Predictive Processing of Gender in Welsh-English bilinguals

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Background

- L1 speakers can predict upcoming information based on the grammatical gender (Kaan, 2015).

- Research suggests that L2 speakers whose L1's do not have grammatical gender (e.g. English) are able to acquire target-like gender processing in the L2 (Hopp, 2018).

- Yet, numerous studies support the view that L2 speakers do not anticipate to the same extent as L1 speakers (Kaan, 2015; Grüter et al., 2012).

- Few studies have explored bilinguals and little to no work has investigated grammatical gender processing in Welsh.

Gender in Welsh

- Welsh is head initial – D-N-Adj

- Welsh has a two-gender system (masc & fem)

- 69% masculine, 27% feminine (4% ind)

- It is not seen on the determiner (y/yr)

- Gender is often tied up with the mutation system.
  - E.g. feminine nouns trigger a soft mutation, masc nouns do no

- Can see gender with numbers

Dau gar

Two MASC *car* MASC

'two cars'

Dwy bont

two FEM *bridge* FEM

'two bridges'

Previous L1 research

Thomas & Gathercole (2007, p.254)

- 'Welsh has a grammatical gender system that offers no clear indication of noun gender, any 'late' development or apparent 'lack' of systematic knowledge of the system may be attributable to its complexity'

- 'Studies suggest that children do not show a systematic, rule-based knowledge of the Welsh system. Instead, they show a more piecemeal, item-by-item route to acquiring gender constructs'

- 'It is not until after the age of 9 years that they begin to demonstrate an increased awareness of gender categories'

Research Questions

Do Welsh-English bilinguals make use of grammatical gender information in Welsh?

- Gender will be used predictively, based on the current literature that shows that L1ers are able to anticipate rapidly and effortlessly (Kamide, 2008; Hopp, 2013).

Do the following individual factors; dominance, proficiency, length of exposure and working memory affect the predictive processing of gender?

- Length of exposure, proficiency and working memory will affect the predictive processing of gender (Hopp 2016; Grüter et al, 2012; Sagarra & Herschensohn, 2010), however dominance will not (Gathercole et al, 2014).

Methodology

Participants

- 23 self-reported Welsh-English bilinguals tested
- One excluded (0 on Welsh cloze test) **n=22**
- Volunteers recruited from friends, family and personal networks

- Gender: 15 (F) 7 (M)
- Age: Range 19-55, *M*=31 years
- Length of exposure: Range 14-55, *M*=29 years
- AoA: 13 simultaneous bilinguals from birth, 9 early sequential bilinguals

Methodology

Tasks

- Background questionnaire - Bilingual Language Profile (+/-218)
- Working memory test - TMT parts A and B
- Visual world eye-tracking study (SR Eyelink Portable Duo)
- Welsh and English cloze tests
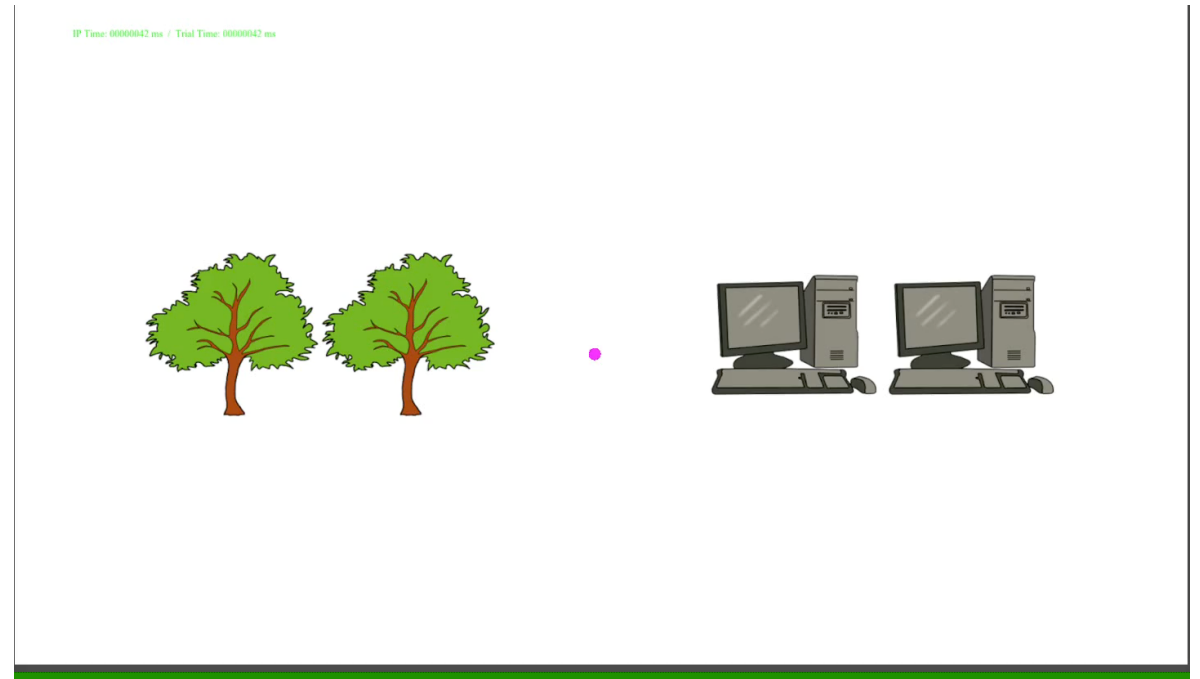- Vocabulary task – forced choice elicitation task

Eye-tracking task

- 22 test condition items
(*MASC vs FEM*)
- 12 control condition items
(*same gender*)
- 12 fillers
(*singular*)

Saw two pictures
After 1.5 secs, heard a sentence of
the form '*Ble mae'r...*'
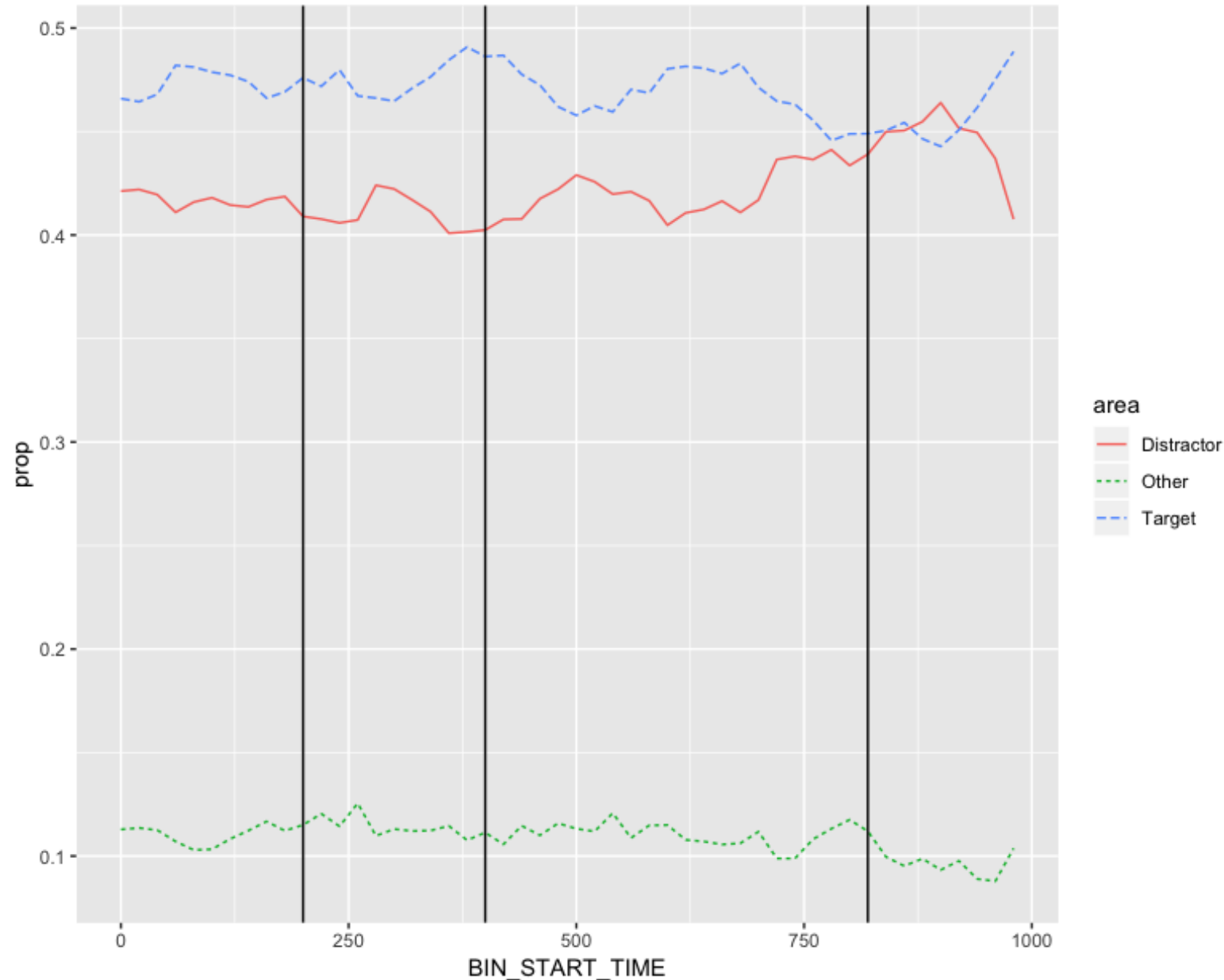*Ble mae'r ddwy goeden?*
Ble mae'r ddau afal?

Descriptive Results

| Bilingual Language Profile	TMT A (seconds)	TMT B (seconds)	Welsh cloze (%)	English cloze (%)	Vocabulary (%)	
-82.37 - 102.71	14.06 – 37.23	23.02 – 78.53	38 – 100	37 – 83	40 – 100	Range
10 WD 12 ED	*M*=24.57 *SD*=7.66	*M*=49.20 *SD*=15.43	*M*=70.17 *SD*=20.04	*M*=61.21 *SD*=14.49	*M*=68 *SD*=4.89	Mean SD

Time course analysis

- First vertical line indicates onset of the number two

- Second vertical line indicates 200ms into the number two

- Third vertical line indicates 200ms into the noun

- Critical window is 420ms (second to third vertical line)

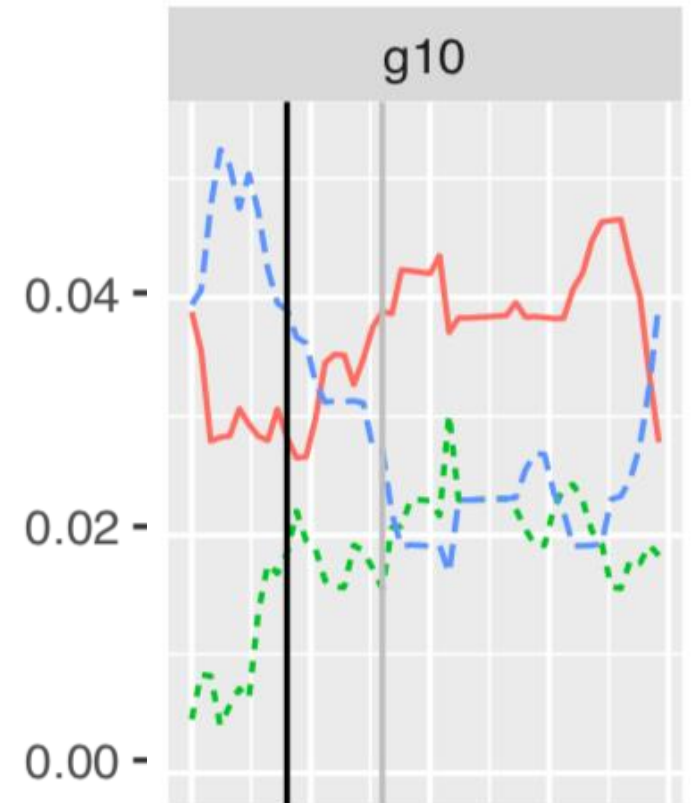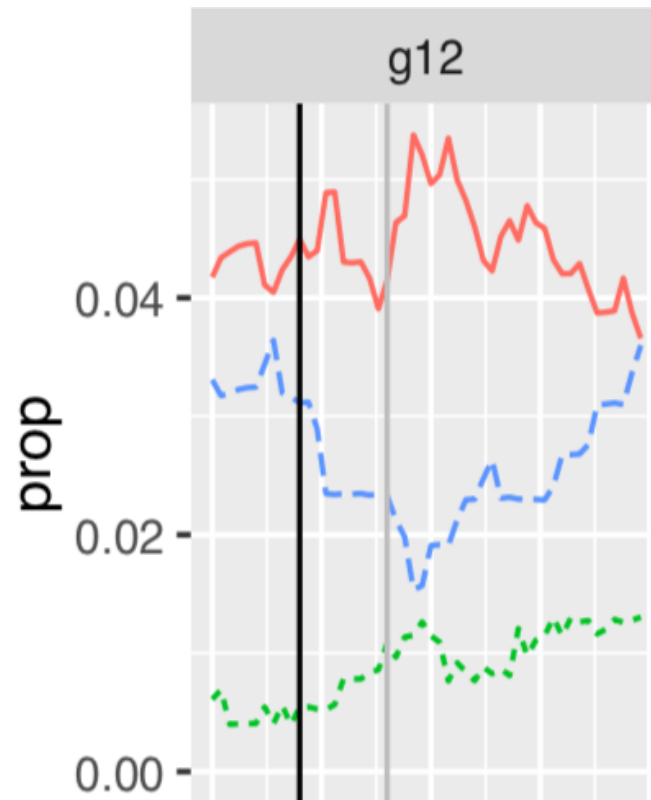# Time-course analysis: individual participants
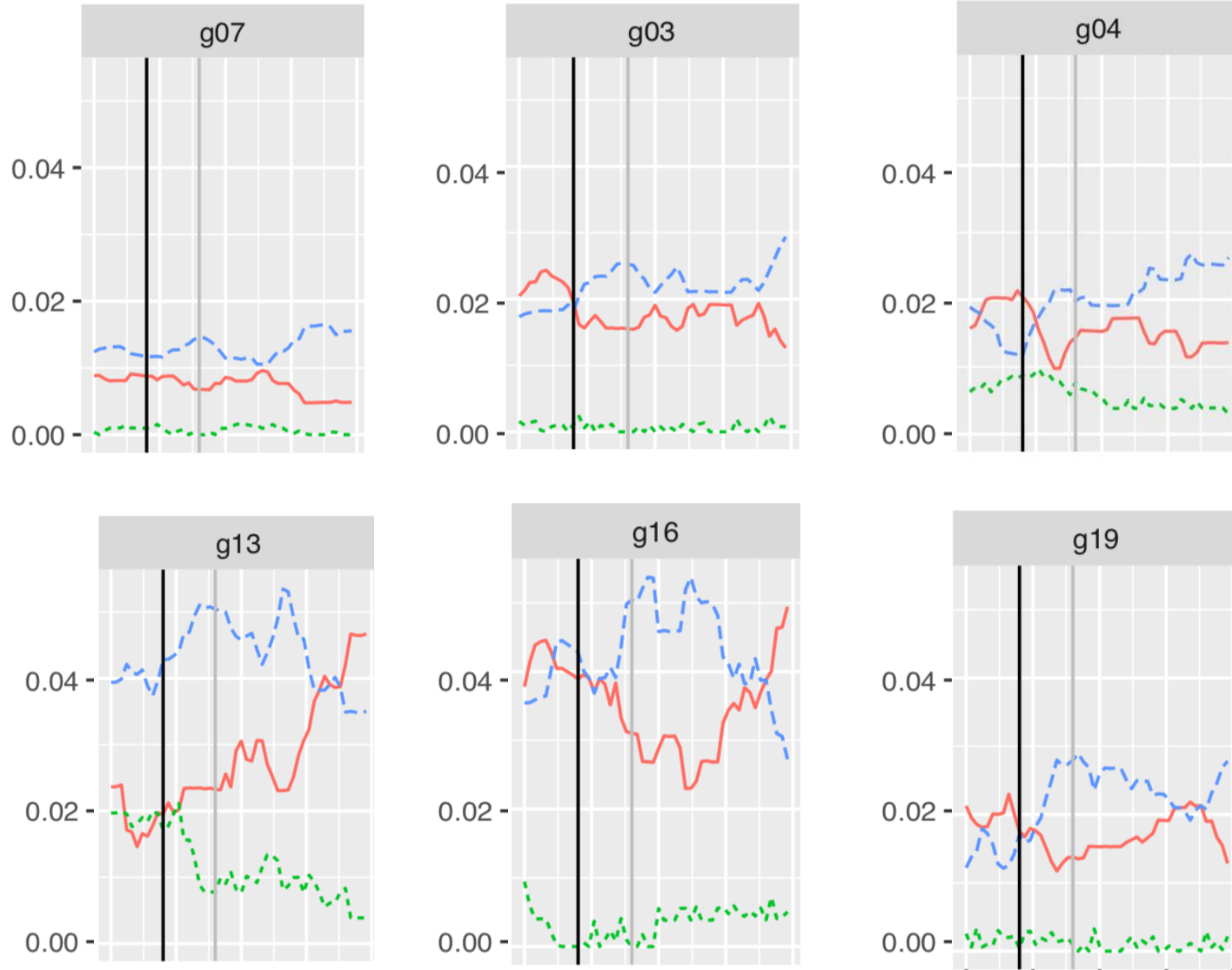
- First vertical line indicates onset of the number two

- Second vertical line (grey) indicates 200ms into the number two
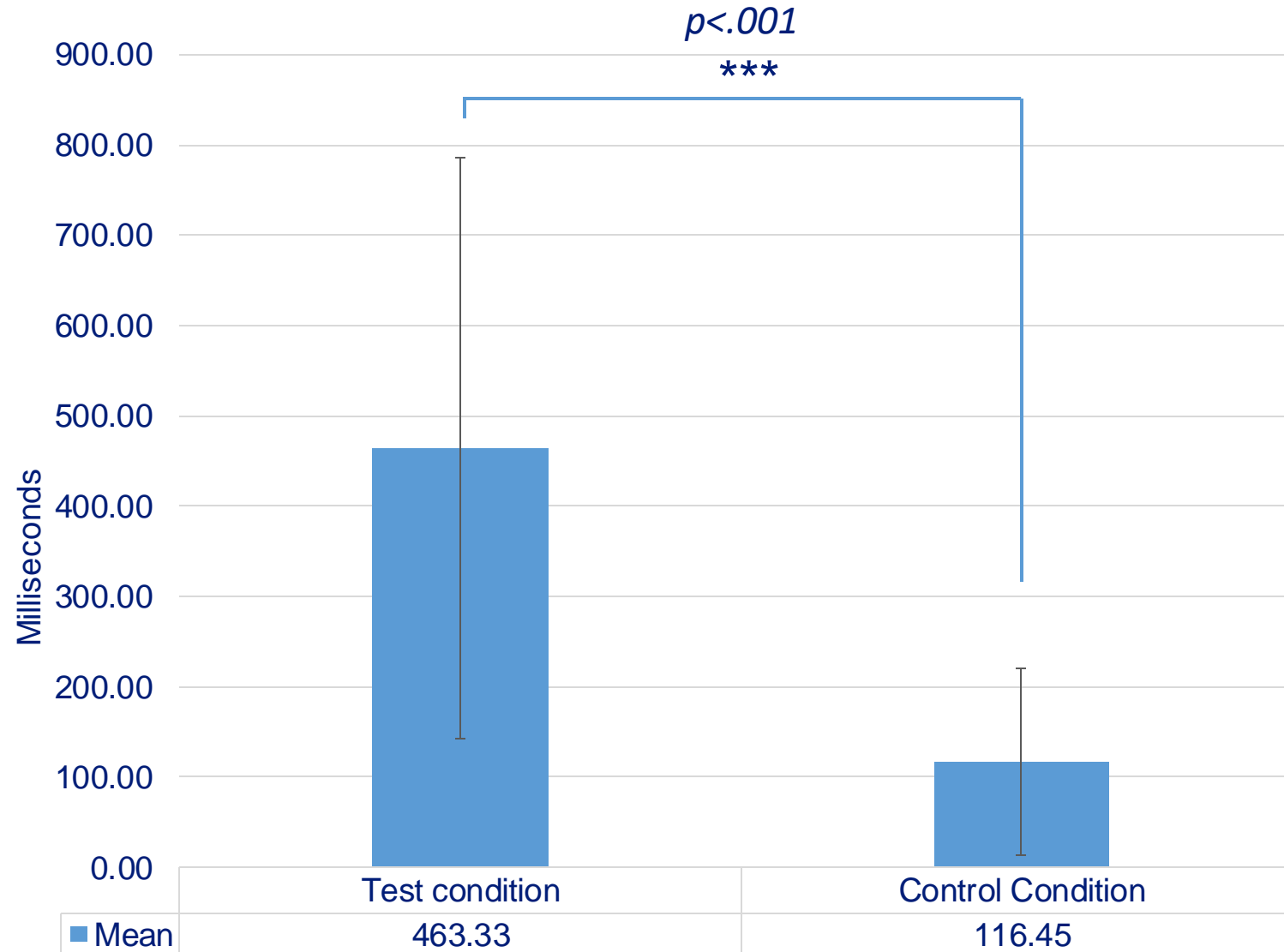
Time-course analysis: individual participants

Red – distractor
Blue – target
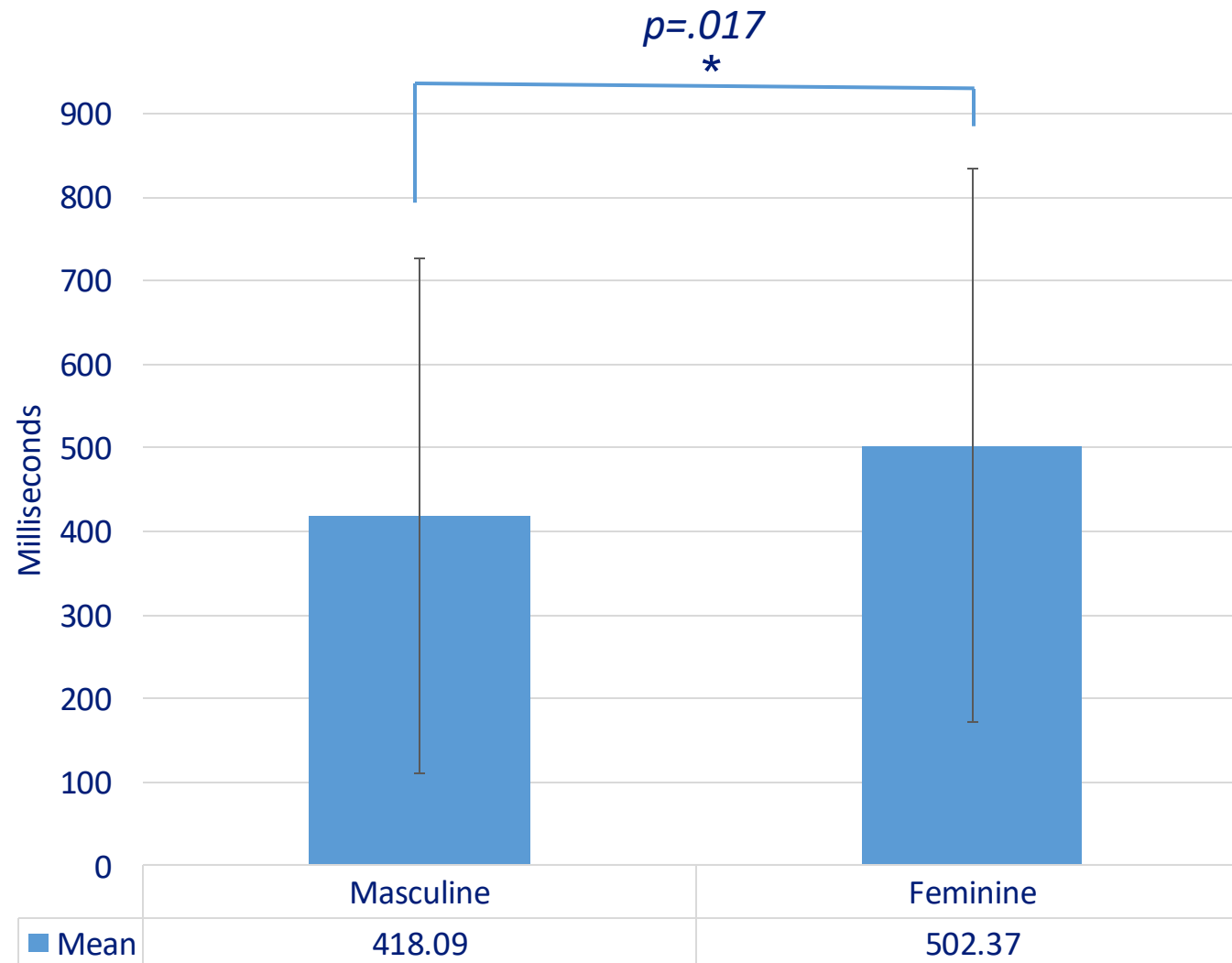Green – other

MRT: Test vs control condition items

- Test condition: different gender

- Control condition: same gender

Trials based on
- Test, n=228/484
Excluded =42%
- Control, n=59/264
Excluded =77%

MRT: vocabulary controlled
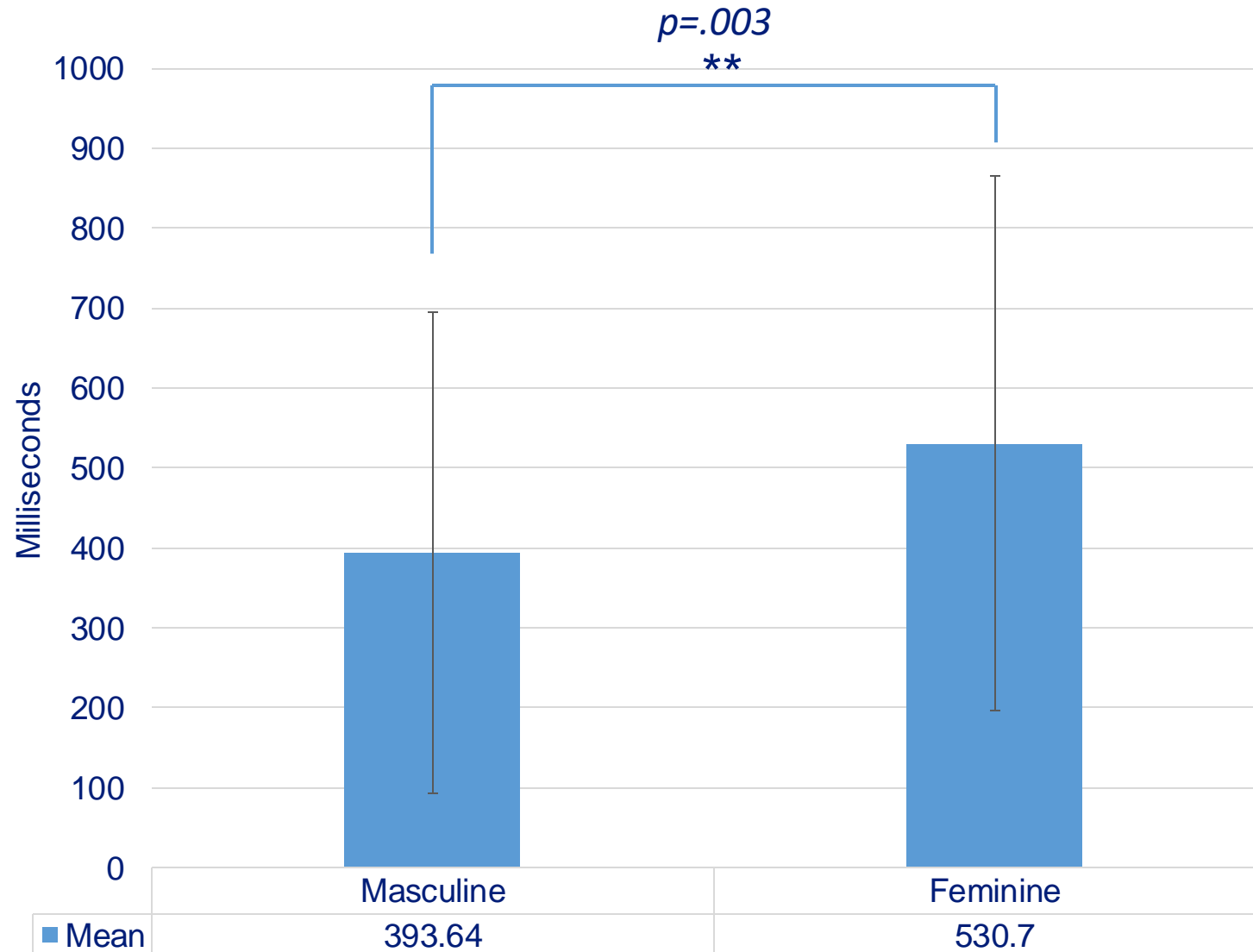

Excluding the items with incorrect responses on vocab test

Trials based on
- Masculine, n=89/242
Excluded =63%
- Feminine, n=71/242
Excluded =71%

Discussion

What do we know?

- Speakers of other languages rely on relations between nouns and gender marked modifiers, such as determiners (Grüter et al., 2012).

- These associations are formed in early L1 lexicons (Grüter et al., 2012).

- The route of Welsh acquisition can often be difficult as the language is highly opaque (Gathercole & Thomas, 2003).

- The quality of input is vital (Gathercole & Thomas, 2003).

Factors to consider;

- Influence of a non-gendered language, English.

- Gender marking and use of gender is not robust in Welsh. Cues are weaker.

- Gender is mixed up with the mutation system.

- Two is an infrequent trigger.

Conclusion

- Extend the results from L1 and L2 processing to adults raised bilingually.
- Time course suggests not much prediction happening.
- '2' is infrequent co-occurrence so may be that node is weaker
  - Similar to L2 (Grüter et al, 2012).

- MRT: gender processed on the noun differently
  - Masculine = more quickly.
- If participant knows gender then predicting (Hopp, 2016).
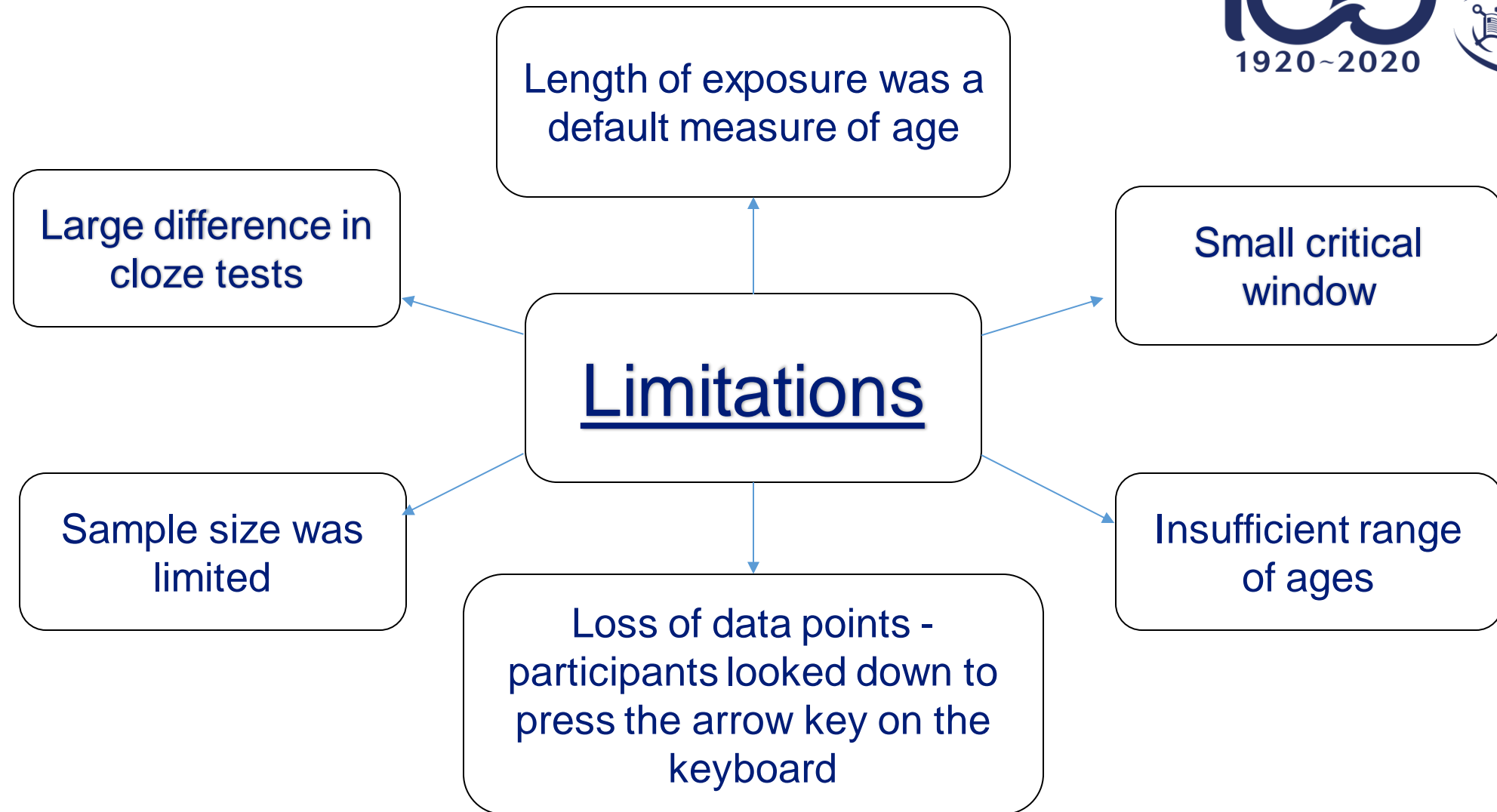
Thank you

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Reference List

- Grüter, T., Lew-Williams, C., & Fernald, A. (2012). Grammatical gender in L2: A production or a real-time processing problem?. *Second Language Research*, *28*(2), 191-215.

- Hopp, H. (2013). Grammatical gender in adult L2 acquisition: Relations between lexical and syntactic variability. *Second Language Research*, *29*(1), 33-56.

- Hopp, H. (2016). Learning (not) to predict: Grammatical gender processing in second language acquisition. *Second Language Research*, *32*(2), 277-307.

- Kamide, Y. (2008). Anticipatory processes in sentence processing. *Language and Linguistics Compass*, *2*(4), 647-670.

- Sagarra, N., & Herschensohn, J. (2010). The role of proficiency and working memory in gender and number agreement processing in L1 and L2 Spanish. *Lingua*, *120*(8), 2022-2039.

Vocabulary task results; group results

Masculine nouns

■ "Dau" (m) ■ "Dwy" (f) ■ "Dou" (m default)

66%
27%
7%

Feminine Nouns

■ "Dwy" (f) ■ "Dau" (m) ■ "Dou" (m default)

65%
28%
7%
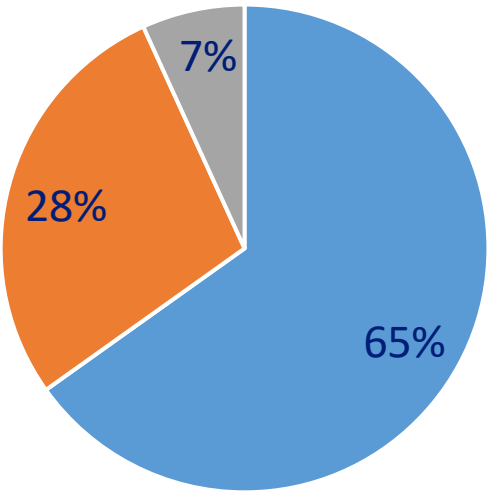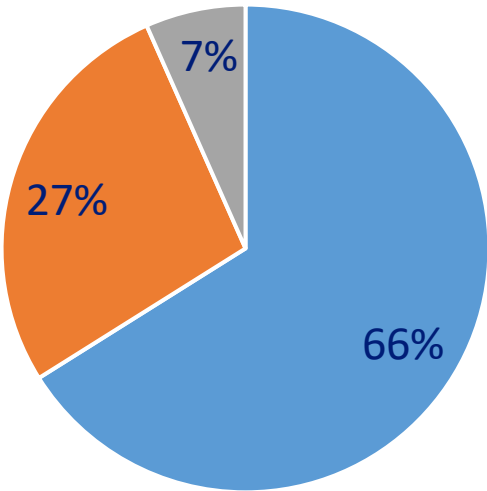
Range:
40% - 100%

M=68%, *SD*=4.89

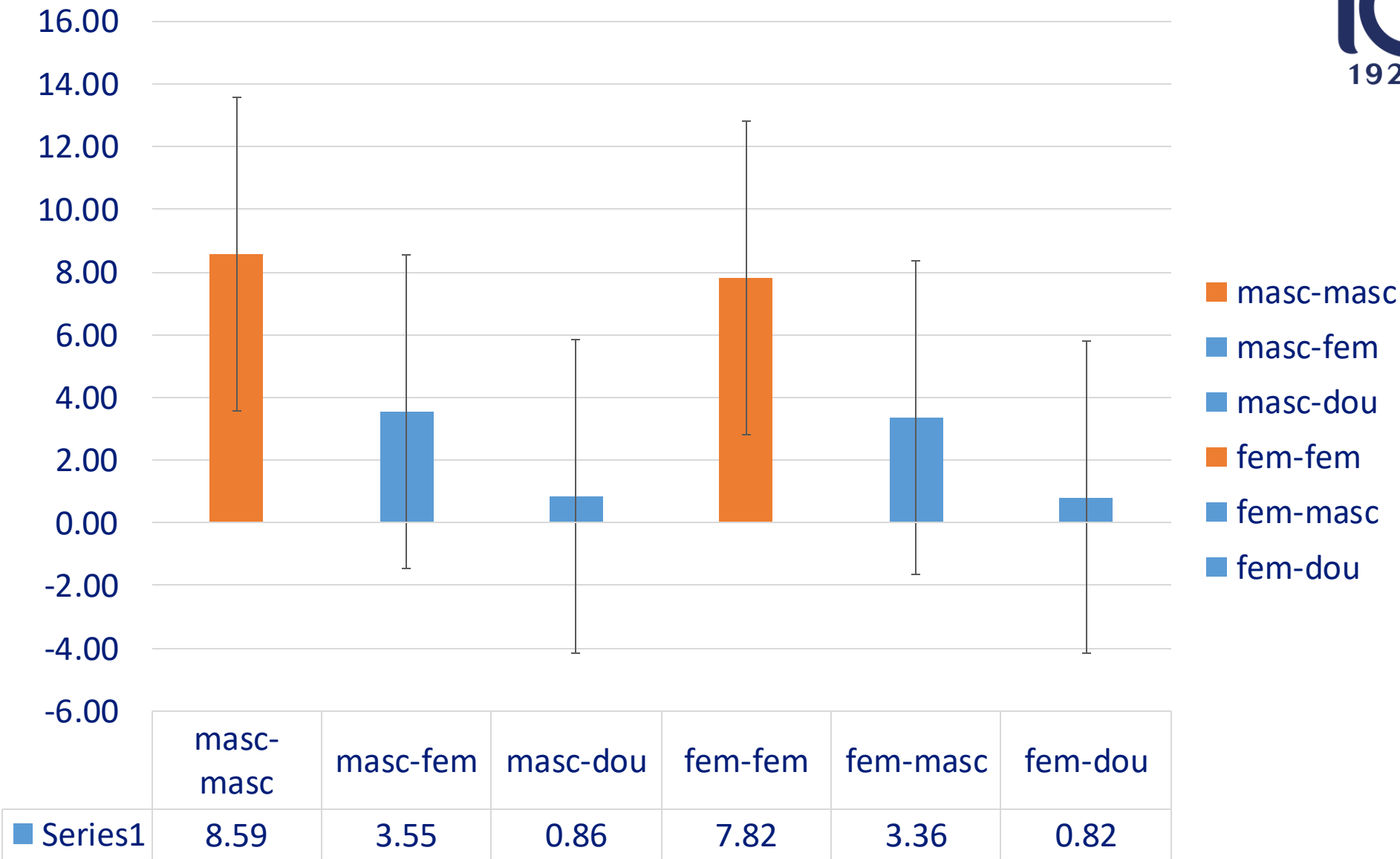Nouns taken from entry and foundation level word lists (A1 & A2 CEFR)

Vocabulary task results; gender judgement

	masc-masc	masc-fem	masc-dou	fem-fem	fem-masc	fem-dou
■ Series1	8.59	3.55	0.86	7.82	3.36	0.82

Legend:
- masc-masc
- masc-fem
- masc-dou
- fem-fem
- fem-masc
- fem-dou

- Dou – colloquial masculine form of the number 2

Gender in Welsh

Nouns

- There are no set rules, but there are frequent suffixes that show trends.

Usually masculine nouns;

'deb' / 'iant' / 'yn' / 'iad' / 'wr/ 'ydd' / 'rwydd'

Usually feminine nouns

'aeth' / 'en'/ 'wraig' / 'es' / 'fa'

- There are exceptions to these rules.

Adjectives

- Nearly all adjectives follow the nouns, few exceptions to the rule – 'prif' (main), 'hen' (old) precede nouns.

- Mark gender in certain adjectives. E.g. gwyn (white-masc) gwen (white-fem).

- Adjectives following a fem noun undergo a SM, where as masc nouns do not. Not sure why - 3 arguments. Phonological, morphosyntactic or agreement.

Gender and mutation

- The mutation and gender systems work in conjunction with one and other; however, they are not the same thing.

- Example; the masc form of the number two 'dau' and the fem form 'dwy' both cause a SM on the word to follow. Whereas the fem number three 'tair' does not cause a mutation yet the mas number three 'tri' triggers an AM.

*SM – Soft mutation
*AM – aspirate mutation

Welsh mutation system

Radical	Soft	Nasal	Aspirate
p [p]	b [b]	mh	ph [f]
t [t]	d [d]	nh	th [θ]
c [k]	g [g]	ngh	ch [x]
b [b]	f [v]	m [m]	
d [d]	dd [ð]	n [n]	
g [g]	-	ng [ŋ]	
m [m]	f [v]		
ll [ɬ]	l [l]		
rh [r̥]	r [r]		

The triggering contexts are predominantly lexical, morphological and syntactic factors; these are activated by a preceding lexical item which are typically prepositions, determiners, conjunctions, agreement clitics and numerals. However, the SM is activated by lexical and syntactic triggers (Borsley et al., 2007), yet both NM and AM are restricted to single morphemes or specific lexical items (Tallerman, 1990; Awbery, 1986). The SMis the most prevalent of the three as it is triggered in more contexts (Thomas, 2001).