

Is my name more special than yours?

Alexander Clemen

May 27, 2023



Alex, Alex, or Alex

Do Ambiguous Names Cause Referential Failure Effects?

Bachelor's thesis
presented by

Alexander Clemen

submitted at the

Heinrich-Heine University
Philosophical Faculty
Institute for Linguistics

on the

20th May 2023

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Univ.-Prof. Dr. Dr. Peter Indefrey

Advisor:

Prof. Dr. Katharina Spalek

My Thesis


hhu Heinrich Heine
Universität
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The phenomenon

Der Ärztekongress wurde mit einem grandiosen Talk beendet.

Anette/Horst Maier referierte über ...

(The medical congress ended with a terrific talk. **Anette**/Horst Maier spoke about ...)

as good as...

I take coffee with cream and **dog**.

...?

Structure

- 1 Introduction
- 2 Overview/The state of the art
 - Anaphora Resolution
 - Self-Paced Reading Experiments
 - (Stereotypical) Gender
- 3 Methods
 - Studies
 - Norming Study
 - Main Study
 - Post Hoc Study
- 4 Statistical Evaluation
 - Statistical Evaluation
- 5 Results

The phenomenon

- 1 Phillip guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.
- 2 Anna guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.

(Philipp/Anna looks out of the window. He/She has seen a good friend.)

The phenomenon

- 1 Phillip guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.
- 2 Anna guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.
- 3 Alex guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.

(Philipp/Anna/Alex looks out of the window. He/She has seen a good friend..)

The phenomenon

Figure: Ambiguous Names in Papers

The boss had been giving Diane
and **Sam** a hard time lately.
Finally the two of them decided
to do something about it.
Diane valued Sam because

- (a) he always knew
how to negotiate.
- (b) she never knew
how to negotiate.

(a) (McKoon et al., 1993)

(b) (Swaab et al., 2004)

- (34) a. **Tony** disappointed Courtney. _____
b. Tony disappointed Courtney because _____

(c) (Kehler et al., 2008)

Max confessed to **Bill** because he wanted a reduced sentence.
Max confessed to **Bill** because he offered a reduced sentence.

(d) (Garnham et al., 1992)

13. **Elliott** (and Muriel) arranged the new dining room
table so that Elliott/he could see out the window.

Research question

Research Question: Do ambiguous names cause referential failure effects?

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The Areas of my Bachelor's Thesis

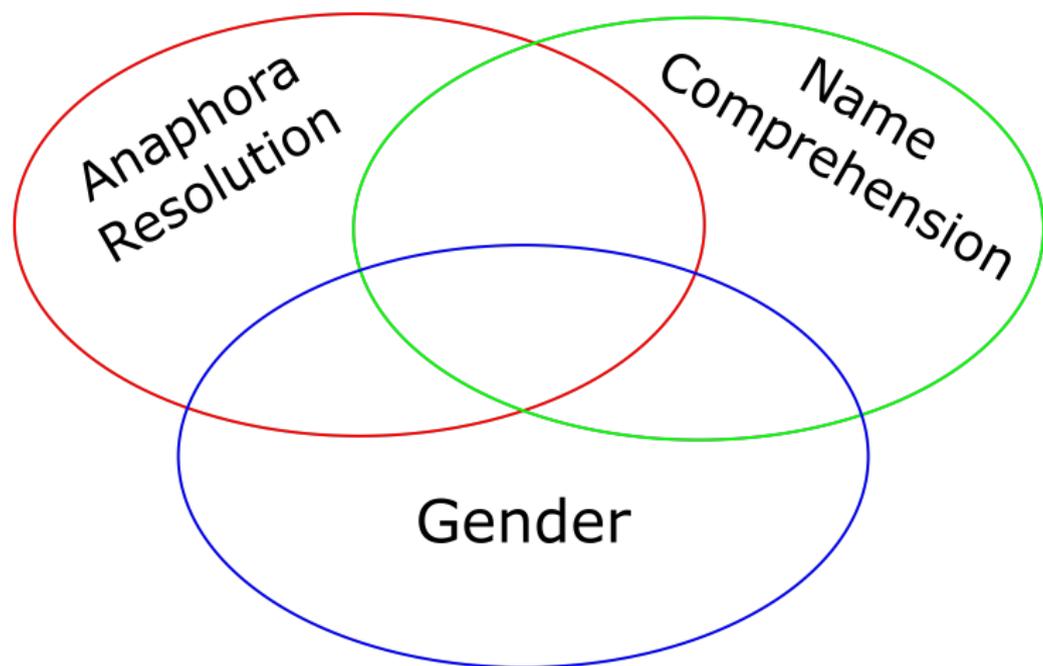


Figure: Venn Diagram of Bachelor's Thesis Topics

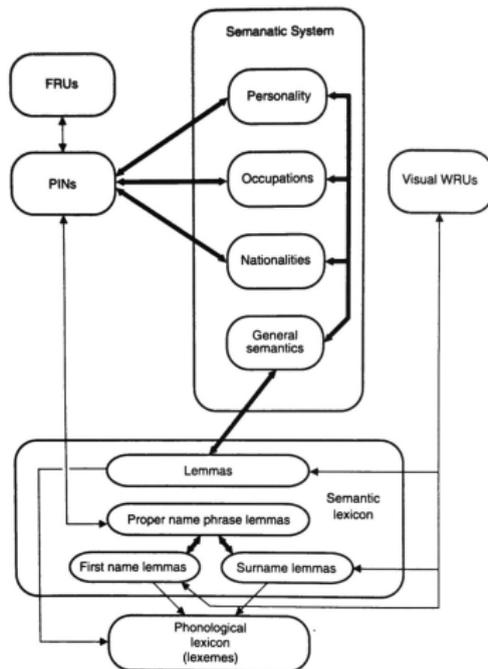
Name Comprehension



Figure: Who is this man?

Names are special

Figure: Semantics system of Valentine et al. (1996: 180)'s Framework



Anaphora Resolution

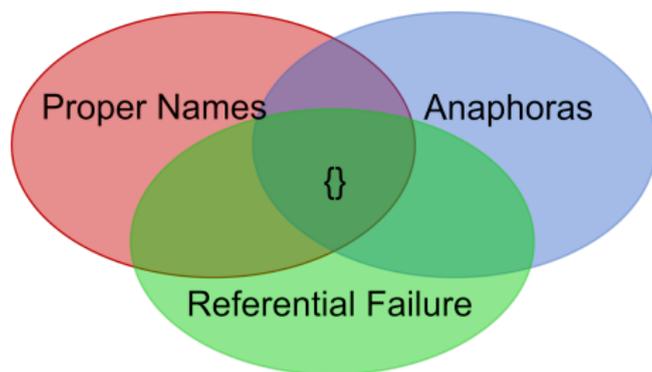
Alexander Clemen is holding *his* presentation.

- 1 Anaphora
- 2 Antecedent
- 3 Referent

Anaphora Resolution

Alexander Clemen is holding *his* presentation.

- 1 Anaphora
- 2 Antecedent
- 3 Referent



→ Role Names (\approx Occupations)

Reading Time: Kennison and Trofe (2003)

Gender effects are noticeable after pronoun presentation

The executive_{<MALE>}/The secretary_{<FEMALE>} *distributed *an urgent *memo.
 *He_M/She_F *made it clear *that *work *would continue *as normal.*

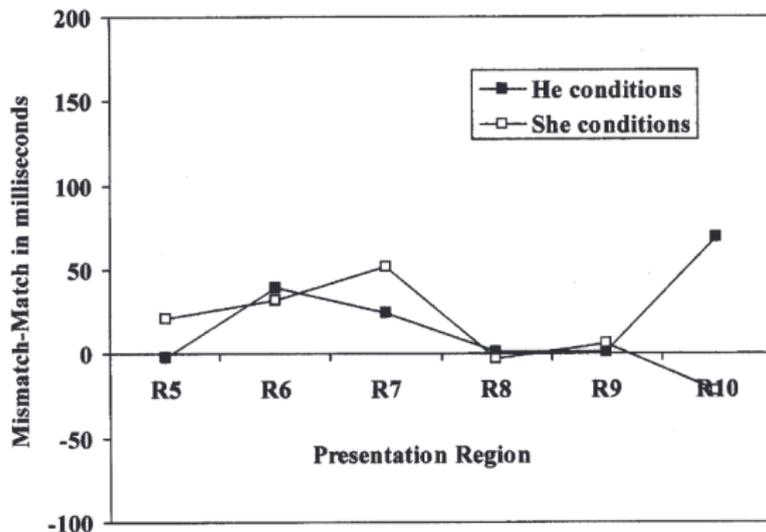
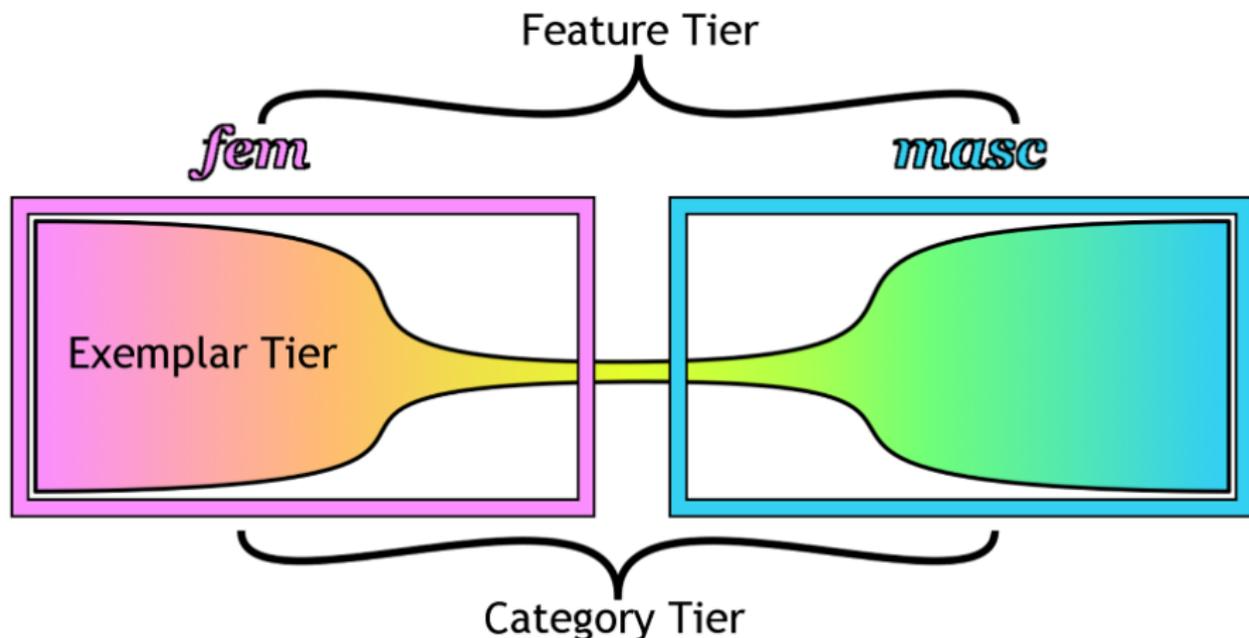


Figure: Mean Reading Time difference for regions after *he/she*

Gender in the framework of Ackerman (2019)

Figure: Ackerman (2019)'s Three-tiered scheme of linguistically and cognitively encoding gender



Research question

Research Question: Do ambiguous names cause referential failure effects?

Hypotheses:

- H1:** Pronouns and subsequent words are read slower when the gender of the pronoun misaligns with the gender of an unambiguous name. (Anna, Phillip)
- H2:** Pronouns and subsequent words are read slower when the gender of the pronoun misaligns with the gender of an ambiguous name. (Alex)
- H3:** Ambiguous names are read slower than unambiguous names.

Anna/Phillip* guckt* aus dem Fenster.* Er/Sie* hat* einen* guten* Freund*
gesehen.

Alex* guckt* aus dem Fenster.* Er/Sie* hat* einen* guten* Freund* gesehen.

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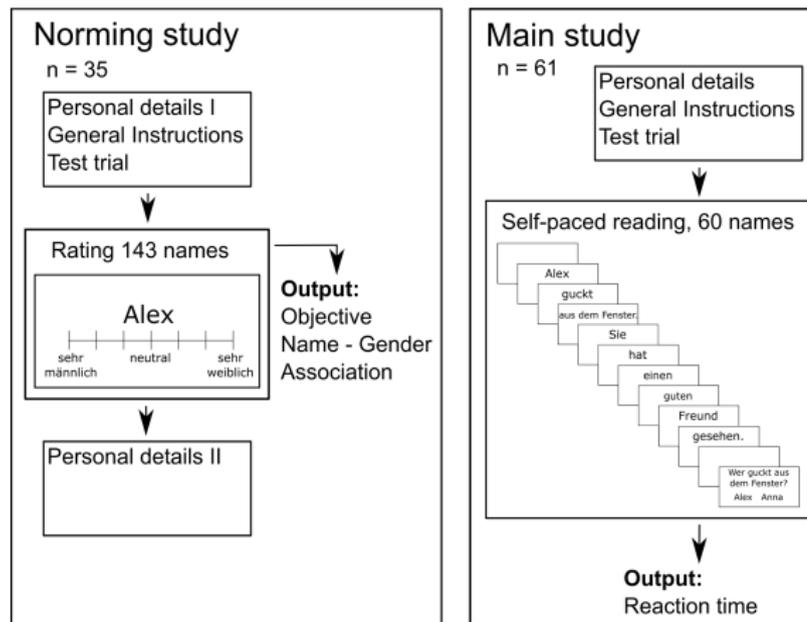
Overview of my studies

Figure: A flowchart of the three studies, the sample population and the main intended output



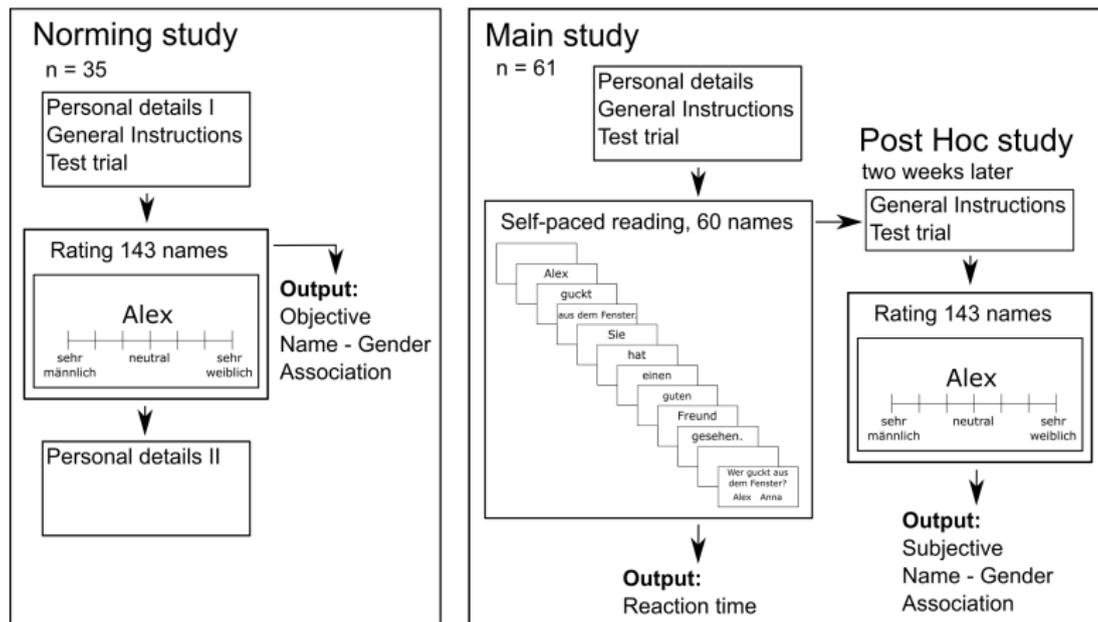
Overview of my studies

Figure: A flowchart of the three studies, the sample population and the main intended output



Overview of my studies

Figure: A flowchart of the three studies, the sample population and the main intended output



Norming Study - Name gathering process

The screenshot shows a web browser window with the URL `vita34.de/namenslisten/unisex-vornamen/`. The page title is "NAMENSLISTE UNISEX-VORNAMEN". The website logo "VITA34" is in the top left, and navigation links "Nabelschnurlut", "Nabelschnurgewebe", "Preise", "Über uns", and "Vitapedia" are in the top right. Below the heading, there is a row of letters from A to Z. Underneath the letters, a list of names is displayed in a grid format:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Adrian				Alex				Aloha			Andy				Antonie										
Akela				Alexis				Andrea			Anouk				Ariel										

A "Desktop anzeigen" button is located in the bottom right corner of the browser window.

Figure: Manually scraping names

Norming Study

Goal: Gain an objective Name-Gender association measure.

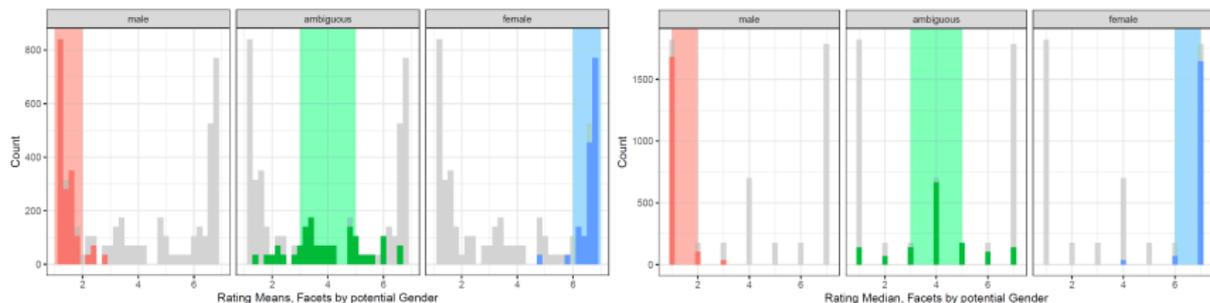
11,208 Names were gathered through Google queries.

35 subjects were instructed to rate 143 names on a 7-point Likert scale.



Figure: Rating Task

Norming Study – Results



(a) mean ratings

(b) median ratings

The final list of names:

- mean 1.0 – 1.3 \wedge median 1.0 – 2.0: 26 male names
- mean 3.0 – 5.0 \wedge median 3.0 – 5.0: 24 ambiguous names
- mean 6.7 – 7.0 \wedge median 6.0 – 7.0: 27 female names

Main Study

Research Question Do ambiguous names cause referential failure effects?

Paradigm Self-Paced Reading

Dependent Variable (on-line): Reading Time at Regions (01 & 02, 04 – 07)

Independent Variables (3×2 within-subject design):

- Name (*Phillip*_{<MALE>}, *Alex*_{<MALE>/<FEMALE>}, *Anna*_{<MALE>})
- Pronoun (*er*_M, *sie*_F)

Filler: Role Names

Alex	guckt	aus dem Fenster.	Sie	hat	einen guten	Freund	gesehen.
Item	V	PP	Pronoun	AUX	DET	ADJ	N V
Item	Item+1		Pro	Pro+1	Pro+2	Pro+3	
reg 01	reg 02	reg 03	reg 04	reg 05	reg 06	reg 07	reg 08 reg 09

(Phillip/Anna looks out of the window. He/She has seen a good friend.)

Main Study – Illustration

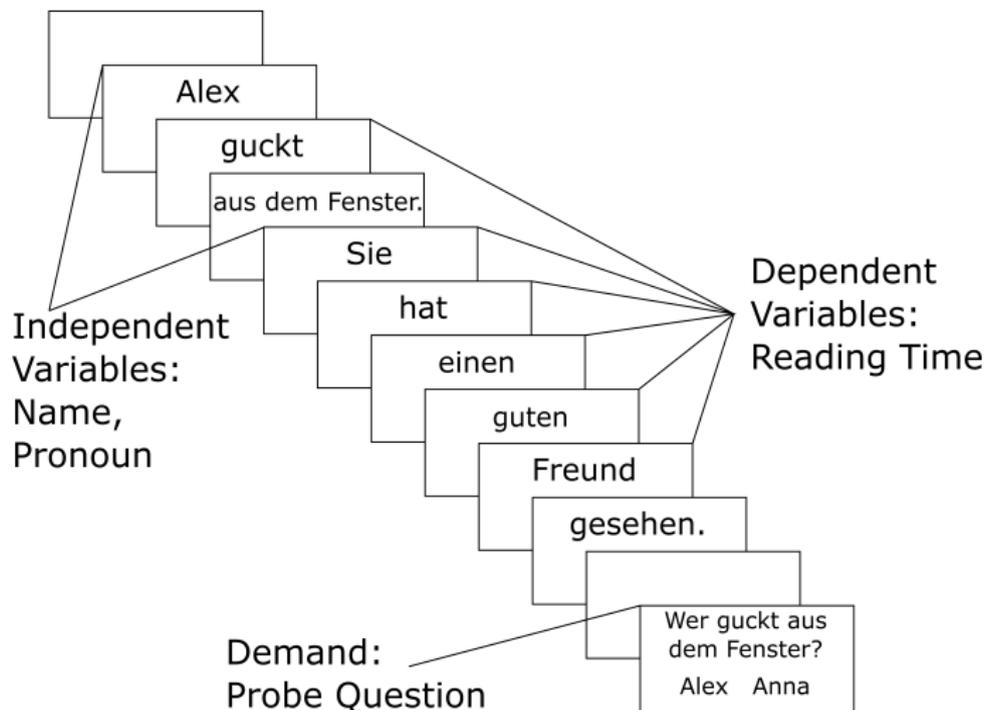


Figure: Self-Paced-Reading-Illustration

Post Hoc Study

1 Name Rating Study

subjects will be instructed to rate 143 names on a 7-point Likert Scale.



Figure: Rating Task

- 2 Results are the subjective name evaluations and will be used to calculate the degree of mismatch

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Statistical Evaluation – The Goal

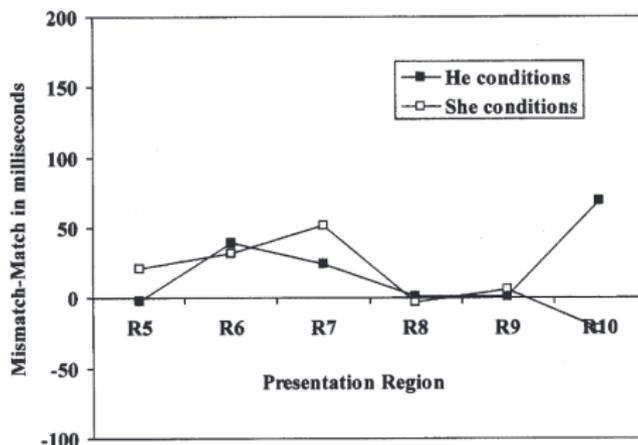


Fig. 2. Mean reading time difference (Gender Mismatch–Gender Match Conditions) for sentences containing the pronouns *he* and *she* by presentation region.

Figure: Kennison and Trofe (2003) Reading Time Results

Kennison and Trofe (2003) used “strongly male” and “strongly female” role names with personal pronouns – i. e. unambiguous Match, Mismatch conditions

Statistical Evaluation – The Mismatch Problem

- 1 Phillip guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.
- 2 Anna guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.
- 3 Alex guckt aus dem Fenster. Er/Sie hat einen guten Freund gesehen.

(Philipp/Anna/Alex looks out of the window. He/She has seen a good friend..)

Statistical Evaluation – The Solution

Subj	Item	Item.Rating	Pro	Pro.Rating	Delta	Absolute.Value
VP1	Anna	7	sie	7	0	0
VP1	Philipp	2	sie	7	-5	5
VP1	Alex	4	er	1	3	3
VP2	Anna	7	er	1	6	6
VP2	Philipp	1	er	1	0	0
VP2	Alex	1	sie	7	-6	6

$participant_itemPro_mm = |Item.Rating - Pro.Rating|$

$0 \geq participant_itemPro_mm \geq 1 \rightarrow participant_mm_grouping == \text{“Match”}$

$2 \geq participant_itemPro_mm \geq 4 \rightarrow participant_mm_grouping == \text{“Ambiguous”}$

$5 \geq participant_itemPro_mm \geq 6 \rightarrow participant_mm_grouping == \text{“Mismatch”}$

Predictor Variables

Predictor Variable	Value
participant_mm_grouping	“Match”, “Mismatch”, “Ambiguous”
participant_itemPro_mm_num	0, 1, 2, 3, 4, 5, 6
list	“1”, “2”, “3”, “4”, “5”, “6”
trial_index_z	range: -1.837250, 1.681417
pro (pronoun)	“er”, “sie”
item_freq_z	range: -1.3840592, 1.90560987
participant	“1” – “85”
participant_gender	“m”, “f”, “nb”, “na”
participant_age_z	range: -1.6998338, 2.4885567
item_id (proper name)	“1” – “72”
block	“1”, “2”, “3”, “4”, “5”, “6”
sent_id (carrier sentence)	“1” – “60”
item_gender_norming	“female”, “male”, “ambiguous”
handedness	“lefthanded”, “righthanded”
L2	“fra”, “jpn”, “ita”, ...

How to deal with the data

- 1 Avoid colinearity with a Correlation Matrix
- 2 Various df cuts to remove outliers (df_raw, df_cat, df_4k, df_2k)
- 3 Residual trimms following (Baayen, 2011: 279)
- 4 Pick best df cut with AIC comparisons
- 5 Top-down “stepwise regression” ($-(1 \mid \text{item_id})$)

The Best Model

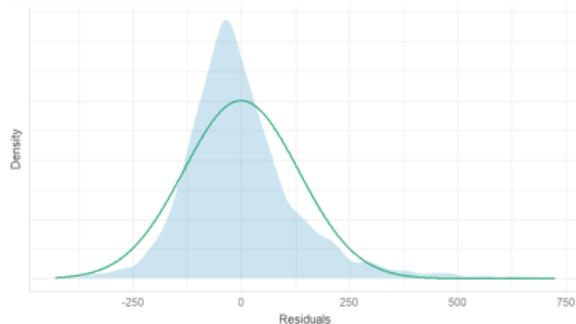
```
mdl_best_R4 <- lmer(rt_pos04_ordNorm ~  
  participant_mm_grouping + (1 | participant) +  
  trial_index + list + pro + item_freq_z +  
  participant_gender + participant_age_z, df_2k)
```

```
mdl_best_R4_trimmed = lmer(rt_pos04_ordNorm ~  
  participant_mm_grouping + (1 | participant) +  
  trial_index + list + pro + item_freq_z +  
  participant_gender + participant_age_z, df_2k,  
  subset = abs(scale(resid(mdl_best_R4))) < 2.5)
```

Model Criticism

Normality of Residuals

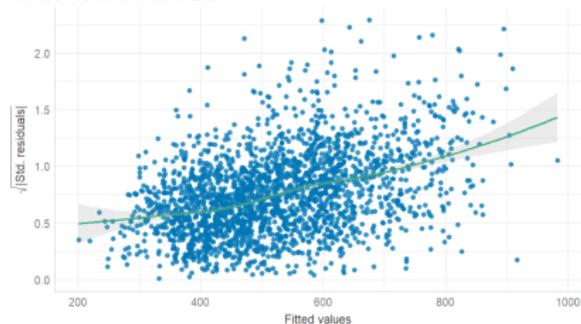
Distribution should be close to the normal curve



(a) Normality

Homogeneity of Variance

Reference line should be flat and horizontal



(b) Homoscedasticity and Linearity

Received: 27 January 2020 | Accepted: 20 May 2020
DOI: 10.1111/1364-3113.12444

RESEARCH ARTICLE

Methods in Ecology and Evolution

Robustness of linear mixed-effects models to violations of distributional assumptions

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David F. Westneat⁴ | Hassen Allegue⁵ | Céline Teplitsky⁶ | Denis Réale⁷ |
Ned A. Dochtermann⁸ | László Zsolt Garamszegi^{9,10} | Yimin G. Araya-Ajoy¹⁰

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Funding information

U.S. National Science Foundation, Grant/Award Number: 1001237718 and 100157915; Deutsche Forschungsgemeinschaft, Grant/Award Number: 39 1984/1-1, SFB 1215/A4; Lead 2017/2020, International Max Planck Research School for Organismal Biology; Centre for Population Biology at the Norwegian University of Science and Technology; Centre of Ecology, Evolution and Evolution at the University of Montpellier; Centre for Ecological Research of the Hungarian Academy of Sciences

Handling Editor: Chris Sullivan

Abstract

1. Linear mixed-effects models are powerful tools for analysing complex datasets with repeated or clustered observations, a common data structure in ecology and evolution. Mixed-effects models involve complex fitting procedures and make several assumptions, in particular about the distribution of residual and random effects. Violations of these assumptions are common in real datasets, yet it is not always clear how much these violations matter to accurate and unbiased estimation.
2. Here we assess the consequences of violating its distributional assumptions and the impact of missing random effect components on model estimates. In particular, we evaluate the effects of skewed, bimodal and heteroscedastic random effect and residual variances, of missing random effect terms and of correlated fixed effect predictors. We focus on bias and prediction error on estimates of fixed and random effects.
3. Mixed estimates were usually robust to violations of assumptions, with the exception of slight upward biases in estimates of random effect variance if the generating distribution was bimodal but was modelled by Gaussian error distributions. Further, estimates for (random effect) components that violated distributional assumptions became less precise but remained unbiased. However, this particular problem did not affect other parameters of the model. The same pattern was found for strongly correlated fixed effects, which led to imprecise, but unbiased estimates, with uncertainty estimates reflecting imprecision.
4. Unmodelled sources of random effect variance had predictable effects on variance component estimates. The pattern is best viewed as a cascade of hierarchical

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Methods Ecol Evol. 2020;11:1145–1162. <https://doi.org/10.1111/1364-3113.12444> onlinelibrary.wiley.com/doi/10.1111/1364-3113.12444

Figure: Schielzeth et al. (2020)

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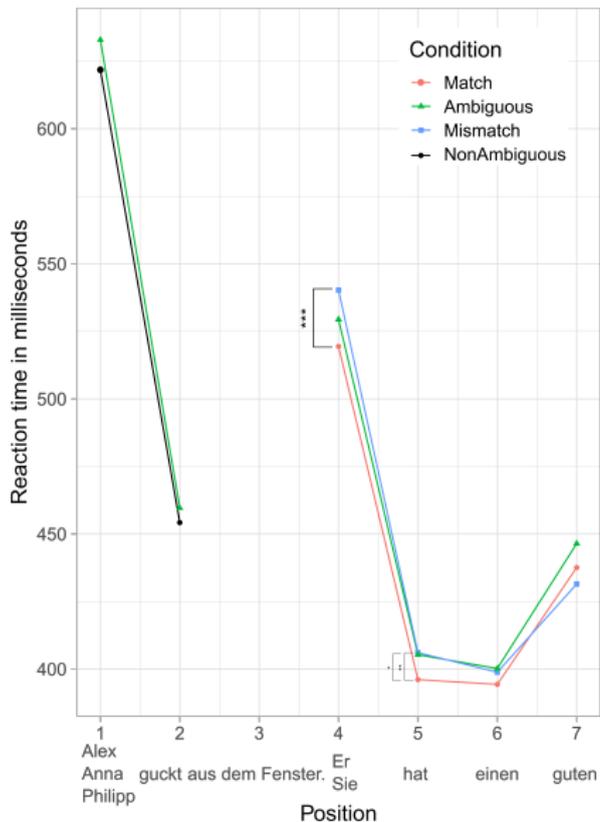
Research Question and Hypotheses

Research Question: Do ambiguous names cause referential failure effects?

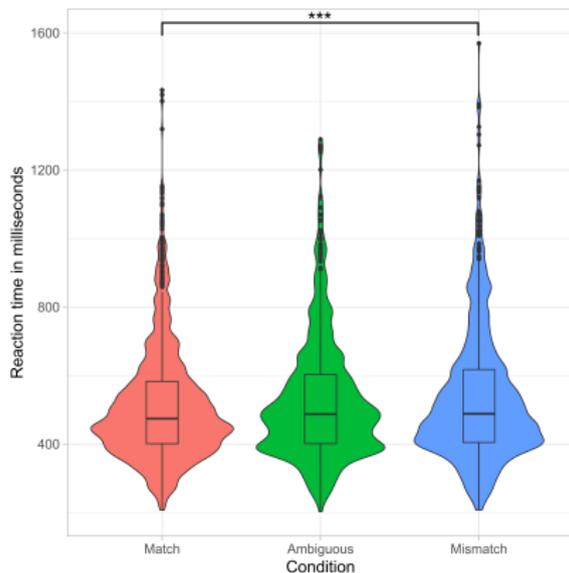
Hypotheses:

- H1: Pronouns are read slower when the gender of the pronoun misaligns with the gender of an unambiguous name. (Anna, Phillip)
- H2: Pronouns are read slower when the gender of the pronoun misaligns with the gender of an ambiguous name. (Alex)
- H3: Ambiguous names are read slower than unambiguous names.

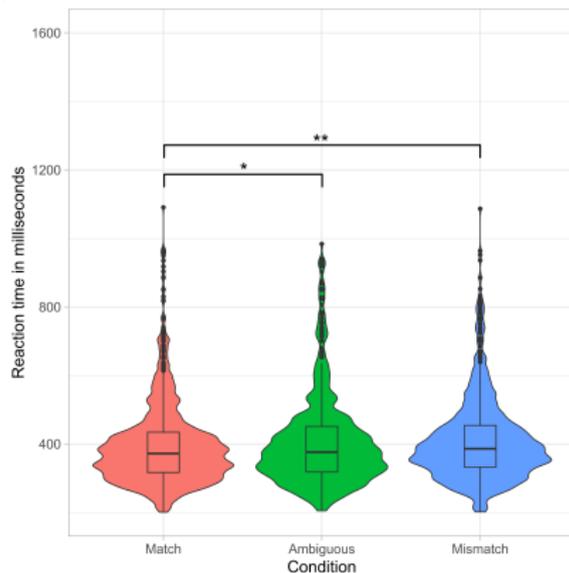
Results - All regions



Results – Conditional Analysis

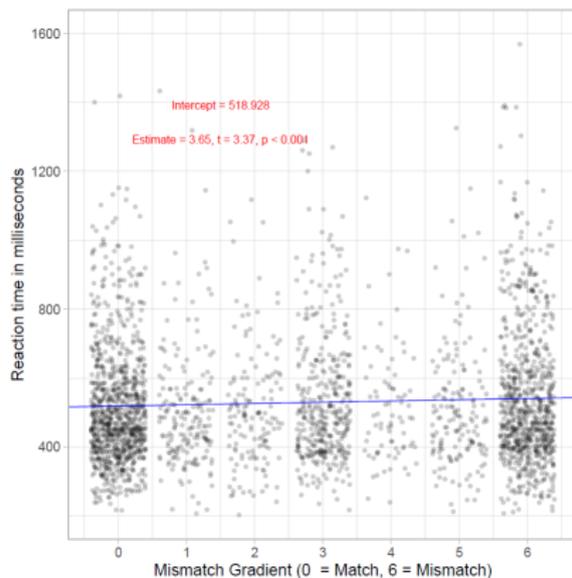


(a) Pronoun region

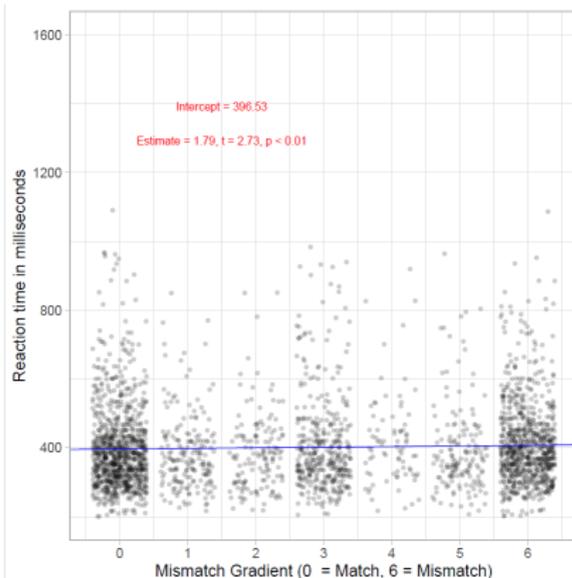


(b) Fist Spillover region

Results – Continuous Analysis



(c) Pronoun region



(d) Fist Spillover region

Research Question and Hypotheses

Research Question: Do ambiguous names cause referential failure effects?

Hypotheses:

- H1 ✓ [a: pronoun; b: first spillover; c: second spillover; d: third spillover]
The mean reaction time at the [a ✓/ b ✓/ c ✗/ d ✗] region is significantly longer in the Mismatch Condition than in the Match condition.
- H2 ✓ [a: pronoun; b: first spillover; c: second spillover; d: third spillover]
The mean reaction time at the [a ✗/ b ✓/ c ✗/ d ✗] region is significantly longer in the Ambiguous Condition than in the Match condition.
- H3 ✗ [a: item; b: item spillover]
The mean reaction time in the [a ✗/ b ✗] region is significantly longer in the Ambiguous Condition than in the Non-Ambiguous Condition.

What does that mean?

Figure: Ambiguous Names in Papers

The boss had been giving Diane
and **Sam** a hard time lately.

Finally the two of them decided
to do something about it.

Diane valued Sam because

- (a) he always knew
how to negotiate.
- (b) she never knew
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(a) (McKoon et al., 1993)

(b) (Swaab et al., 2004)

(34) a. **Tony** disappointed Courtney. _____

b. Tony disappointed Courtney because _____

(c) (Kehler et al., 2008)

Max confessed to **Bill** because he wanted a reduced sentence.

Max confessed to **Bill** because he offered a reduced sentence.

(d) (Garnham et al., 1992)

Dankeschön.

Thank you.

Are there any questions?

Get in touch



(e) my LinkedIn



(f) alexander.clemen@hhu.de

Literature I

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<https://doi.org/10.1023/A:1023599719948>

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[Journal of Experimental Psychology: Learning, Memory, and Cognition](#)

19(5), 1040–1052. <https://doi.org/10.1037/0278-7393.19.5.1040>

Literature III

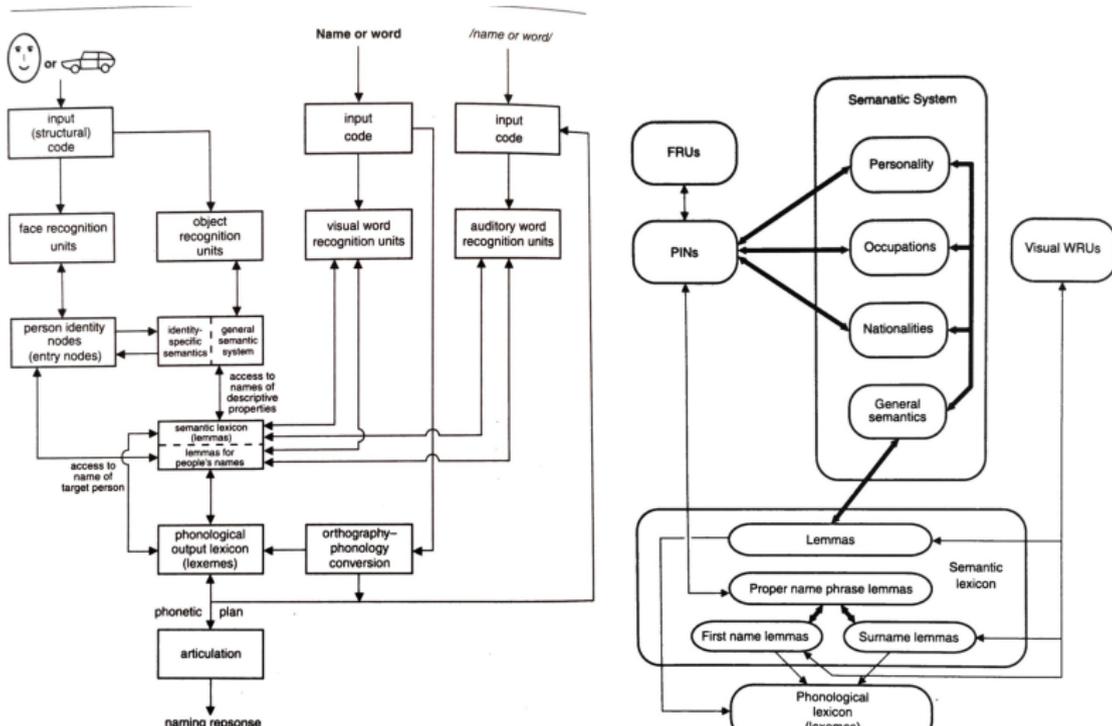
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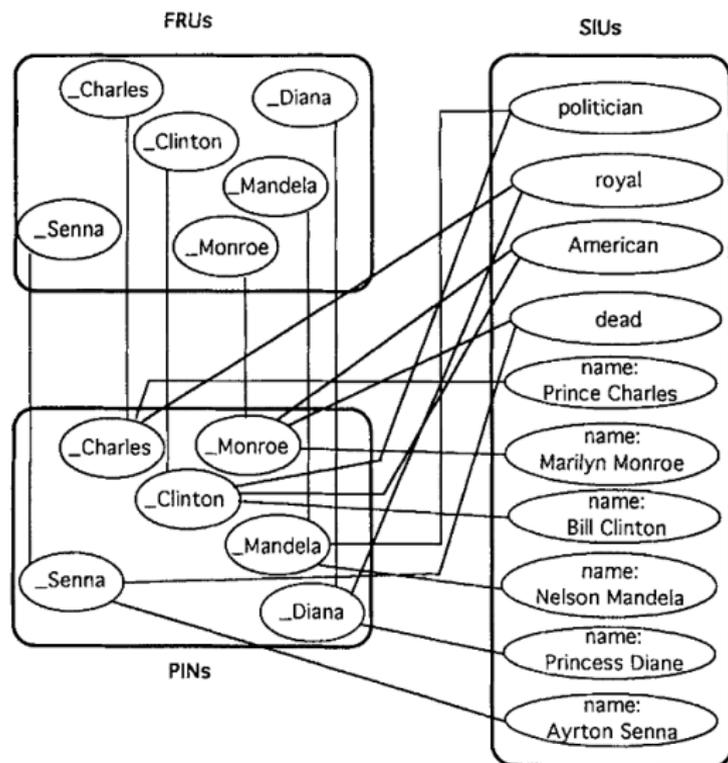
6 Appendix Main Study

Names are special

Figure: Valentine et al. (1996: 180)'s Framework



Brédart et al. (1995)'s Interactive Activation and Competition network



Reading Time: Carreiras et al. (1996)

- (1) *El_M/La_F capintero/a_{<MALE>} tomó las medidas para hacer el armario.*
 (The carpenter took measurements to make the cupboard.)
El_M/Ella_F tenía que terminarlo en el plazo de una semana.
 (He/She had to finish in the space of one week.)

TABLE 2
 Mean Reading Times for the First and Second Sentences in Experiment 2

Clause		Stereotyped Characters		Neutral Characters	
		Match	Mismatch	Masculine	Feminine
1	male bias	3193	3400		
	female bias	3191	3454		
	TOTAL	3192	3427	3121	2992
2	male bias	2213	2211		
	female bias	2282	2348		
	TOTAL	2248	2280	2621	2504

Figure: Mean Reading Time difference for whole sentences

Norming Study

1 Name Gathering Process

- Google Queries: “unisex Namen”, “geschlechtsneutrale Namen”, “Namen für Jungen”, “Namen für Mädchen”
- Frequency analysis in R
- Cleaning Process (no *Alex*, frequency preference, short form preference, ambiguous preference)
- Results: 143 names (52 male, 41 ambiguous, 50 female)

2 Name Rating Study



Figure: Rating Task

3 Results

Norming Study

- 1 Name Gathering Process
- 2 Name Rating Study
 - 35 subjects (male: 5, female: 30, diverse: 1; mean age: 23.23)
 - were instructed to rate 143 names on a 7-point scale labeled “sehr männlich”, “neutral” “sehr weiblich”
 - Pavlovia (online)



Figure: Rating Task

3 Results

Norming Study – Results



Figure: Subject Results

Main Study – Subject Considerations

Age restrictions: 18 – 35 years (because of Norming Study)

L1 restrictions: German

Motivation: HHU reimburses Payments

Fatigue: four to six blocks with a self determined pause length.

Randomization: six pre-randomized lists, same number of sentences as stimuli. (120 different stimuli, 120 different carrier sentences)

Main Study

Research Question: Do ambiguous names cause referential failure effects?

Paradigm: Self-Paced Reading

- Type of presentation: word by word (with one exception)
- Type of embedding: stationary window

Alex	guckt	aus dem Fenster.	Sie	hat	einen guten	Freund	gesehen.	
Item	V	PP	Pronoun	AUX	DET	ADJ	N	V
Item	Item+1		Pro	Pro+1	Pro+2	Pro+3		
reg 01	reg 02	reg 03	reg 04	reg 05	reg 06	reg 07	reg 08	reg 09

Main Study

Research Question: Do ambiguous names cause referential failure effects?

Paradigm: Self-Paced Reading

Dependent Variable (on-line): Reading Time at Regions (R1, R2 and R4 to R7)

Independent Variables (within): Item.Class (m, n, f), Pronoun (*er*, *sie*)

Stimuli: First Names, Role Names (in Carrier Sentences)

Demand: one Probe Questions (NOM, V, PP, ACC)

Example:

{Philipp/ Anna/ Alex/ Der Arzt/ Die Tänzerin}* landet* in der Klinik.*
 {Sie/Er}* hat* einen* diagnostizierten* Burnout* erlitten.

Probe Question:

Wer landet in der Klinik?; Was tat Philipp?; Wo landet Philipp?; Was hat Philipp erlitten?

Results Pronoun region and 1st Pronoun Spillover Region

