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From Book to Bludgeon: A Closer Look at Unsolicited Malevolent Responses on The Alternate Uses Task

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The alternate uses task (AUT) is one of the most commonly utilized measures of divergent thinking within the creativity research literature. Some participants respond to the AUT by describing the possibility of using various common objects in a violent way (e.g., beat someone with a book), and this unsolicited inclination is termed *malevolent creativity*. In this study, participant responses on the AUT were systematically coded for malevolent uses, and the relations among malevolence and various individual differences including sex, ideational fluency, and originality, were examined. Results revealed that male participants generated significantly more malevolent responses to the AUT than did women, despite no significant sex differences on originality or fluency. In addition, participant originality significantly predicted malevolence, although ideational fluency did not. Taken together, these findings suggest that malevolent responses on the AUT do not arise simply when very many uses are generated (i.e., when fluency is high) but may represent a particular inclination, disproportionately displayed by males, toward utilizing divergent thinking in a potentially violent way.

Sheer fluency, and other qualities such as ingenuity, wit, and violence demonstrably tend to go together … there remains a case for including such qualities in the definition of convergence and divergence. (Hudson, 1968, p. 98)

In his seminal early work on the creativity of school-aged children, Liam Hudson (1966, 1968) directed students to generate as many unusual uses for common everyday objects (e.g., a brick) as they could. This task, typically referred to today as the alternate uses task (AUT; Plucker & Makel, 2010; Torrance, 1972) was designed to provide information about students' level of *divergent thinking*, or the ability to generate multiple possible ideas, responses, or solutions to a given problem (Acar & Runco, 2014; Lewis & Lovatt, 2013). In scoring the AUT, Hudson, similar to other creativity researchers of the time (e.g., Guilford, 1967), as well as modern researchers working in the current literature (e.g., Dumas & Dunbar, 2014), sought to quantify not only the amount of ideas that participants generated (termed *ideational fluency*; Runco et al., 2011) but also the novel quality of those ideas (termed *originality*; Hass, 2017). Scoring the fluency of responses was and remains very straightforward: simply counting the number of participant-generated ideas typically yields a fluency score (Turner, 1999). However, determining the originality of responses in order to identify highly divergent students was a more difficult endeavor.

To begin to solve this problem, Hudson (1996) offered the observation that some participants, although not specifically directed to do so, incorporated witty or humorous remarks; other participants offered uses of objects that were sexual in nature, and still other participants generated totally unsolicited violent uses. Hudson (1968) found that those students who were more divergent in terms of their fluency were also more likely to pose such *noteworthy* ideas on the AUT. In this way, violent responses on the AUT (along with those responses that were sexual or witty) were generally considered by Hudson to be indicators of high originality and divergent thinking ability on the part of the student, and were, therefore, both counted and rated for their comparative novelty to quantify a participant's level of

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originality. Indeed, Hudson (1966) drew attention to a number of particularly violent responses that were viewed by him and his raters as highly original including: *smash sister's head in*. [*Brick*]; *suffocating a person to death* [*Blanket*]; and, *to use (full of nails) to torture people* [*Barrel*]. Importantly, such responses to the AUT were not generally considered by Hudson to be evidence of any particular malevolence on the part of the participant, but rather were considered positively discriminating indicators of divergent thinking (i.e., originality).

Twenty-five years after Hudson's work, McLaren (1993) introduced the concept of the *dark side* of creativity, demonstrating how original thinking, particularly in the sciences, has the potential to cause harm to humankind. This work paved the way for further theoretical refinement, including the differentiation of negative creativity, which involves negative consequences to original thinking but not malicious intent, and malevolent creativity, which involves applying original ideas to purposely harm or gain an advantage over other individuals (Hao, Tang, Yang, Wang, & Runco, 2016). Research on negative and malevolent creativity continued during the 1990s (e.g., James, Clark, & Cropanzano, 1999) and, motivated in part by the events of September 11, 2001, increased in the 2000s (e.g., Cropley, Kaufman, & Cropley, 2008), with a major spike in productivity related to the topic during the current decade (e.g., Niepel, Mustafić, Greiff, & Roberts, 2015).

In contrast to Hudson's view, this more modern wave of research on negative and malevolent creativity does not generally incorporate the theoretical position that violence or malevolence is an indicator of originality. Instead, in the modern view, malevolent creativity is typically described as a socially undesirable application of already existent divergent thinking ability and personality traits, in which originality is channeled into violence, harm, or deception (Cropley, Kaufman, White, & Chiera, 2014). Closely associated with this view is the core idea that creativity or divergent thinking is in-and-of-itself free of malevolence, but that divergent thinking ability may be utilized by any individual to serve their motives and goals, including their malevolent goals (Runco, 2010). In this way, recent research has focused on malevolent creativity as a related but distinct construct from divergent thinking, that involves originality but may be better predicted by relatively stable personal characteristics such as antagonism (Lee & Dow, 2011), aggression (Hao et al., 2016), sex (i.e., being male; Harris & Reiter-Palmon, 2015), or criminal background (Eisenman, 2008); or that itself may serve as a predictor of other malevolent activities such as lying (Beaussart, Andrews, & Kaufman, 2013; Gino & Ariely, 2012; Walczyk, Runco, Tripp, & Smith, 2008), premeditation of maliciousness (Harris & Reiter-Palmon, 2015), and possibly even terroristic acts (Gill, Horgan, Hunter, & Cushenberry, 2013).

Although the recent surge in research on malevolent creativity has undeniably improved the field's understanding of the uses and consequences of divergent thinking generally, and certainly brought a reasonable level of awareness to interesting personality differences among high- and low-divergent individuals, at least three fundamental aspects of malevolent creativity are not currently well-explained in the literature and warrant a close and specific examination. For example, (a) major measurement and methodological differences among extant studies raise questions about what exactly constitutes malevolent creativity or a malevolent response to a divergent thinking task and undermine inferences about the conditions in which such malevolent responses can be expected. Additionally, (b) the relations among more commonly measured and widely understood core components of divergent thinking—such as fluency and originality—and malevolence remain unclear at this point, and are further obscured by the aforementioned measurement differences within the literature. Finally, (c) possible inferences about the psychological mechanisms that underlie the effect of individual differences (e.g., sex) on malevolence are currently difficult to draw given the previous two issues raised.

Measurement of malevolence

In the extant empirical literature on malevolent creativity, there is a discernible methodological divide between those studies that attempted to measure malevolent creativity and examine its relations to other constructs, including fluency and originality (e.g., Harris & Reiter-Palmon, 2015) and those studies that measure more general creative ability or activities and demonstrate that those participants with higher creative abilities or activities tend to be more likely to engage in malevolent activities, such as lying (Beaussart et al., 2013; Gino & Ariely, 2012; Walczyk et al., 2008). Of the studies that focus on the measurement of general (i.e., nonmalevolent) creative attributes, the Remote Associations Task (RAT; Mednick, 1962) is the most commonly used measure of creative (but convergent) ability, although other measures including the Creative Behavior Inventory (CBI; Hocevar, 1980) and the Creative Personality Scale (Gough, 1979) have been used to assess general creative dispositions and have produced practically significant correlations with malevolent outcomes such as cheating on an academically-related problem-solving task (Gino & Ariely, 2012). In contrast, one study with a large longitudinal sample of United States middle-school students, in which creativity was assessed using both self- and teacher-report measures, found no significant link between increases in creativity and systematic changes in ethical decision making, possibly casting doubt on the generalizability of this effect (Niepel et al., 2015). It should be noted however, that evidence exists that teachers are especially poor at identifying creative ability within students,

often confusing the construct of creativity with conscientiousness and diligence, potentially making such teacher-report methods less trustworthy (e.g., Westby & Dawson, 1995).

Within the existing studies that have worked to quantify the construct of malevolent creativity itself within participants, a self-report measure specifically designed to tap malevolent creativity (i.e., malevolent creativity behavior scale, MCBS; Hao et al., 2016) has been utilized to uncover three dimensions of the construct: hurting, lying, and playing tricks. In addition, scores on the MCBS have been shown to correlate significantly with performance on a divergent thinking task specifically designed to elicit malevolence (i.e., thinking of as many ways as possible to get revenge) as well as self-reported aggression scores, offering evidence that malevolent divergent thinking (at least when it is specifically solicited by a task) is significantly related to malevolent personality characteristics. Such specifically malevolent divergent thinking tasks that utilize hypothetical scenarios such as the need for revenge, have been used in the literature a number of times and have demonstrated a link between solicited malevolent divergent thinking and a number of malevolence-related personality traits such as implicit aggression and premeditation—specifically that those individuals who are simultaneously more aggressive and less premeditative tend to perform better on malevolent divergent thinking tasks (Harris & Reiter-Palmon, 2015). However, another recent study with similar measures (McBain, Cropley, & Kavanagh, 2017) demonstrated that the context in which a divergent thinking task is completed, even if the task is explicitly designed to elicit malevolent responses, may more strongly affect participant responses than personality.

In general, these solicited-malevolence tasks appear to take advantage of the well-known effect in creativity research of *explicit instructions* (e.g., Runco, Illies, & Eisenman, 2005) and other more general priming effects on divergent thinking (Dumas & Dunbar, 2016; Weinberger, Iyer, & Green, 2016): By formulating a task that directs participants to generate malevolent ideas, malevolent ideas are, of course, produced (although in quantities that differ based on individual difference traits such as aggression and sex). One major problem that arises in the interpretation of findings from solicited malevolence measures is, if a task explicitly requires participants to think of ideas for malevolent purposes (e.g., revenge) than mere conscientiousness or willingness to please the research team (which seems antithetical to true malevolence) may increase the level of responses, making the responses not necessarily malevolent from the participant's viewpoint, but rather simply normative in the context of the research task (which of course the participant knows is not real).

One measurement strategy that may be used to address these problems is to administer a general (i.e., not explicitly malevolent) divergent thinking task (e.g., the AUT) to participants, and analyze the prevalence of unsolicited malevolent responses, as a minority of extant studies have indeed done. For example, Lee and Dow (2011) administered the AUT to an undergraduate sample and identified instances in which participants provided malevolent responses, despite not being solicited to do so. This methodology yielded generally weaker links from malevolence to personality characteristics compared to those studies that explicitly solicited malevolence, although it allowed a more nuanced investigation of the relations among malevolence, fluency, and originality (to be reviewed later). It should be noted that Lee and Dow (2011) only utilized two items (i.e., brick and pencil) on the AUT, possibly limiting the variability in responses. Using a similar measurement paradigm, although with *brick* and *shoe* as items on the AUT, Harris, Reiter-Palmon, and Kaufman (2013) were able to demonstrate that those participants who generated more unsolicited malevolent responses to the AUT had lower emotional intelligence on average than their less malevolent peers. Another study (i.e., Wolhendler, 2016) used a drawing-based divergent thinking task to examine differences in unsolicited malevolence between juvenile delinquents and adolescents from the general population. Although the delinquents tended to score lower, on average, on this drawing task than did the general population of adolescents, they did not differ from the general population in their level of unsolicited malevolent responses. In fact, in line with Lee and Dow's (2011) findings, and Hudson's (1966, 1968) findings, it was those adolescents who produced a greater volume of content overall on the drawing task (analogous to ideational fluency on a verbal task) that were more likely to generate malevolent drawings, regardless of their delinquency background. It may be that findings such as these, which are associated with unsolicited malevolence on a divergent thinking task, most closely correspond to what theorists in the field have meant when describing the dark side of creativity (Cropley, 2010; Cropley, Cropley, Kaufman, & Runco, 2010; McLaren, 1993). Therefore, in this study, unsolicited malevolent responses to the AUT will be the focus of the investigation, with the goal of removing the influence of the effect of explicit directions on the study findings.

Relations among fluency, originality, and malevolence

Given the current measurement landscape within the malevolent creativity literature, the relations among malevolence and other fundamental aspects of divergent thinking (i.e., fluency and originality) are not necessarily clear. This is because, with data arising from explicitly malevolent tasks that solicit malevolent creativity from participants, malevolence is part and parcel of the responses and can, therefore, not be separated from general divergent thinking, nor can it be correlated to other divergent thinking components (e.g., fluency or originality) arising from solicited malevolence tasks. Moreover, self-

report measures of creative behavior (e.g., CBI; Hocevar, 1980) are not capable of separating cognitive components of divergent thinking, such as fluency and originality, from the creative behavior itself. In this way, the psychological mechanisms linking malevolence, fluency, and originality, are not yet well-explained. Although originality has been historically measured in the creativity literature using subjective ratings (Sternberg, 2006) or uniqueness scores (Silvia et al., 2008), a more modern and objective scoring mechanism for originality is utilized here: latent semantic analysis (LSA; Deerwester, Dumais, Furnas, Landauer, & Harshman, 1990; Landauer, Foltz, & Lanham, 1998). LSA is based on a massive body of text, called a corpus, in which patterns of word co-occurrence are organized into matrices (Beaty, Christensen, Benedek, Silvia, & Schacter, 2017). Through the analysis of these matrices, the latent relation between two or more terms can be quantified (Green, Kraemer, Fugelsang, Gray, & Dunbar, 2010). Specifically as regards the AUT, this means that the latent semantic relation between the prompt or object (e.g., book) and any given participant response (e.g., throw like a Frisbee) can be calculated. Previous work (Acar & Runco, 2014; Bossomaier, Harré, Knittel, & Snyder, 2009; Dumas & Dunbar, 2014; Forster & Dunbar, 2009) has suggested that LSA may yield reliable and objective measurements of originality, and, therefore, LSA is rapidly becoming the measurement standard for quantifying originality among creativity researchers (Hass, 2017). Therefore, LSA will be utilized in this study to quantify originality, with the goal of more validly estimating the relation among originality, unsolicited malevolence, and other relevant individual difference characteristics such as sex.

"Male-evolence": effects of sex in the literature

Since the beginning of psychological research on malevolent creativity, consistently strong effects of sex on malevolence have been reported, with male participants generating significantly more unsolicited malevolent ideas on the AUT than women (Hudson, 1966; Hudson, 1968). This effect continues to be documented in the modern literature, with the additional finding that the effect extends to solicited malevolence in an explicitly malevolent divergent thinking task (Harris & Reiter-Palmon, 2015). Such a consistent effect of sex may be explained in a number of ways, including a perceived appropriateness of such malevolent responses on the part of men, hormonal differences among men and women, or greater male expertise on average about weapon-making; although at this point in the literature, no explanation can rise to the forefront as most likely to be true. It is worth noting that the sex effect on malevolence appears to have been found across prompts on the AUT, with men generating more malevolent uses, regardless of the object presented. However, as previously noted, prior studies that measured unsolicited malevolence have typically presented only a small number of objects to participants (e.g., 2; Lee & Dow, 2011), making the explicit testing of an interaction effect between sex and object impossible. Such an untested possibility allows for the conceivable hypothesis that the sex effect on malevolence may be moderated by the actual objects presented in the AUT, if men and women have differential experiences on average with different types of objects. However, to test this hypothesis, more and more diverse objects would need to be presented to participants than has previously been the case in the malevolent creativity literature. In this study, a substantially larger number of objects are included on the AUT and such an interaction effect between sex and objects will be specifically tested.

Specific goals of the current study

Following the literature previously reviewed, a number of explicit and specific goals for this study were formulated. These specific research questions and goals are presented here in bullet form:

1. In a longer and more comprehensive AUT than previously used in the malevolent creativity literature, how many unsolicited malevolent responses arise?
2. Are there any discernible patterns among identified malevolent responses such that different expressions of malevolence are more likely? If so, do these various types of malevolence differ in prevalence by the object presented?
3. Do any particular prompts on the AUT elicit more unsolicited malevolent responses on average than others? And is this effect moderated by participant sex?
4. What are the bivariate relations among malevolence and other components of divergent thinking (i.e., fluency and originality)?
5. From a path-modeling perspective, how and how well can malevolence be predicted by fluency, originality, and sex? Can the coefficients estimated by the model support psychological inferences?

METHOD

Participants

Eighty-four undergraduate students at a large mid-Atlantic American university (48 women; 57.1%) participated in this study. Participants were recruited via introductory psychology courses for which students are required to participate in a research study, and in exchange for their participation, participants received their mandatory research credit. Participants ranged in age from 18 to 41, with a mean age of 19.98 (SD = 2.71). Slightly less

than half of participants were European American (n = 35; 41.7%) with the remaining indicating ethnicity as African American (n = 18; 21.4%), Asian/Pacific Islander (n = 12; 14.3%), Hispanic/Latino (n = 10; 11.9%), and more than one ethnicity (n = 9, 10.7%). The majority of the sample reported their first language as English (n = 76; 90.5%).

Measures

AUT

The AUT is a psychometric measure in which participants are asked to generate as many unique uses for an object as possible within a certain amount of time (i.e., 2 min per object in this case). The AUT has been used for assessing divergent thinking and creative ability for many years (Guilford, 1967; Hudson, 1968; Torrance, 1972), and remains one of the most-often utilized task within the creativity research literature (Puryear, Kettler, & Rinn, 2017). The following 10 object names were presented to participants in a randomized order: book, brick, fork, hammer, pants, shoes, shovel, table, truck, and trumpet.

Procedure

The AUT was administered online through the Qualtrics online platform. For this investigation, participation on the AUT outside the laboratory was considered beneficial as participants could complete the AUT from any computer connected to the Internet, thus allowing for potentially advantageous privacy and flexibility. After agreeing to participate in this study via the psychology participant-pool website, participants were sent a hyperlink to the study website via email. Informed consent was obtained before participants could move forward with the measure. Study instructions asked participants to complete the survey with minimal distractions and recommended that they turn off electronic devices, as well as close other websites or programs open on their computer. Because the AUT requires a significant amount of typing, participation required a traditional keyboard and participation via smartphone or tablet was not allowed. Participants were given 2 min to provide uses for each object before they were automatically advanced to the next object. To reduce confounding effects related to the order of stimuli, the objects of the AUT were presented to each participant in an individually randomized order. After responding to all 10 objects (i.e., after 20 min), participants were informed that the task was complete. At that point, participants provided demographic information and logged out of the study website.

Scoring of the AUT

Fluency

First, the number of uses generated by each participant for each object was tallied, and then summed across all 10 items on the AUT, producing a *total-uses* variable for analysis. Counts such as these are the principle way in which fluency has been operationalized in the extant literature (Plucker & Makel, 2010). In this investigation, fluency counts across the 10 items on the AUT exhibited a high level of scale reliability (α = .95) and were therefore confidentially summed and saved for later analysis.

Originality

Originality was scored in this investigation through latent semantic analysis (LSA) incorporating a very large corpus (i.e., 37,651 included documents and more than 11 million included words) of English-language texts. This corpus (*general-reading-up-to-the-first-year-in-college*: Kintsch, 2000; Landauer et al., 1998) was built to approximate the reading experience of the typical Anglophone undergraduate, and is used regularly within the research literature on divergent thinking (e.g., Dumas & Dunbar, 2016; Hass, 2017). The use of LSA to score the AUT requires the semantic similarity statistic between the object-prompt (e.g., brick) and the individual-generated use (e.g., break a window) to be estimated. As described, LSA similarity statistics of 1 indicate two phrases or words are extremely similar, while similarity statistics approaching −1 indicate two words or phrases are extremely dissimilar. To simplify the interpretation of later analysis, LSA similarity statistics were subtracted from 1, yielding indicators of originality that ranged from 0 (*not original*) to 2 (*very original*). After producing such originality scores for every individual response to the AUT, originality scores were averaged within each AUT object-prompt, producing 10 separate originality-scored items (i.e., the 10 different object-prompts) on the AUT. These 10 scores were then summed to produce a total originality score for each participant on the entire AUT. In previous work (i.e., Forster & Dunbar, 2009), LSA-based originality scores were shown to be a more reliable means for the quantification of originality than were panels of human raters. In this study, originality scores across each of the ten items on the AUT exhibited satisfactory score reliability (α = .82),

Malevolence Coding

Unsolicited malevolence was identified if the participant described a use for a given object that involved harm to something or someone, including the generic use *weapon* when indicated explicitly. Specifically unsolicited malevolent responses were coded as arising in five subcategories: property

damage (e.g., *throw it to smash through glass [BRICK]*), harm to humans (e.g., *kill someone [SHOVEL]*), harm to animals (e.g., *smack fish with shovel to kill them [SHOVEL]*), generic/unspecified harm (e.g., *use as a weapon [TRUMPET]*), or self-defense (e.g., *defend myself [HAMMER]*). It should be noted here that such codes are necessarily formulated by human coders, who undoubtedly bring some subjectivity as to the meaning of malevolence into their work. For example, in this study, harm to animals was included as a category of malevolence, although certainly from some existing human perspectives, killing animals is not malevolent at all. However, harm to bugs or insects (e.g., *kill a bug* [*BOOK]*) was not included in the *harm to animals* category, and such responses were not coded as malevolent.

Further, although traditionally outside of the definition of *malevolence*, defensive responses, such as "defend myself [HAMMER]," were deemed relevant to this study because they imply that the participant was conceptualizing a violent scenario when responding, although, of course, the implication is that the actual aggression is coming from outside of the individual participant (although that aggressor may also be harmed). Also, AUT responses in which the actual object was being destroyed or harmed without any violence or malevolence coming to or from another person, animal, or thing (e.g., smashing the trumpet) were not included in this coding. More examples of unsolicited malevolent responses to the AUT present in this dataset are presented in Table 1, with one example of a malevolent response for each AUT prompt. The second author initially coded all of the responses to the AUT for malevolence. To establish inter-rater reliability, a paid research assistant, blind to the purposes and hypotheses of this project, also coded a randomly selected 20% of the data, drawn from across each of the 10 object-prompts on the AUT. The second author and this research assistant coded the malevolence of responses with an absolute rate of agreement of 98.90% ($K = .97$) and all disagreements were resolved through an in-depth discussion before further analysis continued.

TABLE 1.
Examples of malevolent responses across alternate uses task prompts.

Object	*Malevolent Uses*
Book	*Throw it at someone*
Brick	*Harm people with it*
Fork	*Use it as a projectile weapon (like have it come out of a potato gun)*
Hammer	*Hit and potentially kill people*
Pants	*To whip someone with*
Shoes	*Throw at your sister who tries eating your snacks*
Shovel	*Killing someone*
Table	*Take of[f] the legs and use them as a weapon*
Truck	*Running over people*
Trumpet	*Blunt object used for violence*

TABLE 2.
Counts of malevolent responses across malevolence categories and alternate uses task prompts.

	Malevolence Categories					
AUT Object-Prompt	*Property Damage*	*Harm to Humans*	*Harm to Animals*	*Generic/ Unspecified Harm*	*Self Defense*	*Total*
Book	0	8	0	10	1	19
Brick	13	12	2	25	7	59
Fork	0	12	0	19	3	34
Hammer	3	8	0	26	9	46
Pants	0	1	0	3	0	4
Shoes	2	11	0	13	1	27
Shovel	3	16	2	27	6	54
Table	0	0	1	3	2	6
Truck	5	1	0	7	0	13
Trumpet	3	7	0	13	0	23
Total	29	76	5	146	29	285

RESULTS

Identifying patterns in unsolicited malevolence

For this analysis, the number of identified malevolent responses was counted across participants, and the counts of these responses were organized based on the malevolence category in which that response was coded and the AUT object prompt to which the response was generated. Please see Table 2 for the specific breakdown of these counts. It should be noted here that, because this analysis features fine-grain distinctions among types of malevolence, the counts in each cell of Table 2 are relatively small, and therefore quantities associated with malevolence in any individual cell (e.g., brick/property damage) cannot be reasonably expected to have the properties of a normally distributed continuous variable. Therefore, the initial descriptive and exploratory analysis that constitutes this closer look at unsolicited malevolent responses proceeded nonparametrically. Relatedly, because the focus of this particular analysis is the distribution of AUT responses into categories, the total count in Table 2 is the total number of unsolicited malevolent responses in these data (i.e., 285), and not the total number of participants. First, a chi-square test was used to confirm that the 285 total unsolicited malevolent responses generated in this dataset were not equally likely to be generated across malevolence categories, $\chi^2(4, N = 285) = 103.57$, $p < .01$, $V = .43$. As can be observed in Table 2, responses in general were much more likely to be generated within the category of generic or unspecified harm (e.g., *use it as a weapon [SHOVEL]*) than they were in any other category, with the next most likely category being harm to humans (e.g., *throw it at someone [BRICK]*). Harm to animals (e.g., *throw at an animal to hurt them [BRICK]*) was the least likely category for a response to be generated in, accounting for only five of the 285 total malevolent uses.

Next, a more comprehensive chi-square test of independence was used to determine whether or not the likelihood of a given response being generated within a particular malevolence category was dependent on the AUT object prompt. This test was significant, $\chi^2(36, N = 285) = 65.19$, $p < .01$, $V = .24$, indicating that probabilistic dependence among these variables existed. For example, unsolicited malevolent responses in the property damage category were dominated by responses to the *brick* prompt (e.g., *to break/destroy something [BRICK]*). In contrast, the most likely object on the AUT to be used for harm to humans was shovel (e.g., *hit someone in the face [SHOVEL]*), and, in terms of harm to animals, *table*, which was only rarely used malevolently in this dataset, was disproportionately likely to be used (e.g., *sacrifice a cow on the table as an idol [TABLE]*). *Shovel* and *hammer* were similarly likely to be used for generic or unspecified harm (e.g., *as a weapon [HAMMER]*); the hammer was also the most likely object on the AUT to be used for self-defense (e.g., *a defensive tool against an attacker [HAMMER]*). With these patterns in the unsolicited malevolent responses identified, each of the malevolent responses were summed across the malevolence categories to produce a single continuous score for each participant, similar to a fluency score, but only pertaining to the number of unsolicited malevolent responses that participants generated. The remainder of the analysis presented here pertains to that total malevolence score, mean differences in that score, as well as its relations with fluency, originality, and participant sex.

Mean differences in fluency, originality, and unsolicited malevolence

To accomplish these analyses, general linear models were fit to a long-form dataset, testing both main effects (i.e., of object and sex) as well as the interaction term between those factors simultaneously in the same model.

General descriptive statistics

The mean number of uses generated by participants (i.e., fluency) across all 10 prompts on the AUT was 74.48 ($SD = 34.60$) and the mean originality score, estimated via LSA, across all 10 objects was 7.45 ($SD = 0.58$). The mean number of malevolent uses generated by participants across all 10 objects and across each of the categories of malevolence was 3.39 ($SD = 3.20$). These descriptive statistics, as well as analogous information pertaining to each individual AUT object prompt is available in Table 3.

AUT object prompts

Table 3 presents means for fluency, originality, and malevolence across each of the 10 objects included on the AUT. Significant mean differences across AUT object-prompts were observed for fluency, $F(9, 820) = 4.41$,$p < .01$, $\eta^2 = .04$; originality, $F(9, 820) = 12.55$,$p < .01$, $\eta^2 = .12$; and malevolence, $F(9, 820) = 16.19$,$p < .01$, $\eta^2 = .15$; suggesting that the nature of the object presented to participants had a significant effect on all three primary outcome variables present in this investigation. For example, although the AUT prompts were presented to participants in a random order, the most uses on average were generated for *book*, and the least for *trumpet*. In contrast, the object with the most original responses on average, as estimated by LSA, was *fork*, with the least original responses on average being prompted by *pants*. In terms of malevolence, the most unsolicited malevolent uses were generated on average for *brick*; the least malevolent responses were generated, on average, for *table*.

Sex

Please see Table 4 for descriptive statistics relating to fluency, originality, and malevolence across sex groups. No significant differences were found across sex groups on total AUT fluency, $F(1, 820) = .14$,$p = .71$, $\eta^2 < .01$, or originality, $F(1, 820) = .67$,$p = .41$, $\eta^2 < .01$. However, a significant mean difference was uncovered between men and women on their total unsolicited malevolence, $F(1, 820) = 14.97$,$p < .01$, $\eta^2 = .02$. Specifically in these data, men, on average, generated approximately 152% of the malevolent uses that women generated (See Table 4 for specific group means).

Object by sex interaction

Previously untested in the literature, mean differences in fluency, originality, and malevolence across an object by sex interaction term were examined here. If such a significant moderation effect were uncovered, it would indicate that men's higher levels of unsolicited malevolence on average in these data may be principally driven by particular AUT object-prompts. However, this object by sex interaction term was nonsignificant for all primary outcome variables in this analysis: fluency, $F(9, 820) = .48$,$p = .99$, $\eta^2 < .01$; originality, $F(9, 820) = .44$,$p = .91$, $\eta^2 < .01$; and malevolence, $F(9, 820) = 1.62$,$p = .11$, $\eta^2 = .02$. This pattern of findings indicates that, although some object-prompts elicit more fluency, originality, or malevolence on average, and men on average generate more malevolence across the AUT, these two effects do not interact. Put another way, men's higher malevolence scores on the AUT is generalizable across each of the object-prompts on the measure, and is not moderated by the specific objects presented.

Predicting unsolicited malevolence

With these mean differences uncovered using a general linear modeling framework, a more flexible approach was adopted to determine how unsolicited malevolence may be predicted from other theoretically relevant variables: fluency, originality, and sex. First, a bivariate correlation matrix is presented, followed by a path model (i.e., an observed variable structural equation model).

TABLE 3.
Descriptive statistics of fluency, originality, and malevolence across alternate uses task prompts.

	Outcome Variable								
	Fluency			*Originality*			*Malevolence*		
Object	*Range*	*Mean*	SD	*Range*	*Mean*	SD	*Range*	*Mean*	SD
Book	1–32	9.14	4.70	.48–.90	0.78	0.08	0–2	0.23	0.50
Brick	2–22	7.13	3.93	.26–.92	0.75	0.11	0–4	0.70	0.82
Fork	2–17	6.99	3.44	.62–.92	0.80	0.06	0–2	0.40	0.58
Hammer	1–21	6.62	3.63	.40–.91	0.73	0.10	0–2	0.55	0.59
Pants	2–24	7.88	4.24	.25–.89	0.69	0.10	0–1	0.05	0.21
Shoes	2–25	7.74	4.15	.27–.93	0.70	0.10	0–2	0.32	0.56
Shovel	2–14	6.86	3.07	.57–.90	0.76	0.06	0–2	0.64	0.63
Table	2–45	8.83	5.80	.37–.90	0.77	0.09	0–2	0.07	0.30
Truck	2–28	7.02	3.89	.15–.92	0.72	0.10	0–2	0.15	0.42
Trumpet	1–18	6.26	3.62	.51–.95	0.75	0.11	0–2	0.27	0.57
Total	20–242	74.48	43.60	4.39–8.50	7.45	0.58	0–12	3.39	3.20

TABLE 4.
Descriptive Statistics of Fluency, Originality, and Malevolence across Sex Groups.

	Outcome Variable								
	Fluency			*Originality*			*Malevolence*		
Object	*Range*	*Mean*	SD	*Range*	*Mean*	SD	*Range*	*Mean*	SD
Male	20 – 147	74.47	34.60	4.39 – 8.17	7.48	0.67	0 – 11	4.22	3.31
Female	28 – 242	74.02	37.78	6.35 – 8.50	7.43	0.49	0 – 12	2.77	2.99
Total	20 – 242	74.48	43.60	4.39 – 8.50	7.45	0.58	0 – 12	3.39	3.20

Bivariate correlations

To begin to describe the relations among fluency, originality, and malevolence, the bivariate correlations among these variables were computed. Following in step with previous literature (Dumas & Dunbar, 2014), a significant positive association was observed between fluency and originality ($r = .28$, $p = .01$). This positive association indicated that, on average, participants who generated more uses on the AUT also generated more original uses. A positive correlation was also observed between originality and malevolence, although the correlation did not reach significance at this sample size ($r = .19$, $p = .08$). A weaker, nonsignificant correlation was observed between fluency and malevolence ($r = .11$, $p = .29$). This nonsignificant correlation is psychologically interesting, because it indicates that the generation of malevolent responses on the AUT is not principally driven by a participant's general fluency.

Path model

To ascertain the strength of the predictive relations from fluency, originality, and sex to malevolence, these variables were entered into a path model in which each of the predictors had direct paths to malevolence, and the predictors were allowed to covary. Such a simple path model can be conceptualized as similar to a linear regression model, except this path model was fully estimated through robust maximum likelihood, and did not feature any assumptions about collinearity (or lack thereof) of the predictors. Therefore, this analysis features greater statistical power than a multiple regression model. This analysis was conducted in Mplus version 8. As can be seen in Figure 1, which depicts this path model, a number of statistically and practically significant paths were estimated. For example, as expected, fluency and originality have a significant positive correlation, highlighting the need for a path modeling perspective in which collinearity among predictors is permitted. In contrast, neither fluency nor originality had a significant correlation to the dichotomous variable of sex, which follows from earlier GLM analyses in which neither of these variables displayed significant differences across sex groups. Also following in step with the bivariate correlations, fluency did not significantly predict malevolence ($\beta = .07$, SE = .1), indicating that those participants who generated a high number of malevolent responses are not necessarily those participants who simply generated very many responses in general on the AUT. Within this path modeling perspective, originality was observed to be a significant

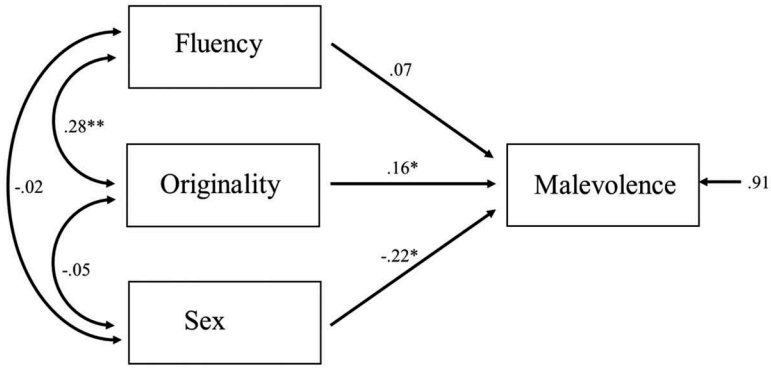

FIGURE 1. Observed variable path model predicting malevolence. *Note*: *$p < .05$, **$p < .01$.

predictor of malevolence (β = .16, SE = .08), despite the fact that their bivariate correlation did not reach significance in earlier analysis. Additionally, sex (which was dichotomously scored with men equal to 1 and women equal to 2) was the strongest predictor (β = −.22, SE = .10) of malevolence in this model. However, it should also be noted that this model did not predict a very high proportion of the variance in malevolence in general, with a residual error term of .91 (SE = .06) on that endogenous outcome.

DISCUSSION

This study was a systematic investigation into unsolicited malevolent responses on the AUT, featuring a nonparametric analysis of patterns within those responses, an examination of mean differences in total malevolence, fluency, and originality, as well as a path-modeling analysis in which predictive relations to malevolence were estimated. There were four principal findings from this analysis: (a) responses to the AUT are disproportionately malevolent across object-prompts, (b) men generate more unsolicited malevolent response to the AUT on average, (c) unsolicited malevolence can be predicted by originality and sex, but (d) unsolicited malevolence does not appear to be related to ideational fluency.

Responses are disproportionately malevolent across objects on the AUT

Because most previous work on malevolent creativity that utilized the AUT administered a small number of object prompts to participants (e.g., Lee & Dow, 2011), prior to this study, it had not yet been examined in the literature whether certain objects tend to elicit more malevolent responses than others. Here, through both a nonparametric analysis of response patterns, as well as a comparison of means, the object prompt on the AUT was found to significantly affect the amount of malevolent responses. For example, from a raw count perspective, *brick* was the most likely object to be used in a malevolent way, with the least likely being *pants*. Importantly however, the objects also differed in the type of malevolence that they elicited from participants. For instance, responses that featured harm to humans were most often generated for *shovel* and self-defensive responses were most often generated for *hammer*. Such a finding suggests that particular constraints and affordances associated with each of the objects on the AUT affect the degree to which participants consider malevolent responses appropriate for them. Importantly, it is certainly physically possible for one to kill another human using any of the objects presented on this AUT, however, participants were more likely to think of that violent possibility for certain object prompts over others. Possible explanations for this effect may include disproportionate exposure among participants to malevolent uses for these objects (possibly through media such as movies or video games; Cropley, 2015), making certain objects easier to associate with violence. Alternatively, certain objects may, in truth, physically function better as violent or malevolent weapons (e.g., shovel), leading participants to generate those uses for those objects from a utility viewpoint. Of course, disentangling such explanations will require future research, possibly including retroactive think-aloud protocols with participants, in which the thought processes that allowed the generation of malevolent uses are made explicit.

Men generate more unsolicited malevolent responses than women

This study corroborated the findings of a number of previously published studies of malevolent creativity over the last half century (e.g., Harris & Reiter-Palmon, 2015; Hudson, 1968) in which male participants generated more malevolent responses, on average, than women. Moreover, this sex effect was not significantly moderated by the object-prompt, indicating that it held across all objects on the AUT.

This finding may be somewhat surprising: Given that men and women may have disproportionately more or less experience or exposure to the actual use of certain objects, this experience was hypothesized to also affect the tendency of men and women to use objects malevolently, therefore producing a moderation effect. However, no such effect was observed. Such a null finding implies that men's greater tendency to respond malevolently on the AUT is not attributable to the objects themselves. Instead, a more stable sex difference among men and women appears to be at work. For example, it could be that men, on average, develop more knowledge of weapon-making or general ways to use everyday objects as weapons, given their socialization and exposure to that domain. In contrast, it could be that men are more likely to consider malevolent responses appropriate for inclusion on a research study, and women may generate similar quantities of malevolent ideas but not report them. At a more fundamental level, a biologically based difference, possibly attributable to levels of various hormones, between men and women may be influencing their responses. Of course, differentiating between these hypotheses remains a future goal of this line of inquiry, and such work would require further research.

Unsolicited malevolence is predicted by originality

In keeping with Hudson's (1966, 1968) view, unsolicited malevolence was positively and significantly predicted by originality in the path model in this study (although the bivariate correlation among the variables was not significant). As previously reviewed, this study was the first to use an LSA-derived measure of originality to understand malevolence, and therefore the relation between these variables may be more validly estimated here than in previous work, given that originality is measured more objectively. That being said, there are some previous studies in the literature that have uncovered similarly positive relations between originality and malevolence (e.g., Gino & Ariely, 2012; Gutworth, Cushenbery, & Hunter, 2016), although with different methodological paradigms. One possible hypothesis to explain these relations among the study variables may be, if originality was correlated with sex in a similar way to malevolence, any male advantage on malevolence could potentially have been explained by men being more original on average as well, and therefore producing more malevolent responses as a result of that originality (i.e., a mediation effect). However, in these data, sex and originality displayed a near-zero correlation, removing the possibility of this explanation in this case. Instead, here, participants were more malevolent if they were more original or male, but being male did not affect their originality. This pattern of findings points to a nuanced description of highly malevolent participants: Such individuals appear to be either male, highly original thinkers, or both. However, such a pattern does not necessarily elucidate any causal relations among the variables in this analysis. Because both malevolence and originality were quantified from the same AUT responses (but using entirely different scoring procedures), it is not possible to say whether participants tend to be malevolent because they are capable of producing original ideas, or the inverse: if high originality arises as a result producing malevolent ideas.

Unsolicited malevolence is not related to fluency

In contrast to originality, which significantly positively predicted malevolence in this study, ideational fluency was not significantly related to malevolence. This finding may appear counterintuitive, given that malevolence scores here were essentially the quantity of responses that met certain criteria for malevolence (analogous to a *malevolent fluency*). In this way, it may be surprising that those participants who generated more ideas on average on the AUT did not also generate more malevolent ideas. This finding suggests that malevolent creativity as a psychological construct may be differentiated from more general divergent thinking ability. As a possible explanation, it may be that the cognitive processes required to produce malevolent responses on the AUT are taxing enough on participants' mental resources that they negatively affect participants' ability to produce very many ideas. Such an effect may fit with a cognitive-control account of divergent thinking (Edl, Benedek, Papousek, Weiss, & Fink, 2014), in which participants must utilize resource-intensive mental processes, such as the suppression of irrelevant responses, to be original on a divergent thinking task. Although such an explanation must necessarily remain hypothetical for the time-being, a cognitive science approach to the study of creativity, as is being undertaken by some in the literature (e.g., Green et al., 2017), may offer opportunities to explicitly test such a hypothesis, and better understand the specific cognitive processes involved in malevolent creativity.

Delimitations

A few delimitations that defined the scope of this investigation must be considered when interpreting the principal findings presented here. First, the sample of participants analyzed here was reasonably diverse in terms of linguistic background and ethnicity. Such diversity of sample is generally considered positive in the psychology literature. However, it is not yet well understood how such demographic differences may moderate the measurement properties of the AUT, possibly complicating interpretation of individual AUT scores in this diverse sample. In the future, measurement invariance research is necessary to determine the degree to which AUT scores can be validly compared across participants with differing linguistic or ethnic backgrounds. Second, although AUT is the most commonly utilized divergent thinking task in the creativity literature today (e.g., Harris

et al., 2013), the sole reliance on any single measure must constrain the inferences that can be drawn from empirical work. Therefore, incorporating other divergent thinking tasks into research on malevolence seems to be a prudent future direction in this line of inquiry. Third, in this study, the participants were specifically allotted 2 min to respond to each item on the AUT. This methodological choice is commonly made in the creativity literature to remove any variance in AUT scores due to differences in time-on-task (Plucker & Makel, 2010). However, it may also be that participants are unable to express their true originality in a 2-min task, and therefore longer time periods for ideation should be included in the future to more deeply understand these effects.

Given the results of this investigation, and a growing consensus within the larger research literature, malevolent creativity is a construct likely arising from similar mental processes as other creative abilities, such as original thinking (Gutworth et al., 2016). However, malevolence also appears to be differentiated from these more familiar constructs both within the nomological network of psychological attributes, and also in its tremendously relevant societal impact. Therefore, understanding the mental phenomena of unsolicited malevolent creativity may be a scientific imperative—an imperative that this study, among others, has just begun to fulfill.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest

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