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# Uncertainty and Information Processing

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UNCERTAINTY AND INFORMATION PROCESSING

A Thesis  
Presented to  
The Faculty of the Department of Psychology  
Western Kentucky University  
Bowling Green, Kentucky

In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Arts

By  
Robert E. Frost III

December 2011

UNCERTAINTY AND INFORMATION PROCESSING

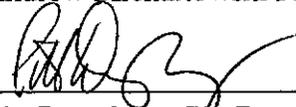
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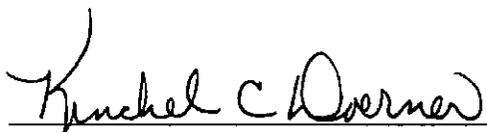
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## UNCERTAINTY AND INFORMATION PROCESSING

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The purpose of these two studies was to examine two factors that may influence the effects of uncertainty on information processing. The first factor is the positioning of uncertainty relative to a target of judgment, and how this affects people's judgment processing. The second factor had to do with the degree to which uncertainty signals active goal conflict or not. In the first study, 145 participants with a mean age of 19.51 were induced with uncertainty either before or after information about the target accused of illegal behavior. The results demonstrated that uncertainty before information produced higher guilt judgments of the target and uncertainty after information produced lower guilt judgments towards the target, but only in a subset of conditions. The second study, with 121 participants and a mean age was 19.58, primed participants with one of two different goals. It then induced uncertainty threat which either was or was not relevant to the primed goal, and asked participants to make judgments based on information given about the target as in Study 1. The results revealed that for women, but not for men, uncertainty threat produced stronger guilt judgments when the uncertainty was relevant to the primed goal. Together, these results indicate that both the positioning and goal relevance of uncertainty may impact its effect on information processing.

## **Introduction**

People make countless decisions every day, all of which involve processing information in order to develop a response. One particular concept included in information processing is uncertainty, or the sense that one's actual level of knowledge does not match one's desired level of knowledge. It is highly improbable that people will know every detail that could be relevant in making a decision. It would seem that the less one knows about the decision at hand, the more uncertainty is involved in processing and developing a response. Regardless of the degree of one's uncertainty, it can play at least two different roles: as a threat, and as a source of information.

## **Review of Study 1 Literature**

### **Uncertainty as a Threat**

When uncertainty is perceived as a threat, people typically take a defensive stance and reinforce their personal beliefs. One particular area threat-induced uncertainty has a notable influence in is stereotyping. Fein and Spencer (1997) looked at how uncertainty-related threat affects how people stereotype. Participants began the experiment by taking an intelligence test, and were given bogus feedback on how they performed. The positive feedback group was told they scored at the 93<sup>rd</sup> percentile and the negative feedback group was told that they received a score at the 47<sup>th</sup> percentile, which presumably made them uncertain about their intellectual ability. Then, participants were asked to assume the role of personnel manager, and were given a file on an applicant for hire. Half of the participants were given a file on an Italian applicant and the other half received a Jewish applicant file (taking advantage of the locally present Jewish-American Princess (JAP) stereotype). Fein and Spencer (1997) found the Jewish applicant was rated more negatively by the negative feedback group than all other conditions. It would seem that the negative feedback induced uncertainty in participants about their abilities, causing them to use stereotypes. Stereotyping may have offered a way to reduce uncertainty-induced anxiety by reinforcing the validity of participants' stereotypic beliefs. This occurred in spite of the fact that reliance on stereotypes biased judgments in this study. Under some conditions, then, it appears that uncertainty can increase reliance on stereotype information.

Uncertainty as a threat also plays a role in how people view contemporary social issues. McGregor, Zanna, Holmes, and Spencer (2001) looked at how personal

uncertainty created by an uncertainty-inducing dilemma rumination task affected people's attitudes toward capital punishment and abortion. Participants were asked to think and write about a complex dilemma that either affected their lives, or affected the life of a friend. Then, participants answered questions about the pros and cons of the dilemma, considering both the implications of the status quo remaining unchanged, and the implications of different dilemma resolution attempts. Attitudes toward capital punishment and abortion were assessed, followed by a measure of perceived attitudinal consensus, which asked how much of the population the participant thought agreed with his or her views. McGregor et al. (2001) found that participants assigned to the personal dilemma condition had increased conviction in their attitudes towards capital punishment and abortion, and reported higher levels of consensus with their views.

Another study on how uncertainty as a threat plays a role in information processing is in the area of procedural fairness research, by Van den Bos, Poortvliet, Maas, Miedama, and Van den Ham (2004). They wanted to observe how uncertainty salience affected fairness concerns. Participants received either an uncertainty salience task or a control task. Participants were then asked to read over a scenario in which they imagined they would be applying for a job which required a selection process involving nine distinct tests. Participants then were told to imagine that a week had passed since taking the tests, and they would be evaluated by scores on all nine tests (fair condition) or by only one test (unfair condition). Questions about anger towards the process and manipulation checks were then answered. Van den Bos et al. (2004) found that uncertainty salience increased participants' anger in the unfair condition, relative to the respective no uncertainty condition. This study suggests that uncertainty has strong ties to

procedural fairness, meaning that uncertainty makes fairness a more significant concern than it otherwise would be.

In sum, existing literature suggests that threat-induced uncertainty affects numerous areas of life. It is involved in stereotyping situations, social issues such as capital punishment and abortion, and how fairness is perceived. Uncertainty induced as a threat typically causes people to have stronger opinions and reactions and appears to cause people to become defensive in order to protect the self.

### **Uncertainty as a Source of Information**

Although uncertainty can be perceived as threatening and cause defensive responses, it also can play a less threatening role. Uncertainty can also play the role of a source of information to inform judgments. This type of uncertainty can be thought of as meta-cognition, or as thought about one's own cognitive processes. Although uncertainty threats have sometimes increased stereotyping (e.g. Fein & Spencer, 1997), stereotyping research also shows how uncertainty as a meta-cognition can lead to decreased stereotyping. Weary, Jacobson, Edwards, and Tobin (2001) conducted a study to examine how uncertainty, measured by the Causal Uncertainty Scale (CUS), affected participants' ability to make guilt judgments about a case of academic misconduct. The CUS measures individual differences in causal uncertainty beliefs, which are beliefs about one's abilities to identify and understand cause-and-effect relationships. Participants in the Weary et al. (2001) study were given a case file about a student accused of cheating on a math test. Half of the participants read in the report that the student was an athlete while the other half did not see any stereotype relevant information about the student listed in the report. Then, participants answered a series of questions about the case file and student's guilt,

followed by the CUS and other scales. Weary et al. (2001) observed that participants with low CUS scores showed stereotype effects, judging targets described as athletes to be more likely be guilty. However, no stereotype effects were found for high CUS scoring participants. Those with high CUS scores did not use the given social category information to make a decision.

Uncertainty also can be induced through physical actions and subsequently serve as information, in a seemingly meta-cognitive role. Briñol and Petty (2003) conducted an experiment testing how confidence in one's thoughts is affected by head movements. Participants were asked to test the quality of headphones by nodding/shaking their heads while listening to a fabricated radio station editorial. This head movement manipulation was shown to cause either certainty or uncertainty, respectively (Briñol & Petty, 2003). The editorial was an argument about students being required to carry personal identification cards while on campus. The argument provided either several strong reasons or several weak reasons as to why the college wanted to establish this policy. Then, participants rated the quality of the headphones and completed several scales that related to how favorable they were toward the issue of personal ID cards. Briñol and Petty (2003) found that nodding created a more favorable opinion of ID cards in the *strong* argument condition when compared to shaking, but shaking created a more favorable opinion of ID cards in the *weak* argument condition compared to nodding. Nodding increases confidence in whatever one's thoughts are and shaking increases doubt in the same. Thus, a strong argument creates positive thoughts which are acted on by subsequently induced head movements related to confidence or doubt. A weak argument causes negative thoughts, which also are affected by head movements.

The influence of power on decision-making is another area in which uncertainty as a source of information has been studied, and one which shows some of the seemingly paradoxical effects that uncertainty can have. Briñol, Petty, Valle, Rucker, and Becerra (2007) conducted a study to see how varying levels of power would affect participants' thought confidence after reading a new vaccination policy. Participants were first asked to read over the policy, then to generate thoughts either in favor of or against the policy. Then, participants completed one of two writing tasks that assigned them to the high-power condition or the low-power condition. Next, all participants were asked to answer questions about the policy, which included questions that assessed attitudes toward the policy. Briñol et al. (2007) found that compared to the low power condition participants, the high power condition caused people who had generated thoughts in favor of the policy to have more positive attitudes toward the policy, and those who had generated thoughts against the policy had more negative attitudes toward the policy. In short, the high power condition increased confidence in one's thoughts, while the low power condition increased uncertainty. One ironic consequence of this was that low power caused people to trust their thoughts against the policy less, in essence negating the negative thoughts they had generated.

Previous literature suggests that uncertainty as information, in a meta-cognitive role, influences various aspects of life. It plays a role in stereotyping issues, thought confidence, and moderates how power can affect decision making. Uncertainty as a source of information usually causes people to have doubts about their own contents of mind, or possibly to look elsewhere for more information in order to make a better decision.

## **Importance of Study 1**

As shown, there are various areas of research in which the multifaceted function of uncertainty becomes an important factor. However, we know little about how uncertainty can be threatening in some cases, yet serve as a source of information in other cases. Based on previous literature, it seems that uncertainty threat is active when the induction task comes before information, as seen in the uncertainty threat induced by the false feedback in Fein and Spencer (1997), the personal rumination task in McGregor et al. (2001), and the uncertainty salience task in Van den Bos et al. (2004). However, uncertainty threat does not seem to occur if the induction task is executed at some point other than before information is given. This can be observed, for example, in the overt uncertainty and confidence-related head movements completed in tandem with listening to the pertinent information in Briñol and Petty's (2003) study, and the confidence-related power induction task completed after reading a vaccination policy in Briñol et al.'s (2007) study. This study addressed this issue of how differences in the confidence-uncertainty dimension can cause such different outcomes by investigating how the placement of uncertainty, relative to a judgment task, would impact responses. This idea builds on the observation that uncertainty presented before some stimulus about which a judgment is to be made seems reactively to increase confidence in those judgments. It simultaneously builds on the observation that uncertainty presented after some stimulus (but before the judgment task measurement) about which a judgment is to be made seems to decrease confidence in judgments. In the former case, uncertainty seems to operate as a threat. In the latter case, it appears to operate as a meta-cognition.

In order to test the idea that the positioning of uncertainty would determine its impact, uncertainty was induced either before or after participants were exposed to information about which their judgments are sought. This study used a modified version of the Weary et al. (2001) paradigm, which consisted of an athlete condition and a no athlete condition. Uncertainty was introduced using a task similar to that used by McGregor, Prentice, and Nash's (2009). McGregor et al. (2009) asked participants to respond to a prompt asking them to indicate what feelings and physical actions were aroused by being "uncertain". This task was used because it has been shown to be effective, and it was easily positioned either before or after the Weary et al. (2001) paradigm.

I predicted that the group that received the uncertainty salience task before the relevant information, or the pre-target group, that was assigned to the athlete stereotype condition, would make stereotype-consistent target judgments. I also predicted that the post-target group, i.e. the group that viewed information before the uncertainty induction, would show less stereotype consistent judgment. In other words, uncertainty induced before information should encourage participants to rely more on their existing knowledge base and increase stereotyping, while uncertainty presented after information should act on that information in a meta-cognitive capacity, weakening whatever interim judgment was made. Post-target uncertainty groups should doubt the implications of accessible stereotypes, and therefore should base their judgments more on the specific details given in the description of the target.

Stereotypes should not only affect the content of judgments, however. Macrae, Bodenhausen, Milne, and Jetten (1994) found that those who use stereotyping in making

decisions generate quicker decisions than those who do not. Based on this, I predicted pre-target uncertainty groups should have used their pre-existing knowledge base to make their judgments, which is quicker than searching for new information to make a judgment, as the post-target groups needed to do (Fein & Spencer, 1997; Tiedens & Linton, 2001; Weary et al., 2001). That is, the meta-cognitive impact of post-target uncertainty should cause longer reaction times responding to questions on stereotype relevant information when compared to pre-target uncertainty groups.

## **Method**

### **Participants**

Participants in this study consisted of 145 undergraduate psychology students attending Western Kentucky University. Human Subjects Review Board (HSRB) approval was obtained for this project, and informed consent was given by participants (See Appendix A for informed consent form). Participants either received extra credit or course research credit for participating. Participants were recruited without regard to their gender, ethnicity, religion, or sexual orientation. There were 43 male participants and 102 female participants, and the mean age was 19.51 with a standard deviation of 3.928.

### **Design**

This study is considered to be a 2 (induction type) X 2(induction placement) X 2 (stereotype information) between-subjects factorial design. The induction types were uncertainty and watching television (control). The placement was either before or after the stereotype information in the experiment. The target in the stereotype information was identified either as an athlete or given no description for the non-athlete condition.

### **Materials**

The manipulations for the salience task consisted of two open-ended response questions. This was a modification of the McGregor et al. (2009) uncertainty salience task (See Appendix B for the materials used in this task). The first question asked participants what emotions come to mind when they are either insecure/uncertain vs. watching television. The second asked participants to explain what happens to them physically when they are uncertain/watching television. After the task, filler questions were asked in order to let the uncertainty salience take effect. These filler questions were

needed in order for uncertainty to take effect properly (c.f. Wichman, Brunner, & Weary, 2008).

The target information included one of two stereotype descriptions. Both stereotype conditions (either athlete or no athlete) contained a police statement and personal statement made by the alleged offender. A mugshot-like image was presented with the personal statement. A police statement was shown to make the information appear to be official, as well as to provide a conflicting view of the student's personal statement. The only difference between the stereotype conditions was that the target was described as an athlete or not. A black-and-white image of college-aged, African-American male was presented in both conditions (See Appendix C for these materials).

Following the salience task and stereotype information were the dependent variable questions used to measure level of guilt judgments. These questions asked participants to indicate on Likert scales how guilty the student was, how comfortable participants would be with the student, etc. Higher dependent variable (DV) scores indicate stronger guilt judgments (These items can be found in Appendix D).

Although my initial analyses focused only on the manipulated independent variables, some individual differences also were measured in order to possibly control for variance between conditions unrelated to the manipulations. The main scales that were used in this study were the Need for Cognition Scale (Ncog; Cacioppo & Petty, 1982), the Personal Need for Structure Scale (PNS; Neuberg & Newsom, 1993), and the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965).

The Ncog (Cacioppo & Petty, 1982) scale was used to indicate a person's tendency to engage in and enjoy thinking. This measure has moderated the use of

uncertainty as meta-cognition, as reported by Briñol, Petty, and Tormala (2004). Those who score high on the Ncog scale typically process information in a more effortful manner than those with low scores, and have been shown by to show larger meta-cognitive effects of doubt (Briñol et al., 2004). According to Cacioppo and Petty (1982), the Cronbach's alpha for the Ncog is .90, and the split-half reliability is .87. In the current study, the Cronbach's alpha for the Ncog scale was .73 (See Appendix E).

The PNS (Neuberg & Newsom, 1993) assesses the preference for simplicity in cognitive endeavors. Higher PNS scores typically correlate with stronger uncertainty reactions. Should the PNS be needed in the analysis, it is possible that high PNS individuals will use stereotypes more, as they are more likely to stereotype. The Cronbach's alpha is .77 (Neuberg & Newsom, 1993). In the current study, the Cronbach's alpha for the PNS was .82 (See Appendix F).

The RSE (Rosenberg, 1965) was designed to assess high school student self-esteem, but has been used to test other populations (Ciarrochi & Bilich, 2006). People with higher scores on the RSE typically show stronger threat responses (McGregor, Gailliot, Vasquez, & Nash, 2007). Ciarrochi and Bilich (2006) report the Cronbach's alpha of the RSE to be .92, and a test-retest reliability of .87. In the current study, The Cronbach's Alpha for the RSE was .68 (See Appendix G).

These measures were to be used if the initial data-analytic approach did not work out as planned. Ultimately, these measures were not helpful in obtaining the predicted effects (all  $p$ 's > .05), although the PNS was related to participant outcomes. These PNS findings are presented below, in the results section.

## **Procedure**

Up to eight participants took part in each experiment session. Participants were each seated in front of a computer, which explained that the study involved how personality and previous experiences play a role in how people perceive the world. Participants were randomly assigned to one of the 8 different conditions formed by the 2 X 2 X 2 design. Demographic information was taken using the computer.

Participants either encountered the stereotype information or the salience task first. These two items were counterbalanced across conditions. Next, participants completed the Ncog, PNS, and RSE. Participants were given time to ask questions about the study after completing the study, and were thanked for their time.

## Study 1 Results and Discussion

### Dependent Measures

The main interest for this study was examining the effects of uncertainty threat type, position of threat, and target type on the dependent variables. An initial MANOVA analyzed position of threat, target type, and uncertainty threat as independent variables and the target questions as dependent variables. A threat position X target type X threat type analysis revealed two marginally significant effects of how confident participants were in the guilt judgment they gave ( $F(1, 144) = 3.247, p = .074, \eta^2 = .023$ ) and how powerful participants thought the evidence was against the target ( $F(1, 144) = 3.519, p = .063, \eta^2 = .025$ ). Table 1 and 2 show the means and standard deviations for the two marginally significant dependent variables.

Unexpectedly, participants in the before information position who received the athlete target type produced less confidence in their guilt judgment when given the uncertainty threat when compared to participants who were given the control condition.

*Table 1: Descriptive Statistics of Confidence of Guilt Judgment towards Target*

Source	Threat Position	Target Type	Threat Type	Mean	Std. Deviation	N
Confidence in Guilt Judgment	Before Information	Athlete	Uncertainty	4.60	1.353	20
			Control	5.06	1.349	18
		No Athlete	Uncertainty	5.11	1.231	18
			Control	4.56	1.822	18
	After Information	Athlete	Uncertainty	4.85	1.565	20
			Control	4.47	1.281	17
		No Athlete	Uncertainty	4.48	1.546	17
			Control	4.82	1.380	17

Participants in the before information position who received the no athlete

condition produced more confidence in their guilt judgment when given the uncertainty threat when compared to participants who were given the control condition as anticipated. This finding is comparable to McGregor et al. (2001), as participants had more confidence in their views when given an uncertainty-inducing personal rumination task when compared to the control task.

The trends seen in the after information position groups are the opposite of those seen in the before information position groups, but unfortunately so small as to be difficult to interpret. Participants in the after information position groups who received the athlete target type produced *more* confidence in their guilt judgments when given the uncertainty threat when compared to the control condition. Participants who received the no athlete target type produced less confidence in their guilt judgment when given uncertainty threat when compared to the control condition. Although judgments about the athlete were influenced in a direction opposite what was expected, this pattern of means is consistent with the hypothesis, if one assumes that participants were uncertain about the athlete's guilt. Uncertainty about guilt, when operated on by subsequent uncertainty, might increase confidence, making this trend consistent with a meta-cognitive perspective. This finding is similar to Briñol and Petty's (2003) uncertainty-inducing head shaking conditions, where, the uncertainty induced by shaking one's head gave more confidence in weak arguments than did nodding. In this study, uncertainty about the athlete's guilt may have combined with situationally-induced uncertainty to create greater confidence. In the no-athlete condition, where participants may have been more certain to begin with, situationally-induced uncertainty lessened people's certainty.

These statistics seem to indicate that the position of uncertainty does change how

uncertainty affects the responses given, and suggest that uncertainty positioned before information and uncertainty positioned after information may have opposite effects.

These trends may not be exclusive to guilt judgments, as can be seen in the result for the next dependent variable.

*Table 2: Descriptive Statistics of Power of Evidence against Target*

<b>Source</b>	<b>Threat Position</b>	<b>Target Type</b>	<b>Threat Type</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>N</b>	
Power of Evidence Against Target	Before Information	Athlete	Uncertainty	4.00	1.777	20	
			Control	4.33	2.000	18	
		No Athlete	Uncertainty	4.72	1.602	18	
			Control	4.50	2.149	18	
	After Information	Athlete	Uncertainty	4.85	1.843	20	
			Control	4.06	1.088	17	
			No Athlete	Uncertainty	2.76	1.562	17
				Control	3.65	1.998	17

The trends of the athlete conditions for the power of evidence against the target question follow the same trends that were seen in the means for the confidence in guilt judgment, but only the no-athlete conditions were consistent with hypotheses and previous literature. Uncertainty before information produced higher ratings for the power of evidence against the non-athlete target than the control condition, and uncertainty after information produced lower ratings than the control condition. Although the pattern of means was consistent with hypotheses, the mean differences between the uncertainty before information and control before information groups ( $M_{diff} = .22$ ,  $d = 0.058$ ), the uncertainty before information and control after information groups ( $M_{diff} = 1.07$ ,  $d = 0.283$ ), and the uncertainty before information and uncertainty after information

groups ( $M_{diff} = 1.96, d = 0.527$ ), before information and control after information groups ( $M_{diff} = .85, d = 0.201$ ), the control before information and uncertainty after information groups ( $M_{diff} = .22, d = 0.419$ ) and the control after information and uncertainty after information groups ( $M_{diff} = .89, d = 0.240$ ) were all insignificant (all Tukey HSD  $p$ 's > .102).

### Reaction Times

Reaction times (RTs) of the target questions were also analyzed using MANOVA. There were no significant interactions, but main effects for the threat position independent variable were found. RTs for the guilt of target ( $F(1, 144) = 5.589, p = .019, \eta^2 = .039$ ) and the power of evidence against the target ( $F(1, 144) = 9.790, p = .002, \eta^2 = .067$ ) were significant when examining threat position, and both sets of RTs follow my hypothesis. Table 3 shows the means and standard deviations for the significant RTs of the threat position independent variable.

*Table 3: Descriptive Statistics of RTs for Threat Position (in seconds)*

<b>Source</b>	<b>Threat position</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>N</b>
Guilt of Target RTs	Before Information	4.091	2.161	74
	After Information	4.922	2.445	71
Power of Evidence RTs	Before Information	6.279	2.393	74
	After Information	8.558	5.957	71

Both sets of RTs in the table followed my hypothesis. The after information means target question reaction times were slower than the before information counterparts for both guilt of target and the power of evidence against the target.

### PNS measures

In order to analyze the target questions using the PNS scale, the PNS score was computed and correlated with the dependent variable questions. From this analysis, a

correlation was observed when correlating PNS scores with the guilt of target question,  $r(144) = .210, p = .011$ , which indicates a weak positive relationship. This suggests that the participants' PNS scores can be used to predict how guilty participants believe the target is, but are a weak predictor. The PNS did not interact with the independent variables to predict target guilt judgments.

The pattern of means in the no-athlete conditions was as predicted, although the athlete conditions were not. This may be because the athlete stereotype information may not be as effective as previously thought, at least in the context of observing differences in uncertainty due to placement.

The RT data, while consistent with the hypothesis, are not conclusive with respect to the role of post-target uncertainty increasing processing time. A more parsimonious explanation would be that any kind of distractor task after exposure to the target, but before completing the judgment task, slows response time. Additional research is needed to determine if uncertainty slows responses above and beyond the effects of a neutral post-target delay task.

### **Limitations of Study 1**

Even though my hypotheses were partially supported, the study design may not have been maximally effective for an uncertainty placement study. Participants seemed to perceive the athlete information in a different way than expected. One additional possibility is that the uncertainty induction task was too general to threaten participants, as it asked for the general physical and emotional aspects that accompany uncertainty. The type of uncertainty induced was not necessarily personally relevant for participants. Indeed, some authors (McGregor, Haji, Nash, & Teper, 2008) have argued that unless

uncertainty threatens active goals, it will not act as a threat. If the design could be modified to get participants personally involved, and ruminate on a situation of uncertainty from their own lives, relevant to their own goals, it might be more effective at drawing out uncertainty-induced responses.

## **Review of Literature for Study 2: Uncertainty as Goal-Conflict**

The concept of uncertainty creating conflict with personally relevant goals has been examined by recent publications in the field. One particular set of studies was conducted by McGregor et al. (2008), who observed how two types of goal conflict created by uncertainty affected the religious zeal of undergraduate psychology students. Their first study had participants receive an uncertainty threat involving academics, which is typically a highly accessible goal for undergraduate students. The task was to read a passage from a graduate-level statistics textbook, which was filled with daunting mathematical formulas and symbols. This manipulation was used to target undergraduates' uncertainty about their own math abilities. The control condition in this study read a simple introductory passage from an undergraduate statistics textbook. Then, all participants' religious zeal was assessed. Participants who received the academic uncertainty threat reported higher levels of religious zeal than the control group. In fact, the academic uncertainty group was more likely to support a war that defended their religious beliefs than the control group (McGregor et al., 2008). These findings suggest uncertainty could create conflict for a personally relevant goal, such as one's math ability, which causes people to strengthen convictions in their religious beliefs to extreme levels.

McGregor et al.'s (2008) second study observed how uncertainty threat involving relationships, another highly accessible goal, affected non-Muslim undergraduate students' opinions of Islam. Participants were either randomly assigned to a relationship uncertainty threat group or to a control group. After these tasks, participants rated their level of agreement with several statements that were either positive or negative

statements about Islam. Participants who received the relationship uncertainty threat task reported significantly more negative evaluations of Islam than the control group. This suggests that when uncertainty creates conflict for personally relevant goals, such as relationships involving the self, goal-conflict can not only cause people to increase convictions in their own views, but also belittle views that are unrelated.

McGregor, Nash, Mann, and Phills (2010) also designed a study that tested how relationship uncertainty threat affected how people approach personal goals. Once again, the McGregor et al. (2001) relationship uncertainty threat task and control condition were used. After the induction task, participants completed a personal project approach task. Participants were asked to select four personal projects that were representative of themselves. These projects were rated by the participants using questions that applied to dimensions linked to approach motivation. The study found that participants in the relationship uncertainty task reported higher approach motivation than the control group. This suggests that it may be possible to link approaching personally-relevant goals to uncertainty threat, as uncertainty threat could cause people to become more active and more likely to engage personal goals.

All of these studies, together, suggest that uncertainty is threatening when it is about important or active personal goals. This idea recently has received clearer empirical support, in the form of studies combining goal primes with uncertainty that either does, or does not, threaten the primed goals (Nash, McGregor, & Prentice, 2011). Under conditions where uncertainty is about an active goal, research shows that participants react defensively, with increased zeal, in a manner consistent with the uncertainty as

threat perspective. The effects of uncertainty that does not threaten active goals remain to be seen.

## **Importance of Study 2**

Thus, it appears that the positioning of uncertainty may not be the only way to affect people and their abilities to process information and make decisions. It may be the case that the context in which uncertainty influences people alters decision making capabilities. Uncertainty that affects an individual's personally relevant goals may cause them to process information differently than another individual who experiences uncertainty that does not affect relevant goals. Uncertainty that creates conflict for a personally significant goal will likely affect decision making differently than uncertainty that does not create such conflict.

One effective way to set up personally significant goals is goal priming (Nash, et al., 2011). Goals can be primed using word searches, scrambled sentence tasks (SST), or even by providing a prompt with questions that cause participants to think about a particular goal. Once a goal has been primed, an uncertainty task related to the primed goal can be completed, which should produce a threat to the primed goal.

In order to test the idea that the context in which uncertainty is induced determines its impact, two different uncertainty threats were induced after goals were primed. Participants were exposed to information and asked to give judgments as well as certainty ratings for their judgments. This study used a modified version of the Wichman et al. (2008) scrambled sentence task (SST), using words and phrases that primed achievement and relationship goals. These goal primes were based on content used by McGregor et al. (2001). The guilt judgment paradigm and DVs that were used in the first study were also used in the second study.

In running this study, I primed either relationship or achievement goals, and these goal primes were followed either by uncertainty inductions that targeted relationships or achievements. I predicted that when the prime matched the threat (operationalized as occurring when both the prime and uncertainty threat had to do with either achievement or relationships) stronger guilt judgments would be produced and participants would experience less uncertainty in their judgments. In other words, when the prime and threat matched (achievement prime/threat or relationship prime/threat), participants should produce stronger guilt judgments and rate lower uncertainty in their judgments than the other conditions. This prediction followed research from both the uncertainty threat and uncertainty as goal-conflict research, which has shown that matching uncertainty threat to active goals produces more extreme responses (Nash et al., 2011). I also predicted that participants who received conflicting primes and uncertainty threat tasks (achievement prime/relationship threat and relationship prime/achievement threat conditions) would produce weaker guilt judgments and more uncertainty in their judgments than the other conditions. I believe the non-matching conditions, or conditions where the prime and threat conflict, should create a situation in which participants doubt their thoughts, thus leading them to seek other information to make their decisions. Control conditions, which primed participants either with achievement or relationships but had no threat task attached, were predicted to produce guilt judgments that fell between the matching conditions and the conflicting conditions.

## **Method**

### **Participants**

Participants in this study consisted of 121 undergraduate psychology students attending Western Kentucky University. HSRB approval was obtained for this project, and informed consent was given by participants (See Appendix H for informed consent form). Participants either received extra credit or course research credit for participating. Participants were recruited without regard to their gender, ethnicity, religion, or sexual orientation. There were 29 male participants and 92 female participants. The mean age was 19.58 with a standard deviation of 3.06.

### **Design**

This study is considered to be a 2 (goal prime) X 3 (uncertainty threat induction type) between-subjects factorial design. The two goal primes are achievement and relationship. The uncertainty threat induction types are achievement-related uncertainty, relationship-related uncertainty, and no uncertainty threat (control).

### **Materials**

The achievement and relationship goal primes were manipulated using the scrambled sentence task. The achievement prime consisted of 16 scrambled sentences and an embedded word was either related to achievement or neutral, based on Wichman et al. (2008). The same task was given for the relationship prime, only relationship-related words were embedded in place of the achievement words. Eight of the 16 sentences for each prime contained an embedded prime-related word or phrase (See Appendix I for the achievement prime sentences and Appendix J for the relationship prime sentences).

The uncertainty threat induction consisted of a prompt that asked participants to think about a complex achievement/relationship dilemma they felt uncertain about. First, participants were asked to list the achievement or relationship they were thinking about. Then, they were asked to describe the uncertainties, problems, and difficulties they were having while thinking about that particular dilemma previously listed. Participants were then asked to describe their feelings and thoughts about the uncertainty of the dilemma continuing to worsen or become more difficult. Each question was presented on separate screens, and participants were given two minutes on each screen. (See Appendix K for the achievement and relationships uncertainty threat inductions).

The target information included an athlete stereotype description, based on Tiedens and Linton's (2001) research. The information used was the same as the first study. The target information contained a police statement and personal statement made by the alleged offender. A mugshot-like image was presented with the personal statement. A police statement was shown in order to make the information appear to be official, as well as providing a conflicting view to the student's personal statement. A black-and-white image of college-aged, African-American male was used (See Appendix C for these materials).

Following the uncertainty induction task and stereotype information were questions used to measure level of guilt judgments and, more importantly, the level of uncertainty participants had in the guilt judgments they made, which provided insight into the degree of uncertainty participants had in their decisions. The guilt judgment questions asked participants to indicate how guilty the student was, how comfortable participants would be with the student, etc. After answering all of the guilt judgments

questions, participants were reminded of each answer they gave and asked, using Likert scales, how uncertain they were in their assessments. These scores were coded so that higher scores indicated higher levels of uncertainty for their assessment of guilt for the target. (Guilt judgment questions can be found in Appendix D).

## **Procedure**

Up to eight participants took part in each experiment session. Participants were each seated in front of a computer, which explained that the study involved how personality and previous experiences play a role in how people perceive the world. Participants were randomly assigned to one of the 6 different conditions formed by the 2 X 3 design. Demographic information was taken using the computer.

Participants encountered the goal prime task first. Upon completing the priming task, participants responded to the uncertainty salience task. Then, target information was presented, followed by the target questions. Participants were given the opportunity to ask questions about the study after completing the study, and were thanked for their time.

## Study 2 Results and Discussion

### Dependent Measures

Initial analyses on target guilt judgments and certainty in judgments did not yield any significant effects (all  $p$ 's > .08). During analyses, though, a particularly unusual trend was noticed when observing gender. Upon examination, females responded to the target questions as expected, following my hypotheses and previous literature. However, males responded in a complete opposite manner than any previous literature I am familiar with. Table 4 shows the gender differences for a MANOVA that was conducted.

The table indicates that female participants followed the trend hypothesized earlier, as matching conditions produced stronger guilt judgments toward the target, conflicting conditions produced weaker guilt judgments, and control conditions fell in between. However, male participants responded in opposite manner, as they had matching conditions producing weaker guilt judgments and conflicting conditions producing stronger guilt judgments.

*Table 4: Descriptive Statistics of Gender Differences for Initial MANOVA*

<b>Gender</b>	<b>Prime Type</b>	<b>Threat type</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>N</b>
Male	Academic	Achievement	4.00	1.000	3
		Relationship	5.00	2.280	6
		Control	4.75	2.630	4
Male	Relationship	Achievement	5.86	1.069	7
		Relationship	5.00	1.826	4
		Control	5.80	0.837	5
Female	Academic	Achievement	5.41	1.228	17
		Relationship	4.27	1.580	15
		Control	5.04	1.459	16
Female	Relationship	Achievement	3.85	1.068	13
		Relationship	5.00	1.461	16
		Control	4.60	1.639	15

It is possible this occurred by chance, because of the low number of male participants ( $n = 29$ ) and correspondingly small cell sizes, or it is possible that this particular set of male participants has some extraneous variable that affected their responses. Due to the low number of male participants and no evidence in previous literature indicating this same finding, male participants were removed from analyses. This gender finding is further considered in the discussion.

Upon removal of males from analysis, A MANOVA of the target questions examining prime type and threat type as independent variables observed two significant findings. A prime type X threat type interaction occurred with the target questions that asked participants to rate how guilty they believed the target was ( $F(2, 91) = 5.178$ ,  $p = .008$ ,  $\eta^2 = .107$ ) and how truthful the target was to the police ( $F(2, 91) = 3.521$ ,  $p = .034$ ,  $\eta^2 = .076$ ). Means and standard deviations can be seen in Table 5.

*Table 5: Descriptive Statistics of Interaction using Dependent Variables*

<b>Source</b>	<b>Prime Type</b>	<b>Threat Type</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>N</b>
Truthful to Police	Achievement	Achievement	3.00	1.458	17
		Relationship	4.20	1.781	15
		Control	3.36	1.237	16
	Relationship	Achievement	4.08	1.382	13
		Relationship	3.38	1.544	16
		Control	3.73	1.387	15
Guilt of Target	Achievement	Achievement	5.41	1.228	17
		Relationship	4.27	1.580	15
		Control	5.14	1.459	16
	Relationship	Achievement	3.85	1.068	13
		Relationship	5.00	1.461	16
		Control	4.60	1.639	15

As predicted, the truthful to police question found that matching conditions produced a stronger reaction. In other words, participants in the matching conditions

found the target to be less truthful to police than the conflicting conditions, and the control conditions are in between the other two conditions. My hypotheses were also supported by the guilt of target question. Matching condition participants gave stronger guilt judgments than participants in the conflicting conditions, and the control conditions are in between the other two conditions. These findings are very similar to what McGregor et al. (2008) and McGregor et al. (2010) found, as both found that active goals that are threatened produced stronger reactions than less relevant or non-active goals.

Another significant finding and a marginally significant finding were observed through main effects of prime type. Participants who received the achievement prime ( $M = 5.81, SD = 1.142, n = 48$ ) had higher ratings than participants who received the relationship prime ( $M = 4.98, SD = 1.745, n = 44$ ) when asked to rate how guilty other people would find the student to be ( $F(1, 91) = 6.940, p = .01, \eta^2 = .075$ ). Achievement prime participants ( $M = 5.06, SD = 1.493, n = 48$ ) also produced marginally stronger guilt judgments toward the target ( $F(1, 91) = 3.491, p = .065, \eta^2 = .039$ ) than relationship prime participants ( $M = 4.52, SD = 1.470, n = 44$ ). These findings suggest that when the participants were primed with a topic that is more self-related, such as achievements, they give the impression they feel other people are more likely to give a guilty verdict for the target when compared participants who received the relationship prime, which not only encompasses the participant, but another individual with a connection to the participant. It is possible that participants who received the relationship prime might have been showing sympathy inspired by thinking about others. Previous literature has not actually compared ratings between different goals such as achievements and relationships, but instead uses them in separate studies, as both McGregor et al. (2008) and McGregor et al.

(2010) have been shown to do.

Another MANOVA examining the target questions revealed several significant findings when analyzing participants' views on legalization of marijuana. Tables 6 and 7 show the significant results and the means and standard deviations.

*Table 6: Effect of Opinion on Marijuana Legalization on Dependent Variables*

<b>Source</b>	<b>Dependent Variable</b>	<b>SS</b>	<b>df</b>	<b>MS</b>	<b>F</b>	<b>Sig.</b>	<b><math>\eta^2</math></b>
Legalization View	Amount of Community Service	12.717	1	12.717	6.010	0.016	0.063
	Comfort of Living Next Door to Target	14.052	1	14.052	4.868	0.030	0.051
	Upset at Marijuana Usage	67.618	1	67.618	18.340	0.001	0.169
	Positivity of Marijuana Usage	26.968	1	26.968	6.342	0.014	0.066

*Table 7: Descriptive Statistics of Marijuana Legalization using Dependent Variables*

<b>Dependent Variable</b>	<b>Legalization View</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>N</b>
Amount of community service	Approve	4.41	1.739	37
	Oppose	5.16	1.229	55
Comfort of living next to target	Approve	4.32	1.973	37
	Oppose	3.53	1.489	55
Upset at marijuana usage	Approve	2.32	1.749	37
	Oppose	4.07	2.026	55
Positivity toward marijuana usage	Approve	4.54	1.966	37
	Oppose	3.44	2.124	55

Participants who approved of marijuana legalization believed less community service should be given for possession of marijuana, would be more comfortable living next to the target in a dorm setting, were less upset about marijuana use on campus, and

felt more positive about marijuana use on campus when compared to participants who opposed marijuana legalization. These findings are logically consistent, as most people who approve of legalization would be more open to the use of marijuana and to the people who are suspected to using marijuana.

A paired samples t-test was used in comparing participants' responses to how guilty they thought the target ( $M = 4.80, SD = 1.499$ ) was to how guilty participants thought other people would find the target ( $M = 5.41, SD = 1.513$ ). The analysis resulted in a significant finding ( $t(91) = 2.880, p = .005, d = .408$ ), which indicates that participants believed that other people were more likely to find the target guilty than they themselves did. This could possibly be an outlet for the uncertainty, as what was possibly when observing gender differences. Participants could have used this dependent variable as a means of appearing less judgmental by giving lower guilt responses when asked about their judgments on the target's guilt. This is a topic that is not discussed in previous literature, as previous literature has focused primarily on measuring uncertainty and not comparisons between questions that measure uncertainty.

### **Certainty Ratings**

Another MANOVA was computed examining all of the certainty ratings in this study, and two particular certainty ratings were found to be significant when comparing participants' views on marijuana legalization. Participants who approved in legalizing marijuana ( $M = 6.13, SD = 1.165$ ) were more certain of their responses about the power of evidence against the target ( $F(1, 91) = 5.172, p = .022, \eta^2 = .081$ ) when compared participants who oppose legalization ( $M = 5.50, SD = 1.447$ ). Unfortunately, a post-hoc Tukey HSD test showed that participants who approved legalization did not have

significantly more certainty in their responses about the power of evidence against the target ( $M_{diff} = .630$ ,  $p_{TukeyHSD} = .101$ ,  $d = 0.233$ ). Participants who approved legalization ( $M = 6.56$ ,  $SD = .951$ ) were also more certain of their responses than participants who opposed legalization ( $M = 6.04$ ,  $SD = 1.343$ ) when asked about comfort level of living next to the target in a dorm ( $F(1, 91) = 6.593$ ,  $p = .030$ ,  $\eta^2 = .073$ ). A post-hoc Tukey HSD test also showed that participants who approved of legalization were marginally more certain in their level of comfort living next to the target than participants who opposed legalization ( $M_{diff} = .520$ ,  $p_{TukeyHSD} = .081$ ,  $d = 0.218$ ). These certainty ratings indicate that participants who approve of legalizing marijuana are more certain in their judgments when the strength of evidence against the target or the comfort of living next to or near the target comes into question when compared to participants who oppose legalization. The most reasonable explanation is that participants who approve of legalizing marijuana will have more personal experience with, and knowledge about, marijuana, and thus will be more certain in their views of a particular target when that target is dealing with legal issues involving marijuana.

## **Limitations of Study 2**

Although there was some support for my hypotheses among women, there may be a couple of explanations as to why my hypotheses for this study were not fully supported. One explanation is that the information given may not have been powerful or prevailing enough to induced the desired effects. Before the study ended, participants were asked what the likelihood of average students and student athletes was to use marijuana. Participants believed average students ( $M = 8.90$ ,  $SD = 1.541$ ) were more likely than student athletes ( $M = 7.82$ ,  $SD = 2.000$ ) to use marijuana,  $t(91) = 5.054$ ,  $p = .001$ ,

$d = .605$ . Although it was unexpected that participants believed average students were more likely to use marijuana than student athletes, this study suggested that the topic of marijuana legalization seems potentially to be an effective topic to use in a study of this type. Marijuana legalization produced significant results, and it is a topic that naturally partitions people into groups. It may be possible to use uncertainty as a means of altering people's opinions on legalization as well as other topics.

The second explanation may come from the gender differences seen above. It seems that males and females can have different reactions to uncertainty when different scenarios are involved. It is possible that gender differences could have also played a role in previous uncertainty studies, but these effects have not systematically been explored in other studies looking at responses to uncertainty (e.g. McGregor et al., 2008; McGregor et al., 2010). It is also possible that the sample of males for this study was not typical or had some extraneous variable that was not accounted for, which may explain the unexpected results observed for male participants. In either case, gender differences could be an interesting topic to focus in future research.

## **Conclusion**

The two studies above investigated both how the positioning of uncertainty and how uncertainty in the context of goal-conflict affects decision making. Unexpectedly, Study 1 found the before information position participants who received the athlete target type produced less confidence in their guilt judgment when given the uncertainty threat. Participants in the after information position group who received the athlete target type produced more confidence of their guilt judgments when given the uncertainty threat. However, as expected, participants in the before information position who received the no athlete condition produced more confidence in their guilt judgment when given the uncertainty threat. Participants in the after information position group who received the no athlete target type produced less confidence in their guilt judgment when given uncertainty threat. This encouraging trend was also seen when participants responded to how powerful the evidence was against the target. The before information findings are similar to the McGregor et al. (2001) consensus question, in which participants believed more people would agree with their opinions after uncertainty threat was induced. The after information results coincide with Briñol and Petty's (2003) finding that the uncertainty induced by nodding one's head gave less confidence in weak arguments than did shaking. These findings indicate that the positioning of uncertainty around information appears to have some effect on how uncertainty influences confidence in guilt judgments and perceptions of how powerful evidence is.

Study 2 results indicate that males and females respond differently to goal-conflict uncertainty. Generally, female participants' results conformed more closely to the expected results than did male participants' results. Female participants who had

matching prime and threat conditions produced stronger guilt judgments toward the target, and conflicting prime and threat conditions produced weaker guilt judgments. Male participants, who had matching prime and threat conditions, produced weaker guilt judgments, and males with conflicting conditions produced stronger guilt judgments.

An unexpected trend also emerged with prime type. Female participants produced stronger guilt judgments when primed with achievement and weaker guilt judgments when primed with relationships. Males gave stronger guilt responses when given the relationship prime as compared to males who received the achievement prime. Beyond indicating that more research is needed to understand these gender differences, these findings suggest that females and males may be more uncertain when primed with achievement and relationships respectively, which may produce stronger guilt judgments towards the target. This may have occurred due to the possibility that males are more achievement-oriented and females are more relationship-oriented, which may have reduced the uncertainty felt for the goals each gender would oriented towards. This assumption is similar to Smith and Sinclair (2005), which showed males had higher self-efficacy and higher motivation to approach academic goals than females, and females had higher motivation to achieve certain emotional goals.

Future research could look at how much stereotyping information is needed to cause increased stereotyping due to threats, and how much stereotyping information is needed to cause decreased stereotyping due to meta-cognition. Also, additional research could be conducted to see if other types of uncertainty manipulations, such as power (Briñol et al., 2007) or head movements (Briñol & Petty, 2003) find results using this experimental design.

If we are able to understand the positioning and the degree of goal conflict effects of uncertainty and their role in how information is processed, then uncertainty may become easier to reduce or eliminate in real world settings. Jury members are a prime example. If jury members feel personally uncertain before information is provided (not only uncertain about the details of the case), they may overlook details that are available, and give a quick verdict that unjustly incriminates someone or lets a guilty person go free. However, if they feel uncertain after information is presented, they may hesitate to make a decision, taking up more time than needed and could possibly become a hung jury. If it is possible to find some way to reduce or even eliminate those potential negative outcomes, it would make life easier and safer for all who make decisions where uncertainty is involved.

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APPENDIX A  
INFORMED CONSENT DOCUMENT



Project Title: \_\_\_\_\_ Uncertainty and Information Processing \_\_\_\_\_

Investigator: \_\_\_\_\_ Robert Frost, Psychology (606)304-4520 \_\_\_\_\_

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you give your agreement to participate in this project.

I will explain to you the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask me any questions you have to help you understand the project.

If you then decide to participate in the project, please tell me.

1. **Nature and Purpose of the Project:** To investigate the way that personality and personal experiences are related to the judgments we make.
2. **Explanation of Procedures:** You will be asked to complete a number of questionnaire-based measures on the computer. You also will be asked to read a short description of a person and give us your impression of this person.
3. **Discomfort and Risks:** None are anticipated.
4. **Benefits:** A better understanding of how we make judgments about other people may result from this research. Understanding the relationship between personality and judgments is an important area of research.
5. **Confidentiality:** Your responses are anonymous. There is no way that your individual responses can be linked to you, personally, once you begin this study.
6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

*You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.*

**By continuing to cooperate with the research project you imply your consent.**

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT  
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY  
THE WESTERN KENTUCKY UNIVERSITY HUMAN SUBJECTS REVIEW BOARD  
Paul Mooney, Compliance Coordinator  
TELEPHONE: (270) 745-4652

## APPENDIX B

### Uncertainty/Watching Television Salience Task

- Please describe the emotions that the thought of feeling insecure and uncertain/watching television arouses in you.
- Please jot down, as specifically as you can, what you think will happen to you physically as you feel insecure and uncertain/watching television.

## APPENDIX C

### Stereotype relevant information

#### Police Report

On August 31<sup>st</sup>, 2007, a member of the varsity basketball team was pulled over by the campus police for a burnt-out rear light. While questioning the individual, the officer noticed trace amounts of marijuana. The student was detained and issued a citation and later released. The incident is pending judicial review. The individual has pleaded not guilty to the incident and claims that the illegal substance must be the property of another individual and was placed in the vehicle by that other person.

#### Photo



## Personal Statement

“I was driving my friends home, when a police officer pulled us over. The officer told me that one of the tail lights was out, and asked to search the car. As the officer searched, a small bag of marijuana was discovered. I told the officer the marijuana is not mine, and I do not know who brought it into the car. My friends and I were all arrested for possession.”

## APPENDIX D

### Dependent Variable Measurements

Dependent Variable Measurements all measured on 1-to-7 scales

How powerful do you think the evidence against the student was?

1= not very powerful, 7= very powerful

Based on the feeling you get from this information, does this student seem like a nice person?

1= not very nice, 7= very nice

Considering the student's statements, how confident does he seem in his innocence?

1= not very confident, 7= very confident

To what degree do you think that the student is being truthful in his statement to the police?

1= not very truthful, 7= very truthful

How guilty do you think the student is?

1= innocent, 7= guilty

How guilty do you think others would find the student to be?

1=innocent, 7- guilty

Regardless who the marijuana actually belonged to, how much, if any, community service would be an appropriate punishment for having the marijuana in the car?

1= very little, 7= a great deal

Think back to how guilty you thought the student was. To what extent would you say you were confident or doubtful in your judgment of the student's guilt?

1=doubtful, 7=confident

How comfortable would you be living next to this student in a dorm?

1= not very comfortable, 7= very comfortable

Considering the reality that some students at WKU use marijuana, how upset or disturbed does it make you feel?\*

1= very upset, 7= not upset at all

Still considering that some students at WKU use marijuana, how positive do you feel about this?

1= not positive, 7= very positive

Asterisk indicates item that was reversed scored.

## APPENDIX E

### Need for Cognition Scale

Ncog measured on a 1-to-9 scale: 1= very strong disagreement, 9=very strong agreement

I would prefer complex to simple problems.

I like to have the responsibility of handling a situation that requires a lot of thinking.

Thinking is not my idea of fun.\*

I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.\*

I try to anticipate and avoid situations where there is likely a chance I will have to think in depth about something.\*

I find satisfaction in deliberating hard and for long hours.

I only think as hard as I have to.\*

I prefer to think about small, daily projects to long-term ones.\*

I like tasks that require little thought once I've learned them.\*

The idea of relying on thought to make my way to the top appeals to me.

I really enjoy a task that involves coming up with new solutions to problems.

Learning new ways to think doesn't excite me very much.\*

I prefer my life to be filled with puzzles that I must solve.

The notion of thinking abstractly is appealing to me.

I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

I feel relief rather than satisfaction after completing a task that required a lot of mental effort.\*

It's enough for me that something gets the job done; I don't care how or why it works.\*

I usually end up deliberating about issues even when they do not affect me personally.

Questions with asterisks are reversed scored.

## APPENDIX F

### Personal Need for Structure Scale

PNS measured on a 1-to-6 scale: 1=Strongly Disagree, 6=Strongly Agree

It upsets me to go into a situation without knowing what I can expect from it.

I'm not bothered by things that interrupt my daily routine.

I enjoy having a clear and structured mode of life.

I like to have a place for everything and everything in its place.

I enjoy being spontaneous.

I find that a well-ordered life with regular hours makes my life tedious.

I don't like situations that are uncertain.

I hate to change my plans at the last minute.

I hate to be with people who are unpredictable.

I find a routine enables me to enjoy life more.

I enjoy the exhilaration of being in unpredictable situations

I become uncomfortable when the rules in a situation are not clear.

## APPENDIX G

### Rosenberg Self-Esteem Scale

RSE is measured on a 1-to-4 scale: 1= Strongly Agree, 4= Strongly Disagree

On the whole, I am satisfied with myself.

At times I think I am no good at all.

I feel that I have a number of good qualities.

I am able to do things as well as most other people.

I feel I do not have much to be proud of.

I certainly feel useless at times.

I feel that I'm a person of worth.

I wish I could have more respect for myself.

All in all, I am inclined to think that I am a failure.

I take a positive attitude toward myself.

APPENDIX H  
INFORMED CONSENT DOCUMENT



Project Title: Goals and information processing

Investigator: Robert Frost, Psychology, (606) 304-4520

You are being asked to participate in a project conducted through Western Kentucky University (and -- if applicable -- any other cooperating institution). The University requires that you give your signed agreement to participate in this project.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask him/her any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

If you then decide to participate in the project, please sign on the last page of this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

1. **Nature and Purpose of the Project:**  
To investigate the way that our goals and personal experiences are related to the judgments we make.
2. **Explanation of Procedures:**  
You will be asked to complete a number of questionnaire-based measures on the computer. You also will be asked to read a short description of a person and give us your impression of this person.
3. **Discomfort and Risks:**  
None are anticipated.
4. **Benefits:**  
A better understanding of how we make judgments about other people may result from this research. Understanding the relationship between personality and judgments is an important area of research.
5. **Confidentiality:**  
Your responses are anonymous. There is no way that your individual responses can be linked to you, personally, once you begin this study.
6. **Refusal/Withdrawal:**  
Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

IRB APPLICATION # 11-261  
APPROVED 4/11/11 to 2/12/12  
EXEMPT EXPEDITED FULLBOARD  
DATE APPROVED 4/11/11

Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

*You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.*

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Date

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT  
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY  
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD  
Paul Mooney, Human Protections Administrator  
TELEPHONE: (270) 745-4652



IRB APPLICATION # 11-261

APPROVED 4/11/11 to 3/12/12

EXEMPT EXPEDITED FULLBOARD

DATE APPROVED 4/11/11

## APPENDIX I

### Achievement Prime Sentences

Achievement SST primes in **bold**.

He took the container. Noise

**His success is clear. Interact**

My friend went home. Example

**The play was fun. Attain**

I washed the car. Transfer

**She strives to win. Sidewalk**

The room is empty. Baton

**They mastered the violin. Speaker**

The pen is mine. Rotate

**I heard the conversation. Excellence**

She's on a ledge. Surf

**His ambitious attitude grows. Stool**

The light came on. Envelope

**They have switched places. Achievement**

I ate a meal. Tomorrow

**She has many accomplishments. Index**

## APPENDIX J

### Relationship Prime Sentences

Relationship SST primes are in **bold**.

He took the container. Noise

**They were both included. Picture**

My friend went home. Example

**He gave a response. Loved**

I washed the car. Transfer

**Those two belong together. Plate**

The room is empty. Baton

**She rested her head. Acceptance**

The pen is mine. Rotate

**The family is caring. Wrinkle**

She's on a ledge. Surf

**The tree grew tall. Supported**

The light came on. Envelope

**He was well liked. Sink**

I ate a meal. Tomorrow

**I raked the leaves. Affection**

## APPENDIX K

### Achievement Uncertainty Prompt

Think about something important you are trying to achieve that is difficult and that you have uncertainty and doubts about. For example, you may be having trouble staying on track, or you may be getting some disturbing negative feedback. You are uncertain as to whether you will be able to accomplish this achievement.

#1) What is this achievement? (For instance, school performance, job search, or excelling at some task)

#2) Continue to think about the achievement (school achievements, job search, excelling at some task: that you are uncertain about and is currently not going very well.

Please take 2 minutes to describe the kinds of uncertainties, doubts, problems and difficulties you are having trying to reach this achievement: The screen will advance automatically in 2 minutes.

#3) Continue to think about the thing (school achievements, job search, excelling at some task; that you are uncertain about and is currently not going well.

Please take 2 minutes to describe your thoughts and feelings regarding the possibility of continuing to have trouble pursuing this achievement, or having additional uncertainty in reaching this achievement: The screen will advance automatically in 2 minutes.

### Relationship Uncertainty Prompt

Think about a close relationship (family member, friend, or romantic partner) that you are

uncertain about and is currently not going very well. For example, you may be fighting a lot lately, or not talking as much as you used to. You are uncertain as to whether you will be able to continue to be as close to this person in the future.

#1) Who is this person? (friend, family member, intimate partner)

#2) Continue to think about the close relationship (family member, friend, or romantic partner) that you are uncertain about and is currently not going very well.

Please take 2 minutes to describe the kinds of uncertainties, problems and difficulties you are having with this person: The screen will advance automatically after 2 minutes.

#3) Continue to think about the close relationship (family member, friend, or romantic partner) that you are uncertain about and is currently not going very well.

Please take 2 minutes to describe your thoughts and feelings regarding the possibility of this uncertain relationship continuing to go poorly or perhaps even getting worse: The screen will advance automatically after 2 minutes.

