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Bilingual children's understanding of implicit meaning in primary-school

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ABSTRACT

In human communication, the comprehension of implicit meaning– i.e. the hidden elements of information necessary to achieve a precise understanding of what is meant in an utterance, is fundamental to the interlocutors' construction of a coherent representation. From a cognitive perspective, the question arises as to whether the cognitive mechanism underlying the processing of implicit meaning is language-specific or language-general. This question is of particular pertinence in the investigation of comprehension mechanisms in a non-native language. The present study addressed this issue by investigating the comprehension of implicit meaning in primary school by forty-five French monolingual and eighty-six French-English bilingual pupils aged 8 and 10. The bilingual children were presented with 24 written sentences (12 in English, 12 in French) containing presuppositions, implicatures or ironies. The monolingual children were presented with the 12 French sentences. The experimental task consisted of answering a question following each trial to ascertain whether the child had recognized and understood the implicit meaning in the target sentence. The mean percentage of correct answers indicated that, despite the bilingual children not being fluent in English, their performance levels in this language were comparable to those observed in their native language, French. Furthermore, and more surprisingly, when tested in French, their native language, bilingual children even outperform monolinguals across both age groups, especially in terms of implicature and irony understanding. Taken together, these data suggest that the cognitive mechanism underlying implicit processing may be language general. One potential strategy that bilinguals might employ is to base their analysis on contextual cues. This would account for their particularly strong performance in both languages for implicature and irony understanding, i.e., two types of implicit processing relying on contextual analysis. The hypothesis that bilingualism improves the ability to understand implicit meaning independently of language proficiency warrants further investigation.

Keywords: Bilingualism, Implicitness, Presupposition, Implicatures, Irony, Primary school.

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1 INTRODUCTION

The presence of implicit meaning in speech and writing is a very common phenomenon, to the point where one might even wonder whether we always speak indirectly by choosing to embed what we want to say within the inferences that can be drawn from the literal meaning of our messages. As C. Kerbrat-Orecchioni points out, *"'It's hot in here' never simply means that it is hot in here, but rather, depending on the context, 'Open the window,' 'Turn off the radiator,' 'Can I take off my jacket?' 'It's cooler elsewhere,' 'I have nothing more interesting to say,' etc. In short, indirection seems to be the rule"* (1986, p. 5).

Detecting and understanding the different types of implicit meaning that languages can express is a challenge for all speakers, regardless of their age (children and adults), socio-cultural background, or level of proficiency in their language(s). The reason is that this process involves an interpretative effort, often carried out with no clear guidance, and its outcome can be challenged by the addressee, since the implicit meaning was never explicitly stated by the speaker (Kerbrat-Orecchioni, 1986). The advantage of communicating implicitly is thus the ability to convey a message without having to take full responsibility for its hidden meaning (Ducrot, 1980). One can always respond by saying that the other person is mistaken and that there was never any intention to give an order to open the window simply stating that it was hot in the room.

Since implicitness subtly shapes the meaning of speech and writing, the ability to recognize and interpret it is essential for mastering any language. This is particularly evident in non-native languages, where speakers, especially novices, depend on contextual information to compensate for their reduced lexical knowledge when constructing the meaning of the message. This can have a detrimental effect on the comprehension of certain types of implicitness (e.g. implicatures, irony) that rely on contextual cues. To achieve this goal, teaching the comprehension of implicit meaning should begin as early as possible in pupils' schooling, while taking into account the cognitive complexity specific to each type of implicit meaning. In this study, which focuses on primary school pupils, we selected three types of implicit meaning (presupposition, conversational implicatures, and antithetical irony) that psycholinguists have shown can be understood and even produced by children as young as five years old in favorable contexts (Kail, 1978; Scoville & Gordon, 1980; Pouscoulous, 2007; Pexman & Glenwright, 2007).

Research on how monolingual children develop their understanding of implicit meaning has been quite extensive (Pouscoulous et al, 2007). In contrast, research on how bilingual children develop those skills remains still limited, even though bilingualism is predominant worldwide. In France, approximately one in five children grows up in a bilingual environment (Grosjean, 2015). Research on child bilingual language acquisition has consistently highlighted the crucial role of both the quantity and quality of exposure to both languages in developing bilingual competence. With regard to quantity, age of exposure onset and exposure rate to each language in the bilingual child's daily life are strong predictors of their proficiency in each (Paradis, 2023). For example, the lexical abilities of bilingual children tend to be more limited in their second language (L2) compared to their monolingual peers, due to differences in quantity exposure. With regards to exposure quality, the variety and richness of language contexts also play a crucial role. Compared to an exposure pattern where each language is strictly divided between home and school, bilingual competence is more easily developed when both languages are used in both family and school settings (Paradis, 2023).

Additionally, compared to exclusive use at home, using a language in a school academic setting enhances proficiency, as it serves both as a language of learning and a language for peer socialization (Cohen et al., 2024).

Some studies have reported better performance in bilinguals compared to monolingual peers in their understanding of implicit meaning (Siegal et al., 2007, 2009, 2010). This bilingual advantage has been accounted for by the fact that bilinguals might develop heightened attention to contextual and communicative cues in order to adapt to their interlocutor's language. This process would in turn enhance their ability to infer others' preferences and perspectives, thereby strengthening their comprehension of non-literal language and implicit meaning, even in their non-dominant language. More recent studies, however, have not reported such bilingual advantages, but instead similar performances in successive bilingual and monolingual children, despite bilinguals having more limited linguistic skills in the tested language (e.g., Antoniou & Katsos, 2017; Antoniou et al., 2019). The explanation here is that bilinguals would achieve the same level in their understanding of implicit meaning as monolinguals but would rely on different skills to do so. Successive bilinguals may use compensatory strategies, by focusing more on contextual cues to infer the non-literal meaning of an utterance, in order to compensate for their limited lexical or syntactic knowledge of their non-native L2. In sum, what emerges from these various studies is that overall bilingualism provides an advantage in understanding implicit meaning. When bilingual children are assessed in a language in which they are very comfortable—either their native language or at least their dominant language—they perform better than monolinguals in understanding implicit meaning (e.g. Siegal et al., 2007, 2009, 2010). When they are assessed in a language in which their proficiency is more limited compared to their monolingual peers, typically in their L2, they still achieve performance levels similar to those of monolinguals (e.g., Antoniou & Katsos, 2017; Antoniou et al., 2019).

In the current study, we explore the understanding of implicit meaning in primary-school monolingual and successive bilingual pupils aged 8 and 10. We assume that successive bilinguals will be better at understanding types of implicit meaning that rely on processing global contextual cues, such as conversational implicature and irony, rather than those that depend on processing more local lexical cues, such as presupposition, in both of their languages. We also posit that successive bilingual pupils, compared to their monolingual peers, will have a better understanding of implicit meaning, because of their heightened attentional resources to contextual cues.

about him.

2 METHODOLOGY

The aim of this study is to provide new data on the understanding of implicit meaning in French-English bilingual children. To this end, three types of implicit meaning (presupposition, implicature, irony) were presented in writing in the native language, French, and the non-native language, English, to French-English successive bilingual children in grades 3 and 5.

2.1 Participants

A total of eighty-two bilingual children (44 males and 38 females) were recruited from the Sévigné school in Paris (France). Of these bilingual children, 39 were in third grade (i.e. CE2 in the French school system) (17 males and 22 females), around age 8, and 43 were in fifth grade (i.e. CM2 in the French school system) (27 males and 16 females), around age 10. All were native French speakers

and their L2 was English. They were taught bilingually at the Sévigné school with equal distribution across French and English instruction. Living in France, they mainly used French in daily life, while English was primarily used at school. In this context, French was their dominant language. The socio-economic status (SES) of the parents was rather high compared to the average in France.

Before data collection began, parents completed a questionnaire asking for biographical information about their child. The parents were informed individually of the objectives of the study, as well as of the experimental protocol and the procedure for storing and anonymising the data. They then gave their written consent. The data collected was anonymised by applying the European Data FAIR principle (Wilkinson et al., 2016) in collaboration with the HumaNum TGIR (https://www.huma-num.fr) for experimental data management. Data processing was carried out in accordance with the General Data Protection Regulation of the Centre National de la Recherche Scientifique (CNRS). The study was approved by the local ethics committee of University Paris Nanterre and was conducted in accordance with the principles of the Declaration of Helsinki.

In order to determine the extent to which bilingualism had a beneficial effect on the understanding of implicit meaning in the mother tongue, we compared our bilingual children's comprehension of the same English sentences translated into French with that of French-speaking monolingual children of the same age tested with the same linguistic material and task in two previous studies (Godart-Wendling, Isel, Kihlstedt & Buci, 2023; Pozniak, Beyssade, Roussarie, & Godart-Wendling, 2024).

2.2 Linguistic materials

Twelve French sentences containing three types of implicitness, namely presupposition, conversational implicature and antithetical irony, were constructed by a group of linguists, including the last author of this article. Table 1 displays examples of the three categories of implicitness in the two languages

Out of the twelve sentences, five involved presuppositions. Presupposition is an implicit meaning of a lexical or syntactic nature[4] (Godart-Wendling et Raïd, 2016). The main test to detect it consists of negating the sentence in which presuppositions are being examined. The part(s) of the sentence that remain(s) unchanged under negation correspond to the presuppositions. Indeed, any statement consists of a part called “asserted” and a part called “presupposed”. The “asserted” part, which is sensitive to negation, allows the discourse to progress, whereas the “presupposed” part corresponds to information that constitutes the context of the statement and cannot be challenged (hence its invariance under negation) without implying that the speaker is either lying or insane. For instance, transforming the affirmative sentence “John has stopped smoking” into its negative form results in “John has not stopped smoking” and helps determine that the asserted (or explicit) part is “John does not smoke today” (since this information is affected by negation and reversed), while the presupposed

[4] In this study, we have only considered lexical presupposition, but there are also presuppositions that arise from the syntactic structure of a sentence. The cleft construction “It is X who…” is an example of this. Indeed, saying “It is John who came” triggers the presupposition that someone other than John was expected to come. We did not take this type of presupposition into account due to its complexity, given the age of the pupils we tested.

(or implicit) part is “John used to smoke before”, as this information remains true whether the sentence is affirmative or negative. The incoherence resulting from the challenge of a presupposition is noticeable in the possible continuations of a sentence. Thus, an incoherent sentence like “John has stopped smoking, and besides, he never smoked before” arises when the sentence is extended by negating its inherent presupposition. In the context of a dialogue where a speaker A states, “I have stopped smoking”, the response “But you never smoked” is highly polemical, as it implies that the speaker is either lying or mentally disturbed. On the other hand, it is possible to develop the discourse based on the asserted part, as one could continue the sentence “John has stopped smoking” with “I think he is really courageous”, thus allowing the dialogue to evolve by discussing John's courage. Since presupposition is lexically anchored in the lexical nature of the words used (“to stop” implicitly means that the action [smoking] was performed before), it does not require the interpreter to rely on context or co-text to be understood (Pozniak et al. 2024) (see Table 1 for an example).

Three sentences involved conversational implicatures. Conversational implicatures, identified by the philosopher Paul Grice in his article *"Logic and Conversation"* (1975), correspond to inferences that we make out of habit (Beyssade, 2017) and are therefore influenced by the speaker's culture. Unlike presuppositions, their main feature is that they are revisable and can be canceled depending on new information introduced later in the discourse or text. For example, the common implicature generated by the sentence *"John and Mary have two children"* is that *the couple has exactly two children*, even though this information is not explicitly stated. This implicature can be canceled if the speaker continues by saying: *"John and Mary have two children, and even three”.* Similarly, the sentence *"Peter and Arthur went to the cinema"* implies that *they watched the same movie*, but this implicature is canceled if the discourse continues with: *"Peter watched a Melville film, and Arthur a Truffaut".* Unlike presupposition, implicature relies on context to be generated. However, the contextual elements it draws upon can vary: they may be limited to a single word, as in the case of *"two"* in the sentence *"John and Mary have two children”,* or extend to multiple words, or even encompass the entire sentence, as illustrated by the example *"Pierre and Jacques went to the cinema”* (see Table 1 for an example).

Three other sentences involved antithetical irony. Antithetical irony falls under implicit meaning, as it requires the ability to reverse the literal meaning to understand what the speaker truly intends to convey. This is the case when a friend exclaims, *"Lucky me!"* while we know he has to drive for two hours on narrow, rocky roads to do his shopping and always gets car sick. Understanding irony therefore requires a broad grasp of context, as it includes not only the information explicitly stated by the speaker but also background knowledge (see Table 1 for an example).

Each of the twelve sentences was preceded by a short context about some characters, which served to introduce the sentence containing an implicit meaning. A comprehension yes-no question followed to verify whether the children had inferred the implicit meaning from the sentence. Moreover, the corpus comprised the twelve equivalent sentences and their context which had previously been translated into English.

Table 1: Examples of sentences

Shared context	Target sentence	Question
English		
Tom doesn't like going to school. He gets a lot of bad marks. This weekend his parents have to sign his notebooks.	Presupposition They are pleased because Tom is continuing to make progress in mathematics.	Do you think this is the first time Tom has made progress in mathematics?
	Implicature They are pleased because Tom got two exercises right.	In your opinion, has he failed all the other exercises?
	Irony His father says to him: "So you're still top of the class?"	Do you think Tom's father thinks his son is top of the class?
French		
Tom n'aime pas aller à l'école. Il a beaucoup de mauvaises notes. Ce week-end, ses parents doivent signer ses cahiers.	Presupposition Ils sont contents parce que Tom continue à faire des progrès en calcul.	À ton avis est-ce que c'est la première fois que Tom fait des progrès en mathématiques ?
	Implicature Ils sont contents parce qu'il a réussi deux exercices.	A ton avis, est-ce qu'il a raté tous les autres exercices ?
	Irony Son père lui dit : « Alors toujours le meilleur de la classe ? »	À ton avis est-ce que le père de Tom pense que son fils est le meilleur de la classe ?

2.3 Procedure

Each child read each of the twelve French target sentences containing an implicit meaning, preceded by their context. The child's task was to answer a question that allows the examiner to determine whether the child has detected and understood the implicit meaning in the target sentence. This forced YES/NO choice was transcribed in writing by circling the YES or NO answer. One week later, each bilingual child was further tested in English with the same twelve sentences. Testing time overall took around 15 and 30 minutes for monolinguals and bilinguals respectively.

Once the tests had been completed, each child's answers to each sentence were transcribed into a spreadsheet. The number of correct responses for each type of implicitness was calculated for each child, then transformed into a proportion.

2.4 2.4 Experimental design

In this study, we systematically manipulated 3 main factors, with Class at school as a between-subjects factor (2 levels: third grade, fifth grade), and Type of implicitness (3 levels: presupposition, implicature, irony) and Language (2 level: French, English) as within-subjects factors. The dependent variable was the proportion of correct responses.

3 RESULTS

Figure 1 illustrates the average performance, expressed as a percentage, of the bilingual children from the Sévigné school for the three forms of implicitness in third and fifth grade. The only significant difference reported by a chi-squared test is that between grades 3 and 5, regardless of language: On average, 10-year-olds (fifth grade) (*Mean* = 82.3%, *SD* = 20.5%) understand all types of implicitness better than 8-year-olds (third grade) (*Mean* = 69.2%, *SD* = 27.2%). Descriptively, the data show that, on average, bilinguals perform similarly in comprehension of implicitness in both their native language (French) and their non-native language (English), regardless of the type of implicitness. In sum, comprehension of implicitness appears to be a relatively late-emerging language skill that continues to develop throughout the primary school years. Surprisingly, bilinguals did not perform better in their native language compared to their non-native language, suggesting that they may develop compensatory strategies to offset their linguistic weaknesses in their non-native language, enabling them to achieve comparable comprehension of implicit meaning across both languages.

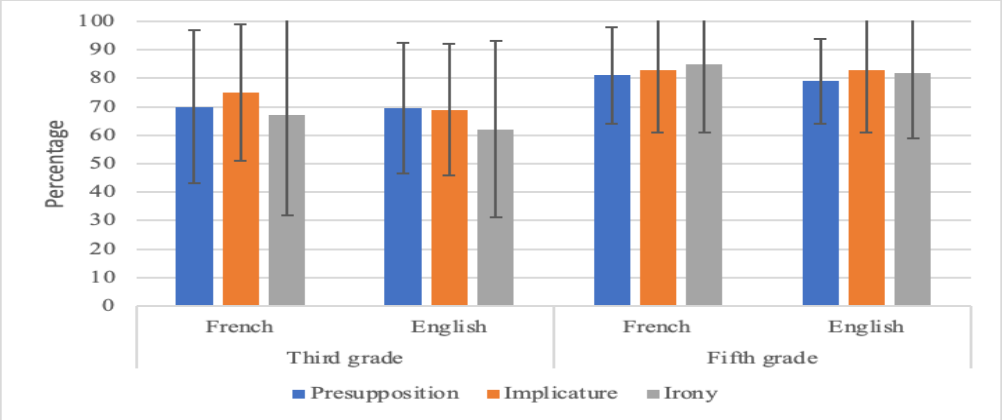

Figure 1. Average percentage of correct answers for the three forms of implicit in third and fifth grade.

Figure 2 displays the comparison between French-English bilinguals and French monolinguals, regarding their understanding of implicitness in French. On average, bilinguals, irrespective of grade, have a better understanding of implicitness of all types (*Mean* = 77%, *SD* = 24.8%) than monolinguals (*Mean* = 67%, *SD* = 22.4%). These findings suggest that bilingualism, on the whole, may confer an advantage in the comprehension of implicit meaning.

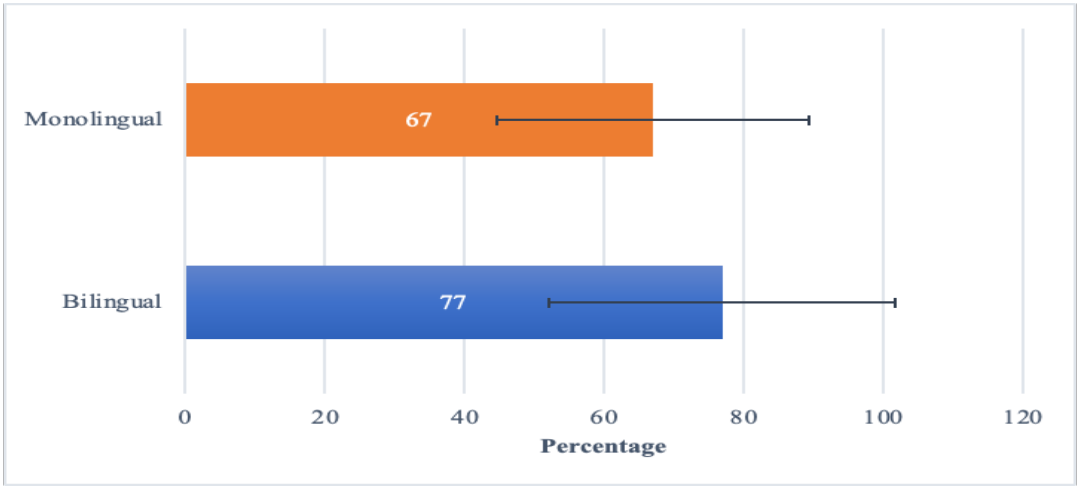

Figure 2. Average percentage of correct answers in French for bilinguals and monolinguals.

Figure 3 summarizes the average percentage of correct answers for the three forms of implicitness in French for bilinguals and monolinguals in third and fifth grade. Looking more closely at the types of implicitness, the descriptive data show that bilinguals, on average, understand implicature (Bilinguals: *Mean* = 83%, *SD* = 22%; Monolinguals: *Mean* = 64%, *SD* = 26%) and irony (Bilinguals: *Mean* = 85%, *SD* = 24%; Monolinguals: *Mean* = 72%, *SD* = 25%) in French better than monolinguals. For presupposition, however, the two groups show similar percentages of correct answers, especially for children in grade 3 (Bilinguals: *Mean* = 70%, *SD* = 27%; Monolinguals: *Mean* = 67%, *SD* = 26%). These results indicate that a bilingual advantage may not extend to the comprehension of all forms of implicit meaning, but rather to those that are context-dependent, such as implicature and irony (cf. method).

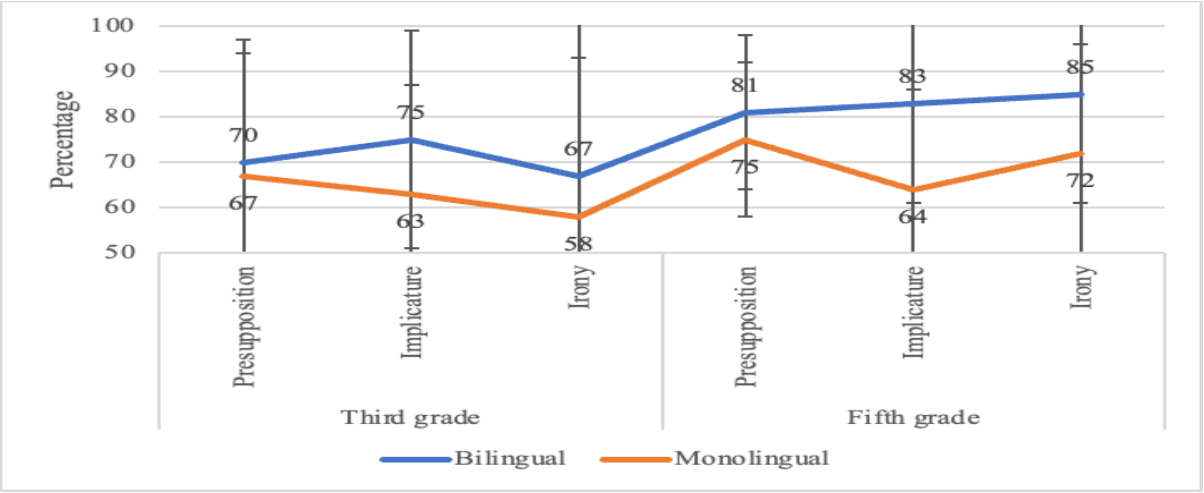

Figure 3. Average percentage of correct answers for the three forms of implicit in French for bilinguals and monolinguals in third and fifth grade.

4 DISCUSSION

With respect to our bilingual group, our findings demonstrate significant progress in their comprehension of implicit meaning between third and fifth grade, with no ceiling effects observed in fifth grade. This confirms that comprehension of implicitness is a language skill that continues to develop throughout primary school (Pozniak et al, 2024). This is likely why a bilingual advantage remains evident at ages 8 and 10. Our bilingual group demonstrated equivalent performance in their understanding of implicit meaning in both French and English. Recall that French was the bilinguals' native language and their most frequently used language in daily life, as they lived in France, while English was their L2, primarily used in school. In this context, French was their dominant language, and English their non-dominant one. Thus, one might have expected better performance in French than in English, given that their lexical and syntactic skills in L2 English should be less developed. The fact that they performed equally well in both languages suggests that they may be using compensatory strategies, as suggested by previous studies (Antoniou & Katsos, 2017; Antoniou et al., 2019). These strategies would involve relying more on contextual cues, which would help them overcome their lexical and syntactic weaknesses, allowing them to understand implicitness equally well in both their L2 and their native language. Yet, one cannot exclude the possibility that performance in English partly reflects a test-retest effect, given that the English sentences were always administered after the French ones. However, the two sessions were spaced one week apart, minimizing any potential training effect. To fully appreciate the English performance of our bilinguals, it would have been useful to include a group of monolingual English-speaking children for comparison.

Turning to the comparison between bilinguals and monolinguals, we observed that bilingual participants displayed a better understanding of implicit meaning than monolingual peers. This supports the hypothesis of a bilingual advantage in this domain, as previously proposed in studies on preschool-aged children (ages 3 to 6) who were raised bilingually at home and attended monolingual schools (Siegal et al., 2007, 2009, 2010). This bilingual advantage hypothesis posits that bilinguals develop heightened attention to contextual cues, allowing them to strengthen their comprehension of implicit meaning (e.g Siegal et al, 2009). Our findings provide new insights on that matter by

demonstrating that bilingualism continues to facilitate the comprehension of implicit meaning in older primary-school children (ages 8 and 10). Our results further indicate that bilingualism, even when experienced solely in a school setting without a bilingual home environment, can still enhance children's ability to understand implicit meaning. Recall that the bilingual children in our study received an equal distribution of instruction in English and French, meaning they had only half as much French instruction as their monolingual peers. Thus, the amount of French instruction alone cannot explain the bilingual advantage. Rather than the quantity of instruction in a given language, it appears that the bilingual experience itself—through regular interaction with speakers of a different language, even exclusively in a school setting—plays a key role in developing the comprehension of implicit meaning.

Our results also suggest that this bilingual advantage does not apply to the understanding of all types of implicit meaning. Specifically, we found a bilingual advantage in understanding implicatures and irony but not presuppositions. This finding further supports the idea that bilingualism enhances sensitivity to contextual cues only. Indeed, while implicatures and irony rely heavily on context to be understood, presuppositions mostly depend on local lexical cues (Pozniak et al. 2024). The superior performance of bilingual children in understanding implicit meaning, however, might be attributed to other factors, such as socio-economic or cultural influences. The bilingual children in our study attended a private school, while the monolinguals were enrolled in a public school. It is likely that the former had a more advantaged socio-economic background (SES) than the latter. Parental SES is a strong predictor of children's overall language skills (Roy & Chiat, 2013), particularly their vocabulary size (Pan et al., 2005). However, if SES were the determining factor, a bilingual advantage would be expected across all types of implicitness. Cultural differences between bilingual and monolingual children also seem an unlikely explanation, as both groups came from the same neighborhood and were presumably culturally similar. Furthermore, cultural factors alone would not account for the absence of a bilingual advantage for presuppositions.

5 CONCLUSION

This study aimed to assess the understanding of three types of implicitness - presupposition, implicature, irony - in French-English bilingual children, both in their native language (French) and in their L2 (English) and to compare their understanding of implicit meaning in French with that of monolingual French-speaking children.

Our study had several limitations. In addition to the lack of precise data on the children's SES background, we did not have accurate estimates of their language skills in either French or English. This would have enabled us to better assess the respective influences of language proficiency and bilingual experience on their understanding of implicitness. Furthermore, it would have been valuable to include a measure of Theory of Mind, as this ability—the capacity to understand others' beliefs and preferences—underpins the development of socio-pragmatic skills, particularly the comprehension of irony (e.g., Nilsen et al., 2011) and may be more developed in bilinguals than in monolinguals (e.g., Schröder et al., 2018).

To conclude, bilingual children performed as well in their L2 as in their native language in terms of their ability to comprehend implicit meaning, even though they were not fluent in their L2. This

finding suggests that the cognitive mechanism underlying implicit processing may be language-general. Furthermore, the observation of enhanced performance in bilingual children in comparison to monolingual individuals in understanding implicitness lends support to the notion that bilingual instruction can facilitate the mastery of linguistic inferences, irrespective of the language employed and the degree of proficiency in the L2. This finding should be considered in educational policies that promote bilingual education. Future studies should aim to replicate these promising results by using even more diverse forms of implicitness and larger corpora. Finally, the use of neuroimaging techniques such as electroencephalography will facilitate the study of the neurocognitive mechanisms underlying processing of various forms of implicitness in longitudinal studies, without any decisional or motor interference.

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