THE IMPACT OF ORDERED AND DISORDERED ENVIRONMENTS ON

MESSAGE PROCESSING

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By
Aili Peyton

Thesis Committee:

R. Kelly Aune, Chairperson
Krystyna S. Aune
Amy S. E. Hubbard

ABSTRACT

This study investigated the extent to which the information processing environment, manipulated to be ordered or disordered, affected the amount of effort committed to information processing within the environment. Numerous lines of research have proposed that people often approach information-processing situations by employing one of two general processing modes. Each approach, as experienced by the individual, can be characterized by either high cognitive effort (slow processing) or low cognitive effort (fast processing). High cognitive effort processing is marked by more analysis, and making more subtle distinctions concerning the stimuli relative to low effort processing. Recent findings suggest that individuals engage in less effortful behavior in a disordered environment relative to an ordered environment. Consequently this study predicted that attitude judgments would be made faster in disordered environments rather than ordered environments, and attitude judgments would show less variability in disordered environments rather than ordered environments. Participants in the disordered environment made faster attitude judgments than participants in ordered environments, however attitude judgments did not should less variability in disordered environments rather than ordered environments. In addition, reported more agreement with attitude statements in the disordered condition.

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CHAPTER 1
INTRODUCTION

The environment is replete with information that individuals must attend to and process to make sense of their world. Numerous lines of research have demonstrated that people often approach multiple types of information-processing situations by employing one of two general processing modes. For instance, individuals may use "selective" versus "unselective" processing when learning (Hayes & Broadbent, 1988), employ "deep" versus "shallow" processing while retaining memories (Craik & Lockhart, 1972), engage in "controlled" versus "automatic" information processing (Schneider & Shiffrin, 1977), use "mindful" or "mindless" processing when problem solving (Langer & Imber, 1980), employ "systematic" or "heuristic" to assess the validity of messages (e.g., Chaiken, 1980), and take the "central" or "peripheral" route to attitude change (Petty and Cacioppo, 1986a, 1986b). Most recently and more generally, Kahneman (2011) summarily described information processing approaches as being "slow" (System 1) versus "fast" (System 2).

All of the approaches mentioned above, can be characterized by the experience of high or low expenditures of cognitive effort. Additionally, there are other characteristics that accompany perceptions of high or low expenditures of cognitive effort. For example, high effort approaches are generally characterized as engaging in selective, mindful processing that is experienced as effortful and slow (e.g., Berry & Broadbent, 1988; Broadbent, Fitzgerald, & Broadbent, 1986; Hayes & Broadbent, 1988; Kahneman, 2011; Langer, 1978; Langer & Piper, 1987). In this approach an individual tends to be more systematic and analytical, deliberately evaluating stimuli. Conversely, low effort approaches are generally characterized by unselective (e.g., Berry & Broadbent), mindless (e.g., Langer), and ultimately lower effort and fast processing. Individuals are less critical and deliberate when evaluating stimuli (e.g., Hayes & Broadbent, 1988). In this approach an individual may simplify information processing by employing noncontent cues and relying on heuristics (e.g., Chaiken, 1980) or by taking a "peripheral route" to evaluating information or messages (e.g., Petty & Cacioppo, 1986a, 1986b).

Some research has focused on how trait-like differences affect the likelihood of effortful or effortless processing (Cacioppo & Petty, 1982, 1984; Cacioppo, Petty, Kao,

& Rodriguez, 1986). For instance, individuals with a high need-for-cognition tend to process messages more effortfully (Cacioppo, Petty, & Morris, 1983). Likewise, Aune and Reynolds (1994) showed that people may prefer analytical or gestalt approaches to message processing. However, most research on dual processing modes has focused on manipulating the environment in some way to situationally influence one of these processing modes.

A number of research studies have explored the triggers that influence which information processing approach is activated or employed across various situations and contexts (e.g., Graham & Golan, 1991; Jacoby, Woloszyn, & Kelley, 1989). For instance, distraction (Petty, Wells, & Brock, 1976); message repetition (Cacioppo & Petty, 1985); and an individual's posture (Petty, Wells, Heesacker, Brock, & Cacioppo, 1983), have all been demonstrated to serve as contextual characteristics that can affect the extent to which an individual engages in effortful processing. How extensively the stimuli under consideration has personal relevance to an individual has been found to be a determinant of how much effort is used in processing (e.g., Chaiken, 1980; Petty & Cacioppo, 1979, 1981b). For instance, high issue involvement has been shown to increase scrutiny or systematic evaluation of stimuli and ultimately more effortful processing. In addition, it has been found that prior knowledge or familiarity with stimuli influenced the extent to which an individual engages in effortful processing (Begg, Anas, & Farinacci, 1992; Jacoby, Woloszyn, & Kelley).

The present study focuses generally on environmental factors that influence information processing modes. More specifically this paper reports the manner in which disordered environments affect message processing. First, information processing modes as conceptualized across multiple disciplines are described. Second, contextual and environmental influences on behavior are reviewed. Third, evidence is presented that suggests the degree of order that characterizes an environment has an effect on human behavior and information processing. Finally, the results of a study examining how the degree of order in an environment can affect message processing are reported.

Information Processing Modes

Humans have a limited cognitive capacity with which they are able to evaluate stimuli (Kahneman, 1973; Norman & Bobrow, 1975; Pashler,1992). Many theorists claim

individuals typically employ multiple modes of processing that differ in the amount of cognitive effort they allot to processing a stimulus (e.g., Hayes & Broadbent, 1988). Tyler, Hertel, McCallum, and Ellis (1979) define cognitive effort as the amount of cognitive capacity expended on information processing. At times a large amount of cognitive effort is used in processing information and at other times a minimal amount is devoted. When individuals engage in effortful information processing they are usually employing deep, mindful, controlled thinking (e.g., Craik & Lockhart, 1972; Langer & Imber, 1980; Langer, Blank, & Channowitz, 1978; Schneider & Shiffrin, 1977). On the other hand lower effort information processing can take on multiple forms, including relying on readily available cognitive structures, and previously formed cognitive associations (Broadbent, 1981, 1984), rather than extensive processing (e.g., Craik & Lockhart; Gilovich, Griffin, & Kahneman, 2002). By definition, highly familiar, meaningful stimuli are compatible with existing cognitive structures. This two system approach is recognized in a number of psychological processes. Further, the rich history, grounded in cognitive and social psychology produces compelling lines of research to support the notion of both effortful and effortless information processing (e.g., memory, learning, problem-solving, and message processing).

Craik and Lockhart (1972) outlined a theoretical framework for the study of memory regarding the depth levels of processing. They argued that the depth of a memory is a positive function of the depth to which a stimulus is cognitively analyzed. In other words, the deeper the levels of processing stimuli, the more likely retention will occur. Craik and Lockhart argue that deep processing occurs if the stimuli are unfamiliar, or novel to an individual, resulting in extended processing time. In addition, they argue that shallow processing occurs when familiar stimuli are compatible with existing cognitive structures and processed quicker than less familiar stimuli. Thus, the depth of a memory is a function of factors such as processing time, attention devoted to stimulus, and compatibility with previous cognitive structures,

In a related manner, Schneider and Shiffrin (1977) formulated a theory of information processing that is based on controlled search and automatic detection processing modes. Controlled search entails high levels of attention and thoughtfulness focused on cognitions and individuals are able to establish, alter, and reverse the

processing comfortably. Through a series of experiments, Shneider and Shiffrin found that controlled processing is employed in situations that are unfamiliar in order to make accurate judgments concerning a stimulus (albeit slow and attention-demanding). Conversely, they found that automatic detection was found to be experienced as less effortful and highly familiarized. Overall, Shneider and Shiffrin deem automatic processing as well learned and occurring when a cue in the environment is detected. In addition, automatic processing is thought to occur without any essential control, attention, or conscious perception. Automatic processing was adopted when information was more recognized by individuals, allowing for less attention to be paid and quicker, efficient processing. This is consistent with others who have reported that time required to respond to stimuli can be taken as a measure of the amount of cognitive effort employed (Chaiken, 1980; Craik & Lockhart, 1972; Kahneman, 2011; Kerr, 1973; Tyler, Hertel, McCalum, and Ellis, 1979). The main distinction between controlled and automatic modes of processing is that controlled processing is deemed as under the control of the individual and automatic processing generally is not.

Langer and Imber (1980) suggested an information processing framework in which individuals employ a two system approach, mindfulness and mindlessness, for judging stimuli in the environment (e.g., evaluating an individual). Mindfulness is described as a state wherein people consciously evaluate stimuli in an attempt to make a judgment, a process described as cognitively effortful (e.g., Langer, 1978). A comparison is made between the present and past stimuli, looking for distinctions between the two (e.g., Chanowitz & Langer, 1980). Individuals making judgments produced via mindful processing have been found to notice "things that are typically not noticed by the individual who mindlessly interacts" (Chanowitz & Langer, p. 366). This is consistent with research reporting that processing marked by more subtle distinctions being made concerning a stimulus is a characteristic of more effortful processing (e.g., Hayes & Broadbent, 1988; Langer & Imber). On the other hand, mindless processing has been found to occur when some small portion of information from the environment is processed that subsequently allows for a script to be cued, thus increasing the efficiency of the processing (Chanowitz & Langer, 1980; Langer, Blank, & Chanowitz, 1978). Abelson (1976) defines a script as a "highly stylized sequence of typical events in a well-

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understood situation, ... a coherent sequence of events expected by the individual, involving him either as a participant or as an observer." (p.33). When attending to scripts in a mindless state, individuals have been found to passively interact with the environment (Langer & Imber). Langer and Imber argue that because environmental stimuli are perceived as consistent with past knowledge, vigilant attention is not given to the stimuli, resulting in less effortful processing. They found that judgments produced through mindless processing are marked by decreased analysis and less subtle distinctions concerning an information stimulus.

Similarly, when investigating information processing while learning, Berry and Broadbent (1988) suggest two modes of learning. First, Broadbent, Fitzgerald, and Broadbent (1988) found that individuals demonstrate a learned change in performance both with the ability to provide a verbal account of the learning process and without the ability to provide a verbal account of the process via which they gained the knowledge. Thus, two independent learning processes exist: one leads to action knowledge in which one can demonstrate a newly learned behavior without any concomitant ability to articulate how one learned the behavior; the other allows for verbal knowledge in addition to the action knowledge. The latter process allows the learner to demonstrate the ability to verbally describe the knowledge and how it was acquired. The two modes of learning are selectively referred to as u-mode or "unselective" mode learning, and s-mode or "selective" mode learning (Hayes & Broadbent, 1988). Selective or s-mode systems consciously observe the variables in the environment and only attend to explicitly given variables for a task, resulting in the ability to give a verbal account of the process taken to learn. This approach to learning "is selective, effortful, and reportable, and is the type of learning which would normally be referred to as 'problem-solving'" (Hayes & Broadbent, p. 251). Further, attention is paid to the details of the specific stimuli and is characterized by more subtle distinctions being made concerning the stimuli. Conversely, unselective or u-mode systems process all the variables in the environment, resulting in minor distinctions specific to the stimuli not specifically attended to; significantly less cognitive effort is employed. This results in the possibility that offering a verbal account of the learning process will be difficult or impossible and subtle nuances concerning the stimuli are absent from verbal reports of processing.

Comparably, Chaiken (1980) argues that systematic and heuristic information processing of persuasive appeals vary in the amount of effort a person uses to assess the validity of the message's claims. Chaiken (1980) found that when engaging in systematic processing, individuals engage in considerable cognitive effort in judging the validity of the message. Individuals actively attempt to understand, analyze, and assess validity while message processing. Chaiken recorded the time individuals spent analyzing the message and found that employing a systematic view results in extended processing time. On the other hand, when heuristically processing, individuals exert limited effort in assessing message validity, instead employing various rules or heuristics they learned in past interactions with similar messages (Eagly & Chaiken, 1984). Rather than thoroughly analyzing the stimuli, individuals typically rely on more accessible non-content cues in deciding whether to accept a message as valid, resulting in less processing time. In short, systematic message processing is focused on detailed processing of stimuli content, whereas a heuristic view focuses on the role of simple rules or cognitive heuristics.

In their general theory of attitude change, the Elaboration Likelihood Model (ELM), Petty and Cacioppo (1981a) suggest two different message processing approaches to attitude change, central route and peripheral route. These two routes are similar to processes described in other dual information processing models. The two routes are distinguished the amount an individual 'elaborates' or the extent to which issue-relevant information is carefully thought about before deciding on an attitude towards the stimulus material, typically a message. Attitudes, in this model, refer to judgments people hold regarding themselves, others, objects, and issues (e.g., Thurstone, 1928). One route, described as the central route, views attitude change as a result of individuals' careful thinking and contemplation of the stimuli, message content or information, considered central to an attitudinal position given in the message. This route to persuasion is often engaged when individuals have high motivation and ability, increasing the likelihood elaboration. Attitudes induced using this route are more lasting and predictive of behavior (Cialdini, Petty & Cacioppo, 1981; Cook & Flay, 1978; Petty & Cacioppo, 1980). In the second approach, the peripheral route, attitude change results from the positive or negative association of contextual cues in an individual's environment with the given stimuli or message instead of allocating cognitive activity to

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evaluating the actual merits of the stimuli. For instance, instead of critically analyzing the message, the processor attends to noncontent cues for more efficient, simplified processing of the stimuli (e.g., Petty & Cacioppo, 1986a, 1986b). Thus elaboration likelihood is low. Whether a person's need for cognition (i.e., an individual's predisposition to engage in and enjoy thinking) is high or low has also been found to affect how much effort an individual expends when message processing (Cacioppo & Petty, 1982, 1984; Cacioppo, et al., 1986; Petty & Cacioppo, 1981a). Individuals who are high in need for cognition are intrinsically motivated to engage in effortful processing. Cacioppo and Petty (1982) found that individuals with a high need-for-cognition are more likely to report taking the central route or actively process stimuli, where those with a low need-for-cognition report often rely on heuristics when evaluating stimuli (Cacioppo, Petty, & Morris, 1983).

The most recent research and terminology concerning dual processing systems is offered by Kahneman (2011). Kahneman differentiates between two modes of processing according to processing speed: 'System 1' is characterized by fast processing whereas 'System 2' is characterized by slow processing. Consistent with numerous findings suggesting that less effortful processing is fast (e.g., Chaiken, 1980; Craik & Lockhart, 1972; Schneider & Shriffrin, 1977), System 1 is described as an automatic mode that operates quickly, intuitively, nonintentionally, with little to no effort. Contrarily, System 2 operates deliberately with the intention of ordering thoughts, thus, attention is allocated to cognitive activities. This results in slower, more effortful processing. Furthermore, System 2 has physiological indicators such as, an increase in blood pressure, heart rate, and dilated pupils (Kahneman, Tursky, Shapiro, & Crider, 1969). System 1 and System 2 interact and are both constantly active with System 1 operating automatically and System 2 generally operating in a low-effort mode until made active by inconsistencies in the environmental stimuli or motivated to increase effort and attention commitment to cognitive processing.

Contextual Influences on Information Processing

A number of research studies have shown that characteristics of the proximal environment can influence human behavior in general, more specifically, human decision-making and information-processing. Some situations influence humans to

process information with either high cognitive effort or low cognitive effort. Most research on dual processing modes has focused on manipulating contextual factors, both situational and proximal, in some way to influence high or lower effort processing. Some contextual factors have been found to disrupt or facilitate cognitive effort exertion in message processing (e.g., Petty & Cacioppo, 1986a). For instance, Petty, Wells, and Brock (1976) found that distraction during message processing induces lower levels of elaboration, measured by message recall, because distraction disrupts the thoughts that would normally be induced by a message, resulting in less evaluation of stimuli, or lower cognitive effort processing.

On the other hand, message repetition has been found to facilitate higher levels of elaboration and effortful processing, measured by message recall (Cacioppo & Petty, 1985). Similarly, increasing the number of message sources facilitates higher levels of effortful processing (Harkins & Petty, 1981). At the same time repeated stimuli have been found to be easily retrieved and processed more effortlessly and fluently (Jacoby & Dallas, 1981; Tversky & Kahneman, 1973, 1974). Furthermore, familiarity influences more automatic and unintentional processing (Begg, Anas, & Farinacci, 1992; Jacoby, Woloszyn, & Kelley, 1989).

In addition, an individual's posture when message processing has been found to be associated with how much effort is expended in processing (Petty, Wells, Heesacker, Brock, & Cacioppo, 1983). People who are in a reclined position report an increase in care and effort in processing of messages, reporting that a reclined position facilitates elaboration while a standing posture inhibits message-relevant thinking. One explanation for this outcome is that a reclining posture reduces the degree of self-focus compared to a standing posture (Wegner & Guiliano, 1980) making more attention available, increasing an individual's ability to engage in information processing (Scheier, Carver, & Matthews, 1983).

Ego-focused motivational states can have an influence on information processing (Graham & Golan, 1991). Ego-involving states are those in which the focus is to demonstrate high ability at a task and an emphasis is placed on competition with others (Nicholls, 1984, 1989). Graham and Golan (adapting Craik and Lockhart's (1972) levels-of-processing) examined the effects of motivational state on information processing and

word recall and found ego-focused motivation resulted in poorer recall at deeper levels of processing. They argued that ego involvement might disrupt ability to engage in effortful information processing.

Personal relevance, or issue involvement, with the stimuli under consideration has been found to be a dispositional determinant of how much effort is used in processing (e.g., Burnkrant & Sawyer, 1983; Chaiken, 1980; Petty & Cacioppo, 1979, 1981b, 1984, Petty, Cacioppo, & Schumann, 1983). Issue involvement pertains to the level that individuals perceive their judgments regarding an issue have consequences for themselves. High issue involvement increases motivation to scrutinize or engage in systematic evaluation of stimuli and ultimately more effortful processing. Conversely, low levels of issue involvement lead individuals to engage in heuristic, lower effort processing. Similar results are seen when investigating levels of response involvement, or the level that individuals perceive their judgments have immediate situational consequences (Chaiken). Chaiken measured the amount of effort subjects put into information processing by recording the time spent examining the stimuli (e.g., message). The longer time spent evaluating stimuli, the more effortful the processing. High levels of personal responsibility have also been found to increase cognitive processing effort (Petty, Harkins, Williams, & Latane, 1977; Petty, Harkins, & Williams, 1980).

Overall, there are many contextual factors that influence information processing. In general, numerous factors have been found to either disrupt or facilitate effort committed to cognitive resources for information processing. In addition, research shows that factors influence either an individual's motivation and/or ability to engage in high or lower effort processing.

Environmental Influences on Behavior

Humans interact with their environment in innumerable ways. An individual's physical surroundings can affect his or her psychological and emotional state, as well as his or her behavior. For instance, particular contexts influence distinct kinds of interactions, and various environmental cues imply sets of rules and guides for behavior (Cialdini, 2001).

Various characteristics of the environment facilitate or disrupt human communication and interaction. For instance, sociopetal environments, which encourage

people to congregate, stimulate interaction, where sociofugal environments hinder communication by discouraging face-to-face positioning (e.g., Mehrabian, 1967; Sommer, 1967). Consequently, when people are arranged in a u-shaped configuration there is an increase interaction compared to everyone facing one direction (Hurt, Scott, & McCrosky, 1978; Rosenfled & Civikly, 1976). Interpersonal attraction decreases as temperature and humidity increase (Griffit, 1970). Todd-Mancillas (1982) found that bright and warm colors facilitate learning. Low light environments induce relaxation and intimacy, well-lit environments are more stimulating and increase communication, and flourescent lighting produces fatigue (Gergen, Gergen, & Barton, 1973, Todd-Mancillas). Background music has been found to improve performance, concentration, and improve social interaction (Rosenfeld & Civikly, 1976; Todd-Mancillas, 1982). Clearly many aspects of the environment influence humans to behave and communication differently.

Environmental Order

In a recent set of studies by Keizer, Lindenberg, and Steg (2008), the effect of disordered environments on behavior was investigated. The studies examined the validity of Kelling and Wilson's (1982) broken windows theory (BWT) that states indications of disorder such as broken windows, litter, and graffiti induce additional disordered and even criminal behavior. Keizer et al., (2008) empirically tested these claims in a series of six field experiments. Disordered settings or environments were conceptualized as environments in which descriptive and injunctive norms are in conflict. Descriptive norms refer to the common behaviors recognized to be normative and expected in a particular environment, and injunctive norms refer to levels of common *approval* or *disapproval* recognized to be associated with a particular behaviors (Cialdini, Reno, & Kallgren, 1990). Thus, when an environment's state indicates that people are behaving in a way that is incongruent with assumed appropriate behavior -- for example, a sign states "no littering" yet trash is scattered on the ground -- the environment is deemed "disordered."

Keizer, Lindenberg, and Steg's (2008) initial three studies focused on visually disordered environments and their effects on the spreading of norm violations. Study one was a field study set in a shopping area with a clearly posted sign indicating "No Graffiti." An ordered condition was created by making certain that the walls were clear of

graffiti; a disordered manipulation was created by covering the walls with graffiti. Researchers then placed pamphlets on the bicycles of people parking in the area. Upon finding the pamphlets on their bicycles, more participants littered by tossing the pamphlets to the ground in the disordered condition than in the order condition.

A second study manipulated orderliness via establishing a setting in which clear obedience or disobedience of a police ordinance (prohibition of bicycles being locked to a fence and a "no trespassing" sign) was in evidence. The ordered condition consisted of four bicycles not locked to the fence with the police mandated sign. In the disordered condition the sign was still present but bicycles were clearly locked to the fence. Participants could get to the other side of the fence either by walking a long way around or forcibly pushing open the gate (marked "no trespassing). Participants disobeyed the "no trespassing" sign significantly more often in the disordered condition.

Finally, Study three examined whether the same pattern would still hold true for rules that are not police enforced. In a supermarket parking garage a conspicuously placed sign stated "please return your shopping carts." In the ordered condition, shopping carts were all clearly returned to their mandated area. Conversely, they were scattered throughout the garage in the disordered condition. Researchers then placed pamphlets on the cars of people parking in the area. Upon finding the pamphlets on their cars, more participants disobeyed the "please return your shopping carts sign" sign and littered, tossing the pamphlets to the ground in the disordered condition than in the ordered condition.

Three additional field experiments conducted by Keizer, et al., (2008) examined whether disordered contexts, discernible through audible rather than visual cues, also induced norm violation behavior. The fourth study employed a Netherlands national law violation (i.e., setting off fireworks before New Year's Eve) to create the disordered context condition and examined the subsequent affects on littering behavior. In the disordered condition firecrackers were set off and in the ordered condition there were no sounds of fireworks. The participants were individuals who came to collect their parked bicycles from a bike shed. Researchers attached flyers to the parked bicycle handlebars. Significantly more individuals littered, throwing the flyer on the ground, in the disordered condition than the ordered condition.

Studies five and six examined whether the norm violation trend would cross over into the behavior of stealing. In study five the disordered condition used a mailbox covered in graffiti, where a white envelope, noticeably containing money, visibly hung from the mailbox. The mailbox was free from graffiti in the ordered condition and the envelope containing money still visibly hung from the mailbox. In study six the ground surrounding the mailbox was covered in litter for the disordered condition. Conversely, the area surrounding the mailbox was free from litter in the ordered condition. The same white envelope visibly containing money hung from the mailbox in both conditions. Participants were those who walked past the mailbox; opening or taking the envelope was considered stealing. In both experiments, participants stole more often in the disordered environment, where the mailbox was covered in graffiti or the surrounding area with trash.

Keizer et al., (2008) argued these findings suggest that one disorder (i.e., graffiti or littering) apparently promotes other forms of disorders (i.e., stealing) when descriptive and injunctive norms are in conflict. They argue that in disordered contexts in which injunctive norm violations, police ordinance defiance, and requests by private companies are ignored, the saliency of conformity to injunctive norms and rules set are reduced. Further, the observation of others' lack of compliance attenuates an individual's goal to act appropriately. In short, if the salience of the goal to act socially appropriately is reduced then individuals will by more likely to pursue more salient goals, for instance, goals more selfish in nature (e.g., purging waste or increasing personal finances).

Keizer et al., (2008) offered a brief argument for the relevancy of the principle of social proof to their study in the rationale for their field experiments. However, they did not expand upon this explanation; instead they argued that their findings are explained by reference to individual goal saliency. Nevertheless, implicit to the explanation of their findings is that people's behavior is influenced by what they observe in their environments. One way to utilize the Keizer et al. findings is to seriously consider the relevancy of a social proof explanation. Cialdini (2001) described the principle of social proof (SP) as occurring when individuals perceive certain behaviors in a given social situation as normative by observation of others' behaviors. The principle of social proof is based on Festinger's (1954) social comparison theory. Festinger argued that people

validate the appropriateness of their behavior through social comparison with referent others. Furthermore, an individual's decision on how to behave in various situations is dependent on the perceived normative behavior of similar others. Social proof operates more powerfully under two conditions (Cialdini). First, social proof is likely to occur in ambiguous circumstances in which people are uncertain about what behavior is deemed most appropriate. Individuals assume that others have more knowledge than themselves about the situation and the subsequent appropriate behavior. Uncertainty about the situation is more likely to cause an individual to accept the behavior of others as appropriate (Tesser, Camphell, & Mickler, 1983; Wooten & Reed, 1998). Second, when an individual observes behaviors of similar others the principle of social proof is stronger (Abrams, Wetherell, Cochran, Hogg, & Turner, 1990; Burn, 1991; Festinger). Thus, individuals tend to conform to the perceived descriptive social norms (i.e., common behaviors recognized to be normative in a particular environment) (Cialdini, Reno, & Kallgren, 1990).

Lapinski and Rimal (2005) argued that individuals depend on social norms when processing their proximal environment. Lapinski and Rimal propose that once descriptive social norms are perceived the norms provide stimuli for a decision-making heuristic and reduce the demand to critically ruminate on each decision or behavior before acting. Cialdini (2001) called this seemingly automatic process, *fixed-action patterns*. Cialdini explains that the patterns are prompted by specific stimuli (e.g., perceived social norms) that prompt behavior that is not ruminated upon and mindless. Lapinski and Rimal argue that individuals rely on social norms to guide their behavior because norms allow more efficient processing of the social environment. Consistent with the focus on efficiency, is the assumption that individuals tend to choose the path of least resistance, i.e., they adhere to the principle of least effort (Zipf, 1949). For instance, numerous studies have shown that individuals use the principle of least effort when information seeking (e.g., Gerstberger & Allen, 1968; Griffiths & Brophy, 2005; Jansen, Spink, & Saracevic, 2000; Marchionini, 1992; Rosenberg, 1967). Furthermore, Marchionini claims that "humans will seek the path of least cognitive resistance" when information seeking (p. 156). Although the majority of empirical research concerning the principle of least effort

concerns information seeking behavior, Zipf argues that attempting to minimize effort is the fundamental motivation for the majority of human behavior.

Keizer et al. (2008) did not argue that the individuals may have relied on two heuristics to govern their behavior. However, the results of Keizer et al. (2008) are consistent with prior research that shows people take cues from their environment to determine appropriate, socially necessary behaviors. First, the subjects may have utilized environmental cues left by others to determine social norms or the appropriate way to behave. In other words, consistent with the principle of social proof, the subjects may have made use of the evidence of how others had behaved in the environment to determine how they should behave in turn. It was found that in the disordered environments where the descriptive norms were inconsistent with the injunctive norms, where evidence of others not making the effort to follow injunctive norms was present, individuals did not make the effort to follow injunctive norms themselves. For instance, in the disordered environments individuals were more likely to litter, not return carts, trespass, and steal. Importantly, subjects' seemed to generalize from the violation of explicit injunctive norms (e.g., no graffiti) to implicit injunctive norms (e.g., no littering). Thus, when the subjects engaged in behavior that was consistent with others in their environment they engaged in behaviors described by the principle of social proof.

Second, the subjects may have adhered to the perceived social norms in the least effortful manner. Consistent with the principle of least effort (Zipf, 1949), the subjects apparently determined the social norm in the environment as evidenced by others' behaviors, and adhered to that norm in a manner that was characterized by less effort and more efficiency. For instance, Keizer et al. found that subjects littered significantly more often in the disordered environment. Littering behavior as opposed to keeping or properly disposing of the flyer may be perceived as the less effortful or easier option, where locating a trashcan to dispose the flyer or taking the flyer with them to later consider as opposed to merely leaving the flyer on the ground could be perceived as a more effortful option. Even in the final two studies in which subjects stole money out of a mailbox significantly more in the disordered environment, the participants' behavior is characterized by less effort and more efficiency. Stealing the money might not seem immediately less effortful than leaving it, however the ratio of effort to self-benefit makes

it the clear choice for efficacious behavior. Thus, when the subjects engaged in behavior that was the less effortful option, they behaved in a manner consistent with the principle of least effort. Overall, the findings of Keizer et al. indicate that in the disordered environments, where evidence of others not making the effort to follow injunctive norms was present, individuals are apparently more likely to engage in behavior that is more self serving by being less effortful.

Given that humans process information employing various degrees of effort (e.g., Kahneman, 2011), the evidence given by Keizer and colleagues (2008) prompts the opportunity to investigate the extent that disordered environments offer cues which influence individuals to engage in high effort or low effort information processing. More specifically, communicological research has frequently relied on assessing cognitive effort expended in information and message processing in the service of attitude formation and change (e.g., Petty & Cacioppo, 1984; Petty; Harkins, & Williams, 1980; See, Petty, & Evans, 2009). Invariably studies that endeavor to assess attitudes are conducted in some proximal environment that may have an impact on participant cognitive effort and subsequently, the participants' recorded attitudes. Further, the quality of data depends, to some extent, on the respondents' motivation and ability to report accurate responses (Cannell, Miller & Oksenberg, 1981). Thus, the extent that disordered environments offer cues which influence individuals to engage in high effort or low effort message processing merits further investigation.

As discussed above, individuals employ one of two approaches to information processing characterized by the amount of effort employed when processing stimuli. To measure the effort expended to information processing, Chaiken (1980) recorded the time individuals spent analyzing stimuli. Higher effort processing resulted in an increase of time spent on evaluations before reporting a validity judgment of stimuli. Others have reported that time required to respond to a stimuli is taken as a measure of the amount of cognitive effort committed to a judgment of a stimuli (Kerr, 1973; Tyler, Hertel, McCalum, and Ellis; 1979). This is consistent with previous research findings suggesting that more effortful processing results in an increase in time spent evaluating stimuli (Chaiken, 1980; Craik & Lockhart, 1972; Kahneman, 2011; Schneider & Shriffrin, 1977). Furthermore, higher cognitive effort judgments are characterized as making more subtle

distinctions when analyzing stimuli, where less cognitive effort results in less subtle distinctions being made (e.g., Hayes & Broadbent, 1988; Langer, 1978). Thus, when the stimulus is an attitudinal statement, outcomes related to the judgment of the statement should indicate what mode of information processing was employed (e.g., how fast the judgment was made, how nuanced the distinctions made concerning the stimuli are). Given that Keizer's et al. (2008) findings suggest that environmental order influences whether an individual engages in high or low effort behavior, manipulations of ordered and disordered environments in a laboratory setting allows for predictions on how participants will process and respond to attitude statements can be made.

Research Propositions

Based on previous research, the degree of order in an environment -- i.e., the consistency between descriptive and injunctive norms -- can affect the extent to which a person engages in effort adhering to the injunctive norms evident in that environment. Keizer's et al. (2008) research indicates that people will exert less energy adhering to injunctive norms in a disordered environment. Likewise the tendency to commit cognitive resources to a task should be greater when the environment is characterized by consistency between descriptive and injunctive norms and lessened when there is inconsistency between descriptive and injunctive norms. More specifically, if a disordered environment provides cues suggesting lower effort is tolerated or even normative behavior, lower cognitive effort will likely be committed to making attitude judgments within that environment. Conversely, cognitive effort committed to attitude judgments should be greater in ordered environments. Less cognitive effort used while information processing should manifest in faster judgment and evaluation time (e.g., Kahneman, 2011). Consequently judgment response time should be faster in disordered environments compared to ordered environments. Furthermore, higher cognitive effort judgments are marked by more analytical reasoning wherein subtle distinctions concerning the stimuli are made (e.g., Hayes & Broadbent, 1988; Langer, 1978). Conversely, less cognitive effort judgments are marked as less analytical with less subtle distinctions made concerning the stimuli. Therefore, judgments should show less variability in attitude scores in disordered environments compared to ordered environments. Thus, the following hypotheses are presented:

H1: Attitude judgments will be made faster in disordered environments than ordered environments.

H2: Attitude judgments will show less variability in disordered environments than ordered environments.

CHAPTER 2

METHOD

Procedure

The study employed 50 undergraduate students from a large pacific university. Participants ranged in age from 18 to 38 years, with an average age of 21 ($M = 21.52$ years, $SD = 3.76$). There were 30 males (60%) and 20 females (40%). Participants were Mixed 26% ($n = 13$), Chinese 18% ($n = 9$), Japanese 14% ($n = 7$), Pacific Islander 14% ($n = 7$), Caucasian 8% ($n = 4$), Other 8% ($n = 4$), Korean 6% ($n = 3$), African American 4% ($n = 2$), and Hispanic 2% ($n = 1$). Participants were comprised of Freshmen 22% ($n = 11$), Sophomore 18% ($n = 9$), Junior 26% ($n = 13$), Senior 30% ($n = 15$), and Graduate students 4% ($n = 2$). Students were recruited to participate in a laboratory study through Sona, a web-based research human subject pool management system. A brief study overview was posted on Sona, indicating the experiment time of twenty minutes and disclosing the number of credits the study would be worth. Students scheduled an appointment time in which they would come to the designated interpersonal research laboratory to take part in the study.

The ordered environment condition (O) served as the control condition in the experiment; the disordered environment condition (D) served as the experimental condition. Keizer et al. (2008) conceptualized disordered environments as settings in which the descriptive and injunctive norms are in conflict. In Keizer et al. injunctive norms were indicated by displaying signs prohibiting certain behaviors. The ordered and disordered environments were operationalized by providing evidence of behavior either consistent or inconsistent with the injunctive norm. In the present study, the injunctive norm was operationalized by placing a sign on the lab wall stating "Please Keep the Research Lab Neat and Orderly." The sign was in eyesight of where the participant was seated.

In the O condition one the research lab was be set up so that the environment was ordered (see Appendix A). For instance, pictures on wall were hung straight, storage boxes for equipment were out of participant view, dust covers on the equipment were put away, and no loose papers were on the participant table. In the D condition the research lab was set up in manner so that the environment was disordered (see Appendix B). For

instance, storage boxes for equipment were scattered on the floor within participant view, magazines open and strewn about the coffee table, dust covers were partially taken off of equipment and still in participant sight, papers were randomly spread about on the participant table.

The researcher followed an experimenter protocol during the lab interaction (see Appendix C). In both conditions the behavior and mannerism of the researcher was consistent and professional. First, participants were asked to take a seat in the lab while the research retrieved all necessary materials. This was done so that participants were exposed to the environmental condition for a controlled amount of time, one minute. Participants were given information about the study and asked to read a consent form on the initial page of the online survey (see Appendix D). Participants were told that the researchers are interested in baseline attitudes on a variety of topics. Participants were instructed to fill out an online survey assessing their attitudes towards various statements. Demographic measures (i.e., gender, school year, age, and ethnicity) and manipulation checks were also included.

Creation of Stimulus

Fifty seven-point Likert items were generated by the researcher for the attitudinal statements. A pre-test was conducted ($n = 21$) to ascertain that items did not induce excessively high or low involvement that might bias participants' recorded attitudes, in turn possibly resulting in unnatural participant judgment response times. An examination of participants responses to attitude items was conducted to ensure that each item mean fell within one standard deviation ($SD = 1.78$) of the mean score ($M = 4.16$) of all attitude statements. None of the attitude statements produced mean scores outside of one standard deviation of the mean score of all the attitude statements. Therefore, all of the 50 seven-point Likert items were used for the final set of attitudinal statements (see Appendix E). A numeric response scale was provided for each statement ranging from 1 to 7, anchored by "Strongly disagree" to "Strongly agree."

Measures

Judgment response time. Judgment response time was recorded through the use of DirectRT, a behavioral annotation system software. Time was recorded beginning

when the attitude statement appeared on the screen and ended when the participant clicked on a number between 1 and 7. The technology reported time spent prior to reporting attitude in milliseconds.

      Manipulation check. Seven 7-point semantic differential items bound by bipolar adjectives were placed at the end of the instrument and used to assess participants' perceptions of the study in general (see Appendix F). Three items were modified from McCroskey and Teven (1999) to measure participants' perception of the researcher's credibility. Cronbach's alpha was .61 ($M = 6.56$, $SD = .67$). Two items were included to measure participants' level of distraction in the environment. Cronbach's alpha was .78 ($M = 6.22$, $SD = 1.20$). Imbedded in the above items were two items measuring participant perceived orderliness of the laboratory environment. Cronbach's alpha was .85 ($M = 5.85$, $SD = 1.67$).

CHAPTER 3

Results

Manipulation Checks

An independent-samples t-test was conducted to examine participants'
perceptions of the environmental order manipulations. As desired, the ordered condition
was perceived to be significantly more orderly ($M = 6.72$, $SD = .70$) and than the
disordered condition ($M = 5.11$, $SD = 1.90$) conditions (see Table I for means and
standard deviations for all dependent measures by condition); $t(33.99) = 4.07$, $p < .01$,
$\eta^2 = .33$. Levene's test indicated unequal variances ($F = 19.26$, $p = .00$), so degrees of
freedom were adjusted from 48 to 33.99. Additional independent-samples t-tests were
conducted for participants' perceived credibility of researcher and participants' reported
distraction while in the environment. There was not a significant difference in the
perception of researcher credibility in the ordered ($M = 6.59$, $SD = .13$) and disordered
($M = 6.53$, $SD = .14$) conditions; $t(48) = .33$, ns. There was no significant difference in
participants' reported distraction in the order ($M = 6.15$, $SD = .28$) and disordered ($M
= 6.28$, $SD = .21$) conditions; $t(48) = -.36$, ns.

Examination of Hypotheses

Hypothesis one stated that attitude judgments would be made faster in disordered
environments relative to ordered environments. A one-way ANOVA was conducted to
compare the effect of environmental order on participant response time across the 50
attitude statements in the environmental order and disorder conditions. A main effect for
environmental order showed that participants in the disordered condition made faster
attitude judgments ($M = 9.18$ seconds, $SD = 2.12$) compared to participants in the ordered
condition ($M = 11.03$ seconds, $SD = 2.91$), $F(1, 48) = 6.73$, $p < .05$, $\eta^2 = .12$. Thus the
results were consistent with Hypothesis one.

Hypothesis two stated attitude judgments would show less variability in
disordered environments relative to ordered environments. A comprehensive series of t-
tests were conducted on mean frequencies of participant attitude indicators in the
environmental order and disorder conditions. In other words, each t-test compared the
means for how frequently participants indicated their attitude by choosing "1" relative to
"2," "1" relative to "3," "1" relative to "4," etc. Given the attitude statements were on a

seven-point scale, this resulted in 21 t-tests being run per condition with 42 t-tests total. In the ordered condition 2 of the 21 t-tests produced significant differences between attitude indicator choices. Participants indicated their attitude by choosing "4" significantly more often than choosing "2" and "3." In the disordered condition, however, 9 of the 21 t-tests produced significant differences between attitude indicator choices. Participants indicated their attitude by choosing "4," "5," and "7" significantly more frequently than "1," choosing "3," "4," "5," "6," and "7" significantly more frequently than "2," choosing "4" significantly more frequently than "3," and choosing "6" significantly more frequently than "4." These findings are consistent with the rationale for hypothesis two, that individuals in the disordered environment will make less nuanced judgments and ultimately show less variability in attitude judgments. Thus, hypothesis two is supported.

Finally, a one-way ANOVA compared participants' attitudes for the 50 attitude statements between the ordered and disordered conditions. A main effect for environmental order showed that participants in the disordered condition reported more agreement with attitude statements ($M= 4.33$, $SD =.37$) compared to participants in the ordered condition ($M = 4.06$, $SD =.46$), $F(1, 48) = 5.17$, $p < .05$, $\eta^2 = .10$.

CHAPTER 4

Discussion

Prior to conducting this experiment, little was known concerning the effect of orderliness of the environment on message processing. Yet a growing body of research indicates that the degree of order in the environment can have substantial social and behavioral effects. To advance this area of research, the impact of ordered and disordered environments on cognitive effort employed during message processing was investigated. Disordered environments are conceptualized as environments where injunctive and descriptive norms are in conflict (Keizer, et al. 2008). Injunctive norms are the perceived approved and disapproved behaviors in a given environment and descriptive norms are the perceived actual behaviors in a given environment (Cialdini, Reno & Kallgren, 1990). An experiment was designed in which participants came into an ordered or disordered laboratory setting to report their attitudes on a variety of issues. Response time of attitude judgments and variability in attitudes was assessed. The findings make several contributions to the study of contextual factors that influence information and message processing.

Hypothesis one predicted that participants would make faster attitude judgments in disordered environments relative to ordered environments. Participants in the disordered environment made faster attitude judgments than participants in ordered environments, thus hypothesis one was supported. Given that quicker response time is indicative of less cognitive effort expenditure (Chaiken, 1980; Craik & Lockhart, 1972; Kahneman, 2011; Schneider & Shriffrin, 1977), results from this study suggest that individuals in disordered environments relative to ordered environments may employ less cognitive effort when message processing. In the disordered laboratory environments where the descriptive norms were inconsistent with the injunctive norms and evidence of others not making the effort to follow explicit injunctive norms was present, participants may have generalized to other implicit injunctive norms (i.e., engage in effortful processing when participating in a laboratory experiment), and consequently did not make the effort to adhere to these norms. Thus, this finding is consistent with both of the aforementioned principle of social proof (Cialdini, 2001) and principle of least effort (Zipf, 1949). The principle of social proof states that individuals discern normative

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behavior within an environment by observation of others' behavior (Cialdini) and the principle of least effort states that across the majority of human behavior individuals attempt to minimize effort and take the path of least resistance (Zipf).

Hypothesis two predicted that participants would show less variability in their recorded attitudes in the disordered environment condition relative to the ordered environment condition. This hypothesis stems from prior research which reports that judgments marked by less subtle distinctions made across stimuli are associated with less cognitive effort expenditure (e.g., Hayes & Broadbent, 1988; Langer, 1978). Results from the current study suggest that participants in the ordered condition recorded their attitudes across the seven possible attitude indicator numbers in a relatively equiprobable manner. This finding is indicative of participants making more nuanced attitude judgments. However, in the disordered condition, some of the seven numbers were chosen significantly more frequently than other numbers. Specifically, participants chose the "4," indicating a neutral attitude, significantly more frequently than any of the numbers indicating disagreement (i.e., "1," "2," or "3"). Participants also chose almost every number significantly more frequently than the number "2." These findings suggest that participants favored some numbers at the expense of others and is indicative of participants making more gross distinctions and less nuanced judgments concerning the attitude indicator numbers in the disordered condition. In addition, when disagreeing with an attitude statement in the disordered condition, participants largely ignored the number "2" and either chose "3" or "1." This pattern is also indicative of participants making less granular distinctions when disagreeing with an attitude statement. Thus, it appears that in the disordered condition participants are more likely to make somewhat nuanced judgments when indicating agreement with an attitude statement. On the other hand, when disagreeing with an attitude statement participants are less nuanced when recording their attitude. In sum, participants showed less variability in their recorded attitudes in the disordered environment than did participants in the ordered environment. Furthermore, results suggest that this pattern may be most evident in the disordered condition when participants disagree rather than agree with an attitude statement.

Interestingly, results from an additional analysis revealed that participants in the disordered environment reported significantly more agreement with attitudes than

participants in the ordered environments. This unhypothesized finding suggests that individuals tend to agree with assertions made by attitude statements more in disordered environments relative to ordered environments. These data are consistent with an argument forwarded by Krosnick (1991). Krosnick (1991) argued that when individuals are asked to provide a response to a survey item, without the motivation to employ cognitive effort, individuals may not deliberate on the nuances of the stimuli and instead agree with the assertion made by the item. In other words, individuals may be more likely to agree with attitude statements when high cognitive effort is not motivated nor required of them, and consequently less cognitive effort is employed. Thus, it could be the case that participants in the disordered condition are employing low cognitive effort and in turn, are more apt to record more agreement with attitude statements. Furthermore, it may be the case that disagreeing with an attitude statement requires more cognitive effort. To the extent that generally, rejecting requires counter-arguing, it may be that rejecting an attitude statement is in general a more effortful, attention demanding process. For instance, Gilbert, Tafarodi, & Malone (1993) found that individuals under load or time pressure to make a decision were more likely to accept false information and use it to make decisions. Thus, in the current study participants committing less time to analyzing the attitude statement may have been more likely to accept and agree with the statement; the counter-arguing necessary to reject it, would have required more cognitive effort.

Overall, the results of this investigation are consistent with the Keizer et al. (2008) findings in that individuals' behaviors are influenced by the orderliness of the environment. Further, the present study also shows that individuals' attitudes were influenced by the orderliness of the environment as well. Specifically, this study suggests the manner in which individuals process and respond to messages is impacted by the orderliness of the environment. The results provide reason to believe that individuals process messages faster and are more biased in their responses in disordered environments relative to ordered environments. However, given the paucity of previous findings concerning the orderliness of the environment and human behavior and the narrow scope of the present investigation, new questions are raised. Future research should seek not only to address the limitations of the current study but also explore the answers for these newly raised questions.

Limitations and Future Research

Given the paucity of existing studies investigating disordered environments, injunctive norm violations have not been thoroughly explored. A lack of previous research detailing the operationalization of the disordered environment manipulation is a limitation to the current study. Assessing the degree of "disorder" created by the manipulation might be a useful approach to understanding the operationalization of the injunctive norm violation, since the strength of the manipulation drives the effect size in the dependent variable. In the Keizer field studies there was no assessment of the effect size of the manipulation on the dependent variables. However, in the present study we have an indication of the effect size of the manipulation. The effect size essentially provides a ceiling on the effectiveness of the manipulation and the likelihood of finding support for the hypotheses. The results from this study indicate that faster judgments were made in disordered environments, a characterization of less cognitive effort expenditure (Chaiken, 1980; Craik & Lockhart, 1972; Kahneman, 2011; Schneider & Shriffrin, 1977). However, there was no difference in variability of attitudes between the two conditions, also a characterization of less cognitive expenditure (e.g., Hayes & Broadbent). It may be that a stronger manipulation effect size is needed in order to give both of the hypotheses a fair test. Future research should seek to measure more closely the effect size of the disordered manipulation in order to understand the threshold of the manipulation effects. Findings from this research would more precisely examine the concept of injunctive norm violations and make better sense of the strength of the relationship between the disordered environment manipulation and the outcome variables. Furthermore, findings will aid in the possibility an understanding of the range of the manipulation and it's effects and of a more precise operationalization of disordered environments in future research.

Whom the injunctive norm violation (i.e., descriptive norms in conflict with injunctive norms) is attributed to may play a crucial role in the effect of disordered environments on message processing as well. In disordered environments it is possible that injunctive norm violations may be attributed to the users of the environment in general (i.e., others outside of the specific experiment) or to the specific user of the environment (i.e., the researcher). Although it is uncertain, participants in the Keizer et

al. (2008) field experiments may have attributed the injunctive norm violations to other users of the environment (i.e., others similar to the participants). In the present study's lab experiment it is unclear who participants perceived to be violating the injunctive norm. The participants' perceived credibility of the researcher was measured and no significant difference in the researcher's perceived credibility was found between the ordered and disordered conditions. This finding suggests that participants may have not attributed the injunctive norm violation to the specific user of the environment but possibly the users of the environment in general. The manipulation might have had a greater effect on the participants if they believed the state of the laboratory was a result of the researcher's efforts (or lack thereof). However, it is not clear whether a credibility measure is indicative of participants' attribution of an injunctive norm violation. Still this raises the question of whether it is possible to attenuate the effects of the disordered environment by allowing the present user of the environment to disclaim or disown the disorder. For instance, the researcher might explicitly apologized for the state of the laboratory, claiming that others use the lab as well and he or she is uncomfortable with the state it was left in. Future research should examine whether it is possible to attenuate the effects of an environment's disorder by publicly stating dissatisfaction with the environment's state.

Considering who is perceived to be responsible for an environment's disorder raises an additional concern. Given the principle of social proof, it might be expected that a user of a disordered environment may be more susceptible to responding to the disorder should that user believe the disorder was brought about by similar others (e.g., Abrams, et al., 1990; Burn, 1991). Conversely the effect of the disorder on the user might be attenuated should the user believe the disorder was brought about by dissimilar others. Rigidly testing the principle of social proof theory and its role in the explanation for disordered environments' impact on message processing would be fruitful for uncovering theoretical explanations. Further research testing this theoretical perspective, however, should include more direct measures of the active theoretical mechanisms. For example, future research should include items that directly measure participants' attribution of injunctive norm violation and how similar the participants perceive the injunctive norm violator relative to themselves.

As aforementioned, Krosnick (1991) argued that without the motivation to employ cognitive effort individuals may not analyze the nuances of the stimuli and by default, agree with the an assertion. Thus, if disordered environments influence individuals to engage in less cognitive effort when processing messages, an indicator may be participants reporting generally more positive attitudes. This is consistent with the incidental finding that participants responded with more positive attitudes in the disordered condition. It is conceivable that positive attitudes in disordered environments is evidence of less nuanced judgments, and more specifically less cognitive effort expended on message processing. Future research should seek to further explore and test this rational. Understanding how biased attitudes manifest in attitude studies not only aids in understanding how much cognitive effort was spent on message processing but also how the orderliness of the environment effects message processing.

Finally, it is not clear that in the disordered environment condition participants were generalizing from one explicit injunctive norm violation (i.e., disordered laboratory environment) to another implicit injunctive norm violation (i.e., not expending high cognitive effort). This claim hinges on the assumption that participants perceive expending cognitive effort while participating in a laboratory experiment an implicit injunctive norm. In other words, that expending high cognitive effort while participating in a research study is the approved and expected normative behavior and expending low cognitive effort is not expected and disapproved. Future research should seek to more fully understand participants' perception of laboratory injunctive norms to ensure that participants are generalizing from explicit injunctive norm violations to implicit injunctive norm violations.

Despite these limitations the findings from this experiment still provide an initial look at how the orderliness of the environment effects message processing. Results from this investigation suggest that disordered environments are indeed a contextual factor that influences the manner in which individuals process and respond to messages. Specifically, the findings suggest that disordered environments influence individuals to make faster and less nuanced judgments. Furthermore, individuals tend to agree with assertions made by attitude statements more in disordered environments relative to ordered environments. Taken together, these findings provide reason to be confident that

the orderliness of the environment and its impact on message processing merit further examination.

TABLE I.

Means and Standard Deviations for all dependent measures by condition

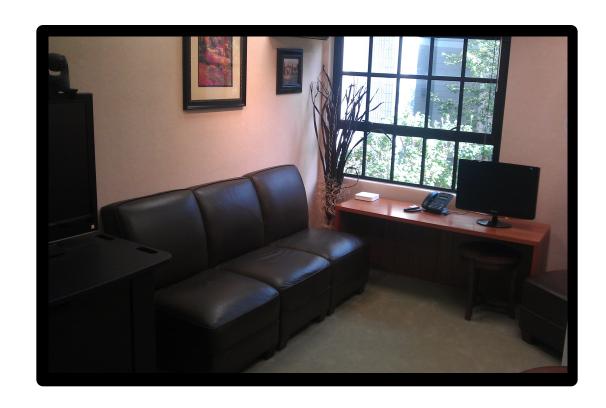| Measure	Ordered Condition	Disordered Condition
	n = 23	n = 27
Response time	11.029 (2.918)	9.175 (2.123)
Attitude	4.06 (.46	4.33 (.37)
Perceived environmental order	6.72 (.15)	5.11 (.37)
Researcher credibility	6.59 (.13)	6.53 (.14)
Distraction	6.15 (.28)	6.28 (.21)

TABLE II

Means and Standard Deviations for paired t-tests of mean frequencies of participant attitude indicators by condition

	Ordered Condition	Disordered Condition
1	$7.00(5.16)^{ab}$	$5.26 (4.67)^{ab}$
2	$6.13(3.78)^{a}$	$4.19 (2.56)^{a}$
3	$6.52(4.35)^{a}$	$7.00 (3.36)^{bc}$
4	$8.65(3.93)^{b}$	$10.04 (7.05)^{d}$
5	$7.87(5.01)^{ab}$	$8.15 (3.59)^{cd}$
6	$6.48(4.39)^{ab}$	$6.56 (4.73)^{bcd}$
7	$7.35(8.07)^{ab}$	$8.82 (6.76)^{cd}$

Note. Items with the same superscripts are not significantly different.

APPENDIX A

Ordered Condition (O)

APPENDIX B

Disordered Condition (D)

Experimenter Protocol

Instructions for the researcher: **DO NOT** hand out or show this protocol to the research participants. This protocol shall be used as a guide to conduct the experiment and to debrief the participants.

- Meet the participant outside of the lab and guide them to the research lab.
- Lead the participant to the round glass table and have them sit in the chair facing the rest of the lab (in front of the computer screen). The researcher will sit in the chair to the participant's right.

1. CONSENT FORM

- Tell the participant:

"Hi, my name is _____. I am the researcher for this study. We are interested in examining attitudinal positions on a series of statements. For this, you will be asked to rate your attitude to a series of statements given to you on a computer screen. Please take a moment to read through the consent form on the screen and feel free to ask any questions you have. If you agree to participate in this study click the indicated button. If you would like a paper copy of the consent form for your record I have them available for you."

2. EXPLAIN PROCEDURES

- Once the participant reads the consent form:

"Now the survey is ready to be completed. Please be sure to respond to every question. Now I will go back to the control room until you have completed. Once you have completed your study please wait and I will be out to debrief you on the study."

3. DEBRIEF & DO-OVER

- Once the participant is finished, return to the room and sit in the opposite chair.

"Thank you, you have now completed the study. We are always interested to hear your feedback. I'm wondering what your thoughts are because many times they give us good ideas for future studies. So, considering everything you just went through how do you suppose researchers could use this information, what do you think we could learn from this?

"One big favor I need to ask of you is PLEASE don't tell your friends or class mates about what this study is really about. That way we can get our most accurate results."

"Do you have any questions? Thank you again for completing this study and helping us out. I will make sure your instructor gets your name so that you get proper credit. Have a great day."

-Lead participant out of the lab.

Study Information and Consent Form

Agreement to participate in the Attitude Assessment Research Study.

This research study is being conducted by: Aili Peyton, and advised by Dr. R. Kelly Aune, University of Hawaii at Manoa - Department of Communicology.

You are invited to be in a research study looking at student attitudes addressing various topics in laboratory environments. We ask that you read this form and ask any questions to the research Aili Peyton before you agree to participate in the study.

Background Information:
The purpose of this study is to explore baseline attitudes on a variety of topics in laboratory environments. Participation will consist of filling out an online survey measuring attitudes on various issues. Completion of this survey should take no longer than 30 minutes. Approximately 50 people will participate in this study.

Risks and Benefits of Being in the Study:
There are no risks or benefits to participating in the study.

Confidentiality:
The records of this study will be kept private. In any sort of report that may be published will not include any information that will make it possible to identify a participant. Research records will be stored securely and only the researcher will have access to the records.

Voluntary Nature of the Study:
Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Hawaii at Manoa. If you decide to participate, you are free to withdraw at any time without affecting those relationships.

Contacts and questions:
The researcher conducting this study is Aili Peyton. If you have questions later, you are encouraged to contact her at George Hall 326, (808) 956-3322, apeyton@hawaii.edu.

If you have any questions or concerns regarding rights and injury in the study and would like to talk to someone other than the researcher, you are encouraged to contact the Committee on Human Studies, 1960 East-West Road, BIOMED Building, Room B-104, Honolulu, Hawaii, 96822, (808) 956-5007, uhirb@hawaii.edu.
By clicking next you freely agree to participate in this study.

APPENDIX E
Attitudinal Statements

Directions: Please rate the following attitude statements on a scale from 1 to 7. Indicate your choice by pressing the appropriate number on the keyboard. Once you rate a statement the next statement will automatically appear on the screen.

1. To help prevent childhood diabetes, there should be a State tax on soft drinks.
2. To encourage a healthy lifestyle, schools should carry only health food in their vending machines.
3. To decrease the possibility of inappropriate relationships between teachers and students, a bill should be passed banning any electronic communication (e.g., Facebook, Twitter, text messaging) between teachers and students.
4. Because the number of Americans in prison older than 55 is growing, along with prisoners with Alzheimer's or dementia, prisoners who are not a threat to public safety should be released under supervision.
5. To help the economy grow, a bill should be passed where marijuana is regulated like alcohol.
6. When a company is soliciting online product reviews, it is unethical to offer customers a rebate and include the statement "We strive to get the best possible review from you."
7. Taxpayer money should be used for secret service to keep the president safe when on vacation.
8. Internet surveillance needs to take place in order to protect citizens from possible cybercrime.
9. It is acceptable to experiment on animals to develop medicines benefitting humans.
10. In order to prevent obesity and chronic disease, sugar should be taxed and regulated.
11. Regardless of the costs to human life, African conflicts should be handled by African countries.
12. The government should not restrict television advertisements aimed at children because it takes the responsibility off of parents to monitor their children's activity.
13. For privacy reasons, parental consent should not be required for underage pregnant girls to have abortions.
14. The military must be allowed to visit schools to promote and recruit for the armed forces.
15. Water should be treated as a commodity that can be priced as an economic resource and traded across international boundaries.
16. Governments should take steps to keep their countries threatened languages alive.
17. The government should not allow sale of prescription drugs manufactured outside of the US in order for proper enforcement of quality standards to be upheld.
18. Government funds spent exploring space should be frozen and used to care for the depleting ecosystem.
19. There should be a law that prohibits online websites from selling data about its users to other companies.

20. In order to prevent road accidents, individuals should have to take the driver's test every 10 years.
21. Celebrity deaths should not receive national news attention.
22. Celebrities adopting children from overseas should not receive preferences over non-celebrity individuals.
23. Advertisements for items that are bad for one's health, such as cigarettes, should be illegal.
24. Only individuals who are medical deemed overweight should be able to take weight loss drugs.
25. The fashion industry should be required to use models that have the average woman's BMI.
26. In should be against the law for authorities to offer criminal money in exchange for information.
27. Robotic, self-driving cars should not be allowed on the streets.
28. Because individuals can enlist in the military at 18, the legal drinking age should be 18 as well.
29. To reduce waste, household recycling should be mandated by law.
30. To decrease on road accidents, cellphones should not be allowed in within reach of the driver.
31. To encourage a decrease in carbon emissions, non vehicle owners should receive a tax break.
32. Airline pilots should be prohibited from flying within 24 hours of consuming alcohol.
33. All felons in prison should be able to vote in the presidential election.
34. Prescription drug advertisements are not helpful to consumers and should be banned.
35. Performance enhancing drugs should be accepted in sports, health risks are an individual's decision.
36. The opposition to immigration in the United States stems from racism.
37. The government should be able to require vaccinations for children, it should be the parent's choice.
38. Americans should have the right to health care, this would reduce overall health care spending.
39. Americans should have to work hard to get medical coverage, it is not the government's responsibility.
40. Terminally ill people should have the right to end their suffering with a quick and dignified death.
41. Reality TV is insightful because it allows individual's to understand real life issues.
42. Censoring language on TV conflicts with the First Amendment, free speech.
43. The Harry Potter series is more intellectually stimulating than the Twilight Series.
44. Using Sparknotes is a legitimate way to study a book.
45. Newscasters should be required to be balanced and impartial in their reporting of events.
46. Children under the age of 13 should not be allowed to participate in beauty contests.

47. Celebrities should receive greater protection from paparazzi and media exploitation.
48. Given that children have instant access to the Internet, the government should censor explicit material.
49. Airbrushing in magazines should be illegal because it projects an unrealistic image and body weight goal for women.
50. Rhianna and Chris Brown should not make songs together.

Note. A numeric response scale was provided for each attitudinal statement ranging from 1 to 7, anchored by "Strongly disagree" to "Strongly agree."

APPENDIX F
Manipulation Checks
Directions: For the following items, please indicate your response on the number scale provided between the pairs of adjectives. The closer the number is to an adjective, the more strongly you feel about your evaluation.
1. While participating in this study paying attention was:
    Difficult   1   2   3   4   5   6   7   Not Difficult
2. While participating in this study the lab environment was:
    Distracting   1   2   3   4   5   6   7   Not Distracting
3. While conducting this research study, the researcher seemed:
    Incompetent 1   2   3   4   5   6   7   Competent
4. While conducting this research study, the researcher seemed:
    Untrained   1   2   3   4   5   6   7   Trained
5. While conducting this research study, the researcher seemed:
    Unintelligent 1   2   3   4   5   6   7   Intelligent
6. The lab appears to be:
    Disorganized 1   2   3   4   5   6   7   Organized
7. The lab appears to be:
    Disorderly   1   2   3   4   5   6   7   Orderly

APPENDIX G
Demographic Information

1. What is your age? _____
2. What is your gender?
    Male
    Female
3. What ethnicity/race do you best identify with?
    African American
    American Indian
    Caucasian
    Chinese
    Hispanic
    Japanese
    Korean
    Pacific Islander
    Mixed
    Other
4. What year in school are you?
    Freshman
    Sophomore
    Junior
    Senior
    Graduate
    N/A

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