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The highest form of intelligence: Sarcasm increases creativity for both expressers and recipients ☆

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ABSTRACT

Sarcasm is ubiquitous in organizations. Despite its prevalence, we know surprisingly little about the cognitive experiences of sarcastic expressers and recipients or their behavioral implications. The current research proposes and tests a novel theoretical model in which both the construction and interpretation of sarcasm lead to greater creativity because they activate abstract thinking. Studies 1 and 2 found that both sarcasm expressers and recipients reported more conflict but also demonstrated enhanced creativity following a simulated sarcastic conversation or after recalling a sarcastic exchange. Study 3 demonstrated that sarcasm's effect on creativity for both parties was mediated by abstract thinking and generalizes across different forms of sarcasm. Finally, Study 4 found that when participants expressed sarcasm toward or received sarcasm from a trusted other, creativity increased but conflict did not. We discuss sarcasm as a double-edged sword: despite its role in instigating conflict, it can also be a catalyst for creativity.

1. Introduction

> *Sarcasm is the lowest form of wit but the highest form of intelligence*
>
> [- Oscar Wilde]

Experts on interpersonal interactions, group dynamics, and organizational effectiveness often instruct people to avoid sarcasm, which are expressions intended to humorously communicate one's meaning through language that signifies the opposite (Gibbs, 1986; Pexman & Olineck, 2002). Because sarcastic remarks often express the poisonous sting of contempt (Gottman & Silver, 1999), they can undermine relationships and harm communication in organizations. For example, Fredrickson and Losada (2005) analyzed 60 management teams and identified sarcasm as a form of negative communication among team members and an important cause of poor performance in struggling teams.

The overall experience of sarcasm, however, may be more nuanced. Indeed, various artists and writers take a distinct pleasure in sarcasm, as noted in the opening quote by Oscar Wilde. Despite the potential interpersonal harm sarcasm can cause, organizational members often deploy sarcasm in sensitive interpersonal situations (e.g., Dean, Brandes, & Dharwadkar, 1998; Gibbs, 1994). Beyond providing plausible deniability, sarcasm, even sarcastic criticism, can be more humorous and memorable than direct communication (e.g., Boylan & Katz, 2013), making sarcasm a common form of exchange in the workplace.

In the current research, we propose that sarcasm may have previously overlooked psychological and organizational benefits. We hypothesize that both expressing and receiving sarcasm, regardless of its content, can facilitate creativity by increasing abstract thinking. We also identify a factor, interpersonal trust, that helps reduce the relational cost of sarcasm for both parties but still allow organizations to take advantage of its creative benefits.

Previous sarcasm theories have predominately focused on its communication function, in particular that sarcasm is intended and perceived to be more contemptuous than sincerity (e.g., Pexman & Olineck, 2002; Toplak & Katz, 2000). Very little research has directly examined the relational, cognitive, or behavioral effects of sarcasm. Only a single article has explored the causal link between sarcasm and creativity, finding that third-party observers of an angry sarcastic exchange showed increased creativity (Miron-Spektor, Efrat-Treister, Rafaeli, & Schwarz-Cohen, 2011). Thus, a number of questions around conceptualization,

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generalizability, causal mechanism and potential cost remain unanswered.

The current research sought to go beyond existing theories and empirical work in four important ways. First, we demonstrate that any and all forms of sarcastic exchanges, not just those involving anger or using "a literal *positive* meaning to communicate a *negative* message" (Miron-Spektor et al., 2011), can enhance creativity. This ensures the generalizability of our theory, one of the most important criteria of good theories in the social sciences (Sutton & Staw, 1995). Second, we establish that sarcasm increases creativity for sarcasm expressers and recipients even though they may have different affective and relational experiences from each other and from those of the observers. Third, we explain why the act of constructing and interpreting sarcasm both activate the same underlying cognitive mechanism – abstract thinking – and how this process accounts for the increased creativity in both expressers *and* recipients. Fourth, we identify a relational cost (i.e., interpersonal conflict) and explore trust as a factor that minimizes conflict but still allows sarcasm to enhance creativity.

To tie all of these effects together, we present a generalizable and parsimonious model that delineates how the effect of all types of sarcasm on creativity occurs in both expressers and recipients. Our model is not captured by previous research as it generalizes across both content (e.g., from angry to critical to playful) and role (i.e., both expressers and recipients), while also establishing the precise mechanism linking sarcasm to creativity. We also present a theory-driven and nuanced look at the relational cost of sarcasm as well as its reduction.

The current research has theoretical and empirical implications for a number of areas in organizational behavior. It significantly extends the emerging literatures on sarcasm's cognitive and behavioral effects (Miron-Spektor et al., 2011), by providing some of the first evidence that certain forms of humor can promote creativity through a cognitive (vs. affective) route (e.g., Martin, 2007). It also suggests new theoretical and empirical endeavors for investigating the role of sarcasm in other organizational phenomena that are facilitated by abstract thinking (Trope & Liberman, 2010). Finally, it significantly extends the literature on sarcasm's relational consequences (e.g., Toplak & Katz, 2000) by exploring factors that minimize its downside.

2. Sarcasm: An instigator of conflict

Sarcasm involves the construction of or exposure to contradictions between stated and intended meanings. It is the most typical form of verbal irony and often used to humorously convey thinly veiled disapproval, contempt, and scorn, as in the case of sarcastic criticisms (e.g., Gibbs, 2000). For instance, a boss catching his assistant surfing the Internet may state, "Pat, don't work too hard!" to express disapproval. Much more so than other basic forms of figurative language (e.g., hyperbole, understatement, metaphor, etc.), sarcasm is used to express negative emotions in a way that can be humorous and memorable (Kreuz, Long, & Church, 1991; Roberts & Kreuz, 1994), making it a likely antecedent of conflict but also potential cognitive benefits.

Indeed, sarcasm is often considered a form of hostile humor, one of the four main types of humor or humor styles (e.g., Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003; the other three types are affiliative, self-enhancing, and self-deprecating humor). However, unlike other forms of humor, sarcasm is often harmful to individuals' well-being and interpersonal relations (Bowes & Katz, 2011; Colston, 1997; Freud, 1928) even when the recipients themselves agree that the statements are humorous (e.g., Toplak & Katz, 2000). Sarcasm expressers are also often fully aware of its hurtfulness and aggravating nature (e.g., Colston, 1997; Toplak & Katz, 2000).

Although sarcasm can be used to criticize, there are many non-contemptuous uses of sarcasm. Organizational members often communicate positive messages through sarcasm (e.g., saying "you look terrible" to someone who is clearly dressed up for an important meeting), in order to praise without embarrassing the recipients or losing their own status (Jorgensen, 1996). Other times, sarcasm is simply used as light-hearted bantering (e.g., saying "we special ordered this weather for you" to a new colleague coming to work for the first time during a snow storm).

However, even these well-meaning remarks are perceived to be more contemptuous than their sincere versions (Dews & Winner, 1995; Pexman & Olineck, 2002). Thus, regardless of how critical the sarcasm is intended to be, interpersonal conflict, namely the awareness of discrepancies, incompatible wishes or irreconcilable desires (e.g., Jehn & Mannix, 2001), is the most obvious potential consequence of sarcasm for both the expressers and recipients.

Hypothesis 1. Expressing or receiving sarcastic (vs. sincere or neutral) remarks increases a sense of conflict.

3. Sarcasm: A catalyst for creativity

Although interpersonal conflict may be the most intuitive effect of any forms of sarcastic exchanges, sarcasm may also generate cognitive and behavioral benefits. Specifically, we propose that general forms of sarcasm may stimulate creativity, the generation of ideas, insights, or problem solutions that are novel and useful (e.g., Sternberg & O'Hara, 1999), in both sarcasm expressers and recipients. For example, all forms of sarcastic exchanges, not just sarcastic anger or criticism, seem to exercise the brain more than direct exchanges, as shown in the neural activity of people exposed to sarcastic versus sincere statements (e.g., McDonald, 1999; Uchiyama et al., 2006). More specifically, because all forms of sarcasm involve conveying one's meaning by using language that signifies the opposite (e.g., Pexman & Olineck, 2002), sarcasm often makes salient contradictory notions. As a result, both constructing and making sense of any type of sarcasm necessitate recognizing and reconciling disparate ideas (Shamay-Tsoory, Tomer, Berger, & Aharon-Peretz, 2003), making sarcasm a potential facilitator of creativity for both sides of the exchange (e.g., Ferris, 1972; Koestler, 1964; Murdock & Ganim, 1993; Rouff, 1975; Schooler & Melcher, 1995; Treadwell, 1970; Wicker, 1985). Therefore, although previous research has only theorized on and demonstrated a link between sarcastic anger and creativity for third party observers (Miron-Spektor et al., 2011), we argue that creative benefits should accrue across any type of sarcastic exchange and for both sarcasm expressers and recipients.

In hypothesizing a generalizable yet parsimonious link between general forms of sarcasm and creativity, one that occurs for both expressers and recipients, it is important to identify whether a common underlying mechanism exists across content and role. After reviewing research that could shed light on the causal mechanism for the sarcasm-creativity link, we found that existing work unpacking the humor-creativity link has largely focused on an affective route (Martin, 2007; O'Quin & Derks, 1997), demonstrating that individuals exposed to humorous materials (e.g., bloopers from a comedy film) or instructed to be humorous experienced more positive mood which then led to more creative performance (Isen & Daubman, 1984; Isen, Daubman, & Nowicki, 1987; Morreall, 1991; Ziv, 1976, 1983, 1989, chap. 4). However, the literature alluding to sarcasm's effect on mood has been equivocal. Some research suggests that sarcasm (vs. sincerity) may reduce positive mood and exacerbate negative mood, with recipients

suffering more than expressers (e.g., Bowes & Katz, 2011; Colston, 1997; Leggitt & Gibbs, 2000; Pexman & Olineck, 2002).[1] Other research indicates that sarcasm can boost positive mood and alleviate negative mood for both expressers and recipients (e.g., Dews, Kaplan, & Winner, 1995; Jorgensen, 1996; Leak, 1974; Singer, 1968).[2] The mixed results suggest that mood is unlikely to be the common mechanism for sarcasm to increase creativity for both expressers and recipients.

Instead, we propose that a cognitive mechanism is a more promising path in explaining the sarcasm–creativity link. Although one recent article has also postulated a cognitive route (Miron-Spektor et al., 2011) predicting that sarcastic anger would enhance creativity in third party observers by increasing their cognitive complexity, this work actually found no correlation between sarcasm (vs. neutrality) and cognitive complexity or between cognitive complexity and creativity. This may be because cognitive complexity, also known as evaluative differentiation, entails recognizing contradictions and clarifying distinctions between contradictory elements (Kelly, 1955), a process that may not enhance creativity and could actually obstruct creative associations and exacerbate functional fixedness (Duncker, 1945; Smith, Ward, & Schumacher, 1993). In contrast to this prior work, we suggest a different cognitive route: abstract thinking.

Abstract thinking is a cognitive processing style that captures the superordinate and general (vs. incidental and contextualized) features of events (Trope & Liberman, 2010). Consider the example of voting. At the very concrete level, one is circling the name of a candidate on paper. At a more abstract level, one is contributing to democracy. Or take an example of behavior at work. "Work harder" and "don't work too hard" are two concrete and distinct manifestations of a more abstract event, "Conduct yourself appropriately".

We propose that both sarcasm construction and sarcasm interpretation are conducive to abstract thinking, regardless of the content of the communication. During sarcastic exchanges, expressers construct a stated meaning that contradicts the intended meaning while recipients infer the intended meaning and recognize its difference from the stated meaning (e.g., Grice, 1975; Kumon-Nakamura, Glucksberg, & Brown, 1995). This contradiction between the stated meaning and the intended meaning renders sarcasm a natural source of psychological distance. The core of Construal Level theory states that traversing psychological distance is made possible by abstract thinking (Trope & Liberman, 2010). Therefore, we hypothesize that abstract thinking is a common cognitive experience for sarcasm expressers and recipients. Although the content of sarcasm may vary (e.g., critical or uncritical) and the expressers and recipients may go through different emotional experiences or have different interpretations of a sarcastic statement's humorousness (Bowes & Katz, 2011; Toplak & Katz, 2000), we propose that the same abstract cognitive processing style is activated in both sarcasm expressers and recipients.

Let's return to our sarcastic statement uttered to someone who is surfing the Internet at work, "don't work too hard", and its intended meaning, "work harder". Both the sarcastic statement and intended meaning are concrete, context-specific exemplars of the more abstract construal of the communication, "conduct yourself appropriately". From the expressers' perspective, abstract thinking allows them to move from the concrete "work harder" to the more abstract "conduct yourself appropriately", which then allow them to construct the context-specific (and deliberately context-contradicting) statement "don't work too hard". From the recipients' perspective, abstract thinking allows them to move from the context-specific (and obviously context-contradicting) "don't work too hard" to the more abstract "conduct yourself appropriately", which then makes more accessible the context-specific interpretation "work harder". As such, to construct or interpret sarcasm is to traverse the psychological distance between the stated and the intended meaning through abstract thinking.

A large body of research suggests that an abstract cognitive processing style produces greater creativity. Empirically, decades of work have shown that both abstract thinking and creativity are consistently linked to right-hemispheric activation in the brain (e.g., Fink et al., 1996; Mihov, Denzler, & Förster, 2010). More importantly, abstract thinking also mediates the effect of various forms of psychological distance on creativity (e.g., Henderson & Wakslak, 2010; Jia, Hirt, & Karpen, 2009; Krüger, Fiedler, Koch, & Alves, 2013; Liberman, Polack, Hameiri, & Blumenfeld, 2012). Theoretically, abstract thinking can increase creativity in two ways. First, concrete thinking renders common associations overly accessible, whereas abstract thinking promotes diverse and novel solutions by reducing the dominance of any single solution (e.g., Ward, Patterson, & Sifonis, 2004). Second, general information obtained through abstract thinking makes the same object, behavior, or event relevant in many more contexts, leading to possible solutions that were not there before (e.g., when the box in the Duncker Candle Problem was construed more abstractly as a "container" instead of more concretely as a "container of thumb tacks"; Finke, 1995; Schooler & Melcher, 1995; Ward, 1995). We therefore argue that the higher level of abstract thinking triggered by sarcasm is a cognitive mechanism that leads to more creative behavior.

Hypothesis 2. Expressing or receiving sarcastic (vs. sincere or neutral) remarks increases creativity.

Hypothesis 3. Expressing or receiving sarcastic (vs. sincere or neutral) remarks increases abstract thinking.

Hypothesis 4. The positive effect of expressing or receiving sarcastic (vs. sincere or neutral) remarks on creativity is mediated through increased abstract thinking.

4. Leveraging the benefits of sarcasm: Satirizing with trusted others enhances creativity without conflict

Because sarcasm can be a double-edged sword, it is important to understand how to take advantage of its creative benefits without suffering its relational costs. One possibility is interpersonal trust, the "hallmark" of relationship quality (Dirks, 1999). Interpersonal trust is the willingness to accept vulnerability based on positive expectations of another's intentions or behavior (e.g., Rousseau, Sitkin, Burt, & Camerer, 1998). Given trust's notable role

[1] More so than recipients, expressers tend to find sarcasm (vs. sincere remarks) more amusing and less aggressive; more so than the expressers, outside observers find sarcasm (vs. sincere remarks) more amusing and less aggressive (Bowes & Katz, 2011; Toplak & Katz, 2000). As a result, if the creative benefits of sarcasm are driven by the positive experiences with sarcasm, then active participants of a sarcastic exchange, especially the recipients, may not enjoy as much creative benefit as the observers. It is therefore critical to study the perspectives of actual sarcasm participants and to also explore non-affective mechanisms for sarcasm's potential creativity effect.

[2] It is also possible that the content of sarcasm may moderate the effect of sarcasm on mood. For example, although both sarcastic compliments and sarcastic criticisms are considered more mocking and conflict-fueling than sincere statements, sarcastic (vs. sincere) compliments are rated as less positive whereas sarcastic (vs. sincere) criticisms are seen as more positive (e.g., Toplak & Katz, 2000). Therefore, it is conceivable that sarcasm would have a positive effect on mood when used to criticize but would have a negative effect on mood when otherwise employed. We did not make a priori hypotheses on mood. We did examine it in multiple studies as a potential alternative explanation.

as a "social lubricant" and its well-established conflict-reduction effects in organizations (Arrow, 1974; Lindskold, 1978), individuals should experience a lower sense of conflict when interacting with someone they trust vs. distrust, regardless of the nature of their exchange.

That said, we argue that the effect of trust should be particularly valuable in situations where others' intentions are somewhat ambiguous, such as during a sarcastic conversation (Katz, Blasko, & Kazmerski, 2004). During a sarcastic conversation, trust should promote more positive interpretations of sarcasm because individuals expect benevolent intentions from those they trust (McEvily, Perrone, & Zaheer, 2003). In contrast, the intention of a sincere remark is often self-evident and thus its interpretation affected less by trust. Therefore, as suggested by Hypothesis 1, recipients should experience sarcastic (vs. sincere) remarks from someone they distrust as more contemptuous and conflict-provoking, but sarcasm's conflict-exacerbating effect should decrease when the recipients trust the expressers. Similarly, because individuals often expect reciprocity from those they trust or distrust (Huang & Murnighan, 2010), expressers are more likely to expect their sarcastic remarks to be seen by recipients they distrust as conflict-provoking, whereas this effect should be weakened when the expressers trust the recipients.

Interpersonal trust is clearly not the only factor that may fend off conflict in the workplace or in social relationships more generally. However, among the other organizational, interpersonal and individuals factors that may reduce interpersonal conflict, such as liking, Leader-Member Exchange (LMX, Gerstner & Day, 1997), and personality traits (e.g., agreeableness, Graziano, Jensen-Campbell, & Hair, 1996), trust seems particularly well-suited as a moderator for the sarcasm-conflict effect. Unlike LMX, which targets the dyadic relationship between a leader and a member (Gerstner & Day, 1997), trust is relevant to exchanges between individuals at the same hierarchical level. Similarly, trust goes beyond liking or personality traits to create person-specific expectations about the trustee and the interaction with them. Therefore, trust is unique in potentially preventing malevolent interpretation of sarcasm and in reducing the conflict generated by sarcastic exchanges across a range of relationships.

Hypothesis 5. The positive effect of expressing or receiving sarcastic (vs. sincere or neutral) remarks on perceptions of conflict will be reduced when individuals express the remarks to or receive the remarks from someone they trust.

Although trust may decrease sense of conflict during sarcastic exchanges, it is less likely to negatively affect creativity. For example, one's trust and distrust toward others do not seem to differentially affect their information search, a key antecedent of creativity (e.g., Sinaceur, 2010). In fact, trust in others, through creating a sense of connection, may even play a positive role in individuals' willingness to engage in innovative behavior (Carmeli & Spreitzer, 2009). We therefore expected that one's trust toward others would have a neutral or positive effect on creativity regardless of whether an exchange was sarcastic or sincere.

5. Overview

We conducted four experiments to investigate our five hypotheses. Experiments 1 and 2 tested Hypotheses 1 and 2, examining whether sarcasm increases both conflict and creativity. Experiment 3 tested Hypotheses 3 and 4, which predicted that sarcasm increases abstract thinking and that abstract thinking mediates the effect of sarcasm on creativity. Experiments 1–3 also examined alternative mechanisms speculated on by previous research, i.e., mood and cognitive complexity. Experiment 4 tested Hypothesis 5, which predicted that trust reduces the effect of sarcasm on conflict. Overall, we employed two sarcasm manipulations that aimed at activating expressers' and recipients' experience of general forms of sarcasm and three creativity tasks to demonstrate (a) a robust relationship between general forms of sarcasm and creativity for both sarcasm expressers and recipients, (b) the mechanism(s) for this relationship, and (c) a method to mitigate sarcasm's relational cost while preserving its creative benefit.

6. Experiment 1: Simulated sarcasm on conflict and creativity

Experiment 1 examined Hypotheses 1 and 2 – expressing or receiving sarcasm triggers a sense of conflict and promotes creativity. It also examined the potential mediating role of mood. We manipulated sarcasm through a simulated conversation task, which did not specify the content of sarcasm (e.g., angry, critical, playful, etc.) so that it could better capture general forms of sarcasm. We also extensively pretested the task to ensure its validity.

6.1. Pretest

The simulated conversation task consists of a modified version of the Picture-Frustration Study (P-FS, Rosenzweig, Clark, & Helen, 1946). It ostensibly assessed participants' conversation skills through their responses to others' comments (see Appendix A for an example item).[3] To ensure that this task manipulates the experience of expressing (or receiving) sarcasm or sincerity, we conducted a pretest in which one hundred and one Americans (34 males, 67 females; age 18–69, $M = 36$, $SD = 13.64$) were randomly assigned to a 2 (sarcasm vs. sincerity) by 2 (expresser vs. recipient) design. In the *expressing-sarcasm condition*, participants wrote in empty bubbles the first sarcastic reply that came to mind. In the *receiving-sarcasm condition*, participants imagined that the person who was shown speaking had said those words sarcastically to them and provided the first reply that came to mind. In the *expressing-sincerity* and *receiving-sincerity conditions*, participants replied by being sincere or imagining that they had been spoken to in a sincere manner. Three raters blind to the conditions independently coded the replies for how sarcastic they are (1 = not sarcastic at all, 11 = extremely sarcastic; αs > .90). Their ratings were averaged. The *expressing*-sarcasm manipulation generated more sarcasm in participants' responses ($M = 7.58$, $SD = 1.80$) than did the receiving-sarcasm manipulation ($M = 4.10$, $SD = 2.80$), $t(48) = 5.11$, $p < .001$, $d = 1.48$, the *expressing*-sincerity ($M = 1.58$, $SD = .53$), $t(47) = 16.25$, $p < .001$, $d = 4.52$, or the receiving-sincerity manipulation ($M = 1.68$, $SD = .98$), $t(46) = 14.30$, $p < .001$, $d = 4.07$. The receiving-sarcasm manipulation also generated more sarcasm than did the *expressing*-sincerity manipulation, $t(51) = 4.51$, $p < .001$, $d = 1.25$, or the receiving-sincerity manipulation, $t(50) = 4.10$, $p < .001$, $d = 1.15$. This pretest demonstrates that the simulated conversation task is a valid manipulation of the expressing (or receiving) of sarcastic or sincere remarks. We therefore proceeded to employ it in Experiment 1.

[3] To ensure that the existing comments, which would appear across all conditions in Experiment 1, are not inherently sarcastic, a factor that would confound our findings, we asked 20 Americans (8 males, 12 females; age 20–62, $M = 37.25$, $SD = 12.46$) on MTurk to imagine that they were on the receiving end of these comments and to (a) choose whether each comment is neutral, sincere, or sarcastic, and (b) rate how neutral, sincere, and sarcastic (1 = not al all, 11 = extremely) each comment is. Eighty percent chose "sincere", 15% chose "neutral", and only 5% chose "sarcastic". The neutral ($M = 4.58$, $SD = 2.24$) and sarcastic ($M = 2.33$, $SD = 1.60$) ratings were significantly lower, $t(19) = 2.85$, $p = .01$, $d = .90$, and $t(19) = 10.27$, $p < .001$, $d = 3.24$, and the sincere rating ($M = 8.78$, $SD = 2.09$) significant higher than the mid-point of the scale, $t(19) = 5.93$, $p < .001$, $d = 1.88$. Thus, when presented alone, the existing comments tend to be perceived as sincere.

Table 1
Mean manipulation check scores, conflict ratings, RAT (creativity) scores, PANAS (mood) ratings, and overall mood ratings across experimental conditions in Experiment 1. Standard deviations are in parentheses. Means with different superscripts within column are significantly different at $p < .05$.

	Manipulation check	Humor check	Conflict	Creativity	PANAS positive	PANAS negative	Positive mood	Negative mood
Control	2.50^{abc} (2.05)	3.58^{a} (2.92)	5.52^{a} (2.22)	7.45^{a} (4.13)	2.74^{a} (1.23)	1.40^{a} (0.91)	2.95^{a} (1.59)	1.45^{a} (1.01)
Receiving sincerity	1.80^{b} (1.17)	1.74^{b} (1.45)	3.89^{b} (2.23)	7.30^{a} (3.13)	2.54^{a} (0.82)	1.31^{a} (0.41)	2.87^{a} (1.39)	1.57^{a} (0.79)
Expressing sincerity	3.18^{c} (2.33)	3.15^{a} (2.69)	4.99^{ab} (2.44)	7.57^{a} (3.06)	2.59^{a} (0.69)	1.17^{a} (0.30)	3.00^{a} (0.95)	1.13^{a} (0.34)
Receiving sarcasm	7.52^{d} (2.70)	2.64^{ab} (2.15)	7.35^{c} (2.69)	10.27^{b} (4.70)	2.79^{a} (0.71)	1.20^{a} (0.33)	2.96^{a} (1.15)	1.31^{a} (0.68)
Expressing sarcasm	8.36^{d} (2.48)	6.31^{c} (3.15)	7.24^{c} (2.35)	10.67^{b} (3.58)	2.59^{a} (0.64)	1.08^{a} (0.22)	2.67^{a} (1.28)	1.17^{a} (0.38)

6.2. Participants and design

One hundred and twelve Americans (66 males, 46 females; age 21–62, $M = 34.21$, $SD = 10.39$), recruited on MTurk for two dollars, were randomly assigned to an expressing-sarcasm, receiving-sarcasm, expressing-sincerity, receiving-sincerity, or control condition.

6.3. Procedure

6.3.1. Manipulations

We employed the same simulated conversation task from the pretest to manipulate the experience of expressing (or receiving) sarcasm or sincerity. The only difference was the addition of a *control* condition, in which participants responded to the same existing comment with the very first reply that came to mind. No further instructions were given.

6.3.2. Creativity

Next, participants completed one of the most widely cited creativity tasks, the Remote Association Task (RAT), which captures the identification of novel and meaningful connections among seemingly unrelated stimuli (Mednick, 1968). Participants were asked to find a word that was logically linked to the set of three words provided (e.g., "table" links "manners-round-tennis"). Instructions and two examples were given before 17 real triads (see Appendix B). Participants were instructed to solve as many as possible and to work fast without sacrificing accuracy. The number of correct responses was our measure of creativity.

6.3.3. Conflict

Participants completed a seven-item scale ($\alpha = .94$) assessing perceived conflict during the simulated conversations (adapted from Jehn, 1995; e.g., "There were feelings of hostility among parties") on an 11-point scale (1 = strongly disagree, 11 = strongly agree).

6.3.4. Mood

Participants then completed the Positive and Negative Affect Schedule (PANAS; e.g., excited or upset, 1 = not at all, 5 = extremely; Watson, Clark, & Tellegen, 1988). Additionally, they rated how positive and negative they felt at the moment, using the same scale.

6.3.5. Manipulation check

Finally, participants reported how much they expressed or imagined that the other parties expressed sarcasm and irony in the simulated conversations (1 = strongly disagree, 11 = strongly agree, $\alpha = .82$). Because sarcasm is considered a form of humor especially by the expressers (e.g., Bowes & Katz, 2011), a procedure that manipulates sarcasm should also increase perceived humorousness, at least in the expressers. Therefore, participants also reported how much they were or they thought the other parties were funny, humorous, and playful (1 = strongly disagree, 11 = strongly agree, $\alpha = .95$).[4]

6.4. Results

6.4.1. Manipulation check

Sarcasm differed significantly across conditions, $F(4, 105) = 40.38$, $p < .001$, $\eta_p^2 = .61$ (see Table 1 for all means in Experiment 1). Participants expressed significantly more sarcasm in the expressing-sarcasm condition than in the expressing-sincerity, $t(38) = 6.79$, $p < .001$, $d = 2.15$, or control condition, $t(38) = 8.17$, $p < .001$, $d = 2.58$, or than they received in the receiving-sincerity condition, $t(39) = 11.21$, $p < .001$, $d = 3.38$. Participants received significantly more sarcasm in the receiving-sarcasm condition than in the receiving-sincerity condition, $t(46) = 9.37$, $p < .001$, $d = 2.75$, or than they expressed in the expressing-sincerity, $t(45) = 5.85$, $p < .001$, $d = 1.72$, or control condition, $t(45) = 7.09$, $p < .001$, $d = 2.09$. Participants received significantly less sarcasm in the receiving-sincerity condition than they expressed in the expressing-sincerity condition, $t(43) = 2.52$, $p = .015$, $d = 0.75$. None of the other comparisons reached significance ($ps > .17$).

Humor also differed significantly across conditions, $F(4, 105) = 9.30$, $p < .001$, $\eta^2 = .26$. The pattern of the specific comparisons was slightly different from sarcasm. Participants in the expressing-sarcasm condition reported being more humorous than they were in the expressing-sincerity condition, $t(38) = 3.43$, $p = .001$, $d = 1.08$, or the control condition, $t(38) = 2.85$, $p = .007$, $d = .90$, or than the other parties were in the receiving sarcasm, $t(41) = 4.55$, $p < .001$, $d = 1.36$, or receiving-sincerity condition, $t(39) = 6.19$, $p < .001$, $d = 1.86$. Participants in the receiving-sarcasm condition, however, did not think the other parties were more humorous than they were in the receiving-sincerity condition, $t(46) = 1.69$, $p = .10$, or than they themselves were in the expressing-sincerity condition, $t(45) = .73$, $p = .47$, or the control condition, $t(45) = 1.26$, $p = .21$. Participants in the receiving-sincerity condition also thought their partners were less humorous than they themselves were in the expressing-sincerity condition, $t(43) = 2.21$, $p = .03$, $d = .65$, or the control condition, $t(43) = 2.69$, $p = .01$, $d = .80$. The expressing-sincerity and control conditions did not differ, $t(42) = .50$, $p = .62$. Together, the two manipulation checks demonstrate that the experience of sarcasm was activated in both the expressers and recipients of sarcasm, even though only participants in the expressing-sarcasm condition seemed amused.

6.4.2. Conflict

Conflict perceptions differed significantly across conditions, $F(4, 107) = 8.66$, $p < .001$, $\eta_p^2 = .25$ (see Fig. 1). Participants perceived significantly more conflict in the expressing-sarcasm condition than in the expressing-sincerity, $t(39) = 2.98$, $p = .005$, $d = .94$, receiving-sincerity, $t(39) = 4.66$, $p < .001$, $d = 1.46$, or control condi-

[4] Two participants skipped the manipulation check due to programming errors.

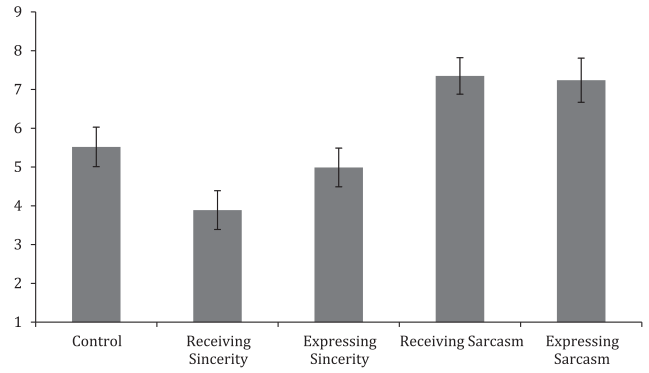


Fig. 1. Mean conflict ratings across experiment conditions in Experiment 1. Error bars indicate ±1 SEM.

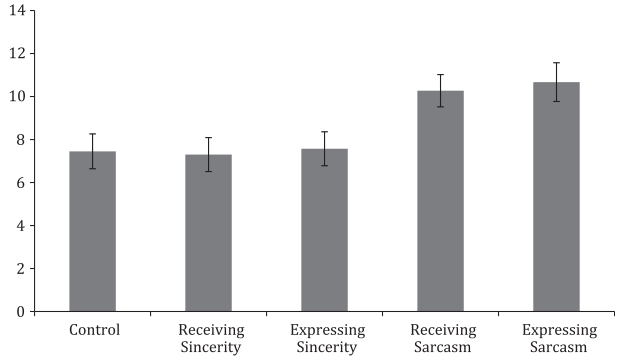


Fig. 2. Number of RAT items correctly solved (creativity) across experiment conditions in Experiment 1. Error bars indicate ±1 SEM.

tion, $t(38) = 2.37$, $p = .023$, $d = .75$. They also perceived significantly more conflict in the receiving-sarcasm condition than in the expressing-sincerity, $t(47) = 3.21$, $p = .002$, $d = .92$, receiving-sincerity, $t(47) = 4.86$, $p < .001$, $d = 1.40$, or control condition, $t(46) = 2.54$, $p = .014$, $d = .74$. Receiving sincerity significantly decreased conflict compared to the control condition, $t(43) = 2.45$, $p = .018$, $d = .73$. None of the rest of the comparisons reached significance ($ps > .12$). Hypothesis 1 was supported.

6.4.3. Creativity

Creative performance differed significantly across conditions, $F(4, 107) = 4.17$, $p = .004$, $\eta_p^2 = .14$. (see Fig. 2). Participants correctly completed significantly more RAT items in the expressing-sarcasm condition than in the expressing-sincerity, $t(39) = 2.99$, $p = .005$, $d = .93$, receiving-sincerity, $t(39) = 3.21$, $p = .003$, $d = 1.00$, or control condition, $t(38) = 2.60$, $p = .013$, $d = .83$. They also completed significantly more RAT items correctly in the receiving-sarcasm condition than in the expressing-sincerity, $t(47) = 2.35$, $p = .023$, $d = .68$, receiving-sincerity, $t(47) = 2.56$, $p = .014$, $d = .74$, or control condition, $t(46) = 2.18$, $p = .034$, $d = .64$. None of the other comparisons reached significance ($ps > .76$). Hypothesis 2 was also supported.

6.4.4. Mood

Neither the PANAS positive or negative subscale scores, $F(4, 107) = .38$, $p = .82$, and $F(4, 107) = 1.28$, $p = .28$, nor the overall positive or negative mood, $F(4, 107) = .21$, $p = .93$, and $F(4, 107) = 1.56$, $p = .19$, varied significantly across conditions. None of the indirect effects of sarcasm on creativity through any mood measures was significant: positive (point estimate = .02; 95% bias-corrected confidence interval of −.15 to .31), and negative subscale of the PANAS (point estimate = .58; 95% bias-corrected confidence interval of −.41 to 2.54); overall positive (point estimate = −.0007; 95% bias-corrected confidence interval of −.30 to .21) and negative mood (point estimate = 1.01; 95% bias-corrected confidence interval of −2.02 to 3.04).

6.5. Discussion

These findings support Hypotheses 1 and 2: Expressing or receiving sarcasm led individuals to perceive a higher sense of conflict but also increased creativity as compared to expressing or receiving sincerity or having a neutral conversation. However, unlike other forms of humor, sarcasm did not seem to predict mood and mood did not drive the effect on creativity.

As the first step into our empirical endeavor, Experiment 1 had a few limitations. First, the simulated conversation task we employed may be inherently conflict-provoking and the higher sense of conflict in the sarcasm conditions might not have emerged in situations that are not already infested with conflict. Similarly, although this task did not specify the content of the sarcasm, participants may have only imagined expressing or receiving angry or critical sarcasm only, undermining our focus on general forms of sarcasm. Second, by keeping the existing message the same in the receiving-sarcasm and receiving-sincerity conditions, we varied the intended meaning across these conditions, (e.g., "I am sorry" meant "I am not sorry" in the receiving-sarcasm condition). Third, we measured mood after the creativity measure. It is possible that, after completing the creativity task, participants' mood had dissipated and therefore could not be captured. Finally, the RAT task focuses on creative association, so the effect of sarcasm on RAT may not be generalizable to other forms of creativity.

7. Experiment 2: Recalled sarcasm on conflict and creativity

Experiment 2 investigated Hypotheses 1 and 2 using a different sarcasm manipulation and a creative insight task. The new manipulation experimentally controlled for the conversation context and the intended meaning of remarks because participants were randomly assigned to experimental conditions, in which they spontaneously recalled their own past experiences with sarcasm or sincerity. This manipulation also provided us with sarcastic remarks that, when combined, convey a host of intents and emotions beyond just anger or criticism. Furthermore, two independent judges coded the recalled content to ensure that they indeed captured general forms of sarcasm. Finally, we captured mood using an implicit measure before the creativity task and an explicit measure after the creativity task.

7.1. Participants and design

One hundred and seven Americans (43 males, 62 females, 2 unreported; age 18–64, $M = 31.51$, $SD = 11.21$), recruited from MTurk for $2, were randomly assigned to an expressing-sarcasm, receiving-sarcasm, expressing-sincerity, receiving-sincerity, or control condition.

7.2. Procedure

7.2.1. Manipulations

Following numerous procedures manipulating psychological experiences in organizational behavior, we used a recall task to recreate personally relevant experience of sarcasm (e.g., Fong, 2006). Participants in the *expressing-sarcasm* (*receiving-sarcasm*) *condition* recalled an incident in which they said something

sarcastic to another person (someone said something sarcastic to them). Participants in the *expressing-sincerity* (*receiving-sincerity*) *condition* recalled an incident in which they said something sincere to another person (someone said something sincere to them). The instructions defined "sarcasm" in the sarcasm conditions as "expressing the opposite of what one thinks or feels with the intention of communicating one's true meaning", defined "sincerity" in the sincerity conditions as "speaking and acting truthfully about one's feelings and thoughts", and asked participants to describe the situation in detail, such as what happened, what they said, what they were thinking, and how they felt. Participants in the *control condition* recalled their last conversation with someone who asked them for directions or whom they asked for directions.

7.2.2. Implicit measure of mood

Next, participants completed a "Word Evaluation Task" that asked how pleasant they thought each of five Chinese words was (1 = very unpleasant, 11 = very pleasant).[5] Similar to other implicit measures of mood (e.g., Hass, Katz, Rizzo, Bailey, & Moore, 1992), this task captures the extent to which individuals project their own mood onto unfamiliar or mood-neutral stimuli and, therefore, serves as an inconspicuous way to measure mood immediately after our manipulations. Isen and Nowicki (1983), for example, found that participants in a positive vs. neutral mood rated these unfamiliar words more positively.

7.2.3. Creativity

Participants then completed the Duncker Candle Problem (Duncker, 1945). They were presented with a picture containing several objects on a table next to a cardboard wall: a candle, a pack of matches, and a box of tacks. Their task was to figure out, using only the objects on the table, how to attach the candle to the wall so that it would burn without dripping wax on the table or the floor. Participants described their solutions in words. The correct solution involves emptying the box of tacks, tacking the box to the wall, and placing the candle inside. It is considered a measure of creative insight because it requires the ability to see objects as performing different functions than indicated by the context; that is, the box is not just a repository for tacks but can also be used as a stand.

7.2.4. Conflict

The same 7-item scale from Experiment 1 measured perceived conflict ($\alpha = .94$).

7.2.5. Explicit measure of mood

Finally, participants reported how they felt at the moment on a single Likert scale (1 = negative, 11 = positive).

7.3. Results

7.3.1. Conflict

Participants' sense of conflict differed significantly across conditions, $F(4, 102) = 5.12$, $p = .001$, $\eta_p^2 = .17$ (see Table 2a and Fig. 3 for means). Participants perceived significantly more conflict in the expressing-sarcasm than in the control condition, $t(43) = 3.45$, $p = .001$, $d = 1.02$. Participants in the receiving-sarcasm condition perceived significantly more conflict than did those in the control condition, $t(45) = 4.77$, $p < .001$, $d = 1.40$, and marginally more conflict than did those in the receiving-sincerity condition, $t(41) = 1.73$, $p = .09$, $d = .53$. Though we did not predict these differences, we also found that participants in the expressing-sincerity, $t(40) = 3.70$, $p = .001$, $d = 1.12$, and receiving-sincerity conditions, $t(40) = 2.45$, $p = .02$, $d = .74$, perceived significantly more conflict than did those in the control condition. None of the rest of the comparisons reached significance ($ps > .27$). These results provided partial support for Hypothesis 1.

Table 2a
Percentages of participants who solved the Dunker's Candle Problem (creativity) and mean conflict and mood ratings across experimental conditions in Experiment 2. Standard deviations are in parentheses. Means with different superscripts within column are significantly different at $p < .05$. Means with different superscripts accompanied by * within column are significantly different at $p < .10$.

	Conflict	Creativity (%)	Implicit mood	Explicit mood
Control	2.61[a] (2.04)	30[a]	7.23[a] (1.90)	7.22[a] (3.10)
Receiving sincerity	4.51[b*] (2.98)	32[a]	6.45[a] (1.34)	7.26[a] (2.66)
Expressing sincerity	5.64[bc] (3.23)	26[a]	6.52[a] (1.60)	7.37[a] (2.24)
Receiving sarcasm	6.05[c*] (2.82)	75[b]	6.48[a] (0.93)	7.29[a] (2.58)
Expressing sarcasm	5.44[bc] (3.33)	64[b]	6.97[a] (1.19)	7.27[a] (2.21)

7.3.2. Creativity

The likelihood of solving the Duncker Candle Problem differed significantly across conditions, $\chi^2(4, N = 107) = 17.62$, $p = .001$, $\varphi = .41$ (see Table 2a and Fig. 4 for percentages of participants). Participants were significantly more likely to solve the problem in the expressing-sarcasm (64%) than in the expressing-sincerity (26%), $\chi^2(1, N = 41) = 5.71$, $p = .02$, $\varphi = .37$, receiving-sincerity (32%), $\chi^2(1, N = 42) = 4.19$, $p = .04$, $\varphi = .32$, or control condition (30%), $\chi^2(1, N = 45) = 4.98$, $p = .03$, $\varphi = .33$. Participants were significantly more likely to solve the problem in the receiving-sarcasm (75%) than in the receiving-sincerity, $\chi^2(1, N = 44) = 8.11$, $p = .004$, $\varphi = .43$, expressing-sincerity, $\chi^2(1, N = 43) = 10.10$, $p = .001$, $\varphi = .49$, or control condition, $\chi^2(1, N = 47) = 9.37$, $p = .002$, $\varphi = .45$. None of the rest of the comparisons was significant ($ps > .40$). These results continue to support Hypothesis 2.

To ensure that the content of sarcasm (i.e., anger, criticism) did not confound the results above, two judges blind to the hypotheses and conditions rated the extent to which the recalled conversations conveyed anger and criticism (1 = not at all, 7 = to a great extent).[6] The reliabilities between the two judges were high ($\alpha s > .90$) and we averaged their scores to create a measure of anger and a measure of criticism. These measures differed significantly across conditions, $F(4, 102) = 3.12$, $p = .018$, $\eta_p^2 = .11$, and $F(4, 102) = 8.85$, $p < .001$, $\eta_p^2 = .26$ (see Table 2b for means and pairwise comparisons). We conducted two binary logistic regressions, regressing creativity on condition, each of these two measures, and the interaction between condition and each of them. Neither the main effects of these two measures nor the interaction effects reached significance ($ps > .28$), while the main effects of condition remained significant, $B = .51$, $SE = .15$, $p = .001$ (anger), and $B = .52$, $SE = .16$, $p = .001$ (criticism), suggesting that sarcasm's creativity effect holds regardless of the level of anger or criticism in the sarcasm.

[5] Although positive and negative moods are theoretically independent, as an empirical matter, they tend to be strongly, negatively correlated, and "cannot be regarded as orthogonal factors" (Green, Goldman, & Salovey, 1993, p. 8). To diversify our methods and maximize our chances of capturing an effect on mood, both our explicit and implicit mood measures in Experiment 2 used bipolar scales.

[6] The judges gave 54.3% of the participants in Experiment 2 and 78.6% in Experiment 3, which employed the same sarcasm manipulation, an anger rating of 1 (not at all). Additionally, they gave 34.5% in Experiment 2 and 35.7% in Experiment 3 a criticism rating of 1 (not at all). This suggests that our manipulation did not just capture critical sarcasm or sarcastic anger (as was the case in Miron-Spektor et al., 2011). Instead it is consistent with our broader conceptualization of sarcasm and our focus on general forms of sarcasm.

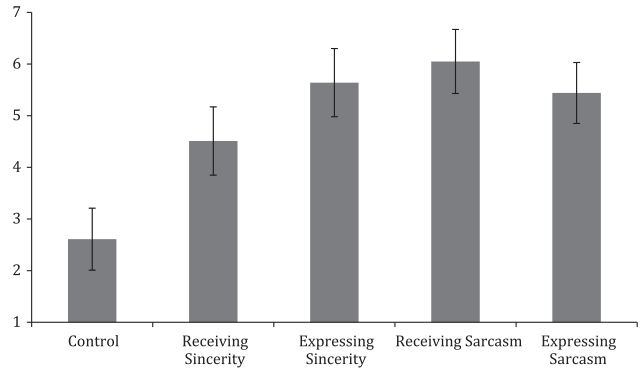


Fig. 3. Mean conflict ratings across experimental conditions in Experiment 2. Error bars indicate ±1 SEM.

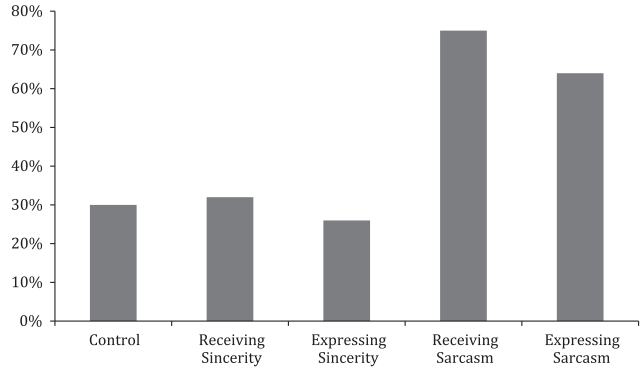


Fig. 4. Percentages of participants who solved the Dunker's Candle Problem (creativity) across experimental conditions in Experiment 2.

7.3.3. Mood

No significant main effects were found for the implicit or explicit measures of mood, $Fs < 1.34$, $ps > .25$, nor were there any significant differences between specific conditions (see Table 2a for means).[7] The indirect effect of sarcasm on creativity through the implicit (point estimate = −.01; 95% bias-corrected confidence interval of −.19 to .10) or explicit mood measure (point estimate = .0002; 95% bias-corrected confidence interval of −.11 to .13) was not significant either. We again found no support for the mediating role of mood.

7.4. Discussion

The first two studies provide consistent evidence that (a) expressing or receiving sarcasm, as compared to expressing or receiving sincerity or having a neutral conversation, promotes creativity, supporting Hypothesis 2, and that (b) sarcasm is not a reliable antecedent of mood and mood is not a reliable mechanism through which sarcasm promotes creativity. These two studies also provide partial support for Hypothesis 1, which states that expressing or receiving sarcasm increases a sense of conflict. Although it is less clear from the current data whether expressing or receiving sarcasm vs. sincere remarks is more conflict-provoking, expressing or receiving sarcasm, as compared to having a neutral conversation, heightens a sense of conflict.

[7] Neither the main effect of criticism (or anger) nor the interaction between condition and criticism (or anger) on either of the mood measures reached significance ($ps > .24$), suggesting that the lack of clear effect of sarcasm on mood did not vary as a function of how critical or angry the sarcastic remarks were.

Table 2b
Mean anger and criticism scores across experimental conditions in Experiment 2. Standard deviations are in parentheses. Means with different superscripts within column are significantly different at $p < .05$.

	Anger	Criticism
Control	1.07^{a} (0.23)	1.04^{a} (0.21)
Receiving sincerity	1.71^{abc} (1.27)	3.37^{b} (2.11)
Expressing sincerity	2.13^{bc} (1.72)	4.24^{b} (2.15)
Receiving sarcasm	2.46^{c} (1.94)	3.75^{b} (2.26)
Expressing sarcasm	2.34^{c} (1.81)	3.25^{b} (2.22)

8. Experiment 3: Sarcasm increases creativity through abstract thinking

The third study investigated Hypotheses 3 and 4, which predicted that expressing or receiving sarcasm (not just sarcastic anger or criticism) leads to abstract thinking, which, in turn, mediates the effect of sarcasm on creativity. Additionally, it further examined the possible role of mood and cognitive complexity as alternative mechanisms.

Experiment 3 also sought to address some methodological limitations with Experiment 2. First, it included manipulation checks to ensure the validity of the recall task. Second, because the candle task in Experiment 2 is relatively well known and some of the participants may have had prior knowledge of its correct solution, we adopted a different measure of creative insight. Finally, both Experiments 1 and 2 used online samples. Although peer-reviewed research has demonstrated that the data obtained through MTurk are at least as reliable as those obtained via traditional methods (e.g., Buhrmester, Kwang, & Gosling, 2011), it was still important to replicate our main findings using a laboratory study on a different sample of participants.

8.1. Participants and design

One hundred and fourteen students (43 males, 71 females; age 18–34, $M = 20.02$, $SD = 2.30$) were recruited from a large East Coast university for a compensation of ten dollars. They were randomly assigned to an expressing-sarcasm, receiving-sarcasm, expressing-sincerity, receiving-sincerity, or control condition.

8.2. Procedure

8.2.1. Manipulations

The same recall task from Experiment 2 manipulated the experience of expressing or receiving sarcasm, expressing or receiving sincerity, and a neutral conversation, once again ensuring that we captured general, as opposed to any specific, forms of sarcasm.

8.2.2. Abstract thinking

Participants then completed a Behavior Identification Form (BIF, Vallacher & Wegner, 1989), assessing the level at which individuals construe everyday actions. This state measure has been used extensively in construal-level research to assess abstract thinking as the outcome of various experimental manipulations (e.g., Smith & Trope, 2006). Each of the 25 items presented a target behavior (e.g., "voting") and asked participants which of two descriptions they preferred: one describing the behavior at a concrete level (e.g., "marking a ballot") and one at an abstract level (e.g., "influencing the election"). The more actions identified at the abstract level, the more abstract participants' thinking was.

8.2.3. Cognitive complexity

Following Miron-Spektor et al. (2011), who measured cognitive complexity with the Role Construct Repertory Test ("Rep test")

Table 3a
Mean manipulation check scores, percentages of participants who solved the Olive in a Glass problem (creativity), mean abstract thinking scores, mean cognitive complexity scores, and mean mood ratings across experimental conditions in Experiment 3. Standard deviations are in parentheses. Means with different superscripts within column are significantly different at $p < .05$. Means with different superscripts accompanied by * within column are significantly different at $p < .10$.

	Manipulation check	Humor check	Creativity (%)	Abstract thinking	Cognitive complexity	PANAS pos.	PANAS neg.	Pos. mood	Neg. mood
Control	2.70[a] (2.28)	4. 17[ab] (2.37)	0[a]	10.72[a] (3.16)	108.08[a] (73.80)	2.40[a] (0.69)	1.83[ab] (0.67)	2.80[ab] (0.96)	2.04[a] (0.89)
Receiving Sincerity	3.46[a] (2.53)	3.31[a] (2.55)	3.8[a]	11.23[a] (4.43)	106.08[a] (27.67)	2.49[a] (0.70)	1.82[ab] (0.65)	2.96[a] (0.82)	2.00[a] (0.98)
Expressing Sincerity	3.02[a] (2.61)	3.11[a] (1.90)	0[a]	12.14[a*] (3.81)	97.02[a] (24.48)	2.44[a] (0.79)	1.57[bc*] (0.53)	3.10[a] (0.89)	1.95[a] (1.07)
Receiving Sarcasm	7.29[b] (2.51)	5.46[bc] (3.16)	25[b]	14.54[b] (3.45)	106.63[a] (58.48)	1.94[b] (0.68)	1.46[c] (0.51)	2.29[bc] (1.30)	1.71[a] (0.81)
Expressing Sarcasm	6.92[b] (3.09)	6.31[c] (3.03)	22.2[b]	14.61[b*] (4.91)	104.12[a] (31.11)	2.54[a] (1.03)	1.94[a*] (0.74)	2.83[ac] (1.15)	1.83[a] (0.79)

developed by Kelly (1955) and used in Bieri (1955), we employed a simplified version developed by Bieri et al. (1966) that received support for its reliability and validity in Menasco and Curry (1978). The Rep test is designed to yield a measure of cognitive complexity based on the number of differentiations made in evaluating given role types. It is presented in grid form with role types as columns and bipolar adjectives as rows (see Appendix C). The test is scored by totaling the number of tied ratings a participant assigns to a given role type. That is, a score of 1 is assigned for every rating that is equal to any of the ratings below it. The minimum score per role type is then 4 (over the 10 bipolar adjectives). The maximum score per role type is 45, in which case all 10 ratings are exactly the same. The overall cognitive complexity scores for the 10 role types therefore can range from 40 to 450. High scores represent less complexity, since they indicate participants' inability to discriminate a role type on the dimensions represented by the adjectives.[8]

8.2.4. Creativity

Next, participants worked on a creative insight task, the Olive in a Glass problem (see Appendix D). They were presented with a picture containing a "glass" made from four matchsticks. Inside the "glass" sits a dot representing an "olive". Their task was to move two and only two matchsticks so that the "olive" would be outside of the "glass". Participants described their solutions in words. The correct solution involves sliding the matchstick that is the bottom of the glass a half-position to the left (or right) and moving the matchstick on the right (or left) side of the glass so that it parallels the stem of the glass and serves as the side of the new upside down "glass". This is considered a measure of creative insight because it involves rejecting the typical but unwarranted assumption that the glass needs to be in the same position or its opening needs to face up. As a result, the solution is both novel and useful. Afterwards, participants also indicated whether they had worked on this problem in the past.

8.2.5. Mood

As in Experiment 1, participants completed the PANAS and rated how positive and negative they felt at the moment.

8.2.6. Manipulation check

Finally, participants reported to what extent they or the other party expressed sarcasm and irony in the conversation they recalled (1 = strongly disagree, 11 = strongly agree, $\alpha = .87$). As in Experiment 1, they also reported how much they or the other party was funny, humorous, and playful (1 = strongly disagree, 11 = strongly agree, $\alpha = .89$).

8.3. Results

8.3.1. Manipulation check

Sarcasm differed significantly across conditions, $F(4, 109) = 16.68$, $p < .001$, $\eta_p^2 = .38$ (see Tables 3a for means). Participants expressed significantly more sarcasm in the expressing-sarcasm condition than in the expressing-sincerity, $t(37) = 4.26$, $p < .001$, $d = 1.36$, or control condition, $t(41) = 5.15$, $p < .001$, $d = 1.55$, or than they received in the receiving-sincerity condition, $t(42) = 4.07$, $p < .001$, $d = 1.23$. Participants perceived significantly more sarcasm in the receiving-sarcasm condition than in the receiving-sincerity condition, $t(48) = 5.37$, $p < .001$, $d = 1.52$, or than they expressed in the expressing-sincerity, $t(43) = 5.58$, $p < .001$, $d = 1.67$, or control condition, $t(47) = 6.70$, $p < .001$, $d = 1.91$. None of the other comparisons reached significance ($ps > .27$).

Humor also differed significantly across conditions, $F(4, 109) = 5.79$, $p < .001$, $\eta^2 = .18$ (see Tables 3a for means). The pattern of the specific comparisons is again slightly different from sarcasm. Participants in the expressing-sarcasm condition reported being more humorous than they were in the expressing-sincerity condition, $t(37) = 4.26$, $p < .001$, $d = 1.27$, or the control condition, $t(41) = 5.15$, $p < .001$, $d = .79$, or than the other parties were in the receiving-sincerity condition, $t(42) = 3.56$, $p = .001$, $d = 1.07$. Participants in the receiving-sarcasm condition thought the other parties were more humorous than they were in the receiving-sincerity condition, $t(48) = 2.66$, $p = .01$, $d = .75$, or than they themselves were in the expressing-sincerity condition, $t(43) = 2.97$, $p = .005$, $d = .90$. But they did not think the other parties were more humorous than they themselves were in the control condition, $t(47) = 1.62$, $p = .11$. None of the other comparisons reached significance ($ps > .10$). Overall, these manipulation checks indicate that our manipulation was effective and that both sarcasm expressers and recipients consider the use of sarcasm humorous.

8.3.2. Creativity

The likelihood of solving the Olive in a Glass problem differed significantly across conditions, $\chi^2(4, N = 114) = 15.67$, $p = .003$, $\varphi = .37$ (see Table 3a and Fig. 5 for percentages).[9] Participants were significantly more likely to solve the problem in the expressing-sarcasm condition than in the expressing-sincerity, $\chi^2(1, N = 39) = 5.20$, $p = .02$, $\varphi = .37$, receiving-sincerity, $\chi^2(1, N = 44) = 3.57$, $p = .059$, $\varphi = .29$, or control condition, $\chi^2(1,$

[8] We were not able to compute the cognitive complexity score for one participant who failed to complete this task.

[9] Five participants reported having completed the Olive in a Glass problem in the past. Removing these five participants did not change our findings on creativity.

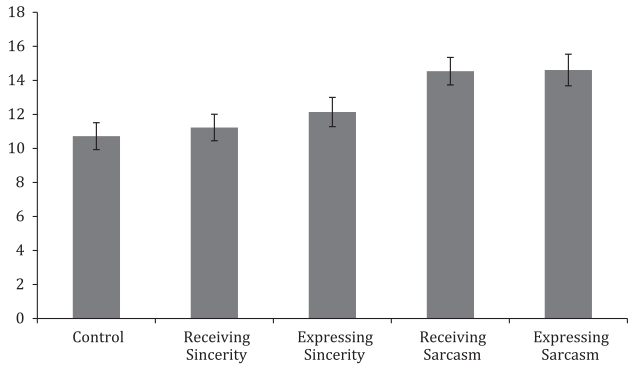


Fig. 5. Percentages of participants who solved the Olive in a Glass Problem (creativity) across experimental conditions in Experiment 3.

$N = 43$) = 6.13, $p = .013$, $\varphi = .38$. Participants were significantly more likely to solve the problem in the receiving-sarcasm condition than in the receiving-sincerity, $\chi^2(1, N = 50) = 4.64$, $p = .031$, $\varphi = .31$, expressing-sincerity, $\chi^2(1, N = 45) = 6.06$, $p = .014$, $\varphi = .37$, or control condition, $\chi^2(1, N = 49) = 7.12$, $p = .008$, $\varphi = .38$. None of the other comparisons reached significance ($ps > .32$). Together with Experiments 1 and 2, the results provide strong support for Hypothesis 2.

To ensure that the content of sarcasm (i.e., anger, criticism) did not confound the results above, same as in Experiment 2, two judges blind to the hypotheses and conditions again rated the extent to which the recalled conversations expressed anger and criticism (1 = not at all, 7 = to a great extent). The reliabilities between the two judges were high ($\alpha s > .93$) and we averaged their scores to create a measure of anger and a measure of criticism. The two measures differed significantly across conditions, $F(4, 108) = 3.74$, $p = .007$, $\eta_p^2 = .12$, and $F(4, 108) = 7.70$, $p < .001$, $\eta_p^2 = .22$ (see Table 3b for means and pairwise comparisons).[10] Two binary logistic regressions regressed creativity on condition, each of these two measures, and the interaction between condition and each of them. Neither the main effects of these measures nor the interaction reached significance ($ps > .15$). The main effects of condition remained significant, $B = .70$, $SE = .25$, $p = .005$ (anger), and $B = .73$, $SE = .26$, $p = .005$ (criticism), suggesting that the creativity effect of sarcasm holds regardless of the level of anger or criticism in the sarcasm.

8.3.3. Abstract thinking

Abstract thinking differed significantly across conditions, $F(4, 109) = 4.86$, $p = .001$, $\eta_p^2 = .15$ (see Table 3a and Fig. 6 for means). Participants engaged in significantly more abstract thinking in the expressing-sarcasm condition than in the receiving-sincerity, $t(42) = 2.38$, $p = .02$, $d = .72$, or control condition, $t(41) = 3.16$, $p = .003$, $d = .94$. They also engaged in marginally more abstract thinking than in the expressing-sincerity condition, $t(37) = 1.77$, $p = .086$, $d = .56$. Participants engaged in significantly more abstract thinking in the receiving-sarcasm condition than in the receiving-sincerity, $t(48) = 2.93$, $p = .005$, $d = .83$, expressing-sincerity, $t(43) = 2.22$, $p = .03$, $d = .66$, or control condition, $t(47) = 4.05$, $p < .001$, $d = 1.15$. No other comparisons reached significance ($ps > .17$). Hypothesis 3 was supported.

Two ANOVAs similarly examined the effect of condition, each of the anger and criticism measures, and the interaction between condition and each of them on abstract thinking. Neither the main effects of these measures nor the interaction reached significance ($ps > .10$), while the main effects of condition remained significant,

[10] One participant was not able to recall a conversation following the instructions, hence the missing value.

Table 3b
Mean anger and criticism scores across experimental conditions in Experiment 3. Standard deviations are in parentheses. Means with different superscripts within column are significantly different at $p < .05$. Means with different superscripts accompanied by * within column are significantly different at $p < .10$.

	Anger	Criticism
Control	1.00^{a} (0.00)	1.00^{a} (0.00)
Receiving sincerity	2.36^{b*} (1.68)	3.12^{b} (1.99)
Expressing sincerity	2.33^{bc} (1.84)	3.57^{b} (2.31)
Receiving sarcasm	1.65^{ac*} (1.36)	3.44^{b} (2.19)
Expressing sarcasm	1.69^{ab} (1.59)	2.61^{b} (1.85)

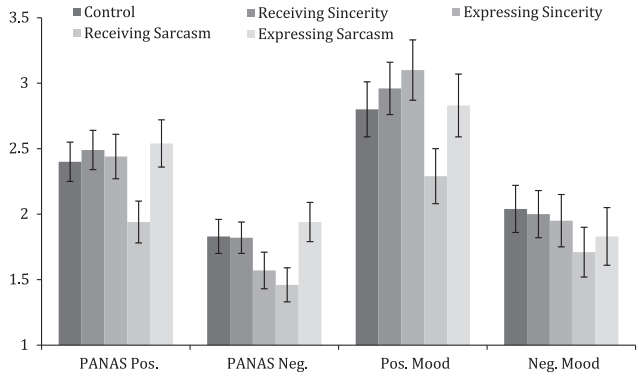


Fig. 6. Mean abstract thinking scores across experimental conditions in Experiment 3. Error bars indicate ±1 SEM.

$F(3, 104) = 5.55$, $p = .001$, $\eta_p^2 = .14$ (anger), and $F(3, 104) = 3.62$, $p = .016$, $\eta_p^2 = .10$ (criticism), suggesting that the effect of sarcasm on abstract thinking also holds regardless of the level of anger or criticism in the sarcasm.

8.3.4. Cognitive complexity

Cognitive complexity scores did not vary significantly across conditions, $F(4, 108) = .17$, $p = .95$ (see Tables 3a for means).

8.3.5. Mood

PANAS positive and negative subscale scores and positive mood scores varied across conditions, although the differences were only marginal, $F(4, 109) = 2.34$, $p = .06$, $\eta_p^2 = .08$, $F(4, 109) = 2.27$, $p = .07$, $\eta_p^2 = .08$, and $F(4, 109) = 2.04$, $p = .09$, $\eta_p^2 = .07$ (see Table 3a and Fig. 7 for means). Negative mood scores did not vary significantly across conditions, $F(4, 109) = .52$, $p = .72$.[11]

Specifically, participants reported significantly less positive affect on the PANAS positive-affect subscale in the receiving-sarcasm condition than in all the other conditions, including the receiving-sincerity, $t(48) = 2.85$, $p = .006$, $d = .80$, expressing-sincerity, $t(43) = 2.30$, $p = .026$, $d = .68$, control, $t(47) = 2.39$, $p = .02$, $d = .67$, and expressing-sarcasm condition, $t(40) = 2.30$, $p = .026$, $d = .69$. They also reported significantly less overall positive mood than in the receiving-sincerity, $t(48) = 2.19$, $p = .033$, $d = .62$, or expressing-sincerity condition, $t(43) = 2.38$, $p = .022$, $d = .73$. Moreover, participants reported significantly less negative affect on the PANAS negative-affect subscale in the receiving-sarcasm condition than in the receiving-sincerity, $t(48) = 2.16$, $p = .036$, $d = .62$, or control condition, $t(47) = 2.16$, $p = .036$, $d = .62$. Finally, they reported significantly more negative affect on the same subscale in the expressing-sarcasm than in the receiving-sarcasm condition, $t(40) = 2.49$, $p = .017$, $d = .76$, and

[11] Neither the main effect of criticism (or anger) nor the interaction between condition and criticism (or anger) on any of the mood measures reached significance ($ps > .15$), suggesting that any effect of sarcasm on mood did not vary as a function of how critical or angry the sarcastic remarks were.

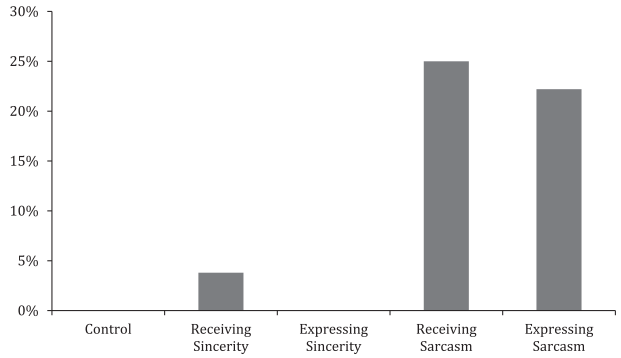


Fig. 7. Mean mood ratings across experimental conditions in Experiment 3. Error bars indicate ±1 SEM.

marginally more negative affect than in the expressing-sincerity condition, $t(37) = 1.82$, $p = .077$, $d = .57$. None of the rest of the comparisons on any of the mood measures reached significance ($ps > .13$).

The above findings suggest that the relationship between sarcasm and mood is complex. Although being the recipient of sarcasm seems to make individuals feel less positive, it also seems to reduce negative feelings, potentially because the humor associated with sarcasm cushions the blow of being mocked (e.g., Dews et al., 1995; Jorgensen, 1996). However, given that we did not observe the same patterns in Experiment 1, which employed the same mood measures, or in Experiment 2, which employed the same recall manipulation of sarcasm, we cannot draw any firm conclusions on the relationship between sarcasm and mood.

8.3.6. Mediation

To examine whether abstract thinking, positive mood, negative mood, or cognitive complexity drove the effect of sarcasm on creativity, we conducted four mediation analyses (Preacher & Hayes, 2008). Bootstrap analyses using 1000 bootstrap re-samples revealed that the indirect effect of sarcasm on creativity through abstract thinking was significant (point estimate = .62; 95% bias-corrected confidence interval of .08–1.61), hence supporting Hypothesis 4. However, the indirect effect of sarcasm on creativity was not significant through any other measures: the PANAS positive-affect subscale (point estimate = −.09; 95% bias-corrected confidence interval of −.71 to .09), the PANAS negative-affect subscale (point estimate = -.07; 95% bias-corrected confidence interval of −.53 to .14), overall positive mood (point estimate = −.09; 95% bias-corrected confidence interval of −.63 to .16), overall negative mood (point estimate = .02; 95% bias-corrected confidence interval of −.22 to .49), and cognitive complexity (point estimate <.01; 95% bias-corrected confidence interval of −.18 to .33).

8.4. Discussion

The findings of Experiments 1–3 demonstrate that expressing or receiving sarcasm (not just sarcastic anger or criticism) reliably increased creativity through abstract thinking, supporting Hypotheses 2, 3, and 4. This effect was observed using two different manipulations of sarcasm, three different measures of creativity, and a widely cited state measure of abstract thinking, both in the lab and on MTurk. Moreover, although there is some evidence that sarcasm recipients may experience less positive and less negative affects than expressers, consistent with Experiments 1 and 2, we did not find support for the mediating role of mood. We also did not find support for the mediating role of cognitive complexity. This is consistent with Miron-Spektor et al. (2011) who did not find a significant difference between observing sarcastic expression of anger and observing neutral conversation on cognitive complexity or a significant correlation between cognitive complexity and creativity. These findings provide evidence that sarcasm, despite its negative effect on conflict, can produce creative benefits through abstract thinking for both the expressers and recipients.

We also conducted a separate study on MTurk to replicate the main findings and mediation found in Experiment 3. The results completely mirrored the results of Experiment 3. Individuals who recalled expressing or receiving sarcasm engaged in more abstract thinking and were significantly better at solving the Duncker Candle Problem than those who recalled a neutral conversation, $F(2, 63) = 3.61$, $p = .03$, $\eta_p^2 = .10$, and $\chi^2(2, N = 66) = 8.96$, $p = .01$, $\varphi = .37$. The effect of sarcasm on creativity was mediated by abstract thinking (point estimate = .70; 95% bias-corrected confidence interval of .15–1.58).

9. Experiment 4: How sarcasm can increase creativity without inflaming conflict

Given the double-edged-sword nature of sarcasm and its wide use in organizational contexts, it is important to explore the conditions under which sarcasm could promote creative thinking without exacerbating conflict. As we have hypothesized, one possibility is that sarcasm is best used between organizational members who trust each other. This is because individuals' trust in conversation partners leads recipients to interpret their partners' behaviors positively and expressers to expect positive interpretation of their behaviors (Huang & Murnighan, 2010; McEvily et al., 2003). Therefore, when sarcasm expressers or recipients do not trust their conversation partners, expressing sarcasm toward or receiving sarcasm from them will increase a sense of conflict (while still increasing creativity). However, when sarcasm expressers or recipients trust their conversation partners, expressing or receiving sarcasm will increase their creativity but will not increase their sense of conflict. Experiment 4 examines these predictions.

9.1. Participants and design

Two hundred and fifty-eight Americans (131 males, 127 females; age 19–75, $M = 35.12$, $SD = 11.37$), recruited on MTurk for two and half dollars, were randomly assigned to a 2 (trust vs. distrust) by 5 (expressing-sarcasm, receiving-sarcasm, expressing-sincerity, receiving-sincerity, or control condition) design in a behavioral study.

9.2. Procedure

9.2.1. Trust manipulation

In the *trust* conditions, participants recalled the person they trust the most, wrote down the person's initials, briefly described the person's face, and explained why they trust this person. In the *distrust* conditions, participants went through the same process except that they recalled a person they distrust the most (or trust the least).

9.2.2. Sarcasm manipulation

We manipulated expressing (vs. receiving) sarcasm (vs. sincerity) or neutral conversations using a simulated conversation task similar to the one used in Experiment 1. In addition to the procedure employed in Experiment 1, we asked participants to imagine that the person shown speaking in these simulated conversations

was the person they just recalled and described (i.e., the person they trust or distrust the most).

9.2.3. Creativity

The same Olive in the Glass task measured creativity as in Experiment 3.

9.2.4. Conflict

The same scale measured perceived conflict as in Experiments 1 and 2 ($\alpha = .92$).

9.2.5. Trust manipulation check

Participants indicated how much they trust the person they described at the beginning of the study on an 11-point Likert scale (1 = not at all, 11 = very much).

9.3. Results

9.3.1. Trust manipulation check

Participants in the trust conditions trusted the person they described (i.e., their hypothetical conversation partner) significantly more than those in the distrust condition, $F(1, 247)$[12] = 1849.50, $p < .001$, $\eta_p^2 = .88$ (see Table 4 for means and pairwise comparisons). None of the rest of the effects reached significance ($ps > .14$).

9.3.2. Conflict

A two-way ANOVA with relationship quality (0 = distrust, 1 = trust) and sarcasm (0 = neutral or receiving or expressing sincerity, 1 = receiving or expressing sarcasm) found a significant main effect of trust, $F(1, 254) = 371.45$, $p < .001$, $\eta_p^2 = .59$, a significant main effect of sarcasm, $F(1, 254) = 10.75$, $p = .001$, $\eta_p^2 = .04$, and a significant interaction effect, $F(1, 254) = 6.97$, $p = .009$, $\eta_p^2 = .03$ (see Table 4 and Fig. 8 for means and pairwise comparisons). Specifically, for those in the distrust conditions, participants perceived significantly more conflict in the expressing-sarcasm condition than in the expressing-sincerity, $t(42) = 2.24$, $p = .03$, $d = .69$, receiving sincerity, $t(42) = 1.97$, $p = .056$, $d = .61$, or control condition, $t(43) = 2.20$, $p = .03$, $d = .67$. They also perceived significantly more conflict in the receiving-sarcasm condition than in the expressing-sincerity, $t(53) = 2.98$, $p = .004$, $d = .80$, receiving sincerity, $t(53) = 2.68$, $p = .01$, $d = .71$, or control condition, $t(54) = 2.94$, $p = .005$, $d = .79$. Supporting Hypothesis 5, none of these comparisons was significant in the trust conditions ($ps > .48$).

9.3.3. Creativity

A logistic regression regressed the solution of the Olive problem (0 = no, 1 = yes) on the relationship quality (0 = distrust, 1 = trust), whether the conversation was sarcastic (0 = neutral or receiving or expressing sincerity, 1 = receiving or expressing sarcasm), and the interaction term between these two variables. Participants who had sarcastic conversations were significantly more likely to solve the problem than those who had non-sarcastic conversations, $B = 3.23$, $SE = 1.08$, $p = .003$ (see Table 4 and Fig. 9 for percentages and pairwise comparisons), once again supporting Hypothesis 2. None of the rest of the effects reached significance ($p > .81$).

9.4. Discussion

The trust that sarcasm expressers or recipients had toward conversation partners moderated the effect of sarcasm on their own sense of conflict, supporting Hypothesis 5. Individuals who trusted their conversation partners did not experience sarcasm's conflict-provoking effect as those who distrusted their conversation partners did. However, regardless of whether sarcasm expressers and recipients trusted or distrusted their conversation partners, they always benefited from sarcasm's creative effect, once again supporting Hypothesis 2.

[12] One participant's answer to the manipulation check questions was not recorded due to a technical error.

Table 4
Trust manipulation check scores, mean conflict ratings, and percentages of participants who solved the Olive in a Glass problem (creativity) across experimental conditions in Experiment 4. Standard deviations are in parentheses. Means with different superscripts within column are significantly different at $p < .05$. Means with different superscripts within column accompanied by * are significantly different at $p < .10$.

		Trust Check	Conflict	Creativity (%)
Distrust	Control	2.71^{a*} (2.14)	6.80^{a} (2.01)	0^{a}
	Receiving sincerity	2.96^{a*} (2.81)	6.75^{a*} (2.47)	0^{a}
	Expressing sincerity	2.46^{ab} (2.06)	6.70^{a} (2.18)	4^{ac*}
	Receiving sarcasm	1.87^{b*} (1.09)	8.28^{b} (1.75)	19^{b*}
	Expressing sarcasm	1.85^{ab} (1.27)	8.04^{b*} (1.70)	20^{b*}
Trust	Control	10.88^{c} (0.33)	2.93^{c} (1.77)	0^{a}
	Receiving sincerity	10.76^{c} (0.79)	2.63^{c} (1.45)	3^{a}
	Expressing sincerity	10.59^{c} (1.71)	2.68^{c} (1.75)	0^{a}
	Receiving sarcasm	11.00^{c} (0.00)	2.83^{c} (1.69)	24^{b*}
	Expressing sarcasm	10.86^{c} (0.48)	2.93^{c} (1.59)	19^{b*}

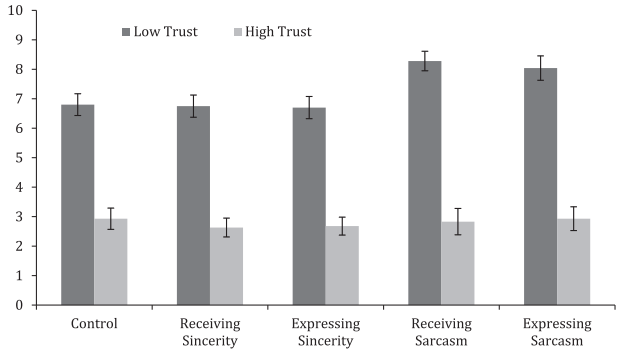


Fig. 8. Mean perceived conflict ratings across experimental conditions in Experiment 4. Error bars indicate ±1 SEM.

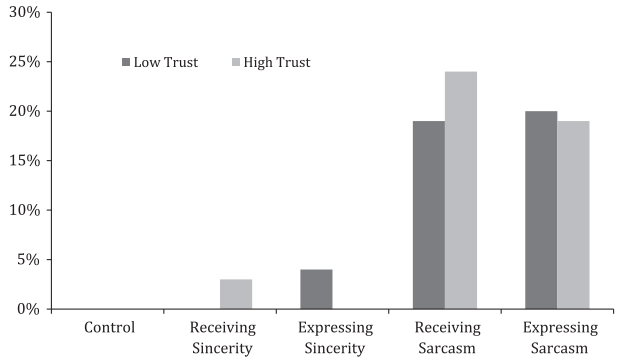


Fig. 9. Percentages of participants who solved the Olive in a Glass Problem (creativity) across experimental conditions in Experiment 4.

10. General discussion

Four studies found that sarcastic remarks catalyzed creativity in both sarcasm expressers and recipients. This creativity effect was not limited to sarcastic anger or criticism and emerged regardless

of the content of the sarcastic exchange. The effect on creativity travelled through abstract thinking for both sarcasm expressers and recipients. In contrast, sarcasm was not a reliable antecedent of positive mood, negative mood, or cognitive complexity. Sarcasm also increased feelings of interpersonal conflict. But, we found that trust was a critical moderator of the effect of sarcasm on conflict but not on creativity.

10.1. Theoretical and practical implications

The current research makes a number of contributions to the literature on creativity. First and foremost, it identifies an important social psychological antecedent of creative behavior. Much management and psychology research has dedicated itself to the study of individual factors, such as personality, intelligence, education, and expertise (e.g., Amabile, 1988; Barron & Harrington, 1981; George & Zhou, 2001; Woodman, Sawyer, & Griffin, 1993). Recently, the two fields have started to devote considerable attention to social and organizational factors that influence creativity through individuals' cognition, emotion, and behavior (e.g., Amabile, Conti, Coon, Lazenby, & Herron, 1996; Maddux & Galinsky, 2009; Oldham & Cummings, 1996; Shalley & Perry-Smith, 2001). One example is cognitive styles (e.g., Woodman et al., 1993), specifically abstract thinking (e.g., Finke, 1995; Ward et al., 2004). Our findings identify sarcasm as an antecedent of abstract thinking and add to this recent line of creativity research.

Second, our research corroborates the increasingly robust relationship between various forms of contradiction and creativity (e.g., Gino & Wiltermuth, 2014; Huang & Galinsky, 2011). It demonstrates that sarcasm—expressions that intend to convey their true meaning by signifying the opposite of their literal meaning—affords creative benefits.

Third, our findings demonstrate that aggressive humor such as sarcasm, like other milder forms of humor, can also promote creativity. Previous theorizing has focused almost exclusively on affiliative humor and its effect on creativity through mood (e.g., Isen et al., 1987). To build a complete theoretical map for the relationship between workplace humor and creativity, the field needs to look at a wider palate of humor. Our findings address this theoretical gap, showing that, unlike the more affiliative humor, sarcasm promotes creativity through a cognitive route.

The current research also contributes to the sarcasm literature. Our model goes beyond previous research and explicates sarcasm's effect on creativity that generalizes across two important dimensions, role and content. First, our model demonstrates that the positive effects of sarcasm on abstract thinking and creativity apply to both expressers and recipients. Previous research found that third-party observers of a sarcastic exchange that was also angry enjoyed enhanced creativity (Miron-Spektor et al., 2011). Our research is the first to demonstrate that being the actual participants, not just the observers, of sarcastic exchanges has creative benefits too. Second, our model demonstrates that the creative benefits of sarcasm do not depend on the particular content of the sarcastic exchange. Instead, creativity seems enhanced following all types of sarcasm, from sarcastic anger and criticism to sarcastic compliments and banters. This demonstration is a fruitful step into the exploration of sarcasm's conceptual boundary and its general effects. It suggests that sarcasm is best represented in its general form, i.e., expressions "that communicate one's meaning through language that signifies the opposite (e.g., Pexman & Olineck, 2002), instead of expressions that use "a literal *positive* meaning to communicate a *negative* message" (Miron-Spektor et al., 2011).

Our finding that trust reduces the sarcasm-conflict effect also sheds light on the relational function of sarcasm. While most psycholinguistic research has found sarcasm more contemptuous than sincerity (e.g., Kreuz et al., 1991), some ethnographic work has found it more polite and solidarity-enhancing among close others and within workgroups (e.g., Jorgensen, 1996; Seckman & Couch, 1989). These seemingly contradictory findings may occur because this literature failed to consider the quality of relationship between expressers and recipients, specifically how much they trust each other. While sarcasm in a non-trusting relationship fuels conflict, sarcasm in a trusting-relationship is less harmful and may even bring individuals closer.

Additionally, our research contributes to Construal Level Theory (Trope & Liberman, 2010). It identifies sarcasm, a contradiction between stated and intended meanings, as a new form of psychological distance and demonstrates that sarcasm expressers and recipients engage in abstract thinking because it is indispensable to the traversing of psychological distance.

Finally, our work bears practical implications. Sarcasm is often used in exchange relationships and in organizations more broadly. It is generally considered detrimental to communication. A simple Internet search would generate copious advice from communication coaches on how to eradicate sarcasm from the workplace. To avoid interpersonal friction and conflict, both teams and organizations may be tempted to follow this advice. The current research suggests that, by doing so, organizations would "throw out the baby with the bath water", jeopardizing the cognitive benefits of sarcasm.[13] Our research offers a pragmatic way to benefit from sarcasm without its relational costs. Expressing sarcasm with or receiving sarcasm from trusted others allows individuals to reap the benefits of creativity without incurring conflict. This practice may prove especially rewarding in organizations where sarcasm is an inherent part of the job and building trust is equally critical but often neglected (e.g., comedy clubs).

10.2. Limitations and directions for future research

We note several limitations of the current work and identify fruitful directions for future research. First, although Experiment 3 found that both sarcasm expressers and recipients considered the sarcasm humorous, Experiment 1 found that sarcasm expressers were more amused than recipients. This suggests that while both expressers and recipients of sarcasm enjoy abstract thinking as a common cognitive process, they might differ on other aspects of their experiences such as humor appreciation, especially since neuropsychology research suggests that cognitive processes are not sufficient for humor appreciation, a process that requires an integration of cognitive and affective processes (Shammi & Stuss, 1999). Neuroimaging results indicate that while left inferior frontal and posterior temporal cortices are responsible for the cognitive process of humor detection, bilateral regions of insular cortex and the amygdala are responsible for the affective experience of mirth and, as a result, humor appreciation (Moran, Wig, Adams, Janata, & Kelley, 2004). Future research could shed more light on when sarcasm expressers and recipients experience different levels of activity in the latter brain regions and enjoy sarcasm to a different degree. It may help build a more integrated theoretical framework for understanding when sarcasm expressers enjoy creative benefits through both a cognitive and an affective route; in contrast, we expect that recipients depend solely on the cognitive channel to deliver sarcasm's creative benefits.

[13] A few sarcastic remarks or even recalling the experience of sarcasm in the past can have medium and occasionally large effects on creativity (φs = .29–.49; Cohen's *d*s = .64–1.00); these effect sizes are comparable to the effect sizes of affiliative humor (φs = .50–.55; *d*s = .46–.91; Isen et al., 1987; Ziv, 1976, 1983), education (*d*s = .43–.87; Perry-Smith, 2006; Tierney, Farmer, & Graen, 1999), and expertise (*d*s = 43–.82; Perry-Smith, 2006; Tierney et al., 1999).

Similarly, although Experiments 1 and 2 did not find an effect of sarcastic experience on mood, Experiment 3 found that sarcasm recipients experienced both more positive *and* negative moods compared to the other conditions. Given this inconsistency across studies, future research is also needed to understand the complex relationship between sarcasm and mood.

Finally, abstract thinking has been shown to predict a variety of social and organizational outcomes, including psychological power, moral outrage, group identification, and stereotyping (Gong & Medin, 2012; McCrea, Wieber, & Myers, 2012; Smith, Wigboldus, & Dijksterhuis, 2008). Given that we have shown that sarcasm is a reliable antecedent of abstract thinking, future research should investigate other potential social and organizational effects of sarcasm through abstraction, beyond just creativity.

11. Conclusion

The current research establishes sarcasm as a double-edged sword: it helps people think creatively even as they seethe in conflict. We have also shown that abstract thinking is the driving force that connects sarcasm to creativity and that sarcastic exchanges in trusting relationships boost creativity without incurring conflict. As Oscar Wilde believed, sarcasm, at times, represents a lower form of humanity, but it certainly catalyzes a higher form of thought.

Acknowledgment

The authors are grateful for the insightful suggestions provided by William W. Maddux.

Appendix A. A sample item of the modified P-FS in Experiments 1 and 4

Appendix B. The Remote Association Task (RAT) in Experiment 1

Triads	Solution
(1) blank-white-lines	PAPER
(2) magic-plush-floor	CARPET
(3) thread-pine-pain	NEEDLE
(4) stop-petty-sneak	THIEF
(5) envy-golf-beans	GREEN
(6) chocolate-fortune-tin	COOKIE
(7) barrel-root-belly	BEER
(8) broken-clear-eye	GLASS
(9) pure-blue-fall	WATER
(10) widow-bite-monkey	SPIDER
(11) chamber-staff-box	MUSIC
(12) mouse-sharp-blue	CHEESE
(13) hall-car-swimming	POOL
(14) square-cardboard-open	BOX
(15) ticket-shop-broker	PAWN
(16) high-book-sour	NOTE
(17) gold-stool-tender	BAR

Appendix C. The role types and scales of the Rep test in Experiment 3

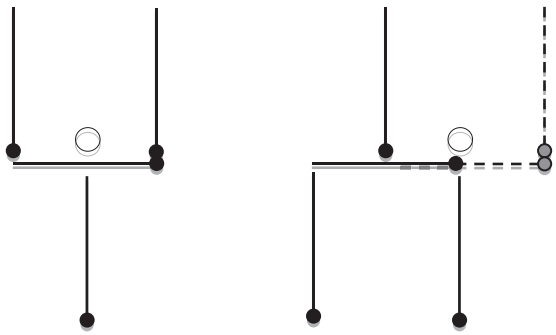
Role Types:

Yourself; Person you dislike; Mother; Person you would like to help; Father; Friend of the same sex; Friend of the opposite sex; Person with whom you feel most uncomfortable; Boss; Person hard to understand

The Scales:

Interesting (1) – Dull (6)
Independent (1) – Dependent (6)
Outgoing (1) – Shy (6)
Maladjusted (1) – Adjusted (6)
Self-absorbed (1) – Interested in others (6)
Decisive (1) – Indecisive (6)
Inconsiderate (1) – Considerate (6)
Ill-humored (1) – Cheerful (6)
Irresponsible (1) – Responsible (6)
Calm (1) – Excitable (6)

Appendix D. The Olive in a Glass problem and solution in Experiments 3 and 4



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