

Individual Differences in Sarcasm Interpretation and Use: Evidence From the UK and China

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Sarcasm is commonly used in everyday language; however, little is currently known about cultural and individual differences in sarcasm interpretation and use, particularly across Western and Eastern cultures. To address these gaps in the literature, the present study investigated individual differences in sarcasm interpretation and use in the UK and China. Participants first rated literal and sarcastic comments regarding degree of perceived sarcasm, aggression, amusement, and politeness. They then completed tasks which assessed their theory of mind (ToM) ability, perspective taking ability, and sarcasm use tendency. The results showed that UK participants were more sarcastic than Chinese participants. In terms of interpretation, UK participants rated sarcasm as being more amusing and polite than literal criticism, whereas the Chinese data showed that sarcasm was rated as being more amusing but also more aggressive than literal criticism. ToM ability and perspective taking ability positively predicted sarcasm perception in both cultural groups, while the effects of ToM on other rating dimensions varied across cultures. Sarcasm use tendency negatively predicted perception of sarcasm and aggression in UK participants, whereas the opposite was found for Chinese participants. The decomposition of individual difference effects showed that different facets of interpretation and socio-emotional impact of sarcasm are differentially associated with different cultural and individual differences factors. From this, we propose that both cultural and individual differences factors modulate sarcasm interpretation and use: Participants from different cultures and with different traits may view sarcasm differently, which, in turn, affects their interpretation and use of sarcastic language.

Keywords: sarcasm interpretation, sarcasm use, theory of mind, cultural differences, perspective taking

Although there is some debate regarding the definition of verbal irony, at a basic level, many comments that are considered ironic are those in which the speaker aims to express the intended meaning by saying the opposite (Grice, 1975). Sarcasm can be defined as a kind of verbal irony for which there is typically a victim (Kreuz & Glucksberg, 1989; see Kreuz, 2020, for recent discussion). An example of sarcasm would be if you said to a friend, “Well done,” when they spilled a cup of coffee on your favorite carpet. You might be very angry about the damage, but you were risking being misunderstood by indirectly criticizing your friend with a comment

that is superficially positive. Some previous research suggests that sarcasm, also known as ironic criticism, may serve extra functions that could not be achieved by straightforward criticism, such as face-saving (e.g., Dews et al., 1995), being humorous (e.g., Dress et al., 2008), or mocking (e.g., Katz & Pexman, 1997). Due to this, linguists and psychologists have become increasingly focused on factors underlying the interpretation of sarcasm. However, research that has examined cultural factors and social cognition factors that may contribute to different interpretations is relatively rare. The present study aims to investigate the effects of participants’ cultural background and individual differences factors in sarcasm interpretation and use, specifically, theory of mind (ToM) ability, and perspective taking ability, by manipulating the perspective that the participant takes while they are rating utterances on a number of dimensions, with participants in both the UK and China.

Sarcasm Interpretation

Some previous research has provided evidence that sarcasm is more condemning and aggressive than literal language and that it is more insincere and impolite (Bowes & Katz, 2011; Colston et al., 1997; Katz et al., 2004; Toplak & Katz, 2000; Zhu & Wang, 2020). In contrast, other research suggests that sarcasm (ironic criticism) dilutes condemnation and is more positive and polite than literal criticism (e.g., Dews & Winner, 1995; Filik et al., 2016; Jorgensen, 1996; Matthews et al., 2006; Pickering et al., 2018). The suggestion that sarcasm mutes the negative effect of criticism compared to literal criticism underlies the Tinge Hypothesis (Dews & Winner, 1995), which states that the negative aspects of criticism are reduced by expressing them in a positive way. The

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<https://osf.io/a5pwn/>.

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Tinge Hypothesis is further supported by evidence from eye-tracking studies on the emotional impact of sarcasm, which showed that sarcastic criticism is ultimately perceived as less negative and more amusing than literal criticism (Barzy et al., 2020; Filik et al., 2017). Thus, the existing evidence is mixed.

Pexman and Olineck (2002) proposed a resolution for the debate over whether sarcasm enhances condemnation (e.g., Colston et al., 1997) or mutes the negativity of criticism (Dews & Winner, 1995). They claimed that the mixed results may be caused by different dependent measures being employed, for example, rating measures of condemnation and sarcasm may have addressed speaker intent and rating measures of politeness and positivity may have addressed social impression. They suggested that the Tinge Hypothesis may be relevant to the social impression of sarcasm rather than speaker intent (Pexman, 2005).

In addition to perspective, some research suggests that ironic intonation may influence the perception of sarcasm. For example, there is some evidence that an ironic intonation can increase irony ratings and decrease processing times for ironic comments, compared to a non-ironic tone of voice (Deliens et al., 2018). In relation to this, Colston (1997) considered whether the format in which the stimulus was presented might be factor for the mixed findings in sarcasm interpretation. That is, Dews and Winner (1995) used auditory recordings as stimuli and Colston used written sarcasm. However, Colston (1997) did not find evidence to support this possibility when comparing a condition in which participants were asked to imagine the tone of voice in reading with a condition without imagination. Thus, there have been mixed findings as for the effects of potential factors that may influence sarcasm interpretation.

Notably, most previous research on the social functions of sarcasm has overlooked the potential effect of cultural factors. That is, research in this area has mainly been conducted in Western cultures, often in the English language, with the resulting theories being exclusively based on data from Western participants. Research has suggested that it is the humorous element that makes sarcasm so widely used, by allowing speakers to criticize with humor, thus muting the negative effect on the speaker-recipient relationship (Dews et al., 1995; Roberts & Kreuz, 1994). Previous research on humor demonstrated that people from Eastern cultures interpreted humor more negatively than people from Western cultures and they were less likely to use humor to deal with stress or difficulty (see Jiang et al., 2019, for a review). McKeown (2017) stated that the comprehension of humor deeply depended on the shared culture and language of characters in a conversation, especially for humor that demanded more cognitive effort (e.g., sarcasm). Blasko et al. (2021) recently demonstrated that participants from the US and Mexico demonstrated higher self-reported tendencies to use sarcasm than Chinese participants. Hence, we propose that there might be cultural differences in sarcasm interpretation and use between the UK and China.

Cultural Differences in Sarcasm Interpretation and Use

There has been some research on cultural differences in sarcasm. For example, sociocultural factors, such as whether they were communicating in their native language, influenced sarcastic communication in both UK and US participants (Oprea & Magdy, 2020). Research on prosody in sarcasm comprehension also showed cultural differences—In English, speakers lowered the fundamental frequency to communicate sarcasm, whereas in Cantonese, speakers

raised the fundamental frequency in sarcastic contexts (Cheang & Pell, 2009).

As for cultural effects in sarcasm use, participants from countries with individualistic cultures tend to be more sarcastic than those from collectivist cultures (Blasko et al., 2021; Rockwell & Theriot, 2001). Some research even showed regional differences in sarcasm use, for example, participants from Northern America were more likely to use sarcasm than participants from Southern regions and were likely to rate sarcasm as being funnier (Dress et al., 2008). Kim and Lantolf (2018) stated that sarcasm was less frequently used and was considered as being more negative in Korean than in American English. Similarly, the Japanese culture may give people the impression that Japanese people seldom use sarcasm (Iseli, 2020). In Japan, sarcasm usually serves the communicative function of insulting people and indicating that you are looking down upon them.

Considering figurative language more broadly, previous research examining idiom and metaphor suggests cultural differences between the UK and China. For example, in relation to idiom, R. Wang (2022) examined differences in areas of geography, history, customs, and religious beliefs between Chinese and Western cultures. For example, many idioms in the UK are related to the sea because the UK is an island nation with a long seafaring history, whereas many idioms in China are related to agriculture due to China being a mainland nation with a long history of farming. Previous research on metaphor also suggests that some metaphors are culture-specific (Yu & Jia, 2016). For example, in Chinese the ideal source domain of the *Life is a show* metaphor is *Chinese opera*, with Beijing opera as the prototype, and the salient subversion is *Life is an opera*. However, in English, the central source domain is *play* and the salient subversion is *Life is a play*. In terms of processing and comprehension, while there has been some research examining moment-to-moment cognitive processing underlying comprehension of figurative expressions in Chinese (see, e.g., X. Wang et al., 2021; H. Zhang et al., 2013), we are not aware of any cross-cultural processing studies between the UK and China.

Sarcasm, as a type of figurative language and a way to criticize indirectly, may be influenced by culture as well. Previous research on Chinese sarcasm suggests that sarcasm is mainly used to show negative attitude, with the intent to be hurtful (e.g., J. Zhang, 2003; Zhao, 1997), which seems different from some of the social functions (e.g., muting the negativity of criticism) suggested by studies based on the English language (e.g., Dews & Winner, 1995). Thus, although there have been some studies examining cultural factors in sarcasm use and comprehension, there are relatively few cross-cultural studies to date and there has been little research on sarcasm comprehension in verbal conversation in China, particularly the social functions of sarcasm compared with literal criticism. To our knowledge, there is no previous research, which has examined both sarcasm interpretation and use across Western and Eastern cultures. This study aimed to fill this gap in the literature. Moreover, constraint-satisfaction accounts suggest that besides linguistic factors and contextual factors (e.g., the relationship between characters in a conversation), individual differences factors may also influence sarcasm interpretation (Pexman, 2008). Previous research in children, in neurodiverse populations, and people with brain damage suggests that ToM ability plays an important role in sarcasm comprehension (e.g., Barzy et al., 2020; Filippova & Astington, 2008; Shamay-Tsoory et al., 2005). However, there has been little research

that examines the effect of ToM in neurotypical adults. In the present study, we will also examine the effects of individual differences, specifically, ToM ability, perspective taking ability, and sarcasm use tendency in sarcasm interpretation.

ToM and Sarcasm

Research in children suggests that first-order and second-order ToM are the basis of successful sarcasm comprehension (e.g., Filippova & Astington, 2008; Happé, 1993; Sullivan et al., 1995). First-order ToM assumes that an individual can infer that another person may hold false beliefs about events; second-order ToM assumes that a person could infer that another person may have false beliefs about someone else's beliefs (Perner & Wimmer, 1985). In sarcasm comprehension, the participant not only needs to know the speaker's intention or motivation concerning the recipient's belief (Winner & Leekam, 1991), but also needs to know that the recipient knows the speaker's intention rather than to interpret it as a lie (Sullivan et al., 1995).

There has been some research that has investigated the relationship between ToM and sarcasm interpretation. For example, evidence from functional magnetic resonance imaging (e.g., Filik et al., 2019; Rapp et al., 2010; Shamay-Tsoory et al., 2005; Shibata et al., 2010; Spotorno et al., 2012; Uchiyama et al., 2012) shows that brain regions involved in mentalizing processes (e.g., medial prefrontal cortex) are also activated during sarcasm comprehension. Spotorno and Noveck (2014) reported a positive effect of mindreading ability on irony processing in adults. However, they did not measure ToM ability directly; instead, they adopted the Autism-Spectrum Quotient (Baron-Cohen et al., 2001). Moreover, Barzy et al. (2020) demonstrated that autistic participants, who scored lower in a ToM task (*the animations task*), did not predict a character's emotional responses to ironic criticism in the same way as neurotypical controls. Caillies et al. (2014) showed that children with attention-deficit hyperactivity disorder (ADHD) performed poorly on both ToM tasks and irony comprehension tasks. Thus, many prior studies on ToM and sarcasm comprehension have focused on participants with diverse characteristics (autism, ADHD, etc.), whereas studies on neurotypical adults' ToM and sarcasm comprehension are relatively rare. Therefore, more research is needed to understand more fully how ToM is related to sarcasm interpretation.

Sarcasm Use Tendency and Sarcasm Interpretation

There are a number of other individual differences factors which may influence sarcasm interpretation. For example, Ivanko et al. (2004) suggested that the self-perceived use of sarcasm is relevant to sarcasm interpretation. More recently, Howman and Filik (2020) examined the relationship between scores on the sarcasm self-report scale (SSS) (Ivanko et al. 2004) and sarcasm comprehension in an eye-tracking study with participants from the UK. Results showed that people who tended to use sarcasm more regularly found it easier to process sarcastic comments and were also more likely to interpret ambiguous comments sarcastically. However, another eye-tracking study conducted in Finnish by Kaakinen et al. (2014, Experiment 2) found no significant relationship between SSS scores and the time course of sarcasm processing.

When participants are more often a speaker (usual speaker) of sarcasm in daily communication, according to in-group bias (Myers &

Twenge, 2016), they may favor other sarcastic speakers, perhaps by assuming that they spoke in such a way to criticize with politeness or to be humorous. Indeed, previous research has illustrated that people who use sarcasm frequently themselves perceive sarcasm as less condemning, less mocking, more humorous, and more polite (e.g., Bowes & Katz, 2011). In contrast, participants who are more often recipients (usual recipient) of sarcasm may perceive sarcastic comments as more condemning and aggressive. They may think that by being critical in a surprisingly positive way, the speaker intends to convey criticism with extra emphasis (Colston, 1997). Thus, it is reasonable to infer that participants' usual role in sarcastic conversation should affect their perception of and attitude toward sarcasm. Therefore, although scales assessing sarcasm use tendency (such as the SSS) are useful in assessing a participants' likelihood of using sarcasm generally, and in certain specific situations, it is necessary to determine the participants' view regarding whether they see themselves as a usual speaker or usual recipient to examine whether there would be "in-group bias" in the interpretation of sarcasm. Furthermore, participants' usual roles in sarcastic conversation may affect their adoption of certain perspectives. That is, when "usual speakers" of sarcasm are asked to imagine they were the speaker in a scenario, it is consistent with their typical role, therefore potentially requiring no perspective change. In contrast, when "usual speakers" are asked to imagine they were the recipient in a conversation, they may need to suppress their own usual perspective to do this. We will examine the effect of participants' usual role in sarcasm interpretation in the current study.

The Role of Perspective in Sarcasm Interpretation

Besides the potential effect of participants' usual role in sarcastic conversation, their role in a specific sarcastic conversation may also affect their interpretation of sarcasm. That is, what the speaker intends to convey (e.g., amusement) might be different from the recipient's perception (e.g., hurtfulness). Thus, it is important to investigate the role of the perspective that participants take during reading in sarcasm interpretation.

A number of studies have suggested an important role for perspective in sarcasm interpretation. For example, a qualitative study showed that some speakers considered sarcastic comments to be humorous, and they believed that the recipients had the same opinions (Jorgensen, 1996, Experiment 1). The author then examined the recipient's feelings and perceptions by asking participants to take the recipient's perspective (Experiment 3). Results showed that sarcasm softened negative feelings toward the speaker more often than causing humor. Toplak and Katz (2000) manipulated perspectives of the speaker and recipient in sarcasm perception and found that participants taking both perspectives rated sarcasm as more impolite than literal criticism. However, Bowes and Katz (2011) found that participants taking the perspective of the speaker rated both sarcastic and literal criticism as being more polite than when they were taking the recipient's perspective, and only participants taking the perspective of the speaker considered sarcasm more humorous than literal criticism. Evidence from eye-tracking during reading (Filik et al., 2017) and event-related brain potentials (Thompson et al., 2021) further suggests that when considering the perspective of the speaker, participants may find it easier to integrate a description of an amused response to criticism than when considering the perspective of the recipient. Investigating situations from multiple perspectives

highlights the need to explore participants' ability to successfully adopt different perspectives. Thus, in the current study, we also will examine the effects of perspective taking ability in sarcasm interpretation.

The Current Study

The purpose of the current study is twofold. First, we aim to investigate cultural differences in sarcasm interpretation when participants take the perspective of the speaker, the recipient, and the reader in a scenario, and cultural differences in sarcasm use tendency. Second, we aim to explore whether and how individual differences, specifically, ToM ability, perspective taking ability, sarcasm use tendency, and usual roles in sarcastic conversation may affect the interpretation of sarcasm differently in UK participants and Chinese participants.

The present study aims to address the following questions: (a) Does sarcasm enhance condemnation or mute the negativity of criticism? (b) Are there any cultural differences in sarcasm interpretation and use between the UK and China? (c) How will participants taking different perspectives interpret sarcasm? (d) What are the relationships between individual differences, such as ToM ability, perspective taking ability, sarcasm use tendency, and sarcasm interpretation?

Participants will be presented with scenarios that are either literal or sarcastic (i.e., ironic criticism), from the perspective of the speaker, the recipient, or the reader (i.e., their own perspective). They will be required to answer four questions—specifically, *How sarcastic is the comment? How aggressive is the comment? How amusing is the comment? And How polite is the comment?*—using 7-point scales from *not at all* to *very*. They will then perform a series of tasks to assess ToM ability, perspective taking ability, sarcasm use tendency, and usual roles in sarcastic interactions.

Predictions

Regarding cultural differences in sarcasm interpretation, based on previous research conducted in English, for the UK sample, we predict that if sarcasm enhances condemnation (Colston, 1997), sarcastic comments would be rated as more aggressive, less polite, and less amusing than literal criticism. If sarcasm mutes the negativity of criticism (following the Tinge Hypothesis; Dews & Winner, 1995), we should observe the opposite. There has been no previous research on the social functions of sarcasm compared with literal criticism in Chinese. However, since sarcasm may be considered as negative and hurtful in China (J. Zhang, 2003; Zhao, 1997), we might predict that sarcastic comments would be rated as being more aggressive and less polite than literal criticism by the China sample. Predictions for ratings of amusement are less clear, as although sarcasm may be considered negative and hurtful, it may nevertheless still be considered to be amusing. However, following previous research on cultural differences in humor comprehension (Jiang et al., 2019), we might predict that Chinese participants may consider sarcasm as being more aggressive, but less amusing than English participants. As for cultural differences in sarcasm use, based on recent findings that participants from China report using sarcasm less than participants from the US (Blasko et al., 2021), we would predict that Chinese participants would be less likely to use sarcasm than UK participants.

In relation to perspective, the interpretation of sarcastic comments may depend on the perspective adopted by the rater (Pexman & Olineck, 2002). Following Bowes and Katz (2011), participants taking the recipient's perspective should perceive sarcasm as being more sarcastic and aggressive than participants taking the speaker's perspective. Participants taking the speaker's perspective should perceive sarcasm as being more polite and amusing than those taking the recipient's perspective. As for cultural differences in the effect of perspective, it is hard to make specific predictions due to the rarity of such research in China.

In relation to individual differences factors, according to Happé (1993), ToM ability should predict sarcasm rating scores. Specifically, participants with a higher level of ToM ability should find it easier to perceive the speaker's intent and so should rate sarcastic comments as being more sarcastic. In terms of the relationship between perspective taking ability and sarcasm interpretation, based on the predicted positive correlation between ToM and perspective taking ability (Barnes-Holmes et al., 2004), we predict that perspective taking ability would also have a positive association with sarcasm rating scores. In terms of self-reported sarcasm use, previous research suggests that participants with higher scores on certain subscales of the SSS are more likely to rate sarcasm as less polite (subscale—*face saving*) and more mocking (subscale—*general sarcasm*; Ivanko et al., 2004), and participants with higher overall scores on the SSS are more likely to interpret ambiguous comments sarcastically (Howman & Filik, 2020). Thus, we predict that overall scores on the SSS would be positively correlated with ratings of sarcasm. Following the ingroup bias (Myers & Twenge, 2016) and Bowes and Katz's (2011) suggestion that the speaker considers sarcasm as being more polite and humorous than the recipient, we would also predict that participants who are more often a speaker in a sarcastic conversation (usual speakers) would perceive sarcasm as being more polite and amusing but less aggressive than participants who are more often a recipient (usual recipients). As for individual difference effects in sarcasm use, previous research conducted in Chinese showed that participants who had very low ToM or who had very advanced ToM ability both demonstrated higher tendency to use sarcasm (Zhu & Wang, 2020). However, generally their results showed a negative prediction of ToM ability for likelihood of sarcasm use. Thus, we predict that ToM ability and perspective taking ability would negatively predict sarcasm use in China. For UK participants, it is harder to make predictions due to the rarity of relevant research in the English language.

As for whether there would be cultural differences in the effects of individual differences factors, it is again more difficult to make predictions. Previous research on the role of ToM ability and sarcasm self-report use tendency was conducted with Western participants. Results from one recent study (Blasko et al., 2021) showed that Chinese participants were less likely to use sarcasm compared with participants from the US, which has more cultural common ground with the UK than with China. Chinese people may view ironic criticism as a negative expression (e.g., Zhao, 1997), whereas people from Western countries (e.g., the UK, the US) may consider ironic criticism as being funny (e.g., Filik et al., 2016; Jorgensen, 1996). Thus, we predict that participants' cultural background may moderate the effects of some individual differences. That is, participants who have higher ToM ability could better perceive the speaker's intent when using sarcasm (i.e., being negative in China, or being funny in the UK); thus, Chinese participants with higher

ToM ability may rate sarcastic comments as being more aggressive and less amusing than participants who have lower ToM ability. In contrast, UK participants with high ToM ability may rate sarcastic comments as being less aggressive and more amusing than participants who have lower ToM ability. As for the effect of sarcasm use tendency in sarcasm interpretation, there have been mixed findings in previous research conducted in English and Finnish (e.g., Howman & Filik, 2020; Ivanko et al., 2004; Kaakinen et al., 2014), and there has been no previous research on this issue in Chinese. Thus, it is hard to make predictions on how culture would moderate this effect.

Method

Transparency and Openness

We report all data exclusions, manipulations, and measures. All the research materials, data, and analysis code are available through the Open Science Framework (Zhu & Filik, 2022): <https://osf.io/a5pwn/>. Data were analyzed using R, Version 4.0.3 (R Core Team, 2020) and the package *lme4*, Version 1.2.1335 (Bates et al., 2015). This study design and analysis were not pre-registered. The study was approved by the Ethics Committee of the School of Psychology, University of Nottingham (Ref. S1303).

Participants: The UK

Two hundred and twenty-one native English speakers took part (age range = 18–54, $M = 21.98$, $SD = 7.01$, 64 males, 155 females, two did not report).¹ Participants with diagnosed autism, schizophrenia, or dyslexia, were excluded from participating, as these might impact reading or sarcasm interpretation. Participants were recruited through the SONA system (a research participation scheme for undergraduate students), survey swap websites such as Survey Circle, social media such as Twitter, and Prolific. Participants were rewarded with course credit, a voucher prize draw, or an honorarium (depending on how they were recruited).

Materials and Design: The UK

The experiment had a 2 (comment type: literal, sarcastic) by 3 (perspective: speaker, recipient, reader) within-subject design. Forty-eight experimental scenarios and 16 filler scenarios (eight of which contained neutral comments and eight contained positive comments) were created (see Table 1 for an example). The target sentence in each scenario was simply a direct expression such as, “You are a good helper,” to lessen any comprehension burden that might be caused by further indirectness. To counterbalance, participants saw each experimental scenario in only one of the six conditions, and in each condition, there were eight scenarios. Thus, there were six versions of the questionnaire and each version included 48 experimental scenarios and 16 fillers. All versions of the experimental materials and fillers are available here (Zhu & Filik, 2022): <https://osf.io/a5pwn/>. The order of the scenarios was randomized separately for each participant and each version was randomly distributed to different participants through the randomization function of Qualtrics. Each scenario was presented with a 7-point rating scale ranging from 1 (*not at all* ~) to 7 (*very* ~). The rating items were: *How sarcastic is the comment?* *How aggressive is the comment?* *How amusing is the comment?* and *How polite is the comment?*

ToM Task

We utilized the Faux Pas test (Stone et al., 1998) to assess ToM ability, since it has been reported that even neurotypical individuals usually do not perform faultlessly in this task (Spek et al., 2010), thus allowing us to observe sufficient variation in scores. Participants were asked to read 20 short stories and after each story to answer a detection question first to see if they grasped the awkward speaking in the story (*Did anyone say something they shouldn't have said or something awkward?*) and then to specify who is the speaker (*Who said something inappropriate?*) via a multiple-choice question. Two more questions were designed to test participants' understanding of the inappropriateness (*Why shouldn't they have said it?*), and the speaker's intention and motivation (*Why do you think they said it?*).

Previous research using the Faux Pas test to measure ToM ability was mainly conducted through face-to-face interviews in the lab. Since this study was an online survey, it was possible that participants learned to choose “No” for the detection question, to skip the following open-ended questions. To avoid any potential unreliability as far as possible, we excluded participants (a) who chose “No” for the detection question for all the Faux Pas stories (52 participants excluded), (b) who answered the first three Faux Pas stories (providing either right or wrong answers), since this was half way through the task, and then chose “No” for the detection question for all remaining Faux Pas stories (16 participants excluded), (c) who answered some of the detection questions correctly but left all of the open-ended questions blank (69 participants excluded). This high exclusion rate was likely because the study was posted online through social media, which attracted a lot of participants who might be interested in the prize draw but were not careful enough in completing the survey. Since the Faux Pas test was the most challenging task, we assumed that participants who were engaged in the Faux Pas test were also engaged in the other tasks.

Participants received one point if they answered the first question (*Did anyone say something they shouldn't have said or something awkward?*) correctly (maximum score = 20). If they gave a wrong answer in the Faux Pas condition, they were not asked the further questions and scored zero; if they gave an incorrect answer in the control condition, although they may see the further questions, they scored zero. Participants got one point if they made the right choice in the second question (*Who said something inappropriate?*) only in the Faux Pas condition (maximum score = 10). The third question (*Why shouldn't they have said it?*) was scored one point if participants could indicate understanding of the inappropriateness (e.g., *John is terminally ill.*). The open-ended answers for the fourth question (*Why do you think they said it?*) were scored one point if the answer indicated that “the character did not know, did not realize, or forgot . . .,” even if they did not mention the protagonist's mental states directly. The maximum possible total score for this task is 50 points. The range of scores observed was 15–50 and Cronbach's $\alpha = 0.95$. Two independent coders coded the open-ended answers by following the above coding scheme, and inter-rater reliability (intraclass correlation coefficient) = 0.87.

¹ In total, 358 participants were recruited, but data were ultimately analyzed from 221, following exclusion criteria outlined in the Materials and Design section.

Table 1
Example Experimental Scenario in all Conditions

| Condition | Scenario |
|-----------|--|
| | Perspective: Speaker |
| Literal | You were building a very complicated structure out of Lego. Person B came over to help. Unfortunately, Person B unintentionally knocked some of it down. You said to Person B: "You are a bad helper." |
| Sarcastic | You were building a very complicated structure out of Lego. Person B came over to help. Unfortunately, Person B unintentionally knocked some of it down. You said to Person B: "You are a good helper." |
| | Perspective: Recipient |
| Literal | Person A was building a very complicated structure out of Lego. You came over to help. Unfortunately, you unintentionally knocked some of it down. Person A said to you: "You are a bad helper." |
| Sarcastic | Person A was building a very complicated structure out of Lego. You came over to help. Unfortunately, you unintentionally knocked some of it down. Person A said to you: "You are a good helper." |
| | Perspective: Reader |
| Literal | Person A was building a very complicated structure out of Lego. Person B came over to help. Unfortunately, Person B unintentionally knocked some of it down. Person A said to Person B: "You are a bad helper." |
| Sarcastic | Person A was building a very complicated structure out of Lego. Person B came over to help. Unfortunately, Person B unintentionally knocked some of it down. Person A said to Person B: "You are a good helper." |

Perspective Taking Task

To assess perspective taking ability, we used the interpersonal reactivity index (IRI) (Davis, 1980), which is a multidimensional measure of empathy with good reliability and validity. This scale included four subscales—fantasy scale, empathic concern, personal distress, and perspective taking. Participants were instructed to rate each item on a 5-point scale ranging from 0 (*does not describe me well*) to 4 (*describes me very well*). For the overall score, Cronbach's $\alpha = 0.84$, and for the perspective taking subscale, which was the only subscale relevant to our predictions, Cronbach's $\alpha = 0.75$.

Sarcasm Use Tendency and "Usual Role" Task

In relation to people's tendencies to use sarcasm in conversations, we tested participants' likelihood of using sarcasm by using the SSS (Ivanko et al., 2004). Participants were asked to complete the SSS which consisted of 16 items on a 7-point rating scale. For the overall scale, Cronbach's $\alpha = 0.84$. To assess the participant's usual role in sarcastic conversation, one more question was added in: *Are you more likely to be the speaker or the recipient of a sarcastic comment?*

Procedure: The UK

The study was conducted online through Qualtrics. All participants confirmed they had read and accepted all items of the consent form before the survey started. There were two parts. In Part 1, participants were instructed to read the scenarios and adopt the perspective of the character labeled "you," when present, and to otherwise simply adopt their own reader perspective. They then randomly received one version of the stimuli. In each scenario, they were required to provide ratings for four questions, *How sarcastic is the comment? How aggressive is the comment? How amusing is the comment? and How polite is the comment?* In Part 2, participants were required to complete three randomized tasks, that is, the Faux Pas test, the IRI scale, and the SSS. All participants were debriefed after the submission and were invited to take part in the prize draw (for Survey Circle and social media participants only).

Participants: China

Data from 221 Chinese native speakers were included (age range = 18–51, $M = 22.43$, $SD = 6.99$, 79 males, 133 females, nine did

not report).² As for the UK sample, all participants self-reported no diagnoses of autism, schizophrenia, or dyslexia. Initially, participants from Chongqing university, Chongqing College of Mobile Communication, and Chengdu College of Arts and Sciences were recruited through university teachers sending the survey link to their students. In an attempt to balance the age and gender with participants from the UK (since both of these factors have been shown to influence sarcasm interpretation, e.g., Garcia et al., 2022; Gibbs, 2000; Oprea & Magdy 2020), additional participants were recruited through Prolific and social media such as WeChat. We then excluded data following the same criteria used for participants from the UK: (a) participants who chose "No" for the detection question for all the Faux Pas stories (1 participant excluded), (b) participants who answered the first three Faux Pas stories (providing either right or wrong answers), since this was half way through the task, and then chose "No" for the detection question for all remaining Faux Pas stories (24 participants excluded), and (c) participants who answered some of the detection questions correctly but left all of the open-ended questions blank (six participants excluded). Finally, to make the participant sample sizes the same across the two cultural groups, and to reduce gender differences, we randomly excluded ten male participants.

Materials and Design: China

The materials were the same as those presented to UK participants, but translated into Chinese. All the scenarios were first created in English by a native Chinese speaker whose second language is English, and then reviewed and revised by a native English speaker. As for the translation, the native Chinese speaker who created the scenarios translated those from English to Chinese, they were then proof-read by another two native Chinese speakers. The ToM task (the Faux Pas test), and self-report sarcasm scale were translated into Chinese through a backward-forward translation procedure. That is, the first author translated the English version into Chinese and another native Chinese speaker translated the Chinese back into English. The

² In total, 262 Chinese participants were recruited, among them 235 from Chinese universities/colleges and 27 from Prolific and social media such as WeChat. Data were ultimately analyzed from 221, following the exclusion criteria outlined in the "Participants" section.

backward translation of English was then reviewed by a native English speaker. The Chinese version of the IRI was first translated by a Chinese researcher (Zan, 1987) and was later tested for validity and reliability by other Chinese researchers (F. F. Zhang et al., 2010). The translated versions of the Faux Pas test, The IRI, and the SSS had good overall reliability, with Cronbach’s $\alpha = 0.92, 0.75,$ and $0.81,$ respectively. The Cronbach’s α for the subscale *perspective taking ability* in the IRI was $0.64.$

Procedure: China

The procedure was almost identical as that used for UK participants, except that there was no prize draw.

Results

The results are reported as follows. Firstly, we report the findings relating to cultural differences, in which we combined data from the UK and China to make cross-cultural comparisons regarding sarcasm interpretation and use. Secondly, the individual differences effects were analyzed using multiple regressions with cultural group (the UK vs. China) included as a predictor. All data and analysis scripts are available here (Zhu & Filik, 2022): <https://osf.io/a5pwn/>.

Differences in Sarcasm Interpretation Between the UK and China

Descriptive statistics are presented in Tables 2 and 3. We used linear mixed-effects models to analyze the sarcasm interpretation rating data. As for fixed effects, we entered *cultural group, comment type,* and *perspective* (with interaction) into the model. The fixed factors *cultural group, and comment type* were coded using sum coding—specifically, China = $-1,$ UK = $1;$ literal comment = $-1,$ sarcastic comment = $1.$ We also used sum contrasts for the fixed factor *perspective.* We first set the reader perspective condition as the reference level and then coded *perspective* using sum contrasts. The regression coefficient (b) of the *intercept* was the overall mean of all the conditions; the b of *cultural group—UK* was the value of UK sample minus the overall mean; the b of *comment type—sarcastic* was the value of sarcastic condition minus the overall mean; the b of *perspective—speaker* was the mean of speaker perspective across literal and sarcastic conditions minus the overall mean; and the b of *perspective—recipient* was the mean of the recipient perspective across literal and sarcastic conditions minus the overall mean. The maximal random effect structure included intercepts and slopes for the fixed effects of within-subject factors (i.e., $1 + \text{comment type} + \text{perspective} + \text{comment type} : \text{perspective}$)

across participants and scenarios (Barr, 2013; Howman & Filik, 2020; Winter, 2013).

The maximal model was first fitted to the data to establish the structure, that is, Cultural group \times Comment type \times Perspective + ($1 + \text{Comment type} + \text{Perspective} + \text{Comment type} : \text{perspective} \mid \text{subject}$) + ($1 + \text{Comment type} + \text{Perspective} + \text{Comment type} : \text{perspective} \mid \text{scenario}$). If the model did not converge, we removed perfect or near-perfect correlations and removed one random component at a time (e.g., the interaction of fixed factors), and the criteria for removing the component were determined by the amount of variance it explained in the non-converging model. If there were two models that both fitted, we selected the best model by performing a likelihood ratio test. We plotted the residuals of all the best fitting models and found that the residual distributions were normal or close to normal. Log-transformation did not improve the distributions; thus, we used the raw rating data as the dependent variable.

The main effects of the fixed factors were obtained through an analysis of variance in the mixed-effects model (Type III with Satterthwaite approximation for degrees of freedom). p -values were obtained using the package *LmerTest* (Kuznetsova et al., 2017) in R. The degrees of freedom in the post-hoc tests were calculated using the Satterthwaite approximation. The Tukey adjustment method was adopted for the post-hoc tests. We report the regression coefficients (b), standard error (SE), 95% confidential intervals, and t -values of each model (see Table 4 for the values of fixed-effects parameters).

Main Effects of Comment Type

Sarcastic comments were rated as being more sarcastic, $M_{\text{sarcastic}} = 6.08, SE = 0.01, M_{\text{literal}} = 2.54, SE = 0.02, F(1, 199) = 1,301.56, p < .001;$ more aggressive, $M_{\text{sarcastic}} = 4.48, SE = 0.02, M_{\text{literal}} = 3.97, SE = 0.02, F(1, 73) = 33.46, p < .001;$ more amusing, $M_{\text{sarcastic}} = 3.35, SE = 0.02, M_{\text{literal}} = 2.21, SE = 0.01, F(1, 178) = 415.44, p < .001;$ and more polite, $M_{\text{sarcastic}} = 3.03, SE = 0.01, M_{\text{literal}} = 2.77, SE = 0.1, F(1, 70) = 12.28, p < .001,$ than literal comments.

Main Effects of Culture

UK participants rated the comments as being less sarcastic, $M_{\text{UK}} = 4.08, SE = 0.02, M_{\text{China}} = 4.54, SE = 0.02, F(1, 440) = 46.13, p < .001;$ less aggressive, $M_{\text{UK}} = 4.07, SE = 0.02, M_{\text{China}} = 4.38, SE = 0.02, F(1, 440) = 12.53, p < .001;$ more amusing, $M_{\text{UK}} = 3.01, SE = 0.02, M_{\text{China}} = 2.56, SE = 0.02, F(1, 440) = 32.65, p < .001;$ and less polite, $M_{\text{UK}} = 2.84, SE = 0.01, M_{\text{China}} = 2.97, SE = 0.02, F(1, 440) = 3.92, p = .048,$ than Chinese participants.

Table 2
Descriptive Statistics of Rating Measures in the UK Sample

| Rating item | Speaker perspective | | | | Recipient perspective | | | | Reader perspective | | | |
|-------------|---------------------|-----------|-----------|-----------|-----------------------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|
| | Literal | | Sarcastic | | Literal | | Sarcastic | | Literal | | Sarcastic | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Sarcasm | 2.04 | 0.04 | 6.17 | 0.03 | 2.03 | 0.04 | 6.18 | 0.03 | 1.95 | 0.04 | 6.09 | 0.03 |
| Aggression | 4.16 | 0.04 | 4.02 | 0.04 | 4.17 | 0.04 | 4.00 | 0.04 | 4.11 | 0.04 | 3.95 | 0.04 |
| Amusement | 2.34 | 0.04 | 3.70 | 0.04 | 2.31 | 0.03 | 3.66 | 0.04 | 2.33 | 0.03 | 3.70 | 0.04 |
| Politeness | 2.62 | 0.03 | 3.00 | 0.03 | 2.64 | 0.03 | 3.00 | 0.03 | 2.71 | 0.03 | 3.05 | 0.03 |

Table 3
Descriptive Statistics of Rating Measures in the China Sample

| Rating item | Speaker perspective | | | | Recipient perspective | | | | Reader perspective | | | |
|-------------|---------------------|-----------|-----------|-----------|-----------------------|-----------|-----------|-----------|--------------------|-----------|-----------|-----------|
| | Literal | | Sarcastic | | Literal | | Sarcastic | | Literal | | Sarcastic | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Sarcasm | 3.02 | 0.05 | 6.03 | 0.04 | 3.10 | 0.05 | 6.02 | 0.04 | 3.08 | 0.05 | 6.00 | 0.04 |
| Aggression | 3.74 | 0.05 | 4.95 | 0.05 | 3.82 | 0.05 | 5.04 | 0.04 | 3.81 | 0.05 | 4.94 | 0.05 |
| Amusement | 2.09 | 0.03 | 3.08 | 0.04 | 2.02 | 0.03 | 2.89 | 0.04 | 2.18 | 0.03 | 3.09 | 0.04 |
| Politeness | 2.83 | 0.04 | 3.06 | 0.04 | 2.88 | 0.04 | 3.00 | 0.04 | 2.95 | 0.04 | 3.10 | 0.04 |

Interaction Effects Between Culture and Comment Type

There was an interaction between culture and comment type in ratings of sarcasm (see Figure 1), $F(1, 439) = 62.46, p < .001, M_{UK-sarcastic} = 6.15, SE = 0.02, M_{UK-literal} = 2.01, SE = 0.02, M_{China-sarcastic} = 6.02, SE = 0.02, M_{China-literal} = 3.07, SE = 0.03$. Post-hoc tests showed that Chinese participants rated literal comments as being significantly more sarcastic than UK participants, whereas there was no significant difference between UK and Chinese participants in ratings of sarcastic comments (see Table 5).

There was an interaction between culture and comment type in ratings of aggression (see Figure 2), $F(1, 439) = 227.07, p < .001, M_{UK-sarcastic} = 3.99, SE = 0.02, M_{UK-literal} = 4.15, SE = 0.02,$

$M_{China-sarcastic} = 4.98, SE = 0.03, M_{China-literal} = 3.79, SE = 0.03$. Post-hoc tests showed that UK participants rated literal comments as being significantly more aggressive than Chinese participants, whereas Chinese participants rated sarcastic comments as being significantly more aggressive than UK participants (see Table 5). The results also showed that in the China sample, sarcastic comments were considered as being more aggressive than literal comments, whereas in the UK sample there was a non-significant trend toward sarcastic comments being rated as being less aggressive than literal criticism.

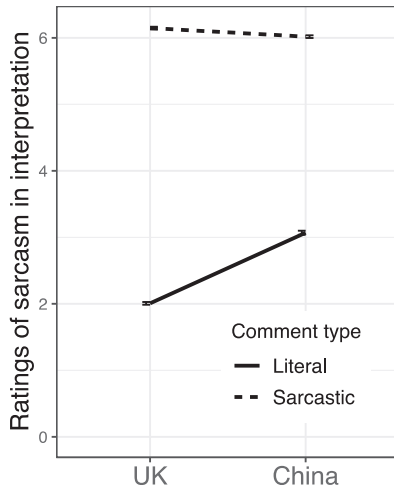
There was an interaction between culture and comment type in ratings of amusement (see Figure 3), $F(1, 439) = 23.94, p < .001, M_{UK-sarcastic} = 3.69, SE = 0.02, M_{UK-literal} = 2.33, SE = 0.02, M_{China-sarcastic} = 3.02, SE = 0.03, M_{China-literal} = 2.10, SE = 0.02$.

Table 4
Results of the Linear Mixed Models and the Fixed-Effects Parameters

| Rating measure | Model | Fixed effects | <i>b</i> | <i>SE</i> | 95% CI | | <i>t</i> |
|---------------------------------|--|---------------------------------|--|-----------|---------|--------|-----------|
| | | | | | 2.5% | 97.5% | |
| Sarcasm | ~Group × Comment type + Group × Perspective + (1 + Comment type subject) + (1 + Comment type scenario) | Intercept | 4.31 | 0.05 | 4.22 | 4.40 | 92.99*** |
| | | Group_UK | -0.23 | 0.03 | -0.30 | -0.17 | -6.79*** |
| | | Comment type_sarcastic | 1.77 | 0.05 | 1.68 | 1.87 | 36.08*** |
| | | Perspective_speaker | 0.006 | 0.01 | -0.02 | 0.03 | 0.47 |
| | | Perspective_recipient | 0.02 | 0.01 | -0.003 | 0.05 | 1.73+ |
| | | Group_UK:Comment type_sarcastic | 0.30 | 0.04 | 0.22 | 0.37 | 7.90*** |
| | | Group_UK:Perspective_speaker | 0.02 | 0.01 | -0.002 | 0.05 | 1.83+ |
| | | Group_UK:Perspective_recipient | 0.003 | 0.01 | -0.02 | 0.03 | 0.28 |
| | | Aggression | ~Group × Comment type + Group × Perspective + (1 + Comment type subject) + (1 + Comment type scenario) | Intercept | 4.23 | 0.08 | 4.06 |
| Group_UK | -0.16 | | | 0.04 | -0.25 | -0.70 | -3.54*** |
| Comment type_sarcastic | 0.26 | | | 0.04 | 0.17 | 0.34 | 5.78*** |
| Perspective_speaker | -0.01 | | | 0.01 | -0.04 | 0.02 | -0.71 |
| Perspective_recipient | 0.03 | | | 0.01 | 0.002 | 0.06 | 2.09* |
| Group_UK:Comment type_sarcastic | -0.34 | | | 0.02 | -0.38 | -0.29 | -15.07*** |
| Group_UK:Perspective_speaker | 0.03 | | | 0.01 | -0.0002 | 0.05 | 1.94+ |
| Group_UK:Perspective_recipient | -0.01 | | | 0.01 | -0.04 | 0.01 | -1.0 |
| Amusement | ~Group × Comment type + Group × Perspective + (1 + Comment type subject) + (1 + Comment type scenario) | | | Intercept | 2.78 | 0.06 | 2.67 |
| | | Group_UK | 0.22 | 0.04 | 0.15 | 0.30 | 5.71*** |
| | | Comment type_sarcastic | 0.57 | 0.03 | 0.52 | 0.63 | 20.38*** |
| | | Perspective_speaker | 0.02 | 0.01 | -0.004 | 0.05 | 1.63 |
| | | Perspective_recipient | -0.06 | 0.01 | -0.09 | -0.04 | -4.90*** |
| | | Group_UK:Comment type_sarcastic | 0.11 | 0.02 | 0.07 | 0.15 | 4.89*** |
| | | Group_UK:Perspective_speaker | -0.006 | 0.01 | -0.03 | 0.02 | -0.49 |
| | | Group_UK:Perspective_recipient | 0.04 | 0.01 | 0.02 | 0.07 | 3.45*** |
| | | Politeness | ~Group × Comment type + Perspective + (1 + Comment type subject) + (1 + Comment type scenario) | Intercept | 2.90 | 0.07 | 2.76 |
| Group_UK | -0.07 | | | 0.03 | -0.13 | -0.001 | -1.98* |
| Comment type_sarcastic | 0.13 | | | 0.04 | 0.06 | 0.21 | 3.50*** |
| Perspective_speaker | -0.02 | | | 0.01 | -0.05 | 0.001 | -1.89+ |
| Perspective_recipient | -0.02 | | | 0.01 | -0.05 | 0.002 | -1.82+ |
| | | Group_UK:Comment type_sarcastic | 0.05 | 0.02 | -0.01 | 0.09 | 2.63** |

Note. CI = confidence interval.
* $p < .05$. ** $p < .01$. *** $p < .001$. + $p < .10$.

Figure 1
Interaction Effect Between Culture and Comment Type in Ratings of Sarcasm



Note. Error bars represent ± 1 standard error.

Sarcastic comments were rated as being more amusing than literal comments by both UK and Chinese participants. However, although UK participants rated both literal and sarcastic comments as being more amusing compared with Chinese participants (see Table 5), the rating differences between the UK and China were larger for sarcastic comments than the differences for literal comments.

There was an interaction between culture and comment type in ratings of politeness (see Figure 4), $F(1, 439) = 6.93, p = .009, M_{UK-sarcastic} = 3.02, SE = 0.02, M_{UK-literal} = 2.65, SE = 0.02, M_{China-sarcastic} = 3.05, SE = 0.02, M_{China-literal} = 2.89, SE = 0.02$. Post-hoc tests showed that sarcastic comments were rated as being significantly more polite than literal comments in the UK sample only (see Table 5).

Table 5
Results of Post hoc Tests of the Interaction Effects Between Culture and Comment Type

| Contrasts | Estimate | SE | Df | Lower.CL | Upper.CL | t.ratio |
|-------------------------------|----------|------|-----|----------|----------|-----------|
| Ratings of sarcasm | | | | | | |
| UK literal–China literal | –1.06 | 0.12 | 439 | –1.37 | –0.75 | –8.78*** |
| UK literal–UK sarcastic | –4.14 | 0.12 | 342 | –4.46 | –3.82 | –33.44*** |
| China literal–China sarcastic | –2.95 | 0.12 | 342 | –3.27 | –2.63 | –23.83*** |
| China sarcastic–UK sarcastic | –0.13 | 0.08 | 439 | –0.33 | 0.07 | –1.64 |
| Ratings of aggression | | | | | | |
| UK literal–China literal | 0.36 | 0.10 | 440 | 0.10 | 0.62 | 3.62** |
| UK literal–UK sarcastic | 0.16 | 0.10 | 111 | –0.10 | 0.42 | 1.61 |
| China literal–China sarcastic | –1.19 | 0.10 | 111 | –1.45 | –0.93 | –11.94*** |
| China sarcastic–UK sarcastic | 0.99 | 0.10 | 440 | 0.73 | 1.25 | 9.88*** |
| Ratings of amusement | | | | | | |
| UK literal–China literal | 0.23 | 0.08 | 440 | 0.04 | 0.43 | 3.08* |
| UK literal–UK sarcastic | –1.36 | 0.07 | 319 | –1.54 | –1.17 | –18.99*** |
| China literal–China sarcastic | –0.92 | 0.07 | 319 | –1.11 | –0.74 | –12.89*** |
| China sarcastic–UK sarcastic | –0.67 | 0.10 | 440 | –0.93 | –0.40 | –6.45*** |
| Ratings of politeness | | | | | | |
| UK literal–China literal | –0.23 | 0.07 | 439 | –0.41 | –0.05 | –3.29** |
| UK literal–UK sarcastic | –0.36 | 0.08 | 105 | –0.58 | –0.14 | –4.31*** |
| China literal–China sarcastic | –0.17 | 0.08 | 105 | –0.39 | 0.05 | –1.98 |
| China sarcastic–UK sarcastic | 0.04 | 0.08 | 440 | –0.18 | 0.25 | 0.43 |

* $p < .05$. ** $p < .01$. *** $p < .001$.

Main Effects of Perspective

There were perspective effects in ratings of amusement, $F(2, 20,239) = 12.45, p < .001$, and politeness, $F(2, 20,232) = 6.89, p = .001$. Participants taking the recipient perspective rated comments as being less amusing ($M_{recipient} = 2.72, SE = 0.02$) than the speaker ($M_{speaker} = 2.80, SE = 0.02$) and reader perspectives ($M_{reader} = 2.82, SE = 0.02$). Participants taking the reader perspective ($M_{reader} = 2.95, SE = 0.02$) rated comments as being more polite than when taking the speaker ($M_{speaker} = 2.88, SE = 0.02$) and recipient perspectives ($M_{recipient} = 2.88, SE = 0.02$). There was a marginally significant perspective effect in ratings of sarcasm, $F(2, 20,236) = 2.69, p = 0.07$. There was no significant perspective effect in ratings of aggression.

Interaction Effects Between Culture and Perspective

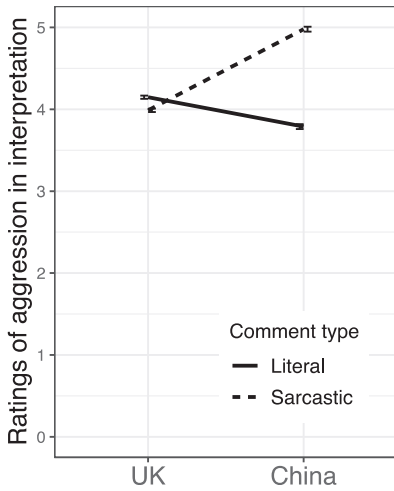
There was an interaction between culture and perspective in ratings of amusement (Figure 5), $F(1, 20,236) = 6.99, p < .001$. Post-hoc tests showed that Chinese participants taking the recipient perspective tended to rate the comments as being significantly less amusing than when taking other perspectives (see Table 6), $M_{China-recipient} = 2.45, SE = 0.03, M_{China-speaker} = 2.59, SE = 0.03, M_{China-reader} = 2.64, SE = 0.03$.

There was a marginally significant interaction between culture and perspective in ratings of sarcasm, $F(1, 20,235) = 2.62, p = .07$. There were no significant interactions in ratings of aggression and politeness. There was no three-way interaction between cultural group, comment type, and perspective in any of the rating measures.

Differences in Sarcasm Use Between the UK and China

We conducted independent-samples *t*-tests to examine cultural differences in sarcasm use (as indexed by scores on the SSS). Results showed that UK participants were more likely to use sarcasm than Chinese participants, $M_{UK} = 65.90, SE = 0.14, M_{China} = 49.53, SE = 0.12, t(20,918) = 87.94, p < .001, 2.5\% CI = 16.01, 97.5\% CI = 16.74$. When we compared the self-reported usual

Figure 2
Interaction Effect Between Culture and Comment Type in Ratings of Aggression



Note. Error bars represent ± 1 standard error.

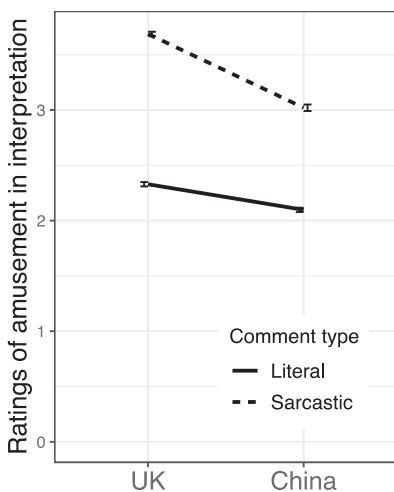
role across UK and China participants using a Chi-squared test, we found that UK participants were more likely to consider themselves as the typical speaker of sarcastic comments in a conversation, $N_{UK} = 147$, $N_{China} = 115$, $\chi^2(1) = 9.01$, $p = .003$.

Cultural Differences in the Effects of Individual Differences on Sarcasm Interpretation

The descriptive statistics of individual differences factors are presented in Tables 7 and 8.

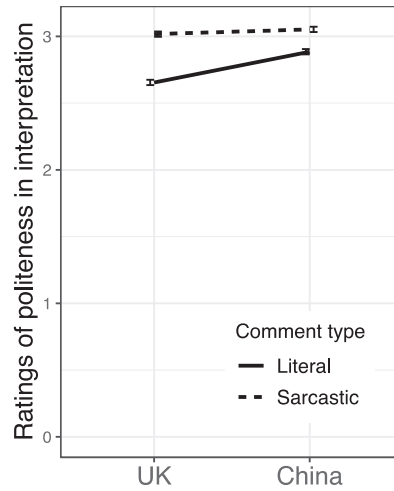
To examine the effects of individual differences factors and whether cultural group would modulate these effects, we conducted hierarchical multiple regressions in R by including both individual differences factors and cultural group in the models. We only included

Figure 3
Interaction Effect Between Culture and Comment Type in Ratings of Amusement



Note. Error bars represent ± 1 standard error.

Figure 4
Interaction Effect Between Culture and Comment Type in Ratings of Politeness



Note. Error bars represent ± 1 standard error.

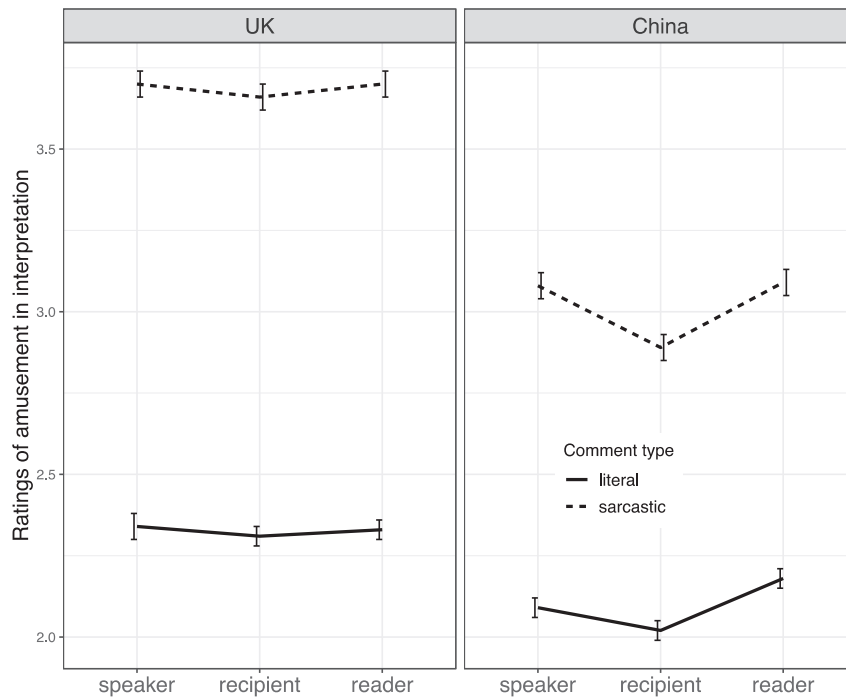
the data from the sarcastic condition, as we aimed to see how culture and individual differences affect the interpretation of sarcastic comments. We set the UK group as the reference level of cultural group in the regression model. We used the mean value of the scores of the *perspective taking* subscale (rather than total scores) because the English version has two more items than the Chinese version.

As for the “usual role” question, UK participants who reported themselves as users ($N = 147$) rather than recipients of sarcasm ($N = 74$) were more likely to use sarcasm (SSS overall score), $M_{usual\ speaker} = 71.30$, $SE = 0.99$, $M_{usual\ recipient} = 55.19$, $SE = 1.47$, $t(140) = 9.11$, $p < .001$, 95% CI [12.61, 19.61]. Chinese participants who self-reported as usual speakers ($N = 115$) also had a higher SSS total score than participants who reported themselves as being the usual recipient ($N = 106$) of sarcastic comments, $t(216.38) = 6.53$, $p < .001$, $M_{usual\ speaker} = 54.56$, $SE = 1.08$, $M_{usual\ recipient} = 44.26$, $SE = 1.15$, 95% CI [7.19, 13.41]. Thus, we did not include “usual role” in the hierarchical regression model, to avoid multicollinearity. To examine the effect of usual role, we conducted a separate multiple regression analysis.

To decompose the contribution of each individual difference factor, we constructed different models by adding one factor each time in hierarchical multiple regressions. That is, Model 0 = Rating measure ~ 1 , Model 1 = Rating measure \sim ToM, Model 2 = Rating measure \sim ToM + Perspective taking (PT), Model 3 = Rating measure \sim ToM + PT + SSS, Model 4 = Rating measure \sim ToM + PT + SSS + Group, Model 5 = Rating measure \sim Group \times ToM + Group \times PT + Group \times SSS. The R^2 of each individual factor was computed manually from sum of square differences, that is, $R^2 = SS_{Explained} / SS_{Total}$. All the continuous individual differences variables were centred before entering the models. The parameters of the multiple regressions are presented in Table 9.

From Table 9, the results showed that the effects of some of the individual differences factors on sarcasm interpretation were different for the UK sample and for the China sample. ToM ability positively predicted sarcasm interpretation and this effect did not vary across cultural groups. However, the effects of ToM ability in ratings

Figure 5
Interaction Effect Between Culture and Perspective in Ratings of Amusement



Note. Error bars represent ± 1 standard error.

of aggression, amusement, and politeness varied across cultures. That is, in the UK, participants' ToM ability negatively predicted ratings of aggression, whereas in China, the predictions were the opposite (see Figure 6). ToM ability positively predicted ratings of amusement in the UK sample, but negatively predicted ratings of amusement in the China sample (see Figure 7). ToM ability negatively predicted ratings of politeness in the UK sample but not in the China sample (see Figure 8).

Perspective taking ability positively predicted rating scores of sarcasm but was not associated with scores on other rating measures.

Sarcasm use tendency (SSS scale) positively predicted ratings of amusement and politeness in both the UK and China. However, there were significant cultural differences in the effects of sarcasm use tendency in measures of sarcasm and aggression. That is, sarcasm use tendency negatively predicted ratings of sarcasm and

aggression in the UK, whereas in China, the predictions were the opposite (see Figures 9 and 10).

From the R^2 of each individual difference factor (see Table 9), we can see that the contribution of each predictor to the rating measures was quite different. Compared with other individual difference factors, ToM ability explained ratings of sarcasm the most, participants' cultural background explained ratings of aggression the most, and sarcasm use tendency (indicated by SSS) explained ratings of amusement and politeness the most.

In relation to the "usual role" effect on sarcasm interpretation, we conducted multiple regressions to examine the main effect of usual role and whether there would be cultural differences in the usual role effect. We set the UK group as the reference level of cultural group, and usual speaker as the reference level of usual role in the regression model. Results showed that the "usual speaker" rated sarcastic

Table 6
Results of Post hoc Tests of the Interaction Effects Between Culture and Perspective

| Contrasts | Estimate | SE | df | Lower.CL | Upper.CL | t.ratio |
|-------------------------------|----------|------|--------|----------|----------|----------|
| Ratings of amusement | | | | | | |
| UK speaker–UK recipient | 0.03 | 0.03 | 20,238 | –0.05 | 0.12 | 1.06 |
| UK speaker–UK reader | 0.01 | 0.03 | 20,238 | –0.07 | 0.10 | 0.35 |
| UK recipient–UK reader | –0.02 | 0.03 | 20,238 | –0.11 | 0.07 | –0.71 |
| China speaker–China recipient | 0.13 | 0.03 | 20,236 | 0.04 | 0.22 | 4.28*** |
| China speaker–China reader | –0.05 | 0.03 | 20,236 | –0.14 | 0.04 | –1.68 |
| China recipient–China reader | –0.18 | 0.03 | 20,236 | –0.27 | –0.10 | –5.96*** |
| UK speaker–China speaker | 0.44 | 0.08 | 535 | 0.20 | 0.67 | 5.29*** |
| UK recipient–China recipient | 0.54 | 0.08 | 535 | 0.30 | 0.77 | 6.50*** |
| UK reader–China reader | 0.37 | 0.08 | 535 | 0.14 | 0.61 | 4.53*** |

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7
Descriptive Statistics of Individual Differences Factors in the UK Sample

| Individual differences factors | Min. | Max. | <i>M</i> | <i>SD</i> |
|--------------------------------|------|------|----------|-----------|
| Theory of mind ability | 15 | 50 | 39.10 | 8.52 |
| Perspective taking ability | 3 | 28 | 18.30 | 4.47 |
| Sarcasm self-report scale | 27 | 106 | 65.90 | 14.34 |

comments as being more sarcastic, more amusing, and less aggressive than the “usual recipient” (see Table 10). However, there was only a cultural difference in the usual role effect on ratings of amusement (see Figure 11). That is, there was only a usual role effect on ratings of amusement in the UK sample.

Cultural Differences in the Effects of Individual Differences on Sarcasm Use

We conducted a multiple regression to examine the effect of individual differences on sarcasm use. To examine whether cultural group would moderate these effects, we included the interaction between cultural group and ToM ability, and the interaction between cultural group and perspective taking ability in the model. The scores of sarcasm use (SSS score) were log-transformed. Results showed that participants’ cultural group, ToM ability, and perspective taking ability predicted their tendency to use sarcasm, and there were cultural differences in measures of ToM ability and perspective taking ability in sarcasm use (see Table 11). That is, UK participants were more likely to use sarcasm than Chinese participants. Participants’ ToM ability positively predicted sarcasm use tendency, and the association was stronger in the UK than in China (see Figure 12). Participants’ perspective taking scores negatively predicted the tendency to use sarcasm in the UK but not in China (see Figure 13).

General Discussion

We investigated cultural and individual differences in sarcasm interpretation and use in participants from the UK and China. Results showed that there were cultural effects in both interpretation and use. In terms of interpretation, for UK participants sarcasm was interpreted as being more amusing and polite, whereas for Chinese participants sarcasm was rated as being more amusing, but also more aggressive than literal criticism. UK participants rated sarcasm as being more amusing, but less aggressive than Chinese

Table 8
Descriptive Statistics of Individual Differences Factors in the China Sample

| Individual differences factors | Min. | Max. | <i>M</i> | <i>SD</i> |
|---|------|------|----------|-----------|
| Theory of mind ability | 12 | 50 | 35.03 | 8.47 |
| Perspective taking ability ^a | 1 | 20 | 13.32 | 3.61 |
| Sarcasm self-report scale | 21 | 88 | 49.53 | 12.73 |

^aThe Chinese version of the IRI scale has 22 items, which is six items fewer than the English version; the perspective taking subscale in the IRI has five items, which is two items fewer than the English version—so the scores are smaller than those of UK participants.

participants. In terms of use, UK participants were more likely to use sarcasm, and more likely to report themselves as being a usual speaker (rather than usual recipient) of sarcasm than Chinese participants. There were perspective effects in the rating measures of politeness in criticism interpretation in both UK and China samples, but perspective influenced the perception of amusement in the Chinese sample only.

As for individual differences, ToM ability positively predicted sarcasm interpretation, especially rating measures of sarcasm and amusement in UK participants, and rating measures of sarcasm in Chinese participants. Participants’ self-reported sarcasm use tendency negatively predicted ratings of sarcasm and aggression and positively predicted ratings of amusement and politeness in the UK sample, and positively predicted all rating measures in the Chinese sample. Perspective taking ability positively predicted ratings of sarcasm in the UK and China. In terms of individual differences in sarcasm use, participants who had higher levels of ToM ability showed a greater tendency to use sarcasm; however, perspective taking ability negatively predicted sarcasm use in the UK sample.

Cultural Differences in Sarcasm Interpretation and Use

A key finding from the current study is that whether sarcasm enhances condemnation (Colston, 1997) or mutes the negativity of criticism (Dews et al., 1995) depends on the culture of the participants. Specifically, results from the UK sample provided evidence that sarcasm had only a positive influence—with sarcastic comments being viewed as more amusing and polite than their literal counterparts (with a non-significant trend toward them also being viewed as less aggressive), which supported the Tinge Hypothesis (Dews et al., 1995). In contrast, in the China sample, results suggested that, although sarcasm was viewed as being more amusing than literal criticism, it instead seemed to enhance the perceived level of negativity, in that sarcastic comments were viewed as being more aggressive than their literal counterparts. Thus, the Tinge Hypothesis (Dews & Winner, 1995) may need to be modified to take culture into account.

In Colston (1997), ironic criticism was found to be more condemning than literal criticism. Colston used this finding to argue that the Tinge Hypothesis (Dews & Winner, 1995), which suggests that irony reduces the negativity of criticism, may be incorrect. Colston (1997) viewed *the level of condemnation as the level of negativity*. While we note that the aggression measure in the current study is not exactly the same as condemnation, we nevertheless argue that ratings of aggression and ratings of condemnation are both indicative of perceived negativity. Both Colston (1997) and Dews and Winner (1995) proposed their theories of the social function of sarcasm based on data from Western participants in the English language. The current study allowed for expansion of these theoretical accounts by collecting data in both the UK and China. Both UK and Chinese participants considered sarcasm as being more amusing than literal language. It is possible that, for Chinese participants, sarcasm was a humorous communication tool, but by criticizing in a surprisingly positive way, sarcasm was also perceived as criticizing with extra emphasis, leading to a more negative interpretation (Colston, 1997). Thus, cultural background seems to influence the emotional impact of sarcastic language.

This finding of cultural differences can also be interpreted in relation to previous research on humor comprehension and use. For example, Chinese participants tend to interpret humorous language

Table 9
The Parameters of Multiple Regressions for All Rating Measures

| Rating measures | Factors | <i>b</i> | <i>SE</i> | <i>t</i> | 95% CI | | <i>R</i> ² | <i>F</i> |
|-----------------|------------|----------|-----------|-----------|--------|---------|-----------------------|----------|
| Sarcasm | Intercept | 6.11 | 0.02 | 272.92*** | 6.07 | 6.15 | | |
| | Group | 0.06 | 0.03 | 1.77+ | -0.006 | 0.12 | <0.001 | 1.59 |
| | ToM | 0.03 | 0.002 | 13.59*** | 0.028 | 0.037 | 0.038 | 417.3*** |
| | PT | 0.08 | 0.03 | 2.63** | 0.02 | 0.14 | 0.0005 | 5.34* |
| | SSS | -0.003 | 0.001 | -2.26* | -0.006 | -0.0004 | 0.0006 | 6.13* |
| | Group: ToM | -0.002 | 0.003 | -0.49 | -0.008 | 0.005 | 0.005 | 16.96*** |
| | Group: PT | -0.07 | 0.04 | -1.69+ | -0.15 | 0.01 | | |
| | Group: SSS | 0.01 | 0.002 | 6.62*** | 0.01 | 0.02 | | |
| Model5 | 0.043 | 68.75*** | | | | | | |
| Aggression | Intercept | 4.09 | 0.03 | 146.74*** | 4.03 | 4.14 | | |
| | Group | 0.98 | 0.04 | 24.36*** | 0.90 | 1.06 | 0.049 | 562.3*** |
| | ToM | -0.01 | 0.003 | -4.52*** | -0.02 | -0.01 | 0.005 | 53.61*** |
| | PT | 0.003 | 0.04 | 0.07 | -0.07 | 0.08 | 0.0001 | 1.69 |
| | SSS | -0.01 | 0.002 | -5.17*** | -0.01 | -0.006 | 0.021 | 238.3*** |
| | Group: ToM | 0.03 | 0.004 | 6.65*** | 0.02 | 0.04 | 0.009 | 33.9*** |
| | Group: PT | -0.05 | 0.05 | -0.98 | -0.15 | 0.05 | | |
| | Group: SSS | 0.02 | 0.003 | 6.30*** | 0.01 | 0.02 | | |
| Model5 | 0.083 | 136.8*** | | | | | | |
| Amusement | Intercept | 3.48 | 0.03 | 123.60*** | 3.43 | 3.54 | | |
| | Group | -0.32 | 0.04 | -7.82*** | -0.40 | -0.24 | 0.005 | 57.10*** |
| | ToM | 0.01 | 0.003 | 3.77*** | 0.005 | 0.02 | 0.007 | 78.71*** |
| | PT | 0.06 | 0.04 | 1.57 | -0.02 | 0.14 | <0.001 | 0.28 |
| | SSS | 0.02 | 0.002 | 12.56*** | 0.02 | 0.03 | 0.048 | 541.4*** |
| | Group: ToM | -0.02 | 0.004 | -4.02*** | -0.02 | -0.009 | 0.002 | 6.81*** |
| | Group: PT | 0.06 | 0.05 | 1.17 | -0.04 | 0.16 | | |
| | Group: SSS | -0.003 | 0.003 | -1.19 | -0.008 | 0.002 | | |
| Model5 | 0.062 | 99.71*** | | | | | | |
| Politeness | Intercept | 2.94 | 0.02 | 120.56*** | 2.89 | 2.99 | | |
| | Group | 0.20 | 0.04 | 5.75*** | 0.13 | 0.27 | 0.003 | 32.85*** |
| | ToM | -0.009 | 0.003 | -3.52*** | -0.01 | -0.004 | 0.0001 | 1.09 |
| | PT | 0.02 | 0.03 | 0.69 | -0.04 | 0.09 | <0.001 | 0.89 |
| | SSS | 0.01 | 0.002 | 7.62*** | 0.009 | 0.01 | 0.007 | 72.09*** |
| | Group: ToM | 0.009 | 0.004 | 2.47* | 0.002 | 0.02 | 0.0008 | 2.75* |
| | Group: PT | 0.05 | 0.05 | 1.08 | -0.04 | 0.14 | | |
| | Group: SSS | -0.0006 | 0.002 | -0.26 | -0.005 | 0.004 | | |
| Model5 | 0.011 | 16.45*** | | | | | | |

Note. CI = confidence interval; PT = perspective taking; SSS = sarcasm self-report scale; ToM = theory of mind.

* $p < .05$. ** $p < .01$. *** $p < .001$. + $p < .10$.

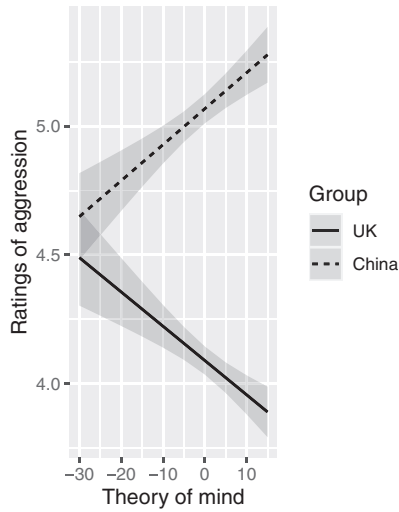
more negatively than participants from Western cultures (Jiang et al., 2019). In addition, research has demonstrated that Chinese people were less likely to use humor compared with Canadians (Chen & Martin, 2007), and people from Eastern cultures tended not to use aggressive humor styles compared to people from Western cultures (Chen et al., 2013; Kazarian & Martin, 2006). Previous research on sarcasm use also indicated that participants from countries with individualist cultures tended to be more sarcastic than participants from collectivist cultures (Blasko et al., 2021; Rockwell & Theriot, 2001). In the current study, both countries are representatives of individualist (the UK) and collectivist (China) cultures. Chinese participants may consider sarcasm as a strategy to insult or look down upon others, similar to the Japanese view of sarcasm (Iseli, 2020). Hence, they may perceive sarcastic comments as being more aggressive or offensive, compared with criticizing in a direct way.

In terms of sarcasm use, Chinese participants reported being less likely to use sarcasm than UK participants, which is in line with previous research showing that participants from Western cultures (i.e., the US and Mexico) showed a higher tendency to use sarcasm than Chinese participants (Blasko et al., 2021). This cultural difference in sarcasm use tendency might be explained by different perceptions

regarding emotional impact. Previous research on indirect language comprehension suggested that participants from collectivist cultures (e.g., Korea) tended to look for indirect meanings in a conversation, compared with participants from individualist cultures (e.g., the US; Holtgraves, 1997). Chinese participants, who are from a collectivist culture, may tend to seek the indirect meaning (i.e., aggressive nature) of a sarcastic comment. According to Ting-Toomey (1988), people from collectivist cultures have greater concerns for others' feelings and for saving face of inter-group members than people from individualist cultures. Thus, it is possible that Chinese people tend not to criticize in an aggressive manner, which may result in losing face.

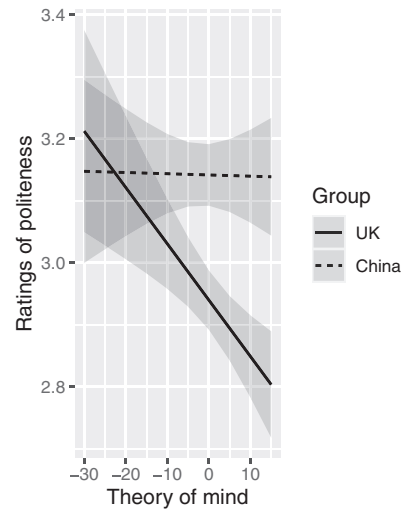
In relation to the effect of perspective, our results in the UK sample did not show evidence to support Bowes and Katz's (2011) statement that participants taking the speaker's perspective would perceive sarcasm as being more polite and amusing than those taking the recipient's perspective. However, we found that Chinese participants taking the recipient perspective tended to rate the comments as being significantly less amusing than when taking the speaker and the reader perspectives, which was consistent with Bowes and Katz's (2011) results. Furthermore, the usual role effect (including both UK and China data) showed that the "usual speaker" rated

Figure 6
Marginal Effects of ToM for Cultural Groups in Ratings of Aggression



Note. ToM = theory of mind.

Figure 8
Marginal Effects of ToM for Cultural Groups in Ratings of Politeness



Note. ToM = theory of mind.

sarcastic comments as being more sarcastic, more amusing, and less aggressive than the “usual recipient,” which may also support Bowes and Katz (2011).

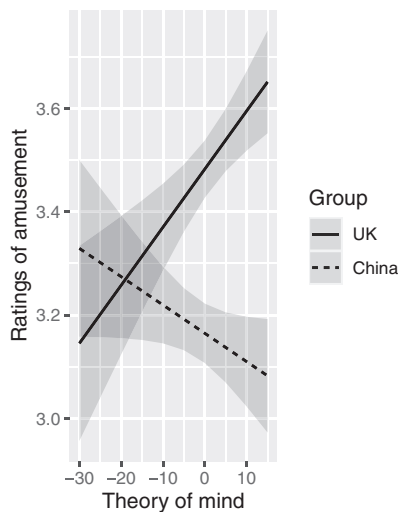
Finally, the finding that Chinese participants tended to interpret *literal* criticism as being more sarcastic than UK participants can perhaps be explained in relation to the definition of sarcasm in the two languages. In recent decades, Chinese researchers in fields such as English linguistics or English literature mainly referred to sarcasm based on the literature in English, that is, “criticizing in a positive way.” However, in the Chinese language, sarcasm (*fěng cǐ*) is defined as “to expose or criticize the stupid or bad behaviors using metaphor, hyperbole, and other measures” (Hanyu Da Cidian, 2017 [*The Great*

Chinese Dictionary], <http://www.hydc.com/cidian/>). Due to this slightly broader definition of sarcasm in Chinese, some literal criticisms might also be interpreted as being sarcastic.

Individual Differences in Sarcasm Interpretation and Use

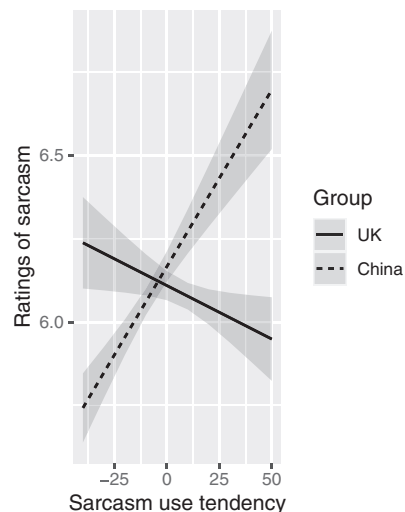
In relation to sarcasm interpretation, ToM ability was positively associated with ratings of sarcasm in both UK and Chinese participants, which is in line with previous research (e.g., Filippova & Astington, 2008; Happé, 1993; Shamay-Tsoory et al., 2005). People with higher ToM ability could better perceive the speaker’s intentions

Figure 7
Marginal Effects of ToM for Cultural Groups in Ratings of Amusement



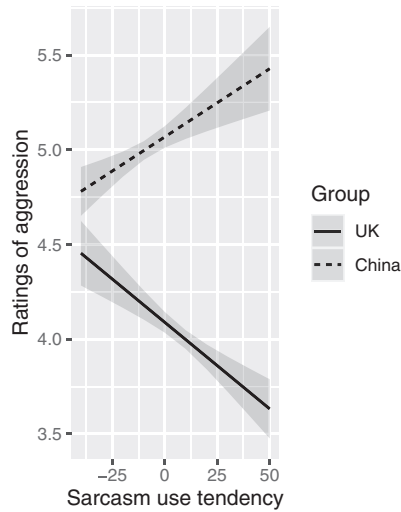
Note. ToM = theory of mind.

Figure 9
Marginal Effects of SSS for Cultural Groups in Ratings of Sarcasm



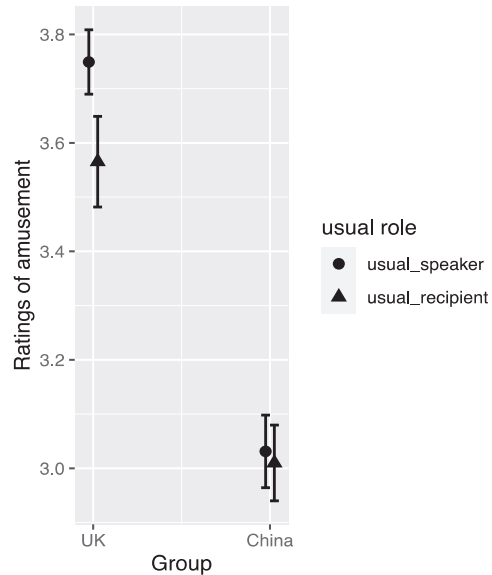
Note. SSS = sarcasm self-report scale.

Figure 10
Marginal Effects of SSS for Cultural Groups in Ratings of Aggression



Note. SSS = sarcasm self-report scale.

Figure 11
Marginal Effects of Usual Role for Cultural Groups in Ratings of Amusement



and thus were more likely to rate sarcasm as being sarcastic. For ratings of aggression, amusement, and politeness, UK participants who had higher ToM ability were more likely to consider sarcasm as less aggressive, more amusing, and less polite than people who had lower ToM ability, whereas Chinese participants who had higher ToM ability demonstrated the opposite tendency except for ratings of

politeness. This difference could be attributed to participants' interpretation of sarcasm based on their cultural background. Since Chinese participants generally perceived sarcasm as being more aggressive, participants with higher ToM ability could better realize the intentions behind the apparent positive language, which was to be amusing but also to be aggressive.

Table 10
The Parameters of Multiple Regressions for All Rating Measures

| Rating measures | Factors | <i>b</i> | <i>SE</i> | <i>t</i> | 95% CI | |
|-----------------|--|----------|-----------|-----------|--------|-------|
| Sarcasm | Intercept | 6.18 | 0.02 | 255.93*** | 6.14 | 6.23 |
| | Group | -0.08 | 0.04 | -2.27* | -0.15 | -0.01 |
| | Usual role | -0.11 | 0.04 | -2.67** | -0.19 | -0.03 |
| | Group × Usual role | -0.06 | 0.06 | -1.07 | -0.17 | 0.05 |
| | $F(3, 10,602) = 15.89, p < .001, R^2 = .004$ | | | | | |
| Aggression | Intercept | 3.94 | 0.03 | 132.97*** | 3.88 | 4.0 |
| | Group | 1.01 | 0.04 | 22.57*** | 0.92 | 1.10 |
| | Usual role | 0.01 | 0.05 | 2.85** | 0.05 | 0.25 |
| | Group × Usual role | -0.08 | 0.07 | -1.12 | -0.22 | 0.06 |
| | $F(3, 10,601) = 284.6, p < .001, R^2 = .075$ | | | | | |
| Amusement | Intercept | 3.75 | 0.03 | 123.96*** | 3.69 | 3.81 |
| | Group | -0.72 | 0.05 | -15.73*** | -0.81 | -0.63 |
| | Usual role | -0.18 | 0.05 | -3.52* | -0.29 | -0.08 |
| | Group × Usual role | 0.16 | 0.07 | 2.26* | 0.02 | 0.30 |
| | $F(3, 10,604) = 125.9, p < .001, R^2 = .034$ | | | | | |
| Politeness | Intercept | 3.01 | 0.03 | 116.05*** | 2.96 | 3.06 |
| | Group | 0.01 | 0.04 | 0.31 | -0.06 | 0.09 |
| | Usual role | 0.03 | 0.04 | 0.58 | -0.06 | 0.11 |
| | Group × Usual role | 0.04 | 0.06 | 0.65 | -0.08 | 0.16 |
| | $F(3, 10,598) = 1.38, p = .25, R^2 = .0004$ | | | | | |

Note. CI = confidence interval. *** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .10$.

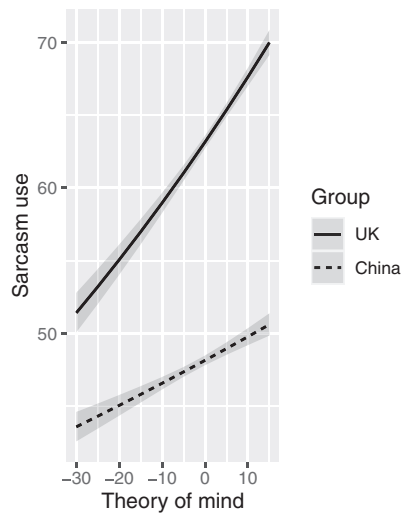
In relation to sarcasm use, ToM ability showed a larger positive association with sarcasm use in the UK sample than in the Chinese sample, which might be related to their interpretation of sarcasm. That is, in the UK, participants who had higher levels of ToM ability tended to rate sarcasm as being more amusing and less aggressive; thus, they may be more likely to use it. The slightly positive association between ToM and sarcasm use tendency for Chinese participants was partially consistent with the findings of previous research, which was also conducted in Chinese by Zhu and Wang (2020), who showed that Chinese participants who had very advanced ToM ability demonstrated slightly higher tendency to use sarcasm. We suggest that the different results might be due to task differences, that is, self-reporting sarcasm use tendency using rating scales, or rating the likelihood of using certain sarcastic

Table 11
The Parameters of Multiple Regressions for Sarcasm Use

| Factors | <i>b</i> | <i>SE</i> | <i>t</i> | 95% CI | |
|--|----------|-----------|------------|--------|--------|
| Intercept | 4.15 | 0.004 | 1175.48*** | 4.13 | 4.15 |
| Group | -0.27 | 0.005 | -54.35*** | -0.28 | -0.26 |
| ToM | 0.007 | 0.0004 | 16.88*** | 0.006 | 0.008 |
| PT | -0.09 | 0.005 | -15.90*** | -0.10 | -0.08 |
| Group × ToM | -0.004 | 0.0006 | -6.15*** | -0.005 | -0.002 |
| Group × PT | 0.08 | 0.01 | 10.53*** | 0.06 | 0.09 |
| $F(5, 10,602) = 846.6, p < .001, R^2 = .285$ | | | | | |

Note. CI = confidence interval; PT = perspective taking; ToM = theory of mind. * $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 12
Marginal Effects of ToM for Cultural Groups in Sarcasm Use

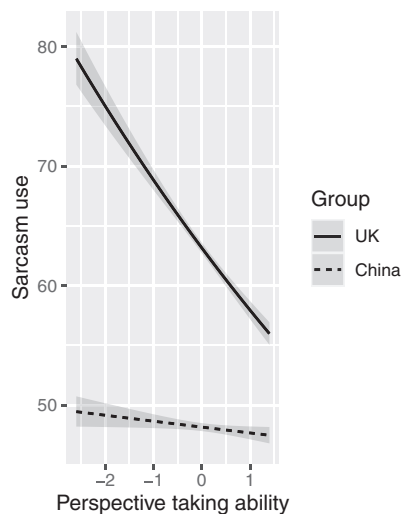


Note. ToM = theory of mind.

comments based on scenarios—This issue warrants further investigation.

As for perspective taking ability and sarcasm interpretation, ratings of perspective taking ability were positively associated with ratings of sarcasm in both the UK and China. This finding is in line with our prediction that both perspective taking ability and ToM ability would positively predict the interpretation of sarcasm. However, as for sarcasm use, perspective taking ability negatively predicted the tendency to use sarcasm in the UK sample, which is the opposite of what was found for ToM ability. In terms of what may underlie these different findings for ToM and perspective taking ability, it may be the case that people who have higher ToM ability may better understand the situations when others may misinterpret or be angry

Figure 13
Marginal Effects of Perspective Taking for Cultural Groups in Sarcasm Use



at sarcastic comments, and thus may demonstrate a higher tendency to use sarcasm due to this confidence in their ability to be interpreted correctly and not cause offence. However, people who have higher perspective taking ability may instead focus more on the feelings of victims of sarcasm and thus may choose to avoid making critical comments. Further research is needed to shed light on this issue.

The positive association between participants' sarcasm use tendency (as indexed by scores on the SSS) and rating measures of amusement and politeness for both UK and Chinese participants suggests that people may not intend to offend by making sarcastic utterances, especially for UK participants, as there was also a negative association between sarcasm use tendency and ratings of aggression in the UK sample. We suggest that the relationship between sarcasm use tendency and sarcasm interpretation might be bi-directional, that is, having a more positive interpretation of sarcasm gives more reasons to use it, and also the more frequent use of sarcasm encourages people to justify their behavior (i.e., they use sarcasm for the purpose of being amusing and polite). Scores on the SSS negatively predicted ratings of sarcasm for sarcastic comments in the UK sample, which was inconsistent with previous research (e.g., Howman & Filik, 2020). The reason might be that Howman and Filik (2020) examined ambiguous comments (i.e., comments could be interpreted as either literal or sarcastic and did not have contextual cues to indicate which interpretation was correct); however, this study focused on sarcastic comments only. In contrast, for the Chinese sample, scores on the SSS positively predicted ratings of sarcasm. It may be that due to the aggressive nature of sarcasm and the relative avoidance of using sarcasm in China, participants who tended to use sarcasm were more sensitive to it.

The decomposition of individual differences effects on sarcasm interpretation suggests different facets of interpretation and socio-emotional impact are differentially associated with different cultural and individual differences factors. That is, ratings of sarcasm were explained mostly by ToM ability, ratings of aggression were explained mostly by participants' cultural background, and ratings of amusement and politeness were explained mostly by sarcasm use tendency. We suggest that the successful interpretation of sarcasm equates to the successful perception of the sarcastic intention of the speaker, which relates to the function of ToM ability. In contrast, the perception of aggression, though this may also include the recognition of speaker intent, is largely constrained by people's conception of the nature of sarcasm, which may be influenced by their own cultures. The interpretation of amusement and politeness involves the appreciation of the social impressions of sarcasm (Pexman, 2005), which may affect people's choice of language use. From this, we may infer that the interpretation of the social functions of sarcasm is complex and that different aspects of socio-emotional impact might be predominantly affected by different traits of the participants.

Generalizability and Limitations

Our findings provide evidence that there are cultural and individual differences in the perceived social functions of sarcasm. Given the nature of our participants and procedures, we would expect the effects to generalize across opportunity samples of Mainland-China-based native-Chinese speaking adults and UK-based native English-speaking adults with similar demographics as those involved in this current study. We would also expect

the effects to generalize across stimuli written in Chinese for Chinese participants and English for UK participants, in which the target comment should be interpreted either literally or sarcastically following the context. A direct replication would test participants from the UK and China by using the stimuli available at <https://osf.io/a5pwn/>. Participants would be predominantly University students, with a small portion of participants recruited via social media. We have no reason to believe that the results depend on other characteristics of the participants, materials, or context.

It is important to consider potential limitations to the current study. Firstly, in our consideration of cultural background (i.e., country and language) as a variable, we did not distinguish “culture” as a general construct from “culture” composed of a list of components. Given that cultural groups were defined based on the country that participants came from, this approach may assume too much homogeneity within groups of participants. Relatedly, although some previous cross-cultural research has divided cultures into categories such as collectivist and individualist cultures, there are differences between individuals within a category (Triandis, 2001). For example, the Chinese culture has frequently been considered as collectivist by researchers in social science, but there are also individualist elements (Hui & Villareal, 1989). Thus, it is important to note that there are critiques of defining cultures in terms of individualism and collectivism (e.g., Voronov & Singer, 2002; see also Fatehi et al., 2020, for recent discussion of the various dimensions used to describe and analyze cultural differences).

In relation to the task itself, there are limitations inherent in asking participants to take different perspectives when rating the scenarios, in particular, in taking the perspective of the “speaker,” and therefore judge the intentions behind an utterance that they might not themselves choose to make. However, it is difficult to otherwise manipulate perspective while keeping the content of the comment the same across conditions—This is an interesting avenue for future research.

Conclusion

This study provides new insights into cultural and individual differences in sarcasm interpretation and use. Results suggest that people from the UK and China have different perceptions of sarcasm—Participants from the UK consider sarcasm as being amusing and polite and are more likely to use sarcasm in a conversation. In contrast, participants from China view speaking sarcastically as an aggressive behavior and are less likely to use it. Results in relation to individual differences suggested that participants with more advanced ToM ability were better at perceiving speaker intent in the context of their own cultural norms. These findings have important implications. Firstly, in relation to theory, the Tinge Hypothesis needs to be modified to take culture into account, since the participant’s cultural background influences whether sarcasm dilutes the negativity of criticism or not. Secondly, since there are cultural differences in how sarcasm is perceived, care should be taken when speaking sarcastically with people from different cultures to avoid a possible negative social impression. That is, speakers from the UK may use sarcasm with largely positive intent, whereas the recipient from China may interpret the sarcasm as an aggressive behavior. Finally, previous research examining the role of ToM in sarcasm comprehension has largely been conducted with neurodiverse participants, whereas this study demonstrates its influence in sarcasm interpretation and use among neurotypical adults, which is crucial

for the development of constraint-satisfaction accounts of sarcasm comprehension (e.g., Katz, 2005; Pexman, 2008).

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