eman ta zabal zazu

Universidad del Pais Vasco

Euskal Herriko Unibertsitatea

ELEBILAB

ON LINGUISTIC UNIVERSALS AND LANGUAGE DIVERSITY

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The emergence of grammar in the brain

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The emergence of grammar in the brain

Acquisition, processing, and cortical organization of the structural aspects of language in bilingual and monolingual populations.

Populations: Spanish monolinguals
Spanish/Catalan bilinguals
Spanish/Basque bilinguals

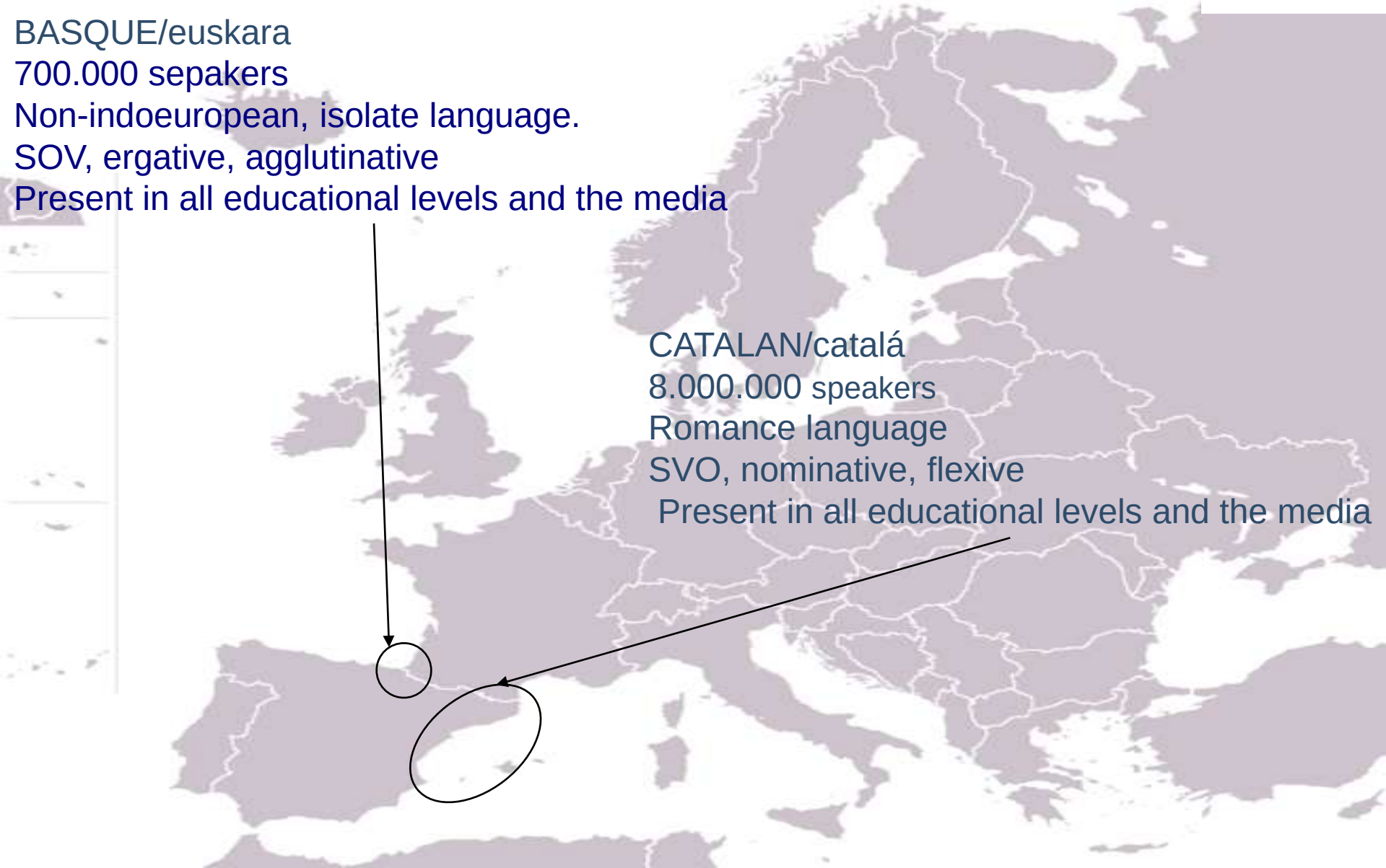
Combining theoretical linguistics
and experimental psycholinguistics

The emergence of grammar in the brain

- Are all grammars processed and represented alike?
- Does bilingualism make a difference in language acquisition, processing and representation?
- Do the languages of the bilingual make a difference?
    - syntax similar languages: Spanish/Catalan
    - syntax dissimilar languages: Spanish/Basque
- Does bilingualism have collateral effects in other areas of cognition?

Bilingual communities in Spain

BASQUE/euskara
700.000 sepakers
Non-indoeuropean, isolate language.
SOV, ergative, agglutinative
Present in all educational levels and the media



CATALAN/catalá
8.000.000 speakers
Romance language
SVO, nominative, flexive
Present in all educational levels and the media

Linguistic variation and universals

This picture of linguistic variation poses an interesting puzzle for theorizing about language origins. After years of reticence, discussion of the evolution of language has exploded in recent years. One striking feature of this literature is how little it has to say about cross-linguistic variation. Most authors are completely silent on this point; they write as though only one language had ever existed.This might make sense if linguistic variation were a minor phenomenon, or if it had no interesting structure. But the opposite is true.

Baker (2003) Linguistic differences and language design *TCS*

Some Parameters in our language pool

	free word order	Object agreement	SVO	nominative-accusative
Spanish	-	-	+	+
Catalan	-	-	+	+
Basque	+	+	-	-

SOV type despite word order freedom

emakume-a-k gizon-a ikusi du
woman-the-S man-the-O seen has
'the woman has seen the man‘

[gaur etorri den] emakume-a
[today arrived is-that] woman-the
“the woman that arrived today”

Processing word order in a free word order grammar: is there a cost?

- Displaced constituents increase processing cost in fixed word order grammars(Rösler et al. 1998; Matzke et al. 2002): LAN and P600
- Are there processing asymmetries in free word order languages?
- If NO: processing costs are grammar dependent
- If YES: hierarchical syntactic structure is a universal blueprint of human language

Is there a cost for freedom? SOV/OSV

Subject	Object	Verb-aux
emakume-a-k	gizon-a	ikusi du
woman-the-S	man-the/O	seen has

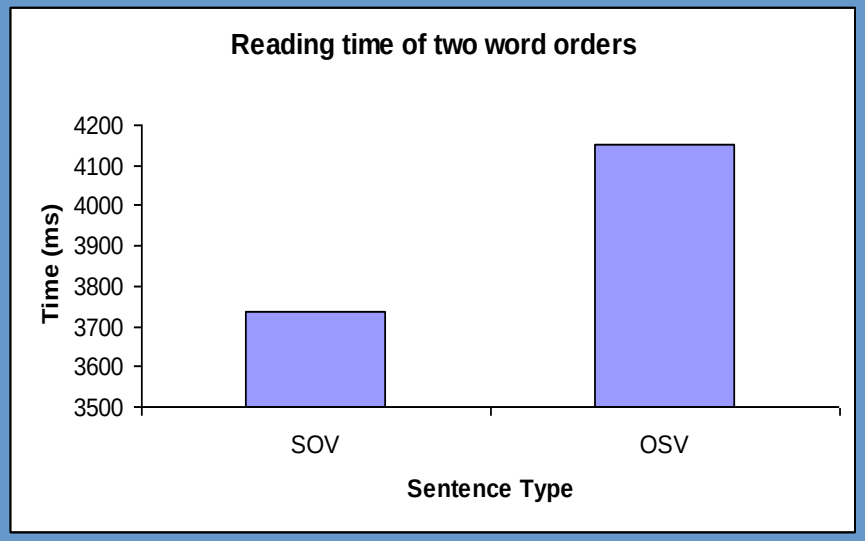
the woman has seen *the man*

Object	Subject	Verb-aux
gizon-a	emakume-a-k	ikusi du
man-the/O	woman-the/S	seen has

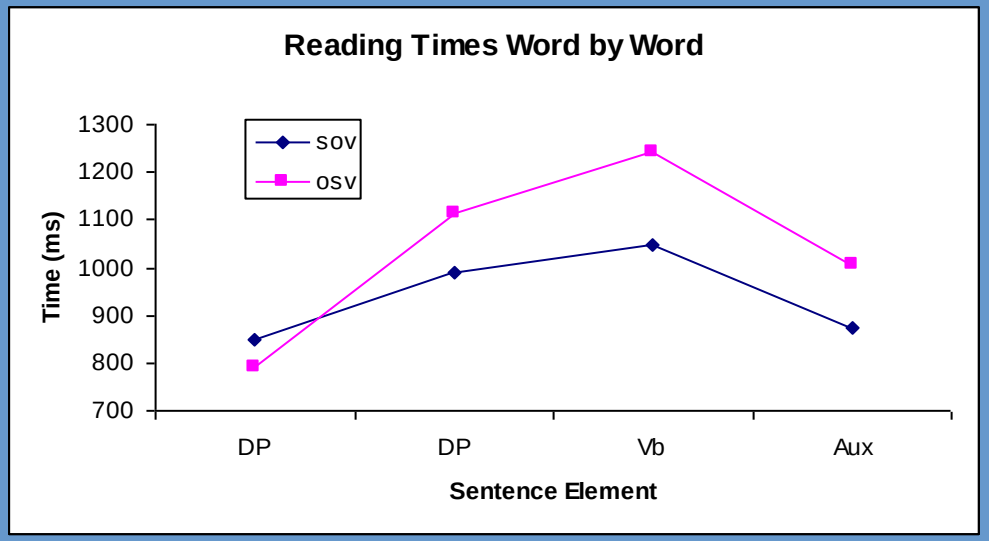
the woman has seen the man

Yes there is: SOV faster than OSV

Mean Reading Times of Sentences



Mean reading times Word by Word



SOV order is processed faster than OSV order

OSV induces reanalysis of syntactic structure at S

Blind grammar and processing cost

- When a sequence is completely ambiguous, there is no context, prosody or any other clue to dissambiguate, processing can only resort to grammar
- We can thus see the grammar alone making decissions
- We constructed such materials: fully ambiguous grammatical sentences

Morphological ambiguity: ak

a + k: singular det + agent case

(a) emakume-a-k gizon-a ikusi du
woman-the-S man-the seen has
"the woman has seen the man"

ak: plural determiner

(b) zu-k emakume-ak_{pl} ikusi dituzu
you-S woman-the seen youhavethem
"you have seen the women"

Morphological ambiguity: SOV/OSV

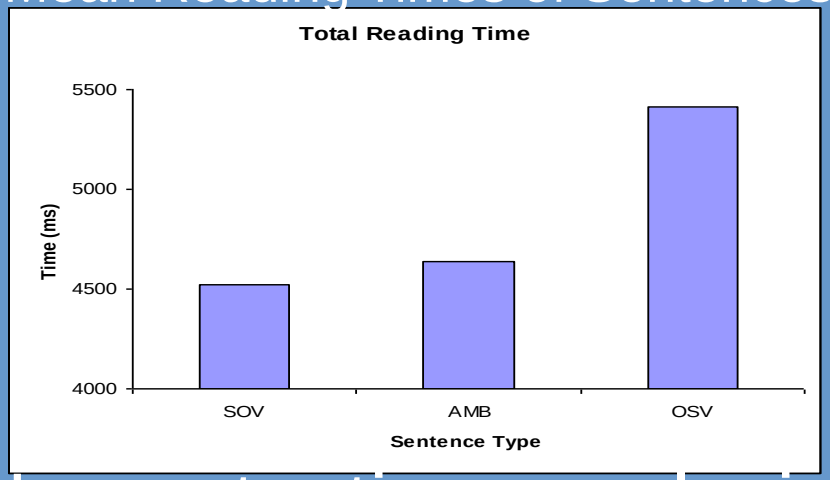
emakumeak gizonak ikusi ditu

(1) emakume-a-k gizon-ak ikusi ditu
woman-the-S man-the$_{pl}$ seen hasthem
"the woman has seen the men"

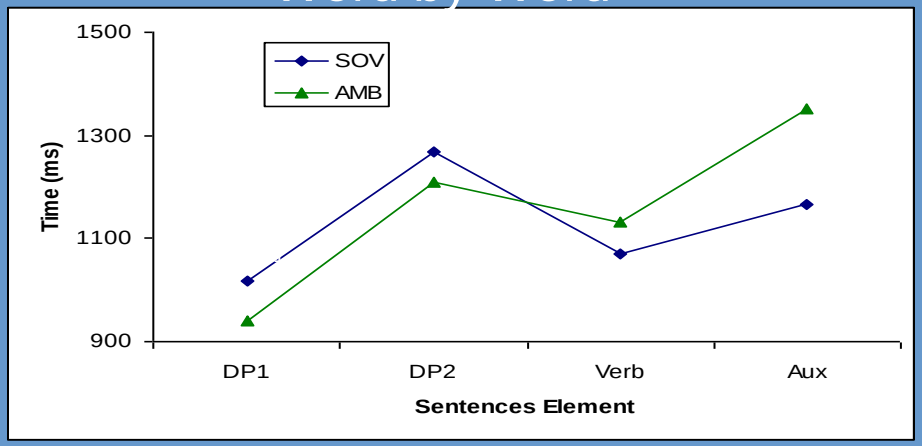
(2) emakume-ak gizon-a-k ikusi ditu
women-the$_{pl}$ man-the-S seen hasthem
"the women, the man has seen them"

AMB(IGUOUS) SENTENCES: SOV

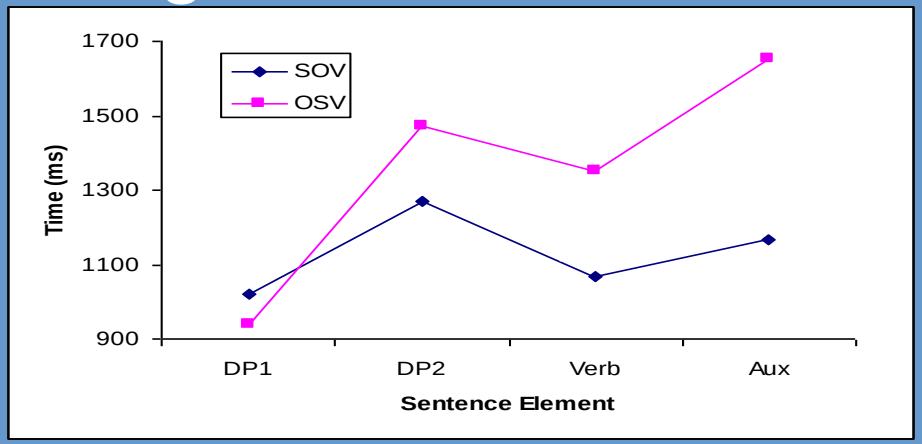
Mean Reading Times of Sentences



Word by Word



No syntactic reanalysis in AMB condition
AMB processed as SOV order sentences
SOV is the simplest processing solution.



Grammar and world-knowledge clash

SOV temporally ambiguous

Otso-ak	ardi-ak	jan	ditu
Wolf-X	sheep-X	eaten	has

'*the wolf has eaten the sheep(pl)*'

OSV temporally ambiguous

Ardi-ak	otso-ak	jan	ditu
Sheep-X	wolf-X	eaten	has

'*the wolf has eaten the sheep(pl)*'

Grammar/knowledge clash: results

At Verb Position

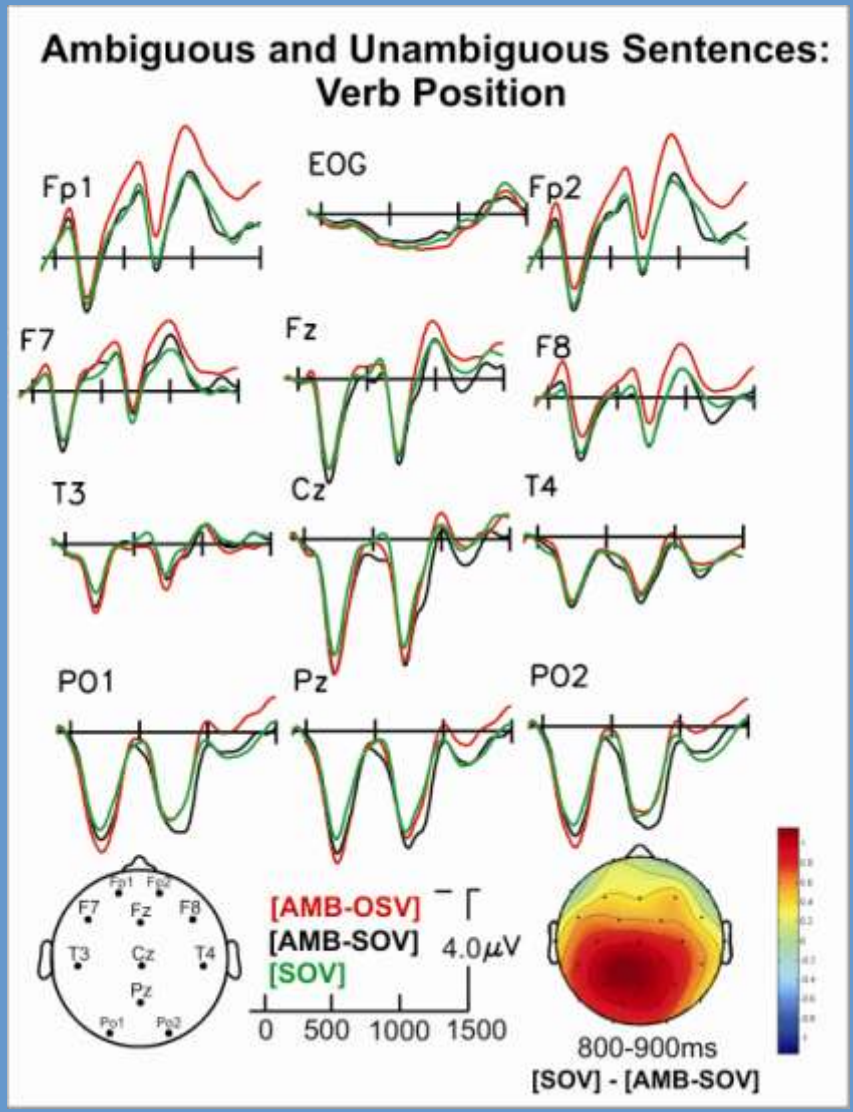
SOV vs AMB-OSV

Broad negativity

SOV vs AMB-SOV

Posterior positivity (P600)

AMB sequences are processed as SOV sentences unless a disambiguating factor generates reanalysis of syntactic structure



What about other word orders?

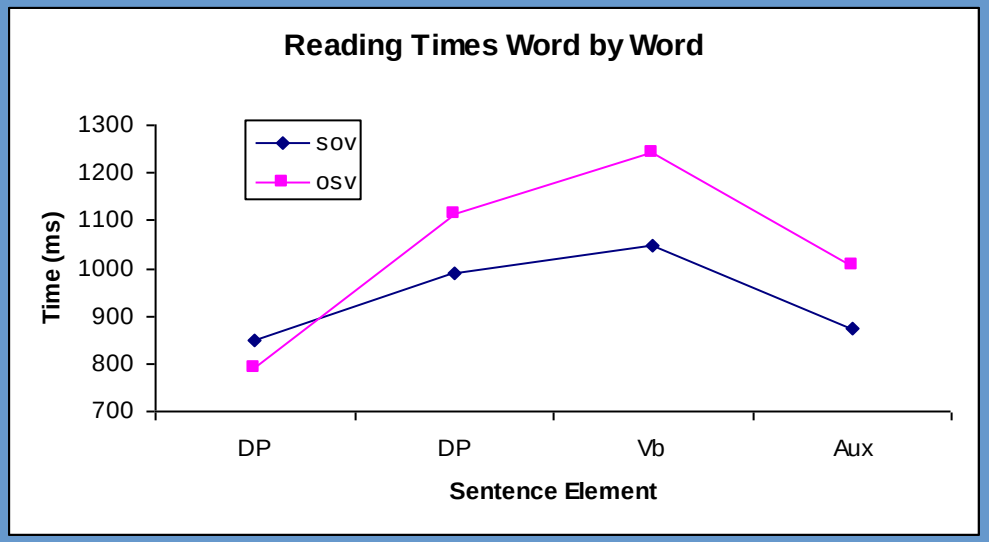
- Verb medial orders (SVO/OVS) are equally costly.
- The only word order that presents a processing advantage is SOV
- Experimental subjects are natives of Basque but bilinguals with Spanish (SVO!)
- SOV/SVO is acquired very early.

Processing word order in a free word order grammar: is there a cost?

- Displaced constituents increase processing cost in fixed word order grammars(Rösler et al. 1998; Matzke et al. 2002): LAN and P600
- Are there processing asymmetries in free word order languages?
- If NO: processing costs are grammar dependent
- If YES: basic syntactic structure is a universal blueprint of human language processing and representation

A different outcome: Subject/Object

- Objects are processed faster than Subjects
- Objects are unmarked, Subjects are marked
- Ergativity



ERGATIVITY:
A DIFFERENT WAY OF ARRANGING ACTANTS

EMAKUME-A-K IKUSI DU
woman-the-erg seen has
the woman has seen the woman

EMAKUME-A HELDU DA
woman-the arrived is
the woman arrived

ERGATIVE TYPE

SHE HAS SEEN HER

SHE HAS ARRIVED

NOMINATIVE TYPE

Subject/Object in Relative clauses

SR easier to process than OR

SR The senator$_1$ [that (e_1) attacked the reporter] admitted the error

OR The senator$_1$ [that the reporter attacked (e_1)] admitted the error

Structural distance hypothesis: object deeper

Universal accesibility hypothesis: subject> object

Linear distance hypothesis: intervening words

Materials: fully ambiguous S/O RCs dissambiguated at main clause V

(5) Subject-gap RC:

[e_1 emakume-ak ikusi ditu-en] gizon-a-k_1 lagunak ditu

[e_1 women-the seen hasthem-rl] man-the-S_1 friends hasthem

"the man that has seen the women has friends"

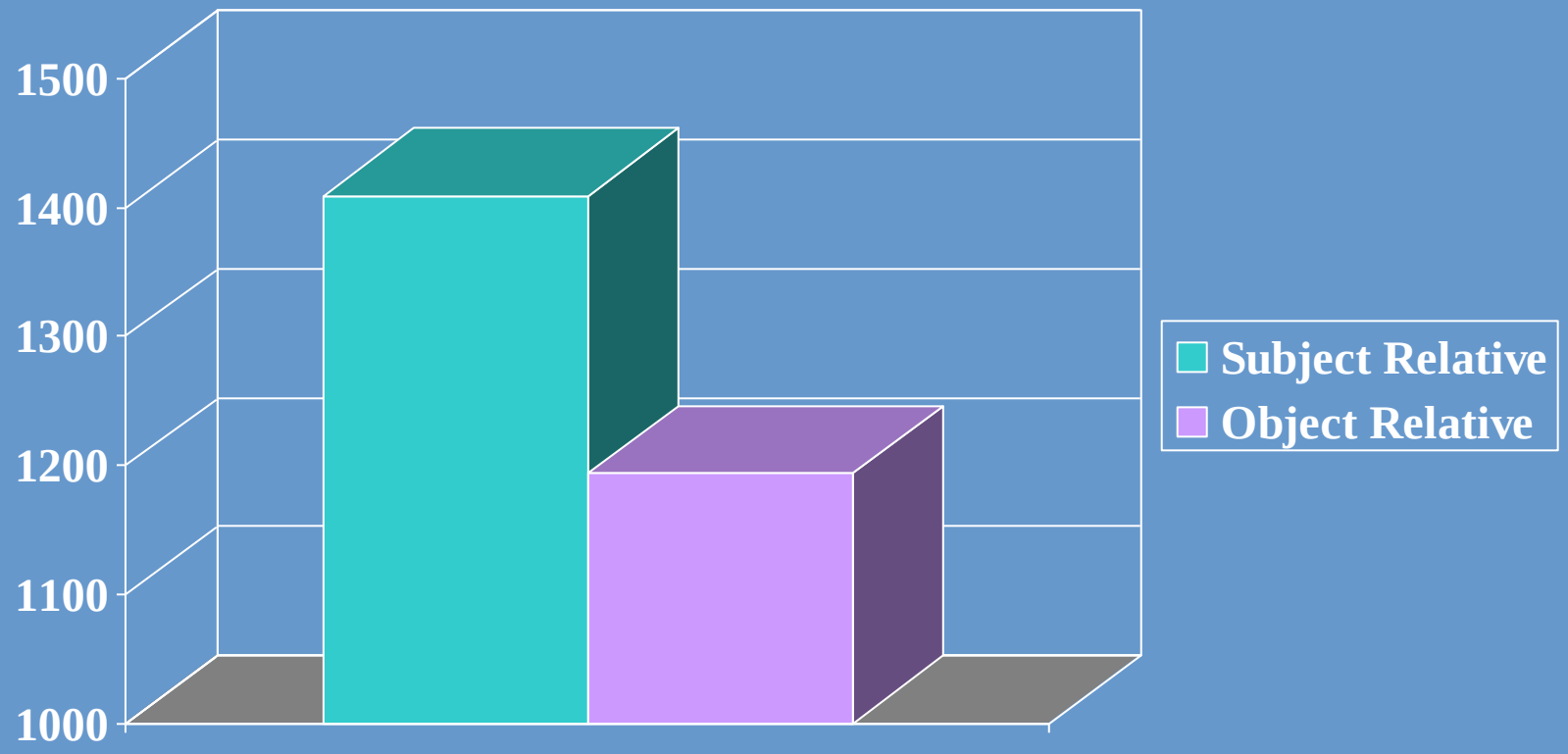
(6) Object-gap RC:

[emakume-a-k e_1 ikusi ditu-en] gizon-ak_1 lagunak dira

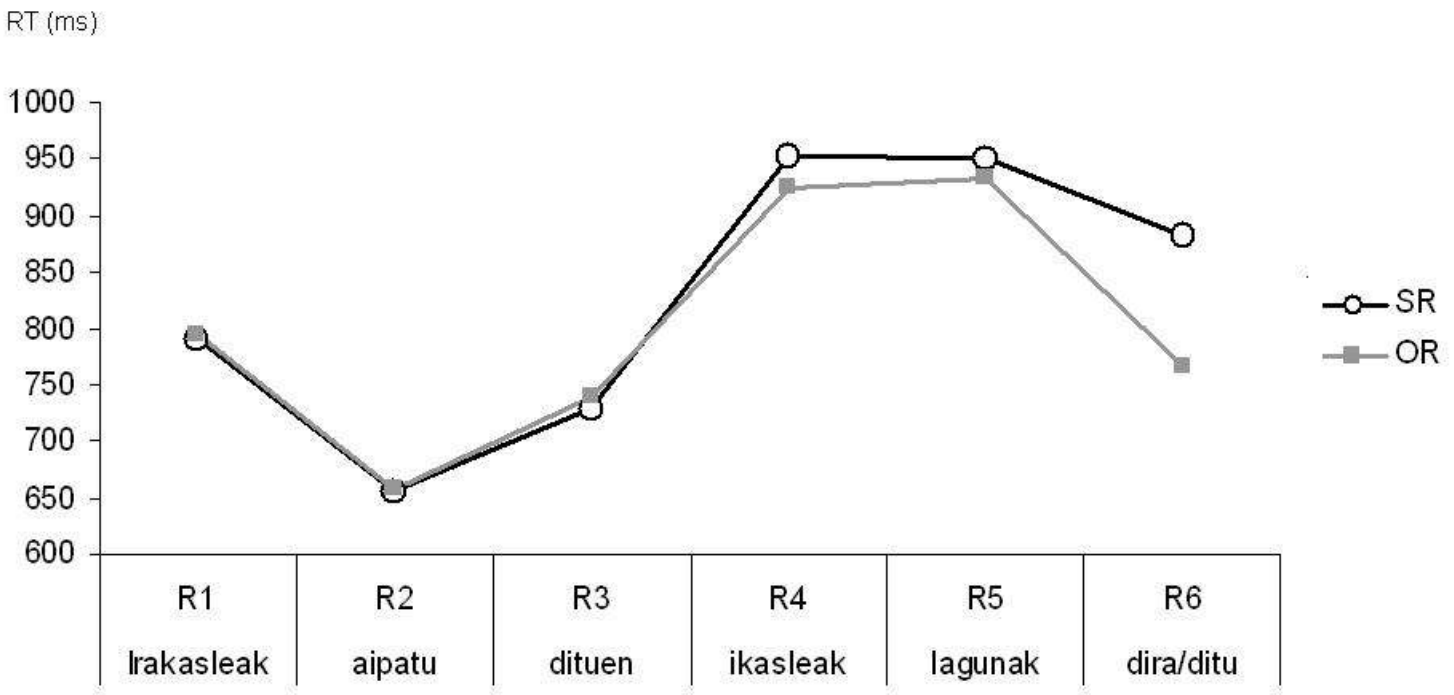
[woman-the-S e_1 seen hasthem-rl] men-the_1 friends are

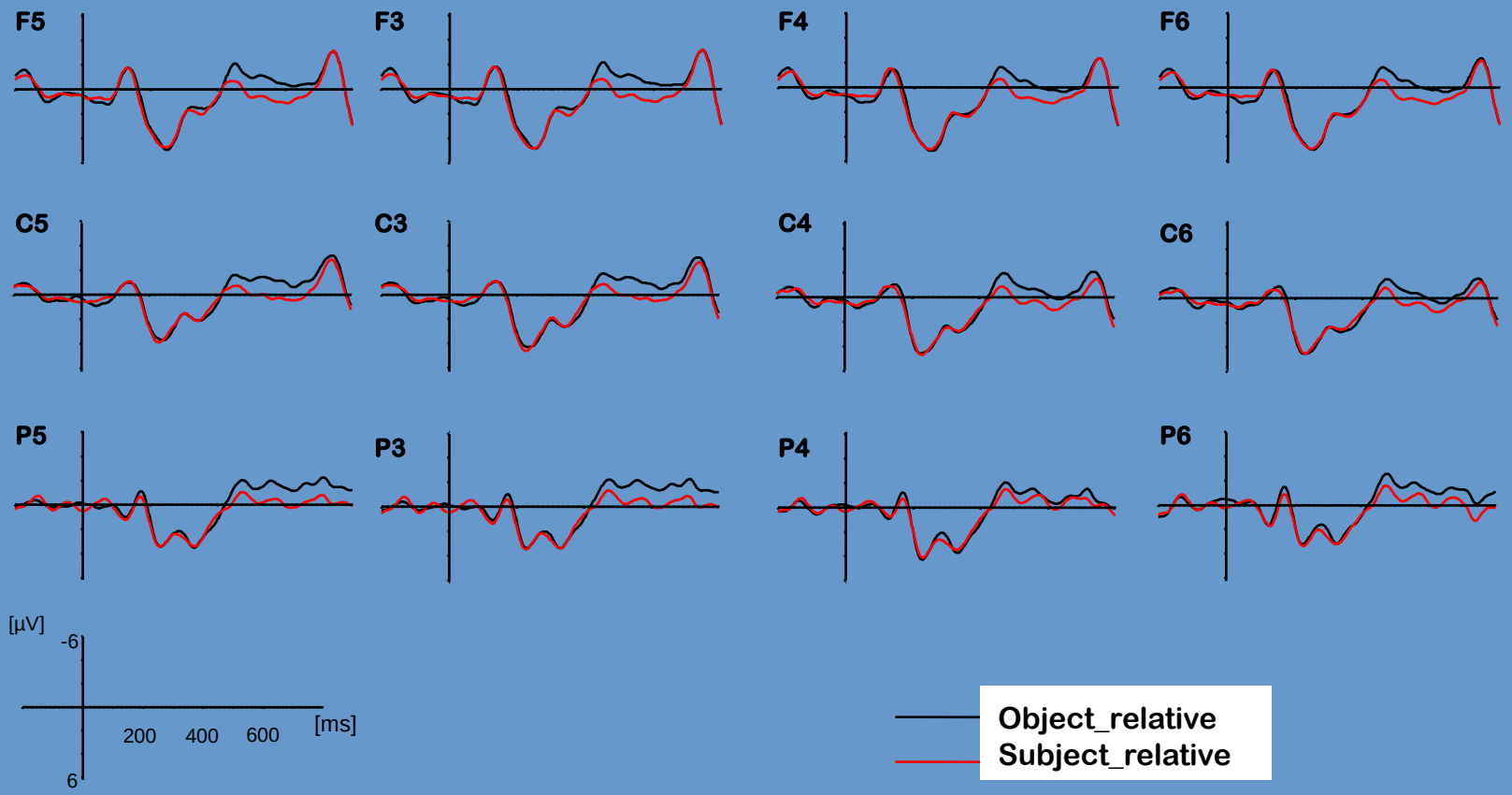
"the men that the woman has seen are friends"

Reading times



READING TIMES: Object relative faster





In the P600 window the amplitude of the SR is more positive going that that of the OR sentences. The present results show that in Basque, SR are harder to process than OR.

ERGATIVITY:
A DIFFERENT WAY OF ARRANGING ACTANTS

EMAKUME-A-K IKUSI DU
woman-the-erg seen has
the woman has seen the woman

EMAKUME-A HELDU DA
woman-the arrived is
the woman arrived

ERGATIVE TYPE

SHE HAS SEEN HER

SHE HAS ARRIVED

NOMINATIVE TYPE

Conclusions

- Word-order processing and representation follows universal mechanisms despite surface differences: fixed and free word order grammars display processing costs
- Seemingly universal phenomena based on Subject/Object require deeper, more abstract characterization
- Cross linguistic research is crucial to understand universal versus language specific acquisition/processing/representation mechanisms and strategies.

The “potential” benefits

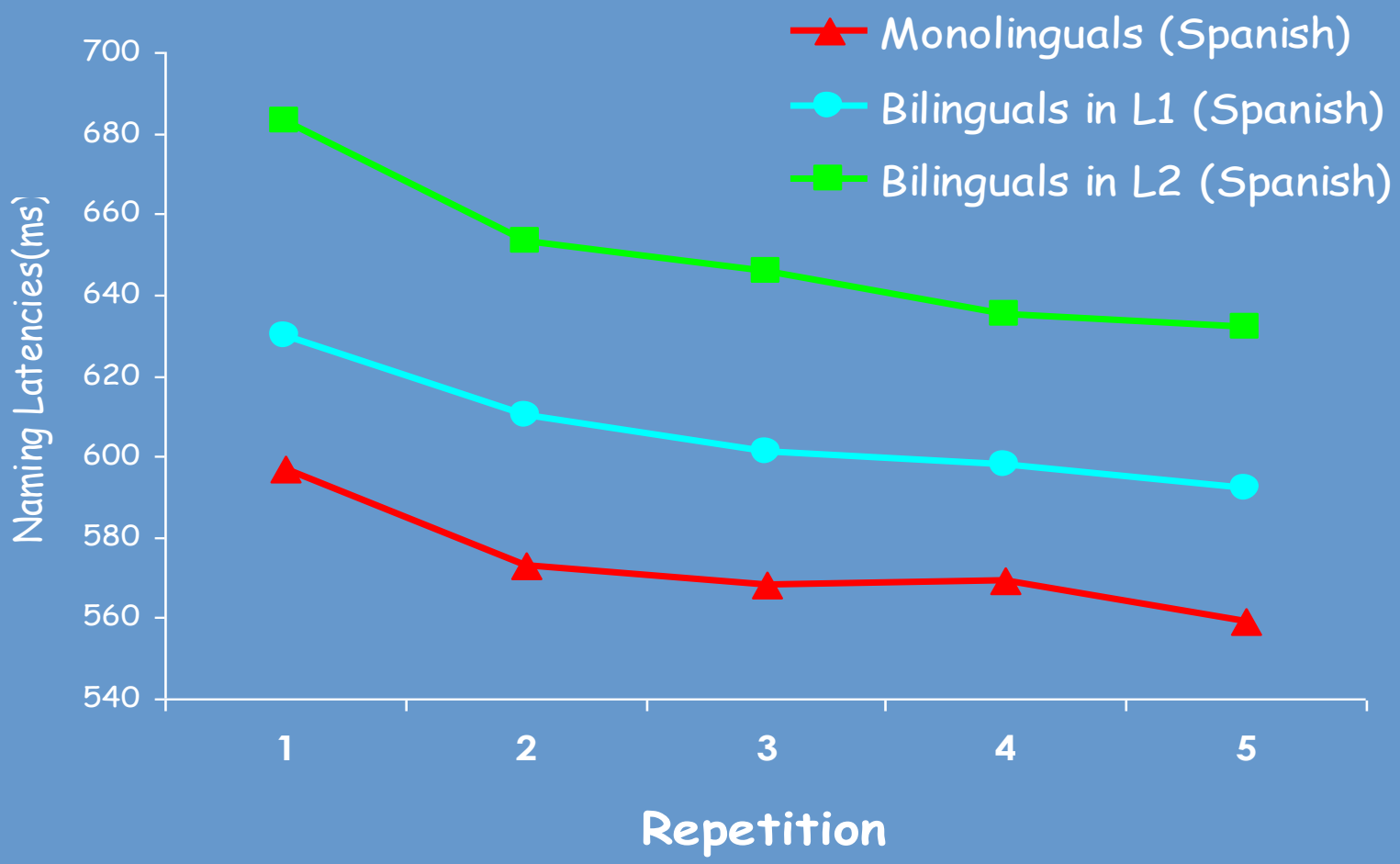
Do bilinguals enjoy an attentional advantage over monolinguals?

If so….

how important is such cost?

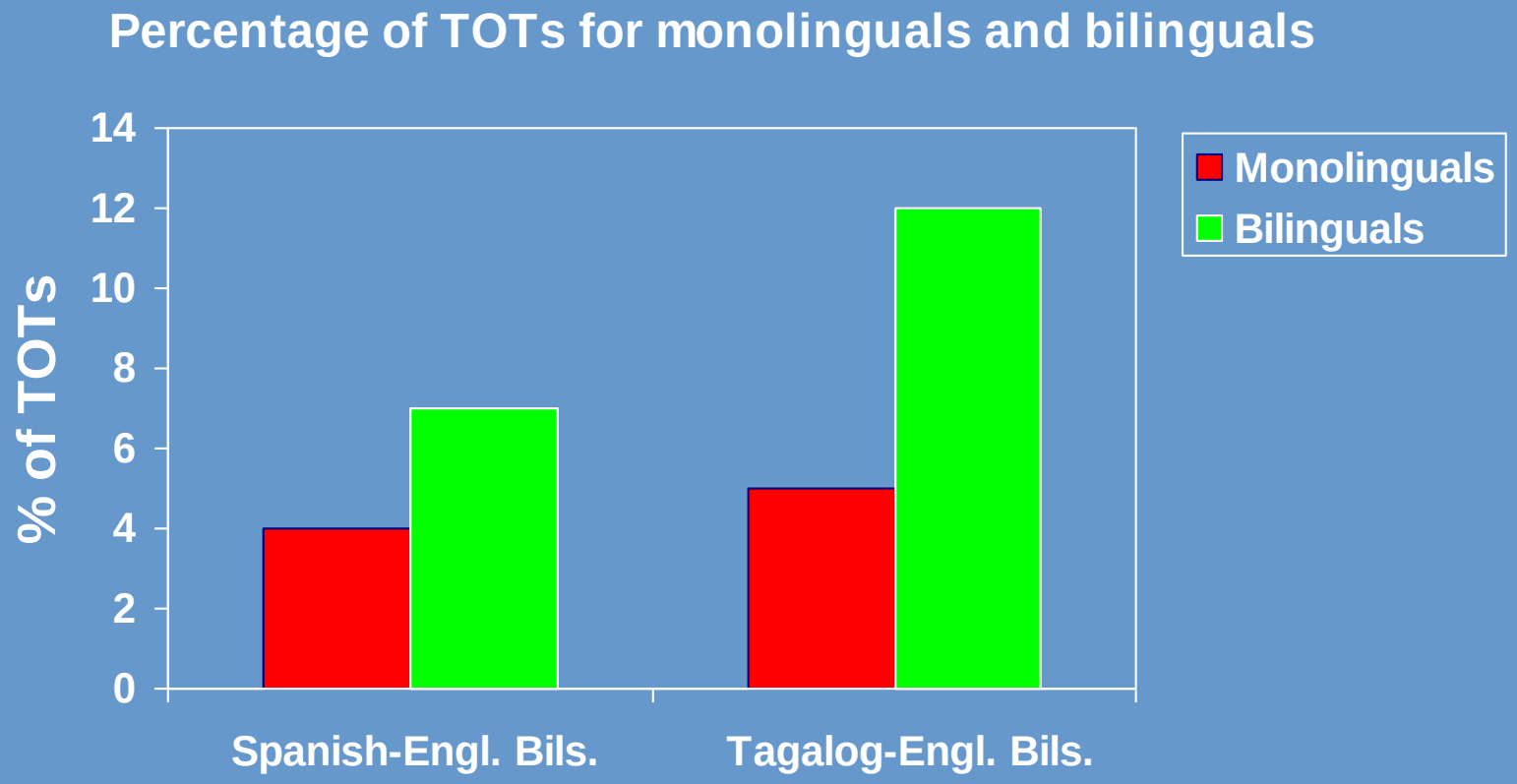
what are the implications of such an effect for brain architecture?

The costs: Slower Picture Naming Latencies



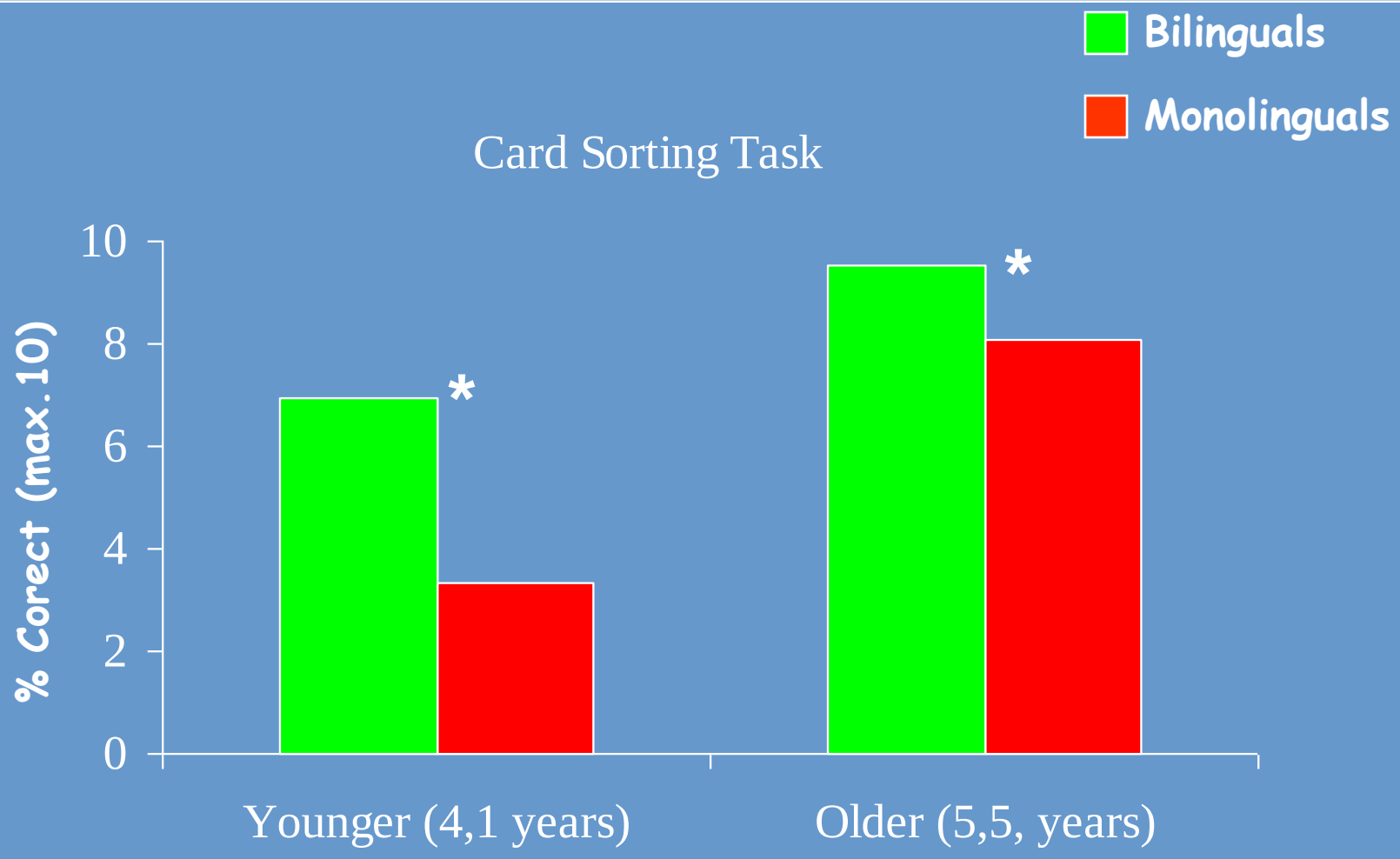
Ivanova & Costa (2008). Acta Psychologica

The costs: More Tip of the Tongue



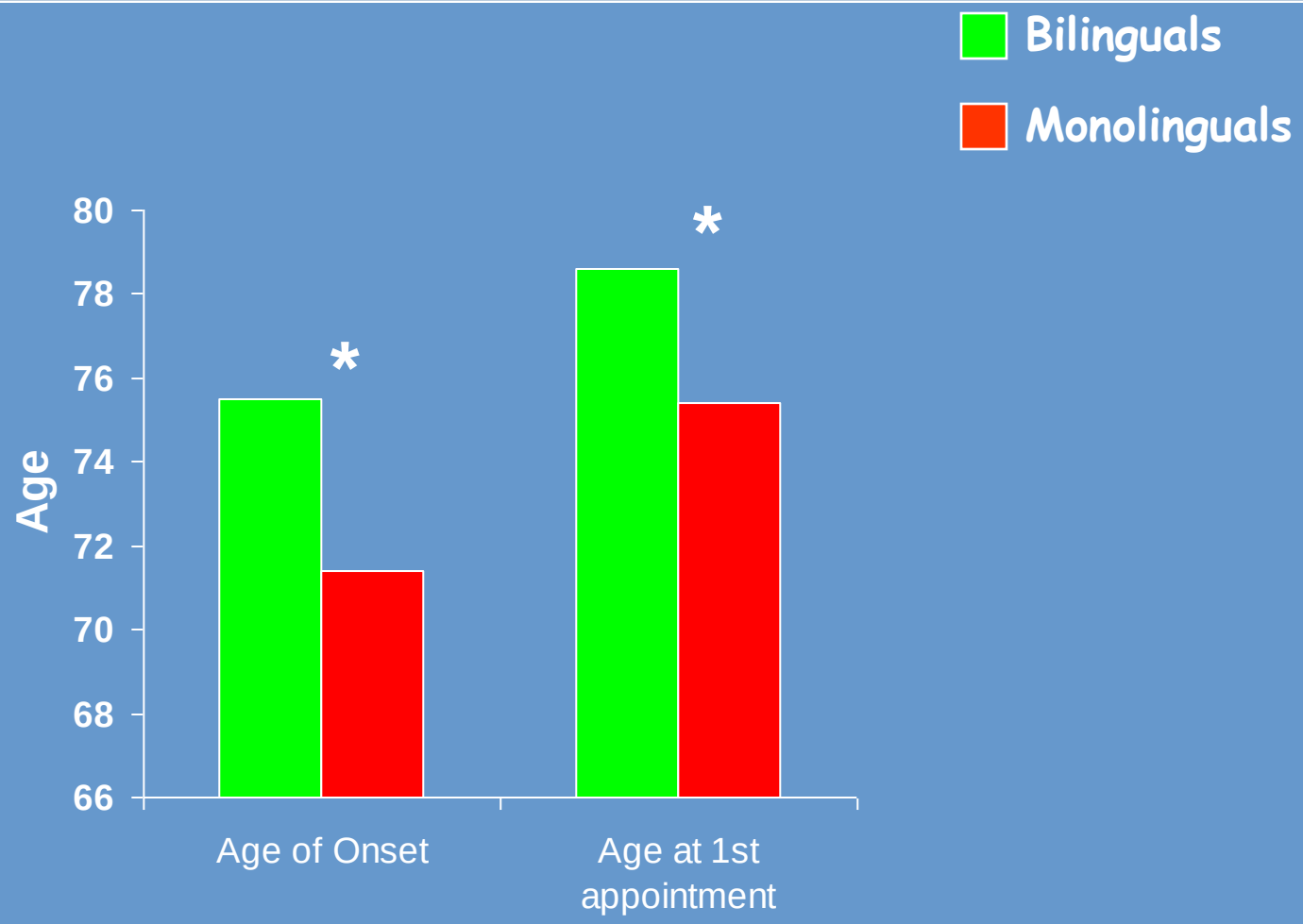
Gollan & Acenas (2004). Journal of Experimental Psychology: LMC

The benefits: More efficient attentional control



Bialystok, 1999

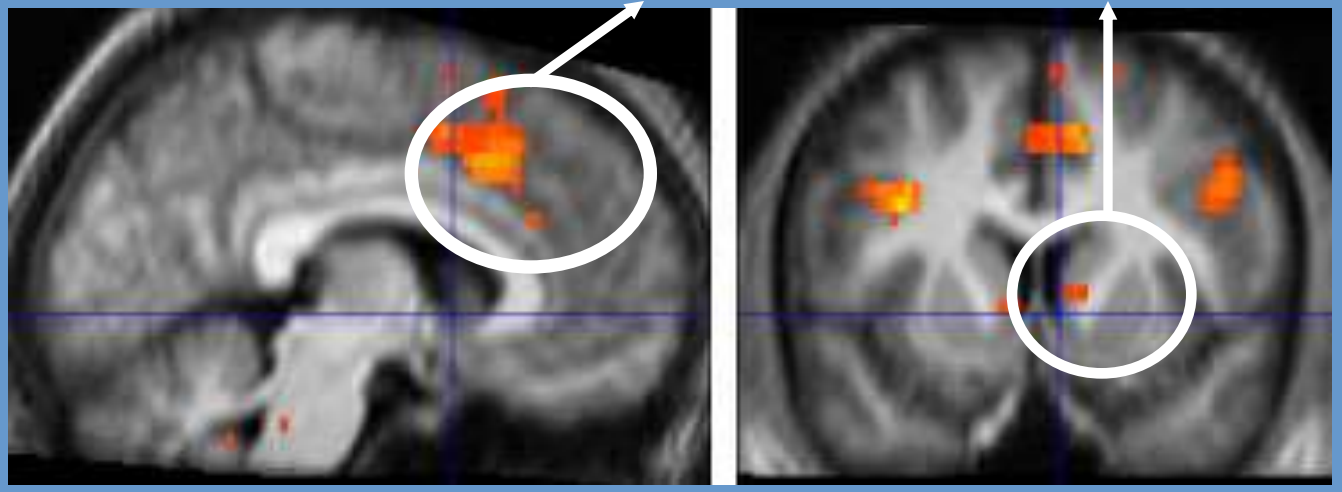
The Benefits: Bilingualism Delays Dementia Symptoms



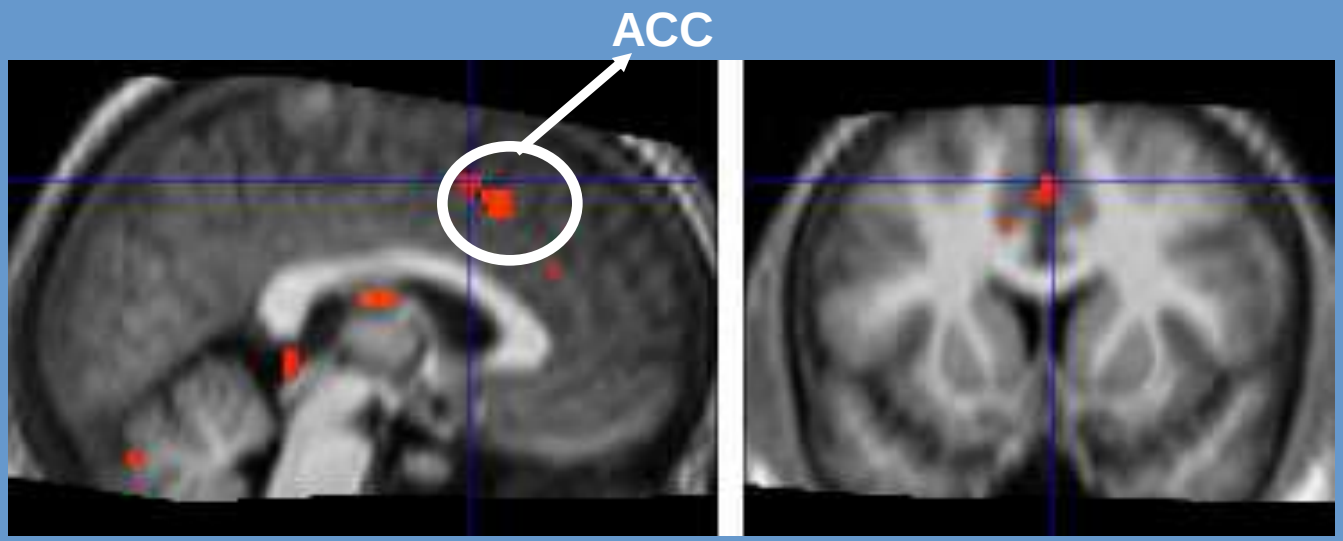
Bialystok, Craik & Freedman, 2007

The benefits: More efficient attentional control

Monolinguals



Bilinguals



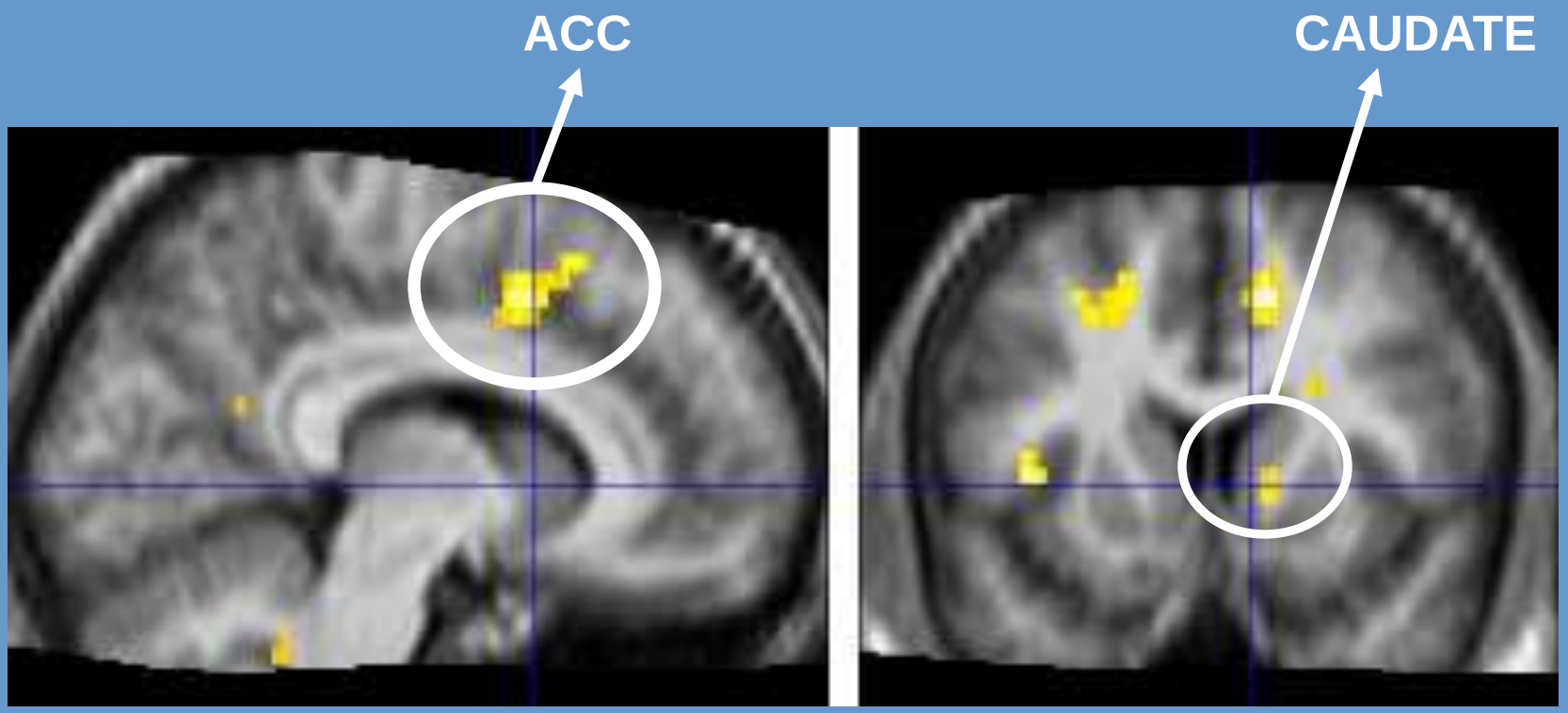
P< 0.005 corrected

Abutalebi, Costa, et al., (in prep)

FLANKER TASK. Incong vs congruent trials

Direct comparison between MONOLINGUALS and BILINGUALS:

Despite similar behavioral performance, MONOLINGUALS engage more extensively areas related to cognitive control such as the ACC and the caudate nucleus



Abutalebi, Costa, et al., (in prep)