

Canolfan ESRC Centre
dros Ymchwil i Ddwyieithrwydd for Research on Bilingualism

English “**red** wine” or Welsh “wine **red**” ?

Bridging Linguistics and Cognitive Neuroscience

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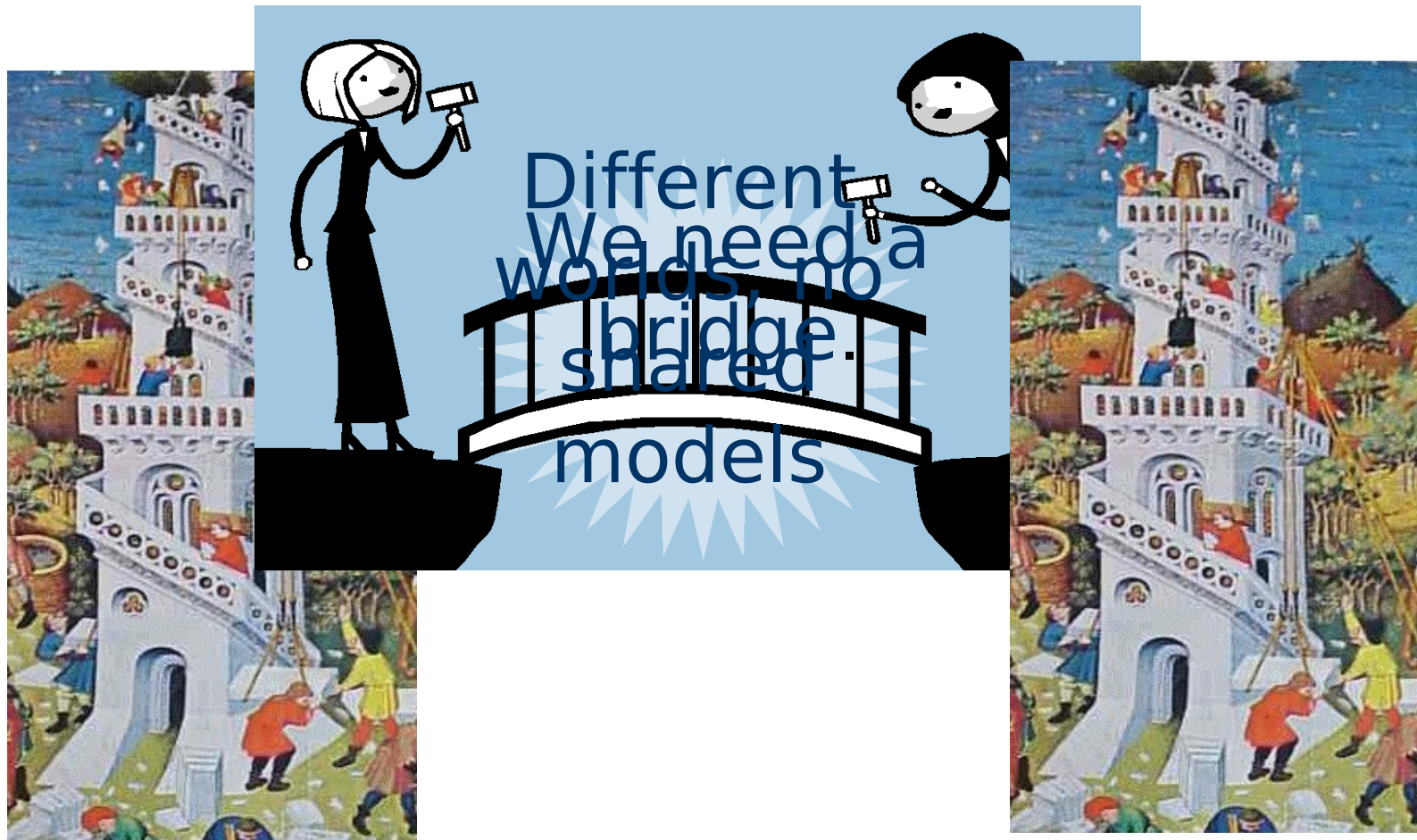
Cyngor Cyllido Addysg
Uwch Cymru
Higher Education Funding
Council for Wales



Llywodraeth Cynulliad Cymru
Welsh Assembly Government



Linguists and psycholinguistics



linguists

(Dick Hudson, 2008)

psycholinguistics

Bilingualism in three contrasting European communities



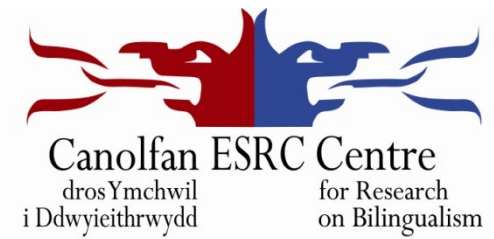
- PI: M. Carmen Parafita Couto
- Co-PI Margaret Deuchar
- Consultants Beñat Oyharçabal and Irantzu Epelde
- Funded by British Academy
- 3 language pairs: **Welsh-English**, Basque-Spanish and Basque-French (Marijo Ezeizabarrena, Amaia Munarriz)
- Focus on resolution of structural conflict in mixed nominal constructions
- Naturalistic and experimental data

Bridging Linguistics and Cognitive Neuroscience



- Co-PIs: Peredur Davies, Noriko Hoshino, M. Carmen Parafita Couto, Margaret Deuchar, Guillaume Thierry
- Researcher: Bastien Boutonnet
- Focus on resolution of structural conflict in Welsh-English mixed nominal constructions
- Funded by an ESRC Bilingualism Centre Development Fund.

Acknowledgments



Corpus

Kevin Donnelly

Margaret Deuchar

Peredur Davies

Toy Task/ Judgments/ RTs

Marika Fusser

Hans Stadhagen-González

Marianne Gullberg

Rocío Pérez Tattam

ERP

Bastien Boutonnet

Noriko Hoshino

Guillaume Thierry

Karsten Steinhauer

Phaedra Royle

Research Questions

1) What happens when there is a **word order conflict** in code-switched nominal constructions? (adjective-noun)

2) Which theoretical model's predictions account for the data better?

Matrix Language Framework vs.
Minimalist Program

Conflict sites

Welsh DPs:

Det

Y

N

mynydd

ADJ

uchel

English DPs:

Det

The

ADJ

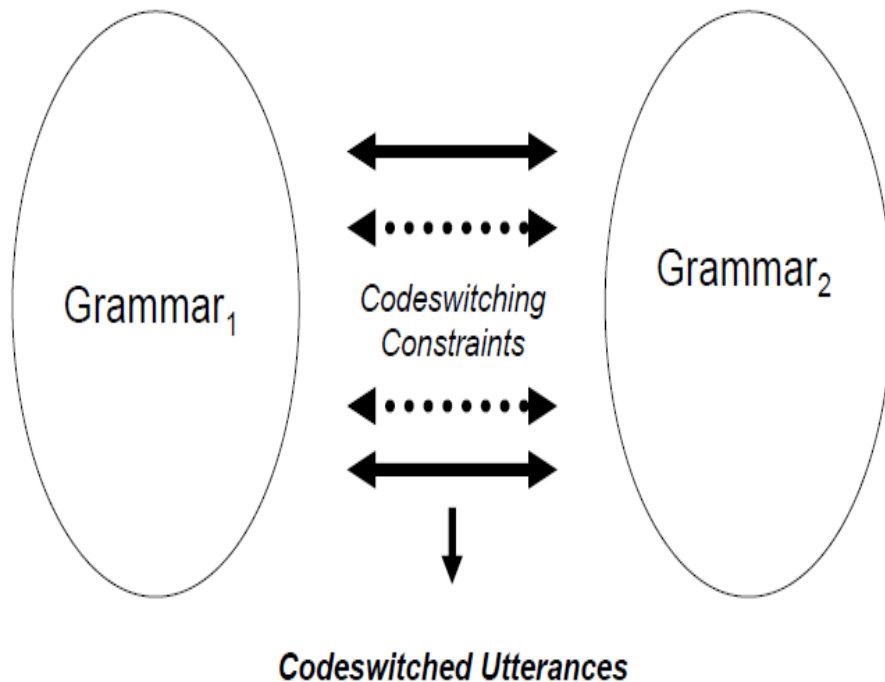
high

N

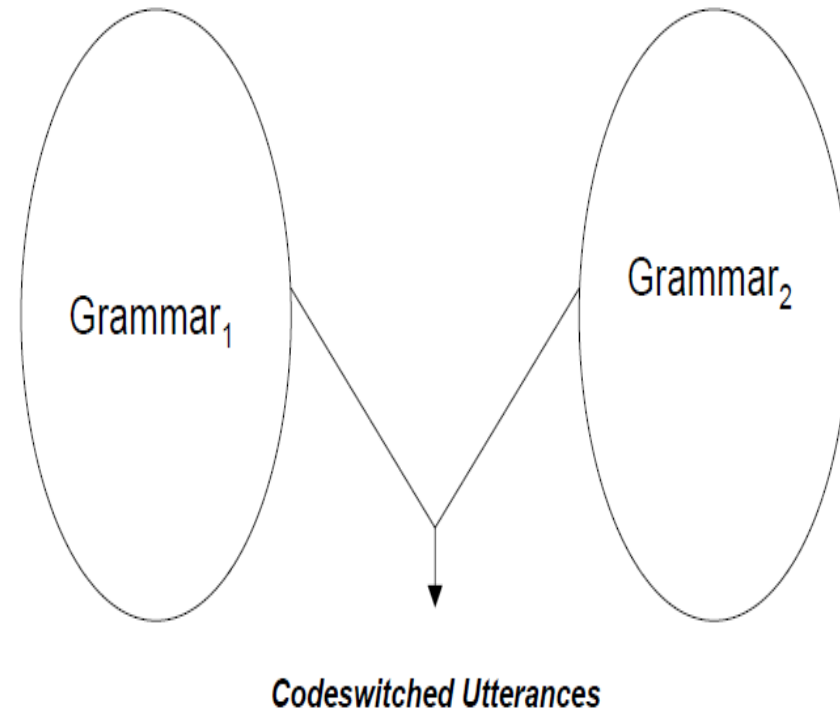
mountain

Theoretical Debate : Myers Scotton vs MacSwan (BLC 2005, vol 8, Issues1 & 3)

Constraint-oriented Approach



Constraint-free Approach



Matrix Language Frame (MLF) (Myers-Scotton 1993)

- In code-switching, the status of the two languages involved is not equivalent: the **matrix language** guides the morphosyntactic construction of code switching.
 - the **matrix language** (ML) is the one that dominates in a CP.
 - the **embedded language** (EL) is the language that participates to a lesser degree in each analysis unit.

Prediction

Adjective/noun order will match the language of the finite verb.
(Myers-Scotton 2002)

(cf.

Morpheme Order Principle: the morpheme order within one bilingual CP comes from the matrix language

Minimalist Approach

Nothing constrains CS apart from the requirements of the mixed grammars.
(MacSwan, 1999)

The account of differences in basic word order in terms of movement requirements is associated with feature strength.

Cantone & MacSwan's (2009) explanation



The NP raises to check features in the specifier position of Agr, deriving DNA word order.

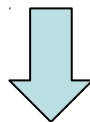
To derive DAN word order the NP checks features covertly, leaving its phonetic features behind with its trace.

Cantone & MacSwan's explanation

Welsh Agr has a strong EPP feature, forcing the NP to raise overtly to its specifier position.

English Agr has a weak EPP feature whereby the NP has its EPP feature valued covertly and remains in situ at PF.

Hence, Welsh Agr forces the NP to raise overtly, while English Agr prompts the NP to raise covertly



The language of the adjective determines the position of the NP relative to the adjective (Cantone & MacSwan 2009).

Predictions of two models

	Matrix Language	MLF Prediction	Canton e & MacSw an Prediction
A. The bear chased one gwyn horse	English	✓	x
B. Helodd yr arth un horse gwyn .	Welsh	✓	✓
C. The bear chased one ceffyl white	English	x	x
D. Helodd yr arth un white ceffyl	Welsh	x	✓

Study design

- Bilingual researcher
- Bilingual participants
- Multi-task approach:

interactive

individual

spontaneous

controlled

non restrictive

restrictive

Data: **Naturalistic**

Semi-Exp

Experimental



Naturalistic

Siarad corpus (www.siarad.org.uk)

40 hours of recordings

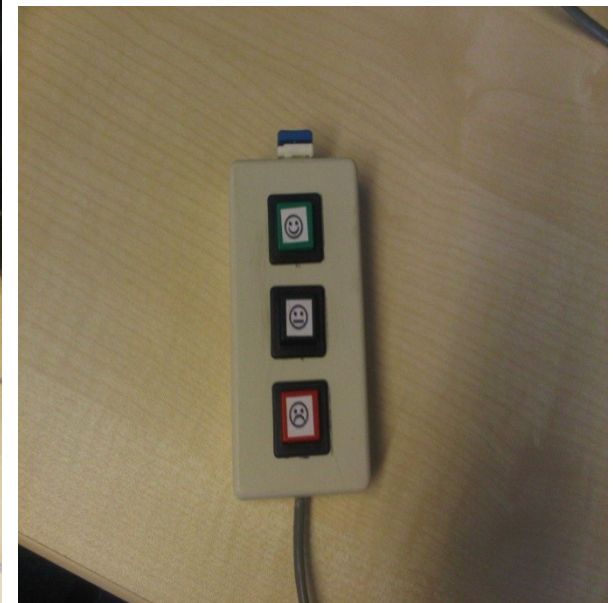
Participants know each other
(friends, family, etc.)
Researcher not present
Recordings last around 35-40
minutes

Semi-experimental data : Toy Task



Experimental data (I)

Oral Acceptability judgments (reaction times and acceptability ratings using DMDX)



Experimental data (II): Event Related Potentials



Corpus data

Automatically extracted (Donnelly et al. 2011); ML Welsh

	N-Adj	N-Adj %	Adj-N	Adj-N %	Total	Total %
Welsh+ English	36	22.4%	14	8.7%	50	31.1%
English+ Welsh	93	57.8%	18	11.8%	111	68.9%
Total	129	80%	32	20%	161	100%

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Corpus data: MLF congruent and violations

ML Welsh

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Corpus data: MP congruent

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Corpus data: MP and MLF

	N- Adj	N-Adj %	Adj-N	Adj-N %	Total	Total %
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Corpus data

Word Order: tends to conform to MLF (and MP) predictions

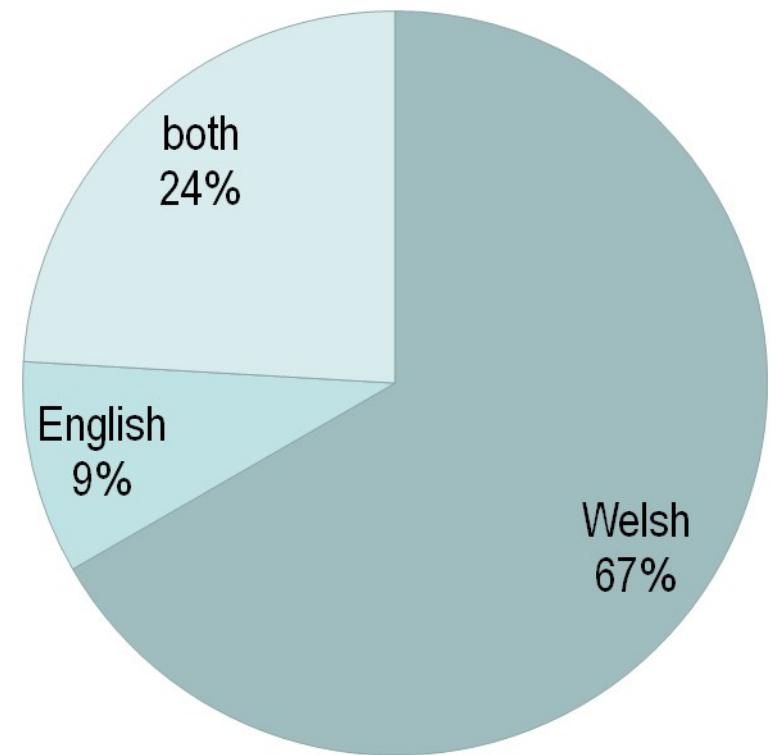
BUT: No examples with ML English



Other evidence: elicited data, experimental data

Elicited/Experimental data (I): Participants

50 Welsh-English bilingual
Between 18 and 77 years



Director-Matcher Task

Guided elicitation of complex nominal constructions

- two participants: one director, one matcher
- locate **16** objects of different colours **and shapes**

Semi-experimental data : Toy Task

1. **Mouse**
(black / white)
2. **Tea bag**
(triangular/square/round)
3. **Tape measure**
(blue/orange)
4. **String**
(green/yellow/blue)
5. **Glasses/spectacles**
(orange/blue)
6. **Calculator**
(blue/black)
7. **Bangle/Bracelet**
(orange/purple)



Patterns observed

Always Welsh ML!

English N Welsh Adjective 133/238

y **bracelet** oren (02D)

the bracelet orange

Det N Adj

English Noun English Adjective 15/238

y **tea bag** **conical** (20D)

the tea bag conical

Det N Adj

Patterns observed

Welsh Noun English Adjective 7/238

Y sbectol orange (02M)

A glasses orange

Det N Adj

English Adjective English Noun 5/238

0 pyramid tea bag (18D)

a pyramid tea bag

Det Adj N

Toy task data:

Adjective position postnominal in all cases except for in embedded language islands.

ML always Welsh

Oral Acceptability Judgements: Stimuli

Mae *the* *horse* *arall* wedi ennill gwobr.
Det Noun Adj (ML=Welsh)

The *arall* *horse* has won a prize.
Det Adj Noun (ML= English)

84 sentences with CS:
24 fillers , 12 practice, 48 stimuli

ML Welsh/English
Det Welsh/English
N Welsh/English
Adj Welsh/English
Adj pre/postnominal
Subject/object position

Acceptability Judgments:



Stimuli

12 switched nominal constructions

the horse arall

the oen *other*

the oen arall

yr *horse other*

yr *horse* arall

yr oen *other*

the arall *horse*

the other oen

the arall oen

yr *other horse*

yr arall *horse*

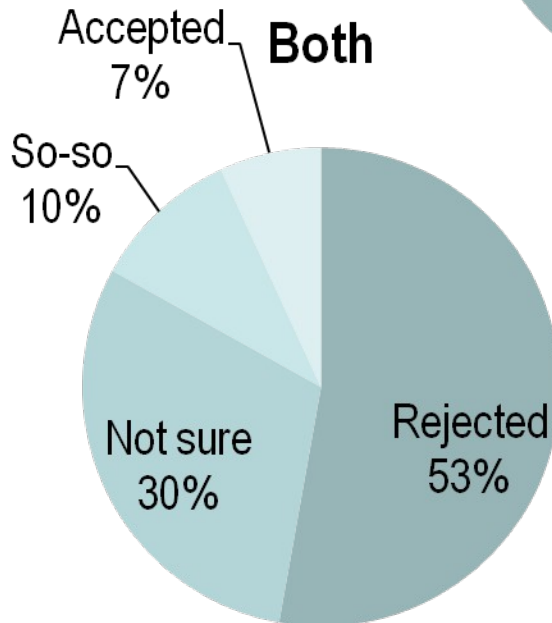
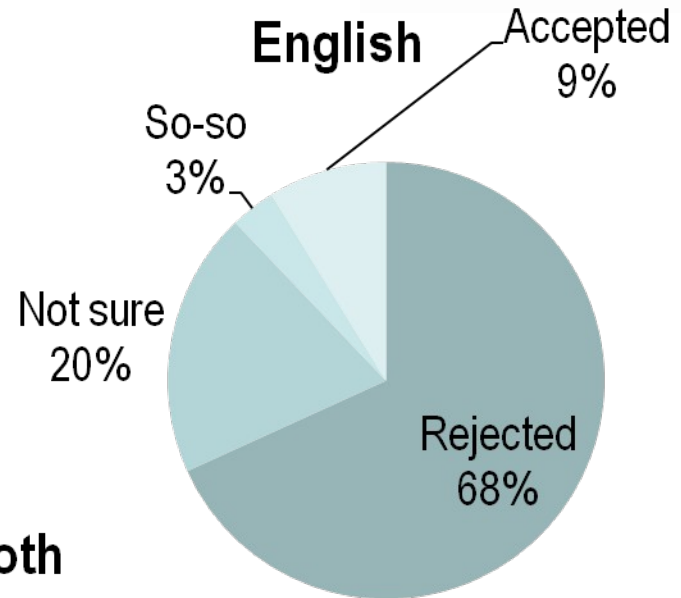
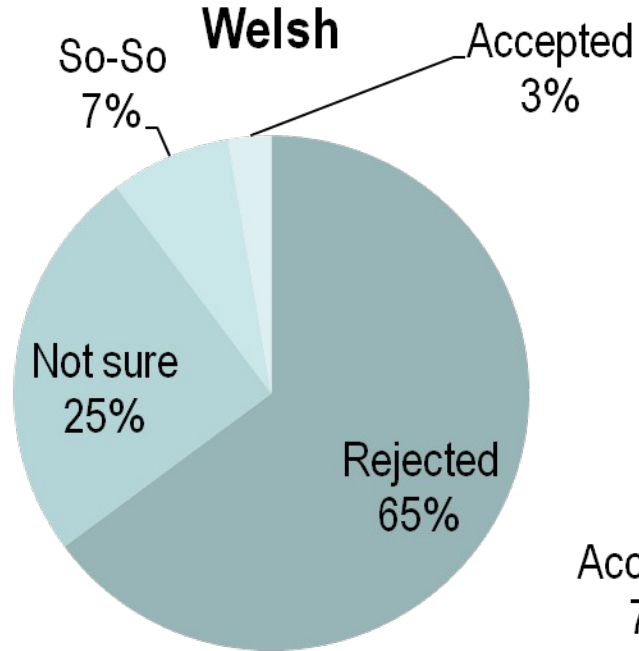
yr *other* oen

Scale

- 0- Don't know**
- 3- Grammatical**
- 2- So-so**
- 1- Ungrammatical**



Language at home

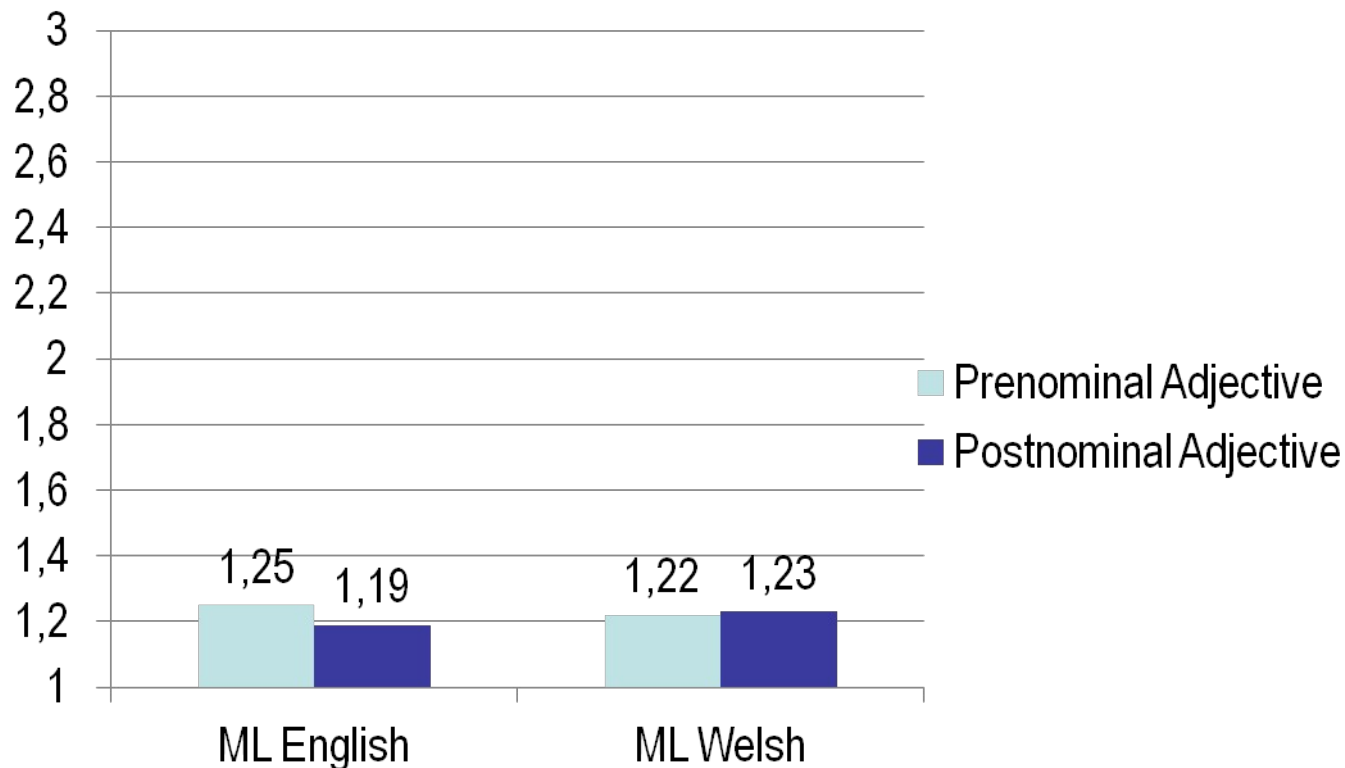


Results: Acceptability Judgments

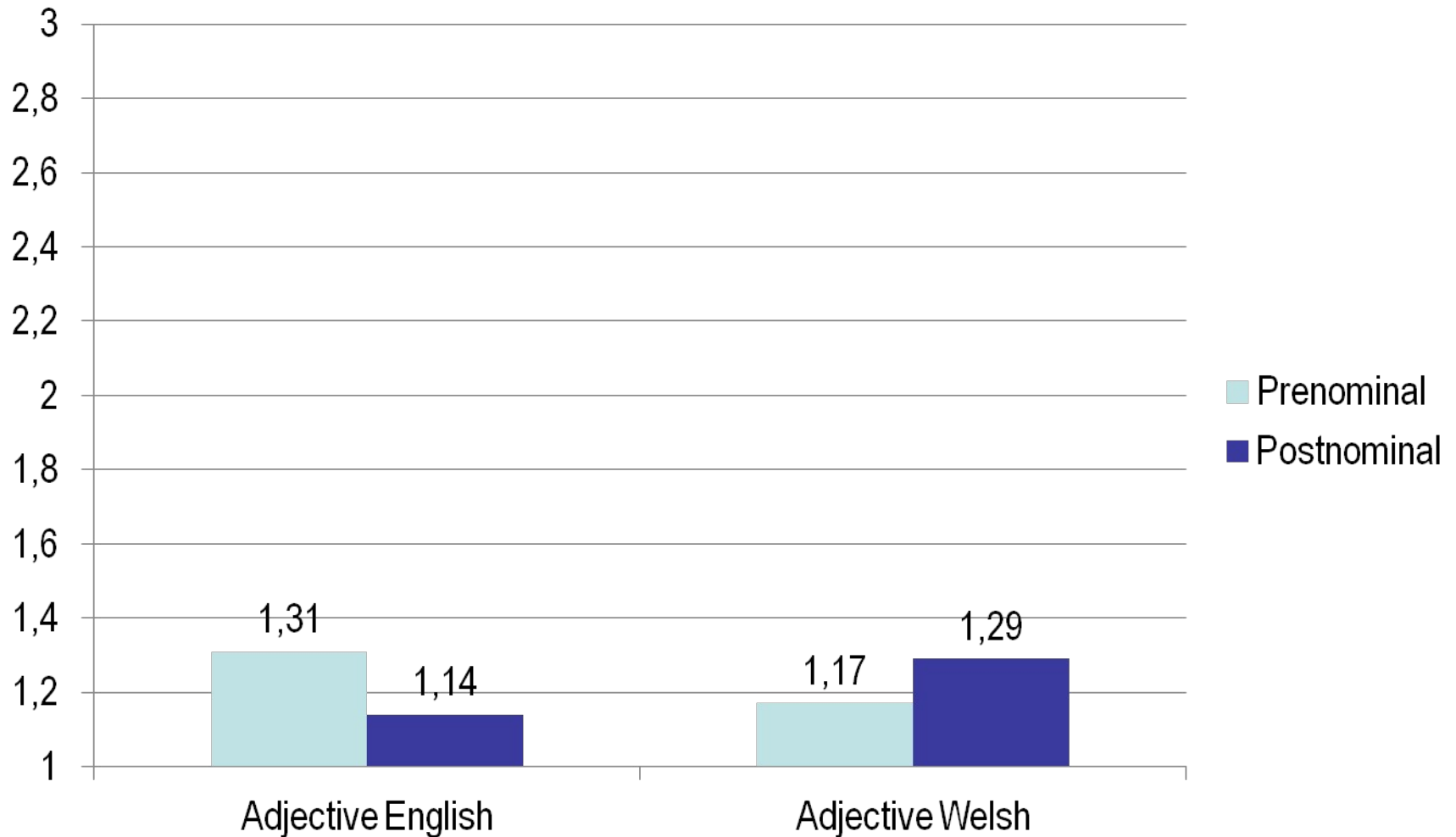
1- Ungrammatical

2- So-so

3- Grammatical

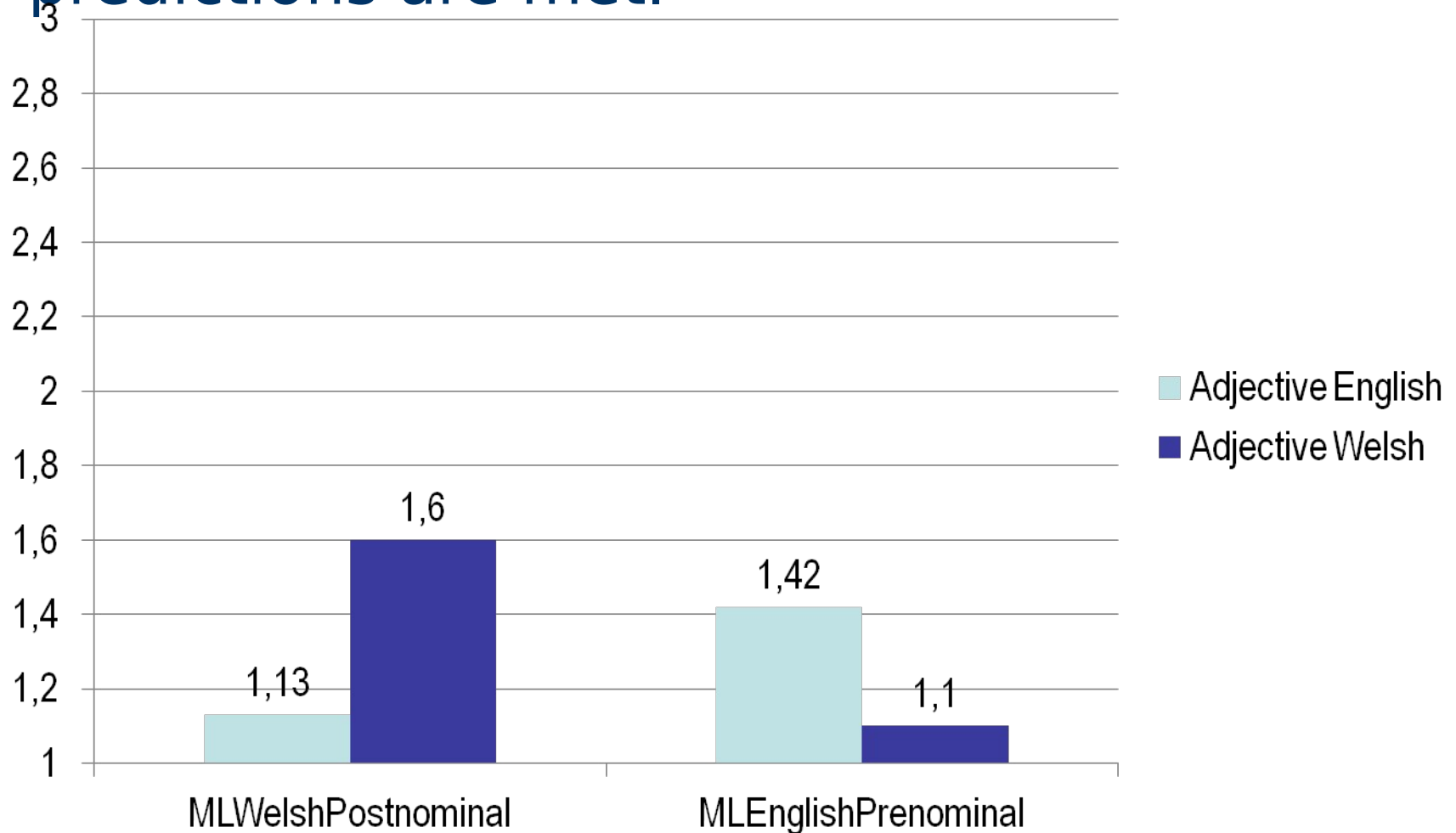


Results: Acceptability Judgments



Results: Acceptability Judgments

Best when both MLF and MP predictions are met.



Perhaps both models have something to say?

Alternative explanation: borrowability hierarchy?

(Matras 2007) gives the following, frequency-based hierarchy:

nouns, conjunctions > verbs >
discourse markers > adjectives >
interjections > adverbs > other particles,
adpositions > numerals > pronouns >
derivational affixes > inflectional affixes

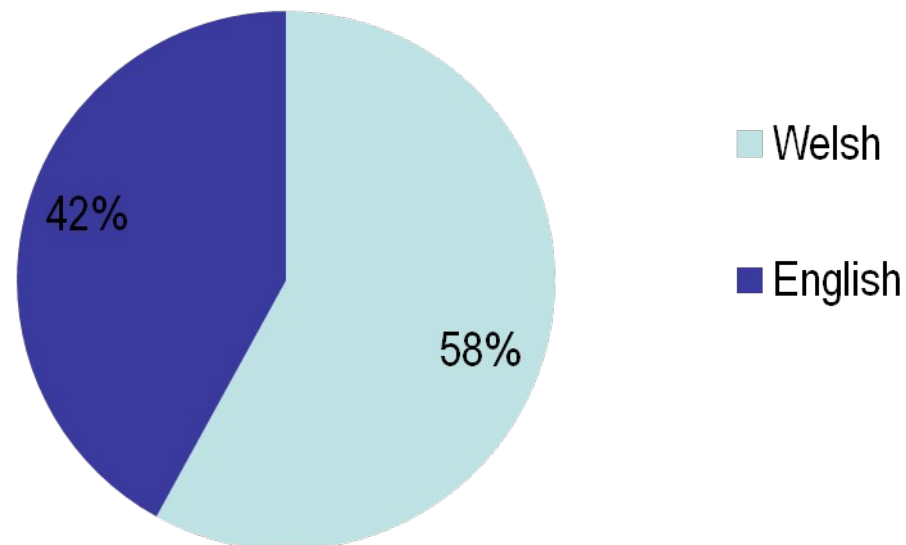
ERP

- No previous neurophysiological evidence on conflict sites in a code-switching context.
- Monolingual evidence of syntactic violations show 2 main types of brain responses:
 - *N400* (Friederici et al. 1996)
 - *LAN* (Friederici et al. 1996) & *P600* (Moreno et al. 2002)
 - Proficient bilinguals exhibit similar patterns (Weber-Fox & Neville 1996).
 - Language switching shows modulation of N400 range due to processing costs (Martin et al. in press, Proverbio et al. 2004).

ERP: Participants

- **15 balanced Welsh-English bilinguals (mean age: 25.5, 7 male, 8 female)**

Language Use



ERP: Methodology

- **Sentence verification task with event-related potentials (ERPs).**

ERP: Methodology

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- **At the end of each sentence, two pictures were presented and the bilinguals were asked to select the picture which matched the sentence.**

ERP: Methodology

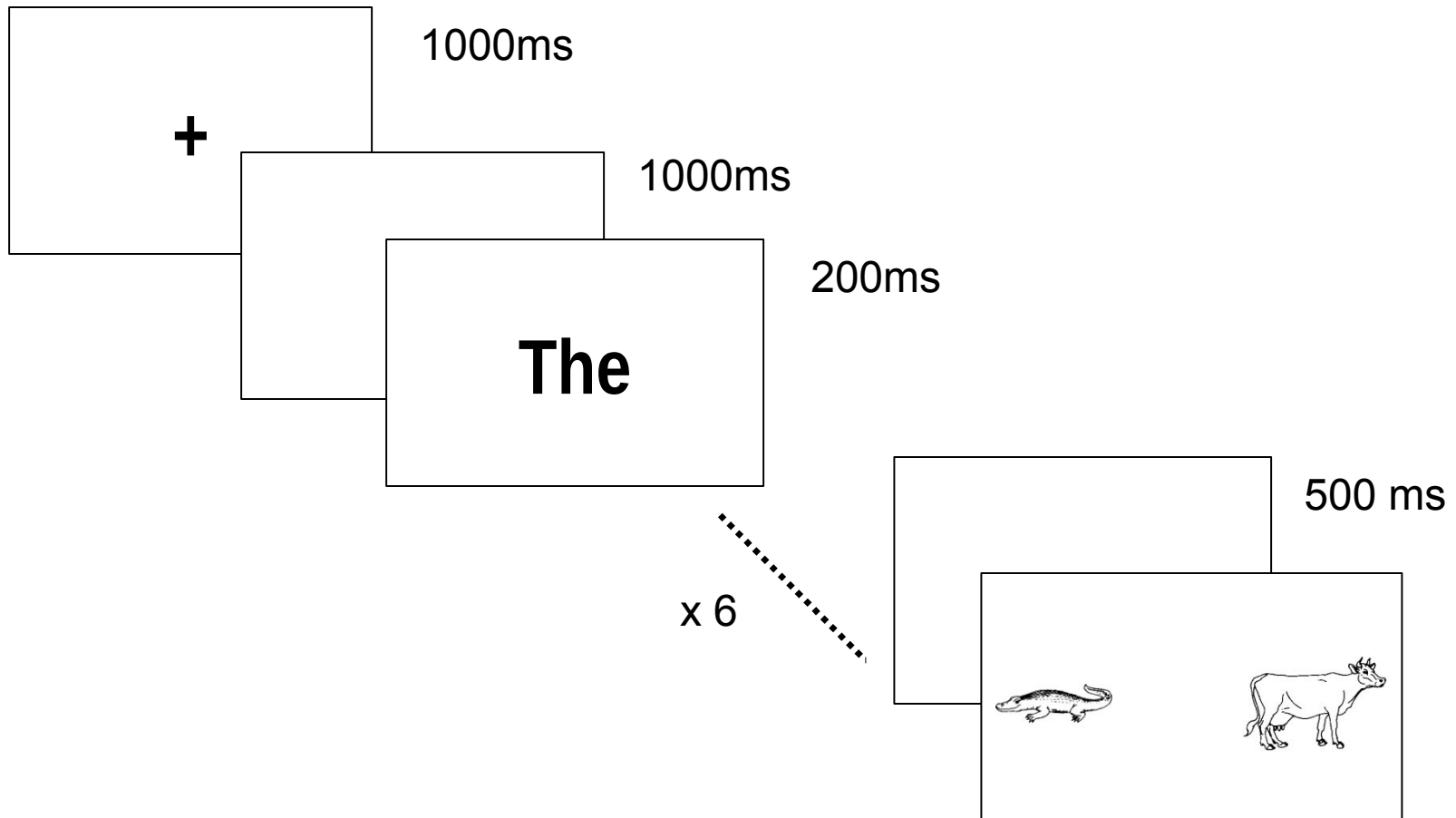
- **Sentence verification task with event-related potentials (ERPs).**
- **At the end of each sentence, two pictures were presented and the bilinguals were asked to select the picture which matched the sentence.**
- **The language of the matrix verb, the adjective, the noun, and the word order of the nominal construction (the adjective + the noun) were manipulated.**

Materials

40 sets of 6 sentences

	Matrix Language	MLF Prediction	Cantone & MacSwan Prediction
A. The bear chased one gwyn horse	English	✓	x
B. Helodd yr arth un horse gwyn .	Welsh	✓	✓
C. The bear chased one ceffyl white	English	x	x
D. Helodd yr arth un white ceffyl	Welsh	x	✓
E. The bear chased one white horse	English	No Switch	No Switch

Procedure



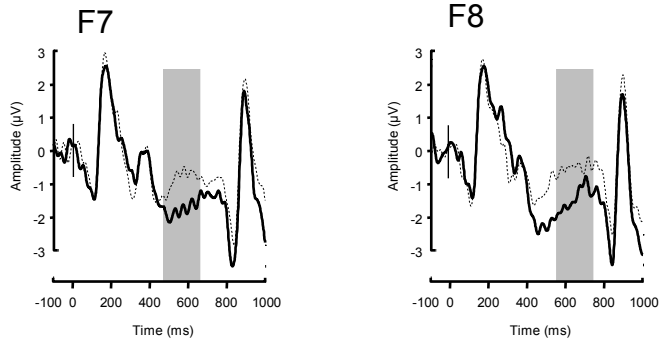
Materials : MLF analysis

	Matrix Language	MLF Prediction	Cantone & MacSwan Prediction
A. The bear chased one gwyn horse	English	✓	✗
B. Helodd yr arth un horse gwyn	Welsh	✓	✓
C. The bear chased one ceffyl white	English	✗	✗
D. Helodd yr arth un white ceffyl	Welsh	✗	✓
E. The bear chased one white horse	English	No Switch	No Switch

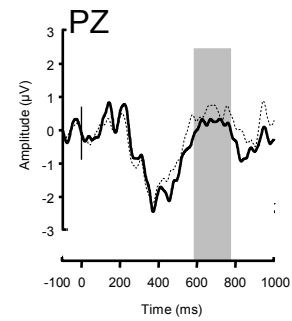
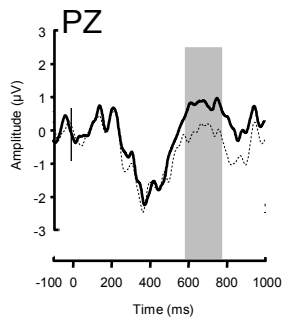
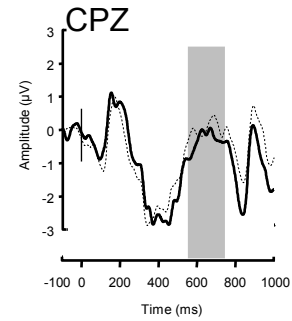
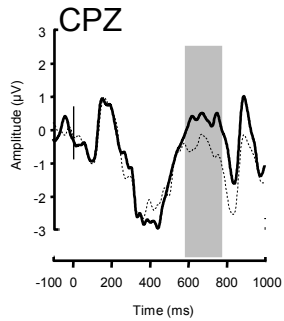
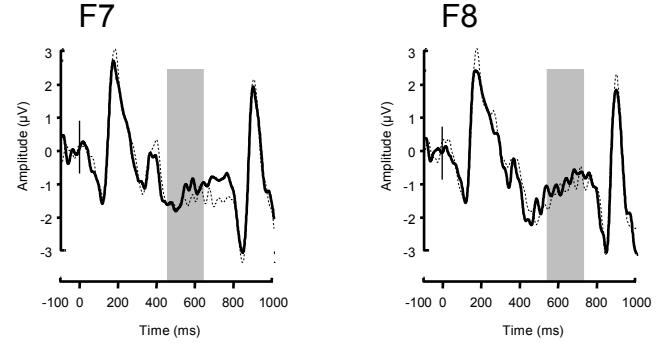
Materials: MP Analysis

	Matrix Language	MLF Prediction	Cantone & MacSwan Prediction
A. The bear chased one gwyn horse	English	✓	✗
B. Helodd yr arth un horse gwyn	Welsh	✓	✓
C. The bear chased one ceffyl white	English	✗	✗
D. Helodd yr arth un white ceffyl	Welsh	✗	✓
E. The bear chased one white horse	English	No Switch	No Switch

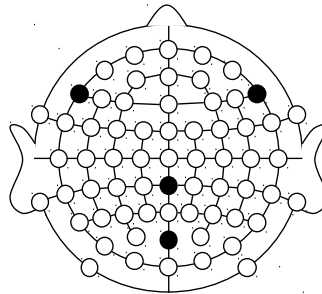
MLF Prediction



Minimalist Prediction



----- Correct
———— Violation



ERP results

~~- Matrix Language Frame vs. Minimalist Program~~

- A negativity in the frontal region (delayed anterior negativity, 450- 600ms window)

- A slightly delayed P600

- The delays in the effects may be attributed to language switching.

Recap

1. **Production data: Corpora and Elicited (toy task)**

No English ML, so not able to test models

2. **Oral Acceptability judgements**

Tend to reject everything, but MLF & MP congruent are higher ranked.

Language spoken at home doesn't influence rejection.

3. **ERP**

Supporting the MLF

Methodological consequences

- Limitations of corpus data
- Judgment tasks alone are not sufficient either
- Collecting evidence from different approaches

Theoretical consequences

- Consequences for possible analyses of noun-phrase-structure: need to take into account whole CP.
- Against the proposal that DP is a separate phase (Chen 2011 , Svenonius 2004, and Hiraiwa 2005)
- Perhaps the MLF dominates the whole CP phase (cf. Radford, Kupisch, Köppe & Azzaro, 2007)?

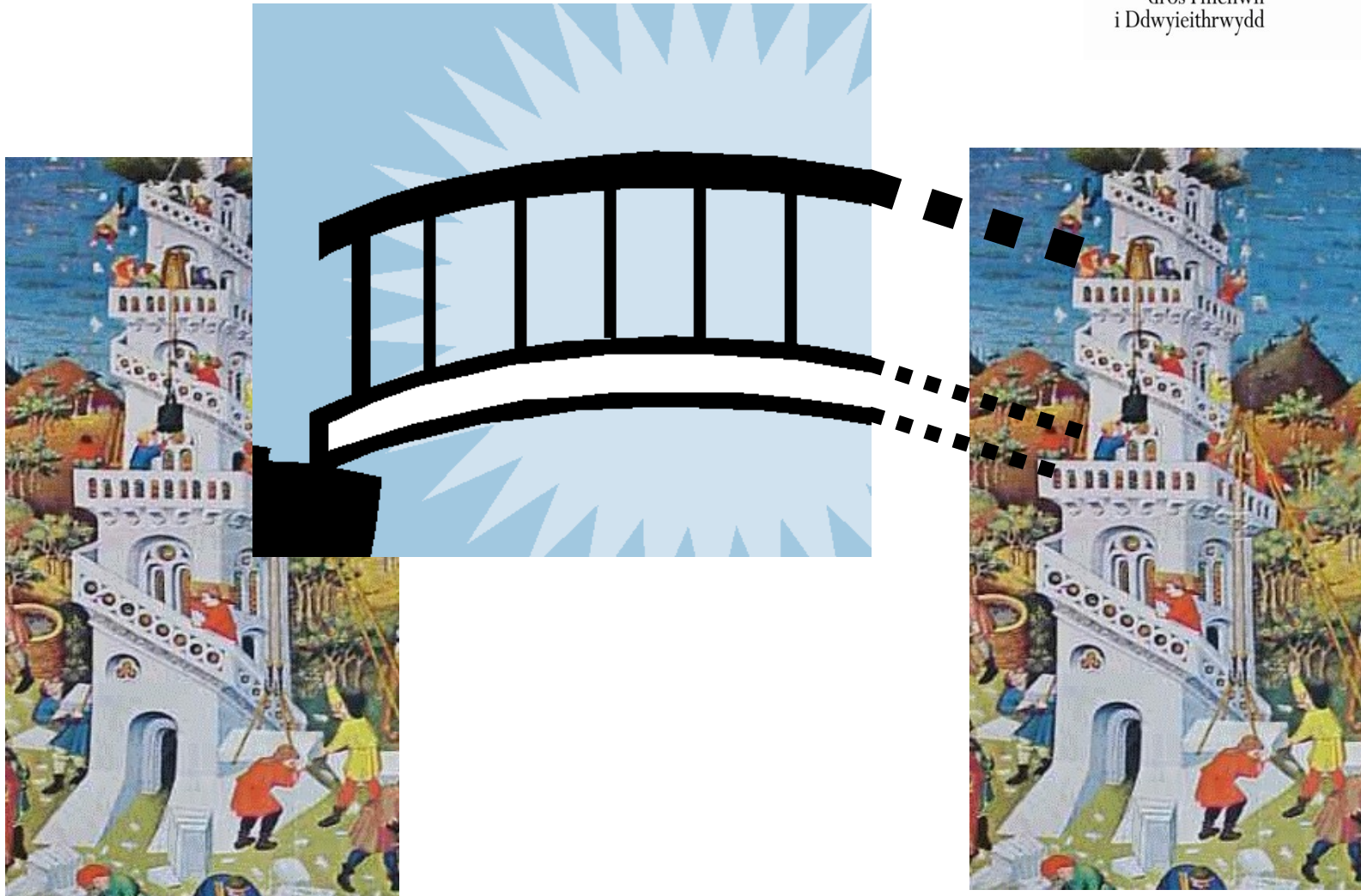
“the head of a phase is responsible (via a form of selection) for “handing over” functional features to subordinate items within the phase” (Radford et al, 2007, p 245)

-

Still to do...

- Analyze judgment data and reaction time data
- Finish data collection for gender conflicts in Basque-Spanish and Basque-French

The bridge is growing



linguistics

psycholinguistics

Diolch yn fawr!
Thanks!

Corpus data

Most common: congruent with MLF predictions

English N Welsh A

addiction mawr (Fusser19, 232)

Welsh N English A

bobl **dodgy** (Davies13, 517)

Less common: (in)congruent with MLF predictions

English A Welsh N

massive tŷ (Davies 7, 75)

Welsh A English N

hen **lord** (Fusser23, 713)

Corpus data

Most common: congruent with MLF predictions

English N Welsh A

addiction mawr (Fusser19, 232)

Welsh N English A

bobl **dodgy** (Davies13, 517)

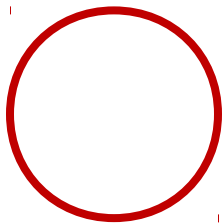
Less common: (in)congruent with MLF predictions

English A Welsh N

massive tŷ (Davies 7, 75)

Welsh A English N

hen **lord** (Fusser23, 713)



Lexical properties?

Always prenominal

actual cwestiynau (stammers,7 813)

actual hogan (davies7, 370)

actual waliau (robert3, 449)

fucking babi (stammers6, 459)

fucking ben (stammers6, 263)

bally tymor (roberts2, 532)

English lexicon, Welsh Word Order



media centre massive

dream weird

fudge gorgeous

(cf. Sanoudaki & Thierry, to appear)