

Deconfounding the effects of competition and attrition on dialect across the lifespan: a panel study investigation of Swabian German

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Abstract

Lifespan dialectal changes in individuals are typically seen as reflecting the attritional effect of standard languages on native dialects. However, particularly relevant to lifespan studies of dialect usage is the observation that the distributional properties of natural languages guarantee that the lexical knowledge of individuals increases continuously throughout their lifetime and that the overwhelming majority of lexical types any individual knows are rare and often unknown by other speakers. These considerations suggest an alternative account of the changes in individual speech patterns across the lifespan: that is, the increased influence of later acquired, usually non-dialect, lexical knowledge on speakers' vocabulary choice, not the "loss" of dialect itself. Consistent with this view, an analysis of the speech of 20 speakers of the southwestern German dialect, Swabian, recorded in 1982 and again in 2017, reveals that rather than "lose" dialect throughout their lifetime, speakers acquire a vast amount of non-dialectal vocabulary reflecting experiences gained in later life. Within the set of relatively high-frequency words sampled in this study, dialect words are used with similar frequency across the years, whereas words from the standard language show higher frequencies in 2017 compared to 1982.

Keywords: lexical frequency, lifespan change, language change, ageing, dialect contact, dialect attrition, standard language, dialect identity.

¹ Authors are presented in alphabetical order to represent the collaborative nature of this research. We would like to thank Jenny Cheshire, John Nerbonne, and Ulrich Reubold for their comments on an early draft of this paper. Any deficiencies remaining are, of course, our own.

Introduction

Rising mobility, increasing levels of education, and intensifying immigration are bringing more diverse people into more frequent contact with more prolonged interaction (Auer 2007; Britain 2013, 2016; Britain and Trudgill 1999; Dodsworth 2017; Trudgill 1992). These factors, coupled with continuing globalisation and ubiquitous social media, are pushing standard languages into the forefront of people's experience and relegating non-standard varieties to the background. As a consequence, a growing body of research suggests that dialects, i.e., non-standard language varieties, are receding across the globe. Nowhere is this more evident than in Europe, notably Germany (Auer 2005, 2018; Auer, Baumann, and Schwarz 2011; Auer and Spiekermann 2011; Kehrein 2012; Pedersen 2005; Schmidt 2011; Streck and Auer 2012).

Dialectologists measure changes in the use of dialect-specific words (e.g., Swabian *Grombiere* versus standard German *Kartoffel* 'potato'), variationists study changes in the frequencies of various phonological and morphosyntactic variants (e.g., Alemannic *Fescht* versus standard German *Fest* 'party'), and corpus/computational linguists examine changes in frequencies between different word forms (e.g., colloquial *geh* versus standard German *gehe* 'go'). Cumulatively, the results of these metrics show that when different language varieties come into contact, accommodation occurs, and most commonly, it is the more prestigious variety that "wins" (Britain and Trudgill 1999; Giles, Taylor, and Bourhis 1973; Trudgill 1986). Indeed, this pattern is also seen in individuals: adult speakers appear to "lose" dialect as they age as they develop greater awareness of and experience with the standard language, gained through their participation in various educational, commercial, and public institutions (Eckert 1997; Labov 1964; Sankoff and Laberge 1978).

The idea of dialect attrition is the dominant view in interpreting these patterns of language development. However, this position builds on the assumption that the standard language is encroaching on the dialect, such that, at the lexical level, dialect words are replaced by their standard counterparts, resulting in attrition of the dialect

vocabulary. There are two main problems inherent in this assumption that are particularly relevant to lifespan studies of dialect usage.

First, the distributional properties of natural languages ensure that the lexical knowledge of healthy individuals increases continuously across their lifespan. These same distributional properties also guarantee that the majority of lexical types any individual knows are relatively rare and that many of these types will be shared only with subsets of the wider community. As people age, their knowledge expands as they experience new things (e.g., in schools, on the job, with leisure activities), face various new life events (e.g., graduation, marriage, childbirth, divorce), and tackle new challenges (e.g., driving a fork-lift, climbing Kilimanjaro). In the course of these undertakings, speakers encounter new words and add them to their vocabulary. Many of these new words are specific to specialised areas of knowledge, such as medicine, plumbing, or linguistics, and are not in the vocabularies of other speakers in the community. In an increasingly technology-driven world, this increased lexical knowledge may involve words for new inventions and technologies (e.g., *cell phone*, *fax*, *emoji*). Importantly, it is likely that many of the specialisation-specific words, as well as words for cultural innovations, have the same form in both the dialect and the standard language.

Second, the social settings for which the standard language or the dialect are appropriate often differ substantially. A rural dialect is lexically strong for discussing traditional methods of farming and socially appropriate for informal interactions with family and friends in the local community. The standard language comes into its own for interactions with speakers of differing backgrounds or to cover topics for which the dialect does not offer the relevant specialised words. These two considerations thus suggest an alternative account of the changes in individual speech patterns across the lifespan. These changes do not represent "skill loss," as has often been claimed (e.g., Köpke and Schmid 2004), but rather reflect the fact that experience tends to make individuals *more* skilled when measured in terms of their ability to communicate about an expanding repertoire of topics. Hence, many changes in speech patterns merely

reflect the increased influence of later acquired, standard language lexical knowledge, and not the “loss” of dialect itself.

THE HYPOTHESES

Accordingly, in this study, we put forth three hypotheses:

- (1) rather than lose dialect, speakers gain a massive amount of new lexical knowledge throughout their lifetime that is not dialect;
- (2) dialect forms are more entrenched than words from the standard language; and,
- (3) speakers use more dialectal forms where context makes early experiences more relevant and fewer dialectal forms where context renders later life experiences more applicable.

THE CURRENT STUDY

This study investigates lexical richness dialect and standard language word usage across the lifespan. Our investigation is positioned at the intersection of the fields of dialectology (dialect contact and attrition studies), sociolinguistics (longitudinal variationist and identity studies), psycholinguistics (lexical frequency studies), and psychology (ageing and cognition studies). We first describe the corpus we used and then explain the methodology we employed, followed by a presentation of the results of our analyses. We conclude with a discussion on the importance of considering lexical distributions and the nature of lifetime learning in studies of language change across the lifespan.

Methodology

CORPUS

The corpus for this investigation comprises casual, semi-structured sociolinguistic interviews with 20 speakers of Swabian, a high-Alemannic dialect spoken in southwestern Germany. Each speaker was interviewed twice, once in 1982 and again in 2017, for approximately an hour, although the interviews in 2017 tended to be

somewhat longer. Local native Swabian speakers were selected as interviewers, matched in 1982 and 2017 for similar social characteristics (i.e., same age group, gender, educational level). The interviews followed a Labovian-style sociolinguistics questionnaire (Labov 1984), covering questions about the speakers' childhood, games, leisure activities, family, friends, and the Swabian language and culture. If speakers wandered off the topic, the interviewer did not interrupt them immediately, with the aim of obtaining more natural, unmonitored speech. The overall goal was to create similar interview situations for all speakers in both time periods.

The corpus comprises two different speech communities, providing the opportunity to investigate changes in language use between an urban and a semi-rural setting. Stuttgart is a large urban centre with 630,000 inhabitants, and Schwäbisch Gmünd is a typical mid-sized, semi-rural town of 60,000 inhabitants. Seven speakers are from Stuttgart, four men and three women, and 13 from Schwäbisch Gmünd, seven men and six women. Most speakers are of the same age group (18-25 in 1982 and 53-60 in 2017) and socioeconomic status (middle class); 14 of the 20 speakers completed their *Abitur*, the German college preparatory exam. Four speakers, parents of the younger speakers, were in their late 40's to early 50's in 1982, and hence in their 80's in 2017. In 1982 each community exhibited many, dense, multiplex social relationships, whereas by 2017, community ties have weakened and social connections become considerably more dispersed, particularly in Stuttgart.

Transcriptions were completed in ELAN (Wittenburg et al. 2006) by native German speakers, students at the University of Tübingen. A standard orthography was developed for easily and clearly transcribing relevant Swabian dialect forms. All transcripts were verified by the principal investigator (Beaman) to ensure that standards were followed and to neutralise transcriber bias. All words (delineated by punctuation marks or blanks) were extracted, and forms were identified as Swabian, colloquial or standard. Swabian-specific forms were tagged with a code indicating one of 32 dialect variables under investigation (see Table 5 in the Supplemental Materials for

a description of the variables²). Colloquial forms were identified as any form differing from the standard German form. For example, with the verb *haben* ‘to have’, *habe* is identified as the Standard form, *hab* as the colloquial variant (with the reduction of the final ‘e’), and *han* as the Swabian variant (an irregular verb in the dialect). Because we are primarily interested in vocabulary growth and attrition across the lifespan, we grouped the colloquial and Swabian-specific forms together (henceforth called, “dialect”) in order to contrast them with the standard German forms.

The vocabulary of the corpus was divided into two subsets, dialect words (n=22,401 in 1982 and n=20,795 in 2017) and standard words (n=50,149 in 1982 and n=69,619 in 2017). Dialect words make up less than a third (30.9%) of the speakers’ actively used vocabularies in 1982, dropping to less than a quarter (23.0%) in 2017. As our results will later show, this apparent dialect attrition stands in stark contrast with the exceptional growth of the standard vocabulary between 1982 and 2017 (27.9%).

SOCIAL PREDICTORS

Four social predictors were considered in this study:

- two recording years, i.e., 1982 and 2017;
- two speech communities, i.e., Stuttgart and Schwäbisch Gmünd;
- two education levels, i.e., with *Abitur* ‘German college preparatory exam’ and without; and,
- Swabian orientation, i.e., a five-point scale from 1 (lowest) to 5 (highest).

Following the model developed by Hoffman and Walker (2010) to measure the degree of Ethnic Orientation (EO), a Swabian Orientation Index (SOI) was derived for each speaker based on their answers to 16 questions posed in the interview. The questions covered attitudes to the Swabian culture and language, knowledge of Swabian icons and markers, participation in Swabian events, and the nature of linguistic interactions with Swabian and non-Swabian friends and family. The speakers’ answers were evaluated on a five-point scale and averaged to create an overall score for

² Supplemental Materials can be found at: <https://osf.io/nhjxk/>

each speaker in each year, from one for the lowest to five for the highest Swabian orientation (see Table 6 in the Supplemental Materials, as well as Beaman 2018 for further details).

TYPES AND TOKENS

In what follows, we use WORD TYPE to refer to any unique word, a string of letters delineated by spaces or punctuation marks in the transcript, and WORD TOKEN to refer to any instance of a specific WORD TYPE that occurs or reoccurs in the transcript regardless of its identity. For each transcript, TEXT LENGTH is measured by the number of WORD TOKENS, while VOCABULARY SIZE is measured by the number of WORD TYPES. No lemmatisation was carried out; thus, for example, if a speaker uses the present and past tense of the same verb, they count as two different WORD TYPES. In 1982, the 20 interviews consisted of 17,707 TYPES and 72,560 TOKENS, and in 2017, the 20 transcripts contained 17,134 TYPES and 90,414 TOKENS. Of the roughly 17,000 WORD TYPES in each recording year, more than half (11,688 in 1982 and 11,337 in 2017) occurred only once, emphasising one premise of this research: that many of the words speakers use are indeed quite rare. Speakers tend to use words specific to their particular areas of interest and experience, and the overlap between speakers is quite small.

VOCABULARY GROWTH

The most straightforward measure for investigating differences in word use between texts is the size of the vocabulary (Baayen 2001). However, vocabulary size is dependent on text length, which, for the present study, is the length of the interview. Quite naturally, the longer the interview, the greater the opportunity for the speaker to utter a new word. Simple ways to sidestep this problem are to either base the analysis on a comparison of texts that are the same length or to plot interpolated VOCABULARY GROWTH CURVES side-by-side for texts of differing lengths (Baayen 2008). Due to the nature of our spontaneously spoken sociolinguistic interviews, we chose the latter approach. VOCABULARY GROWTH CURVES are projected by counting the number of TOKENS within equally spaced measurement points throughout the text (referred to as

TOKEN TIME) and graphing the corresponding count of WORD TYPES. This curve depicts how vocabulary increases throughout the text (i.e., the sequence of interviews), which is typically quite steep at first and then flattening as more and more different WORD TYPES are encountered. By plotting two VOCABULARY GROWTH CURVES side-by-side, core properties of the different dynamics between TYPES and TOKENS become available for visual inspection and statistical evaluation.

STATISTICAL METHODS

In calculating VOCABULARY GROWTH CURVES for heterogeneous collections of texts, the question arises on how to order the texts. Our interviews comprise data sampled from both talkative and taciturn speakers, and there is no natural order by which the interviews can be arranged. As we did not want to disrupt the syntactic and discursive structure of the interviews, we decided to randomise the order of the interviews 50 times. For each permutation of interviews, we calculated the vocabulary size at ten equally-spaced measurement points, called TEXT CHUNKS (due to the varying lengths of the interviews, we used 100 TEXT CHUNKS for dialect and 200 for the standard language). For each TEXT CHUNK, we applied the Wilcoxon test to evaluate whether vocabulary sizes diverged from the mean. We also added outer polygons to the permutation-based vocabulary sizes to show changes in vocabulary use as a function of (by-speaker randomised) interview length.

Analysis and Results

The analysis and results of our investigation into lexical frequency effects in dialect usage in Swabian cover five areas: vocabulary growth across the lifespan, Swabian orientation and lexical choice, individual patterns of lexical change across the lifespan, dialect entrenchment, and contexts of dialect usage.

VOCABULARY GROWTH

Recall that our first hypothesis claims that, rather than lose dialect, speakers actually gain substantial numbers of new standard words as they encounter novel

experiences over the course of their lifetime. Figure 1 depicts THE VOCABULARY GROWTH CURVES for our 20 speakers for the two time periods. Dialect vocabulary growth is pictured on the left and standard vocabulary growth on the right; VOCABULARY SIZE (in TYPES) is shown on the vertical axis and TEXT LENGTH (in TOKENS) on the horizontal axis. Red represents the speakers' vocabulary growth curve in 1982, and blue portrays their growth curve in 2017. The results of the randomisation process are displayed via a polygon that surrounds the outer boundary, encircling all of the points. The dots illustrate vocabulary sizes for the 50 permutations. The asterisks ("*") at the upper left of each plot signify that there is a significant difference in vocabulary size at the corresponding TEXT CHUNKS according to a Wilcoxon test ($p < .05$).

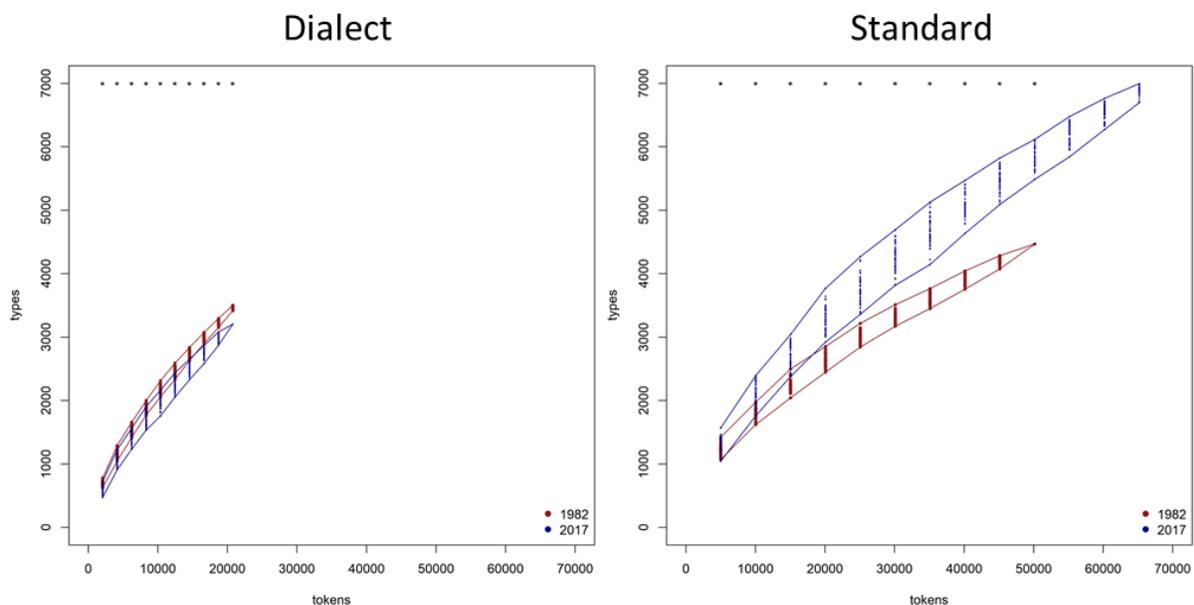


Figure 1. Vocabulary growth curves (dialect and standard) for 20 Swabian panel speakers over a 35-year time span, using 50 permutations of interview orders, for ten equally-spaced measurement points. Asterisks ("*") indicate significant differences between text chunks based on a Wilcoxon test ($p < .05$).

From the left panel, it is evident from the overlapping red and blue polygons that there has been relatively little change in the extent to which speakers use dialect words over the 35-year timespan: speakers appear to use around hundred fewer dialect WORD TYPES in 2017 than they did in 1982. In contrast, on the right panel the larger blue

polygon shows that speakers have considerably enriched their standard language vocabulary by 2017 (cf. the red polygon for 1982). Their conversations made use of some 3,000 more WORD TYPES in 2017 than in 1982. These findings provide support for our hypothesis that, rather than use less dialect forms, in fact, speakers actually gain an immense amount of additional lexical knowledge that is not dialect, making it appear as if dialect forms have been lost. These results replicate numerous other studies that show vocabulary size increases with age (Keuleers et al. 2015; McCabe et al. 2010; Park et al. 2002). Keuleers et al. (2015:1685) claim that “age is by far the most important variable in predicting vocabulary size.... every day lived represents an opportunity for acquisition of vocabulary and that existing vocabulary is not forgotten.” As we surmised, for our Swabian speakers, the wisdom gained through added experience is manifested in the standard language rather than in the dialect.

It is interesting to note that the dialect vocabularies in 1982 and 2017 (left panel) are quite similar, which can be observed in how the polygons overlap for most of the trajectory. The two *active* vocabularies, i.e., the counts of different words used by a set of speakers in our interviews, only begin to disassociate about three quarters into the curve and are not entirely disassociated until the last interval. However, for the standard *active* vocabulary (right panel), the two trajectories disassociate much sooner, almost from the beginning, signifying that the standard language vocabularies in 1982 and 2017 are considerably more dissimilar. This difference leads us to the premise that the domains and contexts in which dialect is spoken have changed little over the years, whereas the domains in which the standard language is encountered are vast and multifarious. In 1982 most of the speakers were students in their 20's at the university or starting their first jobs, with naturally quite limited life experiences. As they completed their education, travelled, moved away from home, entered in the workforce, and made new friends, they encountered novel and diverse experiences, most of which appear to have been in context with the standard language.

Figure 2 shows similar VOCABULARY GROWTH CURVES by community, Stuttgart on the top and Schwäbisch Gmünd on the bottom, dialect on the left and the standard

language on the right. As we would expect, more dialect is spoken in the semi-rural community of Schwäbisch Gmünd than in the urban centre of Stuttgart, in fact, almost double: there are close to 3,000 dialect WORD TYPES in our sample from Schwäbisch Gmünd and only 1,500 dialect WORD TYPES in our sample from Stuttgart. We also note that the *active* dialect vocabulary has declined somewhat in Stuttgart between 1982 and 2017 (by around 500 TYPES), yet remains more constant over the 35 years in Schwäbisch Gmünd (a difference of only around 100 TYPES).

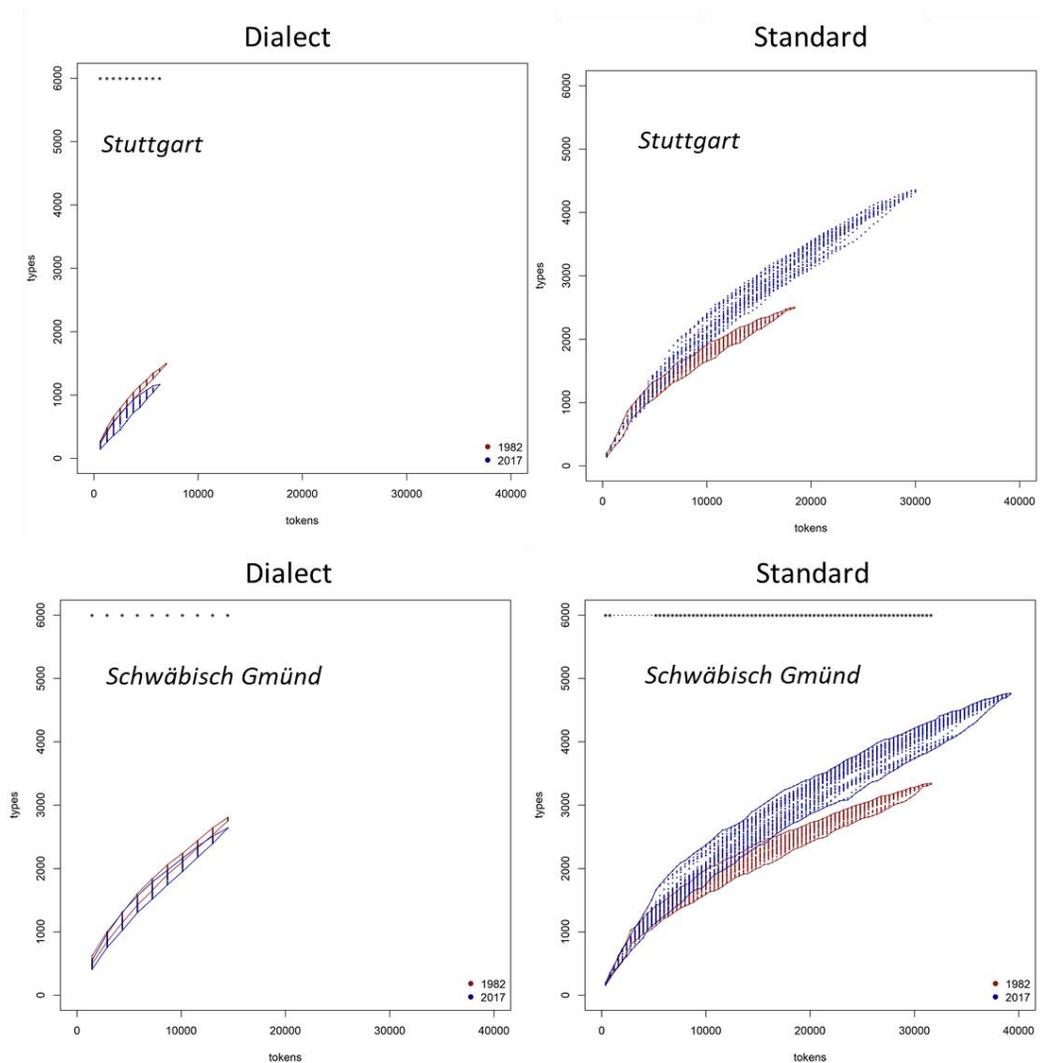


Figure 2. Vocabulary growth curves by community (Stuttgart and Schwäbisch Gmünd) for 20 Swabian panel speakers (7 from Stuttgart, 13 from Schwäbisch Gmünd) over a 35-year time span, using 50 permutations of interview orders, for ten equally-spaced measurement points. Asterisks (“*”) indicate significant differences between text chunks based on a Wilcoxon test ($p < .05$).

The right panels of Figure 2 establish quite clearly that speakers' *active* standard language vocabulary has expanded substantially over the 35 years. The speakers in Stuttgart have started actively using even more standard words than those in Schwäbisch Gmünd (roughly 2,000 more WORD TYPES in Stuttgart versus 1,500 more in Gmünd), presumably partially to fill in the gap left by the small reduction in dialect usage but, more likely, because urban life typically offers more diverse experiences than generally encountered a quieter, semi-rural town.

The lower panels in Figure 2 show that the speakers from Schwäbisch Gmünd are considerably more chatty than those from Stuttgart: they produce more TOKENS (ca. 40,000 TOKENS in Schwäbisch Gmünd versus ca. 30,000 in Stuttgart) and more WORD TYPES (ca. 4,800 TYPES in Schwäbisch Gmünd versus ca. 4,200 in Stuttgart). Based on our ethnographic investigations of the speakers in these communities, we know that people from Schwäbisch Gmünd place a high value on their dialect, which is strengthened in the social setting via intense and frequent communication with friends and family. In the urban centre of Stuttgart, social connections are weaker and looser. Time appears to be of the essence; hence, communication is briefer and to the point. Speakers in Schwäbisch Gmünd manifest a strong orientation to Swabia, and dialect provides a conduit for bonding with the people around them, as the following citation from Angela³ in 2017 shows:

ich bin ein sehr kommunikativer Mensch	I am a very communicative person
ich schwätz gern	I like chit-chatting
de Schwertkampf vom meinr Kinder	my children's sword-fighting camp
da bin i mit einige Lait befreundet	I have some friends there
mr rufet uns au mal ā	sometimes we call each other
oder wenn öiner e Sorge hat	or if one person has a concern
dann ruft er de andere ā	then he calls the others
un mā kann des dann bespreche	and then you can talk about it
i bin au gern mit dene zsamme	I like being together with them
ōifach so zum schwätze	simply to chit-chat

Figure 3 presents another perspective on the lexical growth picture in Swabia by exploring the speakers' VOCABULARY GROWTH RATE by level of education. Speakers who did not complete an *Abitur*, the German college preparatory exam, are shown on the top

³ All speaker names have been replaced by pseudonyms in order to protect their identities and maintain their privacy.

and speakers with an *Abitur* on the bottom. From the left panels, there is little change in the use of dialect based on educational attainment: both groups of speakers have retained most of their dialect words over the years. However, from the right panels, there is considerable growth in the active standard language vocabulary for both groups of speakers, those with and without an *Abitur*.

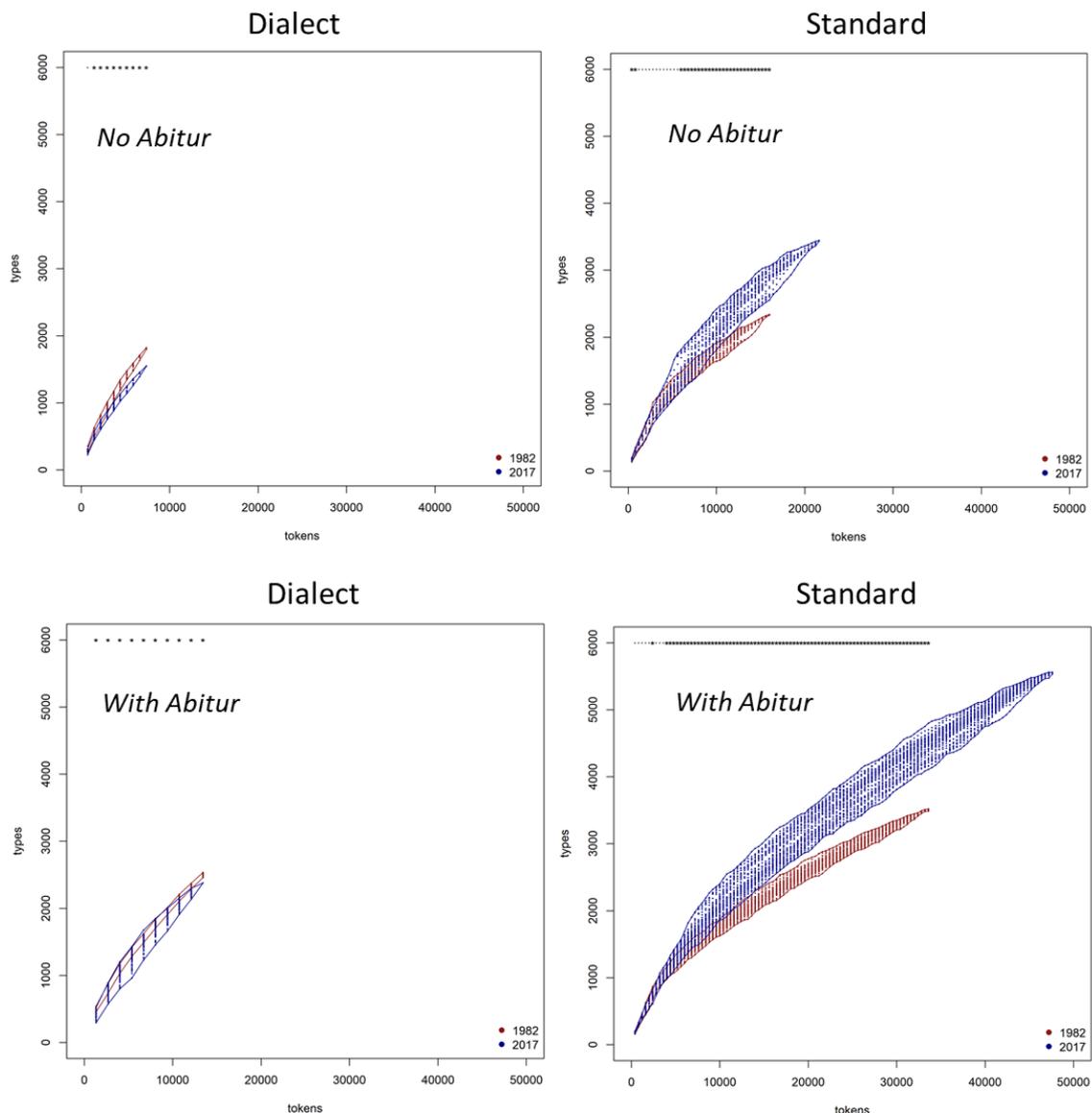


Figure 3. Vocabulary growth curves by educational achievement for 20 Swabian panel speakers (14 with *Abitur*, German college preparatory exam, and 6 without *Abitur*) over a 35-year time span, using 50 permutations of interview orders, for ten equally-spaced measurement points. Asterisks (“**”) indicate significant differences between text chunks based on a Wilcoxon test ($p < .05$).

The types and amount of language that individuals are exposed to throughout their life vary substantially (Hart and Risley 1995). While both the high and less highly educated groups have increased their standard vocabulary over the 35 years, we see a striking surge in 2017 for speakers with higher education (lower right panel). Knowledge, and specifically the accompanying vocabulary, naturally increases with education and diversification of experience. These results can be attributed to the fact that the standard language is reinforced in school, and, indeed, many studies have confirmed the association between a loss of dialect forms and higher levels of education (Cheshire et al. 1989; Keuleers et al. 2015; Prichard and Tamminga 2012; Wieling et al. 2014). Increased standard language vocabulary reflects the contact and involvement that the more educated group has with the standard language. The more highly educated speakers are also more loquacious in the standard language, presumably because they have encountered a broader range of experiences in the standard language, which in turn offers a richer vocabulary for expressing their thoughts and experiences.

ORIENTATION AND LEXICAL CHOICE

Many studies have shown that speakers' linguistic choices are influenced by their orientation or personal affinity towards the dialect or the standard language (Cheshire et al. 2008; Coupland 2007; Eckert 1989; Hoffman and Walker 2010; Horvath and Sankoff 1987; Labov 1963, 1966; Schilling-Estes 2004), which, of course, can change over the course their lifetime. Figure 4 depicts the changing prominence of Swabian orientation over the 35 years and within the two communities, exposing two critical effects that Swabian orientation has on society. The left panel brings to light the powerful role that the Swabian orientation played in 1982 (average 4.0); however, by 2017, Swabian orientation scores have fallen (average 3.6) and now stretch out over a much broader range. The right panel tells us that Stuttgart has a noticeably lower overall Swabian orientation index (3.5) and than Schwäbisch Gmünd (4.3), which is not unexpected. The mid-sized, semi-rural town of Schwäbisch Gmünd is a much smaller,

tighter-knit community than the vast urban metropolis of Stuttgart. Figure 4 makes it evident that the role of Swabian identity has changed dramatically over the years, especially for Stuttgart.

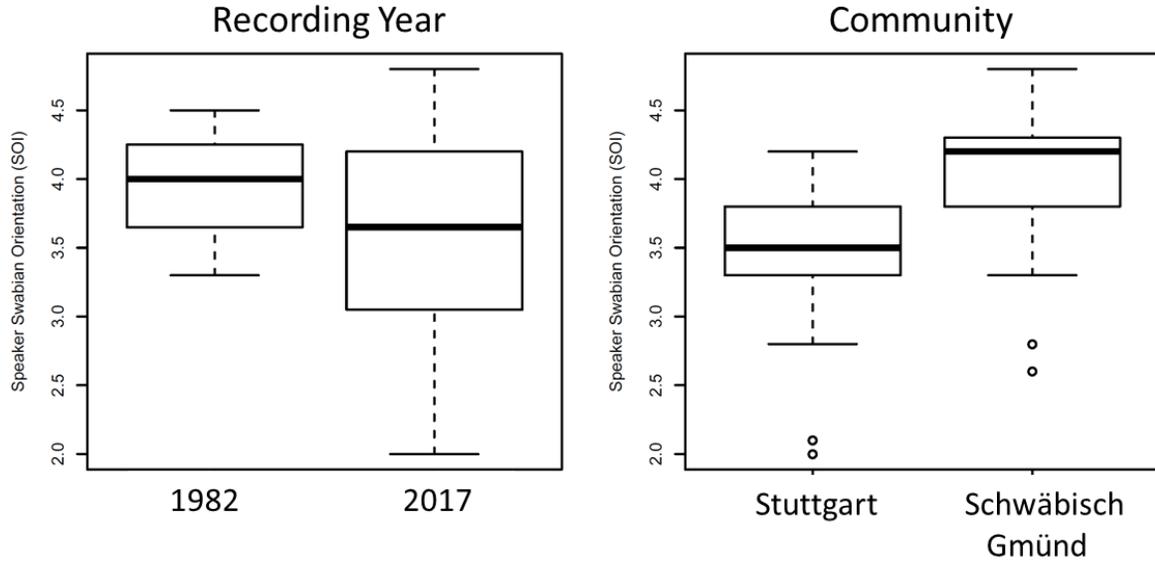


Figure 4. Swabian Orientation Index (SOI) by recording year (1982 and 2017) and community (Stuttgart and Schwäbisch Gmünd) for 20 panel speakers. SOI is calculated from speakers' answers to 16 questions posed in the interview, evaluated on a five-point scale, from 1 for the lowest to 5 for the highest Swabian orientation.

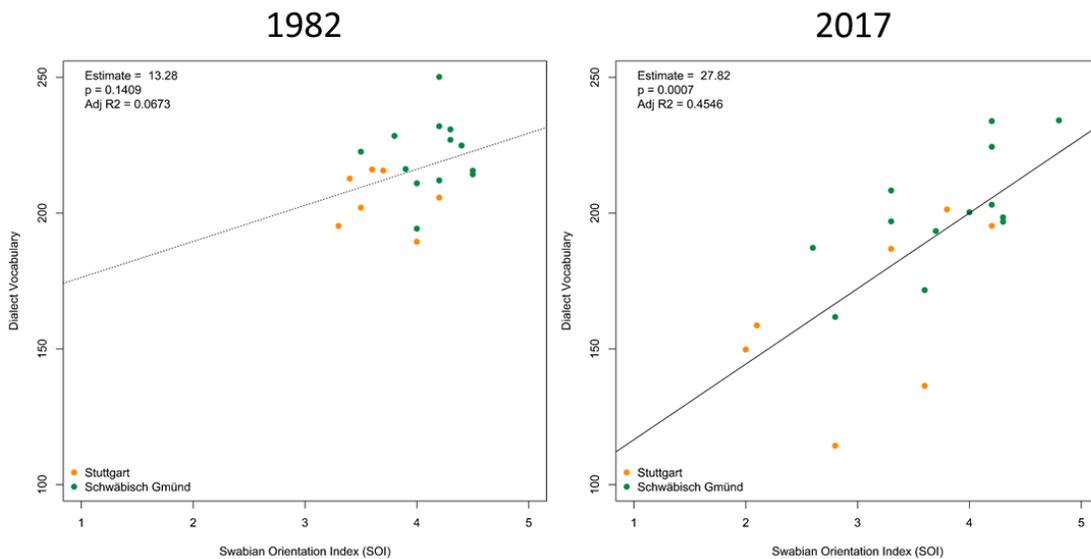


Figure 5. Dialect vocabulary size (at the fourth TEXT CHUNK, about 20 minutes into the interview) and Swabian Orientation Index (SOI) for two recording years (1982 and 2017) and two communities (Stuttgart and Schwäbisch Gmünd).

We now turn to the effect that Swabian orientation has on our individual panel speakers and their propensity to use dialect or standard vocabulary. Figure 5 plots active dialect vocabulary size (at the fourth TEXT CHUNK, about 20 minutes into the interview) and Swabian orientation for the 20 speakers, 1982 on the left and 2017 on the right. The Stuttgart speakers are denoted by orange dots and the Schwäbisch Gmünd speakers by green dots. Our first observation is the tight clustering of speakers in the upper right corner in 1982 (left panel) versus the more dispersed placement of speakers in 2017 (right panel). These speakers' similar patterns of dialect usage imply that Stuttgart and Schwäbisch Gmünd were more homogeneous in 1982 than they have become in 2017. By 2017, for many speakers, Swabian orientation has declined concomitantly with dialect vocabulary (demonstrated on the right panel by the dots spreading down and to the left). Still, we see a number of speakers, particularly from Schwäbisch Gmünd, who have retained their high Swabian orientation and dialect vocabulary (illustrated by the small clustering of green dots in the upper right). The trend is clear: the higher the Swabian orientation score, the larger the active dialect vocabulary; and conversely, the lower the speakers' orientation, the smaller the active dialect vocabulary. These findings are confirmed by a linear regression model that shows orientation not to be a significant predictor in 1982 ($\hat{\beta} = 13.285$, $p = 0.1409$, Adjusted $R^2 = .067$), whereas it has become highly significant in 2017 ($\hat{\beta} = 27.82$, $p = 0.0007$, Adjusted $R^2 = .455$). Conversely, we find orientation has no effect on the size of the standard vocabulary in 1982 ($\hat{\beta} = -9.802$, $p = 0.768$, Adjusted $R^2 = -.050$) and only a marginal effect in 2017 ($\hat{\beta} = -49.56$, $p = 0.04$, Adjusted $R^2 = .170$) (graphs for standard language not shown).

Figure 5 corroborates our finding from Figure 1, that is, while some speakers use less dialect today, other speakers use more, and this is principally driven by Swabian orientation. This change leads us to the question: who are the speakers who have changed their vocabulary the most, and what are the reasons behind this change? A

look into speakers' individual patterns of change across their lifespans can provide some insight.

INDIVIDUAL PATTERNS OF CHANGE

Individual patterns of linguistic change have been shown to complement and enhance insights gained from overall community change (Sankoff 2006; Wagner and Buchstaller 2017). Figure 6 takes a deeper dive into lifespan change by depicting individual speakers' vocabulary change from 1982 to 2017 (Figure 8 in the Supplementary Materials provides the individual vocabulary growth curves for each of the 20 speakers). We used generalised additive mixed models (GAMMs) (the *mgcv()* package for R, version 1.8-27) to visualise the differences in the change in active vocabulary use for the individual speakers.

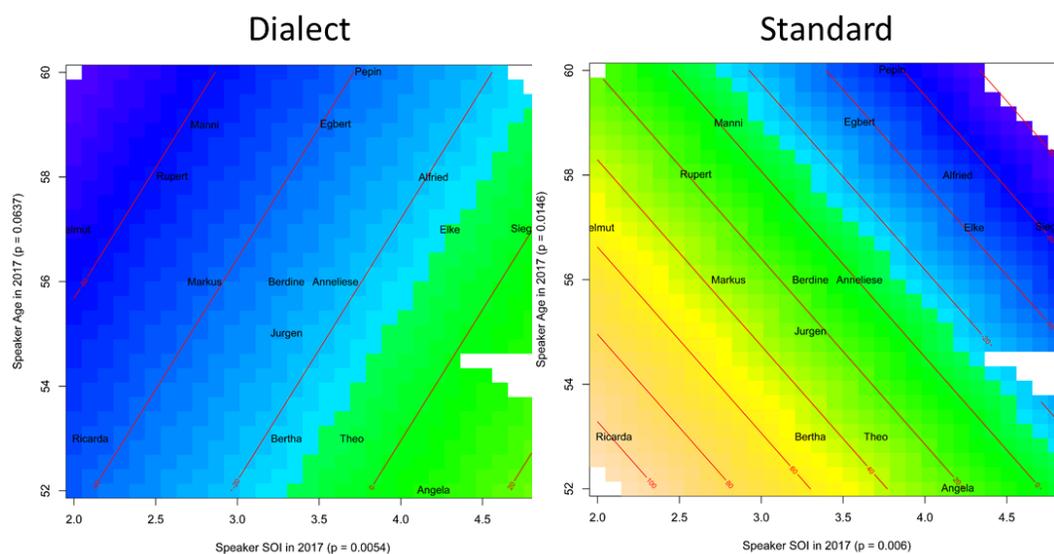


Figure 6. Dialect and standard language vocabulary change between 1982 and 2017 as a function of speaker age and Swabian Orientation Index (SOI) in 2017. Contour lines connect points with the same predicted values, signifying vocabulary change. Warmer colours show greater vocabulary gain, and cooler colours show greater vocabulary loss, with middle values shown in shades of green.

The left panel in Figure 6 depicts speakers' dialect vocabulary change from 1982 to 2017, and the right panel portrays speakers' standard vocabulary change over the same

period. Speaker age⁴ in 2017 is shown on the vertical axis and speaker orientation in 2017 on the horizontal axis. The contour lines delineate vocabulary change between 1982 and 2017, connecting points with the same predicted values, with the zero-contour line demarcating no change. In this colour-coded plot, greater vocabulary gain is shown in warmer colours and greater loss in the cooler colours. Note that the zero-contour line is on the right end of the dialect plot (left panel) and in the middle on the standard plot (right panel), signalling greater gain in the standard language.

In the left graph, illustrating dialect vocabulary change, the zero-contour line in the lower right visually establishes that there is only one speaker, Angela, who uses more dialect in 2017 than she did in 1982. Siegfried is on the cusp, and Elke and Theo are just above the zero line, signalling that these three speakers continue to use a similar amount of dialect in 2017 as they did in 1982. At the far left of the plot in the dark blue zone are Helmut, Rupert, and Manni, who have changed the most over the years and are now using the least dialect vocabulary. In stark contrast to the composite diagram in Figure 1, this individual view shows that active Swabian vocabulary richness has diminished over the 35-year timespan for some speakers and increased or largely stayed the same for others, unmistakably establishing the high correlation that speakers' individual Swabian orientation has on their vocabulary. Our hypothesis is confirmed through a GAMM analysis, which shows Swabian orientation to be a highly significant (linear) predictor ($\hat{\beta} = 23.37$, $p = 0.005$) of dialect usage. Age, however, turns out to be a marginal (linear) predictor of active dialect use, the effect of which is unreliable ($\hat{\beta} = -4.59$, $p = 0.064$).

The right panel in Figure 6, with the individual view of standard vocabulary change, indicates the inverse effect for Swabian orientation. (Note that because the x and y-axes have not changed, the speakers are in the same position on both graphs.) The zero-contour line, showing no change in active vocabulary for the standard

⁴ Due to the small size of our sample, there is large gap in age between the 50-60-year-olds and the over-80-year-olds in our corpus; hence, for display purposes, we have left the four octogenarians out of this figure; they exhibit similar patterns to the younger speakers in the study.

language, is in the middle of the chart in the green zone. Consistent with the findings from above, the majority of speakers have gained active standard vocabulary over the years, yet there are some speakers (in particular, Pepin and Siegfried in the upper right of the graph) for whom a small decrement in active standard vocabulary is visible. The results of our GAMM regression model confirm that both orientation ($\hat{\beta} = -42.61$, $p = 0.0063$) and age ($\hat{\beta} = -11.99$, $p = 0.0146$) are significant (linear) predictors of speakers' standard vocabulary gain. As Swabian orientation scores decrease, speakers' standard vocabulary increases; as people age, their standard vocabulary decreases. Interestingly, this vocabulary decrease with age appears to be characteristic only for the use of the standard language and not for the use of dialect.

The colours depicting dialect change in Figure 6 (left panel) visually reveal the three classic patterns of individual change as identified by Sankoff (2006). The blue zone denotes LIFESPAN CHANGE, that is, those speakers moving in the direction of the overall community change by using less dialect and more standard; the green zone marks SPEAKER STABILITY, those individuals resisting change and continuing to use a similar amount of dialect across the years; and, the lighter green zone portrays RETROGRADE CHANGE, speakers moving in the opposite direction of the general community change and using more dialect today than they did in 1982.

These results underscore the criticality of incorporating individual lifespan analyses into general trend studies to assist the researcher in teasing apart important influences that are otherwise hidden in community-wide averages. Concerning lexical richness, our findings establish that vocabulary change originates with the addition of new standard words gained through ongoing and novel experiences rather than in the "loss" of well-established dialect words.

Table 1 presents our panel speakers based on their degree of dialect change, demonstrating Sankoff's (2006) three types of individual change. We can glean a few trends from this table. First, Manni and Markus, at the top of the table, use the least dialect vocabulary in 2017 and have gained a typical amount of standard vocabulary. Helmut uses less dialect and has gained the most standard words over his peers. All

three of these speakers are businessmen in their late fifties, actively participating in the linguistic market (Bourdieu 1977; Eckert 1997; Sankoff and Laberge 1978; Wagner 2012) and frequently interacting with speakers from other dialect areas: Manni works as a consultant at the Stuttgart airport, Markus travels to Munich each week, and Helmut is a radio moderator. Hence, it is entirely natural that these speakers would come into contact with more diverse experiences in the standard language. In contrast, at the bottom of the table are Angela, Siegfried and Theo, with some of highest Swabian orientation scores, who have retained the majority of their dialect. There are also two speakers, Ema and Pepin, who are retired, reflecting the post-retirement trend of speakers moving back to their roots and returning to more dialect forms as they leave the workforce (Sankoff 2006, 2018).

Pseudonym	Community	2017				Vocabulary Change		
		Age	Sex	Abi	SOI	Dialect	Standard	Net
Manni	Stuttgart	59	M	Yes	2.8	-101	33	-69
Markus	Gmünd	56	M	Yes	2.8	-65	44	-21
Egbert	Stuttgart	59	M	Yes	3.6	-53	-82	-135
Anneliese	Gmünd	56	W	Yes	3.6	-51	18	-33
Helmut	Stuttgart	57	M	Yes	2.0	-46	124	78
Ricarda	Stuttgart	53	W	Yes	2.1	-43	71	28
Louise	Gmünd	88	W	No	4.0	-30	-150	-180
Bertha	Stuttgart	53	W	No	3.3	-29	48	19
Rachael	Gmünd	83	W	No	4.3	-26	33	7
Herbert	Gmünd	86	M	No	4.2	-26	58	32
Rupert	Gmünd	58	M	Yes	2.6	-24	-38	-62
Jurgen	Gmünd	55	M	Yes	3.3	-20	45	24
Berdine	Gmünd	56	W	Yes	3.3	-19	-42	-62
Elke	Gmünd	57	W	No	4.3	-15	-82	-97
Pepin	Stuttgart	60	M	Yes	3.8	-11	-42	-53
Alfried	Gmünd	58	M	Yes	4.2	-11	-33	-44
Ema	Stuttgart	83	W	No	4.2	-10	-38	-48
Theo	Gmünd	53	M	Yes	3.7	-1	1	0
Siegfried	Gmünd	57	M	Yes	4.8	2	-39	-37
Angela	Gmünd	52	W	Yes	4.2	16	62	78

Lifespan Change

Speaker Stability

Retrograde Change

Table 1. Change in speaker vocabulary size across the years (1982 versus 2017), indicating three types of dialect change across the lifespan (sorted by change in dialect vocabulary size).

It is interesting to note that there are more Stuttgart speakers at the top of the table, signalling less use of the dialect in the large urban centre than the semi-rural

community of Schwäbisch Gmünd. This result is not surprising considering the enormously diverse population of Stuttgart, which is one of the cities with the highest number of “foreigners” (individuals with at least one parent who immigrated⁵) in all of Germany, almost twice as many as in Germany overall (Auer 2019).

The prominence of the urban-rural divide can also be seen when comparing speakers of similar demographics, so-called “social twins” (Nordberg and Sundgren 1998; Sankoff and Blondeau 2010). Egbert is a middle school teacher in Stuttgart, and Siegfried is a middle school teacher in Schwäbisch Gmünd; similarly, Ricarda is an elementary school teacher in Stuttgart, and Elke is an elementary teacher in Schwäbisch Gmünd. Both teachers from Stuttgart use less dialect than the teachers from Schwäbisch Gmünd, providing additional support for the dialect levelling occurring in the urban centre in contrast to the vital ongoing role that dialect retains in the Swabian countryside.⁶

However, as might be expected, not all speakers have increased their standard vocabulary usage. Speakers such as Siegfried and Elke, who have retained their high Swabian orientation over the years, continue to actively use the most dialect and the least amount of standard words. Angela, a medical doctor, living near Schwäbisch Gmünd and commuting to Stuttgart for work each day, is a stark advocate for Swabian, so much so that she exhibits retrograde movement, actually using more dialect variants in 2017 than she did in 1982. It is also important to note that her orientation values have changed very little (from 4.4 in 1982 to 4.2 in 2017). In 1982, when asked what she thought of the Swabian language, she provocatively exclaimed, *das beschte Daitsch wo es gib!* ‘the best German that there is!’ Responding to the same question in 2017, she responded similarly, yet more thoughtfully:

Schwäbisch isch für mi kôï Daitsch
‘Swabian is for me not German’

sondern des isch mei Muttersprache
‘rather it is my mother tongue’

⁵Statistisches Amt, Landeshauptstadt Stuttgart, <https://statistik.stuttgart.de/statistiken/tabellen/7392/jb7392.php>

⁶Tests on gender differences between dialect and standard language use were not significant.

in so fern isch se zentral für mich
'in that respect it is crucial for me'

Close to Angela in his sheer love for the Swabian dialect is Siegfried, who remarked
in 2017:

viele Schwââbe erziehet ihre Kinder jetzt als net-Schwââbe
'many Swabians raise their kids now as non-Swabian'

weil se willet, dass se Hochdeutsch schwätztet
'because they want, that they speak standard German'

dâ kommet se an dr Uni besser zrecht ond was-wôis-i,
'then they do better at the university und whatever'

dâ gheer i net dazu,
'I don't belong to [that group]'

i bin, wenn du so willsch, e stolze Schwââbe
'I am, if you will, a proud Swabian'

on i find es schade, dass die Sprâäch verlore gâht
'and I think it's a shame, that Swabian is being lost'

DIALECT ENTRENCHMENT

Our second hypothesis regarding lexical change in dialect and standard language use across the lifespan concerns dialect entrenchment. Several studies have reported that high-frequency words are more resistant in bowing to the standard language than low-frequency words (Bybee 2002; Keuleers et al. 2015; Wieling et al. 2014; Wieling, Nerbonne, and Baayen 2011). This finding leads us to expect that higher-frequency dialect words should be well entrenched in speakers' vocabularies. Testing this hypothesis on our data, however, is not straightforward, as one-hour interviews are unlikely to capture truly low-frequency words. What we can investigate, however, are differences in the use of words in the higher frequency range. Specifically, if, over the lifespan, typical dialect words of everyday life become more entrenched and are in some sense more available for use, then we would expect those words to show higher frequency when compared to standard language words over the same time period.

Figure 7 visualises Swabian and standard word usage by our 20 panel speakers over the 35-year timeframe of this study. In this analysis we separated the Swabian-

specific features from other dialect forms by tagging 32 Swabian linguistic variables for a binary distinction between Swabian and standard German (see Table 5 in the Supplemental Materials for a description of the Swabian linguistic features). The left panel presents word frequency (log transformed after backing off from zero by adding 1) for Swabian variants in blue and standard language counterparts in red; the horizontal axis plots word frequency in 1982 and the vertical axis word frequency in 2017. Words are scattered roughly around the line $y = x$, with greater scatter for lower frequencies. However, due to the large number of overlapping points, the details of the trend are not readily apparent. Hence, the middle panel in Figure 7 pulls out the Swabian word frequencies (blue points), bringing to light a non-linear trend (via GAMM), where we see a positive correlation between high frequency words in Swabian in 1982 and in 2017. In fact, looking at log frequency of 4 (demarcated by gray lines), we see very little change in the frequency of use of Swabian words across the years. It is also worth noting that very low-frequency words that were used in 1982 appear to have also been underused in 2017.

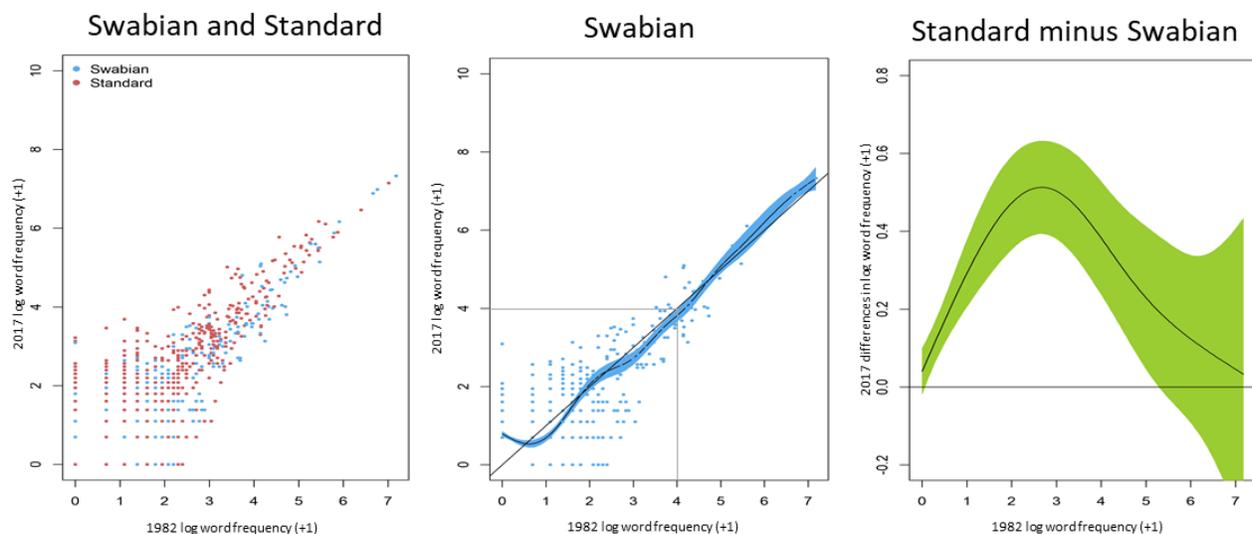


Figure 7. Lexical frequency effects between 1982 and 2017 (log transformed +1) based on 32 selected Swabian linguistic features. Blue dots represent Swabian word frequencies and red dots standard word frequencies. The right panel shows the difference between standard and Swabian word frequencies.

The right panel of Figure 7 depicts the adjustment to the curve that is required to obtain the function showing how frequency of use of standard words in 2017 varies as a function of frequency of use in 1982. Here we see a significant effect showing that standard words in the low frequency range are used somewhat more often in 2017 given their Swabian counterparts. In other words, the consistent frequency of use of Swabian words over the years reveals greater entrenchment than words from the standard language. This finding may also be related to the phenomenon that the age at which words are acquired may predict lexical processing over and above frequency, with earlier acquired words having a processing advantage over later acquired words (see Baayen, Milin, and Ramscar 2016 for a critical discussion). These results support our hypothesis that for speakers with a positive attitude toward Swabian, the dialect is alive and robust, albeit limited with respect to the number of social contexts for which its use is appropriate: what is clear is that the standard language is intruding on more and more areas of traditional life.

CONTEXTS OF DIALECT USAGE

Our third hypothesis proposes that speakers use more dialect forms where context makes early experiences more relevant and fewer dialectal forms where context renders later life experiences more applicable. Our data provide some tangential evidence for this claim. We have seen that lexical diversity is greatest for the use of standard forms (see Figure 1), in the large and diverse urban centre of Stuttgart (see Figure 2) and, most prominently, for speakers with higher education (see Figure 3). This diversity supports our hypothesis that experiences, and the words speakers use to communicate these experiences, diversify over the lifetime and that this diversification of experiences is most notable in domains for which the standard language is the medium of choice. We know that the culture and lifestyles of our informants were much more similar to each other in 1982 than they have become in 2017. In 1982, the speakers were students in their mid 20's who had travelled little and continued to maintain strong, close connections with family and friends from their home town. They reflected a more

'closed' social network (Milroy and Milroy 1985) which is reinforced through greater use of the dialect. Thirty-five years later, these speakers have scattered from northern Germany to Zürich. Most now live in more 'open' social networks, in which connections and ties are loose, varied, and dispersed, necessitating use of the standard language as a lingua franca.

Three independent composite measures provide evidence for the breakdown of Stuttgart and Schwäbisch Gmünd communities over the 35 years (see Table 2 in the Supplemental Materials for a summary of these indices). First, as already mentioned, the Swabian Orientation Index (SOI) shows a weakening, from an average of 4.0 in 1982 to 3.6 in 2017, with the greatest deterioration among the Stuttgart speakers, from 3.7 to 3.1. Second, the Swabian Relationship Index (SRI) has also declined for all speakers, from 3.0 in 1982 to 2.3 in 2017, with the greatest weakening among speakers in Schwäbisch Gmünd, from 3.2 in 1982 to 2.5 in 2017. SRI measures the strength of the relationships and the degree and nature of the interaction among the informants in the community: from 5 for daily, intensive communication to 4 for strong, regular communication to 3 for solid friendship and occasional interaction to 2 for acquaintances who rarely interact to 1 for no interaction (see Table 3 in the Supplemental Materials). Third, the Swabian Mobility Index (SMI) measures speakers' dispersion (number of different locations they have lived in across their lifetime and the amount of time spent in each location) and distance (numbers of kilometres between the speaker's current residence and each previous residence, weighted by the number of years in each location). On a scale from 0 for the least mobile speakers (those born, raised and never moved from their home town, and even the same house for one speaker) to 100 for the most mobile, mobility for our Swabian panel speakers has increased from 12 in 1982 to 38 in 2017, with those from Schwäbisch Gmünd showing the greatest change (from 9 in 1982 to 38 in 2017). These measures demonstrate the changing nature of our two Swabian speech communities and provide evidence that these speakers had many more commonalities in 1982 than they do in 2017.

It is also worth noting that the decrease in active vocabulary as used in our interviews is well supported only for the standard language. As individuals grow older, their world becomes smaller and they have fewer topics to talk about. The topics that disappear are likely to be those that become somewhat irrelevant later in life. Here, retirement is, for many, a watershed. Conversely, although experiences for which dialect is the appropriate vehicle also diversify over the lifetime, this diversification is much more restricted.

Final Remarks

Conventional views of individual lifespan dialect change are typically seen as reflecting the attritional effect of the standard language on the native dialect. In contrast, the findings from our investigation of 20 panel speakers of Swabian confirm the possibility that some of the changes in word use across the lifespan reflect the increased influence of later acquired, non-dialect, lexical knowledge, rather than the “loss” of dialect as a result of attrition. Rather than “lose” lexical items as they age, speakers have a broader range of options available to them through a larger vocabulary developed throughout their lifetime, which accrues to a different “register”, the standard language.

Our findings thus underscore the criticality of taking into account the dynamicity of lexical distributions in interpreting language development across the lifespan. Ramskar and colleagues (Ramskar et al. 2013, 2017; Ramskar and Baayen 2014) have recently shown how many changes in cognitive performance across the lifespan that are taken to reflect “decline” look very different once we control for the inevitable interactions that occur between lexical distributions and the nature of lifetime learning. Although we identified some changes in some of our speakers that are consistent with attrition, to a large degree, our data support the more likely scenario that many of the changes in the balance between standard and dialect lexical choice, which are observed across the lifespan, reflect change in speakers’ lifestyles and growth in their knowledge of the standard language combined with ongoing consolidation of the dialect.

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