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Exploring the effects of trash and disorder on prosocial behavior, antisocial behavior, and cognitive ability in a laboratory study

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ABSTRACT OF THE THESIS

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By

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Master of Arts in Social Ecology

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Professor Peter Ditto, Chair

Two studies were conducted in order to understand the effects and perceptions of trash—unwanted, spoiled, or improperly discarded items. An exploratory correlational study investigated people's attitudes and knowledge about trash and recycling, finding that participants lack knowledge about certain key recycling behaviors. Politically liberal individuals had more negative attitudes towards trash and positive attitudes towards recycling compared with politically conservative individuals. A laboratory study examined the effects of trash and disorder on behavior. Contrary to expectations, no statistically significant differences between conditions were found on creativity, donation to charity, or cheating. Participants in the orderly condition scored significantly higher on verbal GRE questions than those in the disorderly condition, but those in the trash-filled room did not score significantly different from either of the other two conditions on the GRE questions. The set of studies have important implications for trash and recycling policy, and bring further nuance into the discussion on the consequences of trash and disorder.

INTRODUCTION

When it comes to exciting topics in research, few people would place trash at the top of the list. Trash, commonly used to describe unusable or spoiled items, can be placed in trashcans or littered on the street; nevertheless, trash is something to get rid of or put out of sight: humans burn their trash in incinerators or store it away in landfills (Rogers, 2005). This out-of-mind, out-of-sight conceptualization of trash suggests that people may not be apt to investigating trash and its effects. Unsurprisingly, the issue has been largely absent from psychological inquiry. Researchers have flirted with trash's sexier twin—recycling—but have treated it as a dependent variable, an outcome that is influenced by various experimental manipulations, such as social norms, the presence of recycle bins, and the size of the product to be recycled (e.g. Reno, Cialdini, & Kallgren, 1993; Catlin & Wang, 2012; Trudel & Argo, 2013). Yet garbage is an ever-increasing problem as the world's population continues to grow. Since World War II, dramatic increases in consumption have been followed inevitably by equally dramatic increases in waste (Rogers, 2005). With each passing year of growth, people will be in closer contact with the by-products of their consumption habits. Although this problem needs to be addressed, we know little about what humans think about trash and how it affects our cognition or behavior. In this investigation, I examine the psychological effects of a trash-filled environment—both how people perceive trash, and how it affects people's helpful behavior (donation to charity), harmful behavior (cheating), and cognitive ability (creativity and verbal reasoning). In this paper, I seek to begin to address these questions through an exploratory correlational study and an experimental study of the effects of trash and disorder.

CHAPTER 1: PSYCHOLOGY AND TRASH

Ever since the beginnings of industrialization, Americans have been forced to deal with mounting trash (Rogers, 2005). Garbage has become an ever-present, ubiquitous factor in our lives; as one example, the Fresh Kills Landfill in New York is visible from outer space. Americans threw out 500 billion pounds of waste in 2003, and produce 30% of the world's waste despite comprising only 4% of the world population. With a recycling rate of just over 30%, nearly 70% of what Americans throw out goes to a landfill or becomes litter (EPA, 2015).

The environmental impacts of trash are well documented, starting with the basic fact that more trash means more collection, resulting in increased emissions from garbage trucks due to more frequent routes (Rogers, 2005). Incinerators release toxins into the air, including mercury, carbon monoxide, and dioxins (among others), contaminating soil, air, and water. Landfills are probably the most problematic consequence of trash. First, leaching from landfills contaminates soil and groundwater. Second, these trash storage containers emit methane, one of the worst gases in terms of climate change contributions—it is "21 times more effective at trapping heat in the atmosphere than carbon dioxide," (Rogers, 2005, p. 5). Third, landfills also emit carbon dioxide, hazardous air pollutants, and volatile organic compounds (VOC), which all contribute to ozone (smog); ozone exposure causes numerous respiratory and other health problems. The trash that fails to reach landfills or get recycled is scattered as litter. Not only does litter negatively affect aesthetics in natural and urban environments, but it also causes harm to various species of animals. Trash has negative environmental consequences, but what about its psychological consequences?

Psychological Consequences of Waste

There is surprisingly little research on the psychological effects of trash; however, some work has investigated the effects of general physical disorder. Researchers have included trash as a part of physical disorder, and the sheer amount of trash in the current environment contributes to physical disorder (Weaver, 2015; Rogers, 2005). In 1982, Wilson and Kelling proposed the Broken Windows Theory (BWT), suggesting that disordered environments inevitably bring with them deviant social behavior, especially crime. When environmental cues suggest a lack of order and the presence of criminal behavior, such as broken windows, it signals to people that other forms of social order do not apply, leading to cheating, stealing, or littering (to name a few antisocial behaviors). Abandoned cars, litter, and boarded up homes signal a lack of order. This theory had a role in motivating the recent actions of officials in New York City, who began cracking down on petty crimes in order to create perceptions of a more orderly environment; crime rates in the city were much lower after the policy (although the policy has also brought controversy; Sanburn, 2015).

Psychologists empirically tested BWT using a set of field experiments. Keizer, Lindenberg, and Steg (2008) set up situations where social norms were obviously broken and participants had chances to break other social norms. For example, the experimenters put flyers on bicycles that were parked next to a wall with an obvious "no graffiti" sign displayed on the wall. They manipulated whether there was actual graffiti present on the wall (norm violation) or not (no-violation), and measured whether participants littered the flyer or carried it with them (coded as non-littering). The researchers found that more people in the norm violation condition subsequently littered the flyer than did those in the no-violation condition. In another field experiment, near a set of mailboxes, Keizer et al. (2008) placed money in an envelope and had it

sticking out, clearly visible. There was a clear "no litter" sign placed near the mailboxes, and the researchers manipulated whether there was litter around the mailboxes (norm violation) or not (no-violation). Compared to those in the no-violation condition, participants in the norm violation were more likely to steal the money from the envelope. The set of studies show that disorder can lead to antisocial behavior, and trash—manipulated as litter—can be a signal of disorder.

Ramos and Torgler (2012) also ran a similar field experiment, manipulating whether a university department break room was disorderly or orderly. In the disorderly condition, there were dishes left out, newspapers and magazines spread around, and litter near the trashcan. In the orderly condition, all utensils and dishes were in the cabinets and the rest of the room was clean and tidy. The researchers found that more people littered when the room was disorderly than when it was orderly. Using a strictly observational design, Weaver (2015) found that more people littered in a naturally disorderly area compared to those in a naturally orderly area. The researcher coded the amount of littering at a corner in a physically disordered area and at a different corner in a physically ordered area. The neighborhoods were matched on various confounding variables. The researcher found that more littering occurred in the disorderly area. Again, trash in the form of litter can be a signal of disorder, leading to more antisocial or norm-violating behavior.

The research on disorder in the field suggests that it leads to potentially harmful behavior, such as littering or stealing. Researchers have used multiple ways of manipulating disorder—litter, graffiti, and messiness—and found similar patterns from each. In this research, trash in the form of litter has only been used as a proxy for disorder, a signal of a norm-violation. Improperly discarded items (litter) demonstrate that norms can be broken in that area, leading to other

deviant behavior. The research reviewed so far suggests that in a trash-filled world, there will be increased deviant behavior. But what about physical disorder—items or things not in their proper place—that is not trash? The following research investigates situations where the physical environment is disordered, but where norms are not necessarily broken.

Manipulating Disorder in the Laboratory

Chae and Zhu (2014) manipulated order and disorder by creating a very disorganized workspace, with books and papers scattered around a shelf and desk. The researchers found that those in the disorderly condition had reduced self-control and felt more resource depleted—tired, lacking energy, and lacking self-control—compared to those in the orderly condition. Past research has shown that this resource depletion can be restored with glucose or energizing substances (e.g. Baumeister & Vohs, 2007). Therefore, in a follow-up study, the authors gave glucose to some of the participants and a placebo drink to others. The researchers discovered that, after being given glucose (compared to a placebo), participants in the disorderly condition had their self-control restored and performed comparably to those in the orderly condition on a persistence task. The researchers suggested that disorder reduces one's self-control and depletes cognitive resources because it threatens one's perceived sense of control.

Vohs, Redden, and Rahinel (2013) also manipulated disorder experimentally to examine a different set of outcomes. The authors hypothesized that an orderly room would put participants into a conventional mindset, and subsequently participants would act in more conventional ways. Conversely, they hypothesized that participants in a disorderly room would be put into an innovative and non-traditional mindset, and thus act in non-conventional ways. The authors tested a variety of conventional and non-conventional behavior-related outcomes: healthy eating (by giving participants a choice between chocolate and an apple), donation to

charity, creativity, and preference for novelty. They predicted that order would increase convention, namely healthy eating and more donation to charity, whereas disorder would increase innovation, specifically increased creativity and a preference for novelty.

Confirming their hypotheses, the researchers found that, compared to those in the orderly condition, participants in the disorderly condition were more likely to choose an unhealthy snack and donated less to charity. However, participants in the disorderly condition were also more creative than those in the orderly condition and preferred novelty over convention. Whereas BWT research demonstrated only negative effects of disorder, these laboratory studies suggest that disorder can have positive effects. The laboratory studies used only office supplies as disorder rather than trash, leaving the possibility that trash as disorder has different effects than office supplies as disorder. Office supplies are meant to be on a desk—they can be either organized or disorganized. But trash is not meant to be on a desk; since it is meant to be in a trashcan, trash on a desk might be an indicator of broken norms or a nuisance that is yet to be removed. The current research focuses on the possibility that trash and office-supplies disorder may have different effects on behavior.

Current Research

My general research question is a broad one: what are the potential psychological effects of trash, and how can the amount of trash be reduced? Study 1 is an exploratory correlational study that assesses participants' attitudes and knowledge of trash and recycling, and examines some of the possible predictors of these items. Since it is an exploratory study, I used demographic and personality variables as predictors of attitudes and knowledge. This study gives an idea about people's psychological perceptions of trash, and how these perceptions differ by demographics and personality. By uncovering gaps in knowledge, or divergences in attitudes,

researchers can point public policy makers to the areas where knowledge needs to be increased and where attitudes may need to be changed.

Extending the correlational insights of Study1, Study 2 experimentally examines the potential effects of trash. Study 2 sought to both replicate Vohs et al. (2013) and to test whether a disorderly trash environment and disorderly office-supplies have the same effects on behavior. Paralleling Vohs et al. (2013), participants in study 2 were placed into orderly and disorderly environments. However, extending past research, a third condition was included: a trash-filled room. Rather than an office with disorganized office-items, the trash condition had an office with trash on the desks. I added this condition because previous research, like BWT, suggests that trash should have a negative effect on behavior. Furthermore, Keizer et al. (2008) showed that people are more likely to steal in a littered environment. Therefore, one would expect that a trash-filled environment would lead to negative outcomes. However, Vohs et al. (2013) uncovered some positive effects of disorder, specifically increased creativity. The researchers only used two conditions, an orderly and disorderly (with office supplies) condition. This research would suggest that trash and disorder may both have positive effects on behavior.

Study 2 has two objectives: to replicate the effects of disorder found in previous research, and to test if a trash-filled environment has different effects on behavior than a disorderly environment does. Because of BWT and the field test of the theory, I hypothesize that trash will indicate a lack of social norm compliance, whereas disorder will place participants in a non-conventional mindset. Vohs et al. (2013) used office supplies to create disorder, and therefore it was a normal, although messy, academic environment. But having trash in the room is not typical and thus indicates broken social norms. Therefore, I predict that in the trash condition,

participants will demonstrate more antisocial behavior, whereas in the disorder condition participants will be in a non-conventional mindset and demonstrate more innovative behavior.

As an initial step in testing the aforementioned hypotheses concerning the psychological effects of trash, Study 1 sought to explore people's perceptions of trash.

CHAPTER 2: A CORRELATIONAL STUDY INVESTIGATING TRASH ATTITUDES

Overview

To assess the perceptions of trash, I conducted a correlational study looking at attitudes and knowledge about trash and recycling in the United States.

Method

Participants and design. I recruited 1159 participants from the website *yourmorals.org*. The website is maintained by a group of researchers that recruit people to fill out surveys to learn more about their morals. Participants choose which surveys to take, and at the end of a survey they are shown graphs of the results and descriptions of the study's purpose.

The 62 participants who failed either of the two attention checks were excluded.[1] Due to the focus on trash in the United States, I also excluded those who were not living in the U.S. at the time, resulting in a final sample size of 936. The sample was 59% male and had an average age of 33.45 years old (SD = 15.34). The sample was also highly educated: 95% had completed high school, 72% had completed college, and 29% had completed graduate or professional school. The large majority of the sample (72%) identified as politically liberal, compared to moderate (12%) and conservative (16%).

On the website, the link to the survey was listed as "Trash in the U.S." The link led to a consent form followed by the survey and a debriefing page. The survey consisted of 32 questions about attitudes, self-reported behavior, and knowledge of trash and recycling. It included all closed-ended questions, with many Likert Scale response statements.

[1] The attention checks were: "Attention check: Answer YES to this question" and "Attention check: Answer NO to this question."

Measures

Attitudes. I assessed participants' attitudes about trash and recycling with 19 questions (Table 1). Fourteen of the items were statements with 7-point agree/disagree Likert Scale response options, like "Recycling is too hard," "It is acceptable to have some litter on the street," and "I am not bothered when I see trash." I also used various closed-ended questions, including "In your opinion, which of the following is the easiest [hardest] to recycle" and "In your opinion, what is the best way to reduce the amount of trash in the U.S.?"

Knowledge. I assessed participants' knowledge about various aspects of trash and recycling, including knowledge about recycling rates of certain items, recyclability of certain items, and how certain products compare environmentally. There were eight total knowledge questions, listed in Table 4. To create an overall knowledge variable, I coded each correct answer as 1 and each wrong answer as 0 and added up each question for every participant, resulting in a knowledge score from 0-8 ($M = 3.07$, $SD = 1.35$).

Demographics and personality. To sign up for yourmorals.org, participants must fill out a basic demographic questionnaire that includes age, gender, subjective socioeconomic status and political ideology. The education scale ranged from 1 ("Some high school") to 9 ("Completed graduate/professional school"; $M = 6.28$, $SD = 2.12$). Participants completed the MacArthur Scale of social status (Adler & Stewart, 2007), where they indicated their rank on a ladder between the best off (top of the ladder, score of 10) and the worst off (bottom of the ladder, score of 1; $M = 6.04$, $SD = 1.89$). Political ideology was measured on a scale from 1 ("Very liberal") to 7 ("Very conservative"), with 4 labeled as "Moderate" ($M = 2.79$, $SD = 1.59$). Some of the participants that took my survey also took the Big Five Inventory (John, Donahue,

& Kentle (1991), which was on the *yourmorals.org* website at the same time. This allowed me to analyze Big Five variables for a subset of my sample ($N = 315$).

Results

Attitudes. As seen in Table 1, Participants were most bothered by cigarette litter (28%; 22% most bothered by plastic). Not surprisingly, this is also the same type of litter that they report seeing the most (24%), tied with paper as the most common litter that participants see. A slight majority of the sample (54%) reported that consumers are more responsible for the amount of trash in the U.S. than producers. In general participants were not tolerant of trash: they reported being bothered by trash, finding trash to be disgusting, and not accepting others' littering behavior (see Table 1 for *M*s and *SD*s). Even among politically conservative participants, 58% agreed that trash is a major problem in the U.S.

Using an exploratory factor analysis with all of the attitude items, I found that only two factors had an eigenvalue over 1.00 (unrotated; Table 2). One of the factors explained most of the variance (over 80%); using a scree plot, I found that the second factor was at the inflection point and therefore only kept the first factor (Field, 2013). A scree plot graphs the factors by their eigenvalues, resulting in a declining pattern (higher numbered factors, lower eigenvalues; Field, 2013). Researchers suggest that one should drop all factors at or below the inflection point—the point where the line on the scree plot changes concavity—so I only kept the first factor (Field, 2013). Eight variables loaded highly onto the first factor (loadings over 0.4; Field, 2013). Examining the correlations between these variables, I found that the two variables with the lowest loadings were also the only variables to have correlations under 0.30 (the cutoff recommended by Field, 2013); therefore, I kept the six variables with high loadings (all well over 0.40) and high correlations (all well over 0.30). I collapsed these six variables into a

recycling and trash attitudes scale ($\alpha = 0.87$), seen in Table 2. Higher scores on the scale indicate stronger agreement with the items; since all of the statements suggest trash is a problem or recycling is important, higher scores reflect more positive attitudes towards recycling and negative attitudes towards trash. In describing the scale, I will refer to it as the trash and recycling attitudes scale (TRAS). Overall, participants reported positive attitudes towards recycling and negative attitudes towards trash, as measured by the TRAS ($M = 4.92$, $SD = 1.38$).

For TRAS scores and knowledge scores, I conducted a set of three linear multiple regression analyses. Model 1 included demographic variables (age, education, SES, and gender), Model 2 included demographic variables and political ideology, and Model 3 included demographic variables, political ideology, and personality (Big Five variables: extraversion, agreeableness, openness, conscientiousness, and neuroticism).

Predicting attitudes. To explore the predictors of attitudes towards trash and recycling, I conducted a series of three linear regressions with TRAS as the dependent variable. As seen in Table 3, age is a significant predictor of TRAS until politics is added. After adding politics and the Big Five personality inventory, political ideology remained the only significant predictor of TRAS. Controlling for demographic variables and personality, increases in conservative ideology were associated with decreases in TRAS scores ($B = -0.30$ $SE = 0.06$, $\eta_p^2 = 0.14$, $p < .001$), indicating that politically conservative participants had less negative attitudes towards trash and less positive attitudes towards recycling than politically liberal participants had.

Knowledge. Despite believing that trash is a problem, participants on average only answered 3.07 of the knowledge questions correctly ($SD = 1.35$). In fact, no participant answered all 8 knowledge questions correctly. Knowledge scores were moderately correlated with scores

on the TRAS ($r = 0.26$, $p < .001$), indicating that people with more knowledge about trash and recycling also tend to have more positive attitudes towards recycling.

Because some of the questions involved knowledge that most people would not know (how much the average American throws away, percentage of paper recycled, etc.), I narrowed down knowledge into only the most practical variables: "Can recycling reduce greenhouse gas", "Should you throw a plastic bag into a regular recycle bin", and "is paper or plastic more environmentally friendly to produce." These questions are important because they have a direct impact on everyday recycling and consumption behavior: knowing that recycling reduces greenhouse gases could make someone recycle more; knowing that a plastic bag is more environmentally friendly to produce could influence the decision to choose paper or plastic, especially if the person knows how to recycle plastic bags; and knowing that you should not throw plastic bags into a recycle bin could have a direct influence on where a person disposes of a plastic grocery bag. Only 9% of participants answered all three of these questions correctly, and over half of the participants (57%) answered 1 or fewer of these three questions correctly. Only 30% of participants knew that plastic bags are more environmentally friendly to produce. Just over half (51%) of the participants knew that you should not put a plastic bag into a regular recycle bin. More importantly, of these participants that knew how to recycle a plastic bag, 70% believed that paper bags are more environmentally friendly to produce than plastic bags are.

Predicting knowledge. I ran another series of three linear regressions to determine what factors predict knowledge about trash and recycling. As seen in Table 5, political ideology is the only significant predictor of knowledge, even after controlling for the other variables. Increases in conservative ideology are associated with decreased knowledge about trash and recycling ($B = -0.16$ $SE = 0.72$, $\eta_p^2 = 0.03$, $p = .026$). This association is only a small effect, whereas the

association between ideology and attitudes is a medium effect, indicating that politics is a strong predictor of attitudes but a weak predictor of knowledge.

Discussion

This exploratory study sought to begin to understand people's perceptions of trash and recycling. There are two main conclusions from the study: politics is the only significant predictor of recycling attitudes, and participants generally had a low knowledge about trash and recycling.

This second conclusion is especially problematic when looking at practical knowledge. Everybody without reusable bags at a grocery store must answer the question: "paper or plastic?" The correct answer to this question depends on recycling behavior. Plastic bags require fewer resources to produce and thus are more environmentally friendly when recycled correctly (Chafee & Yaros, 2007). However, these bags have a much lower rate of recycling (due to a complicated recycling process) than paper bags do, and therefore tend to become litter (Green Cities California, 2010). Plastic bags are especially problematic when littered, effectively cancelling out their production efficiency when compared to paper bags. Therefore, the most environmentally friendly action is to use plastic bags and correctly recycle them. However, in my sample, a majority of the participants that knew the correct answer to recycling plastic bags also believed that paper bags are more environmentally friendly. Those with the knowledge to choose the most environmentally friendly option (use plastic, recycle correctly) believe that paper bags are more eco-friendly to produce, and thus will likely use paper bags.

To answer my general research question about the effects of trash on behavior and how to reduce the amount of trash, this correlational study looked at who has certain trash and recycling

attitudes, and what participants' know about trash and recycling. This may help provide some insight into why the world and U.S. have low recycling rates and high amounts of trash. The study also found initial evidence that participants were negatively affected by trash: over half of the participants reported being bothered when they see trash, and 36% of participants reported that their mind feels cluttered when trash is around. These responses, paired with overall negative attitudes towards trash (as measured by the TRAS), suggest that people may be negatively affected by having trash around. This leads to my second research question: what are the effects of living in a trash-filled environment? Garbage exists and increases with consumption and population increases—how does this environment affect human behavior? Whereas the exploratory study on perception only measured self-reported attitudes and knowledge, in the next study I assessed in-person behavior and explored the behavioral effects of being in a trash-filled area.

CHAPTER 3: AN EXPERIMENTAL STUDY INVESTIGATING THE EFFECTS OF TRASH

Overview

In this experiment, I sought to replicate and extend Vohs et al. (2013). The authors randomized participants to condition—an orderly room or a disorderly room—and measured snack choice (healthy vs. unhealthy), creativity, donation to charity, and preference for novelty. The researchers found that those in the orderly room where more likely to choose a healthy snack and donated more to charity compared to those in the disorderly room. Those in the disorderly room were more creative and preferred a novel smoothie choice to a classic one, compared to those in the orderly room. The authors framed their results as a difference in mindset: those in the orderly room were put into a conventional, traditional state of mind whereas those in the disorderly room were put into a non-conventional, innovative state of mind.

I added to this study in two ways. First, I added a trash condition in order to see if trash would mimic both the positive and negative effects of disorder. As discussed earlier, previous research suggests that trash has negative effects on behavior (e.g. Keizer et al., 2008), but office disorder has positive effects on behavior (Vohs et al., 2013). Therefore, I looked to test if there is a difference in these manipulations of disorder. Second, I added two measures of creativity (one exploratory and one established), a measure of cheating, and a measure of verbal ability. The measure of verbal ability was initially added to use as a covariate when analyzing creativity scores, but can also be analyzed as a dependent variable. One of the added measures of creativity, the Remote Associates Test, is a measure of convergent creativity (Mednick, 1962), where the participant must take a string of words and find a common word that unites them. This is different from the measure of creativity in Vohs et al. (2013), where divergent creativity is measured. I used both a convergent and divergent measure to explore if the effects of disorder

are specific to divergent creativity or if they generalize to convergent creativity as well. It seems that disorder and trash would benefit divergent creativity the most because they could bring the participant into a non-conventional mindset or provide the participant with actual ideas.

Because of BWT, I hypothesized that trash would be a norm violation and therefore produce antisocial behavior, whereas disorder would increase innovation. Specifically, I predicted that creativity would be highest in the disorder condition, followed by the trash and order conditions. I predicted that cheating would be highest in the trash condition, and the order and disorder conditions would have the same amount of creativity. Because Chae and Zhu (2014) demonstrated decreased self-control and willpower in disorderly environments, I predicted that those in the orderly condition would have the highest verbal scores, followed by trash and disorder with similar low scores. Lastly, I predicted that order would have the highest level of donation to charity, followed by disorder, and followed by trash with the least amount of generous giving. I predicted that trash would increase antisocial behavior (cheating, much less donation) whereas disorder would increase innovation (creativity).

For the trash condition, I used various items as trash, but mostly food wrappers. When deciding what type of trash to use, I decided to use non-disgusting trash. This involved using containers or wrappers with no food remnants left, and only inorganic (non-living) items that would not smell. There were two reasons for this. The first is that I wanted to see if there was an effect of trash beyond disgust. If I had used disgusting trash, that would have tested the question of whether *disgust* causes cheating, creativity, or donation. The focus of this study was trash—items that are supposed to be disposed of, removed, and not visible—rather than disgust. Disgusting trash would still leave the question open of whether disgust caused the outcomes or the presence of trash caused them. The second reason I did not use trash was practical: it would

be extremely difficult to keep the level of disgust constant. For example, if I used a 12 hours-old rotting apple, I would have to make sure that every participant in the trash condition had a 12 hours-old rotting apple in the room. This would apply for any type of rotting food or smelly item. While not impossible (and therefore potentially a focus for future studies), it is logistically very difficult to keep the level of disgusting trash consistent across conditions. Because of the two aforementioned reasons, I decided to use non-disgusting trash in the trash condition.

Method

Participants. I recruited participants from the school's extra credit subject pool at the University of California, Irvine. The University has a subject pool where students in certain departments can sign up for extra credit. In total, 112 participants completed the study. One participant's data was dropped because she was in the main lab while the research assistant set up the back room as disorderly, resulting in a final sample of 111 participants. The sample reflected the demographics of the University (17.12% White, 1.80% Black, 36.94% Latino/Latina, 22.54% Asian, 1.80% Pacific Islander, 11.71% Other, and 8.11% Multiracial). In order to have relatively equal sized groups, I created a categorical race/ethnicity variable with four groups: White (17.12%), Latino/Latina (36.94%), Asian/Pacific Islander (24.32%), and Other (21.62%). All of the following analyses under "race/ethnicity" use this 4-level categorical variable. The sample was mostly female (79.28% female, 19.82% male, 0.90% self-labeled "gender queer") and young (M = 21.52 years old, SD = 3.64, range = 18-39).

One participant took fewer than 10 minutes to complete the whole experiment, so was removed from all analyses because many of the tasks required moderate cognitive effort; for example, the overall average time to complete the five GRE questions alone was over 13 minutes—ten minutes is inadequate for the entire study. Due to experimental error (software

failing to load), one participant's answers were not recorded for the Remote Associates Test, GRE, Free Association or charity variables and were excluded from analyses.

To replicate Vohs et al. (2013), I conducted a power analysis based on the medium-large effect size in that study. To detect a medium effect with power of .8, a sample size of 159 would be needed. To detect a large effect with power of .8, a sample size of 66 would be needed. Due to time constraints, I collected data on 111 participants—enough to find a medium-large effect, which is representative of the findings in Vohs et al. (2013). Furthermore, Vohs et al. (2013) had 17 participants per condition when measuring donation to charity (Study 1) and 24 participants per condition when measuring creativity (Study 2); my experiment had 37 participants per condition. However, because I was replicating main effects of condition, I did not have power to adequately detect interactions with gender and race/ethnicity.

Design and Procedure. Participants were recruited from the school's extra credit subject pool to participate in a study on "Personality and Cognitive Ability." Before a participant arrived, the experimenter set up the back room of a lab as orderly, disorderly, or trash-filled (Figures 1-3). There were three desks in the back room, so the entire room was made to be orderly, disorderly, or trash-filled.

While setting up the back room, the experimenter kept both the door to the back room and the door to the main lab closed. A sign was posted on the main lab door telling participants to wait in the hallway for the experiment. This was to insure that participants did not enter the main lab room while the back room was being set up.

Participants were brought into the lab and told that they would fill out a few simple tasks, like a verbal task, addition and subtraction, pattern recognition, and others. This introduction was done in the main lab room, with the door to the back room closed. The

experimenter then led participants into a back room of the lab and gave them basic instructions on how to work the Qualtrics program. The experimenter left the back room, closed the door, and waited in the main lab room for the participant to finish.

None of the participants made any comments about the state of the room before debriefing. The experimenter completed a funneled debriefing process (Chartrand & Bargh, 1996) with the participant at the end of the experiment, thanked the participant, and dismissed him or her. A handful of participants noticed that the room was trash-filled or disorderly, but none knew that it was part of the experiment or what its purpose was. During the debriefing process, two participants suspected that the donation to charity task was part of the experiment and not an actual call for donations. These participants were not included in the charity analyses.

Measures

Personality and affect. Participants filled out the Big Five Inventory (Big 5; John, Donahue, and Kentle (1991) and the short form Positive and Negative Affect Schedule (PANAS; Thompson, 2007; Watson, Clark, & Tellegen, 1988). The Big 5 captures five aspects of personality: extraversion, openness, conscientiousness, agreeableness, and neuroticism. This variable was included to add to the cover story and give some measure of individual differences.

The short form PANAS gives participants 10 adjectives and asks participants to indicate how often they generally feel 10 emotions or feelings. To measure any differences in disgust that could be induced by trash, I included the word "disgusted" in the short form PANAS, resulting in 11 total adjectives.

Creativity. I measured creativity in 3 ways. The first replicated how Vohs et al. (2013) measured it (an adaptation of the Alternative Uses Task; Guilford, 1967): the authors gave participants 5 minutes to "List up to ten new uses for ping-pong balls, besides a game of ping-

pong." Three coders, blind to condition, rated each idea from 1 (least creative) to 3 (most creative). "Ping-pong" and "table tennis" both received a score of 0 because participants were explicitly told not to list ping-pong. Every other idea was given at least a score of 1. There was between 68-78% agreement between the raters. I computed both an average score from the composite of the 3 coders, and a master list where disagreements were resolved with discussions. The results are the same using either measure; therefore, all results are reported using the master list scores. Scores ranged from 1 to 26 (M = 12.85, SD = 6.92). Participants who took fewer than 60s to complete the task were removed from analyses (n = 7); however, the pattern of results is the same with these participants included.

The second was the Remote Associates Test (RAT; Mednick, 1962), a test of convergent creativity. In this test, participants were given a string of three words (Ex: light, birthday, stick) and must produce a one-word answer that connects all three words (Answer: candle). I gave participants 10 minutes to answer 20 RAT questions (6 easy, 7 medium, 7 hard). Scores ranged from 0 to 12 (M = 5.03, SD = 2.98). Participants who took fewer than 60s to complete the task were removed from analyses (n = 4); however, the pattern of results is the same with these participants included.

The third measure of creativity was a Free Association Task, recently developed by Eric Chen and Kurt Gray. The measure is exploratory and still being piloted. In this task, participants were given a seed word ("toaster") and asked to list the first word that came to their heads after the seed word. Each subsequent word is based on the previous word (Ex: toaster-bread-wheat-field…) and participants were asked to list 20 words total. The measure is scored using public databases of written documents. The researchers made a program that measures how often two words are used together based on thousands of documents. The more often two words are used

together in texts, the less creative that pair of words is. The idea of the program is that words that are often used together are commonly associated with each other; for example, "toaster" and "burnt" would be regularly used in the same context. However, if somebody thinks "Pompeii" after toaster (thinking: toaster, hot, volcano, *Pompeii*), that person would be seen as highly creative because those two words are rarely used together. The computer program uses thousands of documents to assess how often pairs of words are seen together in the same document, and the likelihood words have of being seen in the same document as other words. Scores ranged from 0.001 to 0.317, with higher scores indicated greater creativity ($M = 0.13$, $SD = 0.07$).

Cheating. To measure cheating, I adapted a paradigm from Jordan, Mullen, and Murnighan (2011). Participants were told that they would have to solve a math equation of adding and subtracting 10 single-digit numbers without writing anything down. They were told about a computer glitch: when the numbers are displayed, they must press the spacebar within three seconds or else the correct answer will appear for one second. Participants were told to ignore this glitch and that they would have unlimited time to solve the problem once they pressed the spacebar. They could not move on to the next question without correctly answering the current question. To measure cheating, the "glitch" answer was actually the wrong answer to the equation—always one digit away from the correct answer. Participants who answered the glitch answer or correct answer were allowed to advance to the next problem. With each retry of a problem, the same glitch occurred. Participants who answered the "glitch" answer (on any of the 8 trials) were assumed to be cheating. There was 1 practice round and 8 real rounds, resulting in a cheating range from 0-8 ($M = 2.24$, $SD = 2.52$). One participant—during the experiment—alerted the experimenter that she could not solve the math problems without a calculator or writing them down. This participant was coded as "no-cheat" for all 8 math problems.

Verbal ability. Participants completed five GRE verbal questions. The questions were all fill-in-the-blank: participants were told to choose the answer choice that best completes the sentence. For example, one of the questions was: "Dominant interests often benefit most from _____ of governmental interference in business, since they are able to take care of themselves if left alone," (answer: elimination). There were five answer choices for each question. Scores ranged from 0 to 5 (M = 2.39, SD = 1.24). The full list of questions can be seen in the Appendix.

Donation to charity. In an adapted replication of Vohs et al. (2013), at the end of the survey, participants were told that the lab was approached by four charities and asked to recruit donations. Four charities were listed: Orange County Foundation For Medical Care, Irvine Ranch Conservancy, Orange County Children's Foundation, and the Boys And Girls Club of Santa Ana. All four charities are real charities that are nearby the university where the experiment was conducted. Participants could check a box next to each charity that would ostensibly give the charity their email to send more information. There was another box next to the email box where participants could type in an amount to pledge to donate to that charity. Therefore, participants could give a total of 4 emails and donate an unlimited amount of money. The instructions on the page emphasized that participation in email donation or money donation was completely voluntary. During debriefing, participants were told that the researchers do not actually have access to their emails and that the donation request was fictitious. Participants gave their emails to between 1 and 4 charities (M = 0.68, SD = 1.26). Pledged donations ranged from 0 to 100 dollars (M = 3.20, SD = 15.98).

Results

Preliminary analyses: Personality, affect, and demographics. Neither positive nor negative affect differed significantly between conditions (*Fs* < 1.03). Disgust also did not differ significantly between conditions ($F < 1$). Interactions between gender and condition, age and condition, and ethnicity and condition were tested on every dependent variable, but none of the interactions were statistically significant; therefore, all of the following analyses focus on the main effect of condition.

Creativity. Contrary to my hypotheses and past research, creativity tended to be highest in the order condition, although the differences were non-significant. On the Alternative Uses Task (AUT) , those in the order condition scored the highest, followed by trash and then by disorder (Table 6; $F(2,98) = 0.40$, $p > .65$). Vohs et al. (2013) also analyzed the AUT results by counting the total amount of ideas and the number of highly creative ideas (number of 3's). Although those in the disorder ($M = 1.33$) and trash ($M = 1.33$) conditions had more highly creative ideas than those in the order ($M = 1.26$) condition did, this pattern was non-significant ($F < 1$). Those in the trash condition had more total ideas ($M = 6.88$) than those in the order ($M = 6.71$) and disorder ($M = 5.85$) conditions, but this difference was also non-significant, ($F(2,98) = 1.10$, $p = 0.34$).

Those in the order condition scored the highest on the RAT, followed by those in the trash condition and then by those in the disorder condition (Table 6), but the scores did not differ significantly by condition, ($F(2,102) = 2.01$, $p = .14$). Those in the order condition also scored the highest on the Free Association Test, followed by those in the disorder condition then by those in the trash condition (Table 6), but this difference was also non-significant ($F(2,106) = 1.48$, $p = .23$).

Cheating. As seen in Table 6, those in the order condition cheated the most, followed by the disorder and trash conditions, but these differences were non-significant ($F < 1$). Even when splitting the variable dichotomously between those who did not cheat at all and those who cheated at least once, differences between conditions do not emerge ($X^2(2) = 0.11$, $p > .90$).

Donation to charity. Contrary to hypotheses and prior research, donation to charity was non-significantly different across conditions measured by email or by money pledged ($Fs < 1$). In fact, only 8 individuals pledged to donate any money, and only thirty-one individuals offered their emails to at least one charity.

Verbal ability. GRE scores were marginally different across conditions, ($F(2,106) = 2.68$, $p = .07$, $\eta^2 = .05$); specifically, those in the order condition scored the highest, followed by those in the trash condition and those in the disorderly condition (Table 6).

Planned Contrasts. Because I replicated a previous study that examined differences in order vs. disorder, I planned the contrasts between order and disorder. Two dependent variables showed significant differences between the order and disorder conditions: GRE verbal scores and RAT scores. Planned contrasts (Figure 4) reveal that those in the order condition scored significantly higher ($M = 2.68$) than those in the disorder condition on the GRE verbal questions ($M = 2.03$; $t(107) = -2.27$, $p = .03$, $d = .53$). The planned contrast between order and disorder was marginally significant for the RAT, where participants in the order condition ($M = 5.80$) scored higher than those in the disorder condition ($M = 4.41$; $t(70) = -1.98$, $p = .051$, $d = .46$). On the surface, the RAT seems like a test of verbal ability: participants are given three words, and must search their vocabulary for the third word that connects the seed words. To test this, I regressed RAT scores on condition, but controlled for GRE score. Controlling for GRE score, the difference in RAT scores between order and disorder becomes non-significant: $b = -1.02$, $SE =$

0.71, $t(70) = -1.44$, $p = .15$. This suggests that the marginal difference in RAT scores between the order and disorder conditions is due to a difference in verbal ability rather than creativity.

Discussion

I hypothesized that trash would increase negative outcomes (cheating, reduced charity donation) and disorder would increase creativity. Contrary to hypotheses, the majority of outcomes did not vary significantly across conditions. Trash did not increase cheating or decrease donations, and disorder did not increase creativity. Many of the observed differences were in the opposite direction of my predictions and the results of past research. Neither the dependent variables for the exact replication (AUT, charity) nor the dependent variables for a conceptual replication (RAT, free association task) of Vohs et al. (2013) were significantly different in the predicted directions. In fact, for every one of these variables, the observed means were in the *opposite* directions than found in Vohs et al. (2013). Whereas Vohs et al. (2013) found that disorder increased creativity and order increased donation to charity, I found that those in the disorder condition were less creative and donated more to charity than those in the order condition, although these differences were non-significant. Interestingly, those in the order condition scored higher on the GRE than those in the disorder condition. In what follows, I will elaborate on the possible reasons for these findings and discrepancies from prior research.

CHAPTER 4: SUMMARY AND CONCLUSIONS

General Discussion

Given that trash continues to increase as the world's population continues to grow and produce commodities, the current investigation sought to begin to uncover the psychological consequences of a trash-filled world. Study 1 showed that participants reported a strong concern about trash, yet many failed to understand key behaviors needed to reduce trash. Political ideology was the strongest predictor of positive recycling and negative trash attitudes, and of knowledge, where increased conservatism was associated with less positive attitudes towards recycling and less knowledge of trash and recycling. The study pointed out a predictor of attitudes and knowledge, and indicated a clear lack of knowledge about trash and recycling.

Study 2 failed to replicate a past experiment, but found that participants in an orderly room scored higher on verbal GRE questions than those in a disorderly room. Past researchers found that participants in an orderly room donated more to charity but were less creative than those in a disorderly room. The current study, however, did not find differences between conditions on creativity, donations, or cheating; therefore, differences in GRE scores between participants in different conditions should be interpreted cautiously. Furthermore, only the planned contrast between order and disorder was significantly different; the overall effect of the three conditions was marginally significant.

Disorder as resource depletion

The difference in GRE and RAT scores between the order and disorder conditions provides evidence that corroborates the mechanism proposed by Chae and Zhu (2014), where disorder reduces one's self-control and depletes one's resources. The authors would argue that this resource depletion was the reason that those in the disorderly condition performed worse on

the verbal GRE questions and the RAT. Considering these results, trash could be seen as a weak manipulation of disorder. Across all of the dependent variables—besides the GRE and RAT—trash did not have any divergent effects from disorder (all non-significant). On the GRE and RAT, those in the trash condition scored in-between those in the order and disorder condition. This suggests that trash is a weak manipulation of disorder. My manipulation of the trash condition contained fewer items that took up less space than the items in the disorder condition (as can be seen in Figures 2-4). Because all of the trash I used was non-disgusting, it seems that trash was a disorderly environment that was simply less messy than the disorder condition.

In terms of ego depletion, I do not have enough evidence to sufficiently evaluate the claim that disorder caused lower GRE scores through depletion because I did not collect data on resource depletion. If disorder were resource depleting, then one would expect that those in the disorder condition would move more quickly through the AUT and score lower on this task—but we don't see any differences in condition on the AUT. One would also expect that those in the disorderly condition would cheat more than those in the orderly condition because they would not have the resources to complete the math problems in their heads—but we don't see that pattern of results either. Although I cannot rule out self-control or ego depletion as a potential mechanism, that possibility cannot be adequately addressed by this current study.

Replication

Recently, psychological researchers replicated 100 of the top psychology studies and found that 37% of the replication attempts found significant results, with an overall average effect size about half of the overall average effect size of the original studies (Open Science Collaboration, 2015). The authors did not claim that the original effects are somehow false, but they emphasized the need for more replications in the field. In attempting to bring in a new topic

to psychology—the study of trash—I used an existing study to replicate and extend by adding a condition. In order to understand the effects of trash, I needed to compare it to a baseline disorder effect. But when this effect fails to replicate, it is difficult to draw conclusions about the added trash condition.

Why did the experiment fail to replicate? Because I had only enough power to detect main effects similar to the sizes found in the original study, I can only speculate about interactions. Most of the interactions between condition and gender, race/ethnicity, or personality did not have enough participants in each cell to draw conclusions from statistical significance or insignificance. For example, only 17 participants were above 1 standard deviation in conscientiousness. This makes it impossible to understand the effects of three conditions on high conscientiousness participants compared to the rest of the sample (5-6 high-conscientiousness participants per condition).

Nevertheless, I can speculate about potential interactions when it comes to differences between my study and Vohs et al. (2013). My sample was 17% White; the other researchers do not report demographics, but they ran their study in the Netherlands and in Minnesota, two places very likely to have more than 17% White participants. There very well could be race/ethnicity and condition interactions occurring; this is only speculative, however, and future research should investigate cultural differences in responses to disorder and trash. Moreover, I directly replicated two effects: donation to charity and creativity using the AUT. First, Vohs et al. (2013) paid participants for the study, and then asked for pledged donations to charity. I only gave students course credit and asked for pledged donations. Students in my sample were very unlikely to donate, with only 31 participants (29%) offering an email for charity and 8 participants (7%) pledging any money. This makes it extremely difficult to draw conclusions

about the effect of condition, especially for the money pledge—the most directly replicated donation variable.

In terms of creativity, coding for the AUT was relatively subjective. As used by Vohs et al. (2013), we used a coding scheme where we coded every idea on a scale from 1 (least creative) to 3 (most creative). This scale can be very culturally defined. For example, one of the ideas for uses for ping-pong balls was "hang as decorative holiday lights." One of the coders saw this as extremely creative, whereas the other two coders saw this as uncreative because they saw this exact thing on social media sites. Slight changes in coder personality could affect perceptions of creativity; Vohs et al. (2013) most likely ran into similar problems when coding the AUT.

The AUT and the RAT scores were not significantly correlated with one another. Other researchers have shown this same pattern or relation (see Chermahini & Hommel, 2010), which makes sense given that the AUT measures divergent creativity whereas the RAT measures convergent creativity. Given that Vohs et al. (2013) only used the AUT, conclusions cannot be drawn about the effects of order and disorder on convergent creativity. The current study suggests that disorder has a negative effect on convergent creativity but, as discussed earlier, that effect might be about verbal ability rather than creativity. The failure to replicate might be less about the actual effect of disorder and more about the subjectivity of scoring the AUT in the way that Vohs et al. (2013) did.

Conceptually, it makes sense that disorder did not increase convergent creativity. Given the theory proposed by Vohs et al. (2013) that disorder produces a non-conventional mindset, one would not expect this mindset to help a person think of a unifying word to three stimulus words. In fact, disorganization may hinder that process, one that likely involves mentally searching one's vocabulary. The answers to the RAT questions could actually be considered

conventional: words that correctly unify other words. It is more surprising that the disorder manipulation did not replicate the effects of divergent creativity. A non-conventional mindset should help participants think of non-conventional uses for ping-pong balls. However, I did not see this pattern emerge in my results.

Implications and future directions

The implications of these studies are twofold. The first is that people may not understand recycling behaviors as well as needed for effective changes in recycling to take place. The second is that the effects of trash may be more chronic rather than acute. Although many people reported an intolerance for trash, there were no effects of trash in the laboratory. This type of laboratory experiment may not be matching the effects of trash outside of the lab. For example, different cities have different levels of trash around. Living in trash-filled cities does not mean occasionally working at a desk that has trash on it, but rather it means growing up with trash around and constantly seeing it. If there are effects of trash, they will be difficult to observe in a one-time experiment but may need to be examined through larger datasets and neighborhood-level analyses. Future research should isolate the presence of trash, over and above physical disorder, at a neighborhood level and see if the presence of trash has any unique effects on human behavior and psychology.

In addition, my second study did not fully test the effects of social norms. Keizer et al. (2008) found that people were more likely to break social norms in an environment where norms had already been broken. To adequately test whether social norms had anything to do with my results, I would need six conditions: norm violation order, no norm violation order, norm violation disorder, no norm violation disorder, norm violation trash, and no norm violation trash. Adding another factor, social norm violations, would have allowed me to control whether

participants believed a social norm was broken or not. As it was, my study did not control whether participants perceived the office as a norm violation or not; some may have thought it was a violation to have trash around, whereas others may have thought that trash is completely normal for graduate students. Future research should provide a stronger test for the theory of social norm violations and behavior in orderly, disorderly, and trash-filled environments.

For this study, I wanted to isolate the effects of trash itself and not confound it with disgust; therefore, I used non-disgusting and sanitary trash. However, disgust is most likely what distinguishes trash from physical disorder. Disgust is the reason that trash is so hidden and removed from sight—we keep trashcans in the corners of rooms, or under the sink, or covered up with just a small opening for incoming waste. There are likely many psychological effects of trash that are driven by this disgust response. Does disgust-sensitivity drive different behaviors in response to trash? Does disgust correlate with conceptions of items as trash versus recyclable? Future research needs to put the trash back into trash—examining the effects of disgusting trash.

CHAPTER 5: Conclusion

The current set of studies sought to investigate the psychological consequences of living in a trash-filled environment. Unfortunately, as developed countries become more industrialized and capitalistic, trash will continue to increase with increases in the production of goods. Although the environmental consequences of trash are important and challenging to deal with, the psychological consequences are understudied yet potentially detrimental. Social psychology is ideally positioned to attack the trash problem from an unexplored yet crucial angle. Alongside marketing and waste management, social psychology can enter as another pillar in the much-needed structure of knowledge about the human-trash intersection.

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Figure 1.

The orderly condition

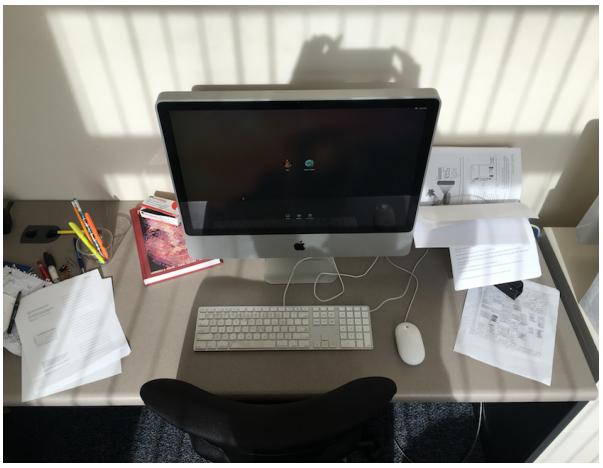

Figure 2.

The disorderly condition

Figure 3.

The trash condition

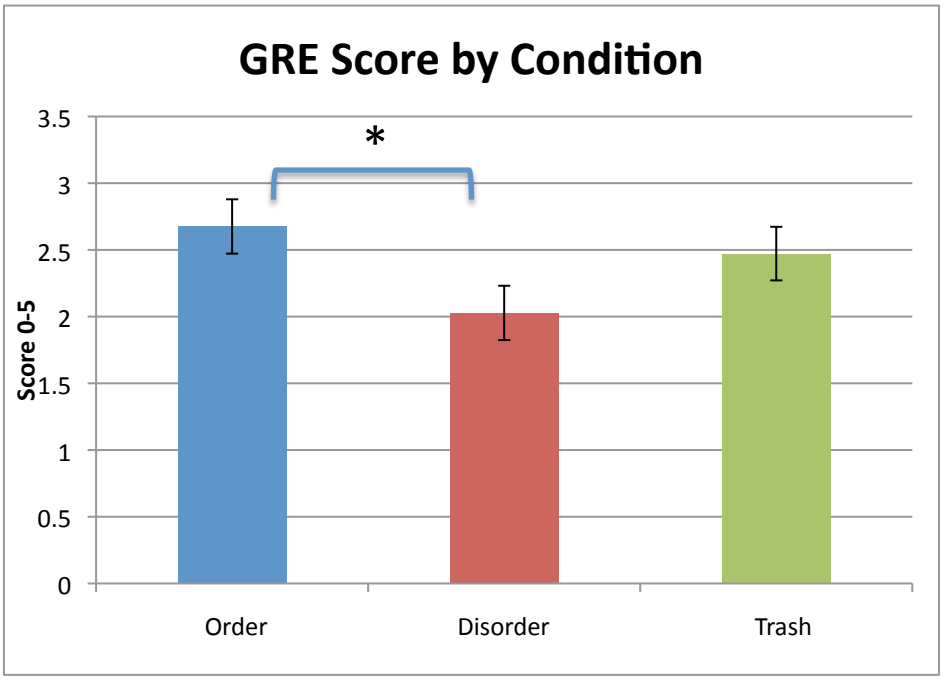

Figure 4.

Planned contrast in GRE scores between the order and disorder condition

Table 1.

Attitudes about trash and recycling

Question	Answer Choices	*M*[a]	*SD*	Range
Recycling is too hard	7pt Likert Scale (Strongly disagree→Strongly agree)	2.38	1.61	1 - 7
It is acceptable to have some litter on the street	7pt Likert Scale	2.31	1.40	1 - 7
I think more clearly when things are clean and organized	7pt Likert Scale	5.21	1.67	1 - 7
Americans produce too much trash*	7pt Likert Scale	6.06	1.41	1 - 7
It bothers me when others do not recycle*	7pt Likert Scale	4.63	1.94	1 - 7
It is immoral to put a recyclable item in a trashcan when a recycling bin is present*	7pt Likert Scale	4.46	2.04	1 - 7
Trash is disgusting	7pt Likert Scale	4.93	1.63	1 - 7
In your opinion, which of the following is the easiest to recycle?	-Paper -Glass -Electronics -Aluminum cans -Plastic (not including grocery bags) -Plastic grocery bags	Paper (42.86%) Aluminum cans (36.41%) Glass (10.96%)	NA	1 - 6

In your opinion, which of the following is the hardest to recycle?	-Paper -Glass -Electronics -Aluminum cans -Plastic (not including grocery bags) -Plastic grocery bags	Electronics (73.66%) Plastic grocery bags (10.71%) Plastic (8.99%)	NA	1 - 6
My neighborhood is clean with little or no trash on the streets	7pt Likert Scale	5.19	1.63	1 - 7
Trash is a major problem in the United States*	7pt Likert Scale	5.31	1.61	1 - 7
I am not bothered when I see trash	7pt Likert Scale	2.82	1.58	1 - 7
If I do not throw trash away immediately, my mind feels cluttered	7pt Likert Scale	3.69	1.84	1 -7
I do not like it when others use a lot of plastic bags at the grocery store*	7pt Likert Scale	3.83	1.94	1 - 7
Recycling is important to me*	7pt Likert Scale	5.24	1.72	1 - 7
It bothers me when I see other people litter	7pt Likert Scale	6.04	1.37	1 - 7
In your opinion, what is the best	-More recycling -Less consumption	-Less consumption	NA	1 - 3

way to reduce the amount of trash in the U.S.?	-The amount of trash does not need to be reduced	(68.42%) -More recycling (26.02%) -No need to reduce (5.57%)		
Which group is more responsible for the amount of trash in the U.S.?	Producers Consumers	-Consumers (53.65%) -Producers (46.53%)	NA	1 - 2
When not properly disposed, which of the following types of litter bothers you the most?	-Paper -Glass -Plastic (not including grocery bags) -Plastic grocery bags -Aluminum cans -Cigarettes -Other	Cigarettes (28.36%) Plastic (22.45%) Plastic grocery bags (20.95%)	NA	1 - 7

[a]For categorical questions, the top three most selected answer choices are shown, with percentage of the sample that selected the choice in parentheses
*Question used in the TRAS scale (Table 2)

Table 2.

The trash and recycling attitudes scale (TRAS)

Items	Factor Loading Estimates
Americans produce too much trash	0.67
It bothers me when others do not recycle	0.85
It is immoral to put a recyclable item in a trashcan when a recycling bin is present	0.67
Trash is a major problem in the United States	0.65
I do not like it when others use a lot of plastic bags at the grocery store	0.62
Recycling is important to me	0.85

Table 3.

Regressions of demographic and personality variables on attitudes (N = 167)[d]

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	*ß*	*B*	*SE B*	*ß*	*B*	*SE B*	*ß*
Age	0.02	0.01	0.19*	0.01	0.01	0.15	0.01	0.01	0.14
Gender[a]	-0.36	0.21	-0.13	-0.23	0.20	-0.08	-0.22	0.20	-0.08
SES[b]	-0.03	0.06	-0.04	0.01	0.05	0.01	-0.01	0.05	-0.01
Education	-0.07	0.06	-0.10	-0.08	0.05	-0.13	-0.10	0.05	-0.15
Ideology[c]				-0.32	0.06	-0.39**	-0.30	0.06	-0.37**
Extraversion							0.11	0.11	0.08
Agreeableness							0.19	0.17	0.09
Conscientiousness							0.21	0.15	0.11
Openness							0.11	0.18	0.05
Neuroticism							-0.02	0.14	-0.01
R^2		0.05			0.20			0.24	
F for ΔR^2		2.26			29.21**			1.53	

*$p < 0.05$, **$p < 0.001$; [a]Gender from female (0) to male (1); [b]Subjective SES; [c]Ideology from very liberal (1) to very conservative (7);[d]The sample size in this analysis is low in comparison to the overall sample size because it only included participants who completed the trash survey, all demographic measures, and all personality measures

Table 4.

General knowledge about trash and recycling

Question	Answer choices	Correct answer	Percentage of sample answering correctly
How much waste does the average American throw out per day (including recycling and composting)?	Less than 1 lb 1-2 lbs 2-3 lbs 3-4 lbs 4-5 lbs 5-6 lbs More than 6 lbs	4-5 lbs (4.4 lbs)	19.64%
Can recycling reduce greenhouse gas emissions?	No Yes Not sure	Yes	55.20%
Of the following options, which has the highest rate of recycling in the U.S.?	Glass Paper Plastic Aluminum	Paper	25.94%
Of the following options, which has the lowest rate of recycling in the U.S.?	Glass Paper Plastic Aluminum	Plastic	47.48%
What percentage of paper is recycled in the U.S.?	0-25% 25-50% 50-75% More than 75%	50-75% (63%)	12.12%
What percentage of plastic is recycled in the U.S.?	0-25% 25-50% 50-75% More than 75%	0-25% (9%)	64.84%
Which type of grocery bag is more environmentally friendly to produce?	Paper Plastic	Plastic	30.32%

Should you put a plastic grocery bag into a regular recycle bin?	Yes No Not sure	No	51.07%

Note: Correct answers obtained from Chaffee and Yaros (2007), *Green Cities California* (2010), and *EPA* (2015).

Table 5.

Regressions of demographic and personality variables on knowledge (N = 165)[d]

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	*ß*	*B*	*SE B*	*ß*	*B*	*SE B*	*ß*
Age	0.01	0.01	0.13	0.01	0.01	0.11	0.01	0.01	0.13
Gender[a]	0.13	0.23	0.05	0.21	0.23	0.07	0.30	0.23	0.10
SES[b]	0.01	0.06	0.01	0.02	0.06	0.03	0.03	0.06	0.04
Education	0.07	0.06	0.10	0.06	0.06	0.09	0.06	0.06	0.08
Ideology[c]				-0.17	0.07	-0.19*	-0.16	0.07	-0.18*
Extraversion							0.06	0.13	0.04
Agreeableness							-0.15	0.20	-0.06
Conscientiousness							0.08	0.18	0.04
Openness							0.12	0.21	0.05
Neuroticism							0.23	0.16	0.13
R^2		0.04			0.08			0.10	
F for ΔR^2		1.86			6.05*			0.75	

*$p < 0.05$, **$p < 0.001$; [a]Gender from female (0) to male (1); [b]Subjective SES; [c]Ideology from very liberal (1) to very conservative (7); [d]The sample size in this analysis is low in comparison to the overall sample size because it only included participants who completed the trash survey, all demographic measures, and all personality measures

Table 6.

Means and significance of the focal dependent variables

	Condition				
Variable	Order	Disorder	Trash	*F*	*p*
Alternative Uses Task	13.17	11.97	13.40	0.40	ns
Cheating	2.32	2.24	2.14	0.05	ns
RAT	5.80	4.41	4.88	2.01	ns
Free Association Task	0.14	0.12	0.11	1.42	ns
Emails given	0.59	0.82	0.64	0.32	ns
GRE Score	2.68	2.03	2.47	2.68	0.07

Note: the *F* represents the omnibus test for each one-way ANOVA.

APPENDIX A

GRE Questions

Instructions: Select one entry for each blank from the corresponding column of choices. Fill all blanks in the way that best completes the text.

1. Dominant interests often benefit most from _____ of governmental interference in business, since they are able to take care of themselves if left alone.

Intensification
Authorization
Centralization
Improvisation
Elimination

2. An investigation that is _____ can occasionally yield new facts, even notable ones, but typically the appearance of such facts is the result of a search in a definite direction.

Timely
Unguided
Consistent
Uncomplicated
Subjective

3. It comes as no surprise that societies have codes of behavior; the character of the codes, on the other hand, can often be_____.

Predictable
Unexpected
Admirable
Explicit
Confusing

4. For some time now, _____ has been presumed not to exist: the cynical convention that everybody has an angle is considered wisdom.

Rationality
Flexibility
Diffidence
Disinterestedness
Insincerity

5. The reception given to Kimura's radical theory of molecular evolution shows that when _____ fights orthodoxy to a draw, then novelty has seized a good chunk of space from convention.

Imitation
Reaction
Dogmatism
Invention
Caution