



ESRC Wales Doctoral
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Swansea University
Prifysgol Abertawe

The production and comprehension of grammatical gender in Welsh-English bilingual adults

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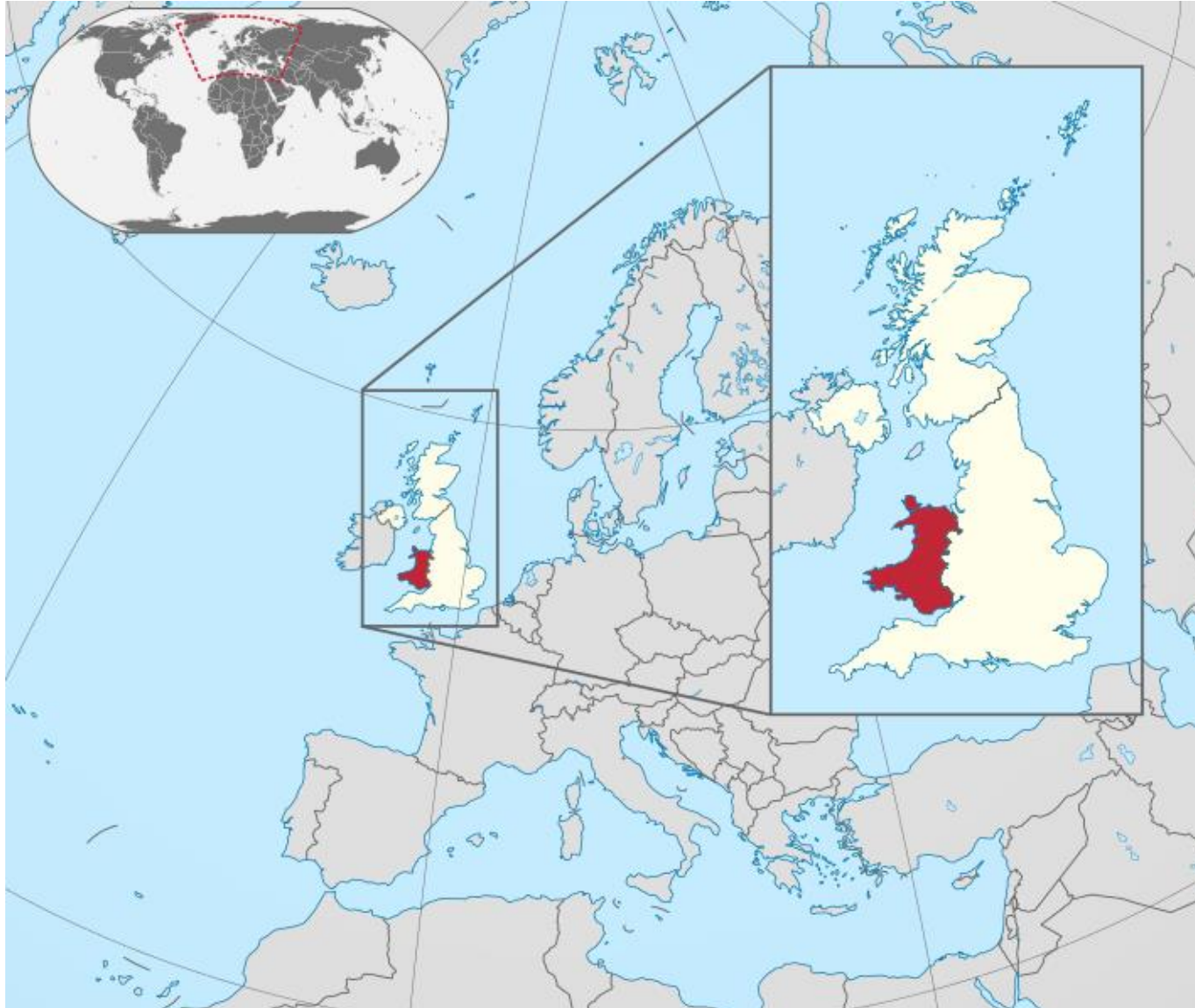
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International Symposium on Bilingualism

ISB13

10-14 July 2021

Wales and the Welsh language



Wales population roughly 3.15 million people

883,600 Welsh speakers in Wales aged 3+ years

Highest % of Welsh speakers in Gwynedd (77%) & Isle of Anglesey (67%), North Wales

Lowest % in Bridgend (17%), South Wales

1 million reported that they could understand spoken Welsh

790,600 could read Welsh

721,300 could write Welsh

Gender in Welsh

- Welsh is head initial – D-N-Adj
- Welsh has a binary gender system (masculine & feminine)
- Nouns: 69% masculine, 27% feminine (4% ind)
- Gender is not seen on the determiner (y/yr)
- Gender and mutation operate in conjunction and independent of one another
- Morphophonological alternations that affect certain initial consonants
- There are 3 types of mutations, 2 relate to gender (not exclusively)
- SM can function as a local (F) and distant (M) gender marker, and in a variety of other contexts unrelated to gender
- System is *complex* and *opaque*



Welsh mutations

Original consonant	Soft mutation	Nasal mutation	Aspirate mutation
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 [l]	l [l]		
rh [r]	r [r]		

- Soft mutation and nasal mutation relevant to gender
- Not mutually exclusive nor is it completely transparent
- Some overlap in the less distinct sounds

Summary

Gender

- Is not on the word for 'the'
- Is on some numbers (2, 3 and 4)
- Triggers different mutations
- Cath (cat) > y gath (the cat) SM - Fem
- Ci (dog) > y ci (the dog) No M – Masc
- Also on certain adjectives, post-nominally

Mutations

- Seen with gender
- Prepositions, adjectives etc
- Not all initial sounds mutate
- Overlapping between mutations
- SM multifunctional & highly frequent
- Overgeneralisation of SM to contexts where no mutation is required or where AM is expected

Previous child bilingual research

Child Welsh acquisition research

- Acquisition process is long and protracted (Thomas, 2001)
- Grammatical differences can continue well into early adulthood - 'stalled' / 'reached a plateau' (Binks & Thomas, 2019)
- Need more time? Some structures not fully acquired at age 16-17, even by L1 Welsh speakers (Welsh at home, Welsh at school) (Binks & Thomas, 2019)
- Children need productive command of mutations in order to mark gender categories in their speech (Gathercole & Thomas, 2007)

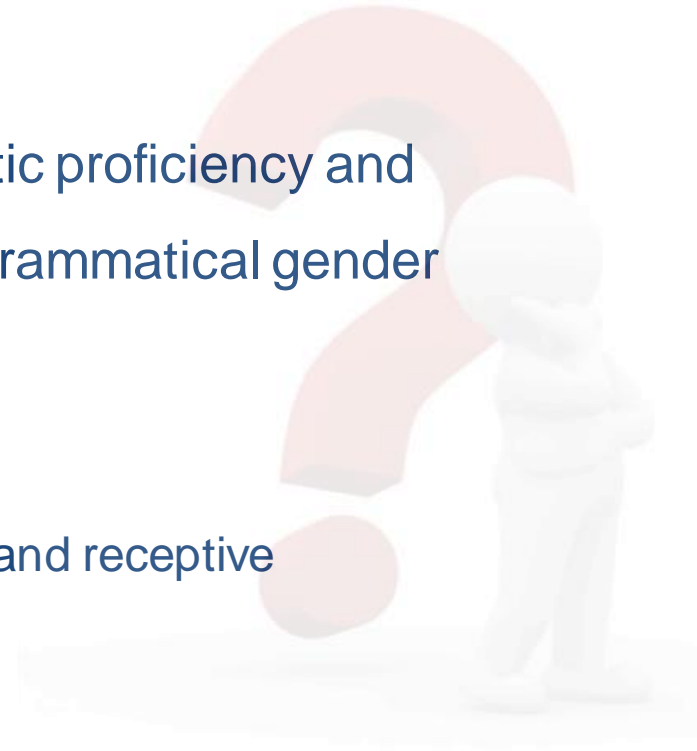
Previous adult bilingual research

Welsh adult speaker research

- Have knowledge of the formal properties and it is well-established in production (Sharp, 2012; Thomas, 2001)
- Distinguish between *M* and *F* forms in local gender marked contexts (Sharp, 2012; Thomas, 2001)
- Good receptive command of gender (Binks & Thomas, 2019)
- Only use gender features in distant gender marked contexts when natural gender information is available (Sharp, 2012)
- Gender and mutations are used in a variable manner (Sharp, 2012)

Research questions

1. Do Welsh speaking adults have productive and receptive command of grammatical gender in Welsh?
 - Hypothesised that they will show productive and receptive command of grammatical gender
2. Do the following individual factors; language dominance, linguistic proficiency and cognitive control affect the productive and receptive command of grammatical gender in Welsh adult speakers?
 - Hypothesised that all of the individual factors will affect the productive and receptive command of grammatical gender



Methodology

Battery of tasks	Measure
Bilingual Language Profile	Questionnaire & dominance
Elicited imitation task	Production measure (1)
Receptive task	Comprehension measure
Production task	Production measure (2)
Productive vocabulary task	Vocabulary familiarity check
Flanker task	Cognitive control measure
Welsh cloze test	Proficiency measure
English cloze test	Proficiency measure

- 40 self-reported Welsh-English bilingual adults (volunteers)
- Gender: 10 (M) 29 (F) 1 (non-binary)
- Age range: 19 - 64 years ($M=34$)
- AoA: 11 simultaneous bilinguals (birth), 23 early-sequential bilinguals ($AoA < 6$) and 6 late bilinguals ($AoA > 6/7$)



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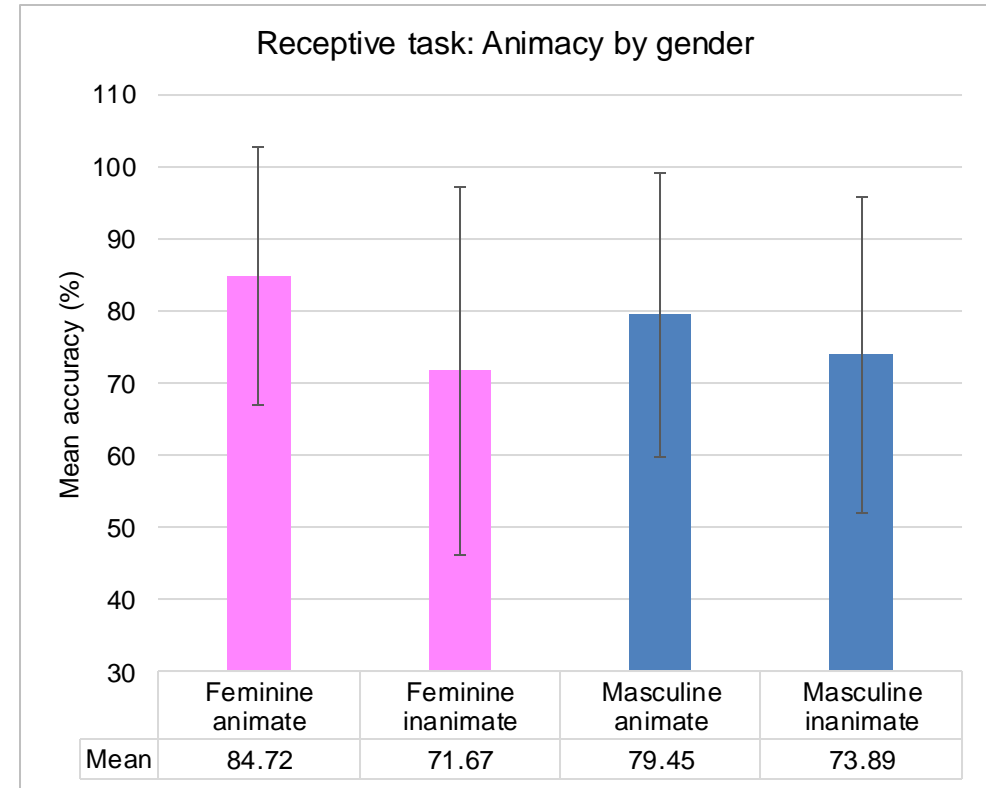
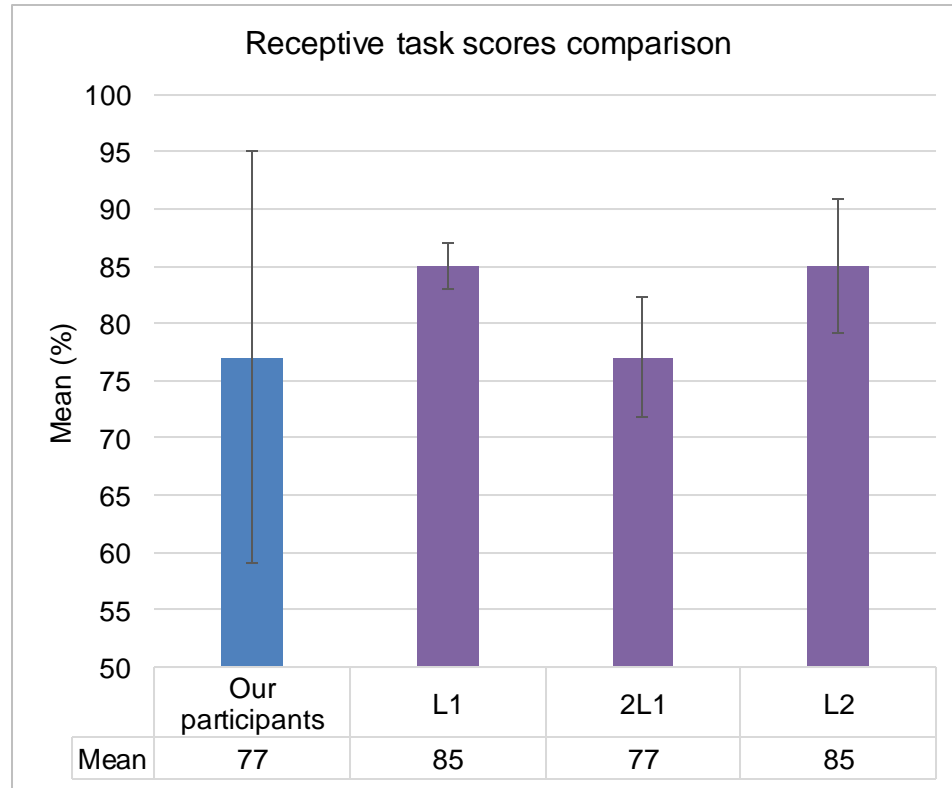
Methodology

Tasks	Local and/or distant	Gender (independent of mutation)	Gender encoded through mutation	Mutation (independent of gender)
EI task	Local and distant	✓	✓	✓
Receptive task	Distant	✗	✓	✗
Production task	Local	✓	✓	✗

- Gender and mutations to be tested in conjunction and independent of one another
- Tasks often conflate the two systems
- Is the gender system robust and the use of mutations variable?

Results: receptive task

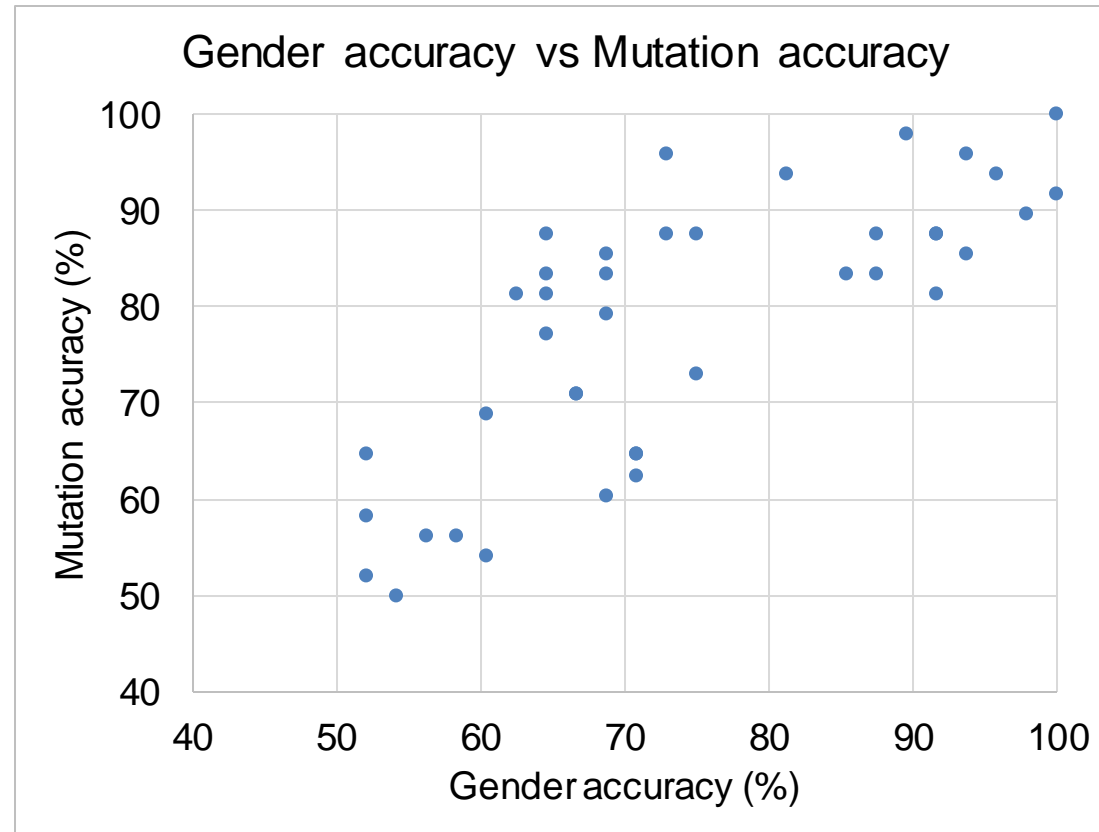
Task	Mean + SD	Range
Receptive task	$M=77.0, SD=18.0$	36% - 100%



(Binks & Thomas, 2019)

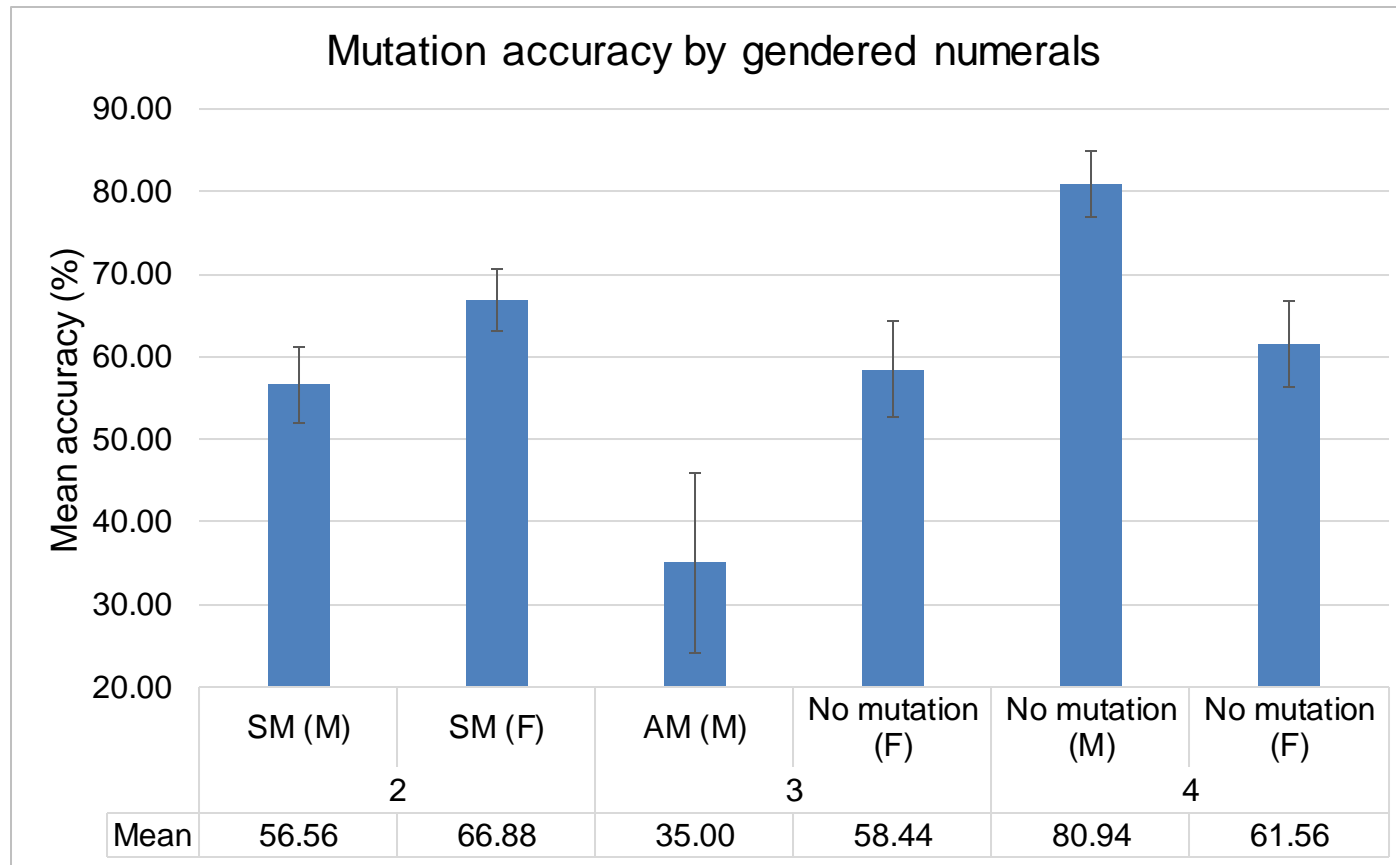
Results: production task

Task	Mean + SD	Range
Gender accuracy	$M=74.3$, $SD=14.68$	52% - 100%
Mutation accuracy	$M=77.9$, $SD=14.14$	50% - 100%



Results: production task - mutations

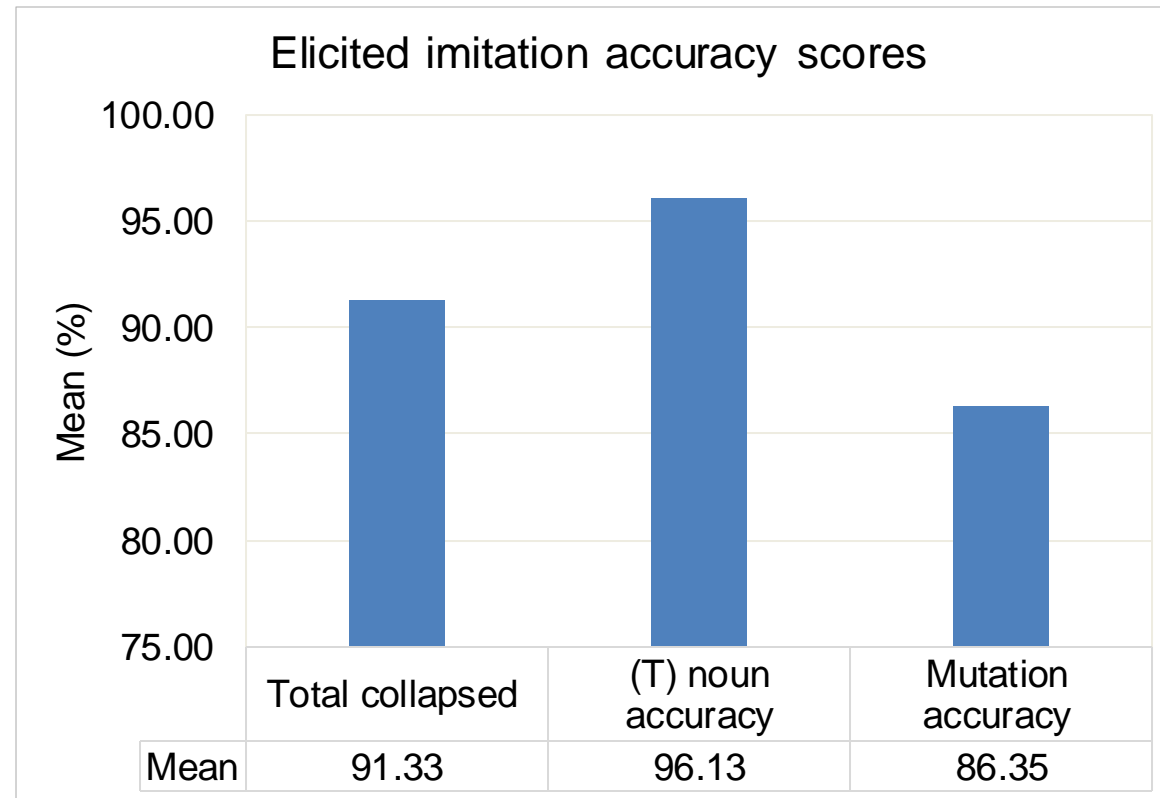
Numeral 2		Numeral 3		Numeral 4	
Masculine SM	Feminine SM	Masculine AM	Feminine No mutation	Masculine No mutation	Feminine No mutation
M=56.56	M=66.88	M=35.00	M=58.44	M=80.94	M=61.56



Excluding the trials with incorrect selection of the gendered numeral

Results: elicited imitation task

	Total collapsed	Noun accuracy	Mutation accuracy
Mean + SD	91.33%, <i>SD</i> =9.56	96.13%, <i>SD</i> =8.01	86.35%, <i>SD</i> =11.14
Range	60.97 - 100	62.50 - 100	56.25 - 100



Results: elicited imitation task

Conditions	Examples	Mutation
<p>Condition 1: Mutation independent of gender</p>	<p>Mae'r <u>hen</u> geffyl llwyd yn gyfeillgar iawn Be-3SG Adj Noun-M Adj Part Adj Adv 'The old grey horse is very friendly'</p>	<p>Soft mutation [C] > [G]</p>
<p>Condition 2: Gender independent of mutation</p>	<p>Bydd pedair prifathrawes yn cwrdd mewn munud Will be Numeral Noun-F Part Verb Prep Noun 'Four headteachers will meet in a minute'</p>	<p>None</p>
<p>Condition 3: Gender independent of mutation, with pronouns</p>	<p>Roedd en canu'r gitâr yn neuadd y dref Be-PST Pron Verb Noun-M Part Noun-F Det Noun-F 'He was playing the guitar in the town hall'</p>	<p>None</p>
<p>Condition 4: Gender encoded locally through mutations</p>	<p>Mae'r ddwy ferch yn ddeallus a charedig iawn Be-3SG Numeral Noun-F Part Adj Conj Adj Adv 'The two girls are very intelligent and caring'</p>	<p>Soft mutation [M] > [F]</p>
<p>Condition 5: Gender encoded through mutations, distant</p>	<p>Mae'r fenyw dal yn gwisgo het bert ar ei phen Be-3SG Noun-F Adj Part Verb Noun-F Adj Prep Pron Noun-M 'The tall woman is wearing a pretty hat on her head'</p>	<p>SM local [M] > [F] AM distant [P] > [Ph]</p>

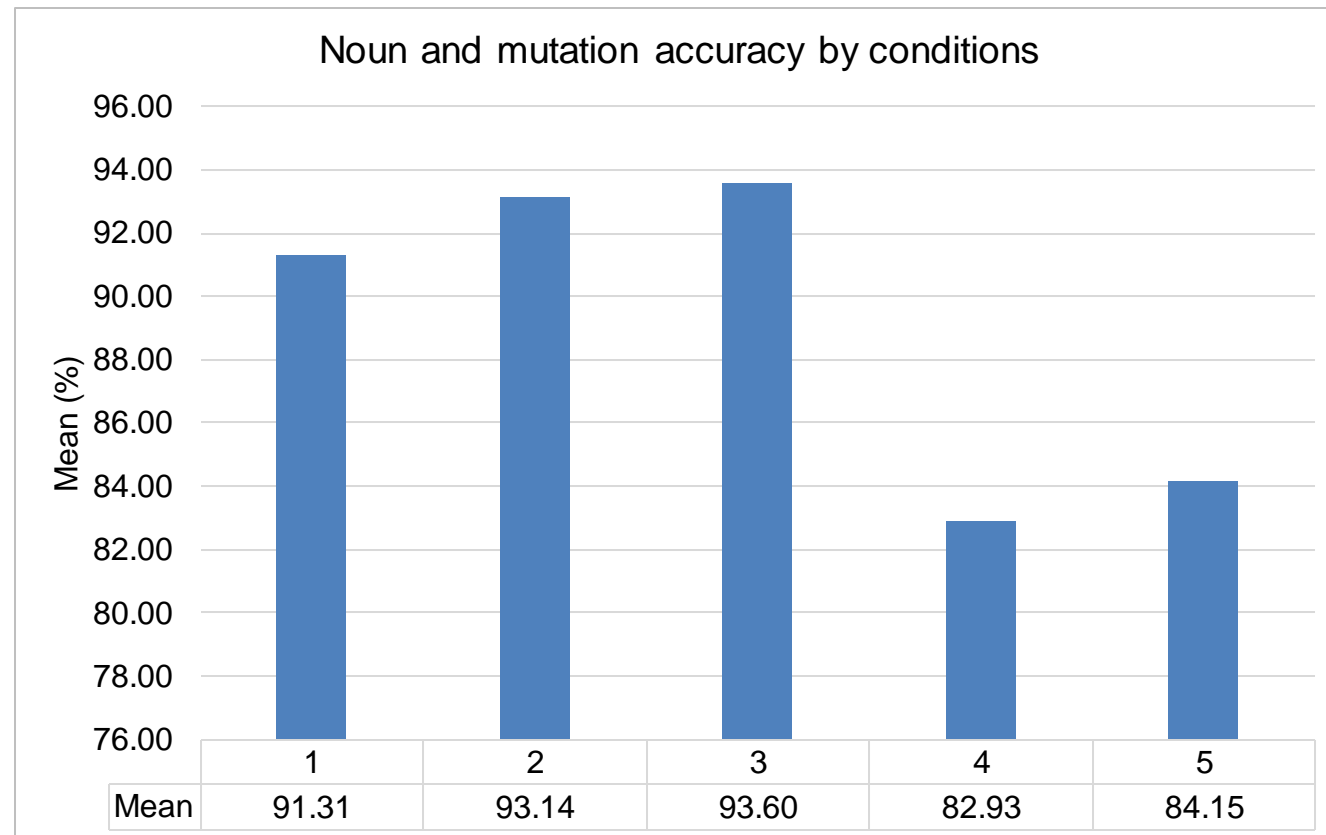
Key:-

Highlight for **mutation**

Highlight for **gender**

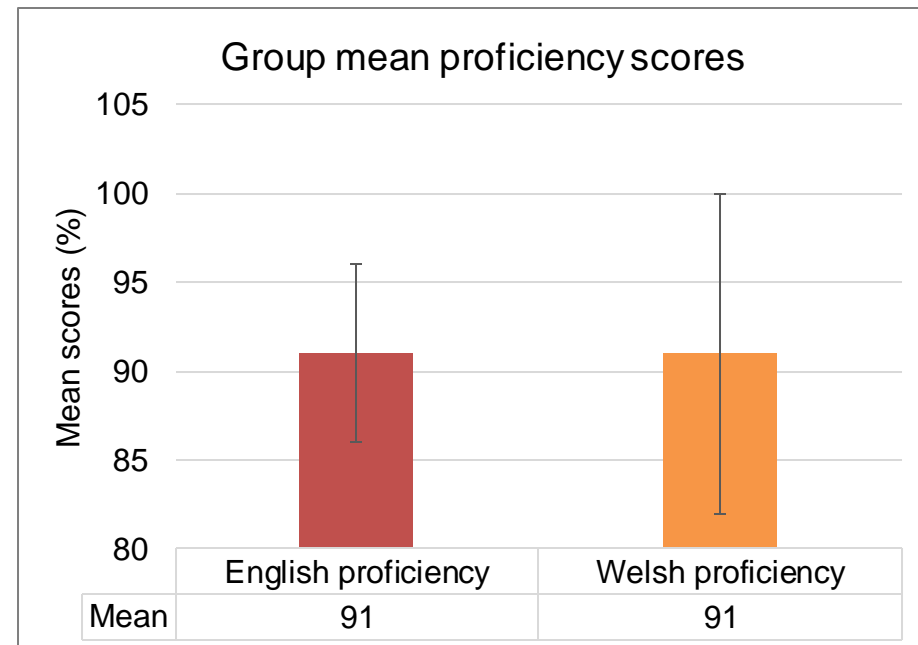
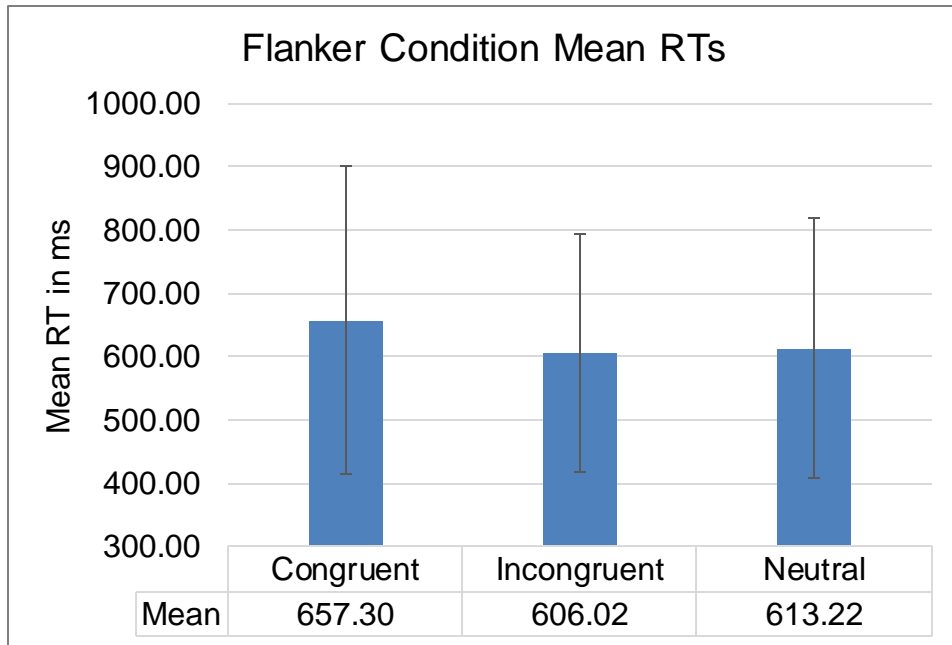
Results: elicited imitation task

Condition 1	Condition 2	Condition 3	Condition 4	Condition 5
Mutation independent of gender	Gender independent of mutation	Gender independent of mutation, with pronouns	Gender encoded locally through mutations	Gender encoded through mutations, distant



Results: individual differences

Measure	Tasks	Mean + SD	Range
<i>Language dominance</i>	BLP	$M=1.29, SD=58.99$	-118.06 - 146.88
<i>Cognitive control</i>	Flanker task	No group Flanker effect	-466.22 - 59.08 seconds
<i>Welsh proficiency</i>	Welsh cloze test	$M=91.0, SD=9.17$	64% - 100%
<i>English proficiency</i>	English cloze test	$M=91.0, SD=4.96$	78% - 98%



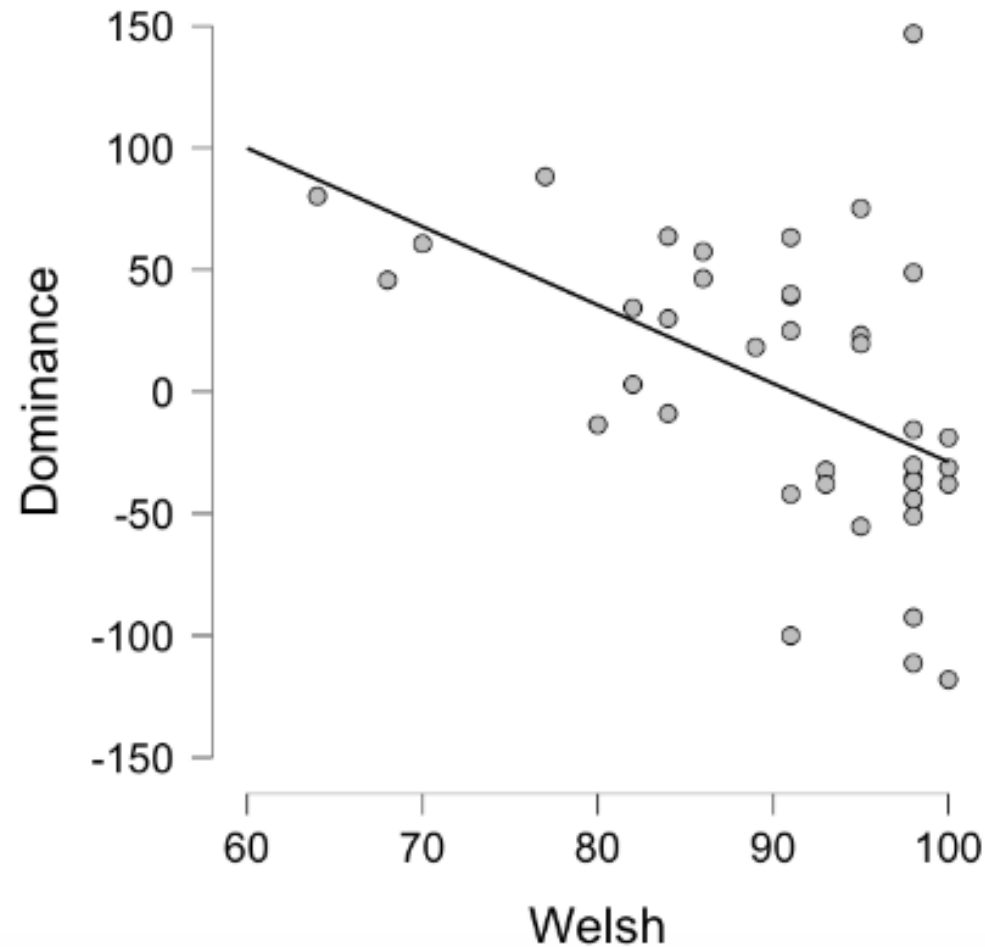
Results: individual differences

Individual factors	Dependent variables		
	<u>Elicited imitation</u>	<u>Receptive</u>	<u>Production</u>
Dominance	R ² =22.3% <i>p</i> =0.002	R ² =16.4% <i>p</i> =0.009	R ² =17% <i>p</i> =0.008
Welsh proficiency	R²=60.4% <i>p</i> < .001	R²=26.9% <i>p</i> < .001	R²=28.7% <i>p</i> < .001
English proficiency	R ² =15.9% <i>p</i> =0.011	R ² =13.9% <i>p</i> =0.018	R ² =13.1% <i>p</i> =0.022
Cognitive control	R ² =0.7% <i>p</i> =0.620	R ² =2.4% <i>p</i> =0.343	R ² =2% <i>p</i> =0.379

- Welsh proficiency scores accounted for the most variance in all three tasks
- Language dominance and English proficiency accounted for some of the variance
- Cognitive control was not a predictor, this is likely due to a lack of variation in the sample ($M=625.51$, $SD=206.51$)

Results: individual differences

Pearson's correlation		Pearson's r	p
Welsh proficiency	Dominance	-0.503***	< .001



Dominance scores below zero indicates Welsh dominance

Key findings



- Showed receptive and productive command (Binks & Thomas, 2019; Sharp, 2012)
- Productive command of gender better when gender is independent of mutations, rather than when it is encoded
- Acquire the gender system, but learn the mutation system?
- Dominance, Welsh and English proficiency scores affect the productive and receptive command of gender, but cognitive control scores do not
- Individual factors influence the productive and receptive command of gender as expected

Discussion



- Gender and mutation systems appear to be well-established / robust, when used separately, but not when used together
- Why is it more difficult when the systems are used in conjunction with one another?
- Gender is syntactic but mutations are largely phonological
- Why is this happening? Is it because two systems have to interact – intricacy of the mutation system
- *MSIH* (Prevost and White, 2000) – is there an interface / mapping problem between the syntax (gender) and (phono)morphology (mutations)?
- Should we consider the *Interface Hypothesis* (Sorace & Filiaci, 2006)?

Next steps

Follow-up experiment

1. Focus on processing and predictive processing
2. Focus on working memory as an individual factor

Experiment 2:

- Grammaticality judgement task
- Self-paced reading task
- ❖ Visual world paradigm experiment (eye-tracking)
- Gender decision task
- WM auditory backwards task
- (Reading span task / declarative memory task)





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