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Author

Antoniou, Kyriakos

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Multilingual and Bi-dialectal Irony Processing

Kyriakos Antoniou (kyriakos.antoniou@cut.ac.cy)

Department of Rehabilitation Sciences, 15 Vragadinou street, 3041, Limassol, Cyprus

Abstract

We examined the effects of multilingualism and bi-dialectalism on irony interpretation by comparing multilingual, bi-dialectal, and monolingual young adults. We used an act-out task with three Meaning (literal positive, literal negative, ironic) and four Cue conditions (context-only, intonation-only, intonation + face, context + intonation + face). Results revealed that irony interpretation was (1) difficult, as shown by slower and less accurate responses to ironic compared to literal items; (2) facilitated by the presence of more ironic cues. Moreover, evidence suggested that linguistic context had a greater and facilitative effect on the speed of irony processing compared to literal meanings. Finally, we found no evidence for group differences in accuracy or speed of irony processing or in the way that different (combinations of) cues affected irony. Overall, our findings support a view of multilingual pragmatics according to which pragmatic interpretation is no different in multilinguals compared to monolinguals.

Keywords: pragmatics; irony; multilingualism; dialects

Introduction

Estimates suggest that most people in the world are now multilingual; that is, they grow up from childhood regularly using more than one language or dialect (Grosjean & Li, 2013). Thus, in the past three decades, research on the cognitive effects of multilingualism has seen a steep increase, reflecting an awareness that findings with monolinguals may not apply to a substantial portion of the world population and that the mind and brain possibly function differently in multilinguals (Bialystok, 2017). This research has revealed two main sets of results. First, multilinguals exhibit lower performance in some domains of language development and processing, such as slower lexical access or smaller vocabularies in each of their languages separately compared to monolinguals (e.g., Bialystok & Luk, 2012). Second, some evidence (though controversial) suggests that multilingualism positively affects facets of non-linguistic cognition, including executive control (Bialystok, 2017) and Theory of Mind (ToM; Rubio-Fernández & Glucksberg, 2012; Schroeder, 2018). Executive control (EC) refers to a set of neurocognitive processes, which, according to an influential model (Miyake et al., 2000), include *switching* (the ability to switch between tasks), *working memory* (the ability to maintain and manipulate information in mind), and *inhibition* (the ability to inhibit irrelevant information). Also, ToM is a neurocognitive system that underlies the capacity for assigning mental states to ourselves and to others and for understanding other people's behavior by taking into account such mental states (e.g., Baron-Cohen, Leslie & Frith, 1985).

Recently, research has also started to investigate the effects of multilingualism on cognitive aspects at the interface of language and non-verbal cognition, including pragmatic

interpretation (e.g., Antoniou, 2019), that is, the comprehension of language in context. However, past studies on multilingual pragmatics have mainly focused on children, while certain pragmatic phenomena, specifically irony, have received little research attention. In this context, our study aimed to examine the effect of multilingualism on irony processing in young adults. We also examined whether close language similarity between multilinguals' languages plays a role by further testing bi-dialectal speakers of two similar dialects of the same language (e.g., Veenstra et al., 2018).

Theoretical Background

Imagine that your boss, after informing them that you just missed an important deadline, remarks *Wow, what a reliable employee you are!*, using a distinctive intonation and facial expression. The contrast of what they said with what you just reported, along with the intonational and facial cues, suggest that your boss' comment was ironic. Such examples of verbal irony (Dynel, 2019; henceforth, *irony*) are routinely used in everyday conversation (e.g., Gibbs, 2000) but, currently, there is no theoretical consensus on the exact definition of irony. However, most researchers would accept that irony has three important characteristics (e.g., Dynel, 2019). First, an implicitly conveyed meaning that often (though not always) corresponds to the reverse of what is explicitly said. Second, an evaluative attitude that is usually (though not necessarily) negative. Finally, the communication of intentions –that is, speakers intentionally use language ironically and hearers grasp ironic meanings by considering the speakers' intentions behind what is uttered (cf. Gibbs, 2012).

There are different pragmatic frameworks, but Relevance Theory, a prominent theory of communication, makes three main assertions about pragmatic interpretation in general and irony processing in particular (e.g., Sperber & Wilson, 2002). First, pragmatic (including irony) comprehension is a cognitively effortful process. From a psycholinguistic perspective, this claim has often been interpreted as suggesting that understanding pragmatic (including ironic) meanings requires longer processing time and/or the recruitment of additional cognitive functions (e.g., EC) relative to literal meanings (e.g., Bott & Noveck, 2004; Breheny, Katsos, & Williams, 2006; de Neys & Schaeken, 2007). Second, pragmatic interpretation involves understanding a speaker's intentions behind an utterance and taking into account mental states such as the speaker's beliefs and knowledge. Thus, it draws on ToM skills. Finally, irony is different from other pragmatically implied meanings (implicatures) in that it more heavily depends on ToM; specifically, ironic utterances express a speaker's thought about another thought and, thus, irony comprehension requires the use of a higher-order ToM.

Multilingualism and Pragmatics

Most research on multilingual pragmatics has been conducted with children (see Antoniou, 2019). An early study by Siegal et al. (2007) with preschoolers reported that multilinguals were better than monolinguals in understanding a specific type of pragmatic meanings, scalar implicatures (i.e., that *some* implies *not all*). A multilingual advantage for preschool-aged children has been also found in other pragmatic skills, including detecting conversationally inappropriate utterances (e.g., Siegal, Iozzi, & Surian, 2009), repairing communication breakdowns (e.g., Wermelinger, Gampe, & Daum, 2017), and using the speaker's perspective (e.g., Fan et al., 2015) or non-verbal cues such as gaze direction to infer another person's referential intention (Yow & Markman, 2011b). There is also evidence that multilingual children rely more on pragmatic (e.g., intonation, pointing) than on purely linguistic cues when acquiring and processing language (e.g., Verhagen, Grassmann, & Küntay 2017; Yow & Markman, 2011a). Multilingual pragmatic advantages have been attributed to various factors, including multilingual children's superior EC, their increased sociolinguistic awareness which stems from the regular experience of choosing the appropriate language with speakers of different languages; and to a compensation process that balances multilingual children's initial delays in aspects of language acquisition with precocious pragmatic development (e.g., Siegal et al., 2009; Yow & Markman, 2001b).

More recently, however, various studies with children and adults did not find evidence for a multilingual pragmatic advantage; specifically, research with preschool- and school-aged children reported no multilingual-monolingual differences in the interpretation of various types of implicatures, including ad hoc quantity, manner, relevance, and scalar implicatures (e.g., Schulze et al., 2020; Wilson, 2017). Similarly, in two studies with school-aged children, Antoniou and colleagues (2017; 2020) found no multilingual or bi-dialectal effect on the interpretation of contrastive, manner, scalar implicatures, novel metaphors, and irony. Antoniou et al. (2020) also directly investigated the relation between pragmatic interpretation, proficiency in the target language, and EC. They found only a positive effect of working memory on pragmatics that did not differ in multilinguals, bi-dialectals, and monolinguals. Finally, focusing on young and older adults, Sundaray, Marinis, and Bose (2020) also did not find evidence for multilingual-monolingual differences in the comprehension of nonconventional indirect requests, conversational implicatures, conventional and novel metaphors, even though a negative effect of aging was more prominent in monolinguals for conventional metaphors. To explain these null results, Antoniou et al. (2020) proposed a psycholinguistic model of multilingual pragmatics according to which, if multilinguals have sufficient (though not necessarily at a monolingual level) proficiency in the target language to effectively process (to the extent necessary) the semantics of target utterances, then multilingual pragmatic interpretation operates similarly to monolinguals.

To date, only a few studies have examined irony comprehension in multilinguals. As already discussed, Antoniou et al. (2020) found no differences between multilingual, bi-dialectal, and monolingual children in the interpretation of various pragmatic meanings, including irony. However, Antoniou et al. (2020) included only two items on irony. Thus, their results should be interpreted with caution because irony was not reliably measured. Other studies focused on multilinguals but without a monolingual comparison group. Banasik and Podsiadło (2016) showed that irony interpretation was related to ToM in multilingual children. Furthermore, Antoniou and Milaki (2021) focused on bi-dialectal young adults and reported that the speed of processing irony was positively affected by working memory and by more exposure to a second dialect. Finally, two recent studies by Tiv and colleagues (2019; 2021) with multilingual young adults revealed that higher second (L2) language proficiency (but not working memory) was linked to more general sarcasm use across multilinguals' languages and to better irony interpretation in the first language.

To sum, the bulk of research on multilingual pragmatics focused on children, while the few studies on irony did not comprehensively examine this pragmatic phenomenon through multiple items and/or did not contrast multilingual performance to that of monolinguals. Moreover, two broad accounts of multilingual pragmatics can be found in the literature. The first account suggests that multilinguals have better pragmatic skills compared to monolinguals (e.g., Siegal et al., 2009). The second account proposes that pragmatic interpretation does not differ in multilinguals and monolinguals, at least if multilinguals have adequate proficiency in the target language to effectively complete the semantic processing necessary for inferring a pragmatic meaning (Antoniou et al., 2020). A third account may be derived from the Interface Hypothesis (IH; Sorace, 2011). The IH proposes that linguistic processes at the interface of language-internal and external cognitive domains (e.g., syntax-pragmatics) are particularly problematic for multilinguals and L2 learners. They also cause non-convergence with monolinguals, which may endure even at the highest levels of language proficiency (in both languages for multilinguals or in the L2 for L2 learners). This is because linguistic phenomena at such interfaces require a costly integration of information from multiple sources, and multilinguals, for various reasons, possibly have fewer resources to devote to the language interpretation process (e.g., because they have to inhibit the non-relevant language). Thus, based on the IH, we may predict that pragmatic (hence, irony) interpretation, which requires combining multiple cues (e.g., semantic, encyclopedic, non-verbal behavior; e.g., Yus, 2000) is more challenging for multilinguals.

In addition, some results suggest that pragmatic (including irony) interpretation draws on working memory in multilinguals, bi-dialectals, and monolinguals alike (e.g., Antoniou et al., 2020). Finally, some evidence with multilingual children indicates that irony depends on ToM (Banasik & Podsiadło, 2016). The last two results are in line

with the broader literature on monolingual pragmatics, which has reported positive links between working memory and pragmatic processing in adults (e.g., de Neys & Schaeken, 2007) and between ToM and the development and processing of irony (e.g., Filippova, 2014; Spotorno & Noveck, 2014).

The Present Study

Against this background, our study aimed to examine the effects of multilingualism and bi-dialectalism on irony comprehension in young adults by directly comparing multilingual, bi-dialectal, and monolingual participants. This would also provide data to test between the three different accounts of multilingual pragmatic processing. We also wanted to investigate potential group differences in the use of different (combinations of) ironic cues (linguistic context, distinctive intonation, facial expression) during the irony process. This would further provide insight on the strength of different (combinations of) cues in affecting irony in multilinguals, bi-dialectals, and monolinguals.

We focused on irony because it is a relatively understudied pragmatic phenomenon in multilingualism but also because several reasons suggest that multilingualism might have a different effect on irony compared to other pragmatic meanings. First, to reiterate, according to Relevance Theory, irony is unique in that it more heavily draws on ToM (Sperber & Wilson, 2002). Also, multilinguals have been reported to possess superior ToM (e.g., Rubio-Fernández & Glucksberg, 2012). This suggests different irony processing in multilinguals if their advanced ToM is engaged during irony interpretation. Second, some evidence suggests that multilinguals are more influenced by pragmatic compared to purely linguistic cues during language processing (e.g., Verhagen et al., 2017; Yow & Markman, 2011a). This might also result in different irony processing in multilinguals because irony presents a case where pragmatic markers (e.g., distinctive facial expression), if present, indicate a different (intended) meaning relative to linguistic cues such as the ironic utterance's literal interpretation.

The experiment reported here was conducted in the sociolinguistic context of Cyprus, where the native Greek-speaking population typically grow up with and use on a daily basis two Greek dialects (Antoniou et al., 2016): Cypriot Greek (CG) is natively acquired and is used for everyday oral communication; and Standard Modern Greek (SMG) is learnt mainly through education and is used for reading, writing, official and formal situations, and in the media. SMG is also the native language of Hellenic Greeks.

Method

Participants

Forty-two monolingual speakers of SMG (32 females; mean age = 22.7, $SD = 4.1$ years), 64 bi-dialectals (in CG and SMG; 44 females; mean age = 21.7, $SD = 3.4$ years), and 44 multilinguals (in CG, SMG, and another language; 31 females; mean age = 21.8, $SD = 3$ years) took part in the study. SMG proficiency (language of testing) was very high for all

participants: on a scale from 0 (no knowledge of the language) to 4 (excellent skill), they all self-reported proficiency level at 3 or 4, apart from three multilinguals who indicated proficiency at 2 (sufficient comprehension and production skill in various topics). Participants' SMG proficiency was also measured with a vocabulary test.

Materials and Procedure

Participants took an irony task, after a series of cognitive tests (not reported here). They were also given the Mill Hill Vocabulary test in SMG (Raven, Raven, & Court, 1997) and a Socioeconomic Status and Language Background Questionnaire. The vocabulary test had a subtest which required defining 44 SMG words and a second part where participants had to select the word (out of six options) that was closest in meaning to another target word (44 items). The questionnaire had items on participants' proficiency in and use of their language(s) as well as questions about socioeconomic status (SES): Family Affluence Scale (FAS; Boyce et al., 2006), maternal, and paternal education level.

Irony Comprehension Task Participants completed an act-out irony task in SMG (Deliens et al., 2018; Kowatch et al., 2013). Ironic items were cases of unfamiliar irony and involved meaning reversal in that a speaker said something positive to mean the opposite with a negative (critical, mocking, though not severely) intent. The irony task, designed on E-Prime (Schneider et al., 2012), included videos with professional actors. Each item involved a dialogue between a female and male actor, where one actor asked the other whether they wanted one of two objects (Table 1). Participants had to select the object that the second person wanted based on their reply (for irony, one object corresponded to the literal meaning), with accuracy and reaction times (from the end of the reply) recorded. There were three Meaning conditions with 12 items each: a literal-*Yes* (second actor provided a *Yes* reply indicating that they want the mentioned object), a literal-*No* (second actor provided a *No* reply indicating that they do not want the mentioned object), and an ironic condition (second actor provided a *Yes* reply but meant that they do not want the mentioned object). Also, the test had four Cue conditions with nine items each (three for each Meaning condition): context-only (no distinctive intonation or facial expression and, for ironic items, a contrast between context and second actor's reply), intonation-only (distinctive positive, negative or ironic intonation depending on Meaning condition), intonation + face (distinctive positive, negative or ironic facial expression and intonation depending on Meaning condition), context + intonation + face (all three cues used). Each item was comprised of two parts: Video 1, where the

Table 2: Different versions of the same target sentence in the three Meaning conditions.

Phase	Meaning Condition		
	Ironic	Literal-No	Literal-Yes
Context	[George] ^a [Anna] ^b , I know how much you like art and that you don't like flowers at all as a home decoration. However, your house would look nicer with some flowers.		John, I know how much you like flowers as a home decoration and you have said this to me many times.
Labeling of the objects	[George] ^a [Anna] ^b , here is a painting and here is a vase with flowers.		John, here is a painting and here is a vase with flowers.
Target question	Would you like me to give you the vase with the flowers to decorate your house?		Would you like me to give you the vase with the flowers to decorate your house?
Speaker	Actor 1	Actor 2	Actor 3
Target sentence ^c	Yes, you know how much I like flowers as a home decoration!	No, you know that I don't like flowers as a home decoration!	Yes, you know how much I like flowers as a home decoration!

Note. Different versions of the same target sentence appeared only in the context + intonation + face cue condition. ^a For ironic items. ^b For literal-No items. ^c Target sentence was uttered with a distinctive facial expression and intonation.

first actor provided information about their knowledge of the second actor's preferences (in context-only condition), labelled the two objects, and asked the target question. Video 2 included the second actor's answer. Each same item appeared in all three Meaning conditions (uttered by a different actor) but always in the same Cue condition (Table 1). A previous study confirmed that professional actors were successful in eliciting an ironic intonation and facial expression, in that the target ironic videos (without sound) and ironic audios (without video) were rated as more ironic than the literal videos and audios (Antonioni & Milaki, 2021).

Analyses

Analyses were conducted with the *lme4* package (Bates et al., 2015) in RStudio (RStudio Team, 2021), unless otherwise stated. Accuracy was analyzed with generalized linear mixed-effects models (*glmer*) and the logit link function. Reaction times (RTs) were analyzed with linear mixed-effects models (*lmer*). For RTs, we analyzed only correct responses. The significance of fixed effects and interactions was determined using likelihood ratio tests to compare models with and without the interaction or fixed effect of interest (otherwise, the comparison models were identical). For all analyses, if a higher-order interaction between factors was non-significant, then we removed it from the models, and proceeded to examine the effect of lower-order interactions involving these factors or the main effects. For post hoc comparisons we used Tukey's test from the *multcomp* package (Hothorn et al., 2016). We attempted to fit maximal models, but we excluded random slopes (keeping by-subject and by-item random intercepts) to deal with convergence, identifiability or singularity issues (Barr et al., 2013).

Composite Scores These were computed for SMG vocabulary (from scores in the two parts of the test) and for SES (from FAS score, paternal and maternal education) by *z*-transforming and averaging the relevant measures.

Background Variables The three groups did not differ in age ($F(2, 147) = 1.04, p > .05$), gender ($\chi^2(4, n = 150) = 0.710, p > .05$), education level (Fisher's exact test = 8.85, $p > .05$), or SES ($F(2, 143) = 0.55, p > .05$). However, they differed in SMG vocabulary ($F(2, 147) = 19.9, p < .05$), in that multilinguals had lower scores than the other groups and bi-dialectals had lower scores than monolinguals ($ps < .05$)

Irony Task Accuracy and RTs by Meaning, Cue condition, and Group are presented in Table 2. We first examined the effect of Meaning and Cue on irony. We specified an initial model with accuracy as the dependent measure, Meaning (1=literal-Yes, 2=literal-No, 3=ironic) and Cue (1=context-only, 2=intonation-only, 3=intonation + face, 4=context + intonation + face) as fixed effects and their interaction. The interaction, illustrated in Figure 1, was significant ($\chi^2(6, n = 150) = 27.31, p < .05$). To further understand it, we examined the effect of Cue within each level of the Meaning factor. This analysis revealed a significant effect of Cue for literal-Yes items ($\chi^2(3, n = 150) = 17.1, p < .05$), in that the context-only condition was less accurate than the other cue conditions (all $ps < .05$); a significant Cue effect for literal-No items ($\chi^2(3, n = 150) = 10.7, p < .05$), in that the three-cue condition was more accurate than the face + intonation condition ($p < .05$); and a significant Cue effect for ironic items ($\chi^2(3, n = 150) = 11, p < .05$), in that the context + intonation + face condition was more accurate than the two single-cue conditions ($ps < .05$). Finally, there was a significant effect of Meaning ($\chi^2(2,$

Table 2: Means and standard deviations (SD) for proportion of accurate responses by Group, Meaning and Cue conditions.

Meaning	Cue	Monolingual		Bi-dialectal		Multilingual	
		Accuracy (SD)	RTs (SD)	Accuracy (SD)	RTs (SD)	Accuracy (SD)	RTs (SD)
Literal Yes	Context	.81 (.39)	942 (970)	.89 (.31)	902 (778)	.83 (.37)	825.24 (834)
	Intonation	.98 (.15)	819 (809)	.99 (.07)	762 (729)	.98 (.12)	703 (747)
	Face+Intonation	.99 (.09)	663 (649)	1.00 (.00)	629 (630)	.99 (.09)	695 (732)
	Context+Face	.98 (.13)	712 (510)	.98 (.13)	734 (618)	.98 (.12)	655 (542)
	+Intonation	.99 (.09)	896 (835)	.98 (.14)	942 (822)	.95 (.21)	844 (569)
Literal No	Context	.98 (.15)	677 (724)	.97 (.16)	678 (644)	.97 (.17)	646 (644)
	Intonation	.96 (.20)	706 (700)	.97 (.17)	649 (593)	.96 (.19)	642 (543)
	Face+Intonation	.99 (.09)	725 (837)	.99 (.07)	754 (747)	.99 (.09)	647 (523)
	Context+Face	.39 (.49)	915 (791)	.36 (.48)	1270 (1110)	.31 (.46)	1411 (1206)
	+Intonation	.42 (.49)	1230 (970)	.36 (.48)	1283 (1172)	.28 (.45)	1141 (1042)
Ironic	Context	.54 (.50)	1190 (1026)	.46 (.50)	1021 (925)	.47 (.50)	1038 (980)
	Intonation	.60 (.49)	960 (1027)	.55 (.50)	822 (811)	.52 (.50)	977 (909)
	Face+Intonation						
	Context+Face +Intonation						

$n = 150$) = 75.5, $p < .05$), in that the ironic condition was less accurate than the two literal conditions ($ps < .05$). Similar analyses on RTs, showed, again, a significant Meaning by Cue interaction ($\chi^2(6, n = 150) = 12.9, p < .05$). The interaction (Figure 2) was driven by the following effects. First, a significant Cue effect for literal-Yes items ($\chi^2(3, n = 150) = 9.19, p < .05$), in that the intonation + face condition was faster than the context-only condition. Second, a significant effect of Cue for literal-No items ($\chi^2(3, n = 150) = 15.9, p < .05$), in that the context-only condition was slower than all other conditions ($ps < .05$). Third, for ironic items, a significant effect of Cue ($\chi^2(3, n = 150) = 9.07, p < .05$) showed that the three-cue condition was significantly faster than the intonation-only condition, and that it was marginally (but not significantly) faster than the context-only condition ($p = .07$). Finally, there was, again, a significant effect of Meaning ($\chi^2(2, n = 150) = 40.6, p < .05$), in that ironic items were slower than the literal conditions ($ps < .05$).

We further examined the effect of individual cues (rather than combination of cues) on irony. To do this, each item was coded for the presence (e.g., intonation-only items were coded as 1 for Intonation) or absence of a specific cue (intonation-only items were coded as 0 for the Face factor). The initial model on accuracy included Context (1=presence, 0=absence of cue), Intonation, Face, and Meaning as within-subjects factors and all two-way interactions between each Cue factor and Meaning (e.g., Intonation by Meaning and

Face by Meaning interactions). This analysis revealed only a significant Context by Meaning interaction ($\chi^2(2, n = 150) = 8.4, p < .05$), in that context resulted in more accurate responses for literal-No items ($\chi^2(1, n = 150) = 10.2, p < .05$). Similar analyses on RTs revealed only a significant Context by Meaning interaction ($\chi^2(2, n = 150) = 6.2, p < .05$). The interaction was driven by the fact the Context had a greater and facilitative effect on RTs for ironic items, while it had a smaller but negative effect in the other Meaning conditions. However, these effects were not significant, when examining the effect of Context within each Meaning condition.

Thus, overall, results showed that irony was distinct from literal meanings in three ways. First, it was harder to understand, indicated by lower accuracy and longer RTs for ironic compared to literal items. Second, the presence of more markers facilitated irony comprehension at both the accuracy and speed of processing level, shown by more accurate and faster ironic interpretations in the context + intonation + face than the single-cue (context-only, intonation-only) conditions. Third, there was suggestive evidence that context had a greater and facilitative effect on the speed of irony processing compared to literal meanings.

Group Analyses We specified an initial model with accuracy as the dependent measure, Meaning, Cue, and Group (0=monolinguals, 1=bi-dialectals, 2=multilinguals) as fixed effects, all two-way interactions between these factors and

their three-way interaction. There was only a significant Meaning by Group interaction ($\chi^2(4, n = 150) = 13.6, p < .05$).

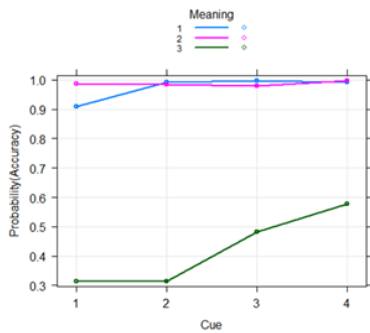


Figure 1: Cue by Meaning interaction on accuracy.

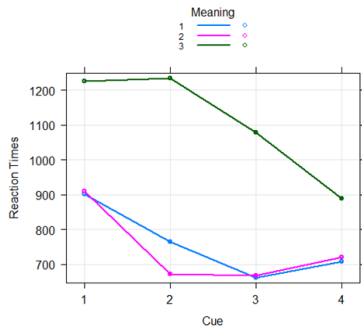


Figure 2: Cue by Meaning interaction on reaction times.

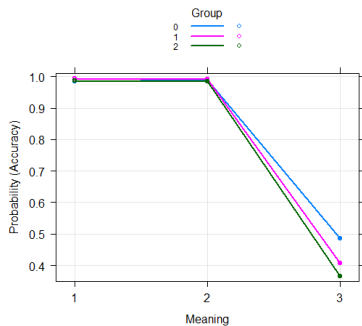


Figure 3: Meaning by Group interaction on accuracy.

Figure 3 suggests that the interaction is driven by Group differences in irony. However, subsequent analyses within each Meaning level indicated no significant Group differences (lowest $p = .13$ for Literal-Yes items, while, for irony, $p = .38$). Similar analyses on RTs, revealed no significant Group effect ($\chi^2(2, n = 150) = 0.69, p > .05$) or interactions involving Group (Meaning by Group: $\chi^2(4, n = 150) = 3.8, p > .05$; Cue by Group: $\chi^2(6, n = 150) = 3.2, p > .05$). We further examined potential group differences in the individual cues that affect irony. We specified an initial model on accuracy with Meaning, Context, Intonation, Face,

and Group, and, for each Cue factor, all of its interactions with Meaning and Group (e.g., for Context, we included the Meaning by Context two-way and Meaning by Context by Group three-way interaction). These analyses showed no significant interactions involving Group (Meaning by Context by Group: $\chi^2(4, n = 150) = 2.16, p > .05$; Context by Group: $\chi^2(2, n = 150) = 0.2, p > .05$; Meaning by Intonation by Group: $\chi^2(4, n = 150) = 1.9, p > .05$; Intonation by Group: $\chi^2(2, n = 150) = 0.2, p > .05$; Meaning by Face by Group: $\chi^2(4, n = 150) = 1.1, p > .05$; Face by Group: $\chi^2(2, n = 150) = 1.1, p > .05$). Similar analyses on RTs also showed no significant results (Meaning by Context by Group: $\chi^2(4, n = 150) = 2.2, p > .05$; Context by Group: $\chi^2(2, n = 150) = 1.1, p > .05$; Meaning by Intonation by Group: $\chi^2(4, n = 150) = 1.6, p > .05$; Intonation by Group: $\chi^2(2, n = 150) = 0.7, p > .05$; Meaning by Face by Group: $\chi^2(4, n = 150) = 1.6, p > .05$; Face by Group: $\chi^2(2, n = 150) = 1.3, p > .05$).

Overall, our data indicate no differences between multilinguals, bi-dialectals, and monolinguals in the accuracy and speed of processing irony. To confirm the hypothesis of no group differences, we conducted two further Bayesian Analyses of Variance on overall accuracy and RTs in the ironic condition (collapsed across cue conditions). We used the Bayes factor to quantify the evidence in support to two hypotheses: H_1 suggests that the groups differ and H_0 that there are no group differences in irony. Analyses were conducted in jamovi statistical software (The Jamovi Project 2020). We used the default priors (r scale fixed effects = 0.5; r scale random effects = 1) because the literature shows mixed findings on the multilingual effect on pragmatics and because different accounts predict all three possible outcomes: null, positive or negative multilingual effect on pragmatics (including irony). Results revealed a Bayes factor, $BF_{10} = 0.16$ for accuracy and $BF_{10} = 0.12$ for RTs. Both results suggest moderate evidence in support to H_0 (Jeffreys, 1961): the accuracy data is about six and the RT data is about eight times more likely under H_0 than under H_1 .

Discussion

We examined the effects of multilingualism and bi-dialectalism on irony interpretation by comparing multilingual, bi-dialectal, and monolingual young adults. Results in the irony test revealed that irony interpretation was (1) difficult, as shown by slower and less accurate responses to ironic compared to literal items; (2) facilitated by the presence of more ironic cues, as indicated by differences in accuracy and RTs between the three-cue (context + intonation + face) condition and one-cue conditions (context-only, intonation-only). Moreover, evidence suggested that context had a greater and facilitative effect on the speed of irony processing compared to literal meanings. Also, we found no group differences in accuracy or speed of irony processing or in the way that different (combinations of) cues affect irony. Our results support the view of multilingual pragmatics according to which pragmatic interpretation is no different in multilinguals compared to monolinguals (at least for highly proficient multilinguals in the target language).

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