2016

To deny or to confess: An interrogation decision-making model

Yueran Yang
Iowa State University

To deny or to confess: An interrogation decision-making model

by

Yueran Yang

A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Co-Majors: Psychology; Statistics

Program of Study Committee:
Stephanie Madon, Co-Major Professor
Dan Nettleton, Co-Major Professor
Max Guyll
Fred Lorenz
Chris Meissner
Gary Wells

Iowa State University

Ames, Iowa

2016

TABLE OF CONTENTS

LIST OF FIGURES

Page

LIST OF TABLES

Page

LIST OF EQUATIONS

Page

ACKNOWLEDGEMENTS

I would like to take this opportunity to express my gratitude to people who made this dissertation possible and because of whom my graduate life has been and will be one of my most cherished memories.

My deepest gratitude is to my co-major professor in Psychology, Dr. Stephanie Madon. I have been amazingly fortunate to have an advisor who always encourages me to pursue my goals, gives me the freedom to explore on my own, and provides me with tremendous help and inspiring guidance. Stephanie's patience and support have helped me overcome many difficulties and finish this dissertation.

I also owe great gratitude to my co-major professor in Statistics, Dr. Dan Nettleton, who has always been there to listen and give advice. Dan has opened a new window to me and taught me how to think statistically and rigorously. Without Dan's encouragement and guidance, I would not have been able to complete my co-major in Statistics.

I would also like to express my gratitude to the rest of my committee members. I am grateful to Dr. Chris Meissner, who has been a great mentor and encouraged me to pursue my career in academia. I am grateful to Dr. Gary Wells, who has guided me to discover my unique strengths and explore new research areas. I am grateful to Dr. Max Guyll, who has always supported and encouraged my research ideas. I am grateful to Dr. Fred Lorenz, who is one of the best teachers in my life.

Finally, and most importantly, I would like to thank my husband, Dr. Feng Guo, for his love, support, and constant patience. And to my daughter, Alice, who has accompanied me to complete my dissertation and made these days special.

ABSTRACT

This dissertation seeks to explain suspects' decision-making processes within the context of a custodial interrogation by presenting a new model of confessions referred to as the *interrogation decision-making model*. The model proposes that suspects' decision-making process can be analyzed at two different levels—a micro-level process and a macro-level process. Drawing on expected utility theory (Edwards, 1962; Shoemaker, 1982; Von Neumann & Morgenstern, 1944), the micro-level process of the model introduces a mathematical framework to explain the psychological mechanisms underlying suspects' single interrogation decision at a certain point in time. The macro-level process of the model describes the dynamic nature of suspects' multiple interrogation decisions throughout an interrogation. These two processes jointly explain suspects' decisions to deny or confess guilt during a custodial interrogation.

This dissertation also describes two experimental studies that tested key predictions generated by the model. Experiment 1 (N = 205) tested the prediction that suspects decide whether to deny or confess guilt on the basis of a proximal outcome's perceived desirability, or in terms of the model, its perceived utility. Experiment 2 (N = 158) tested the prediction that suspects decide whether to deny or confess guilt on the basis of a distal outcome's perceived utility. The results of the experiments were mixed. Whereas the utility of a proximal outcome did not significantly influence participants' admissions and denials of prior misconduct, the utility of a distal outcome did. These findings provide partial support for the model by showing that a critical factor affecting suspects' decision-making is the perceived utility of distal outcomes.

CHAPTER 1. THE MYTH OF CONFESSIONS

When Jeffrey Deskovic walked out of prison at the age of 32, he had spent nearly half of his life behind bars. “The time period to have a family, to spend time with my family, is lost. I lost all my friends. My family has become strangers to me…There was a woman who I wanted to marry at the time that I was convicted, and I lost that too,” he said, sadly (Santo, 2006, para 4-5). The catastrophic transition that altered Jeffrey’s life occurred in 1990, when he was convicted of raping and murdering his high school classmate, Angela Correa. Jeffery had been targeted as a suspect because he was late for school on the day of Angela’s murder and because the police perceived him as “overly distraught” during Angela’s funeral (Santos, 2006, para. 16). The police brought him into a small and isolated room. After being questioned for over six hours, Jeffery told the police what they wanted to hear—he confessed to the murder even though he was innocent. “I thought it was all going to be O.K. in the end”, he said, thinking that his innocence would be proven by the DNA evidence collected at the crime scene (Santo, 2006, para. 18). However, the jury chose to base its verdict on Jeffrey’s tearful confession, not on the contradictory DNA test result. Jeffery spent sixteen years in prison and was released only after the DNA sample obtained from the crime scene was determined to match that of another man—Steven Cunningham—who subsequently confessed to the murder (Innocence Project, 2016a).

Jeffery’s case reveals the incriminating power of a confession. As the U.S. Supreme Court pointed out in the case of *Bruton v. United States* (1968), “…the defendant's own confession is probably the most probative and damaging evidence that can be admitted against him” (p.7). McCormick (1972) expressed the same viewpoint when he said, “The introduction of a confession makes the other aspects of a trial in court superfluous” (p. 316).

Both archival and experimental research have confirmed the powerful role of confession evidence in the incrimination and conviction of both guilty and innocent suspects. For example, Drizin and Leo (2004) found that among a sample of proven false confessors, more than 80% were wrongfully convicted. Kassin and Sukel (1997) demonstrated that confession evidence strongly influenced the verdicts of mock jurors—even when they were told that the confession was coerced, even when they knew that the confession was ruled inadmissible, and even when they regarded themselves as not being influenced by the confession. In fact, a confession has such a profound effect on jurors that sometimes it can overwhelm the effect of exculpatory evidence, as it did at Jeffery Deskovic's trial in which the jury gave more weight to his confession than to the contradictory DNA evidence (Appleby & Kassin, 2016).

Because of its incriminating power, a confession typically leads to legal sanctions (Kassin & Gudjonsson, 2004). These sanctions can be so severe that common sense would suggest that even guilty suspects would form a solid mindset not to admit guilt during a custodial interrogation (Gudjonsson, 2003). Yet between 42% and 55% of all suspects confess when interrogated by police (Kassin & Gudjonsson, 2004). These figures are not limited to guilty suspects. As revealed by the more than 300 exoneration cases reported on the Innocence Project's webpage, approximately 25% of innocent suspects made self-incriminating statements or outright confessions during a custodial interrogation (Innocence Project, 2016b). These striking numbers give rise to a fundamental psychological question: Why do suspects confess?

Empirical Research

The irrational act of confessing has led researchers to examine factors associated with confessions, especially those associated with false confessions (for reviews, see Kassin, 2008, 2012; Kassin et al., 2010; Houston, Meissner, & Evans, 2014). This body of work has established that situational, dispositional, and criminological factors significantly influence suspects' tendency to confess when interrogated. The situational factors that have been tested pertain primarily to characteristics associated with a custodial interrogation, particularly interrogation techniques that police use to elicit confessions. The dispositional factors that have been tested include cognitive disabilities, psychological illness, and personality traits. The criminological factors that have been tested are suspects' true innocence or guilt, criminal history, and the perceived seriousness of the crime. The following subsections briefly review the documented effects that these factors have on suspects' confessions during custodial interrogations.

Situational factors

Interrogation techniques are designed to break down a suspect's resistance to confession (Ofshe & Leo, 1997a). In the past, police relied heavily on "third degree" methods to extract confessions. Because it is conceivable that both innocent and guilty suspects alike would confess under relentless physical torture, needs deprivation, and mental suffering, third degree methods have been abandoned in the U.S. since the 1960s (Bedau & Radelet, 1987; Leo, 2004). Modern interrogation techniques, which are psychologically based, are broadly classified into two categories: minimization and maximization (Kassin & McNall, 1991). Minimization includes so-called "soft-sell" techniques, which lull suspects into a false sense of security, thereby encouraging a confession (Kassin & McNall, 1991, p.

235). They include rapport building, moral justifications and excuses (e.g., Russano, Meissner, Narchet, & Kassin, 2005), and reducing the apparent seriousness of the offense (e.g., Horgan, Russano, Meissner, & Evans, 2012). Maximization includes so-called "hard-sell" techniques, which intimidate or threaten suspects (Kassin & McNall, 1991, p. 234). These techniques also encourage suspects to confess, but do so by causing them to believe that they are trapped by the weight of the evidence. These techniques include presenting false evidence such as false polygraph test results or false eyewitness evidence (e.g., Kassin & Kiechel, 1996; Nash & Wade, 2009), exaggerating the seriousness of the offense, and implying that suspects will receive harsh punishment if they do not admit guilt (e.g., Horgan et al., 2012). Though these psychologically based techniques are subtle and sophisticated, abundant research has demonstrated that they have powerful effects on behavior as evidenced by their tendency to elicit confessions from both guilty and innocent suspects (Kassin et al., 2010).

Dispositional factors

Suspects' susceptibility to interrogation techniques are influenced by individual differences. One of the most commonly studied individual differences is a suspect's age. Both behavioral and neurological research findings have converged on the conclusion that youth are characterized by immaturity, impulsivity, a decreased capacity to consider future consequences, and an increased susceptibility to social influence (Grisso et al., 2003; Owen-Kostelnik, Reppucci, & Meyer, 2006). Consistent with the idea that these dispositional attributes put juveniles at particularly high risk of falsely confessing, research has shown that juveniles are over-represented in false confession cases—35% of the false confessors were

below the age of 18 in Drizin and Leo's (2004) sample, whereas only 13% of people arrested for violent crimes were juveniles (Puzzanchera, 2011).

Many of the dispositional qualities that are associated with youth are also associated with cognitive disabilities. Research has shown that individuals with low IQ scores, impaired executive functioning, and reduced adaptive behavior are especially vulnerable to police influence. They are also impulsive in their judgments and decisions, qualities that increase their risk of falsely confessing (Kassin et al., 2010). For example, individuals with these cognitive disabilities are highly susceptible to leading questions and negative feedback (Everington & Fulero, 1999), and have difficulty understanding legal consequences of a confession (Cloud, Shepherd, Barkoff, & Shur, 2002). Because of these deficits, suspects with cognitive disabilities might confess to a crime merely to avoid the discomfort of police interrogation (Appelbaum & Appelbaum, 1994).

Criminological factors

Suspects' true innocence or guilt influences their tendency to confess during an interrogation. Though innocent suspects are significantly less likely to confess than guilty suspects (Gudjonsson, 2003), they are uniquely vulnerable to a psychological mindset referred to as the *phenomenology of innocence* (Kassin, 2005; Guyll et al., 2013). According to this concept, innocent suspects strongly believe in the protective power of their innocence and fail to recognize the inherent danger of the situation. As a result, innocent suspects make behavioral choices that put their long-term interests at risk. For example, innocent suspects are more likely than guilty suspects to waive their Miranda rights (Kassin & Norwick, 2004), to agree to a show-up rather than a lineup that would offer them more protection (Holland, Kassin, & Wells, 2005), and to increase their willingness to confess when interrogators bluff

about evidence (Perillo & Kassin, 2011). As Kassin (2005) concludes, "… innocence puts innocents at risk" (p. 215).

Criminal history is another factor that influences suspects' confession decisions. All else being equal, suspects without previous criminal records are less likely to invoke their Miranda rights and are more likely to confess during an interrogation than are suspects with previous criminal records (Leo, 1996; Moston, Stephenson, & Williamson, 1992). Suspects' tendency to confess during a custodial interrogation is also influenced by the type and seriousness of crimes of which they have been accused. Research has revealed that suspects more readily confess to non-serious offenses than serious ones (Madon, Yang, Smalarz, Guyll, & Scherr, 2013; Moston et al., 1992). Taken together, these findings suggest that suspects who are truly guilty, who do not have a prior criminal record, and who have been accused of a less serious offense are more likely to confess.

Theoretical Models

A variety of theoretical models have attempted to explain the psychological processes underlying suspects' confessions. These models reflect three different theoretical perspectives, including psychoanalytic, cognitive-behavioral, and decision-making.

Psychoanalytic perspective

Models reflecting a psychoanalytic perspective emphasize the role of the unconscious as the key determinant of confessions. Both Reik (1959) and Rogge (1975), for example, have proposed that feelings of guilt and remorse drive suspects to confess. According to their models, suspects develop an unconscious compulsion to confess in order to release negative emotions, occasionally even to a crime they did not actually commit. Therefore, these models highlight the role of internal conflict and feelings of guilt in suspects' confessions.

Cognitive-behavioral perspective

The cognitive-behavioral approach to understanding confessions emphasizes factors that encourage suspects to confess by virtue of altering their cognitions and behaviors. Gudjonsson (2003), for example, has proposed a five-factor model of confessions. This model includes both antecedents and consequences of confessions that are categorized as social, emotional, cognitive, situational, and physiological. Antecedents are events that precede a confession, such as distress, physical isolation, and drug withdrawal. Consequences are events that follow a confession, such as police approval, feeling relief, and a reduction in arousal.

According to the model, antecedents trigger confessions. For example, the heightened physiological reactivity experienced by suspects during an interrogation may weaken their ability to sustain denials of involvement in the crime, thus causing them to confess. Consequences reflect the short-term and long-term effects that the confession brings about. Short-term consequences reinforce suspects for having confessed. For example, after confessing, a suspect's physiological reactivity may return to normal, thus reinforcing the decision to confess. Long-term consequences punish suspects for confessing. For example, once a suspect has confessed, s/he is more likely to be found guilty and face incarceration than if no confession had been made. According to the five-factor model, therefore, antecedents and consequences jointly influence suspects' tendency to confess.

Decision-making perspective

Two models explain confessions from the perspective of decision-making. Hilgendorf & Irving (1981) first conceptualized suspects as decision-makers, proposing that suspects are faced with a series of decisions during custodial interrogation: whether to speak or remain

silence, whether to admit to the accusation or not, whether to divulge or conceal the truth, and how to respond to interrogators, etc. Hilgendorf and Irving noted that suspects' decisions are governed by subjective rather than objective assessments of the perceived consequences and their probability of occurrence. They further argued that under intense pressure, suspects are motivated to obtain social approval from their interrogators and, at the same time, that their capacity to make efficient decisions is severely impaired. In short, this model highlights important factors that influence suspects' decision-making during custodial interrogation.

Ofshe and Leo (1997a, 1997b) have proposed a two-step decision-making model to describe how police manipulate and alter suspects' initial denials to a confession during an interrogation. Police interrogators first attempt to move suspects from a position of confidence, where suspects believe that they will benefit from continued denials, to one of despair, where suspects believe that they will certainly be arrested, prosecuted, and ultimately convicted. Thus, according to this model, the first goal of interrogation is to change suspects' perception of the immediate situation and to elicit hopelessness and despair. Police achieve this goal with interrogation techniques that lead suspects to believe that the case against them is so strong that they are trapped by the weight of the evidence. For example, Ofshe and Leo described how police accuse suspects of committing the crime, present suspects with incriminating evidence, and attack suspects' memory. Once suspects' confidence has been shaken and hopelessness and despair have set in, Ofshe and Leo propose that police interrogators transition into step two where they offer suspects incentives that pull for a confession by leading them to believe that it is in their best interests to confess. These incentives range from low end incentives such as the suggestion that a confession will alleviate feelings of guilt to high end incentives that promise leniency or avoidance of the

death penalty. Thus, the hypothesized two-step process is designed to influence suspects' subjective assessments about their available choices and the likely consequences that will result.

Is a New Model Needed?

Empirical research has revealed a great many factors that influence suspects' confessions. However, from my point of view, these research findings are scrambled jigsaw pieces that are waiting to be assembled into a complete picture. To do so, the field needs a theoretical model that can systematically explain the psychological mechanisms underlying suspects' confessions. Such a model must be able to explain patterns of research findings related to confessions and to arrange them into a coherent and integrated picture.

For two reasons, existing models of confessions do not achieve this. First, most models are descriptive rather than analytical. They describe the interrogation process, but do not explain the causal mechanisms that operate to influence suspects' confessions. Second, even for models that have proposed underlying mechanisms, they reflect a piecemeal approach. The aforementioned decision-making models, for example, have proposed that suspects' subjective perceptions of the probability of potential consequences play a fundamental role in confessions, but they do not explain how. How do suspects make confession decisions on the basis of their perceptions? In what way do police interrogation practices manipulate suspects' perceptions of these consequences? How does this mechanism explain differences in the confession rates between the innocent and the guilty, juveniles and adults, and those with and without cognitive, emotional, and psychological vulnerabilities? Without a coherent architecture, these models are limited precisely because they do not delve deeply enough into the psychological processes underlying confession decisions.

In this sense, the question “why do suspects confess?” has not yet been adequately addressed. Thus, even though various factors and phenomena relevant to confessions have been examined, the field still lacks a theory that can assemble these individual jigsaw pieces together into a whole.

CHAPTER 2. AN INTERROGATION DECISION-MAKING MODEL

This chapter introduces a new model of confessions referred to as the *interrogation decision-making model*. This model provides a systematic framework with which to understand, explain, and predict suspects' confessions and denials within the context of a custodial police interrogation. The model conceptualizes suspects as decision-makers who must decide whether to deny or confess guilt when subjected to police pressure. The model's conceptualization of suspects as decision-makers is consistent with existing models of confessions (Hilgendorf & Irving, 1981; Ofshe & Leo, 1997a, 1997b). It also aligns with the legal system's standards of voluntariness which requires that, to be admissible in court, a confession must be given freely without the influence of coercion or threat (Grano, 1979).

First and foremost, the interrogation decision-making model proposes that suspects' decision-making within the context of a custodial interrogation can be understood and analyzed at two different levels: a micro-level process and a macro-level process. The micro-level process takes an analytical view and considers a snapshot of an interrogation at a specific moment. It focuses on the psychological mechanisms that underlie a single decision that suspects make at a given time point during an interrogation. The macro-level process, in contrast, takes a holistic view and considers the panorama of an interrogation. It focuses on the dynamic nature of suspects' multiple decisions throughout the entire course of an interrogation. The micro- and macro-level processes analyze suspects' decision-making at different levels, yet they are naturally connected. The micro-level process forms the basic building blocks for the macro-level process, and the macro-level process identifies factors that influence the micro-level process. Together, these two processes help to organize and explain suspects' decision-making during an interrogation.

Micro-Level Process: An Analytical View of an Interrogation Decision

As mentioned above, the micro-level process of the model takes a snapshot of interrogation and anatomizes suspects' interrogation decisions at the individual level. Concretely, the micro-level process corresponds to the psychological mechanisms that underlie a suspect's interrogation decision at a specific point in time. This section presents a theoretical framework to explain and understand suspects' micro-level decision-making process.

The term *decision space* refers to the collection of all choices that suspects perceive as being available to them in the course of an interrogation. For example, during an interrogation, suspects may perceive themselves to have the choice to deny guilt, the choice to confess, and the choice to invoke their Miranda rights (Hilgendorf & Irving, 1981; Ofshe & Leo, 1997a). Although the model can accommodate all choices that exist within suspects' decision space, for simplicity, the following presentation of the model considers only two choices: to deny guilt and to confess guilt. With this restriction in place, the decision space is mathematically expressed as,

$$\boldsymbol{\Omega} = \{\text{Choices in an interrogation: denial, confession}\}$$

Throughout this article, $\boldsymbol{D}$ denotes the choice of a denial, $\boldsymbol{C}$ denotes the choice of a confession, and $\boldsymbol{x}$ denotes either a denial or a confession. Mathematically, $\boldsymbol{x = D}$ or $\boldsymbol{C}$.

The micro-level process of the interrogation decision-making model explains how suspects decide between choices within their decision space to reach an optimal decision at a certain time point during an interrogation. Figure 1 presents a flowchart to illustrate the micro-level process that underlies suspects' interrogation decisions.

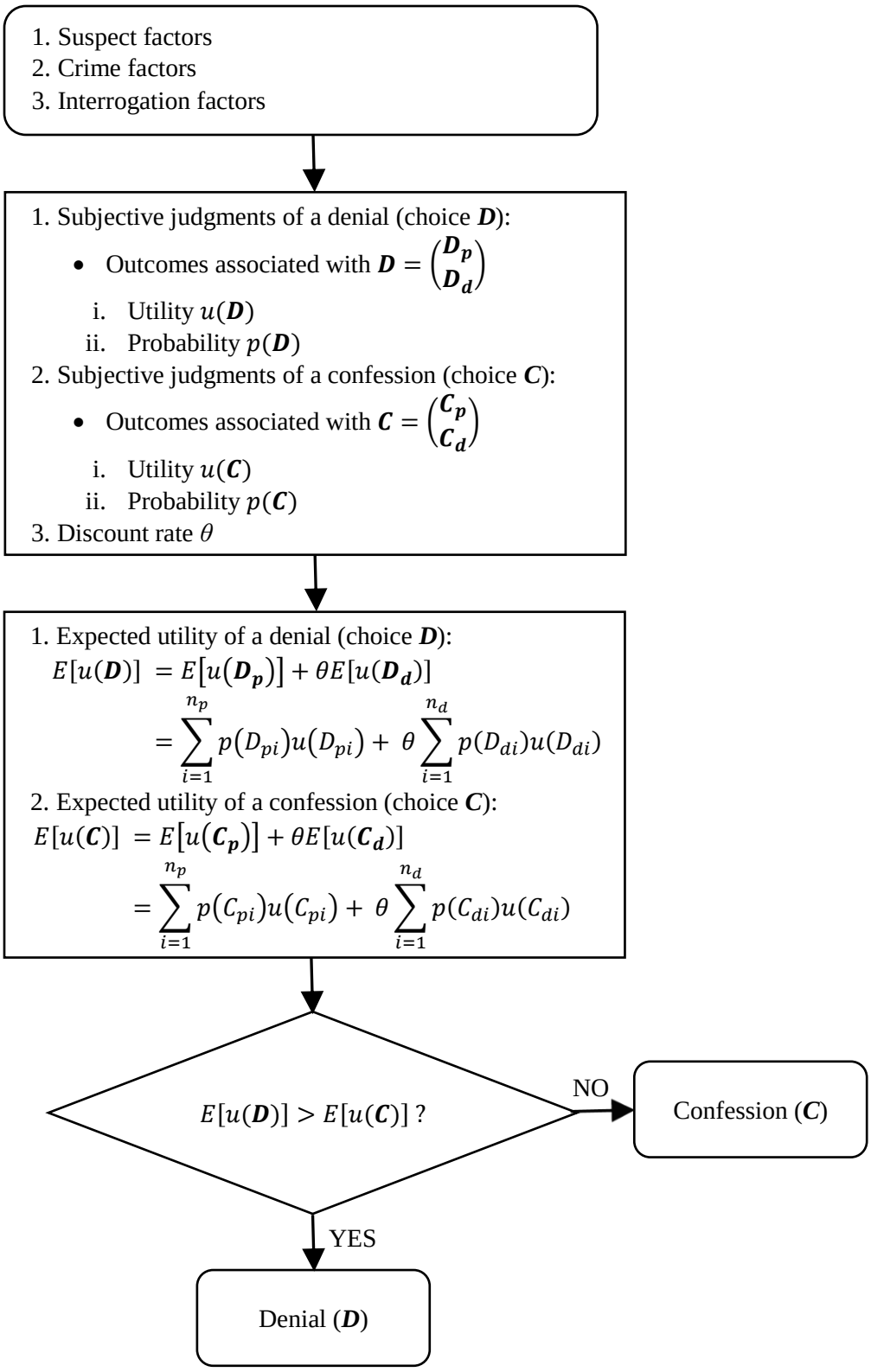

Figure 1. This flowchart presents suspects' micro-level decision-making process. The rounded rectangle at the top shows the starting step, during which different sources of factors are input into the process. The two sharp rectangles in the middle reveal the processing steps,

through which suspects form evaluation of the expected utilities of their choices. The diamond shows the decision rule according to which suspects make their decisions whether to deny or confess guilt. The rounded rectangles at the bottom indicate the end of the process, i.e., the final outputs generated by the decision rule.

In Figure 1, the rounded rectangle at the top indicates the starting point—factors that influence suspects' decision-making. The two sharp rectangles in the middle represent the processing steps. During the processing steps, those factors shape suspects' subjective judgments of the proximal and distal outcomes following a denial and a confession; suspects then use these subjective judgments to evaluate their preference for a denial and a confession, which are quantified in the model as the expected utilities of these two choices. The diamond shows the decision step—once suspects form evaluations of the expected utilities of a denial and a confession, they implicitly compare these two choices according to the decision rule involved in this step. Depending upon the outcome of the decision rule, suspects' micro-level decision-making process ends with one choice in the decision space—either a denial or a confession. This flowchart, therefore, presents the micro-level process that suspects use to make a decision between the two choices in their decision space. The following sections elaborate on these steps.

Decision step: How suspects choose between choices

How do suspects make a decision between a denial and a confession? The model proposes that suspects make their decisions by comparing the expected utilities of a denial and a confession. They will choose to deny guilt if they believe that a denial will yield the greatest expected utility, but will choose to confess if they believe that a confession will yield the greatest expected utility. This decision rule is shown in the diamond, and its outputs are presented in the two rounded rectangles at the bottom in Figure 1.

Processing steps: How suspects evaluate choices

According to the above decision rule, suspects make a decision on the basis of their evaluations of the expected utilities of a denial and a confession. Conceptually, expected utility reflects suspects' preference for a particular choice. Mathematically, the expected utility of a given choice $\boldsymbol{x}$ ($\boldsymbol{x} = \boldsymbol{D}$ or $\boldsymbol{C}$) is expressed below in Equation 1.

Equation 1.

$$E[u(\boldsymbol{x})] = E\left[u(\boldsymbol{x_p})\right] + \theta E[u(\boldsymbol{x_d})] = \sum_{i=1}^{n_p} p(x_{pi})u(x_{pi}) + \theta \sum_{i=1}^{n_d} p(x_{di})u(x_{di})$$

Four sets of parameters influence the expected utility of a choice. These parameters are presented by the symbols $\boldsymbol{x}$, $u(\cdot)$, $p(\cdot)$, and θ. The following subsections explain how these four parameters impinge upon suspects' confession decisions.

Perceived outcomes: Proximal and distal. The first set of parameters is presented by the vector $\boldsymbol{x}$ in Equation 1. It represents all of the outcomes that suspects perceive will follow their choice $\boldsymbol{x}$, whether it be a denial or a confession. The vector $\boldsymbol{x}$ is further partitioned into two sub-vectors $\boldsymbol{x_p}$ and $\boldsymbol{x_d}$. The sub-vector $\boldsymbol{x_p} = (x_{p1}, x_{p2,}, \dots, x_{pn_p})^T$ includes all *proximal outcomes* that suspects perceive will immediately follow choice $\boldsymbol{x}$ during an interrogation, and the sub-vector $\boldsymbol{x_d} = (x_{d1}, x_{d2,}, \dots, x_{dn_d})^T$ includes all *distal outcomes* that suspects perceive will follow choice $\boldsymbol{x}$ in the future; that is, after an interrogation has ended.

To illustrate, consider the choice of denying guilt. Suspects who consider this choice are predicted to perceive themselves as likely to experience potential proximal outcomes, including longer detainment, additional confrontational questioning, and the continued experience of negative emotions such as hopelessness, anxiety, and stress (Gudjonsson,

2003; Gudjonsson & Sigurdsson, 1999). Suspects may also perceive the choice of denying guilt to have a variety of distal outcomes, such as exculpation, or perhaps a lighter sentence if convicted. The choice of confessing has a mirrored set of outcomes. Suspects who consider the choice to confess may perceive this course of action to not only be associated with the proximal outcomes of being released from an interrogation or being given permission to make a phone call, but also with potential distal outcomes, some of which could be quite serious, such as conviction, a lengthy prison sentence, or execution (Drizin & Leo, 2004; Gudjonsson, 2003).

How do suspects make the optimal decision between the two choices of denial and confession when each one has multiple outcomes associated with it? According to expected utility theory, people evaluate the expected utility of a specific choice in terms of the *probability* and *utility* of its outcomes and, moreover, that they will make the choice that yields the highest expected utility (Edwards, 1962; Shoemaker, 1982; Von Neumann & Morgenstern, 1944). Applying the same idea to the interrogation situation, the interrogation decision-making model proposes that the probability and utility of the perceived outcomes are key elements that influence suspects' interrogation decisions. When considering whether to deny or confess guilt, interrogated suspects will evaluate the expected utility of each choice in terms of its outcomes' probabilities (i.e., perceived likelihoods of occurrence) and utilities (i.e., perceived (un)desirability of the outcomes). The idea that an outcome's probability and utility influence suspects' decision is reflected in Equation 1.

Probability. In Equation 1, the function $p(\cdot)$ is a probability function that represents suspects' perception of an outcome's chance of occurring as a result of a given choice

(Gilboa, Postlewaite, & Schmeidler, 2008). For example, a suspect may expect a 0% chance of conviction if s/he denies guilt, but an 80% chance of conviction if s/he confesses.

Utility. Equation 1 also includes the utility function $u(\cdot)$. It represents suspects' perception of an outcome's (un)desirability; that is, how much satisfaction, happiness, or "goodness" is expected if the outcome occurs (Mongin, 1988; Schoemaker, 1982). For example, a suspect may expect to experience a high degree of dissatisfaction and unhappiness if the outcome of conviction occurs. An outcome's utility has two components: valence and magnitude. The valence of an outcome's utility indicates whether the outcome is perceived as positive or negative. A positive valence represents a desired outcome, whereas a negative valence represents an undesired outcome. For example, if $u(y)$ is positively valenced and $u(z)$ is negatively valenced, then *y* is desired and *z* is undesired. The magnitude of an outcome's utility reflects how strongly the outcome is desired or undesired. If $u(y) = 200$ and $u(z) = 100$, then both *y* and *z* are desired, but *y* is twice as desirable as *z*. Similarly, if $u(y) = 200$ and $u(z) = -100$, then *y* is desired and *z* is undesired, and furthermore, the magnitude of the desirability associated with *y* is twice the magnitude of the undesirability associated with *z*.

Discount distal outcomes. It is well established that human beings temporally discount delayed outcomes (Berns, Laibson, & Loewenstein, 2007; Kalenscher & Pennartz, 2008). Compared with larger rewards in the future, people prefer immediate outcomes with smaller values. This robust phenomenon of temporal discounting is also at play when suspects decide whether or not to confess to crimes. Empirical research has demonstrated that suspects have a propensity to focus on short-term contingencies, giving disproportionate weight to the proximal outcomes that are delivered by police during an interrogation, without

sufficient consideration of the distal (and often more severe) outcomes that may be levied by the judicial system if they are convicted (Madon, Guyll, Scherr, Greathouse, & Wells, 2012; Madon et al., 2013).

Drawing on this body of work, the model predicts that suspects discount distal outcomes. Equation 1 represents this predicted tendency with the parameter θ. According to the model, the discount rate becomes smaller as suspects' tendency to discount distal outcomes becomes greater. The interrogation decision-making model assumes that the discount rate, θ, can only take values between 0 and 1, inclusively. The lower bound value of 0 represents full discounting: Suspects make their interrogation decisions solely on the basis of anticipated proximal outcomes without any regard for distal outcomes. The upper bound value of 1, by contrast, represents the absence of discounting: Suspects make their interrogation decisions on the basis of both anticipated distal outcomes and proximal outcomes, without any discounting of distal outcomes. This assumption is expressed mathematically as: $0 \leq \theta \leq 1$.

Table 1. Examples of suspects' perceived proximal and distal outcomes

	Proximal outcomes		Distal outcomes	
	Valence (-)	Valence (+)	Valence (-)	Valence (+)
Denial (***D***)	Police disapproval; Extended detainment; More interrogation techniques; Anxiety, guilt and remorse from deception (if guilty).	Convince police of innocence; End interrogation.	Conviction based on other evidence.	Not convicted.
Confession (***C***)	Discomfort from deception (if innocent).	Police approval; Relief from deception (if guilty). End interrogation.	Conviction and legal sanctions.	Not convicted.

Table 1 lists examples of suspects' perceived proximal and distal outcomes for a denial and a confession, respectively. In addition to the classification of proximal and distal outcomes, Table 1 also separates the perceived outcomes according to their valence. From the table, it may be noted that suspects can perceive a denial and a confession to produce different outcomes. For instance, suspects may expect that an interrogator will show disapproval in response to a denial but approval in response to a confession. It is also the case that suspects can perceive a denial and a confession to produce the same outcomes. For instance, it is possible that suspects, especially innocent ones, will anticipate that they can convince police interrogators of their innocence and end an interrogation by continually denying guilt; it is also possible that suspects, especially guilty ones, will perceive future conviction as a probable event even if they continually deny guilt if they believe that the police have other evidence to support incrimination.

Subjective judgments. It is important to emphasize that suspects' perceptions of possible outcomes are subjective rather than objective. Moreover, because the information that is available to suspects can be both insufficient and inaccurate, their subjective judgments may not be valid (Gilboa et al., 2008). In other words, it is suspects' subjective beliefs about the probability and utility of likely outcomes, which may or may not be accurate, that influence their decisions. When people use inaccurate perceptions during decision making, their final decisions can lead to errors (Tversky & Kahneman, 1974, 1981). For example, if gamblers mistakenly estimate the odds of winning a lottery, then they may take the wrong action and lose large sums of money; if suspects underestimate the possibility of being convicted, then they may decide to waive their Miranda rights or confess during an interrogation (Kassin, 2005; Kassin & Norwick, 2004).

Starting step: Factors affecting suspects' subjective judgments

How do suspects form the subjective judgments of the parameters involved in the expected utility function? A great many of factors may influence the information that suspects use to construct their subjective judgments. For example, suspects' knowledge about the legal system and the incriminating evidence presented by police may influence their perception of the probability of future conviction; suspects' past experience in prison and the seriousness of the offense may influence their perception of the utility of future punishment; and suspects' age, intelligence level, and mental status may influence their tendency to discount the future. Because these factors operate in the macro-level process, I discuss them with more detail in next section.

Examples: Understanding the micro-level process

The above sub-sections presented a theoretical framework for suspects' micro-level decision-making process. To further facilitate understanding of this framework, I next present two hypothetical examples to illustrate how suspects evaluate the expected utility of a denial and a confession and make a decision between these two choices. Table 2 shows the mathematical expressions corresponding to the parameters involved in Equation 1. With these parameters, the expected utility of each choice can be evaluated.

Table 2. Model parameters to evaluate expected utilities of a denial and a confession

	Proximal outcomes			Distal outcomes (discount rate θ)		Expected utility
	(-)	(+)		(-)	(+)	
Denial (***D***)	$u(D_{p-})$, $p(D_{p-})$	$u(D_{p+})$, $p(D_{p+})$	θ	$u(D_{d-})$, $p(D_{d-})$	$u(D_{d+})$, $p(D_{d+})$	$E[u(\boldsymbol{D})]$
Confession (***C***)	$u(C_{p-})$, $p(C_{p-})$	$u(C_{p+})$, $p(C_{p+})$		$u(C_{d-})$, $p(C_{d-})$	$u(C_{d+})$, $p(C_{d+})$	$E[u(\boldsymbol{C})]$

In Table 2, a suspect's perceived outcomes that follow a denial are denoted as $\boldsymbol{D} = [\boldsymbol{D_p}, \boldsymbol{D_d}] = [(D_{p-}, D_{p+}), (D_{d-}, D_{d+})]$. Similarly, the perceived outcomes that follow a confession are denoted as $\boldsymbol{C} = [\boldsymbol{C_p}, \boldsymbol{C_d}] = [(C_{p-}, C_{p+}), (C_{d-}, C_{d+})]$. $\boldsymbol{D_p}$ and $\boldsymbol{C_p}$ represent the proximal outcomes that follow a denial and a confession, respectively; $\boldsymbol{D_d}$ and $\boldsymbol{C_d}$ represent the distal outcomes that follow a denial and a confession, respectively. Although there are usually multiple proximal and distal outcomes, in order to simplify the notations in each cell of Table 2, my examples treat all negative outcomes as a single outcome (i.e., D_{p-}, D_{d-} and C_{p-}, C_{d-}) and all positive outcomes as a single outcome (i.e., D_{p+}, D_{d+} and C_{p+}, C_{d+}). Therefore, with Equation 2 the expected utility of a denial can be expressed as,

Equation 2.

$$E[u(\boldsymbol{D})] = [p(D_{p-})u(D_{p-}) + p(D_{p+})u(D_{p+})] + \theta[p(D_{d-})u(D_{d-}) + p(D_{d+})u(D_{d+})]$$

And similarly, with Equation 3 the expected utility of a confession can be expressed as,

Equation 3.

$$E[u(\boldsymbol{C})] = [p(C_{p-})u(C_{p-}) + p(C_{p+})u(C_{p+})] + \theta[p(C_{d-})u(C_{d-}) + p(C_{d+})u(C_{d+})]$$

Table 3. Example 1: An innocent suspect's subjective judgments.

	Proximal outcomes			Distal outcomes		Expected utility
	(-)	(+)	θ	(-)	(+)	
Denial ($\boldsymbol{D}$)	-100, 90%	$+100$, 10%	0.1	-10000, 0%	$+100$, 100%	-70
Confession ($\boldsymbol{C}$)	-100, 0%	$+100$, 100%		-10000, 50%	$+100$, 50%	-395

Example 1: An innocent suspect is brought into an interrogation. This suspect's perceptions of the utilities and probabilities of possible outcomes and the discount rate are quantified as in Table 3. For the purpose of simplicity, it is assumed that the proximal and distal outcomes considered by this suspect are the same for a denial and for a confession. The suspect perceives that the negative distal outcome of future conviction (with a utility of -10000) are far more severe than the negative proximal outcome of being detained in the interrogation room (with a utility of -100). The suspect also perceives that the positive proximal outcome of escaping from the interrogation and the positive distal outcome of not being convicted in the future are equally desirable (each with a utility of +100). The probabilities of those outcomes, however, are different for a denial and a confession. For a denial, the suspect believes that there is a high risk of being detained in the uncomfortable confrontational situation (with a probability of 90%) but no risk of future conviction (0%). For a confession, the suspect anticipates ending the interrogation immediately (i.e., with a probability of experiencing the negative proximal outcome at 0%), while simultaneously believing that there is some chance that s/he will be convicted and punished in the future (with a probability of experiencing the negative distal outcome at 50%). Furthermore, the discount rate for the distal outcomes is set up as 0.1, indicating that this suspect will discount the distal outcomes to 10% in her or his decisions.

Inserting these values into Equation 2 and 3 yields the expected utilities of a denial and a confession, respectively,

$$E[u(\boldsymbol{D})] = [-100 * 90\% + 100 * 10\%] + 0.1 * [-10000 * 0\% + 100 * 100\%] = -70$$

$$E[u(\boldsymbol{C})] = [-100 * 0\% + 100 * 100\%] + 0.1 * [-10000 * 50\% + 100 * 50\%] = -395$$

Because the expected utility of a denial ($E[u(\boldsymbol{D})] = -70$) is higher than that of a confession ($E[u(\boldsymbol{C})] = -395$), the model predicts that this suspect will choose to deny guilt at this time point.

Table 4. Example 2: A guilty suspect's subjective judgments.

	Proximal outcomes			Distal outcomes		Expected utility
	(-)	(+)	θ	(-)	(+)	
Denial ($\boldsymbol{D}$)	-100, 90%	$+100$, 10%	0.1	-10000, 90%	$+100$, 10%	-979
Confession ($\boldsymbol{C}$)	-100, 0%	$+100$, 100%		-10000, 100%	$+100$, 0%	-900

Example 2: Let us consider another example of an interrogated suspect who is guilty of the crime. Suppose that perceptions of the utilities of all possible outcomes and the discount rate are the same for the guilty suspect as they were for the innocent suspect in the aforementioned example, but the probabilities of the outcomes are different (as shown in Table 4). Being aware of other evidence collected by police investigators confirming her or his guilt, the guilty suspect believes that future punishment is highly probable even if s/he denies culpability (with a probability of experiencing the negative distal outcome at 90%). This suspect also believes that if s/he chooses to confess, it is with absolute certainty that s/he will be convicted in the future (with a probability of 100%). Therefore, the suspect can evaluate the expected utilities of a denial and a confession as follows,

$$E[u(\boldsymbol{D})] = [-100 * 90\% + 100 * 10\%] + 0.1 * [-10000 * 90\% + 100 * 10\%] = -979$$

$$E[u(\boldsymbol{C})] = [-100 * 0\% + 100 * 100\%] + 0.1 * [-10000 * 100\% + 100 * 0\%] = -900$$

Because the expected utility of a confession ($E[u(\boldsymbol{C})] = -900$) is higher than that of a denial ($E[u(\boldsymbol{D})] = -979$), the model predicts that this suspect will choose to confess at this time point.

The above hypothetical examples illustrate how the interrogation decision-making model can be used to understand suspects' micro-level decision-making process during an interrogation. Simply put, the model suggests that interrogated suspects make the decision to either deny or confess guilt on the basis of comparing the expected utilities of their choices. In particular, suspects evaluate the expected utility of a choice in terms of the utilities and probabilities of its proximal and distal outcomes, and suspects naturally discount distal outcomes in this process.

Macro-Level Process: A Holistic View of an Interrogation

During an interrogation, suspects seldom make just one decision; instead, they usually make a series of decisions—at first denials and at last perhaps a confession. Taking a holistic point of view, the macro-level process of the model takes into account suspects' multiple decisions across the entire course of an interrogation and examines changes in their interrogation decisions over time. In other words, the macro-level process corresponds to the entire flow of suspects' decision-making process throughout an interrogation, including how their decisions change over time and what factors may influence these changes.

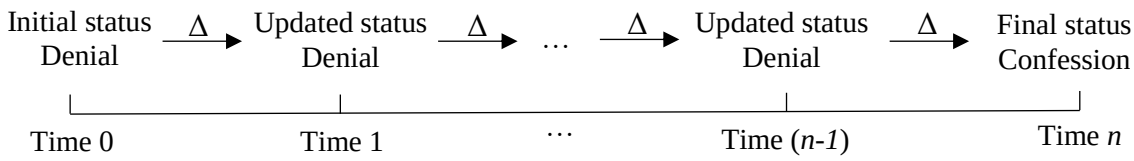

Figure 2. The macro-level process of suspects' decision-making during an interrogation. The symbol Δ represents changes during an interrogation.

Figure 2 shows a hypothetical example of the macro-level process of suspects' decision-making. At the beginning of an interrogation, a suspect may be apt to deny guilt. As the interrogation continues, however, the suspects' internal status may change. For instance, the suspect's knowledge about the crime may change, stress level may increase, and resistance to social influence may decrease. As a result, the suspect may become more and more reluctant to deny guilt, and eventually switch and decide to confess guilt.

A great many factors can operate in the macro-level process and influence suspects' decision-making. These macro-level factors serve as the starting step for the micro-level process of each interrogation decision, influencing the information that suspects use to construct their subjective judgments. These macro-level factors can be classified into three categories according to their relevance to the elements of an interrogation. One class of macro-level factors varies at the level of the interrogated suspect including, suspects' personality traits, intelligence level, general knowledge about the legal system, as well as factual innocence versus guilt, etc. A second class of macro-level factors varies at the level of the crime under investigation. Included in this class of factors are the type of the crime (e.g., murder versus larceny) and the perceived seriousness of the crime. The third class of macro-level factors varies at the level of the interrogation situation, including various police interrogation techniques, features of the interrogation room, characteristics of police interrogator(s), etc.

This categorization of the three classes of macro-level factors reflects different levels of variability introduced by different elements of an interrogation. For example, suspect factors are relevant to understanding population differences in confessions, i.e., the inter-individual differences; crime factors are relevant to understanding crime differences in

confessions, i.e., the inter-crime differences; and interrogation factors are relevant to understanding chronological changes in the decision-making process within the same suspect for the same crime, i.e., the intra-individual differences. The three classes of factors can also interact with each other. For example, the same police interrogation technique may have different effects on juvenile versus adults, minority versus non-minority, and suspects with criminal records versus those without (Leo, 1996).

Correspondingly, these factors play different roles in suspects' decision-making process. Across the entire course of an interrogation, suspect factors and crime factors are usually constant and do not change over time. Therefore, their effects on suspects' decision-making are stable. For example, suspects' age, intelligence, factual innocence or guilt, and the characteristics of the crime should, according to the model, exert a constant effect on suspects' decision-making during an interrogation. Interrogation factors, however, are variable and, therefore, can alter suspects' decision-making dynamically during an interrogation. For example, police interrogators can establish different interrogation techniques at different time points, thereby leading suspects to change their decisions.

When examining the macro-level process depicted in Figure 2, it can be noted that the constant factors, including suspect and crime factors, determine suspects' initial status during the macro-level process; this initial status continuously serves as the baseline status across the entire interrogation. Meanwhile, the variable factors, particularly the police interrogation techniques, update suspects' status by introducing changes into the macro-level process. These changes are marked with the symbol "Δ" in Figure 2. As the effects of these variable factors cumulate, suspects may eventually change their interrogation decision from a denial to a confession.

In summary, the macro-level process of the model explains how suspects' decision-making changes over the course of an interrogation. Taking a holistic view, it accounts for the dynamic nature of an interrogation by highlighting that the factors in the model are all potential functions of time. This characteristic enables the model to account for situations in which suspects may make a series of decisions throughout the course of an interrogation.

Connecting Micro- and Macro-Level Processes

The above sections have described two complementary processes—a micro-level process and a macro-level process—that jointly explain how suspects arrive at their interrogation decisions. Whereas the micro-level process explains how suspects decide whether to deny or confess guilt at a single point in time during an interrogation, the macro-level process explains how suspects' decision-making changes over the course of an interrogation.

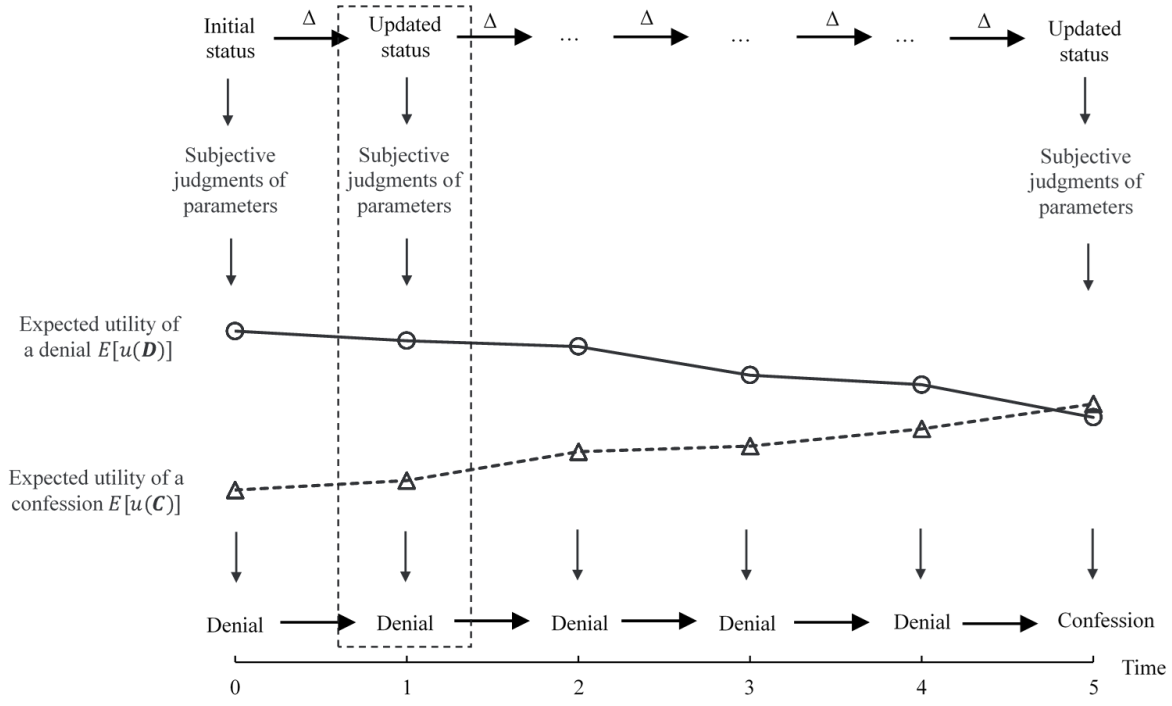

Figure 3. This figure illustrates a hypothetical example of suspects' decision-making during a custodial interrogation. It combines the micro- and macro-level processes together. Each column in the vertical direction indicates the micro-level process underlying a single

interrogation decision. Among these, the dashed rectangle gives one example of the micro-level process for a decision made at time 1. The top and bottom rows in the horizontal direction indicate the macro-level process of suspects' interrogation decisions. The symbol Δ represents the dynamic change that happens during an interrogation, for example, the implementation of an interrogation technique.

The example in Figure 3 illustrates the connection between the micro- and macro-level processes and shows how they jointly explain suspects' interrogation decisions. In the figure, the columns in the vertical direction present the micro-level processes underlying the interrogation decisions that suspects make at different time points. The dashed rectangular box indicates one such process for the decision at time 1 (also see Figure 1). The top and bottom rows in the horizontal direction together present the macro-level process of suspects' decision-making (also see Figure 2).

This example indicates that the micro- and macro-level processes are interconnected. On the one hand, the micro-level process reveals how suspects make a single interrogation decision and constitutes the basic building blocks for the macro-level process. As shown in Figure 3, when aligning multiple micro-level processes in sequence, their inputs and outputs compose suspects' macro-level decision-making process. On the other hand, the macro-level process describes suspects' multiple decisions throughout an interrogation and provides contextual information for the micro-level process. At different time points, the factors from the macro-level process influence suspects' subjective evaluations of their choices, thereby acting as the starting step for the micro-level process. Integrating the micro- and macro-level processes, the interrogation decision-making model captures the whole picture of suspects' decision-making process with a custodial interrogation.

As discussed above, different classes of factors play different roles in suspects' decision-making. The constant factors, including the characteristics of the suspect and features of the crime, provide the same baseline information for each of the micro-level

process. The variable factors, particularly the interrogation techniques, provide updates to the starting step of the micro-level process and cause changes to suspects' decisions over time. With the framework of the interrogation decision-making model, it is possible to analyze how factors in the macro-level process influence the parameters involved in the micro-level process of suspects' decision-making, thereby explaining their effects on suspects' interrogation decisions.

CHAPTER 3. MODEL APPLICATIONS

The interrogation decision-making model provides a theoretical framework to understand suspects' decision-making process within the context of a custodial interrogation. This chapter discusses the applications of the model to explain major research findings relevant to suspects' confessions that have been reported in the literature. The first section discusses how the model explains the population differences in confession rates, including suspects' age, criminal history, and factual innocence versus guilt. The second section discusses how the model explains the effects of various interrogation techniques on suspects' decision-making. The last section discusses the cumulative effects of interrogation techniques on suspects' decisions to deny or confess guilt. Model parameters are referenced using the same notations indicated in Table 2, where ***D*** denotes the choice of a denial and ***C*** denotes the choice of a confession.

Population Differences

It is well established that the confession rate varies across different populations. It has been revealed, for example, that both the true and false confession rate are higher among juveniles than adults (Redlich & Drizin, 2007), higher among those with cognitive disabilities than those without (Cloud et al., 2002; Meyer & Reppucci, 2007), higher among first-time offenders than recidivists (Gudjonsson, Sigurdsson, & Einarsson, 2004; Pearse, Gudjonsson, Clare, & Rutter, 1998), and higher among guilty than innocent suspects (Gudjonsson, 2003; Leo, 1996). As discussed next, the interrogation decision-making model explains population differences in terms of pre-existing variations in model parameters.

Juvenile and cognitively disabled

Both juvenile and cognitively disabled suspects tend to be impulsive and short-sighted in their confession decisions (Owen-Kostelnik et al., 2006; Redlich, 2007). For adolescents, the immaturity in brain development, especially the frontal cortex, leads to impulsivity and lack of self-control in performing cognitive tasks, including making decisions (Cauffman & Steinberg, 2000). For suspects with a cognitive disability, low intelligence may limit their executive functions of taking the future into consideration (Kassin & Gudjonsson, 2004). These characteristics may lead youth and the cognitively disabled to more strongly discount the future, thereby increasing their risk of confessing during an interrogation.

The discount rate, θ, shown in Equation 1, explains this pre-existing vulnerability. As the discount rate, θ, gets smaller, that is, as the tendency to discount the future increases, distal outcomes have less influence on suspects' decisions to deny or confess guilt. This means that suspects with a smaller discount rate (i.e., a stronger tendency to discount the future) are more strongly influenced by proximal outcomes than suspects with a higher discount rate. Consequently, suspects with a smaller discount rate may be inclined to perceive a confession as a more optimal choice than a denial. This may explain the high (false) confession rate among juvenile and cognitively disabled suspects. Compared with adults of normal intelligence, juveniles and those with cognitive disabilities may apply a smaller discount rate, θ, in their decision-making processes.

Recidivists versus first-time offenders

Suspects' knowledge about the legal system plays an important role in their evaluation of distal outcomes. Suspects with significant knowledge and experiences about the

legal procedures and sanctions tend to have more accurate judgments on the possible outcomes following a confession (Gudjonsson, 2003). Because this knowledge represents an advantage, recidivists may be more cognizant of the deterministic power of a confession than are suspects who have little to no knowledge about the legal system. Thus, whereas recidivists may perceive a confession as greatly increasing their risk of conviction, first-time offenders may perceive a confession as having little to no effect on their risk of conviction. Furthermore, recidivists may be more likely to realize the severity of potential legal sanctions than first-time offenders. According to the model, a confession may, therefore, generate higher expected utility for first-time offenders than recidivists. As a result, it can be predicted that first-time offenders might be more likely to perceive a confession as the optimal choice than recidivists.

More importantly, general knowledge about the legal system can even change suspects' decision space from the outset. Suspects who are knowledgeable about their legal rights may, for instance, invoke Miranda before being subjected to an interrogation. In other words, the decision space can be widened or narrowed to accommodate choices other than a denial and a confession depending on suspects' knowledge about their legal rights.

Factual innocence versus guilt

Both observational and experimental research has shown that guilty suspects are more likely than innocent suspects to confess during an interrogation (Guyll et al., 2013; Leo, Costanzo, & Shaked-Schroer, 2009; Russano et al., 2005). Table 5 lists four major differences in the perceptions of possible outcomes between innocent and guilty suspects in terms of the model's parameters. Among the four differences, three are relevant to understanding why guilty suspects are more likely to confess than innocent suspects. The

remaining difference is relevant to understanding innocent suspects' vulnerability to false confessions.

Table 5. Differences in subjective judgments between innocent and guilty suspects

	Proximal outcomes	Distal outcomes
Denial (***D***)	Guilty: Anxiety from deception, feelings of guilt and remorse. Innocent: No anxiety or feeling of guilt.	Guilty: High risk of future conviction. Innocent: No risk of future conviction.
Confession (***C***)	Guilty: Relief from deception. Innocent: Negative emotions.	Guilty: Certainty of future conviction. Innocent: Low risk of future conviction.

Note. The differences in the perceptions of the proximal outcomes of both choices and the distal outcomes of a denial are relevant to guilty suspects' tendency to confess. The difference in the perceived probability of the distal outcomes of a confession is relevant to innocent suspects' tendency to confess.

Suspects' factual innocence or guilt can lead to differences in their perceptions of proximal outcomes. Consider, for instance, the perceived proximal outcomes following a denial. Compared with innocent suspects, guilty suspects who consider denying guilt may anticipate experiencing anxiety and stress as well as guilt and remorse (Gudjonsson, 2003). Thus, the utility of the proximal outcomes following a denial, $u(D_{p-})$, may be more negative for guilty suspects than innocent suspects. The perceived proximal outcomes of a confession can also differ between innocent and guilty suspects. Whereas innocent suspects may anticipate feeling strong negative emotions following a confession due to the betrayal of their innocence, guilty suspects may anticipate a catharsis after admitting guilt (Gudjonsson, 2003). Therefore, the utility of the proximal outcomes following a confession, $u(C_{p-})$, may be more negative for innocent suspects than guilty suspects. In addition, the perceived probability of distal outcomes following a denial (i.e., $p(D_{d-})$) can also differ between the

two groups. Compared with innocent suspects, guilty suspects may perceive future punishment as highly likely even if they deny guilt, presumably because future evidence will be collected to confirm their guilt and thus ensure a conviction. As a result of these pre-existing differences, guilty suspects may be more inclined than innocent suspects to offer a confession during an interrogation.

Although generally speaking, guilty suspects are more likely to confess than innocent suspects, there is one feature inherent in innocent suspects' perceived probability of the distal outcomes following a confession (i.e., $p(C_{d-})$) that may make them particularly vulnerable to giving a false confession. According to the phenomenology of innocence, innocent suspects tend to believe that their innocence will be apparent to others and that it will protect them from experiencing legal sanctions (Kassin, 2005). In terms of the model's parameters, the perception that factual innocence is sufficient to protect them from harm means that innocent suspects may tend to perceive the negative distal outcomes associated with a confession to have a low probability, that is, $p(C_{d-})$ is small. Consider, for example, the opening case of Jeffrey Deskovic. Jeffrey falsely confessed on the basis of the naïve belief that his innocence was sufficient to protect him from conviction. "I thought it was all going to be O.K. in the end", he said (Santo, 2006, para. 18). Jeffrey's reasoning illustrates how innocent suspects may perceive future punishment following their confessions as particularly improbable—a misperception that may increase innocent suspects' willingness to confess (Kassin, 2005, 2012).

Interrogation Techniques

In the dynamic process of an interrogation, police interrogation techniques can manipulate suspects' perceptions of the possible outcomes following a denial and a

confession so as to alter their decisions. With the interrogation decision-making model, it is possible to analyze the information delivered by a specific police interrogation technique, examine its effect on the specific model parameter(s) to which it corresponds, and subsequently understand its influence on suspects' interrogation decisions.

Techniques affecting expected utility of a confession

Minimization techniques manipulate suspects' perceptions of proximal and distal outcomes following a confession. Rapport building, offering sympathy and understanding, and minimizing the seriousness of the crime encourage suspects to expect that a confession will produce more positive, proximal outcomes (e.g., social approval) and less negative, distal outcomes (e.g., leniency). In terms of the model's parameters, increases in $u(C_{p+})$ and $u(C_{d-})$ cause $E[u(\boldsymbol{C})]$ to increase, meaning that suspects' tendency to confess increases.

Table 6. Effects of interrogation techniques on suspects' decision-making.

	Proximal outcomes	Distal outcomes
Denial (***D***)	Isolation, sleep and food deprivation: $u(D_{p-}) \downarrow$ Maximization techniques: • Intimidating, anger: $u(D_{p-}) \downarrow$	Maximization techniques: • Exaggerate consequences: $u(D_{d-}) \downarrow$ • False evidence: $p(D_{d-}) \uparrow$ Bluff (guilty): $p(D_{d-}) \uparrow$
Confession (***C***)	Minimization techniques: • Rapport building, sympathy: $u(C_{p+}) \uparrow$	Minimization techniques: • Minimize seriousness of crime: $u(C_{d-}) \uparrow$ Bluff (innocent): $p(C_{d-}) \downarrow$

Techniques affecting expected utility of a denial

Some interrogation techniques manipulate suspects' perceptions of proximal outcomes following a denial. One of the most straightforward examples that falls into this category is highly aversive and coercive interrogation techniques, such as physical isolation, sleep and food deprivation, and drug withdrawal. This set of practices directly affects

suspects' judgments of the utility of proximal outcomes. For example, once deprived of food, sleep or drugs, suspects may perceive the negative proximal outcomes of a denial as more difficult to endure in the interrogation room than they had initially. In terms of the model's parameters, $u(D_{p-})$ becomes more negative in suspects' perceptions. As a result, the expected utility of a denial, $E[u(\boldsymbol{D})]$, will drop off, which means that suspects are discouraged from denying guilt. In other words, according to the model, highly aversive and coercive interrogation techniques pull for a confession because they change suspects' perceived utility of proximal outcomes following a denial.

Maximization techniques can influence suspects' perceptions of both proximal and distal outcomes following a denial. Intimidating suspects, expressing anger, or threatening suspects with severe legal consequences if they do not "cooperate" with the police, for example, encourages suspects to expect that a denial will produce negative proximal outcomes (e.g., social disapproval) and negative distal outcomes (e.g., harsh sentence). In terms of the model's parameters, $u(D_{p-})$ and $u(D_{d-})$ become more negative. As a result, $E[u(\boldsymbol{D})]$ will reduce, which indicates that suspects are discouraged from denying guilt.

Some maximization techniques manipulate the perceived probability of distal outcomes following a denial. For example, police are allowed to present suspects with false evidence, such as the result of a rigged forensic test or a staged eyewitness identification (Kassin et al., 2007; Perillo & Kassin, 2011). False evidence causes suspects to perceive that the probability of conviction is high even without a confession. In terms of the model, $p(D_{d-})$ increases and $E[u(\boldsymbol{D})]$ will consequently decline, which is moving suspects away from a denial. As predicted by the model, research has demonstrated that false evidence

increases the false confession rate in both laboratory experiments and actual cases (Firstman & Salpeter, 2008; Kassin & Kiechel, 1996).

Bluff technique

The bluff technique is listed separately because its effects on suspects' evaluations of a denial and a confession depend on the population to which it is applied. According to some accounts (e.g., Inbau, Reid, Buckley, & Jayne, 2011), this technique was originally designed to reduce the chance that innocent suspects would falsely confess. However, empirical research has not supported this claim: Although the bluff technique does increase the likelihood that guilty suspects will confess, it has the same effect on innocent suspects (Perillo & Kassin, 2011). Thus, it does not improve surgical precision.

The interrogation decision-making model can explain why. The bluff technique causes suspects to believe that evidence will be examined to show whether or not they are guilty of the crime. To the extent that guilty suspects are duped by this bluff, they should expect the evidence to confirm their guilt, thereby causing them to believe that conviction is likely no matter their choices during the interrogation. In other words, guilty suspects, believing there will be strong evidence against them, should perceive the chances of conviction to be high, even if they keep denying guilt. In terms of the model, $p(D_{d-})$ increases and thus $E[u(\boldsymbol{D})]$ will decrease. Therefore, a guilty suspect is likely to confess when confronted with the bluff technique.

For innocent suspects the decision is the same, but the process is different: To the extent that innocent suspects are duped by the bluff, they will expect the evidence to prove their innocence, thereby causing them to believe that acquittal is likely no matter their choices during the interrogation. Accordingly, innocent suspects, believing there will be

strong evidence of their innocence, should perceive the chances of conviction to be low, even if they offer a confession. In terms of the model, $p(C_{d-})$ decreases and thus $E[u(\boldsymbol{C})]$ will increase. Therefore, an innocent suspect is also likely to confess with the bluff technique. Although the processes are different, the ultimate effects of the bluff technique are the same for innocent and guilty suspects, pushing both towards confessions.

Cumulative effects

During an interrogation, police may utilize multiple interrogation techniques. As these techniques are implemented, suspects incorporate the information delivered by police into their decision-making process. Thus, the use of interrogation techniques at varying points of time can lead suspects to vary decision-making parameters with time, thereby causing the decision-making process to be dynamic rather than static throughout an interrogation. Accordingly, the effects of different interrogation techniques can accumulate and continually influence suspects' evaluation of a denial and a confession. According to the model, a combination of techniques will more strongly influence suspects' decisions than any individual technique alone, an effect supported by prior research (Russano et al., 2005). These cumulative changes are reflected in Figure 4.

The model explains this cumulative process in terms of suspects' changing evaluations of the expected utilities of a denial and a confession. According to the model, suspects continually re-evaluate whether they should deny or confess guilt at the same time that police interrogation techniques are influencing the expected utilities of these choices. This means, therefore, that suspects' evaluations of the expected utilities of a denial and a confession are continuously changing. Because of the nature of police interrogation techniques, their cumulative effects are expected to progressively reduce the expected utility

of a denial while progressively increasing the expected utility of a confession. Flipping from a denial to a confession, therefore, becomes just a matter of time. Of course, not all interrogations will last long enough or be coercive enough to produce this flip, but theoretically, if an interrogation lasts long enough, or is especially coercive, then all or nearly all suspects would be expected to flip their decision from a denial to a confession at some point during the interrogation.

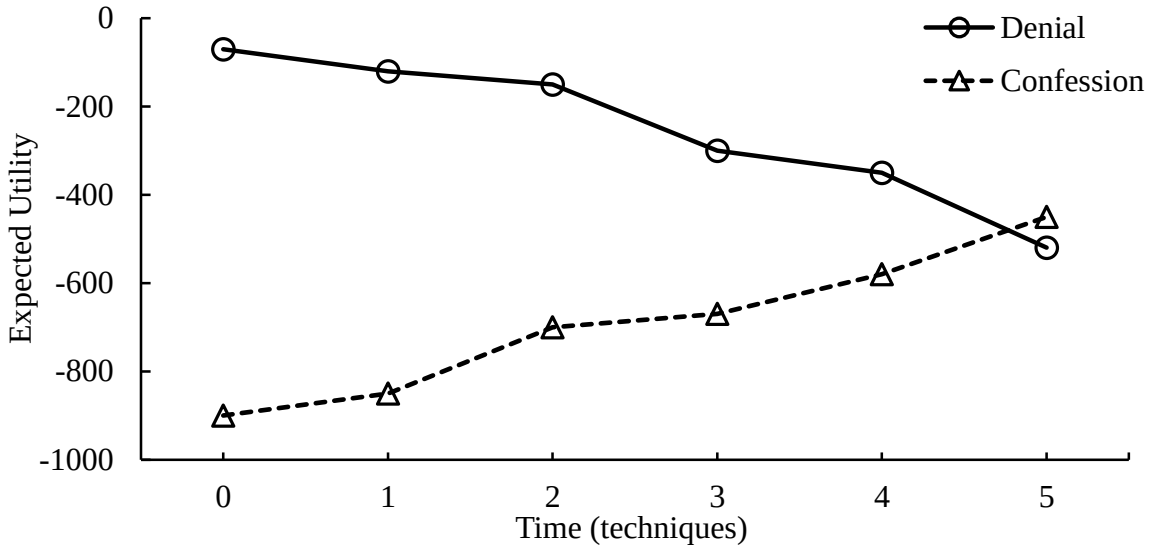

Figure 4. A hypothetical example of cumulative effects of interrogation techniques. The solid line presents a suspect's evaluation of the expected utility of a denial; the dashed line presents the suspect's evaluation of the expected utility of a confession.

It is also worthwhile to point out that this hypothesized process may take longer for innocent suspects than guilty suspects. Because the initial discrepancy between the expected utilities of a denial and a confession may be larger for innocent suspects than guilty suspects, it may take innocent suspects longer than guilty suspects to reach their "breaking point"—the point at which suspects decide that the expected utility of a confession is large enough to flip from a denial to a confession. That may account for the extraordinary length of interrogations in documented false confession cases. Among a sample of proven false confessors, more than 80% were interrogated for more than 6 hours, and about 50% were interrogated for more than

12 hours (Drizin & Leo, 2004), and, the average length of these interrogations was 16.3 hours, which is strikingly long compared with a typical interrogation, which lasts no more than 2 hours (Cassell & Hayman, 1996; Kassin et al., 2007; Leo, 1996).

CHAPTER 4. RESEARCH OVERVIEW

Two experiments tested key predictions of the interrogation decision-making model. The predictions pertain to the way that an outcome's utility influences suspects' confession decisions. Experiment 1 focused on the utility of a proximal outcome, whereas Experiment 2 focused on the utility of a distal outcome.

According to the interrogation decision-making model, the utility of proximal outcomes that follow from suspects' choices to deny or confess guilt is a key factor that influences their decision-making process. In particular, police interrogators may manipulate suspects' perceived utility of proximal outcomes with various interrogation practices, such as physical isolation, extended interrogation, and food and sleep deprivations. Therefore, it is important to examine the effect of a proximal outcome's utility on suspects' confession decisions. To achieve this goal, Experiment 1 directly manipulated the perceived utility of a proximal outcome and examined its influence on participants' admission decisions. Consistent with the interrogation decision-making model, it was hypothesized that the proximal outcome would have a stronger influence on participants' admission decisions the more negatively it was perceived.

The interrogation decision-making model also proposes that the utility of distal outcomes that follow from suspects' choices to deny or confess guilt is another key factor that influences their decision-making process. A great many interrogation techniques work to elicit confessions because they directly manipulate suspects' perceptions of the utility of distal outcomes. As discussed in Chapter 3, minimization techniques may lead suspects to expect the utility of distal outcomes of a confession to become less negative, thereby encouraging suspects to confess. And maximization techniques may lead suspects to expect

the utility of distal outcomes of a denial to become more negative, thereby discouraging suspects from denying. Therefore, it is also important to examine the effect of a distal outcome's utility on suspects' confession decisions. To achieve this goal, Experiment 2 directly manipulated the perceived utility of a distal outcome and examined its influence on participants' admission decisions. On the basis of the interrogation decision-making model, it was hypothesized that the distal outcome would have a stronger influence on participants' admission decisions the more negatively it was perceived.

CHAPTER 5. EXPERIMENT 1

The first experiment tested the hypothesis that a proximal outcome's effect on suspects' interrogation decisions is larger the more negatively the proximal outcome is perceived. Experiment 1 tested this prediction using the *repetitive question paradigm* (Madon, et al., 2012). Participants were interviewed about 20 prior illegal and unethical behaviors and were required to admit or deny each one. A contingency pairing manipulation paired these responses with a proximal outcome (answering a set of repetitive questions) and a distal outcome (to meet with a police officer to discuss their responses in a few weeks). Specifically, for some participants, denials were paired with a proximal outcome and admissions were paired with a distal outcome whereas for others admissions were paired with a proximal outcome and denials were paired with a distal outcome. Experiment 1 also manipulated the utility of the proximal outcome by having participants eat either a pleasant-flavored jelly bean (less negative) or an unpleasant-flavored jelly bean (more negative) each time they experienced the proximal outcome of the repetitive questions.

Method

Participants

A total of 210 participants were recruited from the Psychology Department's research participant pool at Iowa State University. Participants took part in the study to satisfy a course requirement. Five participants were excluded from the analyses because they were not native English speakers. Therefore, the final sample consisted of 205 participants. In the final sample, 55.6% participants were female. The mean age was 19.4 (*SD* = 1.5). Participants included 184 Caucasians, four Asians, seven African Americans, four Latina/o, one Indian, five who self-described as multi-ethnic, and two who did not indicate her or his ethnicity.

Design

Participants were randomly assigned to a 2 (Contingency pairing: denial-proximal outcome vs. admission-proximal outcome) × 2 (Negative utility of proximal outcome: low vs. high) between-subjects experimental design. All participants were interviewed about 20 prior criminal and unethical behaviors and were required to admit or deny each one.

Contingency pairing varied the outcomes that participants faced for denials and admissions of these behaviors. In the "denial-proximal outcome" contingency pairing condition (n = 104), participants faced a negative proximal outcome for each denial and a negative distal outcome for admissions. This situation parallels the situation experienced by interrogated suspects in the sense that each denial results in an immediate (proximal) punishment but reduces the likelihood of a future (distal) punishment, whereas each admission results in the avoidance of an immediate (proximal) punishment but increases the likelihood of a future (distal) punishment. In the "admission-proximal outcome" contingency pairing condition (n = 101), these contingencies were reversed. These participants faced a negative proximal outcome for each admission and a negative distal outcome for denials. In both contingency pairing conditions, the proximal outcome was answering a set of 32 repetitive questions and the distal outcome was meeting with a police officer in several weeks to discuss their interview responses in greater detail. Even though participants could avoid answering the repetitive questions by giving the alternative response rather than the one that was paired with the proximal outcome (e.g., an admission from participants who received the proximal outcome for each denial), they were led to believe that doing so would increase their risk of encountering the distal outcome, which was to meet with a police officer in several weeks.

Negative utility of proximal outcome varied the aversiveness of the proximal outcome. This was accomplished by having participants eat either pleasant or unpleasant-flavored jelly beans while answering the repetitive questions. In the low negative utility condition (n = 101), participants ate a pleasant-flavored jelly bean (i.e., *very cherry*) each and every time they were required to answer the set of repetitive questions. In the high negative utility condition (n = 104), participants ate an unpleasant-flavored jelly bean (i.e., *stinky socks*) each and every time they were required to answer the set of repetitive questions. This experimental manipulation was expected to vary participants' perception of the proximal outcome's utility: Participants who had to eat the unpleasant-flavored jelly bean were expected to perceive the proximal outcome to be more negative than those who ate the pleasant-flavored jelly beans.

In addition to the experimental manipulations of contingency pairing and negative utility of proximal outcome, I also counterbalanced the orders of the 20 illegal and unethical behaviors included in the interview. A total of 40 orders were created within each of the four experimental cells: Half of the orders were created by shifting one question down to the bottom of the interview survey sequentially; the other half first reversed the order of the questions and then used the shifting strategy to create 20 more versions. Therefore, participants received different orders of the illegal behavior interview, although the questions themselves were the same.

Materials

Interview questions. The interview questions assessed whether or not participants had ever engaged in 20 illegal (e.g., transporting fireworks across state lines) and unethical (e.g., starting or spreading a rumor about someone) behaviors (Appendix B). Participants

responded ‘yes’ (coded as 1) or ‘no’ (coded as 0) to each question. The 20 interview questions were developed on the basis of a pilot study in which participants (a) admitted or denied 53 illegal and unethical behaviors and (b) rated the seriousness of each behavior (Madon et al., 2013). The order of the questions was matched for seriousness and counterbalanced to eliminate potential order effects.

Repetitive question set. Thirty-two repetitive questions were included in the set (Appendix C). These questions assessed participants’ perceptions about how the “average Iowan” and “average American” would feel (e.g., hostile, guilty) when engaging in the illegal or unethical behavior about which participants just admitted or denied, depending on the contingency pairing condition to which they were assigned. Participants answered the repetitive questions on a computer that was programmed with a 4-second delay between each question. The set required approximately 7 minutes to complete. Because the repetitive questions were unrelated to the hypothesis in the study, and were developed simply to provide participants with a proximal outcome, participants’ responses to the repetitive questions were not recorded.

Suspicion check. Participants were probed for suspicion with questions that asked them whether they believed that they had been misled in any way during the experiment and if so, to describe how (Appendix D). All responses were examined to identify participants who were suspicious about the veracity of the meeting with the police officer.

Contingency pairing check. To examine participants’ understanding of the contingency pairing, they were asked under which condition they were required to answer the repetitive questions (Appendix E). The response options were (a) “When I gave a ‘NO’

response," (b) "When I gave a 'YES' response," and (c) "Sometimes when I gave a 'NO' response and sometimes when I gave a 'YES' response".

Negative utility manipulation check. Because the proximal outcome is composed of two components—eating jelly beans as well as answering repetitive questions, participants' perceptions of the proximal outcome's utility was assessed with three sets of questions (Appendix F). One set of questions assessed participants' perceptions of the jelly beans. Three items in this set used bipolar adjectives that followed the question stem "*The jelly beans were (1) bad – good; (2) unpleasant – pleasant; (3) disgusting – delicious*". The fourth item in this set asked participants "*How much were you looking forward to eating a jelly bean?*" , with the endpoints 1 (*not at all*) and 7 (*a lot*).

The second set of questions assessed participants' perception of the repetitive questions. Five items in this set used bipolar adjectives that followed the question stem "*The additional questions about Iowans and Americans are (1) irritating – soothing; (2) repetitive – varied; (3) boring – interesting; (4) unpleasant – pleasant; (5) annoying – enjoyable*". Participants were also asked, "*How much were you looking forward to answering the additional questions about Iowans and Americans?*", with the endpoints 1 (*not at all*) and 7 (*a lot*). The last item in this set assessed participants' overall perception of the proximal outcome by asking them "*How glad were you when the illegal behavior interview was completely done?*", with the endpoints 1 (*not at all glad*) and 7 (*very glad*).

Interview room and cover story

All participants were interviewed individually in a small room that included a desk, a personal computer, and two chairs—one for the participant and the other for the experimenter. Next to the computer was a pencil vase that held two pencils with "Ames

Police Department" printed on them. In addition, two colored flyers were affixed to the wall directly above the computer monitor. These flyers offered safety tips for crime prevention. One flyer was obtained from the website of the university's Department of Public Safety and had a university logo printed on it. The other flyer was obtained from the website of the Ames Police Department and had a police department emblem printed on it. These props supported the cover story that the experiment was a partnership between professors in the Psychology Department and law enforcement personnel and that it was designed to examine the rate of illegal behavior among college students. In addition, in order to conceal the true purpose of the jelly beans, participants were told that the study was also interested in the relationship between judgments and sugar consumption.

Procedures

Each participant was interviewed individually about 20 prior illegal and unethical behaviors. After obtaining informed consent, the experimenter provided the participant with the cover story and explained the contingency pairing with a prepared script. As shown below, the contents of the script were the same across experimental conditions except for select words (shown in the parentheses) that served to reverse the contingency pairing.

> "I'm going to ask you some yes/no questions that will assess whether or not you've ever engaged in a variety of illegal and unethical behaviors. Every time you answer NO (YES) to one of these questions, you'll be asked some additional follow-up questions in order to get some more information. You'll answer these additional questions on the computer during your session today. On the other hand, if you tend to answer YES (NO) to the questions I ask you, then I will sign you up to meet with one of the police

officers involved in this research to discuss your answers in more detail. We're doing this to get more information about people's illegal behavior. So, let's see…you would meet with Officer Schiller. Assuming that your score requires that you have this meeting, he would contact you in the next few weeks to set things up. These appointments have generally lasted about an hour. So, basically, if you answer YES (NO) a lot, you'll need to meet with Officer Schiller."

Immediately after reciting the above script, the experimenter interviewed the participant about his or her prior illegal and unethical behaviors. Participants in the "denial-proximal outcome" contingency pairing condition ate a jelly bean and then answered the set of 32 repetitive questions each and every time they denied one of the behaviors, whereas participants in the "admission-proximal outcome" contingency pairing condition ate a jelly bean and then answered the set of 32 repetitive questions each and every time they admitted to one of the behaviors. In the low negative utility condition, participants ate jelly beans with a pleasant flavor (*very cherry*). In the high negative utility condition, participants ate jelly beans with an unpleasant flavor (*stinky socks*). Though participants could avoid the proximal outcome of the jelly beans and repetitive questions by giving the alternative interview response (e.g., an admission from participants who received the proximal outcome for each denial), they were led to believe that doing so would increase their risk of the distal outcome of having to meet with the police officer in several weeks.

Following the interview, participants completed self-report questionnaires that assessed demographic information, suspicion, and their understanding on the experimental manipulations, after which they were debriefed.

Preliminary Analyses

Suspicion and contingency pairing checks

Examination of participants' responses to the suspicion question revealed that there was one participant who doubted the veracity of the meeting with the police officer. In addition, a frequency analysis indicated that three participants did not correctly report the contingency pairing that was associated with their interview responses. The results of the main analyses below suggested that excluding these participants did not influence the pattern of the results. Therefore, I included these participants' data in the analyses.

Negative utility manipulation check

Because the negative utility manipulation check items were not normally distributed, Ws ≤ 0.91, ps < 0.001, I performed the non-parametric Mann-Whitney U tests to examine participants' perceptions of the proximal outcome (Appendix F). Table 7 lists the descriptive statistics of participants' responses to the negative utility manipulation check items.

First, I examined participants' perceptions of the jelly beans. Results indicated that participants who had the unpleasant-flavored jelly beans rated the jelly beans as more negative than participants who had the pleasant-flavored jelly beans on all three judgments (*bad – good; unpleasant – pleasant; disgusting – delicious*), z_U*'s* ≥ 7.54, ps ≤ 0.001. Participants who ate the unpleasant-flavored jelly beans were also less looking forward to eating jelly beans than were participants who ate pleasant-flavored jelly beans, $z_U = 5.30$, $p \leq 0.001$.

Second, I examined participants' perceptions of the repetitive questions. Results failed to detect differences in participants' perceptions of the repetitive questions on any of the five judgments (*soothing – irritating; varied – repetitive; interesting – boring; pleasant –*

unpleasant; enjoyable – annoying), z_U*'s* ≤ 1.06, *p*s ≥ 0.29. Neither was the difference in participants' expectancy of the repetitive questions detected, $z_U = 0.29$, $p = 0.77$.

Table 7. Experiment 1 descriptive statistics of negative utility manipulation check items.

		Negative utility of proximal outcome	
		Low (very cherry)	High (stinky socks)
The jelly beans were… 1 (*negative*) – 7 (*positive*)	bad - good	5.90 (1.48)	3.68 (2.06)
	unpleasant - pleasant	5.83 (1.51)	3.65 (2.00)
	disgusting - delicious	5.79 (1.56)	3.61 (1.86)
How much were you looking forward to eating a jelly bean? 1 (*not at all looking forward to*) – 7 (*very looking forward to*)		3.54 (1.57)	2.39 (1.41)
The additional questions about Iowans and Americans were… 1 (*negative*) – 7 (*positive*)	unpleasant - pleasant	2.49 (1.32)	2.40 (1.37)
	annoying – enjoyable	2.05 (1.17)	2.02 (1.14)
	irritating – soothing	2.24 (1.15)	2.08 (1.13)
	repetitive – varied	1.31 (0.73)	1.26 (0.70)
	boring - interesting	1.69 (0.93)	1.72 (1.03)
How much were you looking forward to answering the additional questions about Iowans and Americans? 1 (*not at all looking forward to*) – 7 (*very looking forward to*)		1.40 (0.70)	1.39 (0.73)
How glad were you when the illegal behavior interview was completely done? 1 (*not at all glad*) – 7 (*very glad*)		5.41 (1.26)	5.58 (1.40)

These results suggest that the utility manipulation successfully differentiated participants' perceptions towards one component of the proximal outcome (the jelly beans), but not the other (the repetitive questions). To assess participants' overall perceptions of the proximal outcome, I examined participants' responses to the last manipulation check item. However, results indicated that the utility manipulation did not significantly influence participants' perception of the proximal outcome, $z_U = 1.30$, $p = 0.19$.

Main Analyses

The primary interest of Experiment 1 was to examine the influence of the two experimental factors, namely, the contingency pairing and the negative utility of proximal outcome, on participants' admission decisions to the 20 prior illegal and unethical behaviors. In particular, I hypothesized that participants would shift their admission decisions to avoid the proximal outcome when it was perceived to be more negative versus less negative.

To evaluate the effects of the experimental factors, I employed two different statistical models to analyze the data. The first model treated the total number of admissions made by each participant as the dependent variable and investigated the effects of the two factors under the framework of a Gauss-Markov model. The second and more complicated model adopted the approach of a generalized linear mixed-effects model, in which participants' dichotomous responses to each of the 20 interview questions (i.e., a denial or an admission) constituted the random variables of interest. In addition to the fixed effects of between-subjects factors (i.e., contingency pairing and negative utility of proximal outcome), this model also examined the fixed effects of within-subjects factors (i.e., question characteristics and positions) as well as the random effects of participants.

Model 1: Gauss-Markov model

In the first model, I defined the random variable Y_{ijk} as the total number of admissions made by participant *k* in the i^{th} contingency pairing condition and the j^{th} negative utility condition. The support of Y_{ijk} thus is

$$\Omega_{Y_{ijk}} = \{0, 1, 2, \ldots, 20\}$$

Because the support of Y_{ijk} is discrete and finite, the Gauss-Markov linear model may not be the model that best conforms to the structure of the data. However, for two reasons, I

employed this simple but classical model to initially explore the effects of the two experimental factors. First of all, the summation of the 20 Bernoulli trials were approximally normal even though those trials are neither identical nor independent. The Shapiro-Wilk normality test indicated that the residuals of the variable were normally distributed, $W = 0.99$, $p = 0.39$. Therefore, the inferences derived from the Gauss-Markov model may be relatively reasonable. Secondly, the Gauss-Markov model has been employed in previous studies with the same paradigm (e.g.,Madon et al., 2012; Madon et al., 2013; Yang, Madon, & Guyll, 2015) because the inferences generated by the model were generally easy to interpret and understand. Therefore, I assumed that the random variable Y_{ijk} defined above follows a Gauss-Markov model, namely,

$$Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}, i = 1,2; j = 1,2; k = 1, \dots, n_{ij}$$

where μ is the intercept parameter; $\alpha_1$and α_2 are the fixed contingency pairing effects; β_1 and β_2 are the fixed negative utility effects; $(\alpha\beta)_{11}$, $(\alpha\beta)_{12}$, $(\alpha\beta)_{21}$, and $(\alpha\beta)_{22}$ are the fixed effects allowing the interaction between contingency pairing and negative utility of proximal outcome; and the ϵ_{ijk} terms are i.i.d. $N(0, \sigma^2)$ random errors. The research hypothesis that the difference in the utility of the proximal outcome would lead to a difference in participants' interview responses can thus be translated into testing a hypothesis of an interaction between the two experimental factors, i.e., the null hypothesis was

$$H_0: (\alpha\beta)_{11} - (\alpha\beta)_{12} - (\alpha\beta)_{21} + (\alpha\beta)_{22} = 0,$$

and the alternative hypothesis was

$$H_A: (\alpha\beta)_{11} - (\alpha\beta)_{12} - (\alpha\beta)_{21} + (\alpha\beta)_{22} \neq 0.$$

To test the hypothesis, I fit the above Gauss-Markov model to the data. The results showed that the interaction was not significant, $F(1, 199) = 2.24$, $p = 0.14$, $\eta^2 = 0.009$.

Therefore, the obtained data did not support the alternative hypothesis of an interaction between contingency pairing and utility of proximal outcome, which implied that the influence of the proximal outcome on participants' decisions did not change as a function of its perceived utility. Table 8 presents the descriptive statistics, and Figure 4 depicts the distribution of the dependent variable in each experimental condition.

Table 8. Experiment 1 descriptive statistics of total number of admissions.

		Negative utility of proximal outcome	
		Low (very cherry)	High (stinky socks)
Contingency pairing	Denial-proximal outcome	11.06 (4.12) n = 52	11.37 (3.64) n = 52
	Admission-proximal outcome	8.20 (3.43) n = 49	7.02 (2.97) n = 52

I also tested the main effects of contingency pairing and negative utility of proximal outcome. Results indicated that the main effect of negative utility of proximal outcome was not significant, $F(1, 199) = 0.76$, $p = 0.39$, $\eta^2 = 0.003$; but the main effect of contingency pairing was significant, $F(1, 199) = 51.83$, $p < 0.001$, $\eta^2 = 0.20$. Further analysis showed that participants in the "denial-proximal outcome" contingency pairing condition ($M = 11.22$, $SD = 3.87$) made more admissions than participants in the "admission-proximal outcome" contingency pairing condition ($M = 7.59$, $SD = 3.24$), t (199) = 7.20, $p < 0.001$; $d = 1.01$, 95% CI [0.73, 1.28].

The pattern of the results was the same when I excluded the data from participants who were suspicious about the police officer and who misreported the contingency pairing. Neither the interaction nor the main effect of negative utility of proximal outcome were

significant, *Fs* (1, 195) ≤ 1.47, *p*s ≥ 0.23. Only the main effect of contingency pairing was significant, F (1, 195) = 49.41, $p < 0.001$.

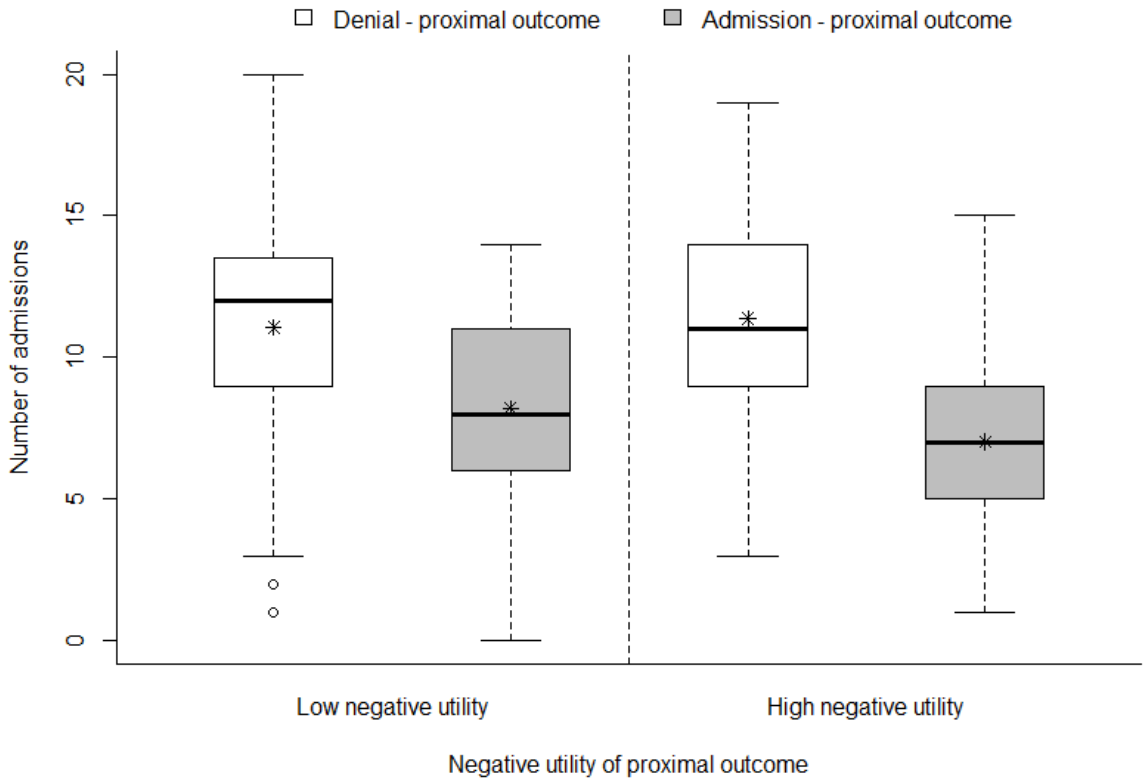

Figure 4. Box plot of total number of admissions in Experiment 1. The stars depict the mean number of admissions in each experimental condition.

Model 2: Generalized linear mixed-effects model

As discussed above, the Gauss-Markov model did not best characterize the structure of the data, and therefore might not be sensitive enough to detect the effects of the experimental manipulations. A more sensitive and precise approach was to model the data using a generalized linear mixed-effects model. Taking this approach, I defined the random variables Y_{ijkl} as the dichotomous response made by participant *k* to the question *l* in the i^{th} contingency pairing condition and the j^{th} negative utility condition:

$$Y_{ijkl} = \begin{cases} 1, & \text{if the response is an admission,} \\ 0, & \text{if the response is a denial.} \end{cases}$$

It is reasonable to assume that Y_{ijkl} follows a Bernoulli distribution (Casella & Berger, 2001, p. 89) and therefore model the probability parameter of the Bernoulli distribution as a function of the fixed effects of experimental factors and the random effect of participants. To employ a generalized linear mixed-effect model approach, I set up the model as follows.

$$Y_{ijkl} | \, p_{ijkl} \sim \text{Bernoulli}\left(p_{ijkl}\right),$$

$$\log\left(\frac{p_{ijkl}}{1-p_{ijkl}}\right) = \eta_{ijkl} \ \text{(defined below)}$$

$$i = 1,2; j = 1,2; k = 1,2,\dots,n_{ij};\ l = 1,2,\dots,20;\ 0 < p_{ijkl} < 1$$

In this model, the linear predictor η_{ijkl} is a linear combination of different fixed effects and potential random effects. According to what the research question is, there can be different choices for the format of the linear predictor η_{ijkl}. First, I assessed the effects of the two experimental manipulations (i.e., contingency pairing and negative utility of the proximal outcome) controlling for the random participant effect. Thus, the linear predictor η_{ijkl} takes the form of

$$\eta_{ijkl} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + s_{ijk}$$

where, similar to the Gauss-Markov model, μ is the intercept parameter; $\alpha_1$and α_2 are the fixed contingency pairing effects; β_1 and β_2 are the fixed negative utility effects; $(\alpha\beta)_{11}$, $(\alpha\beta)_{12}$, $(\alpha\beta)_{21}$, and $(\alpha\beta)_{22}$ are the fixed effects allowing for the interaction. In addition, the s_{ijk} terms are i.i.d. $N(0, \sigma_s^2)$ random participant effects. The hypothesis of interest was the same as that of the Gauss-Markov model, i.e., the null hypothesis was H_0: $(\alpha\beta)_{11} - (\alpha\beta)_{12} - (\alpha\beta)_{21} + (\alpha\beta)_{22} = 0$.

In order to test the hypothesis, I used the SAS GLIMMIX procedure to build the model and analyze the data. The results of the generalized mixed-effects model were consistent with those of the Gauss-Markov model. The interaction between the two experimental manipulations was not significant, $F(1, 3855) = 1.58$, $p = 0.21$, which indicated that the obtained data did not support the research hypothesis that participants would be more likely to shift their admissions to avoid the proximal outcome the more negatively they perceived it.

The main effect of negative utility of proximal outcome was not significant, $F(1, 3855) = 1.10$, $p = 0.29$. Only the main effect of contingency pairing was significant, $F(1, 3855) = 50.78$, $p < 0.001$. For participants in the "denial-proximal outcome" contingency pairing condition, the odds of admitting to the illegal behavior questions were 2.19 times as high as that for participants in the "admission-proximal outcome" contingency pairing condition, *OR* = 2.19, 95% CI [1.77, 2.72]. This result replicates the previous research finding that interrogated suspects generally give disproportionate weight to proximal than distal outcomes when making their confession decisions (Madon, et al., 2012, 2013).

In addition, the generalized mixed-effects model allowed me to examine the effects of the within-subjects factors that could not be examined in the Gauss-Markov model. To understand the effects of illegal behaviors and question positions, I included these factors as covariates in the generalized mixed-effects model. The linear predictor η_{ijkl}, therefore, takes the form of

$$\eta_{ijkl} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \gamma_l + \tau_{h(i,j,k,l)} + s_{ijk}$$

where, γ_1, γ_2, …, and γ_{20} are the fixed illegal behavior effects; $h(i, j, k, l) \in \{1,2, \dots, 20\}$ represents the position of the illegal behavior question *l* answered by participant *k* in the i^{th}

contingency pairing condition and the j^{th} negative utility condition, and τ_1, τ_2, …, and τ_{20} are the fixed position effects.

Results showed that the effect of illegal behaviors was significant, $F(19, 3855) = 28.77$, $p < 0.001$, but the effect of question positions was not significant, $F(19, 3855) = 1.27$, $p = 0.19$. To further understand the how the characteristics of illegal behaviors influenced participants' responses, I used the seriousness scores of illegal behaviors to replace the fixed effects of illegal behaviors in the model. Results revealed a significant effect of seriousness, $F(1, 3873) = 68.28$, $p < 0.001$. As the illegal behavior became more serious, participants were less likely to admit to have done it before, $OR = 0.765$, 95% CI [0.718, 0.815]. This result is consistent with the previous research showing that suspects' tendency to confess varies as a function of the perceived seriousness of the crime (Madon et al., 2013).

The pattern of the results was the same when I excluded the data from participants who were suspicious about the police officer and who misreported the contingency pairing. The interaction between contingency pairing and negative utility of proximal outcome, the effect of negative utility of proximal outcome, and the effect of question positions were not significant, $Fs \leq 1.17$, $ps \geq 0.28$. Only the effects of contingency pairing and illegal behaviors were significant, $Fs \geq 28.04$, $ps \leq 0.001$.

To summarize, the analyses from the above two statistical models reached the same set of conclusions, though they employed different approaches. Basically, the results did not support the research hypothesis that participants' admission decisions were influenced by the utility of a proximal outcome.

Discussion

According to the interrogation decision-making model, one critical factor that affects suspects' decision-making is the utility of proximal outcomes that are associated with their choices. The results of Experiment 1, however, did not provide evidence for the effect of a proximal outcome's utility on participants' admission decisions. The utility of the proximal outcome did not significantly influence participants' tendency to shift their admissions to avoid the proximal outcome. Several reasons could have caused the failure to detect a significant effect.

First, the utility manipulation might not have been strong enough to differentiate participants' perceptions of the proximal outcome. Even though the analyses of the utility manipulation check items indicated that participants in the two utility conditions did have different perceptions of the jelly beans, their perceptions of the repetitive questions were not statistically different. It is possible that the repetitive questions were so negative that their effect overwhelmed the difference created by the jelly beans. As a result, the difference in participants' perceptions of the entire proximal outcome, including both eating the jelly beans and answering the repetitive questions, might not be large enough to be detected. Indeed, both groups of participants responded similarly when they were asked how glad they were when the illegal behavior interview was done, which reflected that they might have perceived the proximal outcome as equally negative, no matter which jelly beans they ate.

Second, the effects of jelly beans may not be universal across different individuals, which could also reduce the strength of the manipulation. Some participants, for example, expressed a fondness for the unpleasant-flavored jelly beans, and some participants did not like eating jelly beans at all, even the pleasant-flavored ones. For those participants, the jelly

beans might have changed their perceptions of the proximal outcome in the opposite direction, thereby complicating the results.

Furthermore, there was too much variability in participants' responses. From Figure 2 and Table 7, it can be noted that the pattern of average number of admissions in the four experimental conditions was in the expected direction of the research hypothesis; however, the standard deviations were generally large. The variability in participants' admissions could come from different sources including, participants' actual misbehaviors, personality traits, intelligence level, etc. As a result, the effect size might shrink and become too small to detect. If the experiment had been able to assess and control for participants' actual misbehaviors, the effect of the proximal outcome's utility might have emerged.

CHAPTER 6. EXPERIMENT 2

The second experiment tested the hypothesis that a distal outcome's effect on suspects' interrogation decisions is larger the more negatively the distal outcome is perceived. Experiment 2 tested this hypothesis using the same contingency pairing manipulation that was used in Experiment 1. In addition, Experiment 2 manipulated the utility of the distal outcome by leading participants to believe that they would speak with a police officer by phone (less negative) or in a face-to-face meeting (more negative).

Method

Participants

A total of 161 participants were recruited from the Psychology Department's research participant pool at Iowa State University. Participants took part in the study to satisfy a course requirement. Among all participants, one did not complete the experiment and two were not native English speakers. Therefore, I excluded them from the analyses, leaving 158 participants in the final sample. In the final sample, 51.3% participants were female. The mean age was 19.5 (*SD* = 1.3). Participants included 136 Caucasians, six Asians, seven African Americans, seven Latina/o, and two participants who self-described as multiethnic.

Design

Participants were randomly assigned to a 2 (Contingency pairing: denial-proximal outcome vs. admission-proximal outcome) × 2 (Negative utility of distal outcome: low vs. high) between-subjects experimental design. Following the procedures of Experiment 1, all participants were interviewed about their prior illegal and unethical behaviors and were required to admit or deny each one. Contingency pairing varied the outcomes that participants faced for their denials and admissions to the interview questions. In the "denial-

proximal outcome" contingency pairing condition, each denial was paired with a proximal outcome and admissions were paired with a distal outcome. These contingencies were reversed in the "admission-proximal outcome" contingency pairing condition. The proximal outcome was answering a set of 32 repetitive questions, and the distal outcome was having to speak with a police officer involved in the research to discuss their interview responses in more detail in a few weeks.

Negative utility of distal outcome varied the aversiveness of the distal outcome of having to speak with a police officer. Participants in the low negative utility condition were led to believe that they would speak with a police officer over the phone if their responses required it, whereas those in the high negative utility condition were led to believe that they would meet with a police officer in-person if their responses required it. This experimental manipulation was expected to vary participants' perception of the distal outcome's utility: Participants who had to meet with the police officer in-person were expected to perceive the potential meeting as more negative than those who had to speak with the police officer over the phone.

Procedure, measures, and materials

The procedures and materials in Experiment 2 were the same as those used in Experiment 1 except for the following modifications. First, the proximal outcome that participants faced was limited to the repetitive questions and did not involve eating any jelly beans. Therefore, the proximal outcome was constant across all experimental conditions. Second, Experiment 2 varied the negative utility of the distal outcome, as described above. Third, the manipulation check items were modified to assess participants' perception of the distal outcome's utility (Appendix G). Five of these items were bipolar adjectives that follow

the question stem "*Please rate the meeting (phone call) with the police officer on these attributes; The meeting (phone call) will be (1) irritating – soothing; (2) painful – delightful; (3) boring – interesting; (4) unpleasant – pleasant; (5)annoying – enjoyable*". Participants were also asked "*Overall, how much do you want to meet (speak) with the police officer to discuss your answers to the illegal behavior survey?*", with the endpoints 1 (*not at all*) and 7 (*a lot*).

Preliminary Analyses

Suspicion and contingency pairing checks

Examination of participants' responses to the suspicion question revealed that no participant doubted the veracity of the meeting with the police officer. A frequency analysis indicated that all participants correctly report the contingency pairing that was associated with their interview responses. Therefore, I included all participants' data in the analyses.

Negative utility manipulation check

To examine whether the negative utility manipulation had the intended effect on participants' perception of the distal outcome, I performed a series of non-parametric Mann-Whitney *U* tests (Appendix G). Table 9 lists the descriptive statistics of participants' responses to the negative utility manipulation check items.

Results indicated that participants' expectations to be interviewed by the police officer over the phone or in-person did not significantly influence their perception of the distal outcome on any of the five judgments (i.e., *irritating –soothing; painful – delightful;boring – interesting; unpleasant – pleasant; annoying – enjoyable*), z_U *'s* ≤ 0.89, *p*s ≥ 0.37. The negative utility manipulation also did not significantly influence how much participants wanted to speak or meet with the police officer, $z_U = 1.54$, $p = 0.12$.

Table 9. Experiment 2 descriptive statistics of negative utility manipulation check items.

		Negative utility of distal outcome	
		Low (phone call)	High (meeting)
The meeting (phone call) would be… 1 (*negative*) – 7 (*positive*)	irritating –soothing	3.04 (1.30)	3.17 (1.60)
	painful – delightful	3.52 (1.29)	3.48 (1.31)
	boring – interesting	3.70 (1.71)	3.41 (1.74)
	unpleasant – pleasant	3.36 (1.36)	3.44 (1.49)
	annoying – enjoyable	3.21 (1.32)	3.28 (1.44)
Overall, how much do you want to meet (speak) with the police officer to discuss your answers to the illegal behavior survey? 1 (*not at all*) – 7 (*a lot*)		2.31 (1.28)	2.04 (1.30)

These results indicate that the negative utility manipulation did not differentiate participants' perception of the distal outcome. However, it is also possible that the negative utility manipulation check items failed to detect the effect of the experimental manipulation. As the 7-point scale of the manipulation check questions ranged from negative to positive ratings, participants generally used the negative half of the scale to rate their perceptions of the distal outcome, which might reduce the sensitivity of the questions. If the questions were in a comparative manner, for example, "*Which one do you prefer, to meet with the police officer in-person or to speak with him over the phone?*", differences in participants' perceptions of the distal outcome might have emerged.

Another possible reason is the timing of the manipulation check questions. By the time participants answered the manipulation check questions, they had already done with the proximal outcome. At this point, participants' perception of the distal outcome might have been influenced by their responses to the illegal behavior interview. The more serious the crimes participants admitted to, the more negative the distal outcome participants might have perceived to be. In addition, participants might have also hoped to avoid the distal outcome

with certain responses, for example, expressing aversiveness towards the possible meeting with the police officer.

Main Analyses

The primary interest of Experiment 2 was to examine the influence of the distal outcome's utility on participants' admission decisions to the 20 prior illegal and unethical behaviors. Experiment 2 had the same factorial design as Experiment 1, except for the experimental manipulation of the negative utility factor, which, in Experiment 2 pertained to the utility of the distal outcome. Because of the similarity in the experimental designs, I conducted the same set of analyses for Experiment 2 as I did for Experiment 1.

Model 1: Gauss-Markov model

In the first model, I defined the random variable Y_{ijk} as the total number of admissions made by participant *k* in the i^{th} contingency pairing condition and the j^{th} negative utility condition. I assumed that the random variable Y_{ijk} defined above follows a Gauss-Markov model,

$$Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}, i = 1,2; j = 1,2; k = 1, \dots, n_{ij}$$

where μ is the intercept parameter; $\alpha_1$and α_2 are the fixed contingency pairing effects; β_1 and β_2 are the fixed negative utility effects; $(\alpha\beta)_{11}$, $(\alpha\beta)_{12}$, $(\alpha\beta)_{21}$, and $(\alpha\beta)_{22}$ are the fixed effects allowing the interaction between contingency pairing and negative utility; and the ϵ_{ijk} terms are i.i.d. $N(0, \sigma^2)$ random errors. The research hypothesis that the difference in the utility of the distal outcome would lead to a difference in participants' interview responses can thus be translated into testing a hypothesis of an interaction between the two experimental factors, i.e., the null hypothesis was

$$H_0: (\alpha\beta)_{11} - (\alpha\beta)_{12} - (\alpha\beta)_{21} + (\alpha\beta)_{22} = 0,$$

and the alternative hypothesis was

$$H_A: (\alpha\beta)_{11} - (\alpha\beta)_{12} - (\alpha\beta)_{21} + (\alpha\beta)_{22} \neq 0.$$

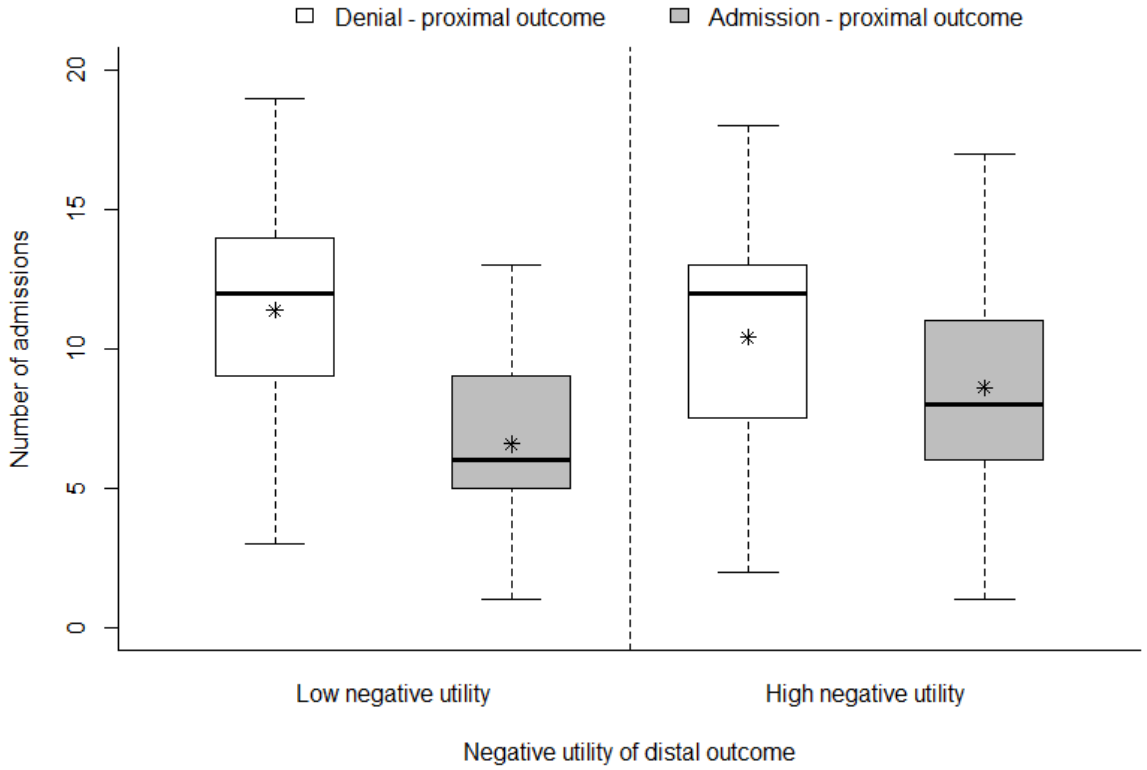

Figure 5. Box plot of total number of admissions in Experiment 2. The stars depict the mean number of admissions in each experimental condition.

The results from the analysis of the above Gauss-Markov model indicated that the interaction was significant, $F(1, 155) = 6.35$, $p = 0.013$, $\eta^2 = 0.040$. Therefore, the obtained data supported the alternative hypothesis of an interaction between contingency pairing and negative utility of distal outcome, which suggested that the distal outcome established different influences on participants' admission decisions when its utility changed. From Figure 5, the discrepancy in participants' admissions between the "denial-proximal outcome" and "admission-proximal outcome" contingency pairing conditions was larger in the low negative utility condition than in the high negative utility condition. This reflected that

participants gave less weight to the distal outcome in their decisions when it was perceived to be less negative versus more negative.

The analyses of simple main effects of negative utility of distal outcome revealed that (1) participants made more admissions in the "denial-proximal outcome" contingency pairing condition than the "admission-proximal outcome" contingency pairing condition when participants expected to meet with the police officer in-person (high negative utility condition), $F(1,155) = 4.06$, $p = 0.025$; $d = 0.48$, 95% CI [0.06, 0.89]; (2) the difference in admissions between the two contingency pairing conditions was also significant when participants expected to speak with the police officer over the phone (low negative utility condition), and to a greater extent, $F(1, 155) = 31.38$, $p < 0.001$; $d = 1.42$, 95% CI [0.94, 1.91]. These results suggested that participants tended to give disproportional weight to the proximal outcome in their decisions, and this tendency became greater as the distal outcome became less negative. Table 10 presents the descriptive statistics of the admissions made by participants in each experimental condition.

Table 10. Experiment 2 descriptive statistics of the total number of admissions.

		Negative utility of distal outcome	
		Low (phone call)	High (in-person meeting)
Contingency pairing	Denial-proximal outcome	11.38 (3.80) $n = 39$	10.41 (4.10) $n = 40$
	Admission-proximal outcome	6.58 (2.85) $n = 38$	8.61 (3.67) $n = 41$

I also tested the main effects of contingency pairing and negative utility of distal outcome. Results indicated that the main effect of negative utility of distal outcome was not

significant, $F(1, 155) = 0.73$, $p = 0.40$, $\eta^2 = 0.005$; but the main effect of contingency pairing was significant, $F(1, 155) = 32.53$, $p < 0.001$, $\eta^2 = 0.18$. Further analysis showed that participants in the "denial-proximal outcome" contingency pairing condition ($M = 10.90$, $SD = 3.96$) made more admissions than participants in the "admission-proximal outcome" contingency pairing condition ($M = 7.63$, $SD = 3.44$), $t(155) = 5.70$, $p < 0.001$; $d = 1.01$, 95% CI [0.73, 1.28].

Model 2: Generalized linear mixed-effects model

Similar to the analyses for Experiment 1, I also modeled the data using a generalized linear mixed-effects model. Taking this approach, I defined the random variables Y_{ijkl} as the dichotomous response made by participant *k* to the question *l* in the i^{th} contingency pairing condition and the j^{th} negative utility condition:

$$Y_{ijkl} = \begin{cases} 1, & \text{if the response is an admission,} \\ 0, & \text{if the response is a denial.} \end{cases}$$

I set up the model as follows.

$$Y_{ijkl} \mid p_{ijkl} \sim \text{Bernoulli}\left(p_{ijkl}\right),$$

$$\log\left(\frac{p_{ijkl}}{1 - p_{ijkl}}\right) = \eta_{ijkl} \text{ (defined below)}$$

$$i = 1,2; j = 1,2; k = 1,2, \ldots, n_{ij};\ l = 1,2, \ldots, 20;\ 0 < p_{ijkl} < 1$$

The linear predictor η_{ijkl} is a linear combination of different fixed effects and potential random effects. According to what the research question is, there can be different choices for the format of the linear predictor η_{ijkl}. First, I assessed the effects of the two experimental manipulations (i.e., contingency pairing and negative utility of the proximal outcome) controlling for the random participant effects. Thus, the linear predictor η_{ijkl} takes the form of

$$\eta_{ijkl} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + s_{ijk}$$

where, similar to the Gauss-Markov model, μ is the intercept parameter; $\alpha_1$and α_2 are the fixed contingency pairing effects; β_1 and β_2 are the fixed negative utility effects; $(\alpha\beta)_{11}$, $(\alpha\beta)_{12}$, $(\alpha\beta)_{21}$, and $(\alpha\beta)_{22}$ are the fixed effects allowing for the interaction. In addition, the s_{ijk} terms are i.i.d. $N(0, \sigma_s^2)$ random participant effects. The hypothesis of interest was also the interaction between contingency pairing and negative utility of distal outcome, i.e., the null hypothesis was H_0: $(\alpha\beta)_{11} - (\alpha\beta)_{12} - (\alpha\beta)_{21} + (\alpha\beta)_{22} = 0$.

The results from the analysis of the above generalized mixed-effects model were consistent with those of the Gauss-Markov model. The interaction between the two experimental manipulations was significant, $F(1, 3001) = 7.06$, $p < 0.01$, which supported the research hypothesis. The analyses of simple main effects also revealed the same pattern as those of the Gauss-Markov model: (1) When expecting to speak with the police officer over the phone, participants were more likely to make an admission in the "denial-proximal outcome" contingency pairing condition than in the "admission-proximal outcome" contingency pairing condition, $F(1, 3001) = 32.37$, $p < 0.001$; $OR = 2.82$, 95% CI [1.97, 4.02]; (2) When expecting to meet with the police officer in-person, they were also more likely to make an admission in the "denial-proximal outcome" contingency pairing condition than in the "admission-proximal outcome" contingency pairing condition, but to a smaller extent, $F(1, 3001) = 4.26$, $p = 0.04$; $OR = 1.44$, 95% CI [1.02, 2.03].

The main effect of negative utility of distal outcome was not significant, $F(1, 3001) = 0.75$, $p = 0.39$. The main effect of contingency pairing was significant, $F(1, 3001) = 30.31=54$, $p < 0.001$; for participants in the "denial-proximal outcome" contingency pairing condition, the odds of admitting to the illegal behavior questions were 2.01 times as high as

that for participants in the "admission-proximal outcome" contingency pairing condition, *OR* = 2.01, 95% CI [1.57, 2.58].

I also tested the effects of illegal behaviors and question positions under the generalized linear mixed-effects model. The effect of illegal behaviors was significant, $F(19, 2963) = 27.35$, $p < 0.001$; and the effect of question positions was not significant, $F(19, 2963) = 1.19$, $p = 0.26$. Similar to the analysis in Experiment 1, I next used the seriousness scores of the illegal behaviors to replace the fixed effects of illegal behaviors to examine how the seriousness of the illegal behaviors influenced participants' admission decisions. Results revealed a significant effect of seriousness, $F(1, 2981) = 73.33$, $p < 0.001$. As an illegal behavior became more serious, participants were less likely to admit to having done it, *OR* = 0.725, 95% CI [0.673, 0.780].

Discussion

According to the interrogation decision-making model, a critical factor that affects suspects' decision-making is the utility of distal outcomes associated with their choices. Consistent with this idea, the results of Experiment 2 provided evidence for the effect of a distal outcome's utility on participants' admission decisions. It showed that participants were more likely to shift their admission decisions to avoid the proximal outcome the more negative they perceived the distal outcome to be. This finding has important implications for understanding suspects' confession decisions within a custodial interrogation.

First, the current research finding helps to understand the effects of some interrogation techniques on suspects' confession decisions. Minimization techniques, for example, may alter suspects' confession decisions by manipulating their perception of the utility of distal outcomes. With minimization techniques, police interrogators downplay the

seriousness of the offense or the legal consequences of a confession (Kassin & McNall, 1991), which may lead suspects to expect less severe future punishment following their confessions. In other words, such techniques manipulate suspects' perception of the utility of distal outcomes associated with a confession. As a result, both innocent and guilty suspects may be more willing to confess as a way to get out of the interrogation when police interrogators apply these techniques. Therefore, the effect of a distal outcome's utility on suspects' confession decisions explains the previous research finding that the usage of minimization techniques increases both true and false confessions (Russano et al., 2005; Houston et al., 2014).

Along the same line, the effect of a distal outcome's utility is also relevant to understanding how crime type and seriousness affect suspects' confession decisions. Suspects' perception of the utility of distal outcomes may vary as a function of crime type and seriousness. They may perceive that the future punishment following their confessions will be less severe for non-violent versus violent crimes as well as minor versus serious crimes. Applying the findings of the current research, both innocent and guilty suspects may be more likely to confess when interrogated for non-violent and minor crimes because the utility of distal outcomes associated with a confession is less negative for these crimes. Indeed, previous research has shown that suspects more readily confess to non-violent crimes than violent ones (Mitchell, 1983), and to minor offenses than serious ones (St-Yves, 2002; Madon et al., 2013).

This further implies that both true and false confessions might be more common for non-violent and minor crimes than violent and serious ones. However, false confessions involved in non-violent and minor cases may never be revealed because these cases generally

contain no DNA evidence and attract no post-conviction scrutiny (Gudjonsson, 2003). Innocent suspects may, as a result, have to endure unjust suffering especially for the non-violent and minor crimes. This underscores the importance for the legal system to enact interrogation reforms to protect innocent suspects from wrongful convictions not only for violent and serious crimes, but also for non-violent and minor ones.

CHAPTER 7. GENERAL DISCUSSION

According to the proposed interrogation decision-making model, an outcome's utility influences suspects' confession decisions. My dissertation included two experiments that examined the effects of a proximal outcome's utility and a distal outcome's utility on participants' admission decisions, respectively. Experiment 1 tested whether a proximal outcome's utility influenced participants' admission decisions, but failed to detect the effect. One possible reason might be that the experimental manipulation was too weak to create a meaningful difference in participants' perceptions of the utility of the proximal outcome. Experiment 2 tested whether a distal outcome's utility influenced participants' admission decisions. Consistent with the model, the results indicated that participants were more likely to shift their admission decisions to avoid a proximal outcome when they perceived the distal outcome to be less negative versus more negative. This finding provides evidence that the utility of a distal outcome plays an important role in suspects' decision-making.

Implications of the Interrogation Decision-Making Model

Though the findings of the two experiments did not fully support the predictions of the interrogation decision-making model, the contributions and limitations of the model warrant discussion. The model provides a useful framework to understand and explain suspects' interrogation decisions, and in this way, makes significant theoretical and applied contributions.

First, the model recognizes the complexity and the dynamic nature of suspects' decision-making processes during an interrogation. It points out that this process usually involves multiple decisions and is influenced by a large number of factors. Second, the model disentangles the complexity of suspects' decision-making by differentiating between the

micro- and macro-level processes. The micro-level process focuses on the psychological mechanisms underlying a single interrogation decision, and thus is able to explain how suspects reach a specific decision. The macro-level process focuses on the entire flow of an interrogation, and thus is able to describe changes among suspects' decisions. Hence, this differentiation not only clarifies suspects' decision-making at different levels, but enhances both the descriptive and explanatory power of the model.

What is more, the model integrates the micro- and macro-level processes and constructs a theoretical framework to present the whole picture of suspects' decision-making within the context of a custodial interrogation. As illustrated in Chapter 3 "Model Application", this framework is able to explain and predict the effects of a variety of factors on suspects' confession decisions. A number of findings reported in the literature support the model's predictions. For example, a meta-analysis of psychological factors relevant to suspects' confessions suggested that internal pressure (e.g., feeling of guilt and remorse) leads to true confessions, while external pressure (e.g., disapproval or disbelief from interrogators) leads to false confessions (Houston et al., 2014). This is consistent with the model's prediction that proximal outcomes play an important role in suspects' decision-making during an interrogation. As guilty and innocent suspects are faced with different sets of proximal outcomes, their confessions may be driven by different psychological factors. The meta-analysis also showed that suspects tended to consider the strengths of incriminating evidence and legal consequences of confessing (Houston et al., 2014), which lends support to the model's prediction that distal outcomes play an essential role in suspects' decision-making process. In summary, the model provides a useful tool to organize and integrate empirical findings on police interrogation and confessions.

Most importantly, the model can provide important implications for the legal system. For example, the model can be used to analyze the effects of a specific interrogation technique on guilty and innocent suspects separately (e.g., the analysis for the bluff technique in Chapter 3), and thus to evaluate whether the same interrogation technique has different effects on guilty versus innocent suspects.

Table 9. Effects of an interrogation technique on guilty versus innocent suspects.

Effects on confessions		Guilty suspects: ↑	Guilty suspects: ↓
Innocent suspects	↑	Confession-prone	Assimilating
	↓	Differentiating	Denial-prone

Ideally, an interrogation technique should be able to differentiate the reactions of guilty and innocent suspects—encouraging guilty suspects to confess while preventing innocent suspects from false confessions. As shown in Table 9, I label such interrogation techniques as *differentiating* techniques. There are three other situations in Table 9. If an interrogation technique drives both guilty and innocent suspects towards confessions, then I label it as a *confession-prone* technique. Similarly, if an interrogation technique moves both groups from confessions towards denials, I label it as a *denial-prone* technique. The worst situation involves *assimilating* techniques, in which case the interrogation technique encourages innocent suspects but not guilty suspects to confess. With this taxonomy, the legal system can decide which category an interrogation technique falls into according to its effects on guilty and innocent suspects. The interrogation decision-making model, therefore,

provides a useful tool for the legal system to understand the effects of different interrogation techniques and to develop *differentiating* techniques that can protect innocent suspects from false confessions without turning guilty suspects loose.

Limitations of the Interrogation Decision-Making Model

As Box (1987) pointed out, "essentially, all models are wrong, but some are useful", and in line with this sentiment there are several limitations associated with the interrogation decision-making model that warrant discussion.

First, the model does not specify the exact form of the probability function, $p(\cdot)$, and the utility function, $u(\cdot)$. In other words, it does not specify the relation between suspects' subjective judgment and the objective value of the probability or the utility of an outcome. As revealed in large amount of research in judgment and decision making, the subjective value of an outcome may not necessarily be identical to its objective value, in other words, $p(\cdot)$ and $u(\cdot)$ may not be a simple linear function (Kahneman & Tversky, 1979; Tversky & Kahneman, 1986). Though the model does not elaborate the relation between suspects' subjective judgments and objective values, I do emphasize that the probability function, $p(\cdot)$, and the utility function, $u(\cdot)$, represent suspects' subjective judgments instead of objective values of the probability and the utility of an outcome. Concretely speaking, the model proposes that it is suspects' subjective perceptions that influence their confession decisions, not the objective values of the outcomes.

Second, the model simplifies the relations among different parameters. According to Equation 1, the model assumes that the expected utility of a choice is a linear function of all parameters. The simple linear function, however, may not accurately capture the relation between the expected utility and its parameters. For example, the expected utility may be

proportional to the cubic function of the discount rate θ (i.e., $E[u(\boldsymbol{x})] \propto \theta^3$) or the exponential function of $E[u(\boldsymbol{x_d})]$ and θ (i.e., $E[u(\boldsymbol{x})] \propto E[u(\boldsymbol{x_d})]^{\theta}$). The reason that I take a linear function is that it captures the monotonic relation between the expected utility and relevant parameters with the simplest form.

Third, the model simplifies the perceived outcomes into two groups: proximal and distal. It assumes that suspects discount all the distal outcomes to the same extent with a single discount rate θ. However, suspects may not perceive different distal outcomes to occur at the same time point. Instead, suspects may perceive *T* groups of distal outcomes to occur at *T* different time points in the future. Consequently, suspects may discount different groups of distal outcomes to a different degree in their decisions. Indeed, Equation 1 can be generalized to

Equation 4.

$$E[u(\boldsymbol{x})] = \sum_{t=0}^{T} E[u(\boldsymbol{x_t})] = \sum_{t=0}^{T} \theta(t) \sum_{i=1}^{n_t} p(x_{ti}) u(x_{ti})$$

In which a choice $\boldsymbol{x}$ yields $(T+1)$ groups of outcomes $(\boldsymbol{x_0}, \boldsymbol{x_1}, \dots, \boldsymbol{x_T})$. The sub-vector $\boldsymbol{x_t} = (x_{t1}, x_{t2}, \dots, x_{tn_t})$ presents all possible outcomes that suspects perceive to happen at time $t = 0, 1, \dots, T$. $\theta(t)$ presents suspects' discount rate for the outcomes $\boldsymbol{x_t}$ and is a monotonically decreasing function of the time variable *t*. $\theta(t)$ is bounded within 0 and 1, with $\theta(0) = 1$ and $\theta(\infty) = 0$. It can be observed that Equation 1 is a special case of Equation 4. In Equation 1, the proximal outcomes can be considered as outcomes that suspects perceive to occur immediately at time $t = 0$, and therefore the discount rate for proximal outcomes becomes $\theta(0) = 1$; the distal outcomes can be considered as outcomes that suspects perceived to occur at a future time point *T* and these outcomes are discounted to the same extent with a discount rate $\theta(\mathrm{T}) = \theta$.

It can be further assumed the discount function $\theta(\cdot)$ not only depends on the time variable *t*, but on the specific outcome x_{ti} as well. In other words, suspects' tendency to discount a distal outcome may be influenced by both the temporal distance and the characteristics of the outcome. Thus, Equation 4 can be updated to,

Equation 5.

$$E[u(\boldsymbol{x})] = \sum_{t=0}^{T} E[u(\boldsymbol{x_t})] = \sum_{t=0}^{T} \sum_{i=1}^{n_t} \theta(t, x_{ti}) p(x_{ti}) u(x_{ti})$$

Though Equation 4 and 5 are more generalized and can thus deal with more complicated situations involving uncertain and inter-temporal choices, I consider that the interrogation decision-making model with Equation 1 is appealing to understanding suspects' confession decisions. On one hand, suspects may generally consider all future outcomes together in their decision-making processes, even though these outcomes may not happen at the same time in the future. Therefore, the interrogation decision-making model, though simplified, may capture suspects' decision-making with fair accuracy. On the other hand, assigning different discount rates to different distal outcomes makes it difficult to describe suspects' tendency to discount future outcomes. In application, it is concise to use one parameter θ to describe suspects' individual differences in discounting. In addition, most police interrogation techniques may only manipulate suspects' perceptions of the probability and utility of specific outcome(s), but may not directly manipulate suspects' tendency to discount distal outcome(s). Hence, it may not be necessary to include different discount rates for different outcomes. For the above reasons, I consider the interrogation decision-making model to be parsimonious and adequate to describe and understand suspects' interrogation decisions.

To summarize, the limitations of the interrogation decision-making model are tied to the mathematical nature of the model. The model uses mathematical parameters and formulas to organize the psychological processes underlying suspects' confession decisions. But in reality, human being are more complex and do not operate in the same way as formulated in the model. For example, people probably do not explicitly form numeric estimations of probabilities and utilities; they probably do not have a concrete number for the discount rate in their mind; and they probably do not directly calculate the expected utilities of their choices. In other words, the model does not represent exactly what happens in the real world. Nevertheless, just as asserted by Killeen (1999), "models of phenomena are not causes of phenomena; they are descriptions of hypothetical structures or functions that aid explanation, prediction, and control" (p. 273).

Conclusion

In this dissertation, I have presented the interrogation decision-making model as a way to understand suspects' decision-making process within the context of a custodial interrogation. The model proposes that suspects' decision-making can be analyzed at two different levels—a micro-level process that explains the psychological mechanisms that underlie suspects' individual interrogation decisions at particular points in time, and a macro-level process that describes changes among suspects' multiple interrogation decisions throughout an interrogation. Incorporating the tenets of expected utility theory, the micro-level process of the model proposes that interrogated suspects make a single decision to deny or confess guilt on the basis of evaluating and comparing the expected utilities of these choices. The macro-level process reveals the dynamic nature of an interrogation and identifies three classes of factors that influence suspects' decisions. The model further

combines these two processes and shows how they jointly can explain suspects' decision-making processes throughout the course of an interrogation.

This dissertation also includes two experimental studies that examined the effects of two key components of the model—a proximal outcome's utility and a distal outcome's utility—on suspects' confession decisions. Experiment 1 failed to detect the effect of a proximal outcome's utility, but Experiment 2 supported the effect of a distal outcome's utility. Although the results of the two experiments did not fully support the research hypotheses, the interrogation decision-making model still provides a useful theoretical framework to understand and analyze suspects' confession decisions within the context of a custodial interrogation.

REFERENCES

Appelbaum, K. L., & Appelbaum, P. S. (1994). Criminal-justice-related competencies in defendants with mental retardation. *Journal of Psychiatry and Law, 22*, 483-503.

Appleby, S. C., & Kassin, S. M. (2016). Effects of confessions, DNA, and prosecutorial theories on perceptions of guilt. *Psychology, Public Policy, and Law, 22*(2), 127-140. doi: 10.1037/law0000080

Bedau, H. A., & Radelet, M. L. (1987). Miscarriages of justice in potentially capital cases. *Stanford Law Review*, 21-179.

Berns, G. S., Laibson, D., & Loewenstein, G. (2007). Intertemporal choice - toward an integrative framework. *Trends in Cognitive Sciences, 11*(11), 482-488. doi: 10.1016/j.tics.2007.08.011

Bonett, D. G. (2010). Sample size fomula for a standardized linear contrast with desired power. *Unpublished formula in Stat 402*.

Box, G. E. P. (1979). Robustness in the strategy of scientific model building. In R. L. Launer & G. N. Wilkinson (Eds.) *Robustness in Statistics* (pp. 201-236). Cambridge, MA: Academic Press.

Bruton v. United States, 391 No. 123 (1968).

Casella, G., & Berger, R. (2001). *Statistical Inference* (2nd ed.). Pacific Grove, CA: Duxbury Press.

Cauffman, E., & Steinberg, L. (2000). (Im)maturity of judgment in adolescence: why adolescents may be less culpable than adults. *Behavioral Sciences and the Law, 18*(6), 741-760. doi: 10.1002/bsl.416

Cloud, M., Shepherd, G. B., Barkoff, A. N., & Shur, J. V. (2002). Words without meaning: The Constitution, confessions, and mentally retarded suspects. *The University of Chicago Law Review*, 495-624.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159. doi: 10.1037/0033-2909.112.1.155

Conti, R. P. (1999). The psychology of false confession. *The Journal of Credibility Assessment and Witness Psychology, 2*(1), 14-36.

Drizin, S. A., & Leo, R. A. (2004). The problem of false confessions in the post-DNA world. *North Carolina Law Review, 82*, 891-1007.

Edwards, W. (1962). Utility, subjective probability, their interaction, and variance preferences. *The Journal of Conflict Resolution, 6*(1), 42-51.

Everington, C., & Fulero, S. M. (1999). Competence to confess: Measuring understanding and suggestibility of defendants with mental retardation. *Mental Retardation, 37*(3), 212-220.

Firstman, R., & Salpeter, J. (2008). *A criminal injustice: A true crime, a false confession, and the fight to free Marty Tankleff*. New York: Ballantine Books.

Gilboa, I., Postlewaite, A. W., & Schmeidler, D. (2008). Probability and uncertainty in economic modeling. *The Journal of Economic Perspectives, 22*(3), 173-188.

Grano, J. D. (1979). Voluntariness, free will, and the law of confessions. *Virginia Law Review*, 859-945.

Grisso, T., Steinberg, L., Woolard, J., Cauffman, E., Scott, E., Graham, S., Lexcen, F., Reppucci, N. D., & Schwartz, R. (2003). Juveniles' competence to stand trial: A comparison of adolescents' and adults' capacities as trial defendants. *Law and Human Behavior, 27*(4), 333-363. doi: 10.1023/a:1024065015717

Gudjonsson, G. H. (2003). *The psychology of interrogations and confessions: A handbook*. Chichester, England: John Wiley & Sons.

Gudjonsson, G. H., & Sigurdsson, J. F. (1999). The Gudjonsson Confession Questionnaire-Revised (GCQ-R) factor structure and its relationship with personality. *Personality and Individual Differences, 27*(5), 953-968.

Gudjonsson, G. H., Sigurdsson, J. F., & Einarsson, E. (2004). The role of personality in relation to confessions and denials. *Psychology, Crime and Law, 10*(2), 125-135.

Guyll, M., Madon, S., Yang, Y., Lannin, D. G., Scherr, K., & Greathouse, S. (2013). Innocence and resisting confession during interrogation: Effects on physiologic activity. *Law and human behavior, 37*(5), 366-375.

Hilgendorf, E. L., & Irving, B. (1981). A decision-making model of confessions. In S. M. Lloyd-Bostock (Ed.), *Psychology in legal contexts: application and limitations* (pp. 67-83). London, England: MacMillar Press.

Holland, L., Kassin, S. M., & Wells, G. L. (2005). *Why suspects waive the right to a lineup: A study in the risk of actual innocence*. Paper presented at the American Psychology-Law Society, San Diego, CA.

Horgan, A. J., Russano, M. B., Meissner, C. A., & Evans, J. R. (2012). Minimization and maximization techniques: Assessing the perceived consequences of confessing and confession diagnosticity. *Psychology, Crime and Law, 18*(1), 65-78.

Houston, K. A., Meissner, C. A, & Evans, J. R. (2014). Psychological processes underlying true and false confessions. In R. Bull (Ed.), *Investigative Interviewing* (pp. 19-34). New York: Springer.

Inbau, F. E., Reid, J., Buckley, J., & Jayne, B. (2011). *Criminal Interrogation and Confessions* (5 ed.). Burlington, MA: Jones & Bartlett Learning.

Innocence Project. (2016a). *Jeff Deskovic.* Retrieved May 23, 2016, from http://www.innocenceproject.org/cases/jeff-deskovic/

Innocence Project. (2016b). *False confessions or admissions.* Retrieved May 23, 2016, from http://www.innocenceproject.org/causes/false-confessions-admissions/

Kalenscher, T., & Pennartz, C. M. A. (2008). Is a bird in the hand worth two in the future? The neuroeconomics of intertemporal decision-making. *Progress in Neurobiology, 84*(3), 284-315. doi: 10.1016/j.pneurobio.2007.11.004

Kassin, S. M. (2005). On the psychology of confessions: Does innocence put innocents at risk? *American Psychologist, 60*(3), 215-228. doi: 10.1037/0003-066x.60.3.215

Kassin, S. M. (2008). The psychology of confessions. *Annual Review of Law and Social Science, 4*, 193-217. doi: 10.1146/annurev.lawsocsci.4.110707.172410

Kassin, S. M. (2012). Why confessions trump innocence. *American Psychologist, 67*(6), 431-445. doi: 10.1037/a0028212

Kassin, S. M., Drizin, S. A., Grisso, T., Gudjonsson, G. H., Leo, R. A., & Redlich, A. D. (2010). Police-induced confessions: Risk factors and recommendations. *Law and Human Behavior, 34*, 3-38. doi: 10.1007/s10979-010-9217-5

Kassin, S. M., & Gudjonsson, G. H. (2004). The psychology of confessions: A review of the literature and issues. *Psychological Science in the Public Interest, 5*(2), 33-67. doi: 10.1111/j.1529-1006.2004.00016.x

Kassin, S. M., & Kiechel, K. L. (1996). The social psychology of false confessions: Compliance, internalization, and confabulation. *Psychological Science, 7*(3), 125-128.

Kassin, S. M., Leo, R. A., Meissner, C. A., Richman, K. D., Colwell, L. H., Leach, A.-M., & La Fon, D. (2007). Police interviewing and interrogation: A self-report survey of police practices and beliefs. *Law and Human Behavior, 31*(4), 381-400.

Kassin, S. M., & McNall, K. (1991). Police interrogations and confessions. *Law and Human Behavior, 15*(3), 233-251.

Kassin, S. M., & Norwick, R. J. (2004). Why people waive their Miranda rights: The power of innocence. *Law and Human Behavior, 28*(2), 211-221. doi: 10.1023/B:LAHU.0000022323.74584.f5

Kassin, S. M., & Sukel, H. (1997). Coerced confessions and the jury. *Law and Human Behavior, 21*(1), 27-46.

Kassin, S. M., & Wrightsman, L. S. (1985). Confession evidence. In S. M. Kassin & L. S. Wrightsman (Eds). *The psychology of evidence and trial procedure* (pp. 67-94). New York: Sage Publications.

Killeen P.R. (1999). Modeling modeling. *Journal of the Experimental Analysis of Behavior, 71*, 275–280.

Leo, R. A. (1996). Inside the interrogation room. *Journal of Criminal Law and Criminology, 86*(2), 266-303.

Leo, R. A. (2004). The third degree and the origins of psychological interrogation in the United States. In G. D. Lassiter (Ed.), *Interrogations, confessions, and entrapment* (pp. 37-84). New York: Kluwer Academic.

Leo, R. A., Costanzo, M., & Shaked-Schroer, N. (2009). Psychological and cultural aspects of interrogations and false confessions: Using research to inform legal decision-making. In D. A. Krauss & J. D. Lieberman (Eds.), *Psychological Expertise in Court* (pp. 48). Abingdon, Oxon: GBR: Ashgate Publishing Group.

Leo, R. A., & Drizin, S. A. (2010). The three errors: Pathways to false confession and wrongful conviction. In G. D. Lassiter & C. Meissner (Eds.), *Interrogations and Confessions: Current Research, Practice, and Policy Recommendations*. Washington, D.C.: American Psychological Association.

Madon, S., Guyll, M., Scherr, K., Greathouse, S., & Wells, G. (2012). Temporal discounting: The differential effect of proximal and distal consequences on confession decisions. *Law and Human Behavior, 36*, 13-20. doi:10.1007/s10979-011-9267-3

Madon, S., Yang, Y., Smalarz, L., Guyll, M., & Scherr, K. C. (2013). How factors present during the immediate interrogation situation produce short-sighted confession decisions. *Law and Human Behavior, 37*(1), 60-74. doi: 10.1037/lhb0000011

McCormick, C. T. (1972). *Handbook of the law of evidence* (2nd ed.). St. Paul, MN: West.

Meyer, J. R., & Reppucci, N. D. (2007). Police practices and perceptions regarding juvenile interrogation and interrogative suggestibility. *Behavioral Sciences & the Law, 25*(6), 757-780. doi: 10.1002/bsl.774

Mongin, P. (1988). Expected utility theory. In J. B. Davis, D. W. Hands, & U. Mäki (Eds.), *Handbook of economic methodology* (pp. 342-350). London: Edward Elgar.

Moston, S., Stephenson, G. M., & Williamson, T. M. (1992). The effects of case characteristics on suspect behaviour during police questioning. *British journal of criminology, 32*(1), 23-40.

Nash, R. A., & Wade, K. A. (2009). Innocent but proven guilty: Eliciting internalized false confessions using doctored - video evidence. *Applied Cognitive Psychology, 23*(5), 624-637.

Ofshe, R. J., & Leo, R. A. (1997a). The decision to confess falsely: Rational choice and irrational action. *Denver University Law Review, 74*, 979-1122.

Ofshe, R. J., & Leo, R. A. (1997b). The social psychology of police interrogation: The theory and classification of true and false confessions. *Studies in Law Politics and Society, 16*, 189-254.

Owen-Kostelnik, J., Reppucci, N. D., & Meyer, J. R. (2006). Testimony and interrogation of minors: Assumptions about maturity and morality. *The American Psychologist, 61*(4), 286-304. doi: 10.1037/0003-066X.61.4.286

Pearse, J., Gudjonsson, G. H., Clare, I. C. H., & Rutter, S. (1998). Police interviewing and psychological vulnerabilities: Predicting the likelihood of a confession. *Journal of Community & Applied Social Psychology, 8*(1), 1-21.

Perillo, J. T., & Kassin, S. M. (2011). Inside interrogation: The lie, the bluff, and false confessions. *Law and Human Behavior, 35*(4), 327-337. doi: 10.1007/s10979-010-9244-2

Puzzanchera, C. (2011). Juvenile arrests. *Juvenile Offenders and Victims: National Report Series Bulletin*. Retrieved November 17, 2014, from http://www.ojjdp.gov/pubs/244476.pdf.

Redlich, A. D. (2007). Double jeopardy in the interrogation room for youths with mental illness. *American Psychologist, 62*, 609-611.

Redlich, A. D., & Drizin, S. (2007). Police interrogation of youth. In C. L. Kessler & L. Kraus (Eds.), *The mental health needs of young offenders: Forging paths toward reintegration and rehabilitation* (pp. 61-78). Cambridge, England: Cambridge University Press.

Reik, T. (1959). *The compulsion to confess.* New York: Farrar, Straus and Cudahy.

Rogge, O. J. (1975). *Why men confess*. Cambridge, MA: Da Capo Press.

Russano, M. B., Meissner, C. A., Narchet, F. M., & Kassin, S. M. (2005). Investigating true and false confessions within a novel experimental paradigm. *Psychological science, 16*(6), 481-486. doi: 10.1111/j.0956-7976.2005.01560.x

Santo, F. (2006). DNA evidence frees a man imprisoned for half his life. *The New York Times*. Retrieved November 17, 2014, from http://www.nytimes.com/2006/09/21/nyregion/21dna.html?_r=0

Schoemaker, P. J. H. (1982). The expected utility model: Its variants, purposes, evidence and limitations. *Journal of Economic Literature, 20*(2), 529-563.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131. doi: 10.1126/science.185.4157.1124

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*(4481), 453-458.

Von Neumann, J., & Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. Princeton NJ: Princeton University Press.

Yang, Y., Madon, S., & Guyll, M. (2014). *Why proximal consequences matter: The power of certainty*. Unpublished data.

Yang, Y., Madon, S., & Guyll, M. (2015). Short-sighted confession decisions: The role of uncertain and delayed consequences. *Law and Human Behavior, 39*(1), 44-52. doi: http://dx.doi.org/10.1037/lhb0000100

APPENDIX A: INFORMED CONSENT

Title of Study: **Illegal Behavior Study**

Investigators: Yueran Yang, Stephanie Madon, and Max Guyll

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION
The purpose of this study is to examine incident rates of illegal behaviors among college students. You are being invited to participate in this study because you are a student in a designated psychology class.

DESCRIPTION OF PROCEDURES
If you agree to participate in this study, your participation will last 90 minutes during which time you will be asked to complete surveys designed to assess your demographic information (e.g., age, gender), personality traits, mood, behaviors, and perceptions. You may also be interviewed by staff involved in this project. You may decline to answer any question or to stop participating at any time without penalty.

RISKS
No physical risks are associated with participation in this study. In addition, because all of your responses will be anonymous, there are also no privacy or legality issues raised by your responses to questions assessing illegal behaviors. However, it is anticipated that some participants may feel a normal amount of unease responding to the questions that assess illegal behaviors. However, jelly beans are provided thereby raising the risk of an allergic reaction. If you are allergic to any of the following ingredients you should immediately alert the experimenter:

> Sugar, glucose or corn syrup, pectin or starch, modified cornstarch, natural and artificial flavorings, acidity regulator, glazing agents, colors, the emulsifying agent lecithin, anti-foaming agents, an edible wax such as beeswax, salt, and confectioner's glaze.

BENEFITS
If you decide to participate in this study you will benefit by having had the educational opportunity for involvement in research. Additionally, it is hoped that the information gained in this study will benefit society by providing valuable information about incident rates of illegal behaviors among college students.

COSTS AND COMPENSATION
You will not incur any costs from participating in this study. You will be compensated for your participation with three research credits in your approved psychology course. As noted on your course syllabus, participation in experiments is one of the available options for acquiring experimental credit in your psychology course. Other options may include writing research papers or taking quizzes. Information about these alternatives is provided in your course syllabus.

PARTICIPANT RIGHTS
Your participation in this study is completely voluntary and you may decline to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled.

CONFIDENTIALITY
Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information. To ensure confidentiality to the extent permitted by law, the following measures will be taken: You will be (a) assigned a unique code that will be used instead of your name; (b) your data will be combined with the data collected from other participants so that no individual information will be identifiable; (c) only members of the research team will have access to your data; and (d) your data will be kept in a locked file cabinet and/or in password protected computers that are located in restricted and locked rooms. If the results are published, your identity will remain anonymous.

QUESTIONS OR PROBLEMS
You are encouraged to ask questions at any time during this study.

- For further information about the study, contact Yueran Yang, M.S. (294-6587, yryang@iastate.edu) or Stephanie Madon, Ph.D. (294-2932, madon@iastate.edu).
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

****

PARTICIPANT SIGNATURE
Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study if you wish.

Participant's Name (printed) _____

_____ _____
(Participant's Signature) (Date)

INVESTIGATOR STATEMENT
I certify that the participant has been given adequate time to read and learn about the study and all of their questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits and the procedures that will be followed in this study and has voluntarily agreed to participate.

_____ _____
(Signature of Person Obtaining Informed Consent) (Date)

APPENDIX B: INTERVIEW QUESTIONS

ILLEGAL BEHAVIOR SURVEY (less serious version)

Have you ever:

1. Drank, bought, or tried to buy alcohol before you were 21?	Yes☐	No☐
2. Bought or held stolen goods worth $25 or more?	Yes☐	No☐
3. Cheated on an exam, homework, school project, or helped another person cheat?	Yes☐	No☐
4. Transported fireworks across state lines?	Yes☐	No☐
5. Used something that belonged to somebody else without permission, such as something that belonged to a family member, friend, roommate or acquaintance?	Yes☐	No☐
6. Hunted or fished without a license?	Yes☐	No☐
7. Purposefully not returned something that you borrowed like a book, clothing, or money?	Yes☐	No☐
8. Failed to wear a seat belt?	Yes☐	No☐
9. Knowingly kept something of value that you received in error, such as extra change given to you by a cashier or extra merchandise from a store or from an internet purchase?	Yes☐	No☐
10. Texted somebody while driving since it became illegal in Iowa?	Yes☐	No☐
11. Engaged in criminal mischief such as a senior prank, egging a house or car, or TP-ing a house?	Yes☐	No☐
12. Invaded another's privacy such as by reading another's diary, text messages or emails without permission?	Yes☐	No☐
13. Jumped or cut in line such as at the dining hall, movie theater, or grocery store?	Yes☐	No☐
14. Made a harassing, threatening, or prank phone call or text message?	Yes☐	No☐
15. Driven a vehicle while under the influence of alcohol or any other drug like marijuana, cocaine, LSD, etc.?	Yes☐	No☐
16. Ran a red light?	Yes☐	No☐
17. Started or spread a rumor about someone?	Yes☐	No☐
18. Been publicly intoxicated?	Yes☐	No☐
19. Tried, used or experimented with any illegal drugs such as marijuana, cocaine, crack, LSD, or any other illegal drug?	Yes☐	No☐
20. Illegally downloaded music, movies, software, or anything else?	Yes☐	No☐

APPENDIX C: REPETITIVE QUESTION SET

Thinking about the average IOWAN...

How invulnerable do you think the average Iowan would be feel while (insert crime from illegal behavior survey)?

(Repeat for each mood on list….)

invulnerable	disoriented
self-important	worthless
gratified	self-assured
resentful	self-conscious
doubtful	happy-go-lucky
guilty	surprised
self-righteous	strong
jealous	hostile

Thinking about the average AMERICAN...

How invulnerable do you think the average American would be while (insert crime from illegal behavior survey).

(Repeat for each mood on list….)

invulnerable	disoriented
self-important	worthless
gratified	self-assured
resentful	self-conscious
doubtful	happy-go-lucky
guilty	surprised
self-righteous	strong
jealous	hostile

APPENDIX D: SUSPICION CHECK

1. Sometimes experiments study questions that are not obvious. Do you believe that is the case in this experiment? No: _ Yes: _If yes, please indicate what research questions you believe might be under investigation in this experiment.

_____

_____

_____

2. Please indicate what you knew about this experiment before participating.

_____

_____

_____

APPENDIX E: CONTINGENCY PAIRING CHECK

1. Did you answer the additional questions about Iowans and Americans when you gave a 'no' response or a 'yes' response to the illegal behavior survey?

   a) When I gave a 'no' response

   b) When I gave a 'yes' response

   c) Sometimes when I gave a 'no' response and sometimes when I gave a 'yes' response

APPENDIX F: EXPERIMENT 1 UTILITY MANIPULATION CHECK

1. The jelly beans were…

bad	1	2	3	4	5	6	7	good
unpleasant	1	2	3	4	5	6	7	pleasant
disgusting	1	2	3	4	5	6	7	delicious

2. How much were you looking forward to eating a jelly bean?

1	2	3	4	5	6	7
not at all looking forward to			moderately looking forward to			very looking forward to

3. The additional questions about Iowans and Americans were…

unpleasant	1	2	3	4	5	6	7	pleasant
annoying	1	2	3	4	5	6	7	enjoyable
irritating	1	2	3	4	5	6	7	soothing
repetitive	1	2	3	4	5	6	7	varied
boring	1	2	3	4	5	6	7	interesting

4. How much were you looking forward to answering the additional questions about Iowans and Americans?

1	2	3	4	5	6	7
not at all looking forward to			moderately looking forward to			very looking forward to

5. How glad were you when the illegal behavior interview was completely done?

1	2	3	4	5	6	7
not at all glad			moderately glad			very glad

APPENDIX G: EXPERIMENT 2 UTILITY MANIPULATION CHECK

1. Please rate the meeting (phone call) with the police officer on these attributes:

The meeting (phone call) will be…

irritating	1	2	3	4	5	6	7	soothing
painful	1	2	3	4	5	6	7	delightful
boring	1	2	3	4	5	6	7	interesting
unpleasant	1	2	3	4	5	6	7	pleasant
annoying	1	2	3	4	5	6	7	enjoyable

2. Overall, how much do you <u>want to</u> meet (speak) with the police officer to discuss your answers to the illegal behavior survey?

1	2	3	4	5	6	7
not at all			moderately			a lot

APPENDIX H: IRB APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 9/23/2014

To: Dr. Stephanie Madon
W112 Lagomarcino Hall

CC: Yueran Yang
W112 Lagomarcino

From: Office for Responsible Research

Title: Illegal Behavior Study

IRB ID: 13-020

Approval Date:	9/18/2014	**Date for Continuing Review:**	2/4/2015
Submission Type:	Modification	**Review Type:**	Expedited

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, **including the recruitment materials and informed consent documents that have the IRB approval stamp**.
- **Retain signed informed consent documents for 3 years after the close of the study**, when documented consent is required.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting a Modification Form for Non-Exempt Research or Amendment for Personnel Changes form, as necessary.
- **Immediately inform the IRB of** (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems involving risks** to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Please be aware that IRB approval means that you have met the requirements of federal regulations and ISU policies governing human subjects research. **Approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **IRB approval in no way implies or guarantees that permission from these other entities will be granted.**

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.