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Conservative and innovative dialect areas

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Abstract

The present paper focuses on conservative and innovative (transitional) dialect areas and the questions of 1) how such areas can be methodologically visualized and 2) how the outcomes can be interpreted.

In the first part of this paper a geostatistical method of representing phonological features in space will be introduced: interpolation. This method is not entirely new to dialectology; it has been quite neglected, though, in comparison to other methods of mapping, such as the isogloss or dot symbol method that was mainly used in traditional dialect atlases. The interpolation method will be applied to a large corpus of spontaneous speech data from rural dialects spoken in southwest Germany. Methodological steps in data processing will be described, resulting in a data set that can be used as input for statistical analysis and the visual depiction of variation in space as interpolated grid plots.

In the second part results will be discussed. The major outcome consists of an aggregate interpolation plot that includes variables from fifteen different etymological sound classes. These sound classes can be used for demonstrating the distribution of receding phonological variables in space. The interpolation shows two conservative areas where receding forms are still widespread. They lie within the centers of the two major dialect groups of southwest Germany: Alemannic and Swabian. The conservative areas are separated by a broad transitional zone characterized by intense variation between receding and innovative variants. It will be argued that this transitional zone is not due to the horizontal spread of the dialects into each other's areas alone. Rather, variation is triggered by vertical standard influence that supports any dialect form to spread out horizontally as long as it is phonologically identical or similar to the standard form.

Keywords: dialect areas, conservative, dialect change, variation, phonology, phonological change, convergence

1 Introduction[1]

In traditional dialectology, space as a factor of linguistic variation has always been the crucial if not only way of interpreting differences within a speech community. The most extensive dialect atlas of the German language, Wenker's *Sprachatlas des Deutschen Reichs* [Linguistic Atlas of the German Reich] (1888 ff.), illustrates this understanding of linguistic variation in space very clearly.[2] In Wenker's atlas dialectological features are represented by isogloss maps that create sharp and categorical borders between areas containing different linguistic realizations. Thus, the areas showing e.g. the various reflexes of an etymological sound class, such as Middle High German *î*, are constructed as homogeneous zones that ideally contain only one of the existing phonological forms that has developed from its Middle High German predecessor. The reflex [aɪ] would thus have its own habitat, just like [i:]/[i]. In the regional dialect atlases that were written starting in the mid-twentieth century, the exclusive attribution of a certain linguistic feature to a specific geographical zone is even more noticeable. As an example, the *Südwestdeutsche Sprachatlas* (Linguistic Atlas of Southwest Germany) (Steger et al. 1989 ff.) is representative of most of the regional atlases of the German language area. In this atlas, different linguistic variants are represented by symbols that form very homogeneous areas containing in most cases only one linguistic form. Although the edges of a certain dialect area are not displayed by isoglosses, the borders between two different zones can clearly be recognized.[3]

Dialect change can now be examined by comparing isoglosses of the older dialect atlas with those of the modern atlas. Traditional dialectology applies a two-dimensional argumentation: Two phonological variants (a) and (b) are separated by an isogloss and variant (a) moves forward into the area that was previously covered by variant (b). The sound change is finished as soon as variant (a) has entirely replaced variant (b) within its former 'territory'. According to this understanding, sound change takes place horizontally through dialect-dialect contact. Applying such an approach to describing conservative and innovative dialect areas, the periphery of a given area would appear to be innovative whereas the center would remain conservative.

It is widely known that the old rural dialects within the German-speaking area came under the influence of the standard language as well as regional varieties no later than the nineteenth century (cf. Auer 2005). This triggered a wide-ranging vertical influence of the rural dialects that not only affected the areas close to the traditional isoglosses but the whole German language area. According to this vertical influence argument, all dialects in the German-speaking area would be leveled off evenly. A standard variant (c) would thus replace the two dialect variants (a) and (b) to the same extent, whereas in both traditional dialect areas equal variation between variants (a) and (c) and between (b) and (c) would be expected. The differentiation between conservative and innovative dialect areas would not be possible following a theory of merely vertically-induced change because area (a) as well as area (b) would both appear to be innovative.

In most cases the spread of an innovative variant is not exclusively due to either horizontal or vertical influence but rather must be seen as a combination of both (cf. Auer/Baumann/Schwarz 2011, Schwarz in print). This combination comes about because one of the two traditional dialect variants (a) or (b) is similar or identical to the standard realization (c). Given that (a) is identical to the standard form (c), we would not expect variation within the traditional area of (a), while within the area of variant (b) we would find variation all across this area (vertical influence) that becomes more intense near the isogloss between variants (a) and (b) (horizontal influence). In the spontaneous speech data of southwest Germany which make up the empirical basis of the present study, this type of variation and change can often be observed. The geographic structures of the traditional dialects can still be observed, and yet at the same time a clear tendency towards standard convergence is visible.

Especially because of the increasing decline of rural dialects in almost all linguistic communities in Europe (cf. Auer 2005), the question arises how this decline manifests itself in geographical space. The following study aims to answer this question. On the basis of a large corpus of spontaneous speech data deriving from the elicitation area of the *Südwestdeutsche Sprachatlas* (SSA), it intends to detect conservative and innovative areas in this region, which is approximately half the size of Switzerland.

The methodological approach is based on interpolated maps that were produced using the statistics software *R*. The objective of the present work not only aims to identify conservative and innovative areas for single phonological sound classes (e.g. MHG *î*) in southwest Germany, but also to create and interpret an aggregated map containing the data of fifteen different sound classes (all of them vocalic). This map will reveal two conservative areas, one of which is located in the very southwestern corner of the area of investigation, and the other in the eastern part within the Swabian dialect area around the city of Biberach. The innovative area is by far larger than the two conservative areas and constitutes a broad transitional zone between the two major dialects of southwest Germany: Alemannic[4] and Swabian. Further discussion will reveal how the innovative area came to appear as such: Is the high amount of variation due to an increasing expansion of Swabian variants into the traditional Alemannic dialect area, or is the variation due to the inverse process of Alemannic variants spreading out into the traditional Swabian dialect area? It will be argued that there is no unidirectional sound change at work here, i.e. neither Swabian nor Alemannic is dominant towards its neighboring dialect.

2 Data and method

2.1 Corpus

Analyses in this study are based on tape recordings from 354 locations within the area of investigation that was covered by the *Südwestdeutsche Sprachatlas* (SSA). The territory covers approximately the southern half of the German state of Baden-Württemberg. The recordings were made in the 1970s and 1980s, around the same time or after the dialectologists conducted their dialect elicitation surveys. Besides the recordings of the SSA, the corpus contains recordings from the elicitations of the *Badisches Wörterbuch* (Dictionary of Baden, 1970s) and the *Zwirner-Korpus* (1950s). The speakers of both additional corpuses derive nearly from the same generation as those from the SSA. They all represent the typical NORMs and NORFs that were traditionally used by dialectologists to elicit the oldest and most archaic dialect spoken at each location of interest. For the analysis carried out in this study, only such parts of the recordings were incorporated that contain informal and easy conversations between the informants and the linguists. Excluded from the corpus were such parts that contain interrogations, e.g. where the linguist asks the informant to translate certain words or phrases into his or her dialect. Furthermore, recordings where informants read something out loud, quote someone, or make metalinguistic comments about a particular linguistic item were not taken into account. By filtering out these parts of the recordings, it can be assured that the remaining parts of the recordings represent linguistic data that are sufficiently identical to the informants' language use in everyday life.

Phonological data analysis was carried out lexeme-wise, as lexemes are carriers of the etymological sound classes in question. For example, for the analysis of the sound class MHG *û* the words *Haus* (house), *laut* (loud) and *sauber* (clean) were chosen. These words in particular were chosen because they contain the reflex of MHG *û* and are available in a sufficiently high number. Thus, an adequate density of data within the area of investigation can be assured. The hits that could be reached for a certain lexeme during the search within the database were phonologically analysed and saved in a list.[5]

By this means 42,970 spontaneous speech tokens were analysed that include 99 words and fifteen etymological sound classes (see table 1). The analyses were not carried out solely for the present paper, but are part of the large-scale research project *"Phonologischer Dialektwandel in den alemannischen Basisdialekten Südwestdeutschlands"* (Phonological dialect change in the Alemannic dialects of southwest Germany). In the framework of this project, the spontaneous speech data serve as a comparison with the elicited (knowledge-based) data from the SSA in order to identify processes of dialect change in apparent time. The results of these analyses were examined by Streck (2012) for the consonantal sector and by Schwarz (in print) for vowels (see also Auer/Schwarz/Streck 2008, Schwarz/Streck 2009, Schwarz/Spiekermann/Streck 2011).

2.2 Interpolating data with *R*

For the mapping of the analysed spontaneous speech data, the statistics software *R* is used. It allows the cartographic presentation of data as colored and interpolated grid plots.[6] Interpolation is carried out for each individual etymological sound class in order to identify sound-class-specific conservative areas. In addition, an aggregated plot incorporating data of all fifteen sound classes will be generated and discussed.

The advantage of interpolated representations of linguistic data in space is a better visibility of the relative frequency of a certain variant in comparison to the other variants. Furthermore, the interpretation of how conservative or innovative an area is can be carried out much easier using fine-grained and colored interpolation plots than by using e.g. dot symbols.

R is a non-commercial open-source software that is used for statistical data analysis and for the graphic representation of results. The program has to be understood as a base system that is complemented with additional modular components (*packages*).[7] For the preparation of the interpolations the packages *fields*, *sp* and *maps* were installed.[8]

All three packages are especially suitable for the geostatistical analysis and cartographic representation of linguistic data in space. The geostatistical method that is used for the creation of interpolated plots of geographically distributed data is called *Kriging*.[9] The values of data points for which no actual linguistic data is available is calculated using the values of the surrounding locations that contain linguistic data. As the density of data in space can vary considerably, a particular advantage of *Kriging* in comparison to other methods of interpolation is the consideration of this density aspect. In this study phonological data are not distributed homogeneously in space. For this reason, *Kriging* is an especially well-suited interpolation method for the representation of our unevenly spread data.

The source data of the interpolations is organized in a data matrix, whereas each analysed token listed is annotated with linguistic and metalinguistic information. For our purposes the phonological value of each token as well as its exact geographic coordinates must be present in the data matrix in order to make the georeferenced plotting of data possible. The resulting interpolation is depicted as a fine-grained colored grid plot. The frequency (percentage) of a certain phonological variant (in comparison to all occurring variants) is labeled by a specific color. The color range reaches from dark read (maximum ratio of the phonological variant examined = 100%) to its complementary color dark blue (minimum ratio of the phonological variant examined = 0%).

2.3 An example: the diphthongization of MHG *î*

As an example of an interpolation plot, the results for a single etymological sound class will be presented: the diphthongization of MHG *î*.

Figure 1 represents the interpolated frequency of the monophthongal realization [iː]/[i] (as a reflex of MHG *î*) in proportion to the diphthongal realizations [eɪ] and [aɪ] that are the remaining two reflexes which have developed out of MHG *î* (for example in *Ziit* vs. *Zeit* vs. *Zait* [time]). The plot contains 6,177 tokens that cover thirteen lexical contexts (words). According to traditional dialectology, we find the monophthongal realization in the west of the SSA's area of investigation while the diphthongal variant covers the Swabian dialect area in the east. In the maps of the SSA both areas are very homogeneous, hardly containing any variation between monophthongs and diphthongs.

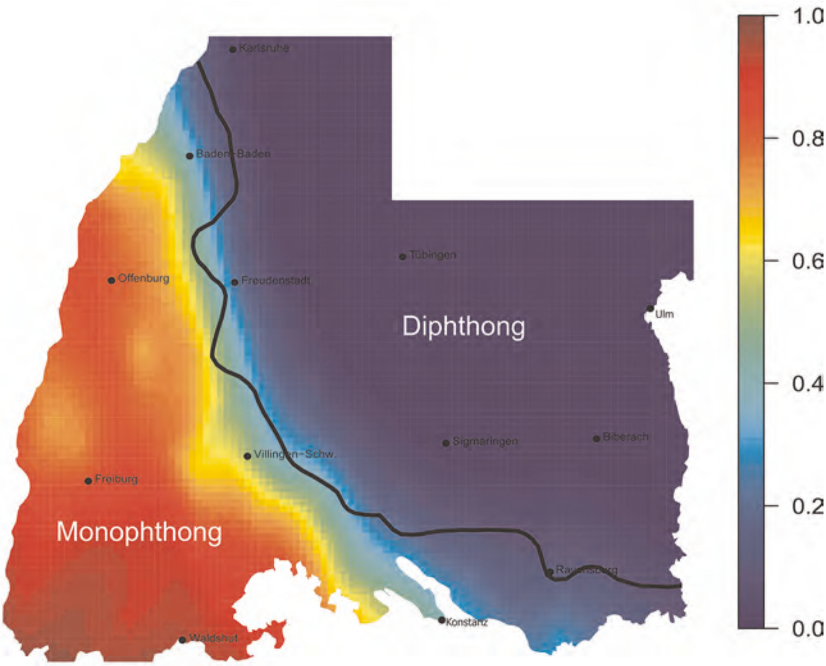

Figure 1 Interpolated frequency of the monophthongal realization [iː]/[i] *as a reflex of the etymological sound class MHG î. The frequency is measured as the ratio of tokens realized as* [iː]/[i]. *The coloring symbolizes the frequency and ranges from dark red* (*high frequency*) *to dark blue* (*low frequency*).

The plot in figure 1 clearly shows the transition of mainly monophthongal to mainly diphthongal realizations (greenish color) formed as a slightly curving zone reaching from the northwestern area of investigation to the western edge of Lake Constance in the south. In the east of this narrow greenish zone a broader blue band can be recognized that shows a much less frequent occurrence of monophthongs that lies between approximately 10-30%. Still further to the east the frequency of monophthongal realizations decreases quickly to the value of 0%. Within the monophthongal area (in red), the proportion of this realization is about 70-80%. Only in a zone in the very southwest of the area of investigation does this value rise up to about 100%. Thus, this area can be considered conservative, at least with regard to the etymological sound class of MHG *î*.

Remarkably, the transitional orange band west of the green band of maximum variation is not always the same width. Especially from the middle section northwards it is broader than in the south. The map shows a shift of the diphthongal realization to the west and south as can be seen by the comparison of the interpolated data with the bundle of isoglosses elicited by the SSA (here illustrated as an interpolated black line). North of Lake Constance the monophthongal realization has practically vanished altogether according to the interpolated spontaneous speech data. Another interesting observation is the occurrence of orange areas in the hinterland of the traditional monophthongal area and generally a percentage of monophthongs considerably below 100% in the area where they traditionally occur.

To sum up, the interpolation explicates a clear decline of the monophthongal realization. Unlike the elicitation results of the SSA, the far northwestern part of the area under investigation no longer belongs to the monophthongal area. The same accounts for the section north of Lake Constance. As far as the realization of MHG *î* is concerned, these two areas can be considered innovative whereas the very southwest seems to be more resistant towards diphthongization.

In this section an interpolated grid plot was presented for a single etymological sound class. In the following, the issue of conservative and innovative dialect areas will be expanded to a collective analysis of all fifteen etymological sound classes that will be incorporated into one aggregated interpolation plot.

3 Aggregated interpolation

Before the creation of an aggregate interpolation that is necessary for detecting conservative and innovative dialect areas, further methodological considerations must be taken into account. These will be elucidated in the following two sections.

3.1 Operationalization of "conservative" and "innovative"

If interpolations are made for single etymological sound classes, the methodological procedure is quite simple. In order to differentiate between innovative and conservative areas, an interpolation plot is produced for the frequency of that phonological variant that is the least frequent among all occurring variants. In the case of MHG *î* this variant is the monophthong [iː]/[i]. Its interpolated frequency in space indicates the geographical position of conservative and innovative dialect areas.

In order to create an interpolation, the program *R* plots all tokens that are annotated with the information "monophthong" in the data matrix. But which measures must be taken into account if we want to plot "conservative" tokens for not only one sound class but for all sound classes together? For the annotation of the property "conservative" two methodological steps are necessary.

First, the variable "conservative" has to be operationalized consistently over all etymological sound classes. The annotations used in the data matrix so far (e.g. "monophthong" and "diphthong") are of course not appropriate as they can only be interpreted correctly in connection to the etymological sound class they belong to. For example, the diphthongal realization [aɪ] represents the phonological variant of MHG *î* (e.g. *Zait* [time]) in the eastern part of the area of investigation. If the realization [aɪ] is the reflex of the etymological sound class MHG *ei*, however, it does not reflect the traditional form of this eastern sector but rather the western part of the area of investigation (e.g. *heiß* [hot]). Subsequently, the sound-class-specific phonological annotation must be replaced by a more general one that is comparable among all sound classes that are included in the study. For this reason a binary annotation "dialect" and "non-dialect" was chosen. The above-mentioned realization *Zait* as a reflex of MHG *î* would result in the annotation "dialect" in the east and "non-dialect" in the west. The annotation follows the criterion of whether a factual realization is in line with the traditional form that is expected at a certain location (→ "dialect") or whether the realization deviates from the expected form in any way (→ "non-dialect"). Hence the annotation "dialect" is equated with the feature "conservative", the attribute "non-dialect" with "innovative". If a certain location or region generally appears to be conservative or innovative, this is indicated by the ratio of "dialect" and "non-dialect" tokens which correspondently serves as a measure for conservativeness.

3.2 The extraction of suitable subareas (receding areas)

For each sound class, spontaneous speech data is spread over the entire area of investigation. As was already mentioned in the introductory section of this article, the occurrence of variation is not uniform throughout the entire area. Often only particular areas are affected by variation, especially if the traditional phonological realization of a certain area is clearly different from the equivalent standard realization. Examples of such instances are the realization [i:]/[i] for MHG *î* as in *Ziit* (standard: *Zait* = time), [ɐə] for MHG *ei* as in *hoas* (standard: *haiß* = hot), and [aʊ] for MHG *ô* as in *grauß* (standard: *groß* = big). Inversely, dialect areas that traditionally contain a phonological realization that is identical or similar to the standard form are hardly affected by variation. Instances of such a constellation are the realization of [aɪ]/[eɪ] for MHG *î*, [aɪ] for MHG *ei*, and [o:] for MHG *ô*.

From this observation follows the conclusion that only spontaneous speech data that stems from areas containing variation is appropriate for the study of conservative and innovative areas. Finally, conservative and innovative areas can only be detected if variation occurs. For each of the sound classes, the spontaneous speech data belonging to the area containing variation was extracted. Likewise, data from dialect areas with no or very little variation was excluded from the corpus used for creating the aggregated interpolation.[10] This data extraction method was carried out for each etymological sound class analysed.[11] Figure 2 illustrates this procedure exemplarily on the basis of the diphthongization of MHG *ô* in the lexeme *groß* (big).

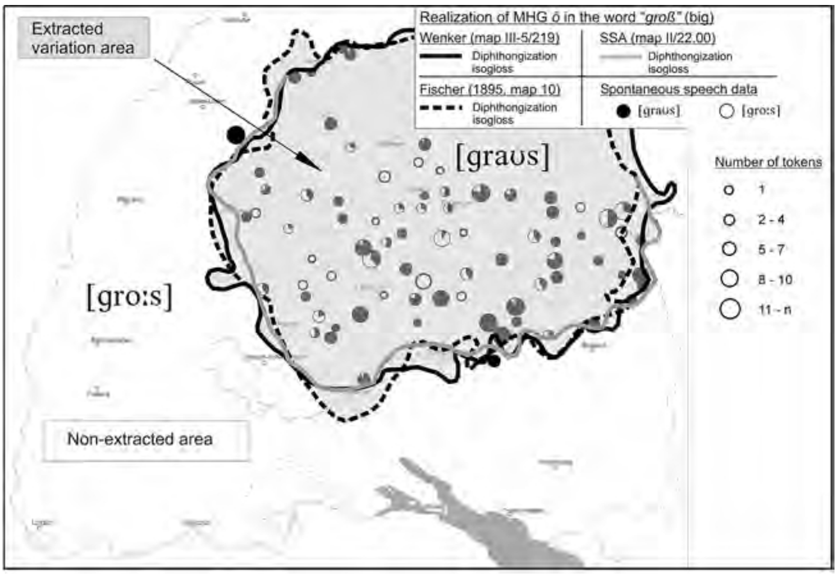

Figure 2 Extraction of the spontaneous speech data from the varying diphthong area for MHG ô. Data from the surrounding monophthong area is not incorporated into the corpus because no variation is found here. Data extraction is carried out for all fifteen etymological sound classes.

It shows that only those data are included that come from the traditional (and receding) diphthong area. Data from the traditional monophthong area is not incorporated into the corpus as there is no variation between the dialect form (monophthong) and non-dialect (diphthong) realization. Regarding the extraction of variation areas, it must be added that the procedure is carried out individually for each lexeme belonging to a certain sound class. In table 1 the extracted variation areas that were incorporated into the data corpus are listed.

Table 1 **Overview of the 16 extracted variation areas containing the spontaneous speech tokens that were incorporated into the aggregated interpolation. The word examples are representative of all analysed words belonging to the relevant sound class.**

Etymological sound class	Occurring realization areas	Extracted area (containing variation)
Diphthongization of MHG *î*	*Ziit* vs. *Zait* (time)	*Ziit*-area
Diphthongization of MHG *û*	*Huus* vs. *Haus* (house)	*Huus*-area
Diphthongization of MHG *iu*	*Liit/Lüüt* vs. *Lait* (people)	*Liit/Lüüt*-area
Diphthongization of MHG *ô*	*grauß* vs. *groß* (big)	*grauß*-area
Diphthongization of MHG *ê*	*Schnai* vs. *Schnee* (snow)	*Schnai*-area
Monophthongization of MHG *uo*	*Bruoder* vs. *Bruder* (brother)	*Bruoder*-area
Monophthongization of MHG *ie*	*lieb* vs. *liib* (dear)	*lieb*-area
Vowel lengthening (open syllable)	*Bodde* vs. *Boode* (ground)	*Bodde*-area (short vowel)
Vowel lengthening (closed syllable)	*Waald* vs. *Wald* (forest)	*Waald*-area (long vowel)
Realization of MHG *ë*	*reacht* vs. *racht* vs. *recht* (right)	*reacht*-area
Realization of MHG *ei*	*hoaß* vs. *hoiß* vs. *haiß* (hot)	*hoaß*-area *hoiß*-area
Realization of MHG *ou*	*Frou* vs. *Frau* (woman)	*Frou*-area
Realization of MHG *â* (Auslaut)	*groo* vs. *grau* (grey)	*groo*-area
Unrounding of MHG *ü* and *oe*	*über* vs. *iber* (over) *bös* vs. *bees* (evil)	*iber*-area *bees*-area

The combination of all 16 extracted variation areas results in an overlay that covers the entire area under investigation. Of course, due to the different position and size of the variation areas, the density and homogeneity of data is not uniform throughout the area of investigation. The overlay of 16 variation areas in figure 3 shows that the isoglosses surrounding these areas often bundle along the dialect border between Swabian and Alemannic. Because a combination of horizontal and vertical change can be found very frequently in the area of investigation (cf. Auer/Baumann/Schwarz 2011), the aggregate interpolation will show clear variation in this sector.

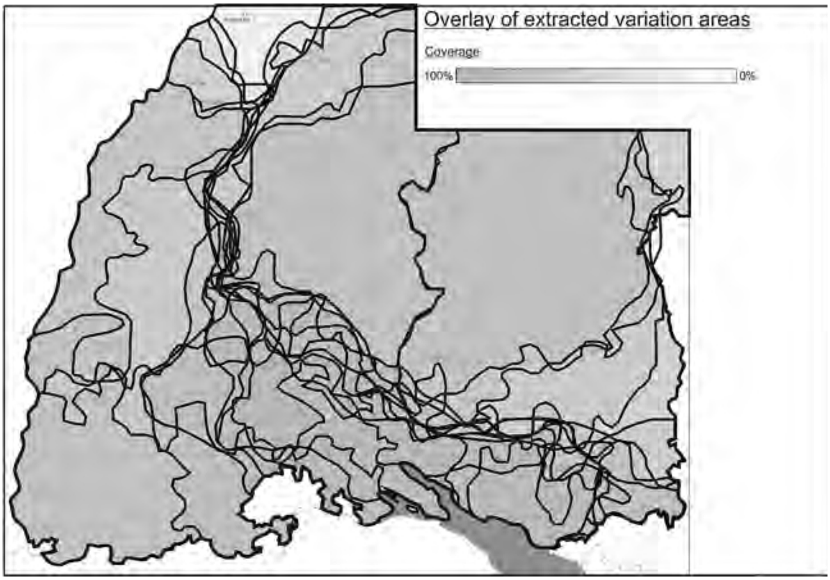

Figure 3 *Overlay of sixteen extracted variation areas containing altogether 21,674 tokens. Clearly visible is the isogloss bundle that runs from northwest to southeast and that separates the Alemannic and Swabian dialect areas.*

4 Result and discussion

The aggregate interpolation and the frequency of dialect tokens (in comparison to the non-dialect tokens) within the investigation area are shown in figure 4. Altogether 21,220 tokens were included in the interpolation plot. Those areas that appear in red in the aggregated plot count as conservative, while the green and blue areas represent innovative zones with strong variation and hence strong sound change. Within the aggregated interpolation plot, two conservative areas stick out very clearly: one in the southwest of the area under investigation and a second (smaller) one in the eastern part around the city of Biberach.

Within the conservative zone in the west the frequency of dialect tokens adds up to 70-80%. Therefore this region is already characterized by a clear decline of the receding dialect forms, although they still outnumber the non-dialect realizations. Further south the conservativeness increases and reaches approximately 90% south of Freiburg. In the very southwest corner of the area under investigation we finally find a zone between the cities of Lörrach and Waldshut that exhibit a nearly 100% occurrence of dialect forms. This southern-most zone stands out repeatedly in its pronounced persistence towards phonological change during the analyses of different etymological sound classes (Schwarz in print). Reasons for the conservative character of this zone could be due to the neighboring part of Switzerland that belongs to the Alemannic dialect continuum and where the dialects show hardly any tendency of (vertical) change. Thus, no linguistic stimuli on the bordering area north of Switzerland can be expected. Rather, Switzerland probably has a preserving effect on this part of the area under investigation.

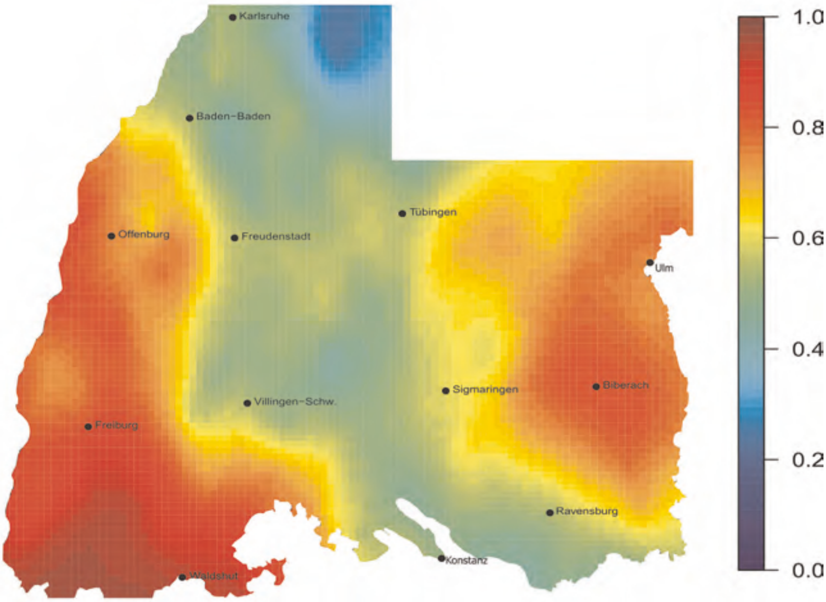

Figure 4 Aggregated interpolation plot containing 21,674 spontaneous speech tokens of all analysed sound classes. Coloring symbolizes the percentage of dialect tokens.

The largest region under investigation is characterized by areas with strong variation between dialect and non-dialect forms. They establish a broad band between the two alternate conservative areas. The area in the east lies in its north-south dimension between the cities of Ravensburg and Ulm, westwards it reaches until ca. Sigmaringen and Tübingen. In comparison with the western conservative zone, its smaller geographical size as well as its weaker conservativeness is remarkable. In the center around the city of Biberach the percentage of dialect tokens reaches only ca. 80% and declines towards its edges to values between 60-70%.

The geographical position of the two conservative areas is not random. It is striking that they are each positioned in the centers of the two major dialects, Alemannic and Swabian, that characterize the area under investigation. Dialect decay thus geographically does not move forward randomly but starts from the edges (isoglosses) of a dialect area and continues inward towards the center of the respective area, i.e. towards those regions that are most remote from the isogloss. The horizontal component of phonological change is not only visible in the present aggregate interpolation, but can also be shown for single etymological sound classes (cf. Auer/Baumann/Schwarz 2011, Schwarz in print).

As shown in figure 3 and by the dialect classifications that were carried out for Baden-Württemberg (Maurer 1942, Steger/Jakob 1983), the Alemannic and Swabian dialect areas are divided by a pronounced bundle of isoglosses. Sound changes that affect dialects horizontally along the isoglosses are apparently responsible for the broad band of variation that appears between the two opposing conservative dialect areas. The question arises whether variation in this transitional zone is due to the expansion of Alemannic dialect features eastwards or, conversely, to the expansion of Swabian dialect features westwards into the traditional Alemannic dialect area. In order to find an answer to this question, table 2 lists those etymological sound classes that traditionally show different dialectal reflexes in Swabian and Alemannic and thus form isoglosses between the two dialects.[12] Furthermore, table 2 shows the direction of sound changes for each of the mentioned sound classes, i.e. whether the Swabian variant replaces the Alemannic one or vice versa.

Table 2 Phonological reflexes of Alemannic and Swabian. The second column shows the direction of change, the third column represents the dominant form (bold) that replaces the receding form in the respective area.

Etymological sound class	Direction of change	Innovative Form
Diphthongization of MHG *î*	Swabian → Alemannic	***ai*** (e.g. *Ziit* → *Zait*) [time]
Diphthongization of MHG *û*	Swabian → Alemannic	***au*** (e.g. *Huus* → *Haus*) [house]
Diphthongization of MHG *iu*	Swabian → Alemannic	***ai*** (e.g. *Liit* → *Lait*) [people]
Realization of MHG *ou*	Swabian → Alemannic	***au*** (e.g. *Frou* → *Frau*) [women]
Vowel lengthening (open syllable)	Swabian → Alemannic	Long vowel (e.g. *sagen* → *saagen*) [to say]
Vowel lengthening (closed syllable)	Swabian → Alemannic	Short vowel (e.g. *baald* → *bald*) [soon]
Diphthongization of MHG *ô*	Alemannic → Swabian	***o*** (e.g. *grauß* → *groß*) [big]
Diphthongization of MHG *ê*	Alemannic → Swabian	***e*** (e.g. *Schnai* → *Schnee*) [snow]
Realization of MHG *â* (as final vowel)	Alemannic → Swabian	***au*** (e.g. *bloo* → *blau*) [blue]
Realization of MHG *ei*	Alemannic → Swabian	***ai*** (e.g. *hoaß/hoiß* → *haiß*) [hot]
Realization of MHG *ë*	Alemannic → Swabian	***e*** (e.g. *schleacht* → *schlecht*) [bad]

Table 2 shows that no unidirectional sound change can be identified. The reflexes of the eleven relevant sound classes in six cases spread out from Swabian into Alemannic, in five cases from Alemannic into Swabian.[13] The direction of the sound change apparently follows a simple principle: a phonological realization spreads out if it is identical or similar to the standard realization. The standard language and its vertical influence on the rural dialects thus represents the decisive factor as to the horizontal spread of a phonological form. Hence, sound change within the area under investigation can (in most cases) be understood as a combination of horizontal and vertical change, whereas the standard form governs the direction of the change. As an effect of synergy it supports a phonologically identical or similar realization within the base dialect to move forward. This effect can be especially observed at a close distance to the correspondent isoglosses and gets weaker with increasing distance from the isogloss (cf. Auer/Baumann/Schwarz 2011). Bearing this finding in mind, the conservative and innovative areas visible in the aggregated interpolation plot can be better interpreted. The broad band of variation emerges because a bundle of several isoglosses which separate Swabian and Alemannic runs along this area. According to the combined effect of vertical and horizontal change along the isogloss bundle, strong variation arises in this zone and becomes visible in the aggregated interpolation. Because the standard language primarily governs sound change, the phonological variants of this variety or of regional varieties close to it serve as a replacement. Their ratio within the transitional zone between the two conservative areas lies at about 50%, according to the aggregated interpolation. Variation and therefore sound change have reached their climax in this area and will supposedly substitute the receding dialect variants gradually. However, it must be stated that the remaining 50% of the analysed tokens (the receding dialect forms) are still existent and hold the traditional spatial image of the rural dialects as well as the linguistic borders between Swabian and Alemannic up (cf. Streck 2012). In the aggregate interpolation plot only the two conservative zones remain of the formerly traditional spatial structure in this area. These two areas persist because of their sufficient distance from the isogloss bundle between Alemannic and Swabian, as they are protected from the synergy effect of horizontal and vertical change.

5 Conclusion

In the study presented here a methodological approach was developed to distinguish between phonologically conservative and innovative areas. This was carried out on the basis of a large corpus of spontaneous speech data from the elicitation area of the *Südwestdeutsche Sprachatlas* (SSA). The visual depiction of these areas was carried out by creating interpolated grid plots that were calculated using the statistics software *R* and the geostatistical *Kriging* method. As a measure for conservativeness the ratio of dialect tokens (traditional forms of a certain location) was taken into account.

As a result, two conservative areas were detected within the area under investigation: one in the southwest, embedded in the center of the Alemannic dialect area, and a second in the east which lies within the central area of the Swabian dialect. Between the two areas appears a broad band that contains maximum variation (ca. 50%) between dialect and non-dialect tokens. Analysis resulted in the finding that variation is triggered neither by a unidirectional spread of Swabian nor Alemannic, but rather by changes in both directions. A decisive factor that governs the direction of sound change is phonological similarity between dialectal variants and the standard realization. According to this finding (at least with regard to the analysed data for vowels), neither Swabian nor Alemannic can be characterized as "dominant" dialects. Rather, the vertical influence of the standard language leads to an increasing takeover of standard realizations, especially in combination with the horizontal influence of a neighboring dialect that is phonologically similar to the standard variant.

Besides answering the actual question of this study, namely the identification of conservative and innovative dialect areas in southwest Germany and the reasons for this, the visualization of variation by interpolations also leads us to an incidental yet principal conclusion: On the basis of spontaneous speech data, there are hardly any homogeneous dialect areas in the southern half of Baden-Württemberg. Also, the concept "isogloss" in the sense of a categorical and sharp border appears to be very problematic against the backdrop of these results.

Notes

1. This article is a slightly modified English translation of the article "Konservative vs. innovative Dialektgebiete. Ein quantitativer Ansatz zu ihrer Bestimmung auf der Grundlage spontansprachlicher Daten aus Südwestdeutschland", published in German in Hansen et al. (2012). For further information see also: http://www.degruyter.com/view/product/44264.
2. The maps of Wenker's Atlas are accessible online via www.diwa.info (= *Digitaler Wenker Atlas*).
3. Wenker's maps show some heterogeneous areas, whereas the maps of the *Südwestdeutsche Sprachatlas* (SSA) are much more homogeneous. This is due to the different elicitation techniques. Wenker used an indirect survey-based method asking school teachers to translate 40 sentences into the local dialect. The method of the SSA was direct and much more precise because skilled linguists carried out the elicitation face to face with the informants using a special script (*Teuthonista*) for exact phonological transcription.
4. During the following discussion "Alemannic" is used as an umbrella term for the three dialects "High Alemannic" (*Hochalemannisch*), "Lower Alemannic" (*Niederalemannisch*) and "Lake Constance Alemannic" (*Bodenseealemannisch*). The three mentioned dialects cover the western, southwestern and southern part of Baden-Württemberg, respectively. Their denomination goes back to a classification by Steger/Jakob (1983).
5. The database *moca* is used for the administration of the large corpus of spontaneous speech. It emerged from its predecessor p*rosoDB* that was programmed by Peter Gilles (Luxembourg) and is currently being developed further by Daniel Alcón (Freiburg). Further information can be found via this link: http://moca.phil2.uni-freiburg.de/web/index.html (13.12.2012).
6. Without the technical support of Michael Cysouw and Peter Baumann the interpolation plots presented in this study would not exist. Many thanks to both of them.
7. The program *R* and a wide range of packages can be downloaded from this site: http://cran.r-project.org (13.12.2012). An introduction to the analysis of linguistic data with *R* is given by Baayen (2008) and Gries (2008).
8. More information about the package *fields* can be found at http://www.image.ucar.edu/Software/Fields (13.12.2012). Information about the packages *sp* and *maps* are available here: http://cran.r-project.org (13.12.2012).
9. The term *Kriging* refers to its inventor Daniel Krige (1951) who originally used this geostatistical technique for gold mining in South Africa.
10. The extraction of data was realized by a semi-automatized algorithm programmed by Uli Held. Many thanks to him for his technical help.
11. Additionally, it must be mentioned that as a reference for a receding realization area, either Wenker's isoglosses or the delimitations recorded in the SSA can be used. When a Wenker and a SSA map is available for that area, the largest recorded area for the receding variant is taken as a reference for extracting data. If only one isogloss is available (Wenker or SSA), the area is defined by this single available isogloss.
12. Of course only a few of the sound classes analysed form isoglosses that are exactly congruent with the demarcation between Alemannic and Swabian according to traditional dialect classifications of southwest Germany (Maurer 1942, Steger/Jakob 1983). Therefore the assignment of sound classes to either of the two dialect areas must be considered an approximation at best.
13. For a detailed analysis of sound change processes within the mentioned etymological sound classes see Schwarz (in print).

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