

Regional and social influences on pragmatic variation in colloquial German

Mason A. Wirtz¹, Stephan Elspaß², Simon Pickl², Konstantin Niehaus³

¹ University of Zurich, English Department, Zurich, Switzerland

² University of Salzburg, Department of German Language and Literatures, Salzburg, Austria

³ University of Marburg, Forschungszentrum Deutscher Sprachatlas, Marburg, Germany

+

E-mail: mason.wirtz@es.uzh.ch

Received 10.06.2024

Accepted for publication 01.03.2025

Published 15.05.2025

Abstract

The present study investigates how ordinal generalized additive mixed-effects models (GAMMs) can be employed in order to model regional and social influences on pragmatic variation in German. We analyze (pro)nominal address (e.g., *Frau Müller, Lisa; du, Sie*) and the socio-contextually conditioned usage thereof (i.e., supervisor to employee, co-worker to co-worker, informal setting) on the basis of seven variables collected in the *Atlas zur deutschen Alltagssprache* 'Atlas of Colloquial German'. Specifically, we address whether social variables (i.e., age, gender, and residential mobility) impact on pragmatic variation in colloquial German and also whether this social variation may be regionally constrained. We found pronounced regional effects in the distributions of the seven pragmatic variables, and these distributions of the pragmatic variants did not conform to national boundaries. We also identified strong age and gender effects on pragmatic variation, but the strength of these effects did not vary regionally. Implications for the application of (ordinal) GAMMs to the integrative investigation of regional and social patterns on language variation are discussed.

Keywords: variational pragmatics, pragmatic variation, ordinal generalized additive models, colloquial German, forms of address

<https://creativecommons.org/licenses/by/4.0/> Wirtz et al.

1 Introduction

This paper explores how ordinal generalized additive mixed-effects models (GAMMs) can be employed to capture the influence of regional and social variables on pragmatic variation in colloquial German. We home in specifically on nominal and pronominal address (e.g., *Frau Müller, Lisa; du, Sie*) and the socio-contextually conditioned usage thereof (i.e., supervisor to employee, co-worker to co-worker, informal setting) by analyzing seven pragmatic variables collected in the *Atlas zur deutschen Alltagssprache* ‘Atlas of Colloquial German’ (AdA; Elspaß & Möller 2003–). As opposed to traditional items (i.e., questions in a survey) employed in dialectology addressing which variant(s) of a linguistic variable speakers would use, the pragmatic items investigated in this article are based on three-point ‘usage rating scales’ which measure whether informants perceive a variant as uncommon, occurring from time to time, or common in their respective locality. The analysis of such resultant ordinal data tends to be quite cumbersome, however. For this reason, we propose the use of ordinal GAMMs, which (a) are able to appropriately model ordinal response variables such as the aforementioned usage rating scale and (b) are suitable for simultaneously modeling the influence of spatial (i.e., regional) variables such as longitude and latitude along with social variables of the informants such as age, gender, and residential mobility on patterns of language variation. Based on the empirical results of this study, we will discuss a critical issue arising in the field of variational pragmatics: Can we identify effects of social variables on pragmatic variation (in colloquial German), and to what extent are the effects of social variables also regionally constrained?

2 Background

The study of language variation has enjoyed vibrant, multi-faceted, and cross-disciplinary interest over the past decades. In spite of their different origins and histories, dialectology, sociolinguistics, and pragmatics converge at their deepest point of interest: the study of language use in and across communities. In practice, however, these three streams of research remain comparatively separate, especially when we consider

the different types of language variation they take under the microscope. (The early study by Mattheier [1980] did little to change this general shortcoming.) Dialectological accounts of language variation illustrate and measure the distribution of (primarily) phonetic, phonological, (morpho-)syntactic, and lexical features across space (e.g., Nerbonne 2009; Pickl 2013; Wieling et al. 2014; Pröll et al. 2015; Pickl et al. 2019; Pickl & Pröll 2019; Nerbonne et al. 2021). Sociolinguistics – at least in its quantitative-correlationist research avenues – aims to disentangle the underpinnings of these regional pictures by determining which speaker-level (macro-)social variables such as age, gender, and residential mobility alongside affective and psychological variables such as dialect identity, attitudes, and personality traits influence the differential use of language variants and varieties (e.g., Cheshire 2004; Cheshire et al. 2008; Beaman 2021; Bülow et al. 2021; Bülow & Vergeiner 2021; Vergeiner et al. 2021; Steiner et al. 2023a; Steiner et al. 2023b; Beaman 2024). The study of pragmatic variation has largely been confined to situational and cross-linguistic variation, focusing on the influence of micro-contextual variables such as a speakers’ choice of pragmatic strategies and the degree of social distance/dominance between interactants (for influential works in this area, see, e.g., Blum-Kulka & Olshtain 1984; Blum-Kulka et al. 1989). In other words, traditional pragmatics research often foregrounded the examination of how pragmatic choices are subject to variation across different languages rather than within varieties of the same language (but see, e.g., Leemann et al. 2024). While these strands have independently generated a wealth of knowledge, they hardly profited from one another, and all three strands have largely treated these conglomerates of variables – specifically the social and regional – in relative isolation from one another. Granted, recent years have seen more vigorous collaborations between dialectology and sociolinguistics (e.g., Wieling et al. 2011; Ko et al. 2014; Wieling et al. 2014; Pröll et al. 2021; Steiner et al. 2023a, Steiner et al. 2023b; Wirtz et al. 2025; Vergeiner & Elspaß 2025), but these still focus most notably on lexical, phonetic, and (morpho-)syntactic variables and so continue to neglect the incorporation of pragmatic variables. Barron and Schneider (2009: 436) thus highlight that the origins of variational pragmatics – the

intersection between sociolinguistics, dialectology, and pragmatics – “lie in the failure of sociolinguistics to address the pragmatic level of language to any systematic extent and in the failure of pragmatics to address variation due to macro-social variables” (see also Schneider & Barron 2008). For this reason, more recent studies have emphasized the importance of social factors such as (informant) age, gender, educational level, and socio-economic background (e.g. Schüpbach et al. 2021: 176; Barron 2021: 192–193; Ackermann 2023: 182). To our knowledge, residential mobility, which is one of the variables surveyed in the AdA along with the age and gender of the informants, has not yet been taken into account in previous studies. Since it is widely accepted that (residential) mobility can be a major thrust for language variation and change (e.g., Britain 2013; Jeszenszky et al. 2024; Wirtz in press), we found it prudent to assess the potential predictive power of residential mobility on pragmatic variation in our study, broadly defined as “any long-term change in one’s place of usual residence within a country” (Coulter & Thomas 2020: 443; see also Wirtz in press).

Taking a variational pragmatics approach, we focus here on nominal and pronominal address. In all varieties of standard German, *du* (2nd person singular) is the informal T-form and *Sie* (conventionally spelled with an upper case initial) has prevailed as the formal V-form. The T-form typically co-occurs with an addressee’s first name, and the V-form either with {honorific + last name} (e.g., *Herr Möller*), {honorific + title} (e.g., *Herr Doktor*), or {title + last name} (e.g., *Professor Möller*) (Rash 1998: 276). As noted, initial evidence from the German-speaking areas (mainly comparing the national varieties of Germany, Austria, and Switzerland) points towards interindividual differences in the degree of ‘informality’ required for T-form use (Schüpbach 2014). Elter (2009), for example, maintains a Switzerland > Austria > Germany hierarchy as concerns how widespread the T-form is and how quickly individuals transition from formal to informal forms of address. Schüpbach (2014: 68) also noted that forms of address are often “seen as reflective of the corporate culture” in that V-forms emphasize hierarchy and power in the spirit of a top-down style of communication, whereas T-forms project equality and solidarity

and coincide with a flatter hierarchical structure. As Elter (2009) illustrated, the use of the T-form of address in Swiss workplaces seems to be quite widespread, and she interpreted this against a sort of cultural ‘orientation towards the group’ backdrop. That is, according to her analysis, Swiss companies tend to expect co-workers and superiors to treat one another as equal partners, whereas Austrian and German companies are more oriented towards hierarchy.

Additionally, while there is ample research into the typical co-occurrence of pronominal and nominal address, much less (quantitative empirical) attention has been paid to the (also regionally constrained) use of mixed forms such as V + first name, popularly referred to as the ‘Hamburger *Sie*’ (*Thomas, bringen Sie mir bitte die Post?* ‘Thomas, could you (V-form) bring me the mail, please?’) or T + last name, popularly referred to as the ‘Münchener *Du*’ (*Müller, bringst du mir bitte die Post?* ‘Müller, could you (T-form) bring me the mail, please?’; cf. Glück & Sauer 1997: 121–122, Ackermann 2023: 172). This is a particular research lacuna seeing as recent accounts of the German address system no longer consider it to be purely binary but also scalar (e.g., Hickey 2003). Kretzenbacher (2010: 15, our translation), for example, proposes a model that situates the formally binary T- vs. V-forms as a “basic context opposition of *du* vs. *Sie* contexts”, and the scalar component consists of a “socio-deictic scaling”. The latter represents gliding scales of perceived vertical (e.g., hierarchical, power-related) and horizontal (e.g., social) distance between interlocutors on the basis of which the appropriate form of address (in a given interactional instance) can be identified. In the V context, for instance, moving along the continua of social and vertical distance may result in the same pronominal address (i.e., *Sie*), but different nominal addresses. Such a model illustrates nicely the complexity inherent to (pro-)nominal address in German, and that determinant (micro-)contextual (e.g., addressee) and social (e.g., relationship with the addressee) variables for (pro-)nominal address choice are less binary but rather continuous by nature. Exploring mixed forms across different interactional relationships (e.g., co-worker to co-worker, supervisor to employee) can add to this scope of research and so refine our understanding of the socio-situational adequacy of different forms of

address. Adding regional and social variables into the mix can additionally aid in decomposing such pragmatic variation in terms of its regional and social structuring.

Despite the notable uptake in the variational pragmatic framework and thus the growing body of research on both the (macro-)social and regional underpinnings of pragmatic variation (for overviews, see, e.g., Georgakopoulou & Charalambidou 2011; Murphy 2011; Schneider 2021; Schneider & Félix-Brasdefer 2022), there are still several pervasive issues:

- (a) To start, the majority of studies currently available focus on pragmatic variation at the national level and often contrast national varieties. For German, Clyne and Norrby (2011), Clyne et al. (2009), and Kretzenbacher (2011), for example, focused on differences in linguistic politeness between Germany and Austria, Schüpbach (2014) and Ackermann (2021) between Germany and Switzerland, and Elter (2009) between the German, Austrian and Swiss standard varieties. The evidence – perhaps expectedly – points to differences between countries. As Dürscheid and Simon (2019: 255, our translation) poignantly question, however, “can the difference really be determined by the country (or the nationality of the speakers)? Shouldn’t we think on a smaller scale?” As they further maintain, regional differences in pragmatic variation cannot be about contrasting countries and national varieties as a whole. There exists ample evidence with respect to regional variation in phonetics and phonology, lexis, and (morpho-) syntax (Kleiner 2011; Ammon et al. 2016; Dürscheid et al. 2018; cf. Elspaß & Kleiner 2019 for an overview) that diatopic variants, not only at the level of dialect but also of standard German, do not stop at national borders, and the same can be assumed for pragmatic variation as well (Dürscheid & Simon 2019; Ackermann 2023; Ackermann et al. in press; see also <https://variprag.net/>).
- (b) What is more, systematic analyses on social predictors such as age on vocatives and/or T- and V-form address in German have only been

conducted to limited extents. For example, in a questionnaire study with 370 participants from Germany, Austria and Switzerland, Ackermann (2023: 189, 191–192) found that older speakers used more vocatives than younger speakers in the production task (whereas gender showed no significant effect). Older participants also rated vocatives more positively than younger ones (Ackermann 2023: 196). In a recent study on historical change in the German pronominal address system, based on different corpora of private correspondence, Schiegg and Elspaß (in press) found that the writer’s age difference to and the familiarity with the addressee, the linguistic context and even a writer’s changing emotional state are relevant factors of intra-individual variation. For instance, the use of the formal *Sie* pronoun (V-form) was still rather common when addressing parents until the early 20th century. Male writers and experienced writers lead the change from formal *Sie* to informal *Du* (T-form) in addressing parents. A further notable example is Clyne et al. (2009), who found for their German data that addressee age has a significant effect on address choice. Considerably older strangers are addressed with the V-form, whereas the T-form is used with same-age or younger addressees. Refining this picture, they found that speaker age plays a critical role in variable T-form usage, specifically that speakers over 50 refrain from employing the T-form with same-age speakers. Similar analyses were employed for additional social variables such as social status. That said, the issue as to how social variables such as speaker age, gender, and the like interact with regional patterns to predict address choice has not seen much attention.

- (c) In order to tackle the issues outlined in (a) and (b) and move away from *a priori* assumptions about national borders being explanatory variables for observed differences in pragmatic variation, we require a more sophisticated arsenal of statistical procedures that can capture the contours of both regionally conditioned linguistic variation and the effects of social var-

variables thereon. Dialectometric analyses (see, e.g., Nerbonne 2009; Pickl & Rumpf 2012; Pickl 2013; Pickl & Pröll 2019; Nerbonne et al. 2021) employ *inter alia* cluster analyses (e.g., Pröll et al. 2021), multidimensional scaling (e.g., Pickl & Pröll 2019) and factor analyses (e.g., Pröll et al. 2015) as suitable procedures for identifying, in a bottom-up manner, diatopic variation within and across linguistic variables. These, however, cannot account for social variables simultaneously, which makes them unsuitable for the integrative investigation of how the social and regional interact in predicting pragmatic variation – a core goal in variational pragmatics (Barron 2005; Schneider & Barron 2008; Barron & Schneider 2009). Wieling et al. (2011) first proposed and Ko et al. (2014) and Wieling et al. (2014) later refined the use of GAMMs to a similar end – that is, a statistical procedure that can simultaneously incorporate both regional variables and social variables such as gender, informant age, etc. in order to study the social and regional structuring of language variation. GAMMs are particularly suitable for such purposes given their flexibility in (1) accounting for complex random effects structures (e.g., at the person, item, and locality level, to name a few), (2) available distribution families (e.g., binomial regression, beta regression for data bounded by 0 and 1 such as slider scales, and even ordinal regression, as we will discuss later in this contribution), and (3) accommodating complex nonlinear surfaces. (3) is of special importance, especially when considering regional structures: As Wieling et al. (2011) maintain, traditional linear regression is ill suited for modeling the influence of geography (operationalized via longitude and latitude) on diatopic variation. At most, linear regression can include the multiplicative interaction of longitude by latitude, but this imposes a limited functional form on the regression surface which is inappropriate for modeling the contours of language variation data as a function of the (more often than not) nonlinear variable geography. To sum up, in order to simultaneously

account for (non)linear social and regional influences on pragmatic variation, and to disregard any necessity to proceed *a-priori* from the assumption of diatopic variation constrained by national borders, GAMMs provide an excellent statistical modeling choice.

In addition to tackling the aforementioned thematic issues yet pervasive in variational pragmatics, we also take this article in a methodological direction. Traditionally, dialectological studies focus on different regional distributions of language variants, that is, on the question as to which variant is likely used in a location (e.g., Chambers & Trudgill 1998; Pröll 2014, 2015; Wieling & Nerbonne 2015; Nerbonne & Wieling 2018). The advent of crowdsourcing methods has drastically expanded the ways in which dialectologists can approach data collection and allows access to socially and geographically diverse samples. In addition to more conventional items concerning which variant is reported where, the AdA also collects information on ‘usage ratings’ of certain variables, including the pragmatic variables under analysis here. As mentioned in the introduction, this is done via three-point usage rating scales that aim to capture whether informants perceive a variant as uncommon, occurring from time to time, or common in their respective locality. Similar types of scales are common in adjacent research strands, for example Likert-scale acceptability ratings in cognitive and psycholinguistics or expert ratings/judgements in L2 pragmatics research (e.g., Divjak 2017; Li et al. 2019). Such data are difficult to analyze, however, as they do not lend themselves to traditional regression analyses: Dichotomizing the variables to fit binomial regression could result in the loss of meaningful variance. Treating the scale as numeric is also ill advised seeing as the data are not necessarily equidistant, meaning the distance between adjacent response options may not be the same for all pairs (see also Liddell & Kruschke 2018; Verissimo 2021). Modeling the data as an unordered categorical variable, for example in the form of multinomial models, also disregards the notion that the data are inherently ordinal, that is the categories have a natural order. To account for these problems, we employ ordinal GAMMs, which are able to appropriately model ordinal response variables such as the aforementioned

usage rating scale (e.g., Baayen & Divjak 2017) while, as mentioned above, also being able to simultaneously estimate the influence of regional and social variables on patterns of language variation.

3 Aims and research questions

We pursue both thematic and methodological aims in this contribution. Thematically, our objective is to provide initial results on pragmatic variation in colloquial German. We focus both on regional and social underpinnings of pragmatic variation and tackle the issue as to whether the effects of social variables may also be regionally constrained. What is more, our analyses are particularly novel in that they (a) include *inter alia* mixed forms (e.g., V + first name, T + last name), which have not seen much quantitative empirical attention by pragmatics research on the German address system and (b) investigate whether social variables constrain pragmatic variation and the regional structuring thereof. Specifically, we address the following research questions:

- RQ1. To what extent do the informant-level social variables age, gender, and residential mobility predict differences in pragmatic variation across Germany, Austria, and Switzerland?
- RQ2. To what extent are the effects of social variables on pragmatic variation regionally constrained? (E.g., is the effect of informant age or gender more strongly pronounced in certain regions than in others?)

As for RQ1, in accordance with the (few) results from recent studies, we hypothesize that informant age may have an effect on pragmatic variation in the German-speaking countries, whereas gender has no effect. Furthermore, we assume that less mobile informants perceive a more typical local usage than mobile informants and that their ratings therefore convey a more homogeneous picture of local usage. As for RQ2, we similarly hypothesize that older and less mobile informants perceive a more typical local usage than younger and mobile informants, but that the effects of these variables may differ from region to region.

From a methodological angle, our contribution is ambitious in that it seeks to test and outline the (dis)advantages and limits of ordinal GAMMs for analyzing

regional and social constraints on language variation, a statistical procedure which does not put forth *a priori* assumptions about national borders representing explanatory variables for observed differences in pragmatic variation.

4 Data and methods

4.1 *Atlas of Colloquial German*

The data for the present study come from the *Atlas zur deutschen Alltagssprache* (AdA) ‘Atlas of Colloquial German’ (Elspaß & Möller 2003–; see also Elspaß 2007; Möller & Elspaß 2014, 2015), which is to date the largest existing collection of crowdsourced data on colloquial German. Colloquial language is defined as the form of language that is spoken spontaneously and routinely in informal everyday situations – regardless of whether this is more closely oriented towards standard language or dialect – for example, “spontaneous conversations between friends, relatives or acquaintances or also in informal exchanges between people from the same place who are not close acquaintances, e.g., in the local grocery store” (Möller & Elspaß 2014: 122). The AdA is based on online internet surveys which are administered in approximately annual to biannual intervals in regions where (also) German is spoken (i.e., Germany, Austria, Liechtenstein, Luxembourg and the German-speaking parts of Switzerland and northern Italy, eastern Belgium and the Alsace and Lorraine regions in eastern France). To facilitate comparisons with previous work on variational pragmatics in German, we focus in this contribution on Germany, Austria, and Switzerland.

In the AdA questionnaires, informants are asked to identify local variant(s) in the colloquial speech in their towns and cities which ‘one would normally hear, be it more dialect or standard German’. As such, participants act as informants – they are requested not to state their individual language use, but rather report on what one would normally hear in their respective locality. Thus, the varietal spectra and thus the notion of ‘everyday colloquial German’ captured in these questionnaires can vary between regional forms of standard German varieties (e.g., in northern Germany and metropolitan areas), intermediate varieties (e.g., in some areas of Bavarian-speaking Austria), and local dialects (e.g., in German-speaking Switzerland).

4.2 Variables

Here, we focus on seven pragmatic variables collected in AdA Round 8 (December 2010 through December 2011). As noted above, these pragmatic variables focus on ‘mixed forms’ in (pro)nominal address, and ‘usage rating scales’ were used to capture whether a select variant is uncommon, occurs from time to time, or is common for a particular locality as per informants’ judgements. Informants were asked to judge the commonality in the use of different mixed forms across different hierarchical contexts, two of which focus on

workplace communication (supervisor to employee; co-worker to co-worker) and one on the use of such pragmatic variants in informal contexts (i.e., familiar, private environment). The pragmatic variables are outlined in Table 1, where they are grouped according to the three socio-situational contexts. Note that the items (1) and (6), as well as (2) and (7), target the same structures respectively, but differ in terms of context.

Table 1: Pragmatic variables.

#	Structure	Context	Item	AdA Map
(1)	[Last Name] + T-Form	Supervisor to Employee	<i>Müller, bringst Du mir bitte die Post?</i> ‘Müller, could you (T-form) bring me the mail, please?’	https://www.atlas-alltagssprache.de/r8-f6a-b-2/
(2)	[First Name] + V-Form	Supervisor to Employee	<i>Thomas, bringen Sie mir bitte die Post?</i> ‘Thomas, could you (V-form) bring me the mail, please?’	https://www.atlas-alltagssprache.de/r8-f6a-b-2/
(3)	V-Form + Ms. [Last Name] + V-Form (‘fronted double V-form’, i.e., the first V-Form is syntactically disintegrated for emphasis)	Informal Usage	<i>Sie, Frau Schneider, haben Sie schon gehört, dass ...</i> ‘You (V-form), Mrs. Schneider, have you (V-form) heard that ...’	https://www.atlas-alltagssprache.de/r8-f6f-g-2/
(4)	T-Form + [First Name] + T-Form (‘fronted double T-form’, i.e., the first T-Form is syntactically disintegrated for emphasis)	Informal Usage	<i>Du, Martin, hast du schon gehört, dass ...</i> ‘You (T-form), Martin, have you (T-form) heard that ...’	https://www.atlas-alltagssprache.de/r8-f6f-g-2/
(5)	Mr./Mrs. [Last Name] + T-Form	Co-Worker to Co-Worker	<i>Herr/Frau Müller, wann kommst Du morgen?</i> ‘Mr./Mrs. Müller, when are you (T-form) coming tomorrow?’	https://www.atlas-alltagssprache.de/r8-f6c-d-e-2/
(6)	[Last Name] + T-Form	Co-Worker to Co-Worker	<i>Müller, wann kommst Du morgen?</i> ‘Müller, when are you (T-form) coming tomorrow?’	https://www.atlas-alltagssprache.de/r8-f6c-d-e-2/
(7)	[First Name] + V-Form	Co-Worker to Co-Worker	<i>Thomas, wann kommen Sie morgen?</i> ‘Thomas, when are you (V-form) coming tomorrow?’	https://www.atlas-alltagssprache.de/r8-f6c-d-e-2/

4.3 Localities and informants

Across the seven pragmatic variables, responses were collected from a total of 3,922 locations. On the basis of the predefined AdA localities (based on the localities in the *Wortatlas der deutschen Umgangssprachen* ‘Word atlas of the German colloquial languages’, WDU; see Eichhoff 1977–2000), the individual locations were aggregated to 468 localities as visualized in Figure 1 by the Voronoi cells.

In AdA Round 8, data were collected from a total of 8,564 informants in Germany, Austria, and Switzerland (men: 4,148, women: 4,416). At the time of data collection, 7,345 informants lived in Germany, 956 in Austria, and 263 in Switzerland. Information on informants’ residential mobility was captured by a categorical scale on their length of residence in the respective locality, with the options ‘less than 10 years’ ($n = 746$), ‘10–29 years’ ($n = 5,031$), ‘over 30 years’ ($n = 794$), and ‘always’ ($n = 1,993$). The age distribution in the current sample was

as follows: ‘10–19 years’ ($n = 494$), ‘20–29 years’ ($n = 3,865$), ‘30–39 years’ ($n = 2,005$), ‘40–49 years’ ($n = 1,244$), ‘50–59 years’ ($n = 620$), and ‘60+’ ($n = 336$).

4.4 Statistical analyses

In order to analyze the social and regional constraints on pragmatic variation, we employ ordinal generalized additive mixed-effects models (GAMMs) (see, e.g., Baayen & Divjak 2017). Its key advantages in our case are as follows:

- Since the response variables were collected on three-point ordinal scales (‘uncommon’, ‘from time to time’, and ‘common’), modeling these data requires techniques that can accommodate ordinal scaling. Ordinal GAMMs can handle these rather cumbersome data by modeling the ordinal response variable (i.e., the usage rating scale) on a continuous latent scale.

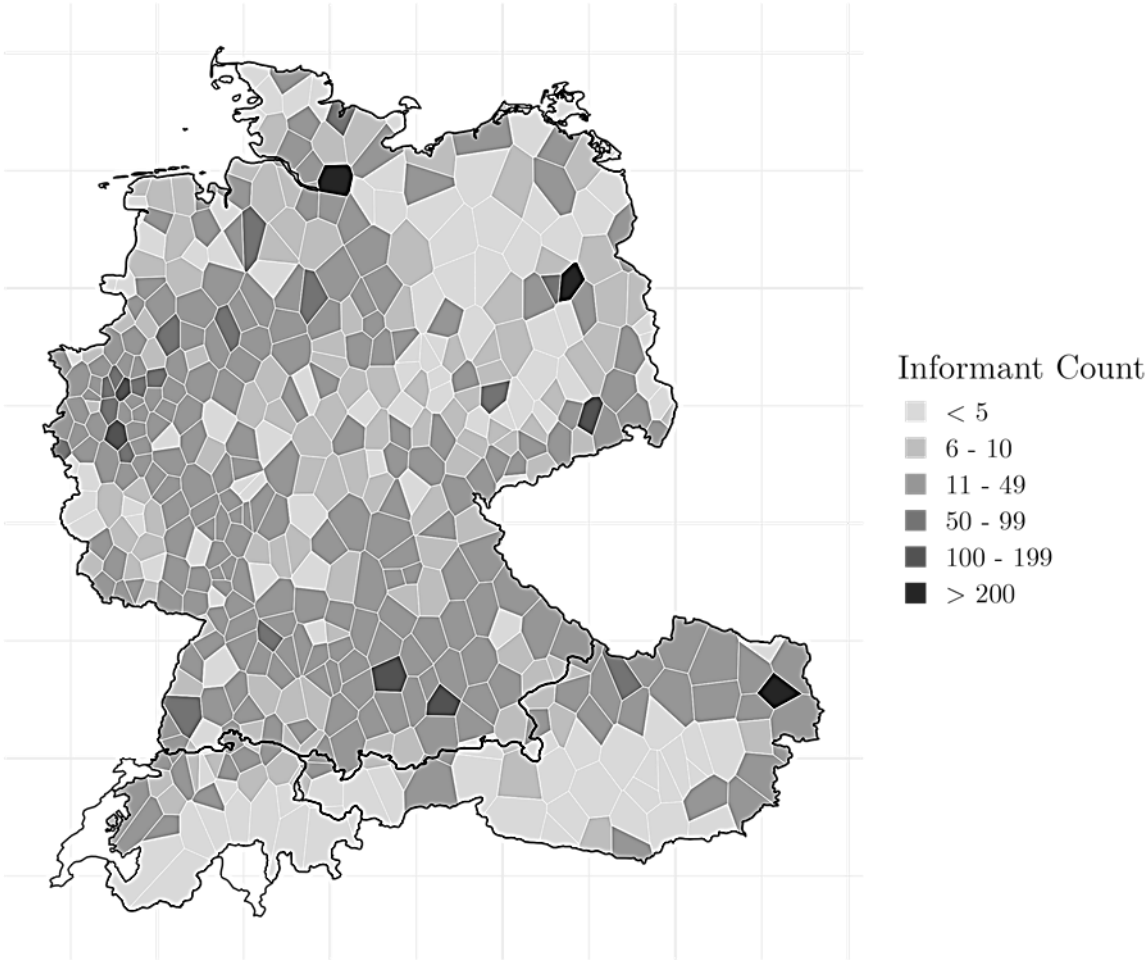


Figure 1: Absolute informant count by aggregated locality ($n = 465$).

In essence, ordinal GAMMs assume that the ordinal variable originates from the categorization of a latent (i.e., not observable) continuous variable. The model then estimates thresholds along the continuous latent scale that partition it into observable, ordered categories. In our data, there are three categories, and thus two thresholds (i.e., the predicted threshold on the continuous latent scale between ‘uncommon’ and ‘from time to time’, and between ‘from time to time’ and ‘common’). These cut-off points are estimated alongside the model parameters. We refer interested readers to Baayen and Divjak (2017: 5), who provide a more technical overview of ordinal GAMMs, and Wood et al. (2016), who outline additional technical details concerning the model fitting process.

- In this modeling set-up, the ordinal GAMMs predict the probability of reporting one of the three categories, and the predictor variables codetermine this probability. To do so, the continuous latent scale is modeled as a sum of smooth functions of covariates (hence the additive). In contrast to linear regression models in which a predictor variable is linear in terms of its effect on the outcome variable, GAMMs relax this assumption so that the predictor–response relationship need not be strictly linear. Importantly, the type of nonlinearity does not need to be specified in advance, it is determined automatically during the model-fitting procedure (e.g., Ko et al. 2014; Wieling et al. 2014). GAMMs ability to capture such nonlinearity is particularly useful when dealing with geography as a predictor (operationalized via longitude and latitude), seeing as its effects tend to be complex and nonlinear. What is more, GAMMs can handle interactions between multiple predictor variables. For example, it is possible to explore how the effects of geography on pragmatic variation interact with social variables such as informant age, gender, and residential mobility (e.g., does the effect of age differ regionally?).

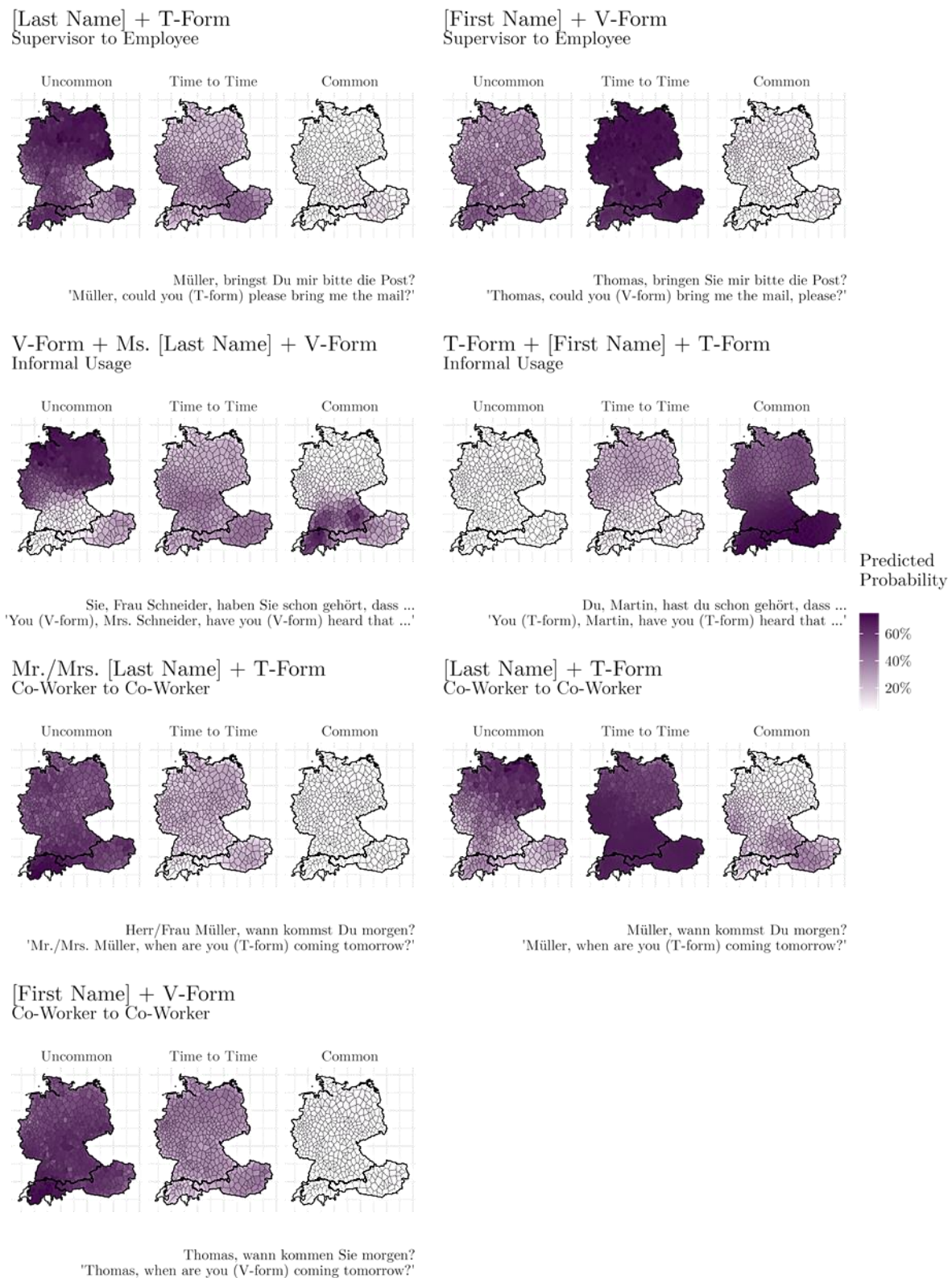
- Finally, GAMMs can also account for random effects, that is, variables with levels that were sampled from a much larger population of possible levels (e.g., localities).

We modeled each pragmatic variable separately. This is because we were not interested in the overall usage ratings across items, but rather whether regional and social variables can predict the pragmatic variation in the respective seven variables individually.¹ We fitted a sequence of increasingly complex models (five models in total for each pragmatic variable), incrementally testing whether the increase in model complexity is counterbalanced by improved model fit (via the *compareML* function in the *itsadug* package [van Rij et al. 2020]). We began by testing whether the addition of social predictors (gender, residential mobility, and informant age, noting that age was entered as a continuous variable) in addition to geography improved the model fit, and then tested whether the social predictors interacted with geography to predict regional differences in pragmatic variation. For all models, the random effects structure included the AdA locality (person-level random effects were not required seeing as we modeled each pragmatic variable separately and participants only provided a single response per item).

5 Results

5.1 Regional effects

The first round of models including only geography as a predictor (i.e., longitude by latitude) revealed significant regional effects on the reports of pragmatic variation across all seven variables. Figure 2 illustrates the respective predicted probability that informants report a pragmatic variant as being ‘uncommon’, ‘occurring from time to time’, or ‘common’ (darker colors indicate higher probability). Based on visual inspection, the variants underlie largely different regional distributions, but we can identify a few select similarities. For example, both for supervisor–employee interactions and interactions among co-workers, the [last name] + T-form variant seems more widespread in Austria and Bavaria than in most of northern Germany and Switzerland.

Figure 2: Conditional effects of geography on pragmatic variation.²

In co-worker communication, this trend becomes more pronounced in Bavarian-speaking regions, specifically in central Austria and Bavaria, and the maps reveal that the variants are predicted to be very uncommon in northern Germany. By contrast, the socio-communicative setting seems to be critical in differentiating the perceived usage of the mixed form [first name] + V-form, in that it is reported as occurring from time to time in the more hierarchical supervisor–employee setting but is regarded as predominantly uncommon in co-worker interactions. The visual inspection also reveals that the fronted double pronoun variants collected in informal usage show different regional patterns. Whereas the fronted double T-form (i.e., T-form + [first name] + T-form) is generally reported as common, or occurring from time to time especially in central and northern Germany, the V-form (i.e., V-form + *Ms.* [last name] + V-form) is only reported as common throughout Switzerland and in southern Germany – particularly in Swabian- and Bavarian-speaking regions – and to a lesser extent in Austria. This geographical pattern in the use of a combination of ‘syntactically disintegrated’ pronoun + name is also confirmed by a recent study by Ackermann (2023: 189–190); she sees these variants as an expression of “positive politeness”.

On the whole, the visualizations illustrate that the areas of usage of the investigated pragmatic variants do not conform to strict national boundaries. Rather, the GAMMs show that the perceptions of usage are more gradient by nature.

5.2 Social effects

As for the impact of social variables (see research question 2), we fitted another round of models including the social predictors to determine whether these aided in explaining the variance in the data. With the exception of the fronted double T-form (i.e., T-form + [first name] + T-form), adding the social variables improved model fit. Using tensor product smooths (see, e.g., Ko et al., 2014; Weiling et al., 2014), we then tested whether the interaction between longitude and latitude with the social predictors improved model fit – that is, does the regional picture differ as a function of informant age, gender, and/or residential mobility? Only for two models was this found to be the case (see the following sec-

tion). In what follows, we present the fixed effects for the social variables with the final models.

Across the six pragmatic variables for which social variation aided in predicting pragmatic variation, informant age was a significant predictor concerning whether a variant is reported as being uncommon, occurring from time to time, or common in informants’ respective locality. In general, this confirms Ackermann’s (2023: 189, 191–192) result that older participants in her study use more vocatives than younger informants. The conditional effects of informant age on pragmatic variation visualized in Figure 3 also indicate interesting nonlinear trajectories. For example, the usage ratings of the mixed forms [last name] + T-form and [first name] + V-form among co-workers are interesting, especially with respect to the curvilinear pattern. Middle-aged individuals reported these pragmatic variants as being particularly uncommon, whereas younger adults found them more acceptable than their older-aged confederates. A similar pattern emerged for the [first name] + V-form in supervisor-employee interactions, though the probability that the variants are perceived as common or uncommon is much lower than informants reporting that it occurs from time to time. The additional pragmatic variants were subject only to minimal age effects.

With the exception of [last name] + T-form in supervisor-employee interaction, we also found significant gender effects. Specifically, women seemed to judge most variants as more common in their respective locality than men. This comes as a surprise, as Ackermann (2023: 189, 195) found no gender effects in the use of vocatives, neither for production dates nor for ratings. Interestingly, this trend did not hold for the fronted double V-form (i.e., V-form + *Ms.* [last name] + V-form), as the predicted probabilities of informants’ usage ratings of the respective pragmatic variants in Figure 4 illustrate.

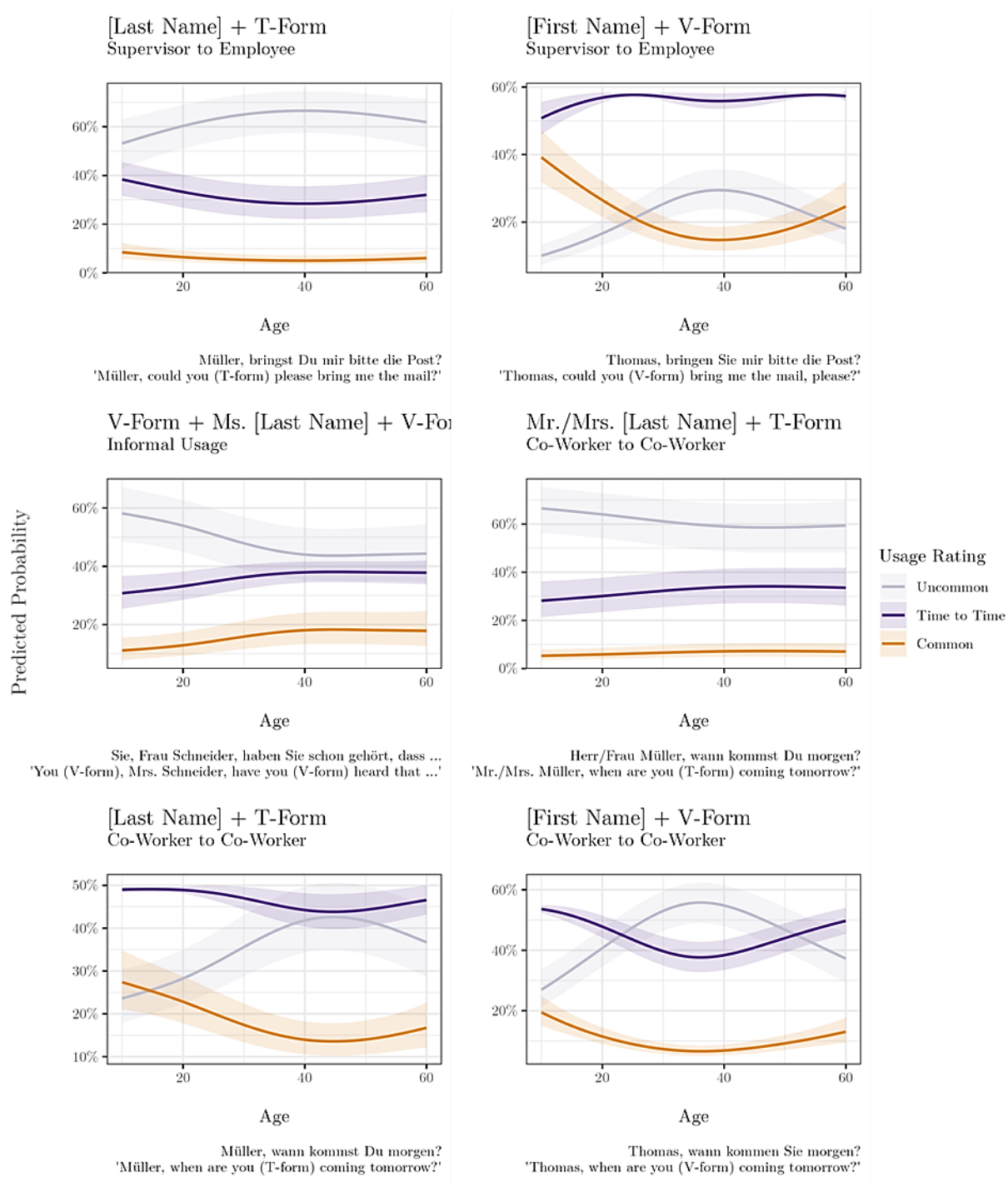


Figure 3: Conditional effects of informant age on pragmatic variation.

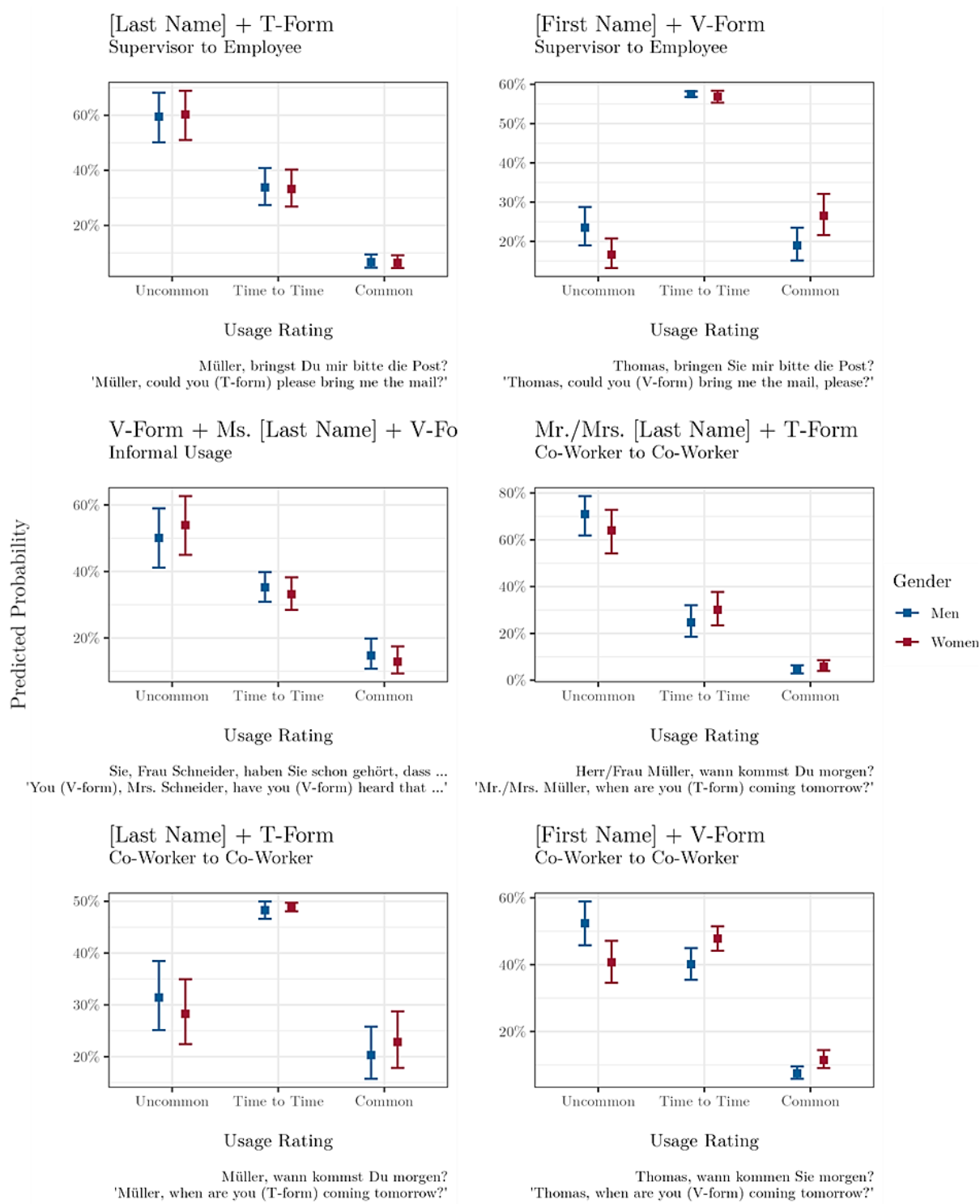


Figure 4: Conditional effects of gender on pragmatic variation.

In contrast to the results for gender and informant age and contrary to our assumption, we found no or only minimal effects for residential mobility on pragmatic variation. As Figure 5 visualizes, only with respect to informants' judgements of [first name] + V-form in co-worker interactions was there a tendency for infor-

nants who had been living in the respective locality for under 10 years to report the variant as slightly more common. Arguably, this effect may relate to the issue of salience, in that this comparatively uncommon combination sounds particularly salient to individuals who have spent the least amount of time in the region.

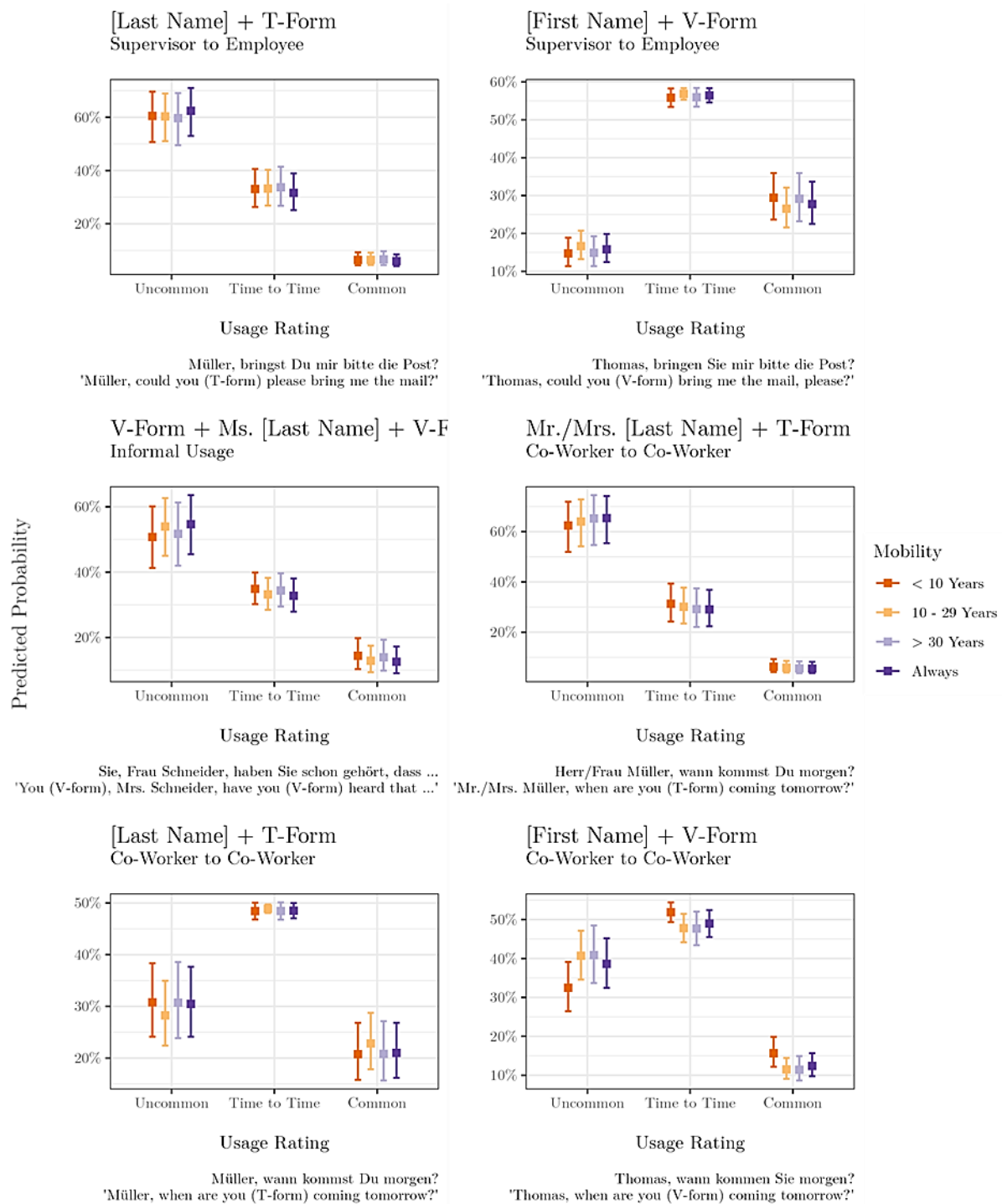


Figure 5: Conditional effects of residential mobility on pragmatic variation.

5.3 Interaction between regional and social predictors

As mentioned previously, only with respect to two variants ([last name] + T-form in supervisor–employee interactions and [first name] + V-form in co-worker interactions) was the model fit improved by allowing geography to interact with social variables. Specifically, the

regional effects were constrained by informant age, but not significantly by gender or residential mobility. As Figure 6 illustrates, however, the moderating effect of informant age on regional patterns was rather minimal. At most, with regard to the variant [last name] + T-form in supervisor–employee interactions, middle-aged and older adults especially in Austria and parts of Bavaria

seemed to report the variant as more uncommon than their younger adult confederates, as evinced by the grey shading in these areas. What is more, older adults also reported the variant [first name] + V-form in co-worker interactions to be more uncommon across northern Germany. That said, older adults particularly in eastern Austria judged the variant to occur more often from time to time than their other-aged cohorts. In sum, while the GAMMs do suggest that informant age moderates the influence of geography as concerns these two variants, the age-related differences are modest at best, suggesting a much more pronounced effect of geography over the more subtle regionally constrained effects of age.

6 Discussion

In this article, we explored regional and social effects on pragmatic variation. Specifically, we employed ordinal GAMMs as a means to model the ordinal-scaled usage ratings – a response variable that is otherwise rather cumbersome to model with traditional regression techniques. What is more, GAMMs are unparalleled in their ability to capture predictor-response (non)linear relationships and also complex interactions between co-variables, for example between geography and social variables such as informant age, gender, and residential mobility. This modeling procedure should be regarded as an extension of the approaches proposed in, for



Figure 6: Gradient plots for significant age * geography interaction effects – younger cohorts (left), older cohorts (right). Note: The raw data were first disaggregated by informant age cohort and visualized respectively using categorical *k*-nearest-neighbour spatial interpolation based on the procedure outlined in Grossenbacher (2018).

example, Wieling et al. (2011), Ko et al. (2014), and Wieling et al. (2014) and, in general, aid in expanding the methodological and statistical toolbox not only in the field of dialectology, but also in sociolinguistics and (variational) pragmatics.

As we outlined, while the regional distribution of forms of (pro)nominal address in German have been investigated previously (e.g., Clyne et al. 2009; Elter 2009; Kretzenbacher 2010; Clyne & Norrby 2011; Kretzenbacher 2011; Norrby & Kretzenbacher 2013; Schüpbach 2014; Schüpbach et al. 2021; Ackermann 2023; Schiegg & Elspaß in press), there are still several pervasive issues facing (variational) pragmatics research on this front. For one, none of the aforementioned studies explored in any extensive quantitative manner mixed forms of address, for example [first name] + V-form or [last name] + T-form. The current results address this research lacuna and contribute critically to more recent accounts of the German address system which argue that it is not to be regarded as purely binary (i.e., T-form vs. V-form), but also scalar (e.g., Hickey 2003; Kretzenbacher 2010, 2011). For example, Kretzenbacher (2010) illustrated via participant examples that mixed forms such as [first name] + V-form (popularly also referred to as the ‘Hamburger *Sie*’) fulfill ‘socio-deictic’ purposes – for example, expressing social closeness while maintaining situational formality. Our results build on this foundation by laying bare not only the areal variation such variants exhibit, but also how context (e.g., supervisor–employee interactions versus co-worker interactions) and social variation fit into the picture. For instance, as concerns the [first name] + V-form variant, our findings revealed a nuanced picture: The variant is chiefly judged as occurring from time to time in supervisor–employee interactions across Germany, Austria, and Switzerland, and there are no indications that, in this context, the variant is constrained to any single region. In co-worker interactions, however, the variant is judged as largely uncommon, indicating that its usage is conditioned strongly by the (socio-)contextual setting. Conversely, the [last name] + T-form (popularly referred to as ‘Münchner *Du*’) is subject to strong regional constraints in terms of the areas in which it is considered common – specifically, throughout (most of) the Bavarian-speaking areas, though this effect only holds for co-worker interactions.³ The use of this variant is con-

sidered rather uncommon in supervisor–employee interactions. With this in mind, our findings support *inter alia* Kretzenbacher’s (2010) view that the forms of address are likely determined socio-deictically – that is, forms of address other than the comparatively unmarked T-form and V-form in combination with first name and last name, respectively may be a means to make the degree of social distance between interactants explicit (e.g., differences between co-worker versus supervisor–employee interactions).

Additionally, the effects of the social predictors aid in refining this picture. Especially with respect to the aforementioned two examples (i.e., [first name] + V-form and [last name] + T-form), we identified effects of informant age. The variants seem to be judged the most uncommon by older adults (i.e., older than 30). One interpretation may be a sort of apparent-time effect, suggesting potential language change in progress (i.e., the variants may be becoming more common as evinced by the younger generation judging the variants to be generally more common than older adults). Another plausible interpretation, especially since the items gauged the variants’ usage in workplace interactions, may be one of change across the lifespan influenced by the workforce, that is, the longer informants are engaged in economically active adulthood, the less common the variants may be perceived. This relates to the idea that the effect may also be due to differences in perception: Younger colleagues may be more likely to be addressed by their first name accompanied by the V-form to maintain politeness, while this practice may not be considered appropriate for older colleagues. Future research is needed to disengage which explanation is most plausible, or whether it is a combination of all three. What is more, it is interesting that across most pragmatic variants, gender is a comparatively strong predictor, with women perceiving the respective variant as more common – particularly as Ackermann (2023) found no connection between gender and vocative use. In any case, it is important to note that, while our results are broadly in line with Kretzenbacher’s (2010) view that especially mixed address forms can fulfill socio-deictic purposes, our findings urge a reconceptualization that employs a wider basis of empirical data that allow for the model to be expanded to include the role of social variables such as age and gender. Also, especially seeing as most

of these pragmatic variants underlie relatively strong regional trends, accounting for regional variation in the model represents an important step forward. Future research will moreover do well to include potential effects of occupation on patterns of (pro)nominal address choice, especially by countenancing differences in individuals' perceived social formality in the workplace (e.g., how informal or relaxed do participants perceive the social environment in their respective workplace?). Such measures, coupled with other social variables like informant age, gender, residential mobility, etc., should aid in refining the initial picture we have sketched here.

Finally, as noted, we found pronounced regional effects in the regional distributions of the seven pragmatic variables subjected to analysis. The fact that geography emerged as a significant predictor is perhaps not all that surprising, however, especially seeing as the AdA collects data primarily on variables (hypothesized) to underlie areal variation across German-speaking regions (e.g. Möller & Elspaß 2008, 2014, 2015). Importantly, however, the regional distributions of the pragmatic variants identified here did not conform to national boundaries – in other words, specific pragmatic variables, such as forms of address, could not be identified as nationally typical or as those in which 'Germans', 'Austrians' and 'Swiss' differ markedly. Rather, the distributional patterns show sub-national pattern, often transcending national borders (cf. Schüpbach et al. 2021: 189–190) and were far more gradient by nature (see, e.g., Pröll 2015). This conclusion, of course, can also be drawn (at least in part) based on the respective descriptive data presented online in the AdA. The use of GAMMs to model the regional effects brings with it the particular advantage of accounting for spatial autocorrelation: "In order to gain a picture of use in an area, the data for the neighboring points must always be taken into account" (Möller & Elspaß 2015: 518, our translation). In other words, by considering not only the variants at a single location, but rather from neighboring locations as well, GAMMs are a useful geostatistical method to facilitate statistically more reliable statements about the regional structuring of linguistic variation.

While we make no claims that our selection of pragmatic variables can generalize to pragmatic variation overall, our contribution indeed represents a critical

springboard to move from contrastive analyses between countries to a more integrative modeling approach that does not rely on *a priori* assumptions that speakers or informants between countries differ categorically in terms of pragmatic variation.

7 Conclusion

This present contribution showed how ordinal GAMMs can be employed in order to model regional and social influences on pragmatic variation in colloquial German. Focusing on (pro)nominal address and potential socio-contextual conditioning variables thereon (i.e., supervisor to employee, co-worker to co-worker, informal setting), we analyzed seven pragmatic variables. Thematically, our goal was to address several critical issues in the field of variational pragmatics – that is, whether social variables impact on pragmatic variation in colloquial German and also whether this social variation may be regionally constrained. Overall, we found the seven pragmatic variants to be subject to comparatively strong geographical trends. Importantly, these regional distributions were not confined to national borders, which can be interpreted as an endorsement of Dürscheid and Simon's (2019: 255) call to consider pragmatic variation "on a smaller scale." While we also identified strong effects of informant age and gender on pragmatic variation, these were not prone to any particularly strong regional constraints.

Methodologically, this study was also ambitious in proposing the use of ordinal GAMMs as a means to (a) appropriately model ordinal response variables such as the usage rating scale employed in the AdA, and (b) simultaneously model the influence of spatial (i.e., regional) variables such as longitude and latitude along with social variables such as informant age, gender, and residential mobility on patterns of language variation. Concerning (a), ordinal models can be useful in future dialectometric, sociolinguistic, and (variational) pragmatic research, for example to model Likert scale data (which, indeed, are inherently ordinal and not numeric [Baayen & Divjak 2017; Liddell & Kruschke 2018; Bürkner & Vuorre 2019; Veríssimo 2021]) or variables collected in, e.g., dialect atlases using similar usage rating scales. With respect to (b), we agree with *inter alia* Ko et al. (2014), Wieling et al. (2014), and Wieling and Nerbonne (2015) that GAMMs are particularly suitable for

dialectology studies employing dialectometric methods, and we argue that they represent a critical advance for studies in variational pragmatics and sociolinguistics aiming to better facilitate the integrative modeling of regional and social variables (see also Wirtz et al. 2025). This is because GAMMs are adept at modeling the influence of geography (represented two-dimensionally rather than simply as a distance) and can include complex (non)linear interactions with additional social and linguistic variables. What is more, the mixed-effects regression aspect (i.e., by including extensive random effects structures) in GAMMs allows us also to focus on individual items (for example, words or concepts) and thus ultimately facilitates a more concentrated view of “variation among the spatialities of linguistic features” (Pickl & Rumpf 2012: 212). Because GAMMs can be fitted using a wide array of distribution families (e.g., logistic regression for binary outcome variables, Beta distributions for slider scales, and ordinal regression for ordinal scales), they are of special importance for agendas aiming to more integratively explore social and regional patterns on language variation.

Acknowledgements

We would like to thank the three anonymous reviewers, and the editor of this issue, Philip C. Vergeiner, for their constructive comments on earlier versions of this manuscript. This project was funded by the Department of Culture and Science of the State of Salzburg (reference number: 20204-WISS/262/9-2021), which is hereby gratefully acknowledge. Any remaining errors are our own.

Author Statement

All authors accepted the responsibility for the content of the manuscript and consent to its submission, reviewed all the results, and approved the final version of the manuscript. S.E. collected the data. M.W. performed the statistical analyses. M.W. wrote the first draft of the manuscript. M.W. and S.E. revised the manuscript. M.W., S.E., S.P., and K.N. commented on the manuscript.

Data availability

The analyses for this article can be made available upon reasonable request to the first and second authors.

Endnotes

1 It could be argued that the variables such as [first name] + V-Form which differ only in the context of the item (supervisor to employee vs. co-worker to co-worker) could be modelled jointly, with context entered as an additional predictor. We abstained from this modeling procedure for reasons of model complexity. Specifically, as the models became increasingly complex during the fitting procedure, considering the role of an additional contextual factor would have further complicated model interpretation. Moreover, explicitly modelling context would not have contributed to answering either of the research questions.

2 Note that visualization of the distribution of each variant separately is, in our view, preferable to using, e.g., red-blue-green (RBG) values, as the latter makes it difficult to extract the information regarding the individual variants in a locality visually.

3 It is interesting to note that we have therefore found only weak evidence for the popular notion that the ‘Münchener *Du*’ form is typical of the Munich region and no (robust) evidence for the notion that the ‘Hamburger *Sie*’ variant is typical of the Hamburg region.

References

- Ackermann, Tanja. 2021. *Bitte könnte ich vielleicht?* Eine kontrastive Untersuchung zu Aufforderungen in Deutschland und in der deutschsprachigen Schweiz. *Zeitschrift für Dialektologie und Linguistik* 88(3). 265–301.
- Ackermann, Tanja. 2023. Soziopragmatik und areale Verteilung von Vokativen im deutschsprachigen Raum. *Beiträge zur Namenforschung* 58(1/2). 169–204.
- Ackermann, Tanja, Christa Dürscheid, Stephan Elspaß & Horst Simon. In press. Variantenpragmatik des Deutschen. Werkstattbericht und Fallanalysen. In Sören Stumpf, Marie-Luis Merten, Susanne Kabatnik & Sebastian Zollner (eds.). *Variationspragmatik*. Tübingen: Narr.
- Ammon, Ulrich, Hans Bickel, Alexandra N Lenz, et al. 2016. *Variantenwörterbuch des Deutschen. Die Standardsprache in Österreich, der Schweiz und Deutschland sowie in Liechtenstein, Luxemburg, Ostbelgien und Südtirol*. Berlin: De Gruyter.

- Baayen, R. Harald & Dagmar Divjak. 2017. Ordinal GAMMs: a new window on human ratings. In Anastasia Makarova, Stephen M. Dickey & Dagmar Divjak (eds.), *Each venture, a new beginning: Studies in Honor of Laura A. Janda*, 39–56. Bloomington: Slavica Publishers.
- Barron, Anne & Klaus P. Schneider. 2009. Variational pragmatics: Studying the impact of social factors on language use in interaction. *Intercultural Pragmatics* 6(4). 425–442.
- Barron, Anne. 2005. Variational pragmatics in the foreign language classroom. *System (Pragmatics in Instructed Language Learning)* 33(3). 519–536.
- Barron, Anne. 2021. Contrastivity and comparability: pragmatic variation across pluricentric varieties. *Sociolinguistica* 35. 189–216.
- Beaman, Karen V. 2021. Identity and mobility in linguistic change across the lifespan: The case of Swabian German. In Arne Ziegler, Stefanie Edler & Georg Oberdorfer (eds.), *Urban matters: Current approaches of international sociolinguistic research*, 27–60. Amsterdam: John Benjamins.
- Beaman, Karen V. 2024. *Language Change in Real- and Apparent-Time: Coherence in the Individual and the Community*. New York: Routledge.
- Blum-Kulka, Shoshana & Elite Olshtain. 1984. Request and apologies: A cross-cultural study of speech act realization patterns (CCSARP). *Applied Linguistics* 5(1). 196–213.
- Blum-Kulka, Shoshana, Juliane House & Gabriele Kasper (eds.). 1989. *Cross-cultural Pragmatics: Requests and Apologies*. Norwood: Ablex.
- Britain, David. 2013. Space, diffusion and mobility. In Jack K. Chamber & Natalie Schilling (eds.), *The handbook of language variation and change*, 469–500. Hoboken: Wiley.
- Bülow, Lars & Philip C. Vergeiner. 2021. Intra-individual variation across the lifespan: Results from an Austrian panel study. *Linguistics Vanguard* 7(s2). 1–11.
- Bülow, Lars, Andrin Bächler, Nicolai Rawyler, Christa Schneider & David Britain. 2021. Linguistic, Social, and Individual Factors Constraining Variation in Spoken Swiss Standard German. In Alexander Werth, Lars Bülow, Simone E. Pfenniger & Markus Schiegg (eds.), *Intra-individual Variation in Language*, 127–176. Berlin: De Gruyter.
- Bürkner, Paul-Christian & Matti Vuorre. 2019. Ordinal Regression Models in Psychology: A Tutorial. *Advances in Methods and Practices in Psychological Science* 2(1). 77–101.
- Chambers, J. K. & Peter Trudgill. 1998. *Dialectology*. Cambridge: Cambridge University Press.
- Cheshire, Jenny, Sue Fox, Paul Kerswill & Eivind Torgersen. 2008. Ethnicity, friendship network and social practices as the motor of dialect change: Linguistic innovation in London. *Sociolinguistica* 22(1). 1–23.
- Cheshire, Jenny. 2004. Sex and Gender in Variationist Research. In Jack K. Chambers, Peter Trudgill & Natalie Schilling-Estes (eds.), *The Handbook of Language Variation and Change*, 423–443. Malden: Blackwell.
- Clyne, Michael & Catrin Norrby. 2011. Address in pluricentric languages – the case of German and Swedish. In Augusto Soares da Silva & Miguel Gonçalves (eds.), *Línguas Pluricêntricas: Variação Linguística e Dimensões Sociocognitivas/Pluricentric Languages: Linguistic Variation and Sociocognitive Dimensions*, 147–160. Braga: Aletheia.
- Clyne, Michael, Catrin Norrby & Jane Warren. 2009. *Language and Human Relations: Styles of Address in Contemporary Language*. Cambridge: Cambridge University Press.
- Coulter, Rory & Michael Thomas. 2020. Residential Mobility. In Audrey Kobayashi (ed.), *International Encyclopedia of Human Geography*, 443–449. Chantilly: Elsevier.
- Divjak, Dagmar. 2017. The Role of Lexical Frequency in the Acceptability of Syntactic Variants: Evidence From that-Clauses in Polish. *Cognitive Science* 41(2). 354–382.
- Dürscheid, Christa & Horst J. Simon. 2019. Auf dem Weg zu einer pluriarealen Variantenpragmatik. In Juliane Schröter, Susanne Tienken, Yvonne Ilg, Joachim Scharloth & Noah Bubenhofer (eds.), *Linguistische Kulturanalyse*, 245–267. Berlin: De Gruyter.
- Dürscheid, Christa, Stephan Elspaß & Arne Ziegler. 2018. *Variantengrammatik des Standarddeutschen. Ein Online-Nachschlagewerk*. Open Access. <http://mediawiki.ids-mannheim.de/VarGra>.
- Eichhoff, Jürgen. 1977–2000. *Wortatlas der deutschen Umgangssprachen*, Vol. 1 & 2, Bern [1977]; Vol. 2, Bern [1978]; Vol. 3, München [1993]; Vol. 4, Bern [2000]: Francke.
- Elspaß, Stephan. 2007. Variation and change in colloquial (standard) German. The Atlas zur deutschen Alltagssprache (AdA) project. In Christian Fandrych & Reinier Salverda (eds.), *Standard, Variation und Sprachwandel in germanischen Sprachen/Standard, variation and language change in Germanic languages*, 201–216. Tübingen: Narr.
- Elspaß, Stephan & Robert Möller. 2003. Atlas zur deutschen Alltagssprache (AdA). <https://www.atlas-alltagssprache.de>.

- Elspaß, Stephan & Stefan Kleiner. 2019. Forschungsergebnisse zur arealen Variation im Standarddeutschen. In Joachim Herrgen & Jürgen Erich Schmidt (eds.), *Sprache und Raum. Ein internationales Handbuch der Sprachvariation*, Volume 4: *Deutsch*, 159–184. Berlin: De Gruyter Mouton.
- Elter, Irmgard. 2009. Höflichkeit in den nationalen Varietäten des Deutschen: Am Beispiel der Anrede. In Claus Ehrhardt & Eva Neuland (eds.), *Sprachliche Höflichkeit in interkultureller Kommunikation und im DaF-Unterricht*, 201–216. Frankfurt am Main: Lang.
- Georgakopoulou, Alexandra & Anna Charalambidou. 2011. Doing age and ageing: language, discourse and social interaction. In Gisle Andersen & Karin Aijmer (eds.), *Pragmatics of Society*, 31–52. Berlin: De Gruyter.
- Glück, Helmut & Wolfgang Werner Sauer. 1997. *Gegenwartsdeutsch*. 2nd ed. Stuttgart, Weimar: Metzler.
- Grossenbacher, Timo. 2018. *Categorical spatial interpolation with R*. Github. <https://github.com/grssnbchr/categorical-spatial-interpolation>.
- Hickey, Raymond. 2003. The German address system: Binary and scalar at once. In Irma Taavitsainen & Andreas H. Jucker (eds.), *Diachronic perspectives on address term systems*, 401–425. Amsterdam: John Benjamins.
- Jeszenszky, Péter, Carina Steiner & Adrian Leemann. 2024. Effects of mobility on dialect change: Introducing the linguistic mobility index. *PLOS ONE* 19(4). e0300735. <https://doi.org/10.1371/journal.pone.0300735>.
- Kleiner, Stefan. 2011. *Atlas zur Aussprache des deutschen Gebrauchsstandards (AADG)*. <http://prowiki.ids-mannheim.de/bin/view/AADG/>.
- Ko, Vinnie, Martijn Wieling, Ernst Wit, John Nerbonne & Wim Krijnen. 2014. Social, geographical, and lexical influences on Dutch dialect pronunciations. *Computational Linguistics in the Netherlands Journal* 4. 29–38.
- Kretzenbacher, Heinz L. 2010. „Man ordnet ja bestimmte Leute irgendwo ein für sich ...“ Anrede und soziale Deixis. *Deutsche Sprache. Zeitschrift für Theorie, Praxis, Dokumentation* 38(1). 1–18.
- Kretzenbacher, Heinz L. 2011. Mikropragmatik in kommunikativen Gattungen und plurizentrischer Sprachkultur: Zur Anrede im Deutschen. In Klaus-Dieter Baumann (ed.), *Fach – Translat – Kultur. Interdisziplinäre Aspekte der vernetzten Vielfalt*, 860–899. Berlin: Frank & Timme.
- Li, Shuai, Naoko Taguchi & Feng Xiao. 2019. Variations in rating scale functioning in assessing pragmatic performance in L2 Chinese. *Language Assessment Quarterly* 16(3). 271–293.
- Liddell, Torrin M. & John K. Kruschke. 2018. Analyzing ordinal data with metric models: What could possibly go wrong? *Journal of Experimental Social Psychology* 79. 328–348.
- Mattheier, Klaus J. 1980. *Pragmatik und Soziologie der Dialekte. Einführung in die kommunikative Dialektologie des Deutschen*. Heidelberg: Quelle & Meyer.
- Möller, Robert & Stephan Elspaß. 2008. Erhebung dialektgeographischer Daten per Internet: Ein Atlasprojekt zur deutschen Alltagssprache. In Stephan Elspaß & Werner König (eds.), *Sprachgeographie digital. Die neue Generation der Sprachatlanten*, 115–132. Hildesheim: Olms.
- Möller, Robert & Stephan Elspaß. 2014. Zur Erhebung und kartographischen Darstellung von Daten zur deutschen Alltagssprache online: Möglichkeiten und Grenzen. In Fabio Tosques (ed.), *20 Jahre digitale Sprachgeographie*, 121–131. Berlin: Humboldt-Universität.
- Möller, Robert & Stephan Elspaß. 2015. Atlas zur deutschen Alltagssprache (AdA). In Roland Kehrein, Alfred Lameli & Stefan Rabanus (eds.), *Regionale Variation des Deutschen. Projekte und Perspektiven*, 519–540. Berlin: De Gruyter.
- Murphy, Bróna. 2011. Gender identities and discourse. In Gisle Andersen & Karin Aijmer (eds.), *Pragmatics of Society*, 53–78. Berlin: De Gruyter Mouton.
- Nerbonne, John & Martijn Wieling. 2018. Statistics for aggregate variationist analyses. In Charles Boberg, John Nerbonne & Dominic Watt (eds.), *The Handbook of Dialectology*, 400–414. Hoboken: Wiley-Blackwell.
- Nerbonne, John, Wilbert Heeringa, Jelena Prokic & Martijn Wieling. 2021. Dialectology for computational linguists. In Marcos Zampieri & Preslav Nakov (eds.), *Similar Languages, Varieties, and Dialects. A Computational Perspective*, 96–118. Cambridge: Cambridge University Press.
- Nerbonne, John. 2009. Data-driven dialectology. *Language and Linguistics Compass* 3(1). 175–198.
- Norrby, Catrin & Heinz L. Kretzenbacher. 2013. National variation of address in pluricentric languages: The examples of Swedish and German. In Augusto Soares da Silva (ed.), *Pluricentricity. Language variation and sociocognitive dimensions*, 243–270. Berlin: De Gruyter.

- Pickl, Simon & Jonas Rumpf. 2012. Dialectometric concepts of space: Towards a variant-based dialectometry. In Sandra Hansen, Christian Schwarz, Philip Stöckle & Tobias Streck (eds.), *Dialectometric concepts of space: Towards a variant-based dialectometry*, 199–214. Berlin: De Gruyter.
- Pickl, Simon & Simon Pröll. 2019. Geolinguistische Querschnitte und Tiefenbohrungen in Bayern und darüber hinaus. In Mechthild Habermann, Sebastian Kürschner & Peter O. Müller (eds.), *Methodik moderner Dialektforschung: Erhebung, Aufbereitung und Auswertung von Daten am Beispiel des Oberdeutschen*, 11–44. Hildesheim: Olms.
- Pickl, Simon, Simon Pröll, Stephan Elspaß & Robert Möller. 2019. Räumliche Strukturen Alltagssprachlicher Variation in Österreich anhand von Daten des „Atlas zur deutschen Alltagssprache (AdA)“. In Lars Bülow, Ann Fischer & Kristina Herbert (eds.), *Dimensions of Linguistic Space: Variation – Multilingualism Conceptualisations*, 39–60. Berlin: Peter Lang.
- Pickl, Simon. 2013. *Probabilistische Geolinguistik. Geostatistische Analysen lexikalischer Variation in Bayerisch-Schwaben*. Stuttgart: Steiner.
- Pröll, Simon, Simon Pickl, Aaron Spettl, Volker Schmidt, Evgeny Spodarev, Stephan Elspaß & Werner König. 2015. Neue Dialektometrie mit Methoden der stochastischen Bildanalyse. In Roland Kehrein, Alfred Lameli & Stefan Rabanus (eds.), *Regionale Variation des Deutschen – Projekte und Perspektiven*, 173–194. Berlin: De Gruyter.
- Pröll, Simon, Stephan Elspaß & Simon Pickl. 2021. Areal microvariation in German-speaking urban areas (Ruhr Area, Berlin, and Vienna). In Arne Ziegler, Stefanie Edler & Georg Oberdorfer (eds.), *Urban Matters. Current approaches in variationist sociolinguistics*, 227–252. Amsterdam: Benjamins.
- Pröll, Simon. 2014. Stochastisch gestützte Methoden der Dialektdifferenzierung. In Dominique Huck, Pascale Erhart & François-Xavier Bogatto (eds.), *Alemannische Dialektologie: Dialekte im Kontakt. Beiträge zur 17. Arbeitstagung für alemannische Dialektologie in Straßburg vom 26.–28.10.2011*, 233–246. Stuttgart: Steiner.
- Pröll, Simon. 2015. *Raumvariation zwischen Muster und Zufall. Geostatistische Analysen am Beispiel des Sprachatlas von Bayerisch-Schwaben*. Stuttgart: Steiner.
- Rash, Felicity. 1998. *The German Language in Switzerland: Multilingualism, Diglossia and Variation*. Berne: Peter Lang.
- Rij, Jacolien van, Martijn Wieling, Harald Baayen & Hedderik van Rijn. 2020. itsadug: Interpreting Time Series and Auto-correlated Data Using GAMMs.
- Schiegg, Markus & Stephan Elspaß. In press. Variation and change in pronominal address in 19th and early 20th-century German private letters. *Journal of Historical Sociolinguistics*.
- Schneider, Klaus P. & Anne Barron. 2008. Where pragmatics and dialectology meet: Introducing variational pragmatics. In Klaus P. Schneider & Anne Barron (eds.), *Variational Pragmatics: A Focus on Regional Varieties in Pluricentric Languages*, 1–32. Amsterdam: Benjamins.
- Schneider, Klaus P. & César J. Félix-Brasdefer. 2022. Pragmatic variation across national varieties of pluricentric languages. In Andreas H. Jucker & Heiko Hausendorf (eds.), *Pragmatics of Space*, 637–678. Berlin: De Gruyter.
- Schneider, Klaus P. 2021. Variational pragmatics. In Michael Haugh, Dániel Z. Kádár & Marina Terkourafi (eds.), *The Cambridge Handbook of Sociopragmatics*, 663–686. Cambridge: Cambridge University Press.
- Schüpbach, Doris, John Hajek, Heinz L. Kretzenbacher & Catrin Norrby. 2021. Approaches to the study of address in pluricentric languages: methodological reflections. *Sociolinguistica* 35. 165–188.
- Schüpbach, Doris. 2014. German or Swiss? Address and other routinised formulas in German-speaking Switzerland. In John Hajek & Yvette Slaughter (eds.), *Challenging the Monolingual Mindset*, 63–77. Bristol: Multilingual Matters.
- Steiner, Carina, Péter Jeszenszky & Adrian Leemann. 2023a. Variation and change in Swiss German agreement morphology: Spatial, social, and attitudinal effects. *Journal of Linguistic Geography* 11(1). 8–24.
- Steiner, Carina, Péter Jeszenszky, Viviane Stebler & Adrian Leemann. 2023b. Extraverted innovators and conscientious laggards? Investigating effects of personality traits on language change. *Language Variation and Change* 35(1). 1–28.
- Vergeiner, Philip C. & Stephan Elspaß. 2025. Infinitival constructions in the German dialects of Austria. On variation, constraints and change of a prominent syntactic feature. *Journal of Germanic Linguistics* 37(1), 1–34.
- Vergeiner, Philip C., Dominik Wallner, Lars Bülow & Hannes Scheutz. 2021. Redialektalisierung und Alter. Ergebnisse einer real-time-Studie zum age-grading in Ulrichsberg. In Helen Christen, Brigitte Ganswindt, Joachim Herrgen & Jürgen Erich Schmidt (eds.), *Regiolekt – Der neue Dialekt? Akten des 6. Kongresses der Internationalen Gesellschaft für Dialektologie des Deutschen (IGDD)*, 101–122. Stuttgart: Steiner.

Veríssimo, João. 2021. Analysis of rating scales: A pervasive problem in bilingualism research and a solution with Bayesian ordinal models. *Bilingualism: Language and Cognition* 24(5). 842–848.

Wieling, Martijn & John Nerbonne. 2015. Advances in dialectometry. *Annual Review of Linguistics* 1(1). 243–264.

Wieling, Martijn, John Nerbonne & Harald Baayen. 2011. Quantitative social dialectology: Explaining linguistic variation geographically and socially. *PLOS ONE* 6(9). 1–14.

Wieling, Martijn, Simonetta Montemagni, John Nerbonne & Harald Baayen. 2014. Lexical differences between Tuscan dialects and standard Italian: Accounting for geographic and sociodemographic variation using generalized additive mixed modeling. *Language* 90(3). 669–692.

Wirtz, Mason A. In press. Individual differences in perceived linguistic change following life-course transitions in the personal domain. *Journal of Germanic Linguistics*.

Wirtz, Mason A., Simon Pickl, Konstantin Niehaus, Stephan Elspaß & Robert Möller. 2025. Gebrauchsstandard in der deutschen Alltagssprache: Eine integrative Modellierung räumlicher und sozialer Variation. *Zeitschrift für germanistische Linguistik* 5(1). 97–125.

Wood, Simon N., Natalya Pya & Benjamin Säfken. 2016. Smoothing Parameter and Model Selection for General Smooth Models. *Journal of the American Statistical Association* 111(516). 1548–1563.