

# Loss of Historical Phonetic Contrast Across the Lifespan: Articulatory, Lexical, and Social Effects on Sound Change in Swabian

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*Fourth Conference on Experimental Approaches to Perception and  
Production of Language Variation (ExAPP4)  
Münster, September 26-28, 2019*

# Background

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## *Lifespan Studies of Language Change*

- Questions about the apparent-time approach to language change:
  - Do all individuals change in the same way, at the same rates, and at the same points across their lifespan?*
  - Do the grammars of individuals change along with the grammars of the communities they are a part of?*

## *Frequency and Phonetic Mergers*

- Bybee (2002) finds that reduction affects high-frequency words first
- Hay et al. (2015) find that sound change, if in progress, affects low-frequency words first and then spreads to high-frequency words across the years
- Tomaschek et al. (2018) maintain that high-frequency words “get more practice”, which consequently may make them more resistant to change

# The Linguistic Variable: /ai/ Diphthong

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- **Linguistic Variable:** Modern standard German /ai/ diphthong
- **MHG Phonemes /i:/ and /ei/:** merged in contemporary Standard German  
MHG /i:/ → SWG [əi] ~ STD [ai]  
e.g., MHG *Zeit* [zi:t] 'time' → **SWG [tsəit] ~ STD [tsait]**  
  
MHG /ei/ → SWG [ɔi] and [əi] ~ STD [ai]  
e.g., MHG *klein* [klein] 'small' → **SWG [glɔi] or [gləi] ~ STD [klain]**
- **Research Question:** To what extent are the two MHG phonemes, /i:/ and /ei/, losing their historical phonetic contrast and merging, or becoming more similar to each other, across the lifespan of the individual speaker

# Our Hypotheses: /ai/ Diphthong

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We expect to see a greater loss of phonetic contrast:

1) in the later recordings (2017) than in the earlier ones (1982)

*(e.g., Auer 2011; Schwarz 2019)*

2) in Stuttgart rather than Schwäbisch Gmünd

*(e.g., Trudgill 1986; Nerbonne & Heeringa 2007)*

3) with speakers who have a low orientation to Swabian

*(e.g., Auer & Hinskens 2005; Dodsworth 2017)*

4) in environments with following voiceless consonants

*(e.g., Kluender et al. 1988, Denes 1955)*

5) in high-frequency over low-frequency words

*(Bybee 2002, Hay et al. 2015, Tomaschek et al. 2018, Todd et al. 2019)*

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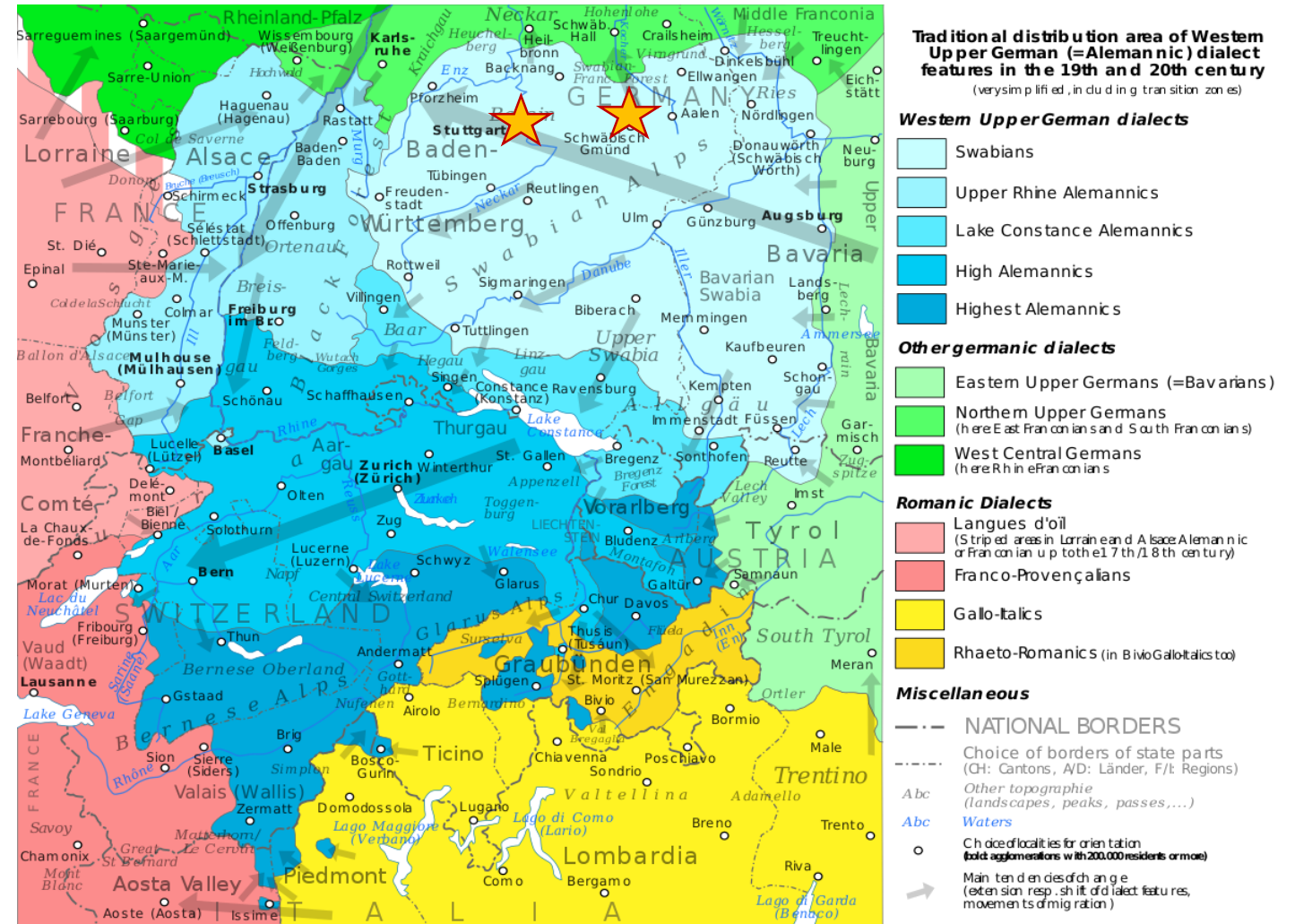
# The Study

# Swabian

**Swabian** or **Schwäbisch** is a High German dialect, belonging to the Alemannic family, spoken by just over 800,000 people.

Two communities:

- Stuttgart area
- Schwäbisch Gmünd



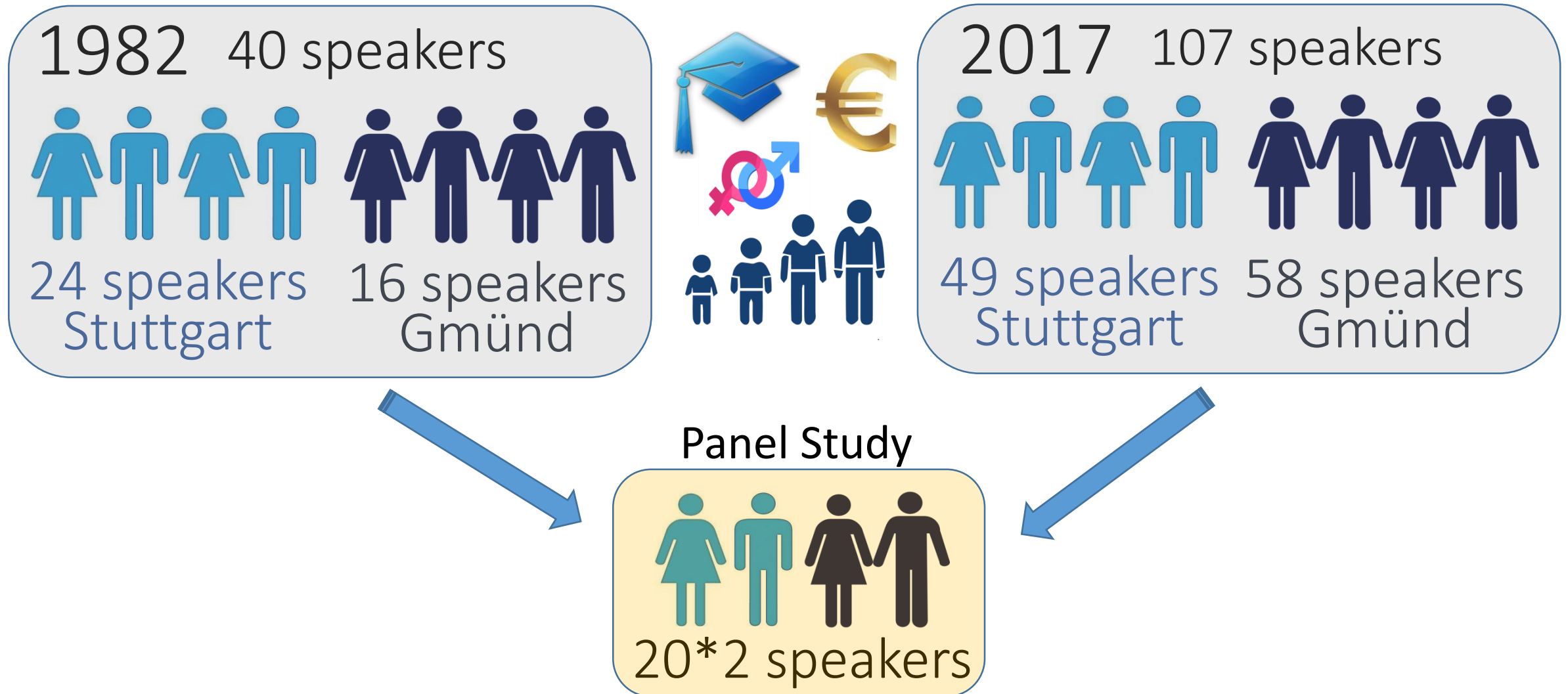


# Two Swabian Communities

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# Swabian Corpora





# Data Collection and Preparation

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- ***Sociolinguistic Interviews***

- Labovian-style, casual interview questions of approximately one hour
- Same interview instrument and techniques used in 1982 and 2017
- Similar casual interview situations

- ***Transcription and Extraction***

- Completed in ELAN 5.3 by native German speakers
- First and second formants extracted in PRAAT 4.0 and z-scaled by speaker
- Word types with [ai] at the onset were excluded

# Swabian: Loved or Loathed

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*also gewisserweise isch mã da scho e bissle Stolz darauf ã ... des [ist] aber eich zu neunundneunzig Komma fünf Prozent alles witzig und positiv [ge]meint, und niemand meint des in Konotation wie Baure oder sowas, also des isch scho ganz cool.*

**‘in a certain way, one is a little proud [to be Swabian]... it’s 99,5% funny and positive, and no one makes a connection to farmers or whatever, it’s pretty cool.’**

(Fabian 2017)

*meine Kinder schämen sich sogar heutzutage Schwäbisch, also die verbinden Schwäbisch mit irgendwas, was sie nicht möchten.... dieser dörfliche Zusammenhalt stoßen die eher ab.*

**‘nowadays my children are actually ashamed of Swabian, well they associate Swabian with something they don’t like.... they are more likely to reject this village solidarity.’**

(Helmut 2017)

# Swabian Orientation Index (SOI)

## **Swabian Allegiance:**

- 1-1. Self-Declared Swabian: Are you a 'real' Swabian?
- 1-2. Non-Swabian Friends: Do you have friends who are NOT Swabian?
- 1-3. Swabian Ridicule: Do they laugh at how you speak?
- 1-4. Accommodation: Do you change how you speak?

## **Swabian Language Attitudes:**

- 2-1. Opinion of Swabian Language: What do you think of the Swabian language?
- 2-2. Job Prospects for Swabians: Is it difficult to find a job when you speak Swabian?
- 2-3. Swabians Speaking German: Is it odd when a Swabian speaks standard German?
- 2-4. Non-Swabians Speaking Swabian: Is it odd when a non-Swabian speaks Swabian?

## **Swabian Cultural Competence:**

- 3-1. Swabian Knowledge: Are there different Swabian dialects?
- 3-2. Swabian Specialties: Do you know how to make Spätzle? Maultaschen?
- 3-3. Swabian People & Jokes: Do you know [various well-known Swabians]?
- 3-4. Swabian Activities: Do you participate in Hocketse & local activities?

## **Swabian Language Usage:**

- 4-1. Parents Speak Swabian: Do your parent speak Swabian?
- 4-2. Swabian with Friends & Family: Do you speak Swabian with ...?
- 4-3. Swabian with Neighbors: Do you speak Swabian with ...?
- 4-4. Swabian with Others: Do you speak Swabian with ...?

Assesses speakers' orientation and attitudes to the Swabian culture and language

$$SOI = \frac{\sum_1^n \lambda_i}{n}$$

scaled from 1 for the lowest to 5 for the highest (rescaled to 0 to 1 for regression analysis)

# Swabian /ai/ Diphthong Corpus

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<b>MHG Variant</b>	<b>1982</b>			<b>2017</b>		
	<b>Types</b>	<b>Tokens</b>	<b>DataPts</b>	<b>Types</b>	<b>Tokens</b>	<b>DataPts</b>
<b>/i:/</b>	357	1984	77,422	468	2189	107,184
<b>/ei/</b>	391	3056	112,656	442	3525	151,417
<b>TOTAL</b>	748	5040	190,078	910	5714	258,601

Types = unique words

Tokens = instances of word type

Dataps = frequency measurements

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# Analysis & Methods



# Predictors

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## *Predictors*

- Recording Year: 1982 versus 2017
- Diphthong Origin: MHG /i:/ versus MHG /ei/ (based on DWDS)
- Speech Community: Stuttgart versus Schwäbisch Gmünd
- Swabian Orientation Index (SOI): high versus low, median split
- Word Frequency: high versus low, median split
- Following Articulatory Environment: voiced versus voiceless
- Time in the Diphthong: normalised between 0 and 1

# Generalized Additive Mixed Models (GAMMs)

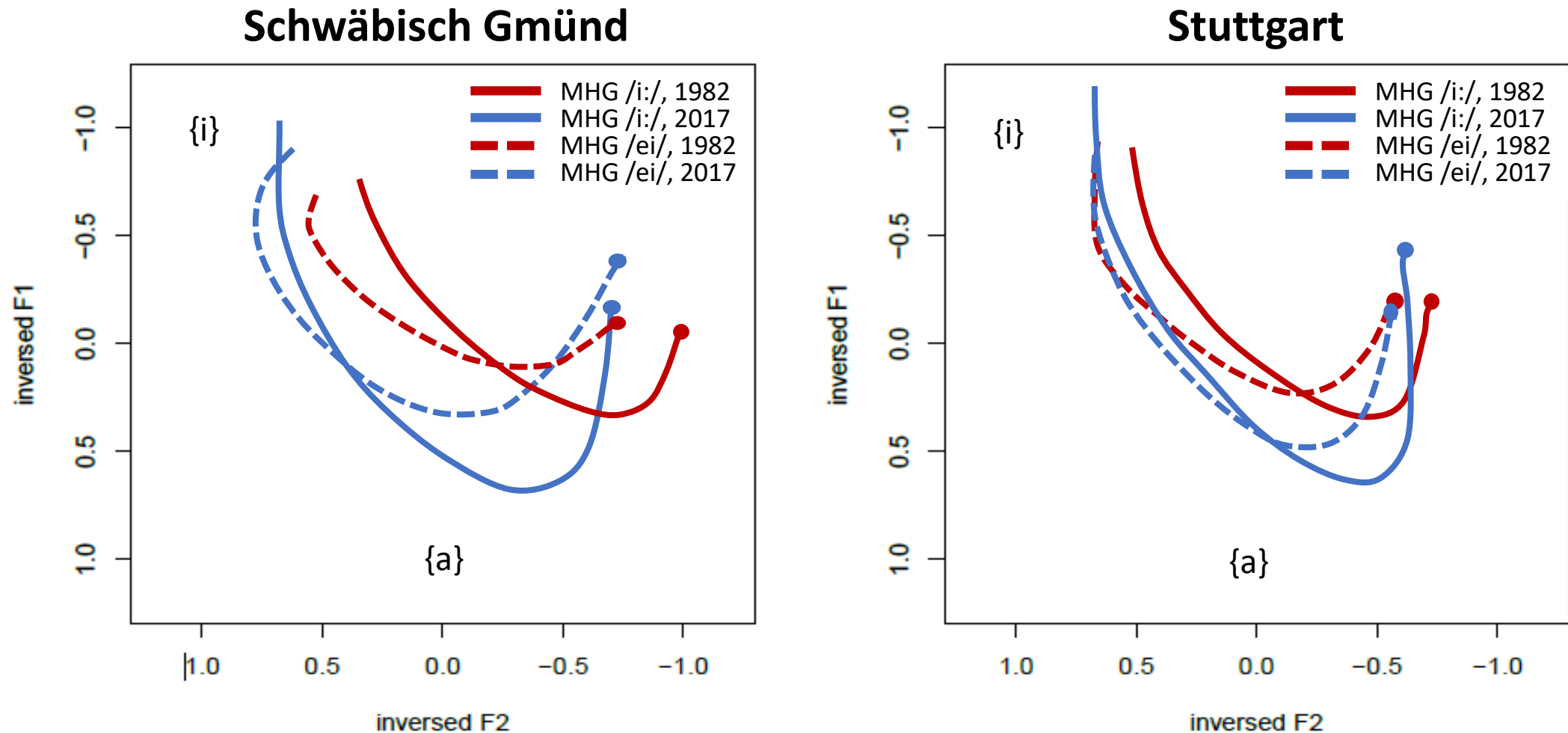
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GAMMs model non-linear relations between dependent and independent variables (Wood 2011).

Three models:

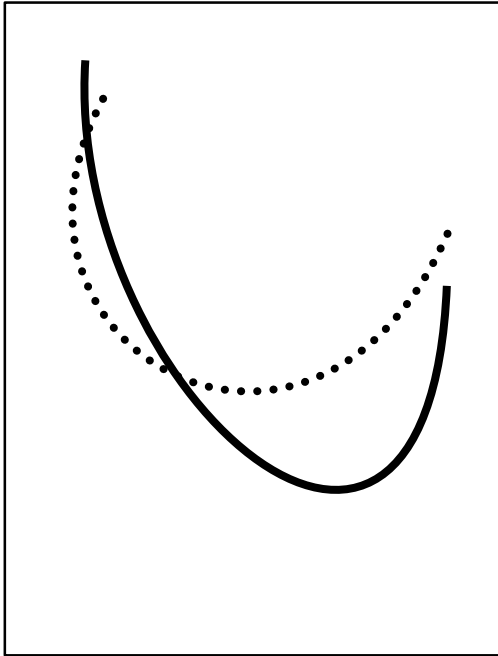
- (1) individual speaker differences between the two diphthongs across the lifespan,
- (2) isolated effects of manner of articulation
- (3) interactional differences between the two diphthongs  
—speech community, Swabian orientation, lexical frequency, and articulatory environment, i.e., following voiced/voiceless consonant.

# Trajectories in the two Communities

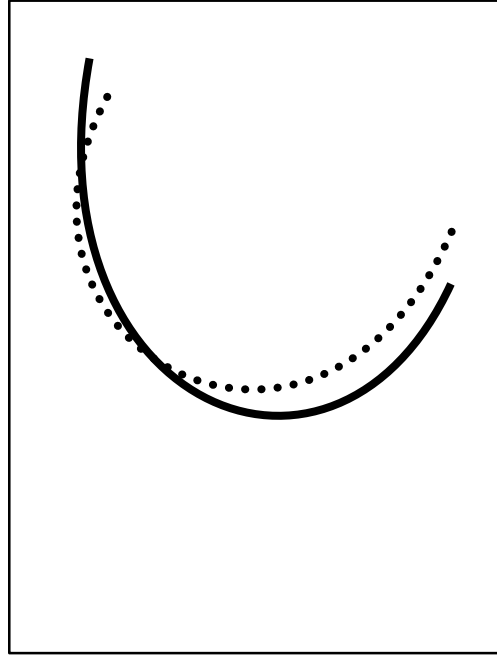


# Operationalising Differences in Trajectories

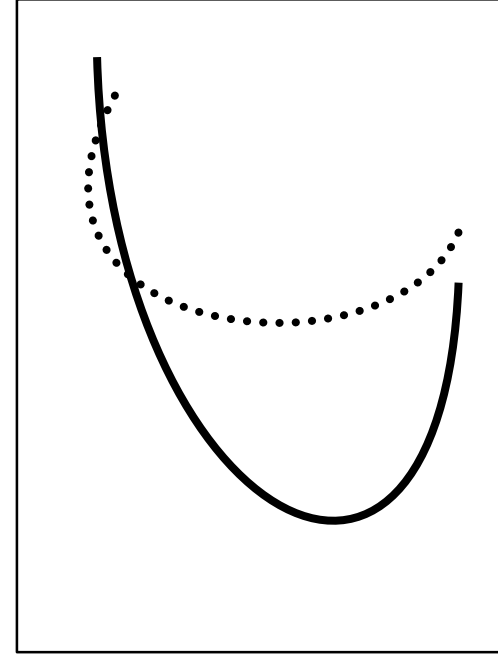
Two trajectories



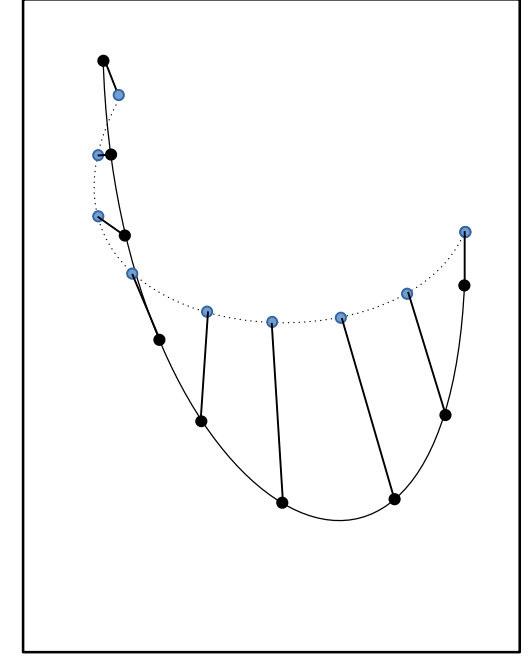
Smaller difference



Larger difference



Point-wise distances



— MHG /i:/  
..... MHG /ei/

# Total Euclidean Distance Squared (TEDS)

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$$TEDS = \sum_{i=1}^n \left( \sqrt{\Delta_{F1}^2 + \Delta_{F2}^2} \right)^2$$

where:

$\Delta_{F1}$  and  $\Delta_{F2}$  denote the vectors of the point-wise differences between the F1/F2 trajectories of the two diphthongs

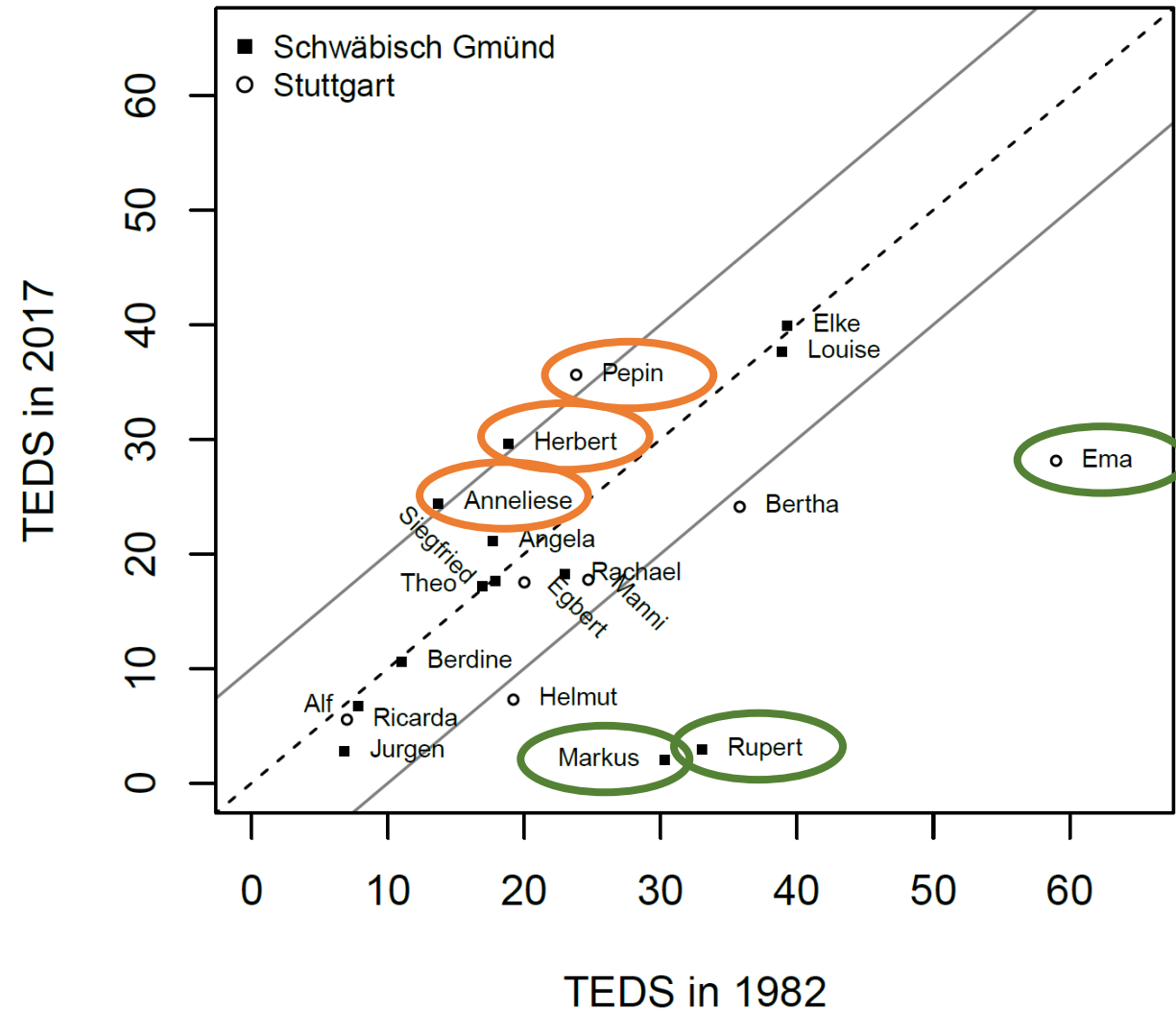
$n$  denotes the length of the vectors (i.e., number of data points) in the F1/F2 trajectory



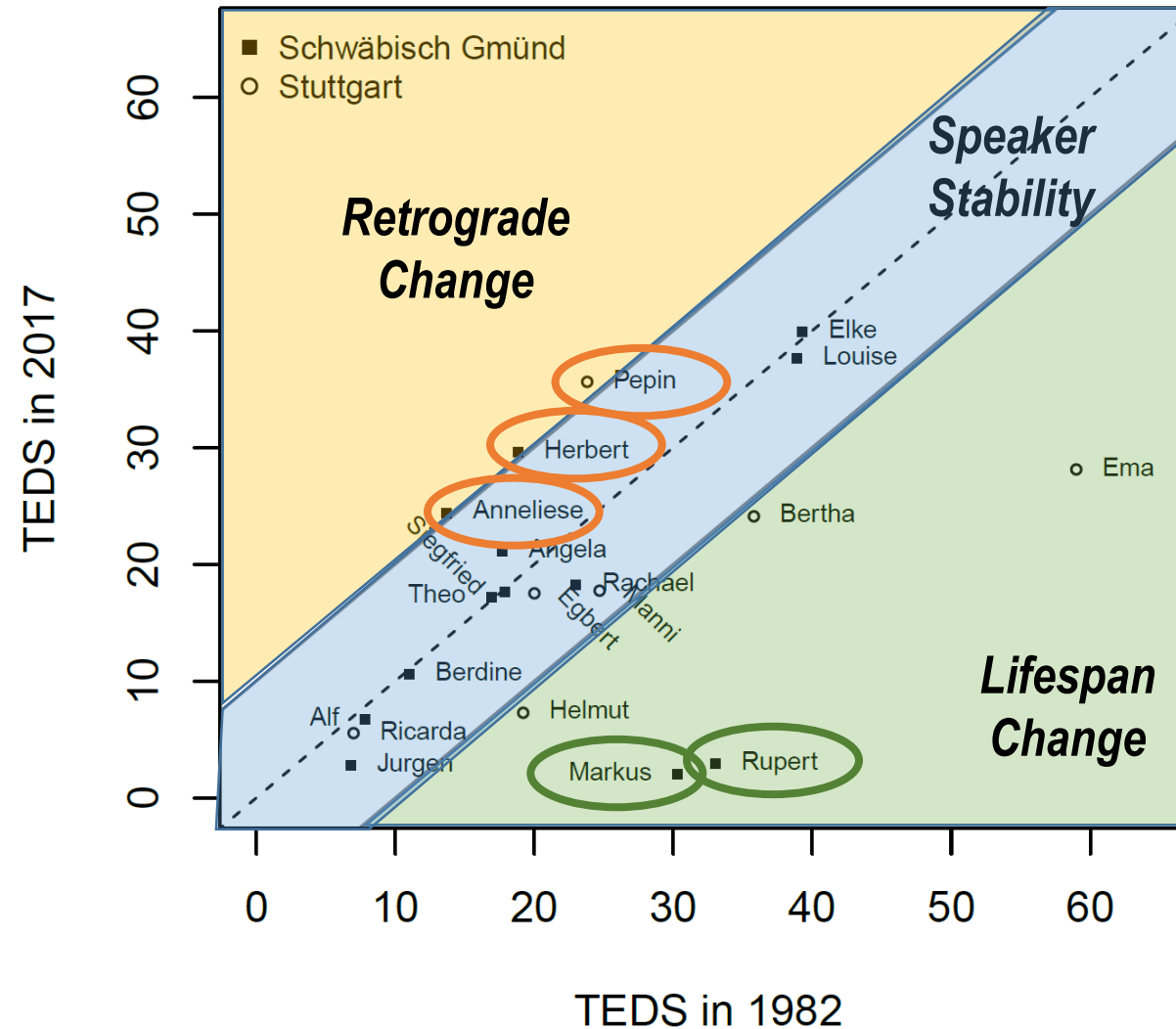
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# Results

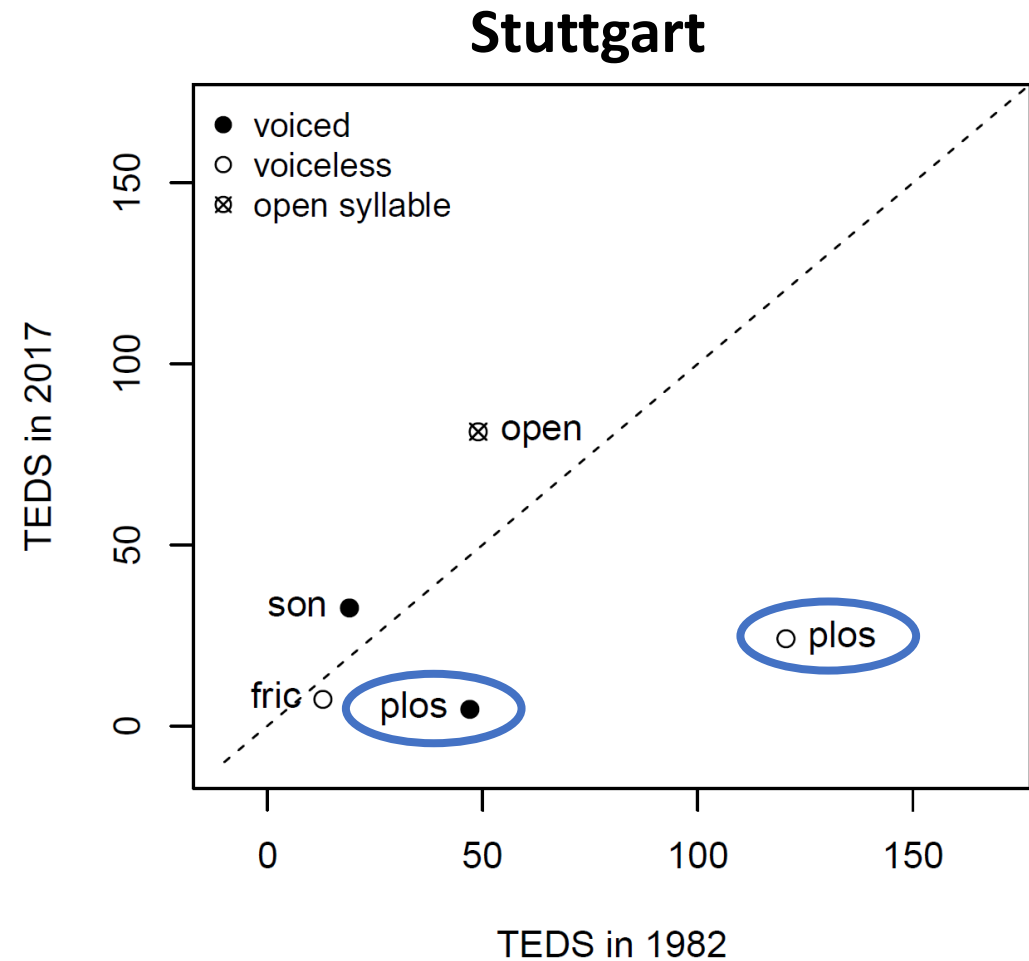
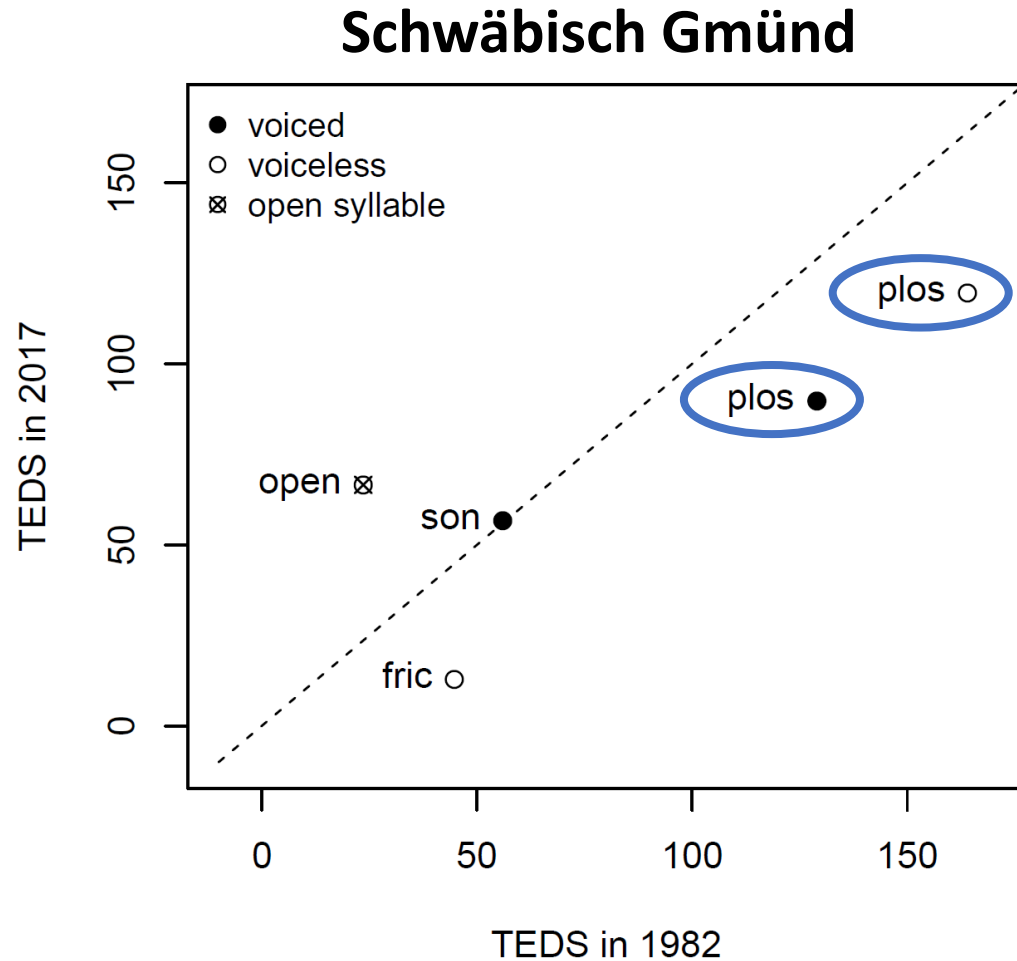
# TEDS in 1982 and 2017: Individual Speakers



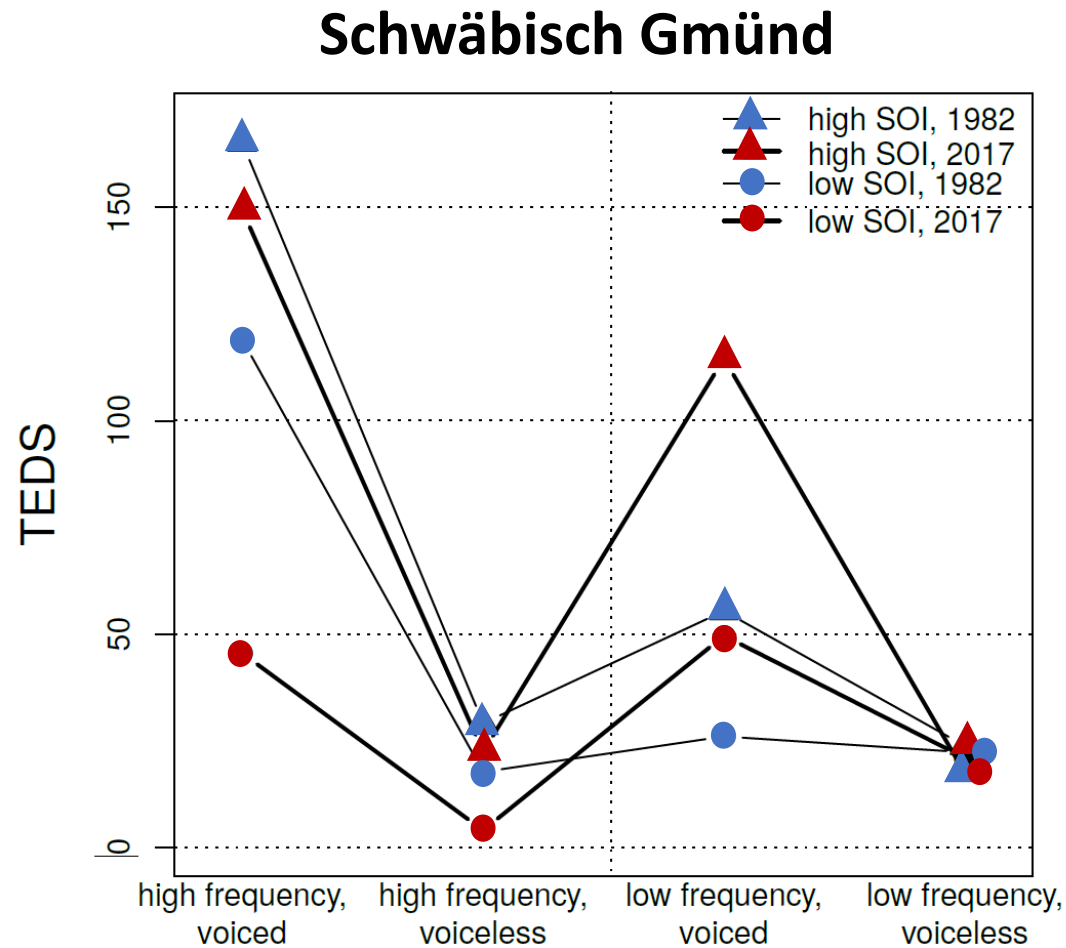
# TEDS in 1982 and 2017: Individual Speakers



# TEDS in 1982 and 2017: Following Environment



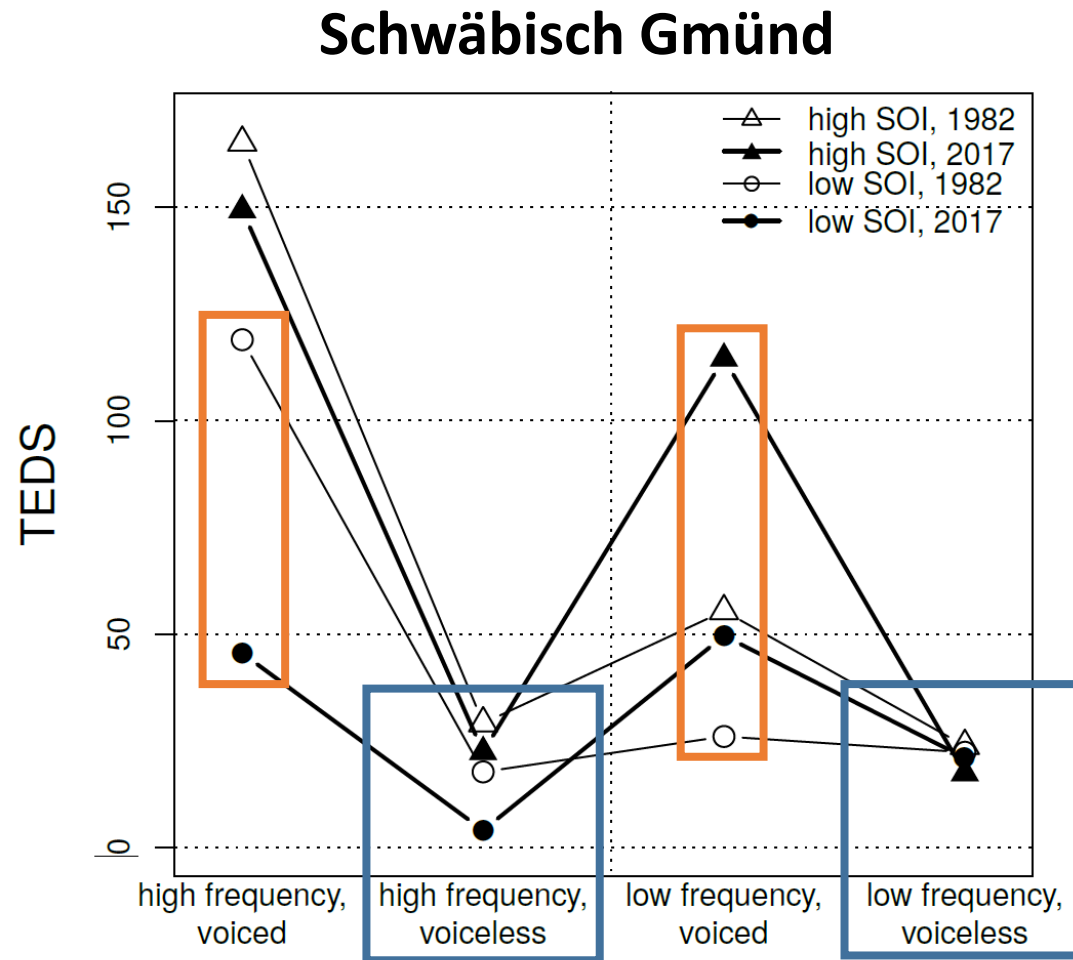
# Interactional Analysis: Schwäbisch Gmünd



- Overall lower TEDS values in 2017 than in 1982, showing loss of phonetic contrast over the 35 years
- Low SOI speakers show greater loss of phonetic contrast than high SOI speakers



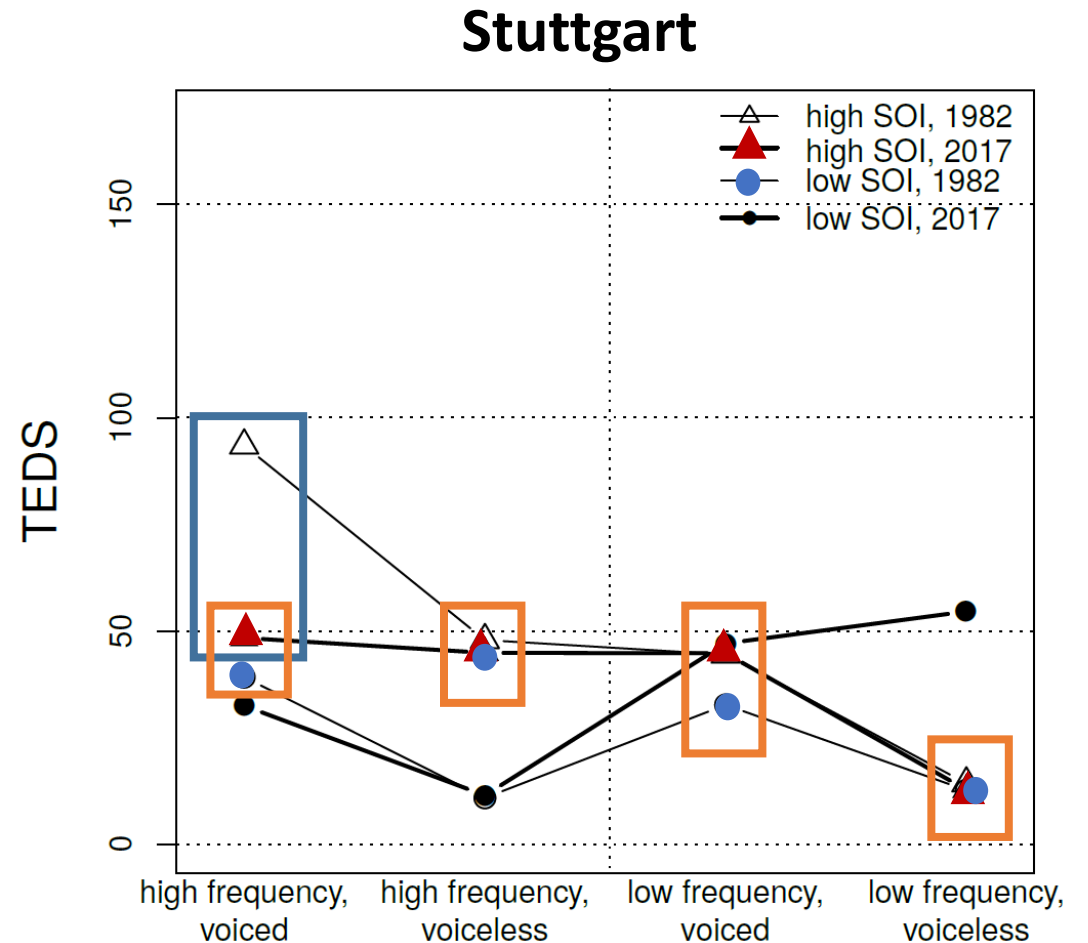
# Interactional Analysis: Schwäbisch Gmünd



- Overall lower TEDS values in 2017 than in 1982, showing loss of phonetic contrast over the 35 years
- Low SOI speakers show greater loss of phonetic contrast than high SOI speakers
- Voiceless consonants show the lowest TEDS, hence the smallest distinction between the diphthongs
- Interaction between frequency and SOI demonstrate the powerful effect socio-cognitive factors have on sound change

# Interactional Analysis: Stuttgart

- Overall lower TEDS values in 2017 than in 1982, showing loss of phonetic contrast over the 35 years
- Stuttgart speakers show smaller TEDS than speakers from Schwäbisch Gmünd
- Lower TEDS with high SOI speakers using high-frequency words in voiced environments
- High SOI speakers in 2017 produce TEDS similar to low SOI speakers in 1982, indicating change well-underway



# Summary

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- Change begins in urban centres and spreads to smaller communities
  - Overall greater loss of phonetic contrast in Stuttgart in Schwäbisch Gmünd*
- Sound change proceeds systematically through articulatory environments
  - Change is most advanced in preceding voiceless environments*
- Swabian orientation and ‘dialect identity’ matter
  - Speakers with high SOI are resisting the change, while those with low SOI are embracing it*
- Word frequency shows strong interaction with Swabian Orientation
  - High SOI speakers are resisting the change with high-frequency words*

# Conclusions

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- Speakers' internal grammars are more malleable than generally thought
  - *Overall loss of phonetic contrast between the two diphthongs across the lifespan for most speakers*
- Changing local ideologies can shape the trajectory of language change
  - *The indexicalities and social meaning of the /ai/ diphthong reflect individual lifespan perspectives*

*von dem her war i mal typisch und  
zum Glück nimme so arg*

*'at that time I was typical and  
luckily not so much anymore'*

*(Pepin 2017)*

*i bin e Schwââb und bleib ôiner*

*'I'm a Schwab and will stay one'*

*(Louise 2017)*

# Thank you

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## **SPECIAL THANKS TO:**

*Peter Auer, Harald Baayen, Isabelle Buchstaller, Jenny Cheshire, Lauren Hall-Lew, Jonathan Harrington, Adrian Leeman, and Konstantin Sering*

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# TEDS in 1982 and 2017: Interactional Effects

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- Interactional effects based on community, Swabian orientation, lexical frequency, and voicing of the following consonant.
- F1 formant: six-way interaction:
  - Time \* Frequency \* Swabian Orientation \* Diphthong origin \* Year \* Voicing.
- F2 formant: five-way interaction:
  - Time \* Frequency \* Swabian Orientation \* Diphthong origin \* Year.
- Random intercepts for speaker and word
- For voicing, 25th and 75th percentile of the frequency distribution
- In total, 32 TEDS values:
  - 2 Diphthongs \* 2 SOI Levels \* 2 Frequencies \* 2 Voicing/Voiceless \* 2 Communities