), pp. 229-237.
- Quesenberry, W. (2003) The Five Dimensions of Usability. In: Abers, M. J. & Mazur, M. B. (eds.) *Content and Complexity: Information Design in Technical Communication* (Abers, M. J. & Mazur, M. B., eds.), pp. 81-102. New York, NY: Routledge.
- Ratnasingham, P. (1998) The importance of trust in electronic commerce. *Internet Research*, 8(4), pp. 313-321.
- Rennie, L. (1982) Research note: detecting a response set to Likert-style attitude items with the rating model. *Education Research and Perspectives*, 9(1), pp. 114-118.
- Roos, P. & Albers, R. (1965) Performance of retardates and normals on a measure of temporal orientation. *American Journal of Mental Deficiency*, 69(6), pp. 835-838.
- Rossi, P.H. & Nock, S.L. (1982) *Measuring Social Judgments: The Factorial Survey Approach*. London, UK : Sage.
- Rothspan, S. & Read, S. J. (1996) Present versus future time perspective and HIV risk among heterosexual college students. *Health Psychology*, 15(2), pp. 131-134.
- Safeena, R., Date, H. & Kammani, A. (2011) Internet Banking Adoption in an Emerging Economy: Indian Consumer's Perspective. *International Arab Journal of e-Technology*, 2(1), pp. 56-64.
- Salam, A. F., Iyer, L., Palvia, P. & Singh, R. (2005) Trust in e-Commerce. *Communications of the ACM*, 48(2), pp. 73-77.
- Schaie, K. W. & Parham, I. A. (1976) Stability of Adult Personality Traits: Fact or Fable? *Journal of Personality and Social Psychology*, 34(1), pp. 146-158.
- Schultz, M. F. (2006) Fear and Norms and Rock & Roll: What Jambands Can Teach Us About Persuading People to Obey Copyright Law. *Berkeley Technology Law Journal*, 21, pp. 651-728.
- Shaw, E. D., Post, J. M. & Ruby, K. G. (2002) Inside the Mind of the Insider. *Security Management*. Retrieved November 11, 2011 from <http://www.securitymanagement.com/library/000762.html>

- Shaw, W. T. (2004) SCADA System Vulnerabilities to Cyber Attack. *Electric Energy T&D*, 8(6), pp. 62-65.
- Sheppard, B. H. & Sherman, D. M. (1998) The Grammars of Trust: A Model and General Implications. *Academy of Management Review*, 23(3), pp 422-437.
- Shim, J. P., Warkentin, M., Courtney, J. F., Power, D. J., Sharda, R. & Carlsson, C. (2002) Past, Present and Future of Decision Support Systems. *Decision Support Systems*, 33(2), pp. 111-126.
- Shores, K. & Scott, D. (2007) The relationship of individual time perspective and recreation experience preferences. *Journal of Leisure Research*, 39(1), pp. 28-59.
- Shropshire, J. (2009) A canonical analysis of intentional information security breaches by insiders. *Information Management & Computer Security*, 17(4), pp. 296-310.
- Simon, H. A. (1955) A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1), pp. 99-118.
- Sims, R. R., Cheng, H. K. & Teegen, H. (1996) Toward a profile of student software pirates. *Journal of Business Ethics*, 15(8), pp. 839-849.
- Siponen, M., Pahnla, S. & Mahmood, A. (2007) Employees' Adherence to Information Security Policies: An Empirical Study. *Proceedings of the International Federation for Information Processing (IFIP) Workshop*, pp. 133-144, 14-16 May, Sandton, Gauteng, South Africa.
- Siponen, M., Pahnla, S. & Mahomood, M. A. (2010) Compliance with Information Security Policies: An Empirical Investigation. *Computer*, 43(2), pp. 64-71.
- Siponen, M., Vance, A. & Willison, R. (2010) New Insights for an Old Problem: Explaining Software Piracy through Neutralization Theory. *Proceedings of the 43rd Hawaii International Conference on System Sciences*, pp. 1-10, IEEE.
- Sirois, F. M. (2004) Procrastination and intentions to perform health behaviors: The role of self-efficacy and the consideration of future consequences. *Personality and Individual Differences*, 37(1), pp. 115-128.
- Slocombe, W. (1981) The Countervailing Strategy. *International Security*, 5(4), pp. 18-27.
- Smith, M. D. & Telang, R. (2009) Competing with Free: The Impact of Movie Broadcasts on DVD Sales and Internet Piracy. *MIS Quarterly*, 33(2), pp. 321-338.

- Spitzner, L. (2003) Honeypots: Catching the insider threat. *Proceedings of the 19th Annual Computer Security Applications Conference (ACSAC '03)*, pp. 170-180, 8-12 December, Miami Beach, Florida.
- Stanton, J. M., Stam, K. R., Mastrangelom, P. & Jolton, J. (2004) Analysis of end user security behaviors. *Computers & Security*, 24(2), pp. 124-133.
- Strathman, A., Gleicher, F., Boninger, D. S. & Edwards, C. S. (1994) The Consideration of Future Consequences: Weighing Immediate and Distant Outcomes of Behavior. *Journal of Personality and Social Psychology*, 66(4), pp. 742-752.
- Straub, D. W. (1989) Validating Instruments in MIS Research. *MIS Quarterly*, 13(2), pp. 147-169.
- Straub, D. W. (1990) Effective IS Security: An Empirical Study. *Information Systems Research*, 1(3), pp. 255-276.
- Straub, D. W. & Collins, R. W. (1990) Key Information Liability Issues Facing Managers: Software Piracy, Proprietary Databases, and Individual Rights to Privacy. *MIS Quarterly*, 14(2), pp. 143-156.
- Straub, D. W. & Welke, R. J. (1998) Coping With Systems Risk: Security Planning Models for Management Decision Making. *MIS Quarterly*, 22(4), pp. 441-470.
- Stutton, S. (1998) Predicting and Explaining Intentions and Behavior: How Well Are We Doing? *Journal of Applied Social Psychology*, 28(15), 1317-1338.
- Strelan, P. & Boeckmann, R. B. (2006) Why Drug Testing in Elite Sport Does Not Work: Perceptual Deterrence Theory and the Role of Personal Moral Beliefs. *Journal of Applied Social Psychology*, 36(12), pp. 2909-2934.
- Sykes, G. & Matza, D. (1957) Techniques of Neutralization: A Theory of Delinquency. *American Sociological Review*, 22(6), pp. 664-670.
- Tabachnick, B. G. & Fidell, L. S. (2007) *Using Multivariate Statistics*, 5<sup>th</sup> ed. Boston, MA : Pearson.
- Taneja, A. (2006) *Determinants of Adverse Usage of Information Systems Assets: A Study of Antecedents of IS Exploit in Organizations*. University of Texas at Arlington.
- Tangari, A. H., Folse, J. A. G., Burton, S. & Kees, J. (2010) The Moderating Influence of Consumers' Temporal Orientation on the Framing of Societal Needs and Corporate Responses in Cause-Related Marketing Campaigns. *Journal of Advertising*, 39(2), pp. 35-50.
- Taylor, B. J. (2006) Factorial Surveys: Using Vignettes to Study Professional Judgment. *British Journal of Social Work*, 36, pp. 1187-1207.



- Teal, J. (2012) *Financial Econometrics Modeling Coursepack*. Retrieved February 22, 2013 from <http://homepages.rpi.edu/~tealj2/mgmt6400.htm>
- Thomas, J., Quinn, B., Robinson, J. & James, D. J. (2011) *Identity Theft Reported by Households: 2005-2010*. Bureau of Justice Statistics. Retrieved August 8, 2012 from <http://bjs.ojp.usdoj.gov/index.cfm?ty=tp&tid=42>.
- Thomas, K. J., Loughran, T. A. & Piquero, A. R. (2013) Do Individual Characteristics Explain Variation in Sanction Risk Updating Among Serious Juvenile Offenders? Advancing the Logic of Differential Deterrence. *Law and Human Behavior*, 37(1), pp. 10-21.
- Toepoel, V. (2010) Is Consideration of Future Consequences a changeable construct? *Personality and Individual Differences*, 48(8), pp. 951-956.
- Tourangeau, R. & Yan, T. (2007) Sensitive Questions in Surveys. *Psychological Bulletin*, 133(5), pp. 859-883.
- Trustwave. (2012) *Trustwave Global Security Report*. Trustwave. Retrieved January 3, 2013 from <https://www.trustwave.com/global-security-report>.
- Ulen, T.S. (1999) Rational choice theory in law and economics. *Encyclopedia of Law and Economics*. Retrieved March 14, 2013 from <http://encyclo.findlaw.com>
- United Nations (2005). *Conference on Trade and Development, Information Economy Report*. Geneva, Switzerland. Retrieved February 1, 2013 from [http://www.unctad.org/en/docs/sdteecb20051overview\\_en.pdf](http://www.unctad.org/en/docs/sdteecb20051overview_en.pdf)
- United States Senate. (2009) *Statement of Edward Amoroso Senior Vice President & Chief Security Officer, AT&T Inc.* March 19. Retrieved February 20, 2013 from [http://commerce.senate.gov/public/?a=Files.Serve&File\\_id=e8d018c6-bf5f-4ea6-9ecc-a990c4b954c4](http://commerce.senate.gov/public/?a=Files.Serve&File_id=e8d018c6-bf5f-4ea6-9ecc-a990c4b954c4).
- Upton, D. J., Bishara, A. J., Ahn, W. Y. & Stout, J. C. (2012) Propensity for risk taking and trait impulsivity in the Iowa Gambling Task. *Personality and Individual Differences*, 50(4), pp. 492-495.
- van der Pol, M. (2010) Health, education and time preference. *Health Economics*, 20(8), pp. 917-929.
- Van Gelder, J. L. & de Vries, R. E. (2012) Traits and States: Integrating Personality and Affect into a Model of Criminal Decision Making. *Criminology*, 50(3), pp. 637-671.
- Vance, A. (2010) The factorial survey method: Applications for information security and privacy research. *The Dewald Roode Information Security Workshop*, October 8-9, Boston, MA.

- Vance, A., & Siponen, M. (2012) IS Security Policy Violations: A Rational Choice Perspective. *Journal of Organizational and End-User Computing*, 24(1), pp. 21-41.
- Vance, A., Siponen, M. & Warkentin, M. (2011) Deterrence Without Borders: How National Culture Affects IS Security Policy Violations. *Workshop on Information Security and Privacy (WISP)*, 3 December, Shanghai, China.
- Verizon. (2012) Verizon 2012 Data Breach Investigations Report. Retrieved December 18, 2012 from [http://www.verizonbusiness.com/resources/reports/rp\\_data-breach-investigations-report-2012\\_en\\_xg.pdf](http://www.verizonbusiness.com/resources/reports/rp_data-breach-investigations-report-2012_en_xg.pdf).
- Von Wagner, C., Semmler, C., Power, E. & Good, A. (2010) What Matters When Deciding Whether to Participate in Colorectal Cancer Screening? The Moderating Role of Time Perspective. *Journal of Applied Biobehavioral Research*, 15(1), pp. 20-30.
- Von Hentig, H. (1938) The limits of deterrence. *Journal of Criminal Law and Criminology*, 29, pp. 555-561.
- Wagenaar, A. C., Denk, C. E., Hannan, P. J., Chen, H. & Harwood, E. M. (2001) *Liability of commercial and social hosts for alcohol-related injuries: a national survey of accountability norms and judgments*. *Public Opinion Quarterly*, 65, pp. 344-368.
- Wallace, M. & Rabin, A. I. (1960) Temporal Experience. *Psychological Bulletin*, 57(3), pp. 213-236.
- Wallander, L. (2009) 25 years of factorial surveys in sociology: A review. *Social Science Research*, 38(3), pp. 505-520.
- Warkentin, M., Johnston, A. C. & Shropshire, J. (2011) The Influence of the Informal Social Learning Environment on Information Privacy Policy Compliance Efficacy and Intention. *European Journal of Information Systems*, 20(1), pp. 267-284.
- Warkentin, M., Malimage, N. & Malimage, K. (2012) Impact of Protection Motivation and Deterrence on IS Security Policy Compliance: A Multi-Cultural View. *Workshop on Information Security and Privacy (WISP)*, Orlando, FL.
- Warkentin, M., McBride, M., Carter, L. & Johnston, A. (2012) The Role of Individual Characteristics on inside Abuse Intentions. *Proceedings of the Eighteenth Americas Conference on Information Systems (AMCIS)*, August 9-12, Seattle, Washington.
- Warkentin, M., Walden, E. A., Johnston, A. C. & Straub, D. W. (2012) Identifying the Neural Correlates of Protection Motivation for Secure IT Behaviors. *Proceedings of the Gmunden Retreat on NeuroIS*, p. 6, June 3-6, Gmunden, Austria.

- Warkentin, M. & Willison, R. (2009) Behavioral and policy issues in information systems security: the insider threat. *European Journal of Information Systems*, 18(2), pp. 101-105.
- Warkentin, M., Willison, R. & Johnston, A. C. (2011) The Role of Perceptions of Organizational Injustice and Techniques of Neutralization in Forming Computer Abuse Intentions. *Proceedings of the Seventeenth Americas Conference on Information Systems (AMCIS)*, August 4-7, Detroit, Michigan.
- Whitman, M. E. (2003) Enemy at the gate: threats to information security. *Communications of the ACM*, 46(8), pp. 91-95.
- Williams, K. R. & Hawkins, R. (1986) Perceptual Research on General Deterrence: A Critical Review. *Law & Society Review*, 20(4), pp. 545-572.
- Willison, R. & Warkentin, M. (2010) The Expanded Security Action Cycle: A Temporal Analysis 'Left of Bang.' *Proceedings of the International Federation for Information Processing (IFIP) Workshop*, pp. 392-438, Boston, MA
- Willison, R. & Warkentin, M. (2013) Beyond Deterrence: An Expanded View of Employee Computer Abuse. *MIS Quarterly*, 37(1), pp 1-20.
- Wilson, M. & Daly, M. (1997) Life expectancy, economic inequality, homicide, and reproductive timing in Chicago neighbourhoods. *British Medical Journal*, 314(7089), pp. 1271-1274.
- Wilson, M. & Daly, M. (2004) Do pretty women inspire men to discount their future? *Proceedings of the Royal Society*, 271(Supp. 4), pp. 177-179.
- Witte, K. (1994) Fear Control and Danger Control: A Test of the Extended Parallel Process Model (EPPM). *Communication Monographs*, 61(2), pp. 113-134.
- Wright, B. R. E., Caspi, A., Moffitt, T. E. & Paternoster, R. (2004) Does the Perceived Risk of Punishment Deter Criminally Prone Individuals? Rational Choice, Self-Control, and Crime. *Journal of Research in Crime and Delinquency*, 41(2), pp. 180-213.
- Yu, J. (1994) Punishment celerity and severity: Testing a specific deterrence model on drunk driving recidivism. *Journal of Criminal Justice*, 22(4), pp. 355-366.
- Zimbardo, P. G. & Boyd, J. N. (1999) Putting Time in Perspective: A Valid, Reliable Individual-Differences Metric. *Journal of Personality and Social Psychology*, 77(6), pp. 1271-1288.
- Zimbardo, P. G., Keough, K. A. & Boyd, J. N. (1997) Present Time Perspective as a Predictor of Risky Driving. *Personality and Individual Differences*, 23(6), pp. 1007-1023.

APPENDIX A  
INSTRUMENT COMPOSITION – THE CONSIDERATION OF FUTURE  
CONSEQUENCES SCALE

## **Introduction**

The survey instrument used in this study was a hybrid design, incorporating elements of traditional as well as factorial survey design. This appendix will examine the Consideration of Future Consequences (CFC) (Strathman, Gleicher, Boninger & Edwards, 1994), an instrument designed to measure time orientation.

### **Initial Consideration of Future Consequences Instrument**

The original CFC consists of 12 items. Of these, 5 are reverse-coded. All items measure the response of the subject on a 1-5 Likert scale, in terms of their agreement with the item's statement as it pertains to themselves. In general, the higher the score on the CFC by an actor, the more that he is considered to have long-term time orientation. CFC has been shown to be reliable, and although it may change in the long-term, it is mostly stable over time (Toepoel, 2010).

Some research has suggested that CFC may in fact be two-dimensional, rather than unidimensional (Petrocelli, 2003). However, as of the time of this writing, recent research indicates that a unidimensional model is indeed a better fit (Hevey, Pertl, Thomas, Maher, Craig & Ni Chuinneagain, 2010).

The following items are the original Consideration of Future Consequences scale.

Table A.1 Original Consideration of Future Consequences scale (Strathman, Gleicher, Boninger & Edwards, 1994)

|                                                                                                                                                    | Very unlike me | Unlike me | Neutral | Like me | Very like me |
|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|---------|---------|--------------|
| I consider how things might be in the future, and try to influence those things with my day-to-day behavior.                                       |                |           |         |         |              |
| Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.                                           |                |           |         |         |              |
| I only act to satisfy immediate concerns, figuring the future will take care of itself.                                                            |                |           |         |         |              |
| My behavior is only influenced by the immediate (i.e. a matter of days or weeks) outcomes of my actions.                                           |                |           |         |         |              |
| My convenience is a big factor in the decisions I make or the actions I take.                                                                      |                |           |         |         |              |
| I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.                                                |                |           |         |         |              |
| I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.             |                |           |         |         |              |
| I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences. |                |           |         |         |              |
| I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.           |                |           |         |         |              |
| I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.                                       |                |           |         |         |              |
| I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.                        |                |           |         |         |              |
| Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.                                |                |           |         |         |              |

### **Adapted Consideration of Future Consequences Scale**

As adapted for this study, the CFC had its wording modified according to the findings of the instrument design panel. Most notably, in accordance with (Podsakoff, MacKenzie, Lee & Podsakoff, 2003), items that were initially reverse coded were reworded to remove this element. Efforts were made to keep the logical flow of the items consistent with the originally presented items. As per recent literature, CFC was analyzed as a one-dimensional construct (Hevey, Pertl, Thomas, Maher, Craig & Ni Chuinneagain, 2010), which also aided in constructing a more parsimonious study model.

The following items are the Consideration of Future Consequences instrument as used for this study.

Table A.2 Consideration of Future Consequences instrument, adapted

|                                                                                                                                                       | Very<br>unlike<br>me | Unlike<br>me | Neutral | Like<br>me | Very<br>like<br>me |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------|---------|------------|--------------------|
| I consider how things might be in the future, and try to influence those things with my day-to-day behavior.                                          |                      |              |         |            |                    |
| Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.                                              |                      |              |         |            |                    |
| I act primarily to satisfy future concerns, figuring the future will turn out better if I take care of it in advance.                                 |                      |              |         |            |                    |
| My behavior is primarily influenced by future outcomes of my actions (i.e. a matter of months or years).                                              |                      |              |         |            |                    |
| Convenience is only a small factor in the decisions I make or actions I take.                                                                         |                      |              |         |            |                    |
| I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.                                                   |                      |              |         |            |                    |
| I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.                |                      |              |         |            |                    |
| I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.    |                      |              |         |            |                    |
| I generally pay attention to warnings about possible future problems because I think the problems need to be resolved before they reach crisis level. |                      |              |         |            |                    |
| I think that making sacrifices now is usually necessary to ensure good future outcomes.                                                               |                      |              |         |            |                    |
| I act to satisfy more than immediate concerns to take care of problems that may arise at a later date.                                                |                      |              |         |            |                    |
| Since my day-to-day work has specific outcomes, it is less important to me than behavior that has distant outcomes.                                   |                      |              |         |            |                    |



APPENDIX B  
INSTRUMENT DESIGN – FACTORIAL SURVEY

## **Introduction**

As noted in the previous appendix, the survey instrument used in the present study was a hybrid design between traditional and factorial survey methods. The present chapter elaborates on the factorial survey portions.

## **Factorial Surveys**

A factorial survey is intended to allow a subject to separate himself from the situation at hand and role-play in the perspective of a character provided in a scenario. This scenario is then asked to the participant several times, but with elements changed. The ultimate intent of most factorial surveys in the social sciences is presently to determine the subject's behavioral intent. This has been found to be useful in many contexts, such as those examining crime, wherein a participant may be reluctant to consider wrongdoing. This design has other benefits, such as being able to extract a large amount of valid data from an otherwise smaller subject pool, and being able to control for specific factors in the context.

## **Scenario for Present Study**

The scenario for the present study was developed with the assistance of the instrument design panel discussed in chapter 3. The intent was to provide a situation which would be familiar to the sample frame and might induce violations of security policy, yet be depersonalized enough that they would be more likely to be honest in their responses. Furthermore, it was also designed such that at least one major factor in personal identity, gender, could be adapted to help the participant insert himself into the scenario.

The skeleton of the scenarios is as follows. Each bracketed passage varied between the low condition (listed first), and the high condition (listed second). Table B.1 indicates the specific variables embedded and reiterates their possible combinations and states. Note that the first variable, reward, is represented twice, albeit merely in terms of the plurality of the books obtained.

Pat is a student at a typical university. Living in a dorm, the only reliable high-speed Internet connection available is the university's connection. Pat's budget has unexpectedly become extremely tight. Pat has found out that textbooks for the upcoming semester are much more expensive than expected, and they are required. Pat knows where to "pirate," or illegally download, textbooks from the Internet. At the sites hosting the illegal downloads, there [is one textbook that is needed|are all the textbooks that are needed]<sup>1</sup>.

However, the university has a strict anti-piracy policy. The system is monitored [occasionally by administrators|constantly by computers]<sup>2</sup>.

Offenders, when caught, may lose their Internet for a [week|semester]<sup>3</sup>, and enforcement will occur within a [week|few seconds]<sup>4</sup>. Pat decides to pirate the [book|books]<sup>1</sup> anyway.

Table B.1 Embedded Variables

| Number | Variable  | Low Condition                    | High Condition                          |
|--------|-----------|----------------------------------|-----------------------------------------|
| 1      | Reward    | "is one textbook that is needed" | "are all the textbooks that are needed" |
| 2      | Certainty | "occasionally by administrators" | "constantly by computers"               |
| 3      | Severity  | "week"                           | "semester"                              |
| 4      | Celerity  | "week"                           | "few seconds"                           |

## Examples of Scenarios Generated

These are two of the possible scenarios that were generated for participants to respond to.

### Example 1

*This example has low reward, low certainty, low severity and low celerity.*

Pat is a student at a typical university. Living in a dorm, the only reliable high-speed Internet connection available is the university's connection. Pat's budget has unexpectedly become extremely tight. Pat has found out that textbooks for the upcoming semester are much more expensive than expected, and they are required. Pat knows where to "pirate," or illegally download, textbooks from the Internet. At the sites hosting the illegal downloads, there is one textbook that is needed.

However, the university has a strict anti-piracy policy. The system is monitored occasionally by administrators.

Offenders, when caught, may lose their Internet for a week, and enforcement will occur within a week. Pat decides to pirate the book anyway.

### Example 2

*This example has high reward, high certainty, high severity and high celerity.*

Pat is a student at a typical university. Living in a dorm, the only reliable high-speed Internet connection available is the university's connection. Pat's budget has unexpectedly become extremely tight. Pat has found out that textbooks for the upcoming semester are much more expensive than expected, and they are required. Pat knows

where to "pirate," or illegally download, textbooks from the Internet. At the sites hosting the illegal downloads, there are all the textbooks that are needed.

However, the university has a strict anti-piracy policy. The system is monitored constantly by computers.

Offenders, when caught, may lose their Internet for a semester, and enforcement will occur within a [week|few seconds]<sup>4</sup>. Pat decides to pirate the books anyway.

### **Manipulation Checks**

There were four manipulation check items, one corresponding to each of the embedded variables. Failing to answer one correctly resulted in the relevant data point being discarded from the computational analysis. The correct answer depended on the specific scenario the participant was examining at the time.

How often is Internet activity monitored on campus?

- Constantly
- Occasionally

If caught, how quickly will Pat be punished?

- Within a few seconds
- Within a week

What benefits are there for Pat in violating policy?

- A single textbook needed
- All the textbooks needed for the whole semester

How long will Pat lose Internet, if caught?

- A week
- A semester

### Likert Scale Items – Main Study

Behavioral intent, the primary dependent variable for this study, was measured via Likert scale. Likert scales were also used as a response set check to make certain that the subject was paying attention to the instrument while responding to it. All items were measured on a scale of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. Items were based on instruments previously validated in the literature (Warkentin, Willison & Johnston, 2011). Note that two of the items reference book or textbook; these vary accordingly with the relevant scenario’s embedded reward variable.

Table B.2 Items used in instrument for each vignette

| Variable Measured  | Item                                                                                    |
|--------------------|-----------------------------------------------------------------------------------------|
| Behavioral Intent  | Just like Pat, I would also download the [book books] in this situation.                |
| Realism            | This situation seems to be a realistic situation that a university student might face.  |
| Behavioral Intent  | Under these circumstances, I would have downloaded the [textbook textbooks] as Pat did. |
| Response Set Check | Please mark your reply to this single statement as agree.                               |
| Behavioral Intent  | If I were Pat, I would do the same thing.                                               |

### Likert Scale Items – Pilot Test

Additional Likert scale items were used during the pilot test in order to determine instrument validity, according to recommendations from Churchill (1979). The intent

was to make certain that the perception of each embedded variable was what was desired, and as such, an additional twelve items were added. There were three items each for celerity, certainty, severity and reward, in order to meet reliability standards as per (Hinkin, 1995; Cook, Hepworth, Wall & Warr, 1981). These items were constructed with the intent of basing them on items from previously validated instruments, adapting them into a context-relevant form. Table B.3 provides the items, along with the embedded variable they were intended to reflect, and the source material which acted as a base. For convenience, the items are grouped together by the variable measured; however, for the actual study, they were unblocked, as per recommendations by (Podsakoff, MacKenzie, Lee & Podsakoff, 2003), making certain that no two immediately adjacent items measured the same variable. Additionally, one item regarding the magnitude of the reward (using “book” as singular or plural) varied accordingly with the embedded variable in the scenario.

Table B.3 Likert scale items used in pilot test version of study instrument

| Variable Measured | Item                                                                                                   | Source                            |
|-------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------|
| Severity          | Getting caught downloading against university policy will result in a severe sanction.                 | (D'Arcy, Hovav & Galletta, 2009)  |
|                   | Getting caught downloading against policy will result in serious punishment.                           | (D'Arcy, Hovav & Galletta, 2009)  |
|                   | For conducting an illegal download, the penalty would be severe.                                       | (Siponen, Pahnla & Mahmood, 2007) |
| Certainty         | Students will be caught if they disobey university download policies.                                  | (D'Arcy, Hovav & Galletta, 2009)  |
|                   | The likelihood the university would discover an illegal download is high.                              | (D'Arcy, Hovav & Galletta, 2009)  |
|                   | Students will be caught if they violate university download policies.                                  | (Siponen, Pahnla & Mahmood, 2007) |
| Celerity          | The penalty will begin immediately for violating university download policies.                         | (Siponen, Pahnla & Mahmood, 2007) |
|                   | Actions against students who violate university download policies are swift                            | (Hu, Xu, Dinev & Ling, 2010)      |
|                   | Actions against students who conduct illegal downloads with university Internet connections are rapid. | (Hu, Xu, Dinev & Ling, 2010)      |
| Reward            | On a limited budget, disobeying university policies would provide significant financial benefits.      | (Vance & Siponen, 2012)           |
|                   | Given this financial situation, doing what Pat did would save a lot of money.                          | (Vance & Siponen, 2012)           |
|                   | A student with limited funds would benefit significantly acquiring the [book books] in this manner.    | (Vance & Siponen, 2012)           |