Shush, the teacher is speaking! A bilingual advantage in comprehending speech in noisy environments

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Key words: Bilingualism, Executive Function, Sentence comprehension, Inhibitory Control

Abstract

Is it possible to learn more efficiently in noisy environments like a primary school? This study investigates children's speech comprehension in the presence of verbal noise. Previous research has demonstrated a performance advantage for bilingual adults over monolinguals in comprehending difficult sentences (e.g., non-canonical Object-Verb-Subject constructions) under such conditions. Here, 40 children, half speaking two languages with different cultural roots, and half English monolinguals, were compared in a sentence comprehension task. The results indicate a developmentally consistent advantage of bilinguals at screening out linguistic interference when comprehending difficult sentences.

Introduction

Noise is the soundtrack of our lives. No matter what we do or where we go; we are constantly surrounded by environmental noise of a verbal and non-verbal nature. This continuous bombardment of sounds can be highly detrimental to our performance. Attention is affected by distractions; which may have fatal consequences, especially when driving. In more harmless cases, noise interferes with reading, working or learning efficiently.

There is now robust evidence that bilinguals have an advantage over monolinguals in dealing with conflicting information. Remarkably, this advantage is shown beyond the language system, using well-controlled measures of executive function such as the Simon task (e.g., Bialystok, Craig & Viswanathan, 2004) or the ANT task (Costa, Hernández, & Sebastián-Gallés, 2008), suggesting that bilinguals domain specific experience with language and linguistic competition translates to domain-general advantages in executive function and inhibitory control.

These findings are significant because they posit a fundamental advancement in the theoretical debate of domain-general vs. domain-specific brain development and clearly show the intimate interaction between general cognitive abilities and the language system (Filippi & Karmiloff-Smith, 2012).

As far as the ability to control auditory interference is concerned, our recent research has shown that bilingualism enhances the ability to select attention and screen out linguistic interference. In our first study investigating speech comprehension in the presence of verbal noise, bilingual adults who learned their second language during adolescence (usually referred to in the literature as late bilinguals), were reliably more accurate in comprehending sentences than their monolingual peers (Filippi, Leech, Thomas, Green, & Dick, 2012). This advantage was particularly strong when comprehending difficult non-canonical sentences, such as passive “Object-Verb-Subject” grammar constructions (e.g., *the cat is bitten by the dog*). Additionally, the level of proficiency in the second language was a reliable predictor of best performance.

A recent EEG study comparing bilingual and monolingual adults suggests that these performance differences may be due to experience-dependent enhancements in the subcortical response to speech sounds in the presence of interference (i.e., multitalker babble - Krizman, Marian, Shook, Skoe & Kraus,2012). Recent functional and structural MRI studies implicate the left caudate and posterior paravermis of the right cerebellum in the control of interference during speech comprehension (Crinion, Turner, Grogan, Hanakawa, Noppeney, Devlin, Aso, Urayama, Fukuyama, Stockton, Usui, Green & Price, 2006; Filippi, Richardson, Dick, Leech Green, Thomas & Price, 2011).

The ability to control auditory interference is perhaps most important within the context of an educational environment. Nurseries and primary schools are the key stages for the development of formal learning in the first years of life. However, they are also remarkably noisy. The ability to control verbal interference efficiently in such an environment could present a significant advantage for learning. Therefore, this study furthers previous adult findings, by investigating whether there is a bilingual advantage in controlling interference early in life. Here, we focus on early bilingual children between the ages of 7 to 10 years (who were exposed to two languages in their first years of life). These children mainly used English at school and their other language within the home environment. We compared the performance of the bilingual children to a group of English monolingual children (matched by age and socio-economic status) on their comprehension of natural speech in the presence of linguistic noise using a sentence interpretation task (Filippi *et al*., 2012).

Based on the results of our previous study (Filippi *et al*., (2012), we anticipated that meaningful individual differences in language skill and crucially in the cognitive control of interference would be revealed by the most challenging set of conditions. We expected interference to be highest when the target sentence had a non-canonical structure. Therefore, we predicted that bilingual children would show more accuracy over monolinguals in comprehending speech in the presence of linguistic noise only when the task was more difficult (i.e., comprehension of non-canonical passive sentences in the presence of interference).

Methods

The study was approved by the local ethics committee. All children's parents gave written informed consent.

Participants

Forty children were distributed equally across two groups: 20 monolingual English speakers in the UK (mean age = 8.8 years, SD = 1.2, range = 7.1–10.7, 11 boys), and 20 bilingual children in the UK (mean age = 8.8 years, SD = 1.0, range = 7.0–10.4, 11 boys) who spoke English plus one other language: Italian (9), Spanish (2), Dutch (2), Armenian (1), Bengali (1), Polish (1), Cezch (1), Russian (1) and Portuguese (1). A parent questionnaire confirmed that all children were exposed to English either from birth or before completion of their native language, that they were being educated in English, and that they regularly used both languages, with English predominantly spoken at school and the second language spoken within the family and the extended family. The parents' level of education for both monolingual and bilingual children was at least at degree level.

Tasks and Procedure

Children were tested individually in a quiet room either at school or in their home environment. Each child was greeted and asked if s/he agreed to play computer games and answer some questions about pictures and numbers. All children gave their verbal consent.

Each session started with a short test to establish if the children could successfully perform an auditory-motor task (Leech *et al.*, 2007). This baseline measure consisted of 32 'ping' sounds, each 0.3 seconds long, which were adapted from the alert sounds native to Mac OS 10.3. The children pressed either the left or right button on a response keypad corresponding to the ear in which they heard a sound. They were asked to press the button as fast as they could with the thumbs of each hands.

In order to ensure the cognitive equivalence of participant groups, receptive vocabulary (BPVS-II, Dunn, Whetton, & Burley, 1997), working memory (Digit Span forward and backward - WAIS IV Wechsler, D. (2008), and non-verbal reasoning (Raven's Coloured Matrices - Raven, Court, & Raven, 1986) were assessed as background measures, and are reported in Table 1. Performance on all tests was equivalent between the two groups. This contrasts with previous studies in which bilingual children obtained lower scores on the BPVS (Bialystok & Feng, in press; Oller & Eilers, 2002).

The experimental task was a sentence interpretation task (described below). The full test battery took approximately 50 minutes to complete. At the end of the session, the children were given a certificate as a reward for their participation.

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The Sentence Interpretation Task

We designed a variant of a sentence interpretation task that has been used in previous bilingual research (Filippi, Leech, Thomas, Green, & Dick, 2012). In this task, participants must identify the "bad animal" (the agent) in a series of sentences. These sentences were of varying syntactic complexity and presented in auditory format either with or without auditory linguistic interference.

The target language was always English. However, language interference could either be the same language as the target (English) or a different unknown, semantically unrelated, language (Greek). An equal number of trials without interference acted as a control condition. This resulted in three different conditions: (i) target sentence in English with interference in English, (ii) target sentence in English with interference in Greek, (iii) target sentence in English with no interference. Within each condition, the syntactic structure of the sentences was either canonical (Subject-Verb-Object: S-V-O) or non-canonical (Object-Verb-Subject: O-V-S or Object-Subject-Verb: O-S-V). Canonical sentences were taken to be easier and therefore imposing a lower cognitive load. Conversely, the non-canonical sentences were taken to be harder and more cognitively demanding (Roland, Dick, & Elman, 2006).

The children were told that they would see two drawings of animals presented simultaneously on the left and right sides of a computer screen and that during this time they would also hear a sentence featuring the two animals, with one of them doing a "*bad action*" to the other. They were required to identify this animal by making the corresponding left or right key press. Children were also told that sometimes they would hear two people speaking simultaneously, one male voice and one female voice. They were instructed to focus on the voice with the gender indicated on the computer screen at the beginning of the task and ignore the other voice. An illustration of the experimental setup is displayed in Figure 1.

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All children were instructed in English and completed 8 practice trial sentences for each experimental condition. For a given sentence, the position of the agent animal (left or right) was counterbalanced across participants. Two pseudo-random condition orders were created, and the children were randomly and equally allocated between the two orders. Each trial was presented immediately following the children's response, allowing a maximum of 3 seconds, after which, if there was no response, the next trial was presented automatically. Trials were presented in short runs of variable length (4, 6, or 8 trials) in which language interference sentences were counterbalanced in a way that participants would perform an equal number of trials in all conditions.

Each trial combined visual and auditory stimuli. The visual stimuli were drawings of familiar animals taken from several picture databases (Abbate & LaChappelle, 1984a, 1984b; Snodgrass & Vanderwart, 1980). Single pictures were digitized black-and-white line drawings (7.0 cm by 5.0 cm) displayed in pairs in accordance with the auditory stimuli (the sentences featuring the animals). Each drawing was embedded in a solid grey rectangle surrounded by a white background, as illustrated in Figure X. The auditory stimuli were 192 sentences, 96 in English and 96 translation equivalents in Greek, spoken with natural prosody. The easy canonical sentences (S-V-O) were (1) active and (2) subject-cleft syntactic structures. The difficult non-canonical sentences (O-V-S or O-S-V) were (3) object cleft and (4) passive syntactic structures. Table 2 shows examples of these sentence types.

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Target and non-target sentences were created from a pool of animal nouns and action verbs using the following criteria: (1) Each animal appeared twice as subject, and twice as object; (2) Each verb appeared twice; (3) No noun appeared with a verb more than once as a subject and no noun appeared with a verb more than once as an object; (4) No two nouns were combined together twice; (5) The names of the animals were not cognates; (6) The verbs chosen were all high frequency verbs, transitive, and with mildly negative meaning; (7) Attended (i.e., target) and competing (i.e., interfering) sentences were always spoken by speakers with different genders (8) Attended and competing sentences were paired pseudo-randomly with the proviso that the same animals and syntactic structure would never be presented simultaneously in target and non-target sentences. Thus, the decision point for driving a response would rarely if ever be simultaneous in target and non-target sentences.

Sentences were recorded by native speakers (1 male and 1 female in each case) of British English or Greek onto digital audio tape (DAT) in an Industrial Acoustics 403-A audiometric chamber with a TASCAM DA-P1 DAT recorder and a Sennheiser ME65/K6 supercardioid microphone and pre-amp at gain levels between 6 and 12 db. The recorded stimuli were then digitized via digital-to-digital sampling onto a Macintosh G4 computer via a Digidesign MBox using ProTools LE software at a sampling rate of 44.125 kHz with a 16-bit quantization. The waveform of each sentence and animal name was then edited, converted into a 16-bit 44.125 kHz mono sound file in Audacity 1.2.5 for Mac, and saved in .wav format. Each target and competing speech sentence was normalized to a root mean squared amplitude of 70 dB using Praat software (Boersma & Weenink, 2010), such that the average signal-to-noise ratio over the whole sentence was zero (0) dB.

The experiment was run under Matlab 7.7.0 (Mathworks Inc. Sherbon MA, USA) on a MacBook 13” laptop computer with the auditory stimuli presented through Sennheiser EH-150 headphones. Accuracy was recorded in Matlab from a USB Logitech Precision game-pad in which only two buttons were enabled, one on the right and one on the left.

Results

We first report the results of the auditory check and background measures. We then report those of the sentence interpretation task focusing on the key contrast between bilingual monolingual children. In a final section we examine the role of age in the control of interference between the two linguistic groups.

Auditory check

A one-way ANOVA revealed no significant difference between bilingual and monolingual children in terms of response time, accuracy ($F<1$).

All children’s scores in the sentence interpretation task were therefore included in the analysis.

Background measures

There was no statistically significant difference between the bilingual and the monolingual children on the Raven’s Coloured Matrices, $F(1,38)=2.56$, $p=.12$, the Digit Span forward, $F(1,38)=1.15$, $p=.29$, and backward, $F(1,38)=1.14$, $p=.30$.

Unlike previous research (e.g., Bialystok & Feng, 2009; Oller & Eilers, 2002), bilingual and monolingual children obtained comparable scores on the BPVS, $F(1,38)=.55$, $p=.50$.

Comprehension of sentences in the presence of interference

Response time and accuracy were analysed separately in a mixed factor omnibus (2x2x3) ANOVA with a between-subjects factor of group (bilinguals/monolinguals) and within-subjects factors of sentence type (canonical/non-canonical) and language interference (no interference/English/Greek). The means and standard deviations for both groups are reported in Table 3.

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The ANOVA results indicate similar levels of overall performance for monolingual and bilingual children ($F<1$ for both response time and accuracy).

There were highly significant main effects of sentence type, [Accuracy: $F(1,38) = 88.1$, $p < 0.001$, $\eta^2 = 0.70$; Response Time: $F(1,38) = 83.9$, $p < 0.001$, $\eta^2 = 0.69$], and interference [Accuracy: $F(2,76) = 27.9$, $p < 0.001$, $\eta^2 = 0.42$; Response Time: $F(2,76) = 5.46$, $p = 0.006$, $\eta^2 = 0.13$], indicating respectively better performance on canonical compared to non-canonical sentences, and better performance in the control condition, that is, in the absence of linguistic interference.

The interaction between interference and group, was significant for accuracy measures only,[$F(1,38)= 5.18$, $p = 0.008$, $\eta^2 = 0.12$], suggesting linguistic interference had a differential effect on the bilingual and the monolingual children's sentence comprehension All other interactions, that is, sentence type and group; sentence type and interference; and sentence type, interference and group, were non-significant (F<1).

Two separate 2x3 ANOVAs were carried out teasing apart sentence complexity. There was no reliable difference between bilingual and monolingual children in comprehending canonical (easy) sentences, F<1), a significant main effect of interference $F(1,38)= 17.32$, $p < 0.001$, $\eta^2 =.31$, and a non-significant interaction between interference and group (F<1). Compared to performance in the control condition, both groups were equally affected by English interference $t(19)=9.80$, $p=.001$, and Greek interference, $t(19)=4.20$, $p=.001$, that is, the level of comprehension was reduced in the presence of linguistic interference.

The second ANOVA focused on the level of accuracy in the comprehension of non-canonical sentences. As illustrated in Figure 2, the bilingual and the monolingual children show similar performance in the control condition and in the presence of English interference. However, a significant interaction between group and interference ($F(1,38)= 3.92$, $p = 0.024$, $\eta^2 = 0.1$) revealed the two groups' performance was differently affected by language interference. Bilingual children outperformed monolingual peers in the comprehension of non-canonical sentences only when interference was in the unknown language, Greek [$t(38)=2.21$, $p=.017$, one tailed].

Within-group analyses with non-canonical sentences

Paired-samples t-tests indicated that bilingual children were remarkably more accurate in comprehending non-canonical sentences when interference was in Greek language, $t(19)=3.967$, $p=.001$, compared to when there was English interference. Strikingly, their performance in this condition was as equally efficient as in the absence of interference, $t(19)=.720$, $p=.480$.

Monolingual children's efficiency in comprehending non-canonical sentences dropped significantly regardless of the linguistic nature of the interference when compared with performance in the absence of noise [with English interference $t(19)=2.273$, $p=.035$; with Greek interference $t(19)=2.298$, $p=.033$], and there was no statistical difference between comprehension in the two conditions with interference, $t(19)=.278$, $p=.784$.

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The role of age in control of interference in the comprehension of complex syntactic structures

The children' individual accuracy scores in the sentence interpretation task were regressed against their chronological age. A series of regression analyses inspected for outliers (Cook & Dennis, 1977) revealed that for the monolingual children age does not make a significant contribution to predicting comprehension of non-canonical sentence either in the presence English interference, $F(1,19)=.449$, $p=.511$, adjusted R square = .030, Greek interference, $F(1,19)=.242$, $p=.629$, adjusted R square = .042, or no interference at all, $F(1,19)=1.290$, $p=.271$, adjusted R square = .015.

For the bilingual children age was not a reliable predictor of complex sentence comprehension in the control condition, $F(1,19)=2.226$, $p=.153$, adjusted R square = .061. However, interestingly and contrary to the monolingual group, age significantly contributed to predicting comprehension in the presence of both types of interference, English, $F(1,19)=5.728$, $p=.271$, adjusted R square = .199, and Greek language, $F(1,19)=6.527$, $p=.020$, adjusted R square = .225.

As illustrated in Figure 3 (a, b, and c), these data indicate the ability to control interference improves with development within the bilingual children, but not within the monolinguals.

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Discussion

In this study we investigated whether a developmental bilingual ability exists to inhibit irrelevant auditory information when comprehending natural speech. For this purpose, we extended our previous work with late bilingual adults to early bilingual children from 7 to 10 years of age. Their performance was compared with that of age-matched English monolingual children. Both linguistic groups were tested with a listening paradigm adapted from our previous study involving late bilingual and monolingual adults (Filippi et al., 2012). Children were required to identify the agent of English canonical and non-canonical sentences in the presence or absence of semantically related (English) and semantically unrelated (Greek) interfering sentences.

In the key contrast, we confirmed a bilingual advantage. Bilingual children outperformed their monolingual peers when responding to non-canonical English sentences (high comprehension demand), but only when interference was in the semantically unrelated language (Greek). The response time analysis showed that there was no significant difference between the two groups in the speed of reaching a decision to identify the agent. Replicating the results of our previous work (Filippi et al. 2012), monolingual children were equally affected by their native tongue interference (English) and the semantically unrelated interference (Greek). However, in contrast to the adult study in which late bilinguals were able to inhibit interference regardless of its semantic relation with the target sentence, here we observe a different pattern: the early bilingual children's performance was affected by the semantically related interference (English) in the same way as the monolinguals'. It seems that the predominant use of English at school lowers the early bilinguals' ability to inhibit noise when this is in strong conflict with the target stimuli.

However, this is not the case when interference was semantically unrelated. Here, bilingual children outperformed monolinguals. Interestingly, the early bilingual children's performance in comprehending target sentences with Greek interference is no different from the one observed in the control condition, highlighting their remarkable ability to concentrate on the task and cancel out any unrelated sound stimuli.

The difference in performance between late bilingual adults, and early bilingual children may be suggestive of different inhibitory processes depending on the age of second language acquisition. However, individual difference analyses revealed that age predicts control of interference in bilingual children. Through development, bilingual children seem to be able to inhibit both types of interference reconciling these results with the findings in the adult study.

Our data provide evidence for a beneficial effect of bilingualism irrespective of the age of acquisition. However, as the advantage is already observable early in life, we may predict that the areas of the brain involved in auditory processing and control of interference develop differently in monolingual and bilingual speakers. An early maturation of these areas may provide a significant advantage in the development of higher-cognitive processing from early stages in life (e.g., Bialystok, 2005). Further research should also focus on whether these brain areas are preserved from the effect of ageing. Some reports indicate that the use of two languages throughout the lifespan may contribute to "cognitive reserve" protecting the brain from age decline, and delaying the onset of dementia and Alzheimer's (e.g., Bialystok, Craik & Freedman, 2007). Given the results of our two studies, it is not unreasonable to predict that the bilingual experience may also protect auditory processing. Recently, it has been reported that hearing loss may be one of the markers for dementia and Alzheimer's disease (Lin, Metter, O'Brien, Resnick, Zonderman, Ferrucci, 2011). Bilingual research may be highly relevant to this important field.

The paradigm used in this study is a "developmental" one; this means that it can be used either in longitudinal or cross-sectional studies to compare the performance of different age groups and build developmental trajectories, also in clinical settings (Annaz, Karmiloff-Smith, Thomas, 2008; Karmiloff-Smith, 1992). The use of neuroimaging techniques such as MRI and fMRI would also help reveal the locus/loci of verbal control and possible structural differences between the monolingual and the bilingual brain (Karmiloff-Smith, 2010).

In conclusion, early bilingual children show an advantage over monolinguals in focusing on complex tasks, in this case the comprehension of non-canonical sentences, and in inhibiting irrelevant information provided by simultaneous background noise. This advantage seems to improve across development.

These results support our initial prediction that bilinguals would show an advantage in controlling interference only when the cognitive task is more demanding (i.e., comprehension of non-canonical passive sentences in the presence of interference). This study represents a significant step in advancing our knowledge about the positive effects of learning a second language. It has been shown that bilingual children outperform monolingual peers in maintaining focus on a complex task in the presence of environmental noise. This ability is crucial for learning, especially in the early stages of formal education. Finally, the results of the current study should encourage education professionals to establish more intense programmes for teaching a second language very early in the nursery school curriculum.

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List of Tables:

Table 1: Mean raw scores and standard deviations for background measures by language group

Groups	BPVS†	Raven's Coloured Matrices†	Digit Span†	
			Forward	Backward
Bilingual children	101 *(16)*	30 *(5)*	10 *(2)*	5 *(1)*
English monolingual children	104 *(13)*	32 *(2)*	9 *(1)*	5 *(2)*

† Performance for Bilingual and Monolingual children was equivalent across tests: Raven's Coloured Matrices [$F(1,38)=2.56$, $p=.12$], Digit Span forward [$F(1,38)=1.15$, $p=.29$] and backward [$F(1,38)=1.14$, $p=.30$], BPVS [$F(1,38)=.55$, $p=.50$].

Table 2: Example of sentence types (the agent is in bold – but was not stressed in the oral presentation)

Sentence Type	Constituent Order	English	Greek	Tot. sentences per lang.
Canonical	Active (S-V-O)	The **frog** is biting the cow	Ο βάτραχος δαγκώνει την αγελάδα	24
	Subject Cleft (S-V-O)	It's the **frog** that is biting the cow	Ο βάτραχος δαγκώνεται από την αγελάδα	24
Non-Canonical	Passive (O-V-S)	The frog is bitten by the **cow**	Ο βάτραχος είναι που δαγκώνει την αγελάδα	24
	Object Cleft (O-S-V)	It's the frog that the **cow** is biting	Ο βάτραχος είναι που δαγκώνει η αγελάδα	24

Table 3: Monolingual and bilingual children's reaction times (RT) in milliseconds and percent correct responses (CR) in the Sentence Interpretation Task.

		Bilinguals		**Monolinguals**	
		Mean	*SD*	Mean	*SD*
Canonical Sentences	RT No Interference	2329	*250*	2276	*220*
	CR No Interference	83%	*13*	84%	*11*
	RT English Interference	2425	*270*	2350	*300*
	CR English Interference	68%	*15*	73%	*14*
	RT Greek Interference	2351	*220*	2275	*260*
	CR Greek Interference	77%	*17*	75%	*15*
Non-Canonical Sentences	RT No Interference	2507	*270*	2467	*240*
	CR No Interference	61%	*16*	60%	*16*
	RT English Interference	2581	*290*	2523	*340*
	CR English Interference	53%	*13*	52%	*13*
	RT Greek Interference	2481	*270*	2458	*300*
	CR Greek Interference	63%	*16*	51%	*16*

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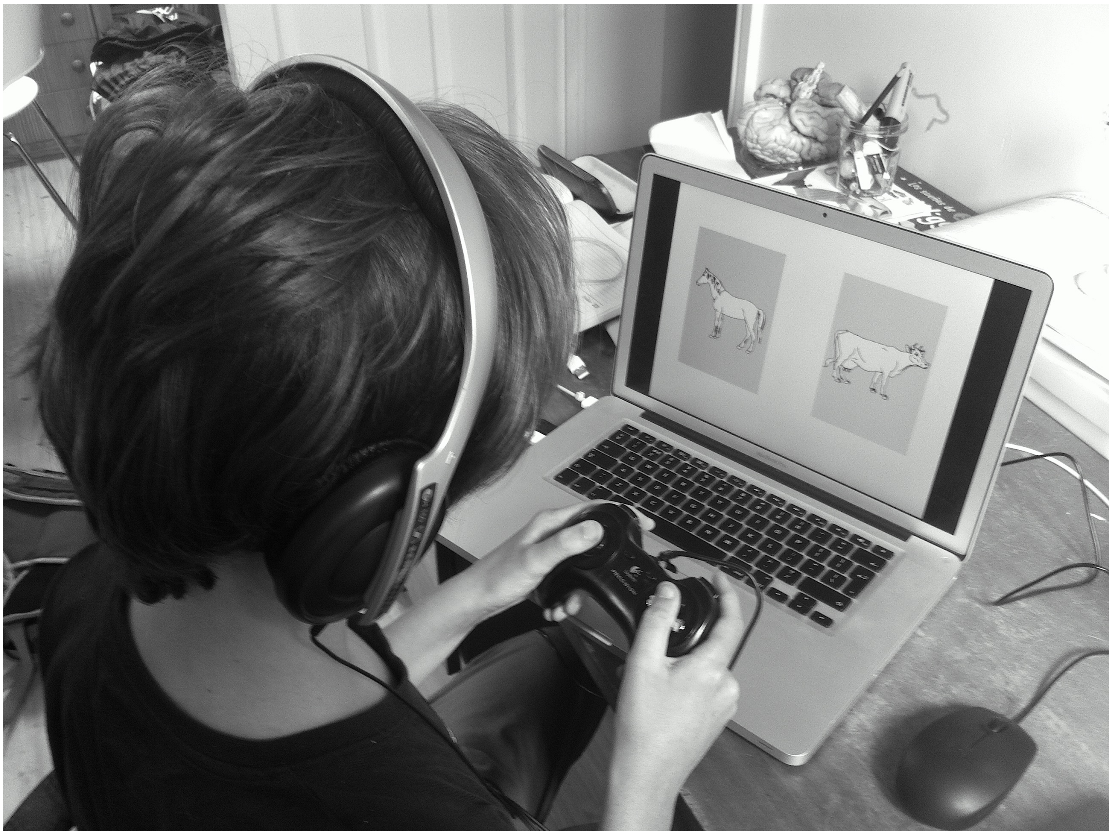


Figure 1: An example of experimental setting. Two animals are presented on the computer screen. The child is hearing a sentence featuring the two animals (e.g., *The Cow is Biting the Horse*). S/he needs to identify the animal "doing the bad action" and press either the right or left button on the keypad. In this example, the right answer is "*Cow*", right button.

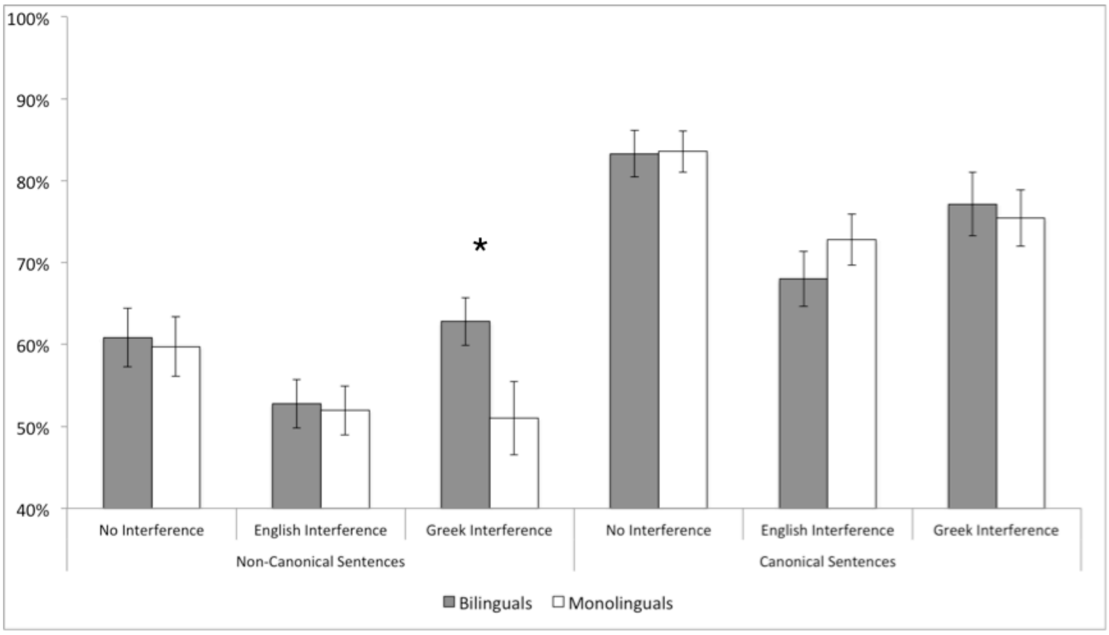
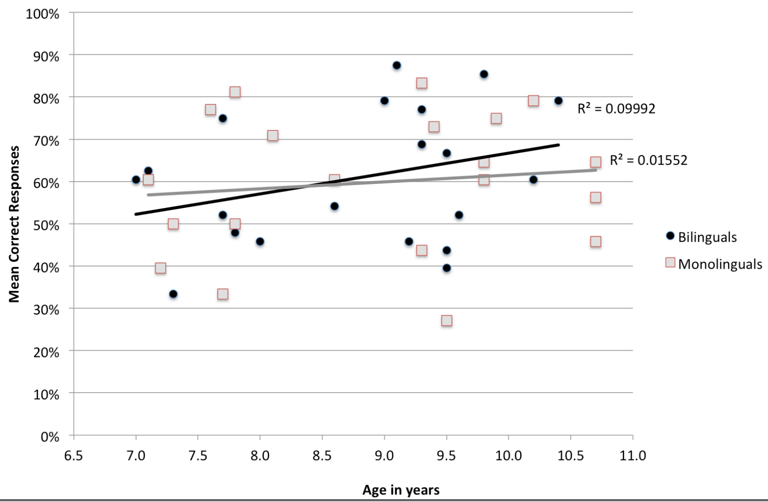


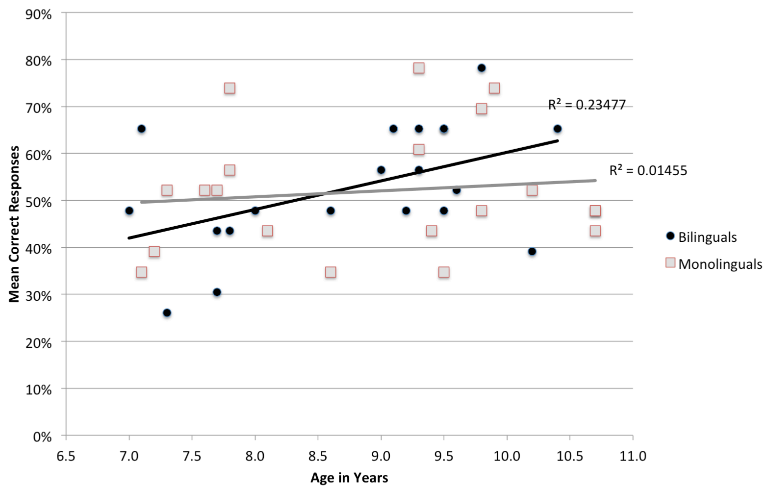
Figure 2: Bilingual and monolingual children's accuracy in comprehending non-canonical and canonical sentences in the presence or in the absence of linguistic interference. Bars represent error bars.

A



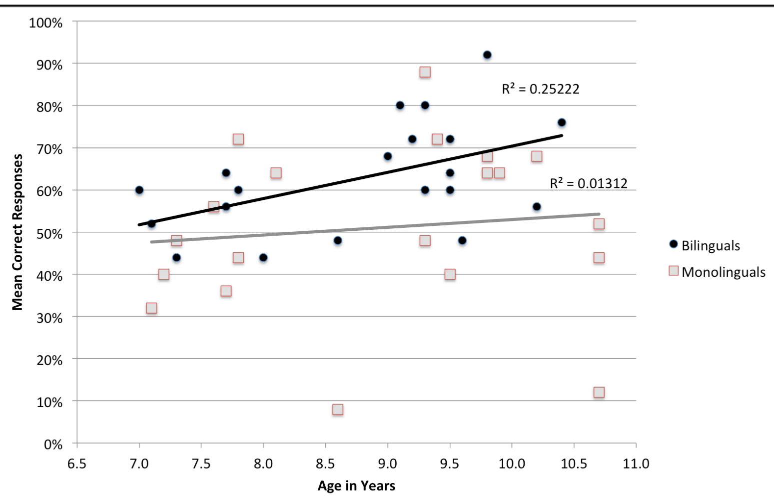
Mean Correct Responses
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
Age in years
R² = 0.09992
R² = 0.01552
Bilinguals
Monolinguals

B



Mean Correct Responses
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
Age in Years
R² = 0.23477
R² = 0.01455
Bilinguals
Monolinguals

C



Mean Correct Responses
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
Age in Years
R² = 0.25222
R² = 0.01312
Bilinguals
Monolinguals

Figure 3: Bilingual and monolingual children's individual performance in the comprehension of non-canonical sentences correlated with chronological age: a) no interference (control); b) English interference; c) Greek interference

APPENDIX

Sentences

File Name	Sentences (ENGLISH)	Sentences (GREEK)
1	The Parrot is biting The Bull	Ο παπαγάλος δαγκώνει τον ταύρο
2	The Goat is chasing The Snake	Η κατσίκα κυνηγά το φίδι
3	The Cat is eating The Eagle	Η γάτα τρώει τον αετό
4	The Fox is grabbing The Seal	Η αλεπού αρπάζει τη φώκια
5	The Horse is bumping The Bull	Το άλογο σκουντάει τον ταύρο
6	The Whale is hurting The Dog	Η φάλαινα πληγώνει το σκύλο
7	The Cats are kicking The Seals	Οι γάτες κλωτσάνε τις φώκιες
8	The Foxes are pulling The Monkeys	Οι αλεπούδες τραβάνε τους πιθήκους
9	The Dogs are pushing The Horses	Οι σκύλοι σπρώχνουν τα άλογα
10	The Goats are scratching The Snakes	Οι κατσίκες γρατσουνούν τα φίδια
11	The Pigs are scaring The Eagles	Τα γουρούνια τρομάζουν τους αετούς
12	The Whales are hitting The Frogs	Οι φάλαινες χτυπάνε τους βατράχους
13	The Bull is biting The Cats	Ο ταύρος δαγκώνει τις γάτες
14	The Seal is chasing The Pigs	Η φώκια κυνηγά τα γουρούνια
15	The Snake is eating The Goats	Το φίδι τρώει τις κατσίκες
16	The Eagle is grabbing The Foxes	Ο αετός αρπάζει τις αλεπούδες
17	The Wolf is bumping The Parrots	Ο λύκος σκουντάει τους παπαγάλους
18	The Cow is hurting The Whales	Η αγελάδα πληγώνει τις φάλαινες
19	The Bulls are kicking The Goat	Οι ταύροι κλωτσάνε την κατσίκα
20	The Seals are pulling The Whale	Οι φώκιες τραβάνε τη φάλαινα
21	The Snakes are pushing The Pig	Τα φίδια σπρώχνουν το γουρούνι
22	The Frogs are scratching The Parrot	Οι βάτραχοι γρατσουνούν τον παπαγάλο
23	The Horses are scaring The Monkey	Τα άλογα τρομάζουν τον πίθηκο
24	The Eagles are hitting The Frog	Οι αετοί χτυπάνε το βάτραχο
25	The Dog is Kicked by the Frog	Ο σκύλος κλωτσιέται από το βάτραχο
26	The Seal is Pulled by the Fox	Η φώκια τραβιέται από την αλεπού
27	The Snake is Pushed by the Parrot	Το φίδι σπρώχνεται από τον παπαγάλο
28	The Eagle is Scratched by the Cat	Ο αετός γρατσουνιέται από τη γάτα
29	The Bull is Scared by the Monkey	Ο ταύρος τρομάζεται από τον πίθηκο
30	The Frog is Hit by the Cow	Ο βάτραχος χτυπιέται από την αγελάδα
31	The Cats are Bitten by the Bulls	Οι γάτες δαγκώνονται από τους ταύρους
32	The Foxes are Chased by the Pigs	Οι αλεπούδες κυνηγούνται από τα γουρούνια
33	The Dogs are Eaten by the Seals	Οι σκύλοι τρώγονται από τις φώκιες
34	The Goats are Grabbed by the Foxes	Οι κατσίκες αρπάζονται από τις αλεπούδες

35	The Pigs are Bumped by the Parrots	Τα γουρούνια σκουντιούνται από τους παπαγάλους
36	The Monkeys are Hurt by the Dogs	Οι πίθηκοι πληγώνονται από τους σκύλους
37	The Pig is Kicked by the Goats	Το γουρούνι κλωτσιέται από τις κατσίκες
38	The Goat is Pulled by the Monkeys	Η κατσίκα τραβιέται από τους πιθήκους
39	The Wolf is Pushed by the Horses	Ο λύκος σπρώχνεται από τα άλογα
40	The Fox is Scratched by the Snakes	Η αλεπού γρατσουνιέται από τα φίδια
41	The Horse is Scared by the Eagles	Το άλογο τρομάζεται από τους αετούς
42	The Monkey is Hit by the Frogs	Ο πίθηκος χτυπιέται από τους βατράχους
43	The Bulls are Bitten by the Horse	Οι ταύροι δαγκώνονται από το άλογο
44	The Cows are Chased by the Snake	Οι αγελάδες κυνηγούνται από το φίδι
45	The Parrots are Eaten by the Eagle	Οι παπαγάλοι τρώγονται από τον αετό
46	The Frogs are Grabbed by the Seal	Οι βάτραχοι αρπάζονται από τη φώκια
47	The Wolves are Bumped by the Pig	Οι λύκοι σκουντιούνται από το γουρούνι
48	The Eagles are Hurt by the Dog	Οι αετοί πληγώνονται από το σκύλο
49	It's the Pig that is Kicking the Whale	Το γουρούνι είναι που κλωτσάει τη φάλαινα
50	It's the Monkey that is Pulling the Fox	Ο πίθηκος είναι που τραβάει την αλεπού
51	It's the Cat that is Pushing the Pig	Η γάτα είναι που σπρώχνει το γουρούνι
52	It's the Fox that is Scratching the Cat	Η αλεπού είναι που γρατσουνάει τη γάτα
53	It's the Horse that is Scaring the Monkey	Το άλογο είναι που τρομάζει τον πίθηκο
54	It's the Goat that is Hitting the Frog	Η κατσίκα είναι που χτυπάει το βάτραχο
55	It's the Bulls that are Kicking the Seals	Οι ταύροι είναι που κλωτσάνε τις φώκιες
56	It's the Eagles that are Pulling the Monkeys	Οι αετοί είναι που τραβάνε τους πιθήκους
57	It's the Snakes that are Pushing the Horses	Τα φίδια είναι που σπρώχνουν τα άλογα
58	It's the Frogs that are Scratching the Pigs	Οι βάτραχοι είναι που γρατσουνούν τα γουρούνια
59	It's the Horses that are Scaring the Whales	Τα άλογα είναι που τρομάζουν τις φάλαινες
60	It's the Seals that are Hitting the Frogs	Οι φώκιες είναι που χτυπάνε τους βατράχους
61	It's the Dog that is Biting the Parrots	Ο σκύλος είναι που δαγκώνει τους παπαγάλους
62	It's the Seal that is Chasing the Snakes	Η φώκια είναι που κυνηγά τα φίδια
63	It's the Wolf that is Eating the Cows	Η αλεπού είναι που τρώει τις αγελάδες
64	It's the Whale that is Grabbing the Monkeys	Η φάλαινα είναι που αρπάζει τους πιθήκους
65	It's the Bull that is Bumping the Wolves	Ο ταύρος είναι που σκουντάει τους λύκους
66	It's the Cow that is Hurting the Dogs	Η αγελάδα είναι που πληγώνει τους σκύλους
67	It's the Cats that are Biting the Horse	Οι γάτες είναι που δαγκώνουν το άλογο
68	It's the Whales that are Chasing the Snake	Οι φάλαινες είναι που κυνηγούν το φίδι
69	It's the Dogs that are Eating the Eagle	Οι σκύλοι είναι που τρώνε τον αετό
70	It's the Goats that are Grabbing the Seal	Οι κατσίκες είναι που αρπάζουν τη φώκια
71	It's the Pigs that are Bumping the Bull	Τα γουρούνια είναι που χτυπάνε τον ταύρο
72	It's the Monkeys that are Hurting the Wolf	Οι πίθηκοι είναι που πληγώνουν το λύκο
73	It's the Pig that the Horse is Biting	Το γουρούνι είναι που δαγκώνει το άλογο
74	It's the Seal that the Parrot is Chasing	Η φώκια είναι που κυνηγά ο παπαγάλος
75	It's the Snake that the Eagle is Eating	Το φίδι είναι που τρώει ο αετός

76	It's the Frog that the Goat is Grabbing	Ο βάτραχος είναι που αρπάζει η κατσίκα
77	It's the Parrot that the Horse is Bumping	Ο παπαγάλος είναι που σκουντάει το άλογο
78	It's the Eagle that the Wolf is Hurting	Ο αετός είναι που πληγώνει ο λύκος
79	It's the Cats that the Wolves are Biting	Οι γάτες είναι που δαγκώνουν οι λύκοι
80	It's the Monkeys that the Parrots are Chasing	Οι πίθηκοι είναι που κυνηγούν οι παπαγάλοι
81	It's the Dogs that the Goats are Eating	Οι σκύλοι είναι που τρώνε οι κατσίκες
82	It's the Whales that the Foxes are Grabbing	Οι φάλαινες είναι που αρπάζουν οι αλεπούδες
83	It's the Pigs that the Cats are Bumping	Τα γουρούνια είναι που σκουντάνε οι γάτες
84	It's the Whales that the Pigs are Hurting	Οι φάλαινες είναι που πληγώνουν τα γουρούνια
85	It's the Pig that the Seals are Kicking	Το γουρούνι είναι που κλωτσάνε οι φώκιες
86	It's the Cow that the Monkeys are Pulling	Η αγελάδα είναι που τραβάνε οι πιθήκοι
87	It's the Dog that the Bulls are Pushing	Ο σκύλος είναι που σπρώχνουν οι ταύροι
88	It's the Cow that the Snakes are Scratching	Η αγελάδα είναι που γρατσουνούν τα φίδια
89	It's the Horse that the Cows are Scaring	Το άλογο είναι που τρομάζουν οι αγελάδες
90	It's the Frog that the Whales are Hitting	Ο βάτραχος είναι που χτυπάνε οι φάλαινες
91	It's the Bulls that the Monkey is Kicking	Οι ταύροι είναι που κλωτσάει ο πίθηκος
92	It's the Seals that the Cow is Pulling	Οι φώκιες είναι που τραβάει η αγελάδα
93	It's the Horses that the Bull is Pushing	Τα άλογα είναι που σπρώχνει ο ταύρος
94	It's the Frogs that the Cat is Scratching	Οι βάτραχοι είναι που γρατσουνάει η γάτα
95	It's the Bulls that the Whales are Scaring	Οι ταύροι είναι που τρομάζουν οι φάλαινες
96	It's the Cows that the Frog is Hitting	Οι αγελάδες είναι που χτυπάει ο βάτραχος