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Multilingual pragmatics: Implicature comprehension in adult L2 learners and multilingual children[1]

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Introduction

In the past three decades, research on the cognitive functioning of multilinguals has seen a steep increase, reflecting an increasing awareness that empirical findings on monolinguals do not apply to a substantial number of people in the world who regularly use more than one language (or dialect) in everyday life (Barac, Bialystok, Castro & Sanchez, 2014; Bialystok, Craik, Green & Gollan, 2009; Grosjean & Li, 2013; Hammer, Hoff, Uchikoshi, Gillanders, Castro & Sandilos, 2014; Paap, Johnson & Sawi, 2015). Within this growing body of work, researchers have also investigated the effects of multilingualism on pragmatic competence, broadly defined as the ability to efficiently produce and understand meaning in context (Taguchi, 2009). In this chapter, I review the research on multilingual adults' and children's comprehension of non-literal (pragmatically implicated) meanings, an aspect of pragmatic competence that has been relatively well studied in the field of SLA and for which there is now a fair amount of research with multilingual children.

The structure of this chapter is as follows. I start by briefly outlining some of Grice's (1989) core ideas about meaning, which form the foundation for most recent theoretical and experimental approaches to pragmatics. I continue by examining the literature on the verbal and non-verbal cognitive effects of multilingualism. Psycholinguistic studies have often

relied on this research to make predictions or explain empirical findings regarding the relation between multilingualism and pragmatic understanding. Then, I review the evidence from studies that examined implicature understanding skills in adult L2 learners (as compared to native speakers[2]) and multilingual children (as compared to monolinguals). Finally, I consider the implications of this research for the development and processing of pragmatic meanings in multilinguals and propose directions for future research.

Throughout this chapter, I adopt a definition of *multilingualism* as including all speakers who use two or more languages (or dialects) on a daily basis (Grosjean & Li, 2003, p. 5). In this sense, *multilingualism* also includes individuals who are often described as L2 learners. This definition is necessarily broad, reflecting the large heteregoneity across studies on who is considered *multilingual*. Given the broad scope of the term *multilingualism* as adopted here, in subsequent sections, I give as much information as possible about the specific characteristics of the multilingual samples in the studies reviewed.

Theoretical underpinnings and key concepts

Grice on meaning and implicature

According to Grice (1989), speaker meaning can be defined in terms of intentions. By describing speaker meaning in this way, Grice laid the foundation for an inferential model of communication, whereby utterance interpretation consists of uncovering the speaker's intentions behind an utterance (Sperber & Wilson, 1986) (see also Chapter 3 in this volume).

Grice (1989) also systematically examined cases where what a speaker says with an utterance (sentence meaning) differs from what she/he intends to communicate (speaker meaning). He proposed that conversational exchanges are cooperative efforts which are expected to follow certain conversational maxims; specifically, the maxims of quantity (be no more and no less informative than is necessary), quality (tell the truth), relevance (provide relevant information), and manner (be clear). Consideration of these maxims during

conversation often leads to the generation of implicit meanings, what Grice called

conversational implicatures. For instance, consider the following dialogue:

> (1)   A: Did you eat all the cookies in the box?
>
>   B: I ate some of the cookies in the box.
>
> (2)   B did not eat all the cookies in the box.

B's reply in (1) implicates the proposition in (2), which contains more information than the

conventional meaning of B's utterance. Linguistic inferences like the one in (2) (i.e., that

'some' implicates 'not all') are known as scalar implicatures (SIs) because they are generated

based on scales which order lexical terms (e.g., 'some' and 'all') with respect to informational

strength (Horn, 1972)[3]. These inferences arise from consideration of Grice's maxim of

quantity: Given that the speaker used the less informative term in the scale (e.g., 'some'), the

listener is licensed to infer that the more informative term (e.g., 'all') does not hold. In a

similar vein, a broad class of implicatures (e.g., metaphoric or ironic interpretations) may be

generated by using the other maxims.

      Grice (1989) was never interested in cognitive-psychological issues related to

utterance interpretation and production. Subsequent pragmatic theorists, however, viewed

pragmatics as a capacity of the mind (e.g., Sperber & Wilson, 1986). Within this cognitive

approach to pragmatics, issues concerning pragmatic development, the processing of

pragmatic meanings, and the interaction of the pragmatic system with other mental capacities

during pragmatic interpretation became particularly pertinent.

      In their influential work on Relevance Theory, for instance, Sperber and Wilson

(2002) suggest that, since pragmatic comprehension requires the recognition of the speaker's

intentions behind an utterance, it further depends on a Theory of Mind. Theory of Mind is a

cognitive process dedicated to the understanding of mental states (e.g., Baron-Cohen, Leslie,

& Frith, 1985) including the understanding of intentions during communication. Other

researchers (e.g., De Neys & Schaeken, 2007) have further proposed that pragmatic comprehension possibly interacts with non-linguistic cognitive components such as executive control. Executive control is an umbrella term for a set of partly interrelated cognitive processes, which include working memory (the abilility to maintain and use information in mind), task-switching (the skill to switch between tasks and representations), and inhibition (the ability to suppress automatic responses or irrelevant information) (Miyake, Friedman, Emerson, Witzki, Howerter & Wager, 2000). During pragmatic comprehension, these executive functions might be needed, for instance, to suppress a literal meaning, to flexibly switch between alternative meanings of the same statement (e.g., from a literal to a pragmatic meaning), or to hold in memory and combine linguistic and contextual information. Finally, given that pragmatic comprehension usually concerns verbal stimuli, language proficiency is another factor that by necessity interacts with and has been reported to affect pragmatic interpretation (see Andrés-Roqueta & Katsos, 2017, for some empirical evidence).

Within this cognitive conceptualisation of pragmatics, then, any experience that has an effect on language skills and other cognitive processes is likely to impact pragmatic interpretation too. Indeed, multilingualism is one such experience that has been suggested to have broad consequences for cognition. In the next section, I briefly review the findings regarding the impact of multilingualism on language skills, executive control, and Theory of Mind; that is, on three key cognitive components that have been linked to pragmatic interpretation. I also consider the evidence from studies that examined multilinguals' use of various pragmatic cues in language processing and communication, given that pragmatic interpretation often requires considering such information.

Multilingualism, language and non-verbal cognition

Research on the cognitive effects of multilingualism has revealed different patterns of results for verbal and non-verbal cognitive skills. In terms of language, multilingual

participants appear disadvantaged in domains of language knowledge, processing, and development when compared to monolinguals in each of their languages separately (e.g., Bialystok et al., 2009; Hammer et al., 2014). Multilingual children, for instance, have been typically reported to possess smaller vocabularies in each of their two languages relative to monolinguals, a difference that some studies find to persist even in adulthood (see Bialystok, Craik, & Luk, 2012). These findings, however, do not indicate a problem in the language acquisition process for multilinguals but, rather, largely reflect the different quantity and quality of language input that multilinguals receive as compared to monolinguals (most notably, multilinguals' lesser exposure to each of their languages relative to monolinguals) (e.g., Hammer et al., 2014). In support to this conclusion, some studies report that monolingual-multilingual differences in vocabulary size often disappear when multilinguals' total vocabulary (i.e., total lexical items known across languages) or conceptual vocabulary (i.e., total number of concepts for which a word is known across languages) is considered, when simultaneous multilingual children with daily exposure to their languages are tested, or when multilingual children are assessed in their dominant language (e.g., Hammer et al., 2014).

Multilingual adults have been also reported to exhibit slower lexical access in controlled experiments (e.g., Bialystok, et al., 2009). Furthermore, they are often slower in processing semantic and grammatical phenomena in their L2, even though they might attain native-like semantic and grammatical processing with increased language proficiency (e.g., Clahsen & Felser, 2006). These differences have been attributed, once more, to multilinguals' lesser experience in using each of their languages and/or to interference from the non-relevant language when using the other (e.g., see Bialystok et al., 2009).

With regards to non-verbal (or at least not purely verbal) cognitive processing, some experimental evidence suggests a positive effect of multilingualism on executive functions

(e.g., Barac et al., 2014; Bialystok et al., 2009) and various social and communicative skills (e.g., Liberman, Woodward, Keysar & Kinzler, 2017; Yow & Markman, 2011b). It has been proposed that multilinguals exhibit superior executive control skills as compared to monolinguals because of their continuous experience in using the executive control system to manage two languages in the mind and select the appropriate language (without intrusions from the other) in any given conversational situation (e.g., Bialystok et al., 2009). Superior executive control for multilinguals has been reported across the lifespan, although the effect seems to be weaker (or even absent) in young adults (Bialystok et al., 2012; Paap & Greenberg, 2013). However, recently, the claim that multilingualism enhances executive functions has been challenged by many researchers (e.g., Paap et al., 2015).

Besides executive control, multilingual advantages have been also reported in various aspects of social and communicative functioning. Research with preschool-aged children has shown that multilinguals are better than monolinguals at using communicative cues like gaze direction and the speaker's perspective, when making inference of their interlocutor's intention (Liberman et al., 2017; Yow & Markman, 2011b). In addition, studies that compared multilingual and monolingual children in Theory of Mind tasks reported superior multilingual performance (see in Barac et al., 2014), and this advantage seems to hold even for multilingual adults (Rubio-Fernández & Glucksberg, 2012). All these advantages have been attributed to multilinguals' enhanced executive control skills or to their increased experience in considering which language their interlocutors speak in order to use the appropriate language (e.g., Liberman et al., 2017; Yow & Markman, 2011b). Finally, there is some evidence that multilingual children are more sensitive to pragmatic cues and weigh pragmatic information (e.g., intonation, pointing) more heavily than linguistic information during language acquisition and processing (Verhagen, Grassmann & Küntay, 2017; Yow & Markman, 2011a).

To sum, multilingualism has been found to affect various aspects of cognition, including facets of language knowledge and processing, executive functions, Theory of Mind, and the use of pragmatic cues during language processing and communication. These effects possibly have further consequences for multilingual implicature comprehension. On the one hand, linguistic costs for multilinguals might have a negative impact on pragmatic understanding. Insufficient language knowledge might lead to incomplete or erroneous semantic processing, that, in turn, results in drawing no or unintended pragmatic implications. In addition, slower and more effortful language processing might prohibit multilingual speakers from recruiting additional processing resources for further pragmatic processing. This is a particularly possible scenario given some evidence that implicature interpretation is itself an effortful process as compared to the comprehension of literal meanings (e.g., De Neys & Schaeken, 2007). On the other hand, multilingual benefits might lead to comparable pragmatic performance to that of monolinguals by balancing linguistic costs or might result to better implicature comprehension skills in multilinguals either because cognitive benefits outweigh the linguistic costs or because multilinguals have reached a stage of language proficiency at which linguistic costs are minimal.

In the next section, I turn to the literatures on multilingual adults' and children's impicature understanding skills. I will argue that the bulk of the evidence from this research provides support to three generalisations regarding multilingual implicature comprehension. First, that, at initial stages of language learning, language proficiency (broadly understood as proficiency in language knowledge *and* processing) in the target language positively affects implicature understanding; and linguistc costs at this stage lead to problems in multilingual pragmatic comprehension. Second, that, with sufficient language proficiency, multilinguals can reach an equivalent level of implicature understanding to that of monolinguals/native speakers. At this stage, language proficiency no longer affects implicature comprehension.

Third, that there is no strong evidence for a point in multilingual development where multilinguals outperform monolinguals in pragmatic comprehension. I conclude by proposing an account of multilingual implicature understanding according to which multilinguals have a single, language-independent pragmatic system (where universal pragmatic maxims of conversation are represented), which is no special as compared to monolinguals in terms of how it is acquired and functions.

Survey and appraisal of the current literature

Adult multilinguals: How well do they comprehend L2 implicatures?

Studies with multilingual adults have focused on individuals who are often described as L2 learners; that is, speakers who started learning or regularly using an L2 at a relatively old age in life, often during adolescence or young adulthood. In all the studies reviewed in this section, participants lived in a context that required the regular use of L2. However, the specific characteristics of this use vary widely from study to study, ranging, for instance, from speakers with a few months of daily use to learners with a lengthier daily experience with a L2. Based on the fndings reviewed in this section, the main argument to be developed is as follows. Implicature development in an L2 is best characterised in terms of two stages: An early stage at which multilinguals have not yet reached an adequate level of language proficiency in the L2. This results in poor L2 implicature performance relative to native speakers. During this stage, language proficiency is an important predictor of implicature performance. Second, a final stage of implicature development at which multilinguals have reached a threshold level of language proficiency. This leads to native-like implicature understanding. At this stage, language proficiency, no longer predicts implicature performance.

In a pioneering series of studies, Bouton (1988, 1994) examined implicature interpretation (e.g., Joan: Do you have a lot of relatives? Fran: Are there flies in the summer?)

in non-native English-speaking university students. In his first study, Bouton (1988) administered a test on different types of implicatures (e.g., relevance, scalar implicatures, irony) to international students entering university in the U.S.A. and to native speakers. The results of this study showed significantly lower implicature performance for the non-native group. However, in subsequent work, Bouton (1994) argued that after a 54-month stay in the U.S.A. non-native speakers became quite proficient with all types of implicatures. The non-native speakers' implicature performance was still lower than that of native speakers, but the difference was not systematic and could not be attributed to specific implicature types (as in the initial study). In the same study, Bouton (1994) further reported that there was a medium-size but non-significant correlation between a composite language proficiency score and non-native participants' overall implicature performance. The studies conducted by Bouton (1988, 1994) were the first to systematically investigate L2 implicature understanding. Research that followed up on Bouton's findings reported clearer results showing that native-like implicature performance in L2 is indeed possible and that level of attainment with implicature in L2 depends on language proficiency.

Destruel and Donaldson (2017) examined the pragmatic inference associated with the *c'est*-cleft in L2 speakers of French. The clefted sentence in (3), for instance, conveys an exhaustive meaning ('John and no one else ate a sandwich'), which has been suggested to arise as a scalar implicature:

> (3) C' est Jean qui a mangé un sandwich
>
> 'It's John who ate a sandwich'

The L2 learners who took part in the study included English undergraduate and graduate students in French programs in the U.S.A., but also English expatriates living in France. All had studied French between two to four years and were divided into low, intermediate, and high language proficiency groups. From a theoretical perspective, Destruel

and Donaldson (2017) were interested in examining the predictions of the Interface Hypothesis (Sorace, 2011), which posits that linguistic phenomena involving the coordination of linguistic (e.g., syntax, semantics) and non-linguistic factors (e.g., pragmatics) cannot be acquired by multilingual speakers to a native-like degree even at the highest level of L2 attainment. Destruel and Donaldson (2017) found that the high- and (to a lesser degree) the intermediate-proficiency groups, but not the low-proficiency group, exhibited interpretation patterns comparable to the native monolinguals. This suggests that, contra the Interface Hypothesis, speakers can achieve native-like proficiency with an implicature phenomenon lying at the syntax-pragmatics interface at relatively high levels of L2 attainment.

Effects of language proficiency have been also consistently reported in studies examining other implicatures in L2 speakers, including, for instance, indirect speech and irony (see Chapter 3 for a summary). Based on their results on L2 learners' understanding of indirect requests, Cook and Liddicoat (2002) suggest a processing account according to which different types of requests require a different amount of processing resources, and speakers at different stages of language learning have different processing capacity at their disposal because of the more effortful nature of language processing in the L2. Thus, initially, L2 learners often have difficulty in understanding indirect requests as compared to native speakers, because their access to language is not yet automatic enough to allow extra processing resources to be allocated to contextual processing.

Another study by Johnson and Rosano (1993) reported comparable metaphor interpretation skills in native English-speaking participants (who themselves were mutilinguals) and L2 learners of English who had recently entered an English-speaking university in Canada (but resided in the country for 2.5-5 years). The L2 learners were divided into a group who had just started a L2 English course and a group who had five months of additional English instruction. Participants were asked to provide interpretations of

ambiguous metaphorical sentences (e.g., 'My shirt was a butterfly'). Two scores were extracted from their responses: level of cognitive complexity of metaphorical interpretations (e.g, the response 'The shirt could be very colorful' was considered as less complex than the interpretation 'Colorful—it had sort of like a Hawaian style') and number of different interpretations for each item. Johnson and Rosano found that the two L2 groups underperformed on measures of language proficiency in L2 relative to the native group and did not differ from each other. However, there were no group differences in metaphor performance.

Various studies have also examined multilingual adults' understanding of the scalar implicature associated with the term *some*, indicating, in general, native-level performance for L2 learners. In two experiments, Slabakova (2010) tested four groups of participants: Korean and English native speakers, and intermediate and advanced Korean learners of L2 English. A judgment task was used in each experiment, where participants had to respond whether they agreed or disagreed with statements presented with or without context (e.g., 'Some elephants have trunks', where a disagree response indicates a scalar implicature interpretation). L2 English learners had started learning English in a classroom setting from the age of 12 or 13, and at the time of testing they were students at an American university. The findings revealed that the two L2 groups gave more implicature responses than the native groups. There was also no difference between the two native groups, suggesting that the maxim of quantity and the scalar implicature associated with 'some' are universal properties of language use; and no difference between the two non-native groups indicating no effect of language proficiency. Based on these results, Slabakova (2010) suggested that it is entirely possible to understand implicatures in L2.

Subsequent studies corroborated but also qualified Slabakova's (2010) conclusion. Dupuy, Stateva, Andreetta, Cheylus, Deprez, et al. (2018; see also Miller, Giancaspro,

Iverson, Rothman, & Slabakova, 2016) conducted two experiments with French learners of English (experiments 1a and 1b) and learners of Spanish (experiment 1a) as compared to French monolinguals. In experiment 1a, the L2 learners were recruited from a French university, they started learning their second language between 11-13 years of age and 'were still exposed to their L2 both in classes and for communication purposes' (Dupuy et al., 2018, p. 10). In experiment 1b, L2 learners were studying for an English studies degree at a French university. Dupuy et al. (2018) concluded that scalar implicature comprehension did not differ in L2 learners (whether tested in their first or second language) and monolinguals. They also found that the number of scalar implicature answers given by L2 learners did not differ in their two languages, providing further support for the universality of scalar implicature and the maxim of quantity.

Finally, Lieberman (2009; as cited in Slabakova & Mayo, 2013) examined whether L2 learners' understanding of scalar implicatures was modulated by processing difficulty. He presented Japanese learners of L2 English and native English speakers with a judgment task where they had to evaluate sentences that were pragmatically infelicitous based on the context given. Two types of sentences were used: statements like (5) that conveyed direct implicatures (e.g., when 'sometimes' implicates 'not always' based on the scale <sometimes, always>), and statements like (6), where the scalar term is negated, the scale is, thus, reversed (<not always, sometimes>) and an indirect scalar meaning is communicated (i.e., 'sometimes').

(4) When students show up late, George sometimes cancels classes.

(5) Joshua doesn't always remember to pick up his dry-cleaning.

Lieberman (2009) found that both groups had more difficulty understanding the indirect implicatures as in (6) than the direct implicatures as in (5). The L2 learners, however, were less accurate than the native speakers with indirect implicatures. Lieberman (2009) also used

a different task where the processing demands were lowered by providing participants with two sentences as an appropriate description of an event. In this task, the L2 learners selected the pragmatically appropriate sentence at the same rate as native speakers, even if cases like (6) were included. In a discussion of these results, Slabakova and Mayo (2013, p. 195) suggest that L2 learners do not have a problem in comprehending implicatures (because these involve universal computation mechanisms) but that 'processing difficulty interferes with comprehension and affects learners more than natives'.

To sum, studies that have examined implicature comprehension in adult L2 learners have revealed two main findings. First, language proficiency in the L2 affects L2 implicature interpretation skills, especially at early stages of language learning (Cook & Liddicoat, 2002; Destruel & Donaldson, 2017; see also Chapter 3 in this volume). It is not clear, however, from the current research, how exactly language proficiency affects implicature comprehension. Language proficiency (broadly understood as proficiency in language knowledge *and* processing) can influence implicature interpretation in two ways: first, because L2 learners have a 'deficient' understanding of the semantics of target utterances due to a gap in their language knowledge; and second, because language processing in L2 is effortful and, thus, multilinguals' cognitive resources are often consumed by semantic processing in the L2, leaving no resources for further pragmatic processing (Cook & Liddicoat, 2002). There also seems to be a threshold on the effect of language proficiency on L2 implicature interpretation, in that, after multilinguals reach a certain level of language proficiency in the L2, further improvement does not lead to better implicature performance (Destruel & Donaldson, 2017; Slabakova, 2010), possibly because multilinguals have reached a plateau (native level) in implicature understanding skills. This threshold is probably at the point where, for a given implicature, multilinguals have adequate proficiency to understand and process the semantics of the target utterance in a native-like manner. It is also

possible that this threshold changes depending on implicature (or task) difficulty, in that for more demanding implicatures (or tasks), a higher level of automaticity in language processing is required. The existence of this threshold might also explain why some studies do not report a language proficiency effect on L2 implicature comprehension: Different studies have tested L2 learners at different levels of language proficiency and examined implicatures that vary in processing complexity. A positive effect of language proficiency is expected only for L2 learners at low levels of language proficiency and for more difficult implicature phenomena.

The second important finding is that L2 learners can achieve native-like performance with implicature, provided, of course, that they have reached an adequate level of language proficiency. They might have difficulty in understanding more demanding implicatures, but even for those learners, native-like attainment is not impossible as the data in Lieberman (2009), but also some results from research with multilingual children (reviewed in a subsequent section) suggest.

Evaluating three theoretical accounts of adult L2 pragmatic processing

As described in the previous section, two theoretical models have been proposed to account or have implications for pragmatic interpretation in adult L2 learners. The Interface Hypothesis (Sorace, 2011) proposes that linguistic phenomena that lie at the interfaces between linguistic and extralinguistic systems lead to enduring difficulties in bilinguals which cannot be overcome even at the highest levels of language proficiency. This account thus predicts that pragmatic phenomena which lie at the syntax-pragmatics or semantics-pragmatics interface cannot ever be attained to a native-like degree. This prediction, however, is not confirmed by the bulk of the evidence reviewed in the previous section. A second account, proposed by Slabakova (2010; Slabakova & Mayo, 2013) suggests that implicature understanding is achieved using universal mechanisms of language use. This account predicts

that, if learners know the semantics and have sufficient language processing capacity in the L2, then pragmatic computations should not constitute a problem for them (at least not to a greater degree than for monolinguals/native speakers). Indeed, the findings presented in this review are largely consistent with this proposal.

A third theoretical account, which has not been discussed in relation to any empirical data in the previous section, is Bialystok's (1993) two-dimensional model of pragmatic acquisition. Bialystok (1993) suggests that the main learning task regarding pragmatic competence in L2 is not about developing analysed pragmatic knowledge but about developing control over existing analysed representations from L1. Thus, her account makes two important claims regarding pragmatic interpretation and development in the L2. The first claim is that much of pragmatic knowledge required for pragmatic interpretation in the L2 is already available and can be trasferred from the L1. This claim is directly in line with the proposal of Slabakova (2010). The second claim is that pragmatic interpretation and development depends on executive control skills; and that the main problem of pragmatic acquisition and understanding in the L2 lies in executive control. Bialystok, however, is rather vague about how and why executive control is the main problem for L2 leaners. She suggests that selective attention is more difficult for L2 learners because 'conventions are less familiar' and because cultural differences 'make the decision regarding the intended meaning difficult' (p. 53). The account I have advocated here, however, explicitly attributes L2 learners' non-native understanding of implicature to insufficient semantic understanding and/or to insufficient cognitive resources due to the more effortful nature of L2 language processing.

Implicature comprehension in multilingual children: Different from monolinguals?

In contrast to research with adult L2 learners, studies with multilingual children have typically targeted speakers with an earlier and more extensive daily experience of using two

languages. In the present section, I will argue that a review of this literarure shows no consistent mutilingual-monolingual differences in pragmatic understanding. These results have been reported across several studies that used different tasks and tested various types of implicatures and different multilingual groups at various ages during childhood. There are also no clear findings that implicature comprehension in multilingual children depends differently to monolinguals on non-verbal cognitive resources, while some crosslinguistic evidence indicates that pragmatic maxims of conversation are universal. I suggest that the above results in combination provide support to the following model of multilingual implicature comprehension: Pragmatic maxims of conversation are represented as a single, language-independent system in multilinguals, which is no different to monolinguals in terms of the way it develops and functions during pragmatic comprehension.

A set of studies conducted by Johnson (1989, 1991) investigated metaphor interpretation in bilingual Spanish-English children (7-12 years old). In her 1991 study, bilingual and monolingual children were given a task similar to the one used with adult L2 learners in Johnson and Rosano (1993; see previous section). All children were educated in English at school, and bilingual children had Spanish as their first language and were mostly exposed to Spanish at home. The bilingual children were further divided into long-term residents (with at least five years in Canada) and recent immigrants (with three years or less in Canada).

Johnson (1991) reported that both groups of bilingual children performed worse than monolinguals on a measure of language proficiency (and recent immigrants underperformed relative to long-term resident bilinguals). Nevertrheless, in the comparison between bilingual and monolingual children recruited from the same schools, there was no difference in complexity level of metaphorical interpretations between the bilingual long-term residents and monolinguals. The bilingual recent immigrants performed worse than monolinguals, but

the group effect was very small and was due to only some of the metaphor items (items with 'my shirt' as topic, as in 'My shirt was a rock'). In a previous study, Johnson (1989) had found that correlations between bilingual children's metaphor scores in their two languages and between metaphor performance and measures of non-verbal mental-attentional capacity and conceptual knowledge were higher than with pure measures of language proficiency. Therefore, Johnson (1991) concludes that proceesing capacity and conceptual repertoire are the major factors affecting complexity level of metaphor interpretations and that language proficiency plays only a minor role. These results also provide support for the claim that implicature comprehension (and metaphor interpretation, specifically) is based on language-independent, universal mechanisms of language use.

In more recent research, Siegal and collaborators (Siegal, Iozzi, & Surian, 2009; Siegal, Matsuo, Pond, & Otsu, 2007; Siegal, Surian, Matsuo, Geraci, Iozzi, et al., 2010) proposed that bilingual children of preschool age exhibit superior pragmatic skills as compared to monolinguals. In their first study, Siegal et al. (2007) reported that Japanese-English bilingual children (tested in Japanese) gave more pragmatic responses than Japanese and English monolinguals in a judgement task examining the comprehension of the scalar implicature associated with the term 'some'. Half of the bilinguals in this study were recruited from Japan and the rest from England. Most of them had one Japanese and one English parent, while the rest had both parents speaking the same language but lived in the country where their first language was not natively spoken.

In subsequent work, Siegal et al. (2009, 2010) further found that bilingual children were more sensitive than monolinguals to Grice's maxims of conversation (sometimes despite a smaller vocabulary in the language of testing). In their 2010 study, they further reported that the Japanese-English children's pragmatic performance did not differ between their two languages, a finding which provides further support to the claim for the universality

of pragmatic maxims of conversation. All children in the two studies were given a test in which, for each item, one doll asked a question (e.g., 'Which baby animals do you like?') and then two others replied, one with a pragmatically appropriate statement (e.g., 'I like puppies.') and the second with a sentence that violated one of Grice's maxims of conversation (e.g., 'I like puppies which are animals with four legs and a tail.'). Children had to indicate the pragmatically infelicitous answer. In Siegal et al. (2009), the bilingual children were predominantly exposed to Slovenian, their first language, at home and to Italian at preschool, and they were tested in Italian. Siegal et al. (2010), on the other hand, tested German-Italian bilinguals as compared to Italian monolingual children (experiment 1), and Japanese-English bilingual children in each of their languages compared to Japanese monolinguals (experiment 2). All bilingual children in Siegal et al. (2010) were exposed to both languages from birth or before the age of two. The German-Italian children lived in a German-speaking area and were predominantly exposed to German at home, but attended an Italian-speaking school. The English-Japanese children were recruited from England, they had at least one Japanese-speaking parent and heard a mixture of English and Japanese at home.

Siegal et al. (2009) propose that bilingual children develop these pragmatic advantages either because of their superior executive control skills or as a compensation for the initial 'delays' they often exhibit in some aspects of language acquisition. It should be noted, however, that Siegal and colleagues (2007, 2009, and 2010) directly tested the impact of executive control on pragmatic performance but failed to find supporting evidence for the executive control account. Nevertheless, because they found a near ceiling level of performance in one of their executive control tasks (Card Sort task measuring task-switching) and they did not administer a working memory task, no strong conclusions can be drawn from these studies regarding the relation between pragmatics and executive functions in

bilinguals.

The findings of subsequent research, however, do not corroborate the strong conclusion of Siegal and collaborators (2007, 2009, and 2010) that bilingualism leads to precocious pragmatic development. Antoniou and Katsos (2017) compared three groups of school-aged children (6-9 years old): multilingual children (in Standard Modern Greek, Cypriot Greek, English, and, occassionally, an additional language), children who were bi-dialectal (in Standard Modern Greek and Cypriot Greek), and monolingual children (in Standard Modern Greek). Multilingual and bi-dilacetal children were recruited from Cyprus and monolingual children in Greece. All multilinguals attended an English-instructed school. Approximately half of them were predominantly exposed to/used Cypriot Greek (Cypriot Greek-dominant) and the rest were mostly exposed to/used English (English-dominant). The strict majority of multilingual children had started being exposed to their L2 (Cypriot Greek or English) before their third year of life. All groups were tested in the interpretation of various implicatures (relevance, manner, scalar implicatures, and novel metaphors). Bi-dialectal and multilingual children took the test in Cypriot Greek (dialect of the community and bi-dialectals' dominant, first dialect) and monolinguals in Standard Greek. Language proficiency in Greek was also measured for all children. Based on the previous study by Siegal et al. (2007), Antoniou and Katsos predicted that multilingual (and possibly bi-dialectal) children would excel in implicature comprehension relative to monolinguals. The multilingual advantage was also expected because past research (e.g., Barac et al., 2014; Siegal et al., 2009) has shown superior multilingual skill in various factors that are thought to be implicated in the implicature interpretation process (sensitivity to Gricean maxims, Theory of Mind, and executive control).

For most implicature types, a picture-selection test was used in which participants were presented with a statement (e.g., the figurative sentence 'George's father was a melting

snowman.') and had to respond by selecting one of two pictures (e.g., a sad man and an angry man). For scalar implicatures, a judgment task was used. The researchers found lower expressive vocabulary in Greek for multilinguals and bi-dialectals as compared to monolinguals (with bi-dialectals having a higher vocabulary than multilinguals) but no group differences in implicature performance. Moreover, there were no differences with monolinguals whether considering the Cypriot Greek- or the English-dominant multilingual sub-group. Antoniou and Katsos suggest that these results support a weaker but still important conclusion regarding the impact of multilingualism on pragmatic comprehension: Multilingual and bi-dialectal children can be expected to have similar levels of implicature comprehension to monolinguals, even when their proficiency in the language of testing may be lower.

Antoniou and Katsos (2017) further examined the factors that affect implicature understanding in children. Regression analyses on overall implicature performance across groups showed that only age and language proficiency in Greek were significant positive predictors of implicature understanding. Moreover, when considering each of the three groups separately, an interesting divide was found: Language proficiency predicted implicature comprehension in the monolingual and bi-dialectal groups, but only age was a significant positive predictor in multilinguals. Based on these results, Antoniou and Katsos suggest that multilingual children are comparable to monolinguals (and bi-dialectals) in their implicature understanding skills, but this is achieved, possibly, by using different resources. The authors suggest that, the positive contribution of age in multilinguals can be attributed to a non-verbal cognitive factor that develops with age. They speculate that this cognitive component is possibly Theory of Mind (the ability to understand other people's mental states, including intentions during communication; see previous section), given that Theory of Mind has been theoretically linked to implicature comprehension (e.g. Sperber & Wilson, 2002)

and has been often reported to be a domain of strength in multilinguals (e.g., Barac et al., 2014; Rubio-Fernández & Glucksberg, 2012).

In line with the findings of Antoniou and Katsos (2017), Dupuy et al. (2018), Syrett, Austin, Sánchez, Germak, Lingwall, et al. (2016) and Syrett Lingwall, Perez-Cortes, Austin, Sánchez et al. (2017) also reported no differences between bilingual and monolingual children in scalar implicature comprehension. The study by Dupuy et al. (2018) compared Slovenian-Italian bilingual and Slovenian monolingual children (10-11 years old). Bilingual children were recruited from Slovenia and Italy, started receiving input to both languages before the second year of life and had daily exposure to their two languages in school. The two studies by Syrett et al. (2016, 2017) were conducted with preschool-aged children and included Spanish-English bilinguals from the U.S.A. and Spanish monolinguals from Peru. Bilinguals were exposed to Spanish since birth, to English before 36 months of age and were exposed to both languages in school. All these studies used judgment tasks similar in rational to the one employed by Siegal et al. (2007) except for the second experiment of Syrett et al. (2017), which featured a picture-selection task.

In a more recent study, Antoniou, Veenstra, Kissine, and Katsos (under review) conducted another test of the hypothesis of superior implicature comprehension in bilingual children. They used a test that assessed both accuracy and processing speed of comprehension for various implicature types, including implicatures that had not been previously investigated in multilinguals, such as contrastive implicatures (e.g., when the phrase 'Open window' implicates that there is another window in the situation) and irony. The experiment included three groups of participants (10-12 years old): French-Dutch bilingual, Dutch-West Flemish bi-dialectal, and Dutch monolingual children. All bilingual children were dominant in French, but attended a Dutch-instructed school, roughly since they were three years of age. Participants were tested in Dutch.

Results indicated that, with control items involving no implicature, all groups performed at ceiling and were equally fast. Moreover, there was significant variation in implicature performance on a number of variables other than the monolingual/multilingual status. First, overall implicature performance positively correlated with working memory (though not with vocabulary). There was, however, little evidence that the relation between implicature understanding and working memory differed in the three groups, suggesting that all groups relied on their working memory resources similarly when interpreting implicatures. Second, novel metaphors and irony were the hardest to understand for all children, regardless of how many languages or dialects they spoke. Third, implicature responses to critical items in all sub-tests were slower than literal responses to control items, suggesting that implicature processing is effortful for all children. Despite this variation, however, no differences were observed between monolinguals and the other two groups either in implicature responses or in speed of implicature processing. As in Antoniou and Katsos (2017), this was again true, despite bilinguals' and bi-dialectals' lower vocabularies in the language of testing.

Based on these results and building on previous work by Slabakova (2010; Slabakova & Mayo, 2013) and Kesckes (2015), Antoniou et al. (under review) propose an account of bilingual pragmatic development and processing according to which bilinguals have a single pragmatic system (at least for the kind of pragmatic competence that is required for implicature interpretation) that is language-independent and that develops and operates in a similar way to monolinguals. First, Antoniou et al.'s (under review) data show that there is a point in language development at which language proficiency stops being a significant predictor of pragmatic comprehension (even though there is still variability in pragmatic performance). These results suggest separation of pragmatics from language. Second, crosslinguistic evidence (as reviewed in this section, but see also Katsos, Cummins, Ezeizabarrena, Gavarró, Kraljević et al., 2016; Grice, 1989; Prince, 1982) indicates that

implicature comprehension and pragmatic maxims of conversation are universal properties of language use. This suggests that maxims of conversation are represented as a single pragmatic system and that, across their two languages, multilinguals have equal to monolinguals experience with pragmatic aspects of language. Finally, Antoniou et al. (under review) found that pragmatic comprehension draws on working memory, but there was little evidence that bilinguals or bi-dialectals used these resources differently to monolinguals when interpreting implicatures. The last two considerations indicate that pragmatic comprehension possibly develops and operates similarly in multilinguals and monolinguals.

To sum, two broad accounts have been proposed in the literature on multilingual children's pragmatic skills. On the one hand, Siegal and colleagues suggest that bilingual children exhibit precocious pragmatic development. Indeed, research from this group indicates that bilingual children of preschool age are better than monolinguals in detecting utterances that violate Gricean maxims and in understanding scalar implicatures. On the other hand, research by Antoniou and colleagues (2017, under review), Dupuy et al. (2018), Johnson (1991) and Syrett and collaborators (2016, 2017) indicates no differences between multilingual and monolingual children in pragmatic comprehension. This has been shown for a wide range of implicatures (relevance, scalar, manner, contrastive implicatures, metaphors, and irony), with different methodologies (picture-selection, judgment tasks), for both comprehension accuracy and speed of processing, for different age groups (3-12 years old), for different language and cultural groups, and regardless of whether multilingual children were tested in their L1 or L2. There is also little evidence that multilingual children rely more or use differently their executive control resources as compared to monolinguals in the process of understanding implicatures. Thus, the bulk of the evidence suggests that implicature understanding develops and operates similarly in multilingual and monolingual children.

Conclusion and future directions

In this chapter, I have reviewed the evidence from adult and child studies that examined the effect of multilingualism on pragmatic comprehension. I have argued that studies with adult L2 learners largely reveal two main generalisations. First, during initial stages of language learning, language proficiency (broadly understood as proficiency in language knowledge *and* processing) has a positive effect on implicature understanding; second, adult speakers can attain native-like pragmatic understanding skills in their L2 if they reach a certain level of language proficiency.

On the other hand, research with multilingual children suggests largely no differences between multilingual and monolingual children in pragmatic comprehension or processing. There is also some evidence that pragmatic comprehension in children draws on non-verbal cognitive resources like working memory, but no clear evidence that these resources are used differently by multilingual and monolingual children in the process of understanding implicatures. Finally, in contrast to the adult literature, language proficiency effects on implicature have been less consistently reported for multilingual children. This difference with the adult literature, however, is likely due to the different characteristics of the targeted multilingual groups. Studies with adults have mostly focused on L2 learners with varying degrees of experience in their L2, some of whom at the very beginning of L2 learning. Research with children, on the other hand, has mostly recruited multilinguals with a substantial daily experience in both languages from relatively early on in life. This suggests that multilingual children, but not adult L2 learners in many studies, have probably reached the level of language proficiency necessary for native-like semantic processing at the time of testing. As already argued in a previous section, this is probably the threshold at which language proficiency stops being a signifcant predictor of implicature performance.

What do these results then show regarding the mechanics and development of implicature comprehension in multilinguals? There is some crosslinguistic evidence suggesting that implicature and pragmatic maxims of conversation are universal properties of language use. The universality of implicature and pragmatic maxims of conversation and the experimental evidence indicating separation of pragmatic comprehension from language proficiency, suggest that this type of pragmatic competence is represented independently from language(s). It can be transferred from L1 in adult L2 learners and it develops similarly in monolingual and multilingual children, at least given that multilinguals have equal to monolinguals pragmatic exposure across their two languages. Thus, as soon as multilinguals reach a certain level of language proficiency which allows semantic processing to proceed unobstructed in a given language, then pragmatic comprehension operates in fundamentally the same way for multilinguals and monolinguals; that is, by drawing on the same pragmatic knowledge and, possibly, based on the same non-verbal mechanisms. In this account, then, there is nothing special in multilingual or monolingual implicature comprehension and development that can be attributed to pragmatics *per se*.

Of course, in this review I have considered a pragmatic phenomenon that is probably universal; and the account proposed in this chapter is specific to such phenomena which are based on pragmatic knowledge common to the multilinguals' languages. I have argued that for these phenomena any differences between multilinguals and monolinguals are unrelated to pragmatics and result from differences in language proficiency, which, once levelled, should make pragmatic differences dissipate. Nevertheless, there are also other facets of pragmatic competence which are more language- and culture-specific. For these, one would expect differences between multilinguals and monolinguals that arise due to aspects such as incomplete pragmatic knowledge or negative pragmatic transfer; that is, differences in pragmatic performance which are directly attributable to pragmatic competence *per se*[4].

Moreover, multilingualism is a multifaceted phenomenon that can be characterised by a wide range of factors (e.g., age of onset of acquisition of, proficiency level in, daily exposure to/use of each language, language of schooling, age of the individual). Differences in any of these factors can lead each mutlingual individual to a uniquely different multilingual experience. In this chapter, I proposed an account of multilingual implicature interpretation and development based on the currently available data from the multilingual samples so far examined. However, it is an empirical question whether this account generalises to all multilingual speakers.

Having reviewed the evidence on multilingual adult and children's implicature interpretation skills, I close this chapter by identifying some gaps in the literature and suggesting directions for future research.

Invesigating implicature processing in multilinguals using more fine-grained psycholinguitic and neuroscientific tools

Despite the variety of psycholinguistic and neuroscientific tools that have been used to investigate language processing in monolingual and multilingual participants, studies on multilinguals' implicature understanding skills have only focused on behavioural measures of pragmatic performance: accuracy rates (mainly) and reaction times. Behavioural measures can provide useful information about the end-product of the pragmatic interpretation process (i.e., whether participants understood the intended pragmatic meaning or not) but can, nevertheless, give limited and only indirect information about the pragmatic process itself. In contrast, psycholinguistic techniques such as eye-tracking and neuroscientific tools such as event-related potentials can provide a clearer picture about the time-course (e.g., speed of pragmatic relative to literal processing) of pragmatic interpretation during real-time, natural comprehension (see also Chapter 19 in this volume). The eye-tracking psycholinguistic paradigm records participants' eye-movements as they listen to speech and watch a visual

display. The event-related potentials technique, on the other hand, provides brain waves time-locked to task events (e.g., critical words) that reflect the participants' neural activity as they process language. Both tools provide high temporal resolution measures of language comprehension that are not influenced by metalinguistic and response-related (e.g., decision, motor) processes. In this respect, the use of these techniques could reveal more subtle differences in multilinguals' and monolinguals' processing of implicature, which cannot be detected by traditional, behavioural measures.

Direct examinination of the role of Theory of Mind in multilingual implicature comprehension

In this chapter, I suggested an account that multilingual implicature interpretation depends to the same degree and on the same non-verbal cognitive mechanisms as in monolinguals. This proposal was based on the empirical evidence suggesting largely no difference between multilinguals and monolinguals in the use of executive control skills during pragmatic interpretation (Antoniou et al., under review), but it was also based on the lack of any direct evidence indicating that multilinguals rely on different non-linguistic cognitive components when they comprehend pragmatic meanings. Nevertheless, a possibility that still remains open is that implicature comprehension in multilinguals draws more heavily on Theory of Mind (Antoniou & Katsos, 2017). As already discussed, Theory of Mind is a cognitive process which has been theoretically linked to pragmatic comprehension and in which multilinguals have been found to excel. Better multilingual performance in Theory of Mind tasks has been mainly reported for preschool-aged children (Barac et al., 2014), an advantage which suggests that Theory of Mind develops earlier in multilinguals. Some evidence, however, indicates that this benefit extends to multilingual adults too (Rubio-Fernández & Glucksberg, 2012), which suggests an advantage in the use of Theory of Mind (not in competence). Future research should aim to directly test this proposal by

administering a range of Theory of Mind tasks to multilingual and monolingual participants. A related question is whether the effect of Theory of Mind (if any) can be found in both multilingual young children and adults.

NOTES

2. Note that the focus in L2 studies is on the comparison between non-native (multilingual) and native speakers. Some studies reviewed in this chapter are not clear about whether the native participants were monolingual or not. I provide this information in the description of the studies whenever it is available from the studies themselves.

3. For example, in the scale <some, all>, 'all' is informationally stronger than 'some' because 'all' entails 'some'.

4. Note that pragmatic knowledge could be distinguished from cultural knowledge in the sense that the former includes general (possibly innate) properties of the human processing system (which is another way of making the universality claim for pragmatic maxims of conversation) just like Sperber and Wilson (1986) propose for the principle of relevance. In this sense, pragmatic knowledge includes only pragmatic principles like Grice's cooperative principle or Sperber and Wilson's relevance principle; that is, principles that likely reflect general, universal properties of the human mind and are always recruited during implicature comprehension. Any other culturally, environmentally, and individually variable information can be just contextual information that is recruited ad hoc during implicature comprehension (and could, of course, also impact implicature interpretation if not available).

Suggested reading

Antoniou, K., & Katsos, N. (2017). The effect of childhood multilingualism and bilectalism on implicature understanding. *Applied Psycholinguistics, 38*, 787-833.

This study compared multilingual, bi-dialectal and monolingual children in implicature comprehension. The introduction includes a short review of research on the bilingualism effect on children's pragmatic skills. Results showed no group differences in implicature understanding. The study also discusses factors that might explain the difference in the findings with previous research which did report superior pragmatic skills in bilingual children.

Slabakova, R., & Mayo, M. D. P. G. (2013). Whether to Teach and How to Teach Complex Linguistic Structures in a Second Language. In M. Whong, G. Kook-Hee, H. Marsden (Eds.), *Universal grammar and the second language lassroom* (pp. 187-205). Amsterdam, Netherlands: Sringer.

This paper discusses the acquisition of complex meanings in a second language focusing on scalar implicature. Sections 10.3 and 10.5 are the most relevant to this chapter. The former section discusses some representative studies of implicature in a second language. The latter discusses in some detail the research by Slabakova (2010) and Lieberman (2009) which examined scalar implicature interpretation in second language learners as compared to native speakers.

References

Andrés-Roqueta, C., & Katsos, N. (2017). The contribution of grammar, vocabulary and Theory of Mind in pragmatic language competence in children with autistic spectrum disorders. *Frontiers in psychology, 8*, 996.

Antoniou, K., & Katsos, N. (2017). The effect of childhood multilingualism and bilectalism on implicature understanding. *Applied Psycholinguistics, 38*, 787-833.

Antoniou, K., Veenstra, A., Kissine, M. & Katsos, N. (under review). How does childhood bilingualism and bi-dialectalism affect the interpretation and processing of implicature?.

Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"?. *Cognition*, *21*(1), 37-46.

Barac, R., Bialystok, E., Castro, D. C., & Sanchez, M. (2014). The cognitive development of young dual language learners: A critical review. *Early Childhood Research Quarterly*. doi.org/10.1016/j.ecresq.2013.08.004

Bialystok, E. (1993). Symbolic representation and attentional control in pragmatic competence. In G. Kasper & S. Blum-Kulka (Eds.), *Interlanguage pragmatics* (pp. 43-59). New York: Oxford University Press.

Bialystok, E., Craik, F. I., Green, D. W., & Gollan, T. H. (2009). Bilingual minds. *Psychological science in the public interest, 10*(3), 89-129.

Bialystok, E., Craik, F.I., & Luk G. (2012). Bilingualism: Consequences for mind and brain. *Trends in Cognitive Sciences, 16*(4): 240-250.

Bouton, L. F. (1988). A cross-cultural study of ability to interpret implicatures in English. *World Englishes, 7*(2), 183-196.

Bouton, L. F. (1994). Conversational implicature in a second language: Learned slowly when not deliberately taught. *Journal of Pragmatics, 22*(2), 157-167.

Clahsen, H., Felser, C., (2006). How native-like is non-native language processing? *Trends in Cognitive Science, 10* (12), 564–570.

Cook, M., & Liddicoat, A. J. (2002). The development of comprehension in interlanguage pragmatics. *Australian Review of Applied Linguistics, 25*(1), 19-39.

Dupuy, L., Stateva, P., Andreetta, S., Cheylus, A., Déprez, V., Henst, J. B. V. D., et al. (2018). Pragmatic abilities in bilinguals: The case of scalar implicatures. *Linguistic Approaches to Bilingualism.*

de Neys, W., & Schaeken, W. (2007). When people are more logical under cognitive load: dual task impact on scalar implicature. *Experimental Psychology, 54*(2), 128-33.

Destruel, E., & Donaldson, B. (2017). Second language acquisition of pragmatic inferences: Evidence from the French *c'est-cleft*. *Applied Psycholinguistics, 38*(3), 703-732.

Grice, H. P. (1989). *Studies in the Way of Words*. Cambridge, MA: Harvard University Press.

Grosjean, F., & Li, P. (2013). *The Psycholinguistics of Bilingualism*. New York: Wiley-Blackwell.

Hammer, C. S., Hoff, E., Uchikoshi, Y., Gillanders, C., Castro, D. C., & Sandilos, L. E. (2014). The language and literacy development of young dual language learners: A critical review. *Early Childhood Research Quarterly, 29*, 715-733.

Horn, L. R. (1972). *On the Semantic Properties of Logical Operators in English*. Doctoral dissertation, University of California, LA

Johnson, J. (1989). Factors related to cross-language transfer and metaphor interpretation in bilingual children. *Applied Psycholinguistics*, *10*(2), 157-177.

Johnson, J. (1991). Developmental versus language-based factors in metaphor interpretation. *Journal of Educational Psychology*, *83*(4), 470.

Johnson, J., & Rosano, T. (1993). Relation of cognitive style to metaphor interpretation and second language proficiency. *Applied Psycholinguistics*, *14*(2), 159-175.

Katsos, N., Cummins, C., Ezeizabarrena, M. J., Gavarró, A., Kraljević, J. K., Hrzica, G., et al. (2016). Cross-linguistic patterns in the acquisition of quantifiers. *Proceedings of the National Academy of Sciences*, *113*, 9244-9249.

Kecskes, I. (2015). How does pragmatic competence develop in bilinguals?. *International Journal of Multilingualism, 12*, 419-434.

Liberman, Z., Woodward, A. L., Keysar, B., & Kinzler, K. D. (2017). Exposure to multiple languages enhances communication skills in infancy. *Developmental science, 20*.

Lieberman, M. (2009). Necessary interpretation at the syntax/pragmatics interface: L2 acquisition of scalar implicatures. Paper Presented at the Workshop on Mind Context Divide: Language Acquisition and Interfaces of Cognitive Linguistic Modules. University of Iowa.

Miller, D., Giancaspro, D., Iverson, M., Rothman, J., & Slabakova, R. (2016). Not just algunos, but indeed unos L2ers can acquire scalar implicatures in L2 Spanish. In A. Alba de la Fuente, E. Valenzuela, and C. Martínez-Sanz (eds.), *Language acquisition beyond parameters: Studies in honour of Juana Liceras*. Amsterdam: John Benjamins

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive psychology, 41*(1), 49-100.

Paap, K. R., & Greenberg, Z. I. (2013). There is no coherent evidence for a bilingual advantage in executive processing. *Cognitive Psychology, 66*(2), 232-258.

Paap, K. R., Johnson, H. A., & Sawi, O. (2015). Bilingual advantages in executive functioning either do not exist or are restricted to very specific and undetermined circumstances. *Cortex, 69*, 265-278.

Prince, E. F. (1982). Grice and universality: A reappraisal. Ms., University of Pennsylvania.

Rubio-Fernández, P., & Glucksberg, S. (2012). Reasoning about other people's beliefs: bilinguals have an advantage. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 38*(1), 211.

Siegal, M., Iozzi, L., & Surian, L. (2009). Bilingualism and conversational understanding in young children. *Cognition, 110*, 115-122.

Siegal, M., Matsuo, A., Pond, C., & Otsu, Y. (2007). Bilingualism and cognitive development: Evidence from scalar implicatures *Proceedings of the Eighth Tokyo Conference on Psycholinguistics* (pp. 265-280). Tokyo, Japan: Hituzi Syobo

Siegal M, Surian L, Matsuo A, Geraci A, Iozzi L, et al. (2010). Bilingualism Accentuates Children's Conversational Understanding. *PLoS ONE 5*(2): e9004. doi:10.1371/journal.pone.0009004

Slabakova, R. (2010). Scalar implicatures in second language acquisition. *Lingua, 120*(10), 2444-2462.

Slabakova, R., & Mayo, M. D. P. G. (2013). Whether to Teach and How to Teach Complex Linguistic Structures in a Second Language. In *Universal Grammar and the Second Language Classroom* (pp. 187-205). Springer Netherlands.

Sorace, A. (2011). Pinning down the concept of "interface" in bilingualism. *Linguistic approaches to bilingualism, 1*(1), 1-33.

Sperber, D., & Wilson, D. (1986/1995). *Relevance: Communication and cognition*. Oxford: Blackwell.

Sperber, D., & Wilson, D. (2002). Pragmatics, modularity and mind-reading. *Mind & Language, 17*(1-2), 3-23.

Syrett, K., Austin, J., Sánchez, L., Germak, C., Lingwall, A., et al. (2016). The influence of conversational context and the developing lexicon on the calculation of scalar implicatures. *Linguistic Approaches to Bilingualism, 7*, 230-264.

Syrett, K., Lingwall, A., Perez-Cortes, S., Austin, J., Sánchez, L., et al. (2017). Differences between Spanish monolingual and Spanish-English bilingual children in their calculation of entailment-based scalar implicatures. *Glossa: a journal of general linguistics, 2*.

Taguchi, N. (2009). *Pragmatic competence*. Berlin, Germany: Mouton de Gruyter.

Verhagen, J., Grassmann, S., & Küntay, A. C. (2017). Monolingual and bilingual children's resolution of referential conflicts: Effects of bilingualism and relative language proficiency. *Cognitive Development, 41*, 10-18.

Yow, W. Q., & Markman, E. M. (2011a). Bilingualism and children's use of paralinguistic cues to interpret emotion in speech. *Bilingualism: Language and Cognition, 14*, 562-569.

Yow, W. Q., & Markman, E. M. (2011b). Young bilingual children's heightened sensitivity to referential cues. *Journal of Cognition and Development, 12*, 12-31.