

The Role of Phonology and Multiple Exponence in the
Acquisition of L2 German Plural Allomorphy:
Feature Dependency and the Poverty of the Stimulus

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Wiese's Dilemma

- German plural forms are prosodically homogenous

$(\sigma_{\text{full}} \cdot \sigma_{\text{weak}})$

- But segmentally heterogeneous:

The German Plural

Singular Form	Plural Form	Affixation
Pelz (fur)	Pelz[ə]	Affixation of -ə
Kind (child)	Kind[ɐ]	Affixation of -ɐ
Held (hero)	Helden	Affixation of -n
Stecken (stick)	Stecken	∅-Affixation

Wunderlich's Dilemma

- Central parameters are unpredictable
 - Thron → Thron[ə] (throne)
 - Sohn → Söhn[ə] (son)
 - Mund → Münd[ʌ] (mouth)
 - Bund → Bünd[ə] (federation)

Umlaut & -n

- Plural -n cannot co-occur with umlaut
 - Pat[ə] → Pate-n/*Päte-n (godparents)
- But non-plural -n can:
 - But Laden (store) → Läden (stores)

Multiple Exponence

- “...in which a category if positively identified at all, would have exponents in each of two or more distinct positions.”

--Mathews (1974: 149)

Multiple Exponence

Singular	Plural	
Arm	Arme	'arm'
Vater	Väter	'father'
Hals	Hälse	'neck'



Why do we care as Linguists?

- Violates *biuniqueness*: 1 form : 1 meaning
- Contra *economy* principles

-
- “Multiple exponence is the occurrence of multiple realizations of a single morphosemantic feature, bundle of features, or derivational category within a word.” (Harris, 2017: 9)
 - “An alternation introduced by a phonological rule is not considered an exponent, and hence the alternation cannot involve this as one of the two morphemes in a relation of multiple exponence.”
 - Phonologically-conditioned morphological phenomena are not ME

Why do we care as Acquisitionists?

- Given the variation in the input, what are the possible learning paths and hypotheses?
- Representationally, what does it look like?

Interfaces

- This is an area where we confront the phonology/morphology interface

-
- Prosodic Transfer Hypothesis (Goad & White, 2006; forthcoming)
 - Why L2 morphemes are omitted

Embick (2010)

- A local, serial model of the interface
- Distributed Morphology
- Competition for allomorph selection but not competition between complex objects
 - Explored in Archibald (2016)

Trommer (2015)

- Coloured Containment Theory (van Oostendorp, 2006)
 - Distinct morphemes have different morphological ‘colours’
 - All phonological objects affiliated with a given morpheme wear its colour
 - Phonological constraints can’t target specific morphemes (e.g., 3sg)
 - Morphological structure is minimally reflected in phonological representations by colour only
 - Morphological colour is the only morphological information visible to phonological constraints

Exponence

- $[F] \Leftrightarrow \phi$
- The feature $[F]$ has exponent ϕ
- E.g. If English present participle, then $[I\eta]$

Contextual Allomorphy

[F] { ϕ_1 Context₁
 ϕ_2 Context₂

(Bonet & Harbour, 2012)

German Plural Allomorphs

- There is only a single [+pl] affix ↔



- [COR]

- [+pl +fem] ↔ [NASAL]

*umlaut]Root + [n]

- Why?

Phonological Architecture

- Feature dependency
- Association lines

Feature Geometry

/t/

Root

|

Place

/p/

Root

|

Place

|

Peripheral

/k/

Root

|

Place

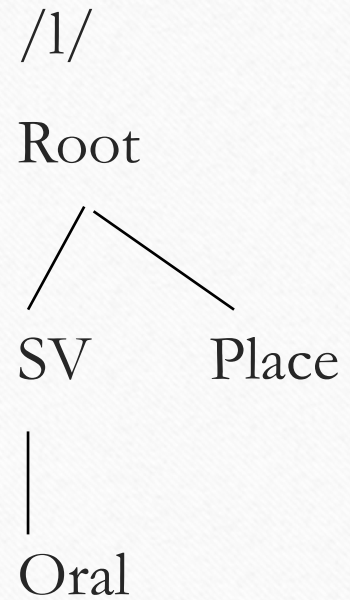
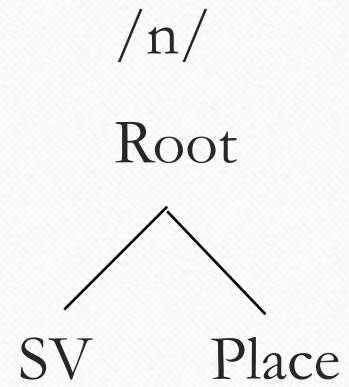
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Peripheral

|

Dorsal

Feature Geometry



Trommer

Coronal Consonant	Coronal Vowel
CPlace [COR] [n]	CPlace VPlace [COR] [i]

Plural

- [+pl] ↔ COR
- [+pl +fem]. ↔ NAS

L2 Learners

- Will they produce umlaut]Root + -n?
- If so, they might be violating phonological universals

How NOT to design a research study

- Don't do as I do.....



-
- Let's gather data from 150 people and see if they don't do something that Trommer says they shouldn't do....
 - Why is this not a null result?

Prove a platypus doesn't lay eggs

- Don't show a picture of a platypus *not* laying eggs

Actual Drawings!



Our Study

- 154 university, classroom learners of German
- Fill in the blanks test of German plurals
 - E.g. given article + noun, the plural would be _____
- Two data collection times approximately one month apart in Intro German at a Canadian University
 - T1: given *spelling* of singular noun
 - T2: given *picture* of singular noun

Test Items T1

5. Translation. Translate the following words. (5 Punkte)

1. good, well gut
2. gladly (when you like doing something) gern
3. really well, really great sehr gut
4. a little, a little bit ein bisschen
5. not at all gar nicht

4.5/5

6. Lebensmittel. Please provide the plurals of the following nouns (6 Punkte)

- der Apfel; die Äpfel ✓
- die Suppe; die Suppen ✓
- die Wurst; die Wurst ✓
- der Salat; die Salate ✓
- die Tomate; die Tomaten ✓
- das Ei; die Eier ✓

4/6

Test Items T2

GMST 101 – November 2018

Vokabelquiz 4


Name: _____


Punkte: 30/30


100%


Ausgezeichnet!


1. Verkehrsmittel und andere Nomen. Fill in the correct nouns with the correct article in the singular as well as the plural. (14 Punkte)


1.  die Haltestelle
die Haltestellen ✓

2.  der Zug
die Züge ✓


3.  das Taxi
die Taxis ✓

4.  das Geschenk
die Geschenke ✓

5.  der Koffer
die Koffer ✓

6.  die Zeitung
die Zeitungen ✓

17/14

7.  das Flugzeug
die Flugzeuge ✓

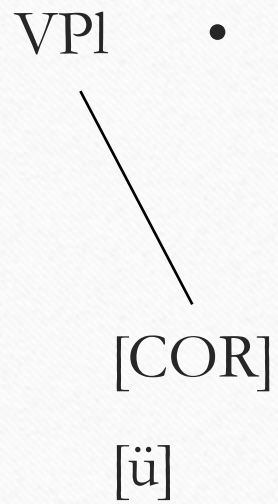
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Most Likely Outcome?

- Coordinate 3 instructors
- Tally all the error forms
- Subjects make all kinds of errors
- **Can't tell anything definitively**
 - Usual risk of exploratory research

-
- I didn't design or score the tests; this was done by the instructors
 - I looked at the wrong answers, and assessed what *type* of wrong answer it was
 - Type A: choosing the wrong (but possible) allomorph
 - E.g., **Wursten**; **Wurste** ← Würste
 - Type B: choosing the wrong (but impossible) allomorph
 - E.g., **Würsten** ← Würste

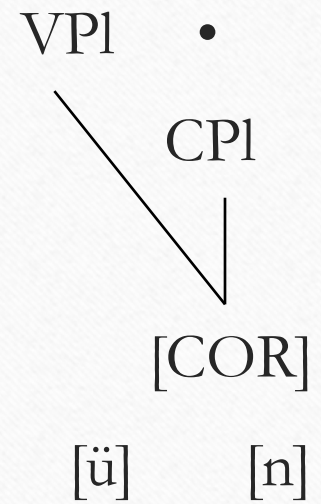
Würste + {+Pl}



Wurste + {+Pl}

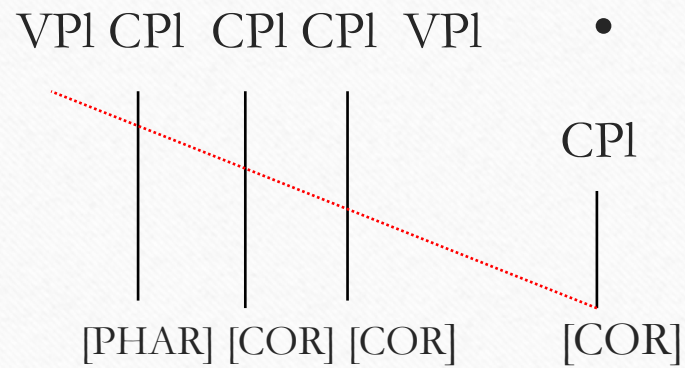


*Würste + {+Pl}



*Würsten

*W ü r s t e + {+Pl}



Time 1 Words

Der Apfel (apple)	Die Äpfel
Die Wurst (sausage)	Die Würste
Die Tomate (tomato)	Die Tomaten
Die Suppe (soup)	Die Suppen
Der Salat (salad)	Die Salate
Das Ei (egg)	Die Eier

Time 2 Words

Die Haltestelle ((bus) stop)	Die Haltestellen
Der Zug (train)	Die Züge
Das Geschenk ((birthday) present)	Die Geschenke
Das Taxi (taxi)	Die Taxis
Der Koffer (suitcase)	Die Koffer
Die Zeitung (newspaper)	Die Zeitungen
Das Flugzeug (airplane)	Die Flugzeuge

The Task

- Q: Does this task really tap phonology?

- A: Yes, it does.

Phonology, Silent Reading, and Lexical Activation

- Acoustic influence in letter cancellation. (Corcoran, 1966, 1967)
 - Cross-out the letter *e*
- Visual tongue twister effects (McCutchen, D. and Perfetti, C., 1982)
 - Tongue twisters take longer to read silently
- Prosodic constraints on reanalysis (Bader, 1998)
 - In order to help the little boy put down the package he was carrying.
 - Peter knew the answer would be false.

Phonology, Silent Reading, and Lexical Activation

- Relative clause ambiguity attachment. (Fodor, 2002).
 - Someone shot the servant of the **actress** [**who** was on the balcony]
 - Someone shot the **servant** of the actress [**who** was on the balcony with her husband]
- Corollary discharge in inner speech (Scott et al., 2013).
 - I.e., categorization effects on imagining and mouthing speech
- Electromyography (McGuian & Dollins, 1989)
 - Muscular activity triggered during silent reading

-
- Bilingual lexicon and non-selective access (LDT and eyetracking)
 - Differential behavior of interlingual homophones and interlingual homographs in
 - LDT reaction times
 - and eyetracking fixation times

Dijkstra et al.

SOP Cognates	SO Cognates	SP Cognates
hotel	fruit [frøyt]	news/nieuws
film	chaos [xaɔs]	boat/boot
lip	jury [ʒyri]	wheel/wiel
OP False Friends	O IL Homographs	P IL Homophones
step (scooter)	glad	[lif]
arts (doctor)	[xlat] (slippery)	'leaf' 'lief'
kin (chin)		(dear)

Eyetracking Task

- IL Homographs: An **angel/elbow** can be damaged easily.
- IL Homophones: I had never seen a single **oar/oat** before.
 - Frequency, length and predictability matched

Gaze Duration Results: Interlingual *Homophones*

- Phonological Condition:
 - Mean Control fixation: 239 ms
 - Mean Experimental fixation: 280 ms
 - $p < .05$
- +41 ms *inhibition*

-
- So, lexical activation (including by silent reading) taps into phonology

German Results

	T1	T2	Totals
Subjects	87	67	154
Test Items	522	469	991
Correct	292	239	593
Type A Error	225 (43%)	71 (15%) 159 (33%)	296 (30%) 159(16%)
Type B Error	5 (.9%)	2 (.4%)	7 (.7%)

Type B Errors

- Die **Zü**gen (*trains*)
- Die **Zeitü**ngen (*newspapers*)
- Die **Tö**maten (*tomatoes*)
- Die **Wü**rsten (*sausages*)
- Die **Sü**ppen (*soups*)

- Errors (systematic) or **mistakes** (random)?

Chi-squared Results

	Observed N	Expected N	Residual
Type A	296	151.5	144.5
Type B	7	151.5	-144.5
Total	303		

Chi-Square	275.64
df	1
Asymp. Sig.	.000

T1 Errors by Item

Umlaut Only		Umlaut + e		-n		-e		-er	
Apfel (apple)		Wurst (sausage)		Tomate (tomato) Suppe (soup)		Salat (salad)		Ei (egg)	
Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
48 (55%)	39 (44%)	38 (43%)	49 (56%)	123 (70%)	51 (29%)	60 (68%)	27 (31%)	28 (32%)	59 (67%)

n= 87

T2 Errors by Item

Null		Umlaut + e		-n		-e		-en		-s	
Koffer		Zuge		Haltstelle		Flugzeug Geschenk		Zeitung		Taxi	
✓	x	✓	x	✓	x	✓	x	✓	x	✓	x
25	17	31	12	35	2	52	20	30	13	59	5
(Blank)	(25)		(14)		(30)		(62)		(34)		(3)

n= 67

-
- It is not the case that ‘they don’t produce things they don’t hear, and they never hear umlaut+n’.
 - Rather ‘they don’t produce illegal structures that they don’t hear but they produce legal structures that they don’t hear’

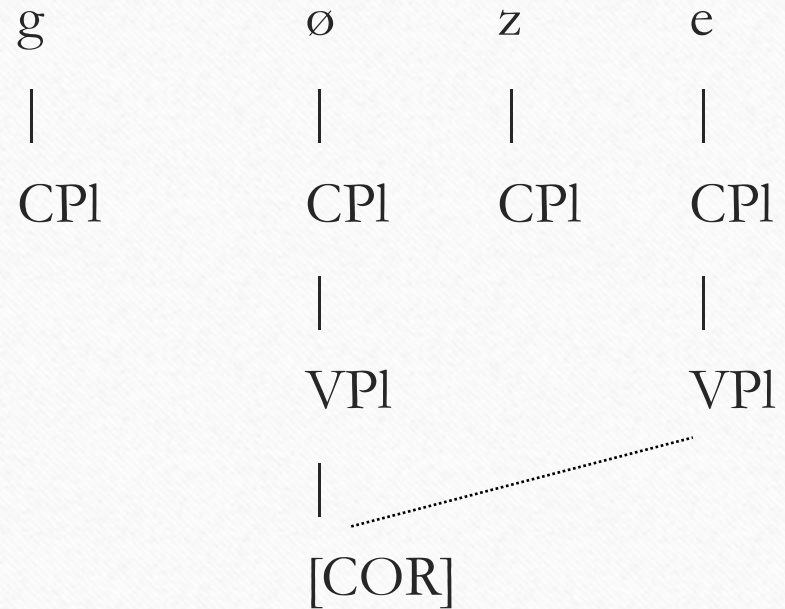
Type A Errors

- Wursten; Wurste ← Würste
- Apfels; Apfelen ← Äpfel
- Súppe ← Suppen
- Tomate; Tomates ← Tomaten

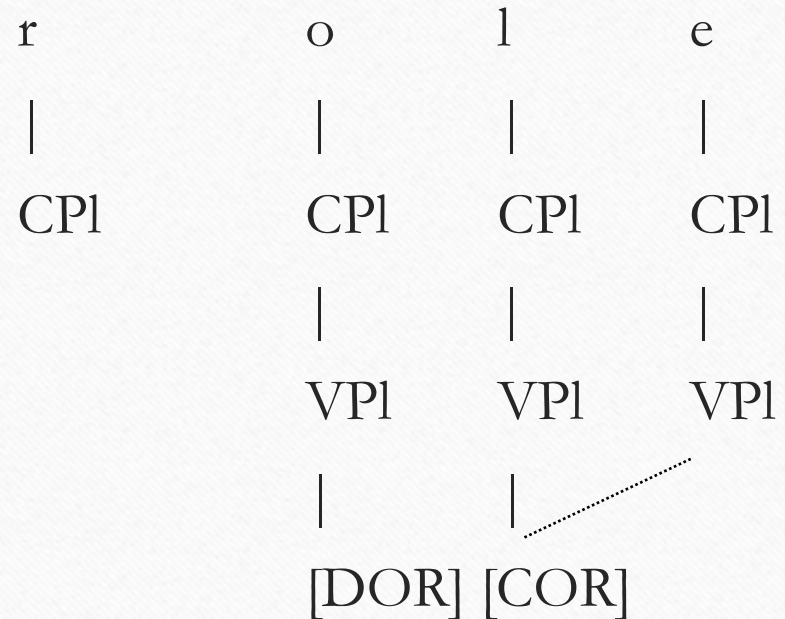
No impossible Turkish grammars

- Özcelik & Sprouse (2016)
 - Tier-based locality of vowel harmony in Turkish

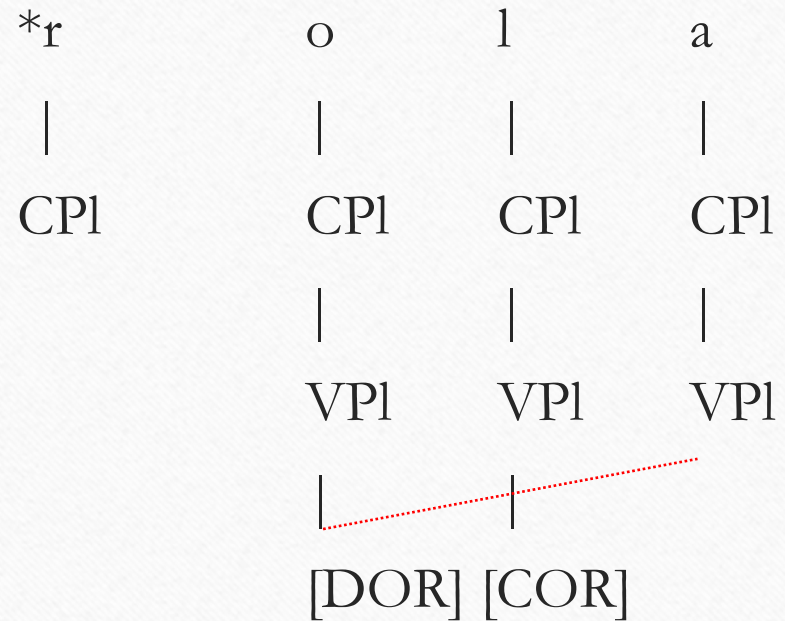
Vowel Harmony



Secondary Feature Spreading



No Crossing Constraint



No impossible German grammars

- Poverty of the stimulus
 - Acoustic cues of umlaut and [n] are very different
 - ‘Sometimes I hear umlaut’ (e.g., *Würste*)
 - Sometimes I hear -[n] (e.g. *Suppen*)
 - I never hear umlaut AND plural -[n] but I hear umlaut + [n] in Roots
- Certainly not taught in class

- What IS taught in class?

- From Glas-Peters, Pude & Reimann (2012). *Menschen. Deutsch als Fremdsprache. Arbeitsbuch.*

LERNWORTSCHATZ

1 Wie heißen die Wörter in Ihrer Sprache? Übersetzen Sie.

Haus/Wohnung

Haus das, =er _____
 Wohnung die, -en _____
 Balkon der, -e _____
 Baum der, =e _____
 Blume die, -n _____
 Erdgeschoss das, -e _____
 A/CH: Parterre das, -n _____
 A: Erdgeschoß das, -e _____
 Fenster das, - _____
 Garage die, -n _____
 Garten der, = _____
 Keller der, - _____
 Licht das, -er _____
 Miete die, -n _____
 Müll der _____
 A: auch: Mist der _____
 CH: auch: Abfall der, =e _____
 Nachbar der, -n / die _____
 Nachbarin, -nen _____
 Quadratmeter _____
 der, - _____
 Stock der, die _____
 Stockwerke _____
 Treppe die, -n _____
 A: Stiege die, -n _____
 Vermieter der, - _____
 Wasser das _____
 vermieten, hat _____
 vermietet _____
 gemütlich _____
 leer _____
 möbliert _____

Zimmer

Arbeitszimmer _____
 das, - _____
 CH: Büro das, -s _____
 Bad das, =er _____
 CH: auch: Badzimmer das, - _____

Flur der, -e _____
 A: Gang der, =e _____
 CH: Gang der, =e oder Korridor der, -e _____
 Kinderzimmer _____
 das, - _____
 Küche die, -n _____
 Schlafzimmer _____
 das, - _____
 Toilette die, -n _____
 Wohnzimmer _____
 das, - _____
 CH: auch: Stube die, -n _____
 Zimmer das, - _____

In der Natur

Berg der, -e _____
 Fluss der, =e _____
 Meer das, -e _____
 Wald der, =er _____

Wo ...?

hinten _____
 oben _____
 unten _____
 vorn _____

Weitere wichtige Wörter

Anzeige die, -n _____
 Fabrik die, -en _____
 Familie die, -n _____
 Stadt die, -e _____
 Zelt das, -e _____
 aus-sehen, hat _____
 ausgesehen _____
 bezahlen, hat _____
 stehen, hat _____
 gestanden _____
 A: ist gestanden _____

2 Welche Wörter möchten Sie noch lernen? Notieren Sie.

Beschreiben Sie Wörter.

Hier kann man kochen. → Küche
 Das bezahle ich für meine Wohnung. → Miete



The Input

- Learners *hear* ME in the input:
 - ‘Sohn’ -> ‘Söhne’ {umlaut + [ə]}
 - ‘Mund’ -> ‘Münder’ {umlaut + [ɐ]}
- So what blocks the hypothesizing of {umlaut + plural [n]}?
 - Remember umlaut + n exists in Roots (e.g. Läden)
 - Indirect -ve evidence?
 - VC interaction in English plural? Seems unlikely. *Children. Geese.* Irregulars.

Trommer Machinery

- No Crossing Lines (aka NoSkipCPlace)
 - A Plc node dominated by a Cplace node may not associate across another Cplace node

Phonological Architecture

- No multiple linking
- [COR] links to EITHER CPlace OR VPlace
- Our subjects' behaviour is consistent with this principle

-
- This is not multiple exponence but phonologically-conditioned allomorphy
 - IL grammars respect the rules of the morphology/phonology interface

Conclusion

- The IL grammars do not allow Crossing of Association lines
- It's the 889/991 forms ((90%) that tell the story
- The 7/991 (.7%) are more like marginalia; notable in their absence
- My picture of a platypus not laying eggs fits into a bigger theoretical and empirical picture.

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