



# The Representation of Grammatical Gender in Welsh-English Bilingual Adults

Swansea University  
Prifysgol Abertawe

Tesni Galvin & Vivienne Rogers  
826930@swansea.ac.uk: v.e.rogers@swansea.ac.uk



## Background

- Grammatical gender in Welsh is a persistent area of difficulty in child bilingual acquisition (Binks & Thomas, 2019)
- But, not in adult control data from North Wales (Binks & Thomas, 2019; Sharp, 2012)
- Gender production has been investigated through the mutation system - consonant-initial alternations
- This study extends these findings to disambiguate the representation of Welsh gender when encoded through or independent of mutations

## The Welsh language

- Binary gender system (masculine/feminine)
- Gender not marked on the determiner (y/yr)
- Gender appears post-nominally,
  - on the noun itself and
  - pre-nominally with cardinal numbers
- Dau **gar** (two-MASC car/cars-MASC)
- Dwy **bont** (two-FEM bridge/bridges-FEM)
- Gender is also encoded through mutations.
  - Two mutations relate to gender (SM/AM)
  - Mutations not evident on all initial consonants e.g., the Welsh determiner 'y' triggers SM on feminine nouns, cath > y **g**ath (the cat), but not on masculine nouns, ci > y **c**i (the dog)



## Research questions

- Do Welsh-English adult bilinguals make use of grammatical gender in production?
- What effect does the mutation system have on the production of gender?

## Methodology

Experiment 1 - battery of tasks including:

- Bilingual Language Profile (background questionnaire & language dominance)
- Welsh & English cloze tests (proficiency)
- Elicited numeral task (production)
- Elicited imitation task (production)



Four contexts to disentangle gender from mutations in the **elicited imitation** task:

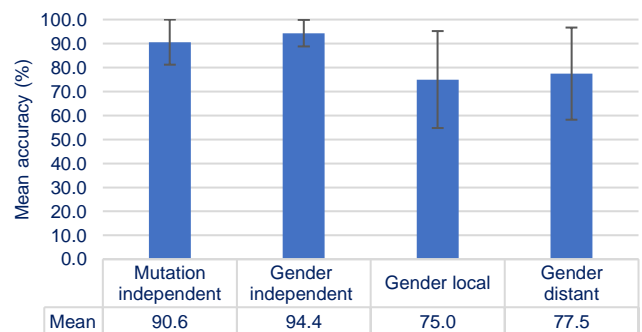
- Mutation independent: pre-nominal adjectives
- Gender independent: numeral 4
- Gender encoded locally: numeral 2
- Gender encoded distant: 3<sup>rd</sup> person pronoun

Data were collected from 40 self-reported Welsh-English bilingual adults  
(Mean age=34, age range 19-64, 19 females)

## Results (Repeated Measures ANOVA)

- Gender independent > gender local ( $p < .001$ ,  $d = 1.192$ ) and gender distant ( $p < .001$ ,  $d = 1.000$ )
- Mutation independent > gender local ( $p < .001$ ,  $d = 0.825$ ) and gender distant ( $p = 0.002$ ,  $d = 0.637$ )
- No significant difference between gender independent and mutations independent ( $p = 0.887$ ,  $d = -0.233$ )
- No significant difference between local and distant gender ( $p = 1.000$ ,  $d = -0.180$ )

Mutation accuracy by condition



## Main findings

- Gender and mutations more robust independent of one another
- Experience difficulty when the two systems are used in conjunction with one another

## Discussion: Interface Hypothesis

- Is there an interface interference between gender and mutations?
  - Gender is a morphosyntactic instantiation but the status of mutations is unclear (Borsley et al., 2007)
  - Mutations = phonological / phonomorphological?
- Is it processing? More costly to integrate two levels of representation
- Influence of English?

Can one factor explain the findings or are several interacting in a cumulative way, without cancelling each other out?

## Conclusion

Previous findings on difficulties with gender may be due to collection methods through mutations, rather than the underlying representation when disambiguated

## Follow-up experiment

- Self-paced reading task (n=21)
- 3 memory measures: OSPAN (WM), Tower of Hanoi (procedural) and CVMT (declarative)

The *elicited imitation* task contained four contexts to disentangle gender from mutations:

Conditions	Examples	Mutation
<b>Condition 1:</b> Mutation independent of gender	Mae'r <u>hen</u> <b>geffyl</b> llwyd yn gyfeillgar iawn Mae'r <u>hen</u> ceffyl+SM llwyd yn gyfeillgar iawn <i>Be-3SG Adj Noun-M Adj Part Adj Adv</i> 'The old grey horse is very friendly'	Soft mutation [C] > [G]
<b>Condition 2:</b> Gender independent of mutation	Bydd pedair <b>prifathrawes</b> yn cwrdd mewn munud Bydd pedair prifathrawes yn cwrdd mewn munud <i>Will be Numeral Noun-F Part Verb Prep Noun</i> 'Four headteachers will meet in a minute'	None
<b>Condition 3:</b> Gender encoded locally through mutations	Mae'r ddwy <b>ferch</b> yn ddeallus a charedig iawn Mae'r ddwy merch+SM yn ddeallus a charedig iawn <i>Be-3SG Numeral Noun-F Part Adj Conj Adj Adv</i> 'The two girls are very intelligent and caring'	Soft mutation [C] > [G]
<b>Condition 4:</b> Gender encoded through mutations, distant	Mae'r <b>fenyw</b> dal yn gwisgo het bert ar ei phen Mae'r menyw+SM dal yn gwisgo het bert ar ei pen+AM <i>Be-3SG Noun-F Adj Part Verb Noun-F Adj Prep Pron Noun-M</i> 'The tall woman is wearing a pretty hat on her head'	SM <i>local</i> [C] > [G] AM <i>distant</i> [P] > [Ph]

### Elicited numeral task results (testing gender via numerals 2, 3 and 4)

*Gendered numerals:*

- Overall accuracy 73.4% ( $SD=15.33$ ). Produced masculine numerals more accurately than feminine numerals ( $p = 0.053$ )
- Produced masculine numeral 4 most accurately ( $M=82.2$ ,  $SD=15.3$ ), produced feminine numeral 3 least accurately ( $M=65.3$ ,  $SD=24.1$ ) – statistically significant difference ( $p=0.020$ )

*Mutation accuracy:*

- Performed best on nouns following masculine numeral 4 in bare form ( $M=79.7$ ,  $SD=18.6$ ), next best on SM nouns following feminine numeral 2 ( $M=66.3$ ,  $SD=32.6$ ), poorest on AM nouns following masculine numeral 3 ( $M=33.8$ ,  $SD=26.6$ )

Participants most accurate when there is no mutation involved, then when mutation is involved, the numeral 2 is the most consistent, and when it differs by gender, they are least accurate involving the masculine numeral 3.

### Experiment 2: Initial results

*Self-paced reading* - four contexts to disentangle gender from mutations:

Condition 1: Gender encoded locally via 2

Condition 2: Gender independent via 4

Condition 3: Mutation independent via pre-nominal adjectives

Condition 4: Gender encoded & independent using determiner 'y' triggers SM on *F* but not *M* nouns

- No statistically significant difference between grammatical & ungrammatical sentences across pre-critical ( $p=0.063$ ), critical ( $p=0.764$ ) and post-critical ( $p=0.464$ ) regions of interest
- No statistically significant differences between the two levels of grammaticality for the 3 regions of interest, across the 4 conditions to disentangle gender from mutations
- But, close to medium effect sizes for pre ( $d=0.446$ ), critical ( $d=0.392$ ) and post ( $d=0.427$ ) ROIs, between grammatical & ungrammatical sentences in condition 4 (using the determiner 'y')
- Will individual scores/results tell us more?

*Memory measures:* OSPAN, TOH, CVMT (multiple regression analyses)

- When collapsed across conditions, results showed that the memory measures predicted 5.2% of the outcome variance (adjusted  $R^2$ ), with no statistically significant result ( $p=0.287$ )
- When divided according to conditions, results showed a statistically significant result in condition 1 ( $p=0.031$ ), where TOH predicts 35% of the variance ( $p=0.005$ )
- Indicates that procedural memory affects gender encoded locally through mutations (via the numeral 2)