


Does the linguistic market explain sociolinguistic variation in spoken Swiss Standard German?

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Abstract

This paper shows (a) how the concept of the linguistic market can be operationalized as an index to enable its inclusion as a factor in variationist analysis and (b) how this index helps to explain sociolinguistic variation in a diglossic situation. To do this, sociolinguistic interviews were conducted in Swiss Standard German among 16 L1-dialect-speakers aged between 19 and 40 from Biel/Bienne in western Switzerland. Drawing from participants' self-assessments of the importance of Standard German in their professional life, a linguistic market index (LMI) was created and cross-validated with external assessments. Our variationist analysis considered four phonetic-phonological variables—/k/, /ç/, /a: /, /ɛ-ɛ: /—for which typical Swiss variants (i.e., sociolinguistic stereotypes) exist. Findings show that the LMI is crucial for explaining variation in all the variables tested. Other social (i.e., gender and formality of the language production task) and linguistic factors (e.g., phonetic environment) show partial effects as well.

Keywords: variationist sociolinguistics; linguistic market; spoken Swiss Standard German; phonetic variation

Introduction

Since sociolinguists investigate the correlation between language use and social structure, it is understandable that they draw on central concepts from sociology. One foundational sociological concept that has found its way into sociolinguistics is Rossi-Landi and Bourdieu's concept of the *linguistic market* (*mercato linguistico*, cf. Rossi-Landi, 1968; *marché linguistique*, cf. Bourdieu & Boltanski, 1975). This concept was first operationalized for variationist linguistic purposes by Sankoff and Laberge (1978) to explain patterns of linguistic variability in Montreal, Canada, in the 1970s. They (1978:239) used an index based on “how speakers' economic activity, taken in its widest sense, requires, or is necessarily associated with, competence in the legitimized language (or standard, elite, educated, etc., language).” Although their results suggest that their linguistic market index (LMI) sets “the sociological aspects of linguistic variation

analysis on more satisfying theoretical bases than the ‘objective’ stratificational criteria which have often been taken for granted” (Sankoff & Laberge, 1978:248-249; see also Sankoff, Cedergren, Kemp, Thibault, & Vincent, 1989), it has since seen little *empirical* uptake in other sociolinguistic settings. The concept of the linguistic market is, however, often used as a post-hoc explanation to account for age-grading and lifespan change (e.g., Evans Wagner, 2012:376; Rickford & Price, 2013:157).

In this article, we consider to what extent an index of linguistic marketplace orientation can account for sociolinguistic variability in spoken Swiss Standard German. To do so, we analyze data extracted from sociolinguistic interviews with 16 speakers from the city of Biel/Bienne that incorporated free conversation, two reading tasks, and a translation task (dialect to standard). In the analysis, we focus on the phonetic-phonological variables /k/, /ç/, /a:/, and /ɛ-ɛ:/, for which variation in spoken Swiss Standard German has already been amply demonstrated (e.g., Bülow, Büchler, Rawyler, Schneider, & Britain, 2021; Christen, Guntern, Hove, & Petkova, 2010; Hove, 2002; Siebenhaar, 1994; Zihlmann, 2021).

We first present and discuss the sociolinguistic state of research on the linguistic market, before elaborating on the sociolinguistic situation in German-speaking Switzerland. In this context, we summarize the factors that have previously been assumed to constrain variation in spoken Swiss Standard German and then introduce the variables analyzed in this study. Subsequently, the research design and methods are explained, including the LMI used for this study. We then present and discuss the results.

The linguistic market model

From the very start of the sociolinguistic enterprise, researchers have attempted to model and then empirically operationalize the ways in which an individual’s social position within their speech community both affects their access to societally legitimized forms of language and interacts with the process of linguistic change. Models of social class were adopted (and quantitatively operationalized in various ways) to chart a hierarchy of social stratification, with the linguistic behavior of those lowest on the *social* hierarchy being presented as most remote from the forms at the top of the legitimized *linguistic* hierarchy. But the connection between social class and language is a complex and indirect one, and many scholars took aim at the way class had been conceptualized and operationalized. Sankoff and Laberge (1978) were, for example, frustrated with the inadequacy of social class membership at accounting for linguistic variation in Montreal French, since, they argued, it “ignores established facts such as that teachers, actors and receptionists tend to speak a more standard variety than other people of similar social or economic position” (Sankoff & Laberge, 1978:239). Their approach, drawing inspiration from the concept of the *linguistic market*, attempted to model the extent to which linguistic competence, in this case in Standard French, was a required or desirable skill for particular economic roles (Sankoff & Laberge, 1978:239).

The linguistic market (Bourdieu & Boltanski, 1975; Rossi-Landi, 1968) is the label given to a domain in which different values, higher or lower, come to be assigned to different forms of language (Bourdieu & Boltanski, 1975:8). The concept relies on the idea that certain types of language (e.g., standard accents, formal styles, elaborated written genres) can form a kind of “capital” or asset that can be put to good use in

the socioeconomic marketplace. In general, of course, the dominant class both control and gatekeep which forms of language have power in the market and enforce the higher status of their own language capital. Consequently, to secure certain positions in the socioeconomic market, people need to possess the relevant types of linguistic capital that are deemed by the dominant classes to be necessary for that position. As Meyerhoff (2019:166) argued,

you can't get a job as a banker unless you can talk the way a banker is supposed to talk, and you won't talk like a banker is supposed to talk unless you have grown up in a part of the speech community that is made up of bankers and people like them

The concept of the linguistic market has been applied in two rather different ways in the variationist literature:

- (a) As a post-hoc explanation for patterns of linguistic variation that demonstrate age-graded inter-speaker variability: One common pattern, assumed to demonstrate variability but overall system stability, is where adolescents and the retired show similar levels of nonstandardness for a particular variable, but where the economically active 25-60-year-olds show lower levels. This is often explained as the result of those in the workforce orienting more than they had done in their youth or need to in their retirement to the expectations of the elite-controlled linguistic market—the need to speak more standardly to secure and maintain better jobs in the economy. Several studies have used this argument, for example, to explain why levels of nonstandard [in] for (ing) in English appear higher among the young and old than among the economically active (e.g., Holmes, 2008:175-176). This post-hoc approach is usually applied community-wide. It assumes that *everyone* is impacted in the same way once they enter the workforce, that it is a general characteristic of economically active adulthood.
- (b) As an explicitly operationalized constraint in variationist analyses: In such studies (and there are relatively few), linguistic market is treated as an independent social constraint, alongside others such as gender, age, and social class. In Sankoff and Laberge (1978:241), the “socioeconomic life histories” of their speakers were given to eight “judges” whose task it was to score each on the basis of “the relative importance of the legitimized language in the socioeconomic life of the speaker.” This linguistic marketplace measure significantly accounted for the use of non-standard perfective auxiliary *avoir* in Montreal French—the lower that Standard French was deemed important to the economic lives of the individual speakers, the higher their use of nonstandard *avoir*. Sankoff and Laberge (1978) were therefore able to distinguish between adults for whom Standard French was important in their working lives and those for whom it was not, *even though all of them were active in the workforce*, overcoming one of the weaknesses of the post-hoc argument. King and Nadasdi (1996:121; see also King, Nadasdi, & Butler, 2004) adapted Sankoff and Laberge’s approach, however, instead of drawing on judges, the authors themselves rated how important it was for their informants to use the standard language in their jobs based on social histories and voluntary activities compiled for each individual by the local interviewers and an insider from the community who was part of the research team.

Social class and linguistic marketplace evaluation will clearly overlap, especially to the extent that education and income are involved in the “scoring” of social class. But both Bourdieu and Sankoff and Laberge argued that there was no one-to-one relationship between the two: Bourdieu (2017) argued that cultural, social, and symbolic (including linguistic) capital are often stronger forces than economic capital alone. Sankoff and Laberge (1978) found that their speakers’ social class was not as important as marketplace evaluation in determining use of nonstandard *avoir* in Montreal. Clearly, economic capital and the symbolic power of the standard are not perfectly aligned—some low-paid professions may involve customer-facing roles which nevertheless demand attention to normative linguistic (and other symbolic) marketplace behavior—think, for example, of perfume and make-up salespeople in department stores: low paid, but selling aspirational products to customers who care about symbolic capital. Electricians, plumbers, and builders, on the other hand, may have no customer-facing role, require no long *academic* training, but earn vastly more. Linguistic marketplace approaches to variation therefore appear to cope better with how variability carries symbolic capital in the world of work than social class approaches that are insensitive to the power of language in specific occupations.

The linguistic marketplace approach appears to especially well account for variability in diglossic societies. In such contexts the standard often becomes formally assigned to certain occupational roles or is used only in certain types of interaction (e.g., with nonlocals), and so consequently is more important in workplaces that require such interaction.

Spoken Swiss Standard German

The language situation in German-speaking Switzerland has traditionally been described as diglossic with two varieties clearly separated from each other functionally and structurally (cf. Ferguson, 1959). The Swiss situation is also classified by many researchers as one of medial diglossia with an endoglossic standard (cf. Auer, 2005:12-15). Dialects, which are not negatively evaluated in German-speaking Switzerland and thus best not classified as low-varieties in the Fergusonian sense (1959), are dominant in most spoken contexts—even in very formal ones, whereas the standard language is typically used in most written media (newspapers, journals, official written statements). Although the dialects play a far greater role in everyday life in Switzerland than anywhere else in the German-speaking world, spoken Swiss Standard German is nevertheless important for Swiss Germans. It is typically used in official and formal speech (in parliament, in church, and in official news broadcasts on TV and radio). It is also the language of instruction within the Swiss educational system (Christen & Schmidlin, 2019:208). Swiss Germans usually learn the standard language, therefore, in school and through the media. Furthermore, the spoken standard language is used if one of the conversation partners is not Swiss German or not familiar with Swiss German dialects (among each other, Swiss Germans only use their dialects). Since many Swiss companies maintain economic relations with neighboring German-speaking Germany and Austria, the spoken standard language also plays a key role in professional contexts. Census data show that about 45% of participants regularly use the standard language at work (Werlen, 2004:15). Furthermore,

these census data indicate a strong sociolinguistically motivated correlation between profession, level of education, and the need to use the standard in professional contexts: the higher the educational level a particular profession requires, the more likely is the use of the standard language (cf. Bülow et al., 2021:166; Werlen, 2004:16). It is important to note that the dialect is the default variety spoken in almost all workplaces when Swiss Germans speak to each other (the one exception being the school sector, in which the standard is the norm for communication during formal classes). The standard, therefore, is more important in those professions in which communication with people from other German-speaking countries, such as Germany or Austria, is necessary.

Because the standard language in German-speaking Switzerland differs from the standard in Germany (and Austria) and shows variation at all linguistic levels, Swiss Germans often have an ambivalent relationship to the standard (cf. Scharloth, 2005). On the one hand, the standard language typically used in Germany is considered “better”; on the other hand, a non-Swiss-colored use of the standard might attract negative reactions (cf. Hove, 2017; Studler, 2019). In other words: Swiss Germans use their standard language proudly, but at the same time often consider Federal German Standard German to be of higher value (cf. Scharloth, 2005). Because of structural differences between the standard norms, the German-speaking Swiss may orient themselves more toward the Federal German standard or toward conventions of German-speaking Switzerland, with the range of possibilities described as a continuum (Guntern, 2012:106). Consequently, the spoken standard in German-speaking Switzerland, can be “Swiss-colored” to varying degrees.

Since variation in spoken Swiss Standard German is particularly apparent at the phonetic-phonological level, we focus on four such variables: /k/, /ç/, /a:/, and /ε-ε:/.

Factors constraining variation in spoken Swiss Standard German

Here we focus on the factors that constrain phonetic-phonological variation within spoken Swiss Standard German. Variation at the phonetic-phonological level is a transfer effect. Some dialect features influence the spoken standard language (Zihlmann, 2020:7) and provide the standard with a certain degree of Swissness (Guntern, 2012; Hove, 2002, 2008). Bear in mind that these variants can be used in the standard language alongside variants that are strongly associated with the Federal German Standard variety.

In the literature, variant choice has been explained primarily by means of situational, socio-pragmatic, and attitudinal factors. We can show this by comparing two studies from the 2000s. Hove (2002) examined the use of spoken Swiss Standard German by 61 younger and tertiary educated speakers in a “formal” (conversation but in a school-like situation) and a “norm-oriented” (reading task) language production task. Christen et al. (2010), instead, investigated the standard language in a situation “oriented toward comprehension,” namely data drawn from police emergency calls.¹ In comparing their results with Hove’s (2002), Christen and colleagues (2010) found situational differences (comprehension- versus norm-oriented speech) for most of the phonetic-phonological variables analyzed.

Kolly’s (2011) study showed a correlation between attitudes toward Standard German and the degree of “Swissness” of the accent. In this study, 80 students had

to judge the accent strength of eight speakers using the standard language. It turned out that the least accented speech was used by those of the eight speakers who were most positive to Standard German.

Furthermore, two recent studies provide evidence that sociolinguistic factors also influence variation in spoken Swiss Standard German. Büchler, Bülow, and Rawyler (2022) and Bülow et al. (2021) showed, in a series of sociolinguistic interviews with 16 speakers from the city of Biel (canton of Berne), that level of education and gender constrained variation for two phonetic-phonological variables (/k/ and /ç/) in spoken Swiss Standard German more than the language production task (i.e., comprehension- versus norm-oriented). Some studies moreover have shown evidence that geographical factors are likely to have some relevance. Siebenhaar (1994:54), for example, found regional differences in the use of the spoken standard language in Berne, Zurich, and St. Gallen, a finding also confirmed by the *Atlas zur Aussprache des deutschen Gebrauchsstandards* 'Atlas of Standard German Pronunciation' (AADG, 2011). Siebenhaar (1994:44-45) showed that Zurich speakers use aspirated [k^h] (typical of Federal German Standard German) more frequently than speakers from Berne and St. Gallen, who use the affricate [kx] more often.

Variables and variants

We will now introduce the target variables of this study: /k/, /ç/, /a:/, and /ε-ε:/. All four have variants that are available in spoken Swiss Standard German, Federal German Standard German, and the Swiss German dialects.

The variable /k/. The variable /k/ can be produced as an aspirated plosive [k^h] and as an affricate [kx] (e.g., [k^har'tɔf] or [kxar'tɔf] 'potato') in spoken Swiss Standard German, with the latter being a marker of local Swissness (Christen et al., 2010:150-151; Guntern, 2012:104). Regional, situational, and stylistic factors constrain this variability. Siebenhaar (1994:44-45) found some evidence for regional variation between Berne, Zurich, and St. Gallen. He also found that word-initial /k/ is usually produced as a plosive. Other studies have highlighted the importance of situational factors (cf. Christen et al., 2010; Hove, 2002). Speakers are more likely to produce plosives when reading or having formal conversations than in informal conversations (Christen et al., 2010:151). Finally, individual stylistic practices also play a role in that speakers can use the affricated variant to index their Swissness, therefore functioning as a sociolinguistic stereotype (in Labov's sense) (Labov, 1972; Hove, 2002:13-14).

The variable /ç/. Variation between [ç] and [x] found for the variable /ç/ is not exclusive to Swiss Standard German but is also found within Federal German Standard German. The crucial point here, however, is that Swiss German speakers tend to overuse the velar variant [x], thereby ignoring the complementary distribution determined by the preceding sound (e.g., ['niçtə] 'niece' versus [naxt] 'night'), which is prototypical for the Federal German Standard (Christen et al., 2010:152; Guntern, 2012:104; see also AADG, 2011 maps for /ç/). Swiss Standard German speakers, consequently, may use the velar fricative [x] not only when it is preceded by back vowels, as speakers of Federal German Standard German do, but also in cases where it is preceded

by front vowels or the sonorants /l/, /m/, /n/, and /r/ (i.e., where in the Federal German Standard we would usually find [ç]) (cf. Siebs, 1969:61-63). We focus here only on those contexts in which Federal German Standard German would use [ç]: when [x] is used in these phonetic contexts, the variant functions as a Swiss shibboleth (Christen et al., 2010:152). Previous research has either found /ç/ to be produced almost exclusively as a palatal fricative (Hove, 2002:100; Siebenhaar, 1994:48) or to be highly variable (Christen et al., 2010).

The variable /a:/. There is ample evidence for the variability of /a:/ in spoken Swiss Standard German. Previous research concurs that speakers often use the same variant when speaking Swiss Standard German as they do when speaking their respective Swiss German dialect (Christen et al., 2010; Hove, 2002; Siebenhaar, 1994). This results in regional variation, with speakers from certain parts (of the east) of Switzerland producing front or central variants (i.e., [a:], e.g., [ˈʃpra:xə] ‘language’) while others produce more backed variants (i.e., [ɑ:] or [ɔ:], e.g., [tsɛnˈtra:l] ‘central’) (Siebenhaar, 1994:37-38).²

Both Hove (2002:64-65) and Christen et al. (2010:167-168) explained the variability between front/central and backed variants by the influence of the Swiss German dialect substrate of their speakers. Other factors such as formality or internal constraints (i.e., phonetic environment) seem to play a minor role, if any (Hove, 2002:64). For speakers with a Bernese German substrate, we thus expect variation between a front/central variant [a:] and a backed variant [ɑ:] (cf. Panizzolo, 1982:15; Siebenhaar, 1994:37-38).

*The variable /ε-ε:/. In spoken Swiss Standard German, there is variation between [ε] and a more open variant [æ]. This variation is to be found for short (e.g., [ˈmɛnə] ‘men’) as well as long vowels (e.g., [ɛgˈtʰsɛ:lən] ‘to tell [e.g., a story]’), hence the variable label /ε-ε:/. It is important to note that the more open variants [æ] and [æ:] are said to be prototypical of spoken Swiss Standard German (Christen et al., 2010:166-167). Historically, they developed during the Old High German period from the so-called *Sekundärumlaut* and have survived in various Swiss German varieties, including Bernese (cf. Schlotte, 2008:14). In the standard variety, all the *e*-sounds that came into existence through *Umlaut* merged into [ε] and [e:] or [ɛ:] (cf. Schmid, 2017:74). Thus, the variation found for spoken Swiss Standard German is most probably motivated by transfer of the variants [æ] and [æ:] from Swiss German dialects.*

While some studies suggest that [æ] and [æ:] are common in spoken Swiss Standard German (Métral, 1971:49; Panizzolo, 1982:16; Takahashi, 1996:174), more recent research has found hardly any evidence either of short [æ] or of long [æ:] (Christen et al., 2010:166-167; Hove, 2002:55; Siebenhaar, 1994:37): /ε-ε:/. is realized either as [ε-ɛ:] or even as [e-e:] (see also Sloos, 2018). There may be two reasons behind this. First, Hove (2002:55) argued that [æ:] might be considered to deviate too far from the standard to be produced in formal speech. Second, [æ] is shown to occur more frequently with speakers originating from western dialect areas (AADG, 2011; Guntern, 2011:161-162; Siebenhaar, 1994:40), which had not been well represented in some earlier surveys (Christen et al., 2010:194). Furthermore, graphematic representation also seems to exert a certain influence on the variable /ε-ε:/. (Hove, 2002:61-62): variants are more open when represented in writing by <ä> which raises the question of whether

the variation at least to some degree arises due to spelling pronunciation. Note that the long vowel [ɛ:] is always written as <ä> or <äh> while the short vowel [ɛ] can be represented by <e> as in *Bett* ‘bed’ or by <ä> *drängen* ‘to push’ (Siebs, 1969:56-58). We have therefore focused only on tokens of the variable /ɛ-ɛ:/ which orthographically have <ä> (e.g., *Käse* ‘cheese’).

Design and methods

Our data come from sociolinguistic interviews involving a variety of tasks conducted among 16 speakers. Along with Hove (2002) and Christen et al. (2010), we differentiate between norm-oriented speech (requiring high attention to speech in Labov’s terminology), such as reading tasks, and comprehension-oriented speech (requiring less attention to speech) found when conversing more informally. It should not be forgotten, however, that speakers of Swiss German dialects *always* pay more attention to speech when speaking the standard language in *any* context than when speaking their own dialects.

Materials and procedure

The sociolinguistic interviews were comprised of five sequential parts, resulting in a total length of around 20 minutes per interview (see Table 1).

Table 1. Structure and tasks of the sociolinguistic interviews

Parts/tasks	Length	Speech
1. Informal conversation	5–12 minutes	Comprehension-oriented (informal)
2. Reading task: newspaper text	ca. 3 minutes	Norm-oriented (formal)
3. Reading task: composed text	ca. 2 minutes	
4. Translation task	ca. 3 minutes	
5. Sociodemographic questionnaire	ca. 5 minutes	

Participants engaged in a short warm-up conversation before starting the recording in order for them to grow accustomed to both the situation and the interviewer, as well as to have the basic aims and procedures of the study explained. The interviewer grew up in the same city as the participants. His use of the standard language could be described as moderately Swiss-accented (cf. Guntern, 2012:106). The decision to have a Swiss interviewer has the advantage that speakers did not feel the urge to radically accommodate their speech as they might have done to a Federal German Standard-speaking interviewer. Furthermore, when Swiss Germans speak Standard German to their compatriots, the *schweizerhochdeutsche Aussprachekonvention* ‘Swiss Standard German pronunciation convention,’ to use Hove’s (2002:6-7) label, comes into play. This is a societal consensus about which variants are “too” dialectal and which are “too” Federal German.

The informal conversation part of each interview comprised open-ended questions about everyday life to maximize the elicitation of spontaneous conversational speech. We are fully aware, of course, that speakers of Swiss German are not used to speaking

the standard language with other Swiss Germans, but our interview design ensured that we collected speech that is as informal as one can get in this context.

Subsequently, the participants were introduced to the more formal parts of the interview. They were asked to first read a newspaper text drawn from the *Neue Zürcher Zeitung*, Switzerland's most prominent daily newspaper, followed by a short text we wrote to elicit our linguistic variables. Then, in the translation task, the participants were confronted with nine sentences which the interviewer presented to them orally in the Bernese dialect. Participants were asked to translate these—also orally—into the standard language. The material used for the formal parts of the interview ensured that the linguistic variables would occur frequently: (a) in different phonological environments (e.g., pre- and postvocalic), (b) in different positions within individual words (i.e., word-initial, -medial, and -final), and (c) for the variable /k/, in syllable onsets (e.g., *Ver-käu-fer* 'salesman') and codas (e.g., *Werk-statt* 'workshop').

The final part of the sociolinguistic interview entailed an online questionnaire, which the participants completed on a mobile device. It was designed to elicit sociodemographic data as well as data on language attitudes and use by means of 7-point Likert scales. It provided the basic information needed to create an index of the speakers' participation in the linguistic market (see below).

Participants

In total, 16 speakers from the city of Biel aged between 19 and 40 ($\bar{M} = 26.6$, $SD = 3.5$) were recorded. The sample is balanced for gender as well as educational level (secondary, tertiary).

Secondary-educated speakers had completed 9 years of compulsory schooling as well as either grammar school or an apprenticeship, the minimum permitted today. Tertiary-educated speakers had attended university or an equivalently ranked educational institution. As a result of their educational paths, the participants are employed in a variety of professions ranging from manually oriented jobs (secondary sector) to office jobs (tertiary sector), which, as will be shown below, impacts their position in the linguistic market.³ All participants, including at least one parent, grew up in Biel and are L1 speakers of the Bernese German variety spoken there. Having entered school at the age of 7, they gradually acquired active competence of the spoken and written standard language which is both a mode and subject of instruction in schools in German-speaking Switzerland. In self-assessing their competence in the standard language, participants on average indicated 4.6 ($SD = 1.1$) on a 7-point Likert scale (1 = very badly, 7 = very well). This may seem relatively modest for L1 speakers, but it is not surprising given that Swiss German dialects are used as the default in almost all contexts in German-speaking Switzerland. It might also be interpreted as a sign of linguistic insecurity with respect to the status of Swiss Standard German vis-à-vis Federal German Standard German (Scharloth, 2005).

Operationalization and analysis

The analysis of the two consonantal (/k/ and /ç/) and the two vocalic variables (/a:/ and /ɛ-ɛ:/) was performed auditorily by the first and second authors of the study. Both are L1 speakers of German, one of Swiss German and Swiss Standard German

(alongside Romansh) and the other of Federal German Standard German.⁴ Statistical analysis was performed using *R* (version 4.2.0; R Core Team, 2022). For each variable individually, general linear mixed effects models (GLMMs) (package *lme4* [Bates, Mächler, Bolker, & Walker, 2022]) were applied always including the same external factors (i.e., LMI, gender, language production task) but variable-specific internal factors. The factors were included using a forward stepwise approach based on likelihood ratio to assess if they improve the goodness-of-fit. Speaker and lemma were only integrated as random intercepts if they improved the model fit (based on the Akaike information criterion [AIC] and analysis of variance). Thus, speaker-bound as well as lexical effects were accounted for. To validate and to better be able to assess the impact of the LMI, two further analytical steps were performed. First, based on random forests (*randomForestSRC*; Ishwaran & Kogalur, 2022), we calculated variable importance values to check whether the LMI indeed, as supposed, is pivotal to explaining variation in spoken Swiss Standard German. Second, for each variable, we ran alternative models which had the same structure, but with the LMI predictor replaced by level of education. The original and alternative models were compared with respect to explained variation and model fit (i.e., R^2 and AIC). Finally, results have been visualized using *ggplot2* (Wickham, Chang, Henry, et al., 2022).

Operationalization of the linguistic market

To operationalize the concept of the linguistic market, we followed Sankoff and Laberge's (1978; Sankoff et al., 1989) approach of creating a numeric predictor (i.e., an LMI) which reflects the speakers' participation in the linguistic market. However, the approach used to derive each speakers' participation-value is rather different from that used by Sankoff and Laberge (1978). Our operationalization of the linguistic market (see Figure 1) is based primarily on speakers' own subjective evaluations of the importance of the standard language (i.e., the legitimized language) in their socioeconomic lives. At a later stage, these evaluations were compared with those made by independent judges (i.e., participants of an online survey) based on short descriptions of our participants' socioeconomic lives, in order to cross-check our speakers' self-assessments.

We begin by explaining in more detail how the subjective evaluations were converted into a numeric variable and then turn to the construction of the index. The questionnaire completed by each participant contained the following four questions relevant to the concept of the linguistic market:

- QS1: How often do you speak Standard German with other people in your professional life? (1 = never, 7 = very often)
- QS2: How important is Standard German in your professional life? (1 = unimportant, 7 = very important)
- QS3: Please estimate how well you speak Standard German (1 = very badly, 7 = very well)
- QE: What is the highest qualification you have earned?

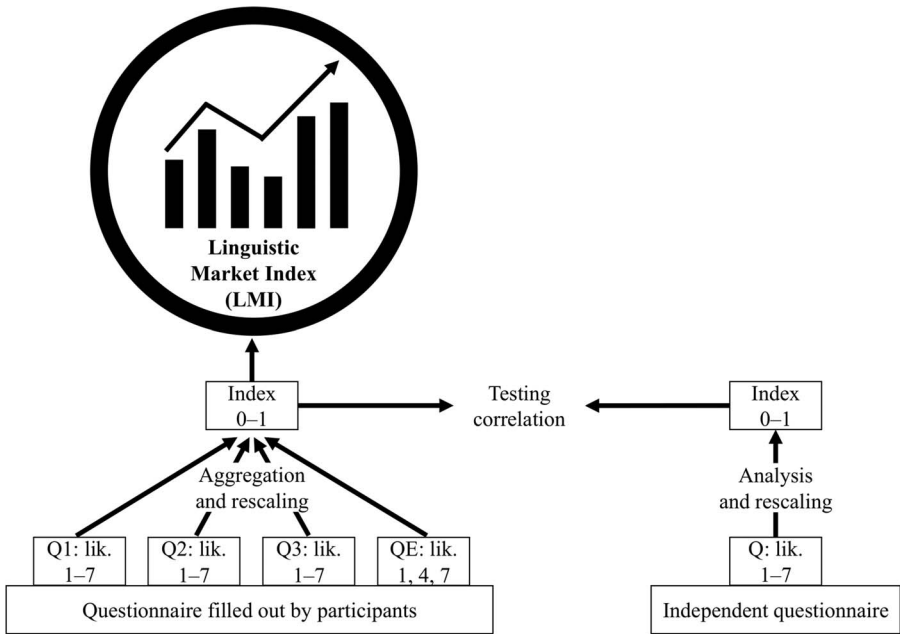


Figure 1. Operationalization of the linguistic market.

Except for educational level, which is a nominal variable (secondary or tertiary), answers were provided on 7-point Likert scales having only the poles labelled as indicated above.⁵

In a first step, nominal data obtained for educational level was turned into ordinal data as follows: 1 = secondary education, 7 = tertiary education, and 4 = in-between category (this was applied to two speakers who had completed the highest schools possible at the secondary level). We are aware that, in this way, educational level is given considerable weight relative to the other questions, however, this procedure is justified by the importance of educational level in constraining variation in spoken Swiss Standard German (Büchler et al., 2022; Bülow et al., 2021). The second step involved rescaling and aggregating the ordinal data from the questions from 1–7 to 0–1. To sum up, our index measuring each interviewee's participation in the linguistic market is composed of four self-assessed dimensions: frequency, importance, and competence of the standard language as well as educational level.

In order to cross-check our index, we set up an online questionnaire on *SoSci Survey* (Leiner, 2019) which was distributed among students or former students of the University of Berne (i.e., the judges), who were then encouraged to forward the questionnaire link to others. The judges were provided with descriptions of the socioeconomic lives (i.e., age, education, current employment; see example below) of our participants and had to assess how important it may be for these people to speak the standard language in their professional life.

Example: Alina is 27 years old. She undertook an apprenticeship as a salesperson in the retail sector. At the moment, she is employed as a security guard for a security company.
Please assess how important it is for Alina to speak Standard German in her job

This procedure mirrors Sankoff and Laberge's (1978; Sankoff et al., 1989) approach of creating an LMI based on external assessments. Answers were again provided on 7-point Likert scales (1 = unimportant, 7 = very important). Each judge was asked to assess eight descriptions. We used two questionnaire versions (each containing eight out of the sixteen descriptions) which were randomly assigned to the judges, ensuring equal distribution across the two versions of the questionnaire.

In total, 125 people with a median age of 24 participated in our online survey. All participants were employed full- or part-time and had grown up in German-speaking Switzerland. Eighty-four percent were tertiary educated, the remainder secondary educated. For each description, the median of all judgments was computed and afterward rescaled in order, again, for the final score to fall between 0 and 1. Like the procedure explained above, therefore, we arrived at an index measuring each speaker's participation in the linguistic market; here, however, based on external assessments.

We then checked the correlation of the scores obtained from self-assessment with those obtained from external assessment using a Pearson correlation test. The p -value of the test was .014 rendering a correlation coefficient of .6, suggesting a strong correlation (cf. Cohen, 1988). Overall, the judges assigned speakers somewhat higher LMI scores ($M = .67$, $Mdn = .69$) than participants in self-assessment ($M = .5$, $Mdn = .5$). The final LMI scores, then, range from 0 to 1, with 0 meaning that the speaker considers speaking Standard German plays no role in their professional life, and 1 indicating that it plays a vital role.

While the ratings from independent judges validate our approach, we do not consider them absolutely necessary. From our point of view, self-assessments have certain advantages. The individual speakers know better than anyone else how important a variety such as the standard language is for *them specifically*, in their own professional life. It is hardly possible to integrate all relevant information into a brief description based on which independent judges could decide how important a particular variety is for that specific person. This is probably one of the reasons why small inconsistencies occur. Let us consider a brief example from our data: the two women with tertiary education (S11_W.T and S12_W.T) scored themselves relatively low on the LMI compared with the external ratings (see Figure 2). Speaker S11_W.T, who scored herself .625 on the LMI and is rated 1.0 by the judges, is a radio editor and speaker S12_W.T, who scored herself .5 and is rated 1.0 by the judges, is a special needs teacher. Both professions were expected by the independent judges to require high competence in the standard language, whereas both speakers indicate that, in fact, the standard is not so important for their profession. For example, both speakers gave a score of 1 (1 = not important, 7 = very important) to the question "How important is Standard German for you in your professional life?" In the case of the radio editor, this is because she only presents on a local radio program, where anything other than dialect would be highly

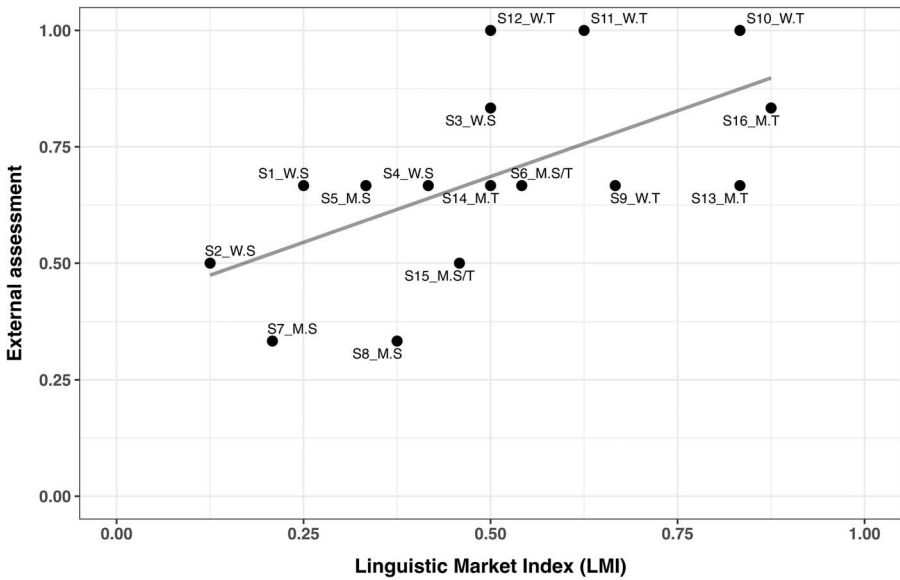


Figure 2. Correlation of LMI with external assessment (M = men, W = women, T = tertiary educated, S = secondary educated, S/T = in-between category).

marked. In the case of the teacher, this is because the children with special needs are addressed in their dialects only. Despite these small discrepancies, we found the use of independent judges' assessments to be a valuable endorsement of our decision to operationalize LMI based on self-assessments, since they demonstrate how self-assessments provide greater specificity than is possible by outsiders.

Results

In presenting the results for our four variables, we focus in particular on the LMI. It proved to be significant for all four variables tested and furthermore, in the random forest models, it turned out to be the variable explaining most variation in the data (i.e., highest variable importance). We also present the results for the other constraints that we considered, namely gender, language production task (norm-versus comprehension-oriented), and linguistic constraints (phonetic-phonological environment).

/k/ variation

In total, participants produced 1330 /k/ tokens, with [k^h] ($n = 1104$, 83%) clearly prevailing over [kx] ($n = 226$, 17%). Figure 3 summarizes the use of the dominant variant [k^h] as a function of the participants' LMI and the respective language production task (LPT). It shows that the higher a speaker's score on the index, the more likely they are to produce the plosive [k^h] and the lower a speaker's score on the index, the more likely they are to use the affricate [kx]. Note that most of the variation between the two

variants is to be found for speakers who have LMI scores below .6. To make interindividual differences apparent, we have added speakers' mean values to Figure 3 and all subsequent figures featuring the LMI.

An intriguing interaction effect emerges for the LMI and the LPT (see Table 2). Speakers whose LMI is lower than .4 surprisingly use the plosive [k^h] more often in the comprehension-oriented setting than in the norm-oriented settings. In contrast, the setting does not matter for the speakers whose index is higher than .4

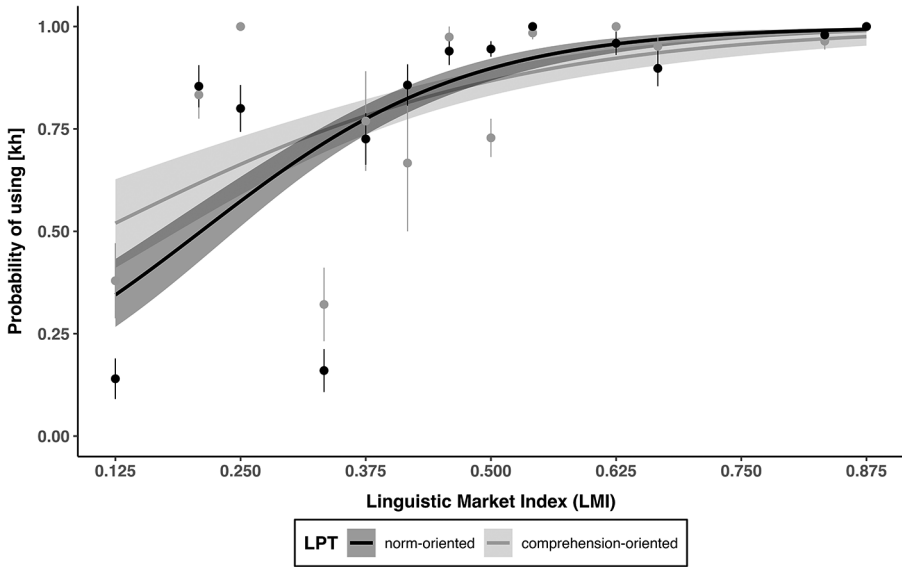


Figure 3. Use of the variant [k^h] according to LMI (linguistic market index) and LPT (language production task) (*n* = 1330).

Table 2. Best-fit GLMM for main effects on /k/ (*n* = 1330, with [k^h] as reference value for the dependent variable)

Variable	Est.	SE	z-value	p-value	<i>n</i>	% [k ^h]
(Intercept)	2.88	.40	7.26	<.001		
LMI	1.96	.38	5.10	<.001		Continuous
LPT						
(Reference level: norm-oriented)					790	81.9%
Comprehension-oriented	-.51	.27	-1.88	.06	540	84.6%
LMI*LPT						
(Reference level: norm-oriented)						Interaction
Comprehension-oriented	-.78	.26	-3.02	<.01		Interaction

Note. Number of observations = 1330, random effect of speaker (variance = 1.36,⁶ SD = 1.17) and lemma (variance = .55, SD = .74), *R*² (marginal) = .36, *R*² (conditional) = .59, AIC = 824.4.

(see Figure 3). Neither gender nor the linguistic factors considered improve the model fit.

An alternative model featuring educational level instead of LMI, but otherwise sharing the same structure, shows a worse model fit (AIC = 839). This is most clear in terms of the fixed effects ($R^2 = .17$) but less so when the effects of the random intercepts are included ($R^2 = .55$).

/ç/ variation

The dataset contains 1288 tokens of the variable /ç/. Seventy-six percent ($n = 976$) of these are palatal fricatives [ç] and the remaining 24% ($n = 312$) are velar fricatives [x]. The results from the GLMM (see Table 3) show that the LMI is crucial in determining this variation. As with /k/, linguistic variation mainly resides in the lower regions of the LMI. The lower a speaker is on the index, the more likely they are to produce the variant [x] and vice-versa. Gender, LPT, and linguistic constraints are also significant. Women use [ç] more often than men. In norm-oriented tasks, those speakers scoring around .5 or less on the LMI are more prone to use [x] than in the comprehension-oriented task (see Figure 4), which, as for the first variable /k/, is not the expected outcome.

Table 3. Significant contrasts between the preceding sounds in the realization of variable /ç/ ($n = 1288$)

Significant contrasts				
	Est.	SE	z-value	p-value
Close vowels versus close-mid vowels	-1.72	.47	-3.69	<.01
Close vowels versus open-mid vowels	-2.11	.40	-5.18	<.001
Close vowels versus sonorants	-1.79	.40	-4.46	<.001
Close-mid vowels versus obstruents	2.07	.70	2.96	<.05
Open-mid vowels versus obstruents	2.46	.68	3.62	<.01
Obstruent versus sonorants	2.14	.68	3.15	<.05

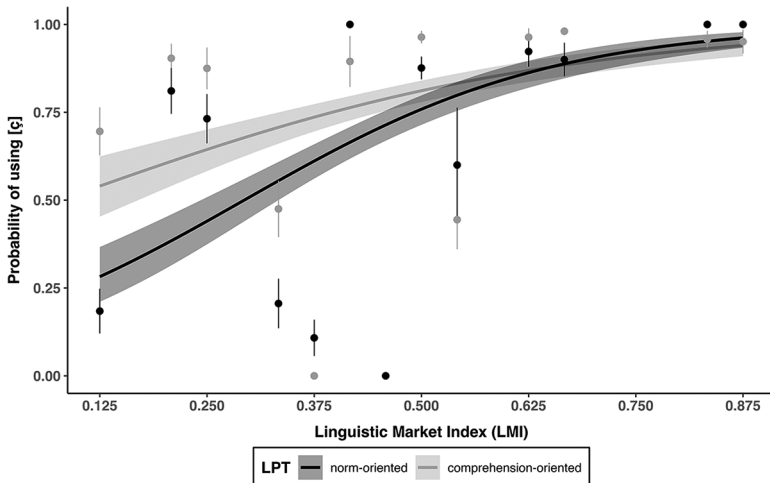


Figure 4. Use of the variant [ç] according to LMI and LPT ($n = 1288$).

The preceding sound significantly influences the production of the variable. Preceding close vowels and obstruents favor the production of palatal variants while other contexts (i.e., preceding close-mid vowels, open-mid vowels, and sonorants) trigger much more variance (see Table 4). No other linguistic constraint showed significant effects.

Table 4. Best-fit GLMM for main effects on /ç/ ($n = 1288$, with [ç] as reference value for dependent variable)

Variable	Est.	SE	z-value	p-value	n	% [ç]
(Intercept)	-3.81	.75	-5.10	<.001		
LMI	2.15	.53	4.03	<.001		Continuous
LPT						
(Reference level: norm-oriented)					565	70.3%
Comprehension-oriented	-.12	.27	-.44	.66	723	80.1%
Gender						
(Reference level: women)					739	89.4%
Men	3.19	.99	3.23	<.01	549	57.4%
Position word						
(Reference level: word-final)					732	78.7%
Word-medial	.04	.22	.18	.86	556	71.9%
Previous sound						
(Reference level: close)					1067	79.1%
Close-mid	1.72	.47	3.69	<.001	49	49%
Open-mid	2.11	.41	5.18	<.001	74	60.8%
Obstruent	-.35	.59	-.59	.55	39	82.1%
Sonorant	1.79	.40	4.46	<.001	59	52.5%
LMI*LPT						
(Reference level: norm-oriented)						Interaction
Comprehension-oriented	-.90	.24	-3.81	<.001		Interaction

Note. Number of observations = 1288, random effect of speaker (variance = 3.42, SD = 1.85), R^2 (marginal) = .48, R^2 (conditional) = .74, AIC = 705.34.

The alternative model using educational level instead of LMI rendered comparable results as for /k/. The model fit overall (AIC = 727) is not as good as for the best-fit GLMM that includes the LMI. The value for the fixed effects ($R^2 = .27$) is a lot lower for the alternative model while the conditional value (i.e., including the random intercept) ($R^2 = 73.6$) is nearly identical to the original model.

/a:/ variation

Out of 594 tokens of the variable /a:/, our participants produced 67% ($n = 399$) front/central variants [a:] and 33% ($n = 399$) backed variants [ɑ:] or [ɔ:]. Again, the analysis confirms a strong correlation between the participants' score on the LMI and

their respective use of the front/central variant: the likelihood of using the front/central variant becomes greater, the higher the speaker's LMI (Table 5; see Figure 5).

Table 5. Best-fit GLMM for main effects on /a:/ ($n = 594$, with [a:] as reference value for dependent variable)

Variable	Est.	SE	z-value	p-value	n	% [a:]
(Intercept)	.99	.52	1.92	.06		
LMI	1.01	.35	2.86	<.01		Continuous
Gender						
(Reference level: women)					304	75.3%
Men	-1.15	.71	-1.62	.11	290	58.6%
Previous sound						
(Reference level: approximant)					191	60.7%
Liquid	.61	.35	1.72	.09	84	70.2%
Nasal	.31	.36	.87	.38	72	63.9%
Obstruent	.84	.27	3.17	<.01	211	70.1%
Vowel	1.82	.61	3.01	<.01	36	83.3%

Note. Number of observations = 594, random effect of speaker (variance = 1.75, SD = 1.32), R^2 (marginal) = .24, R^2 (conditional) = .50, AIC = 569.22.

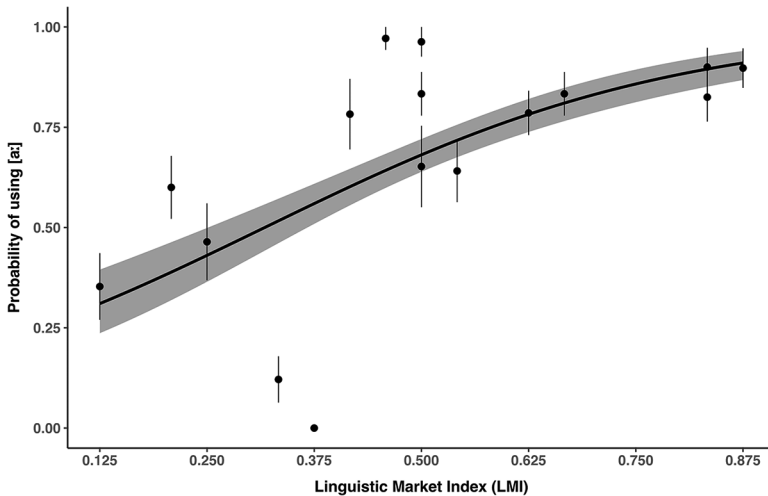


Figure 5. Use of the variant [a:] according to LMI ($n = 594$).

No other external factors had any predictive power. Of the linguistic constraints, only previous sound was included as significant in the final model: backed variants occur more frequently after approximants (e.g., in the very frequently occurring verb, *haben* 'have') than after vowels (e.g., *soziale* 'social') or obstruents (e.g., *Tag* 'day').

Adding level of education instead of the LMI in an alternative model resulted in a model fit that was nearly identical to the best-fit GLMM reported above (AIC = 569). R^2 of the fixed effects is .245 and R^2 including the random intercept .51.

/ɛ-ɛ:/ variation

In total, we collected 311 tokens of /ɛ-ɛ:/, with [ɛ-ɛ:] ($n = 175, 56\%$) prevailing over the more open vowel [æ-æ:] ($n = 136, 44\%$). Again, the analysis confirms that the LMI is a significant predictor. Figure 6 shows the use of the dominant variant [ɛ-ɛ:] as a function of our participants' LMI and the LPT. Clearly, the higher that speakers are on the index, the more likely they are to use the mid-open vowel [ɛ-ɛ:] (see Table 6).

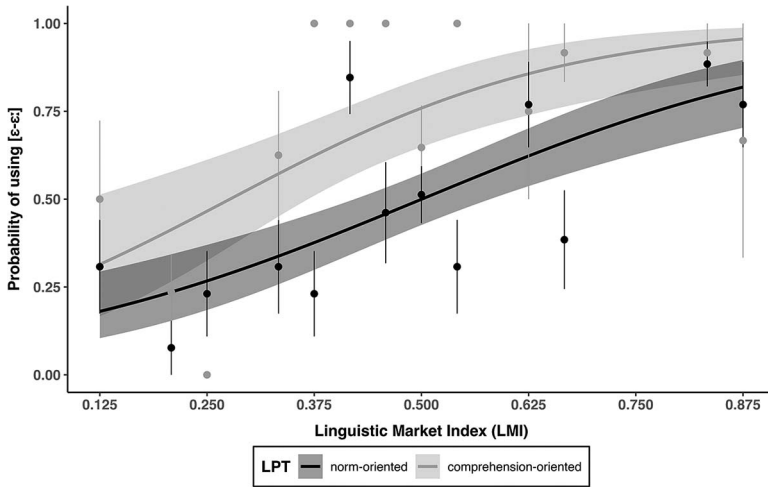


Figure 6. Use of the variant [ɛ-ɛ:] according to LMI and LPT ($n = 311$).

As Table 6 shows, LPT, previous sound, and following sound appear as significant predictors in the model, whereas gender does not. Surprisingly, speakers are more likely to use the open [æ-æ:] vowels in the norm-oriented tasks than in the comprehension-oriented task. Furthermore, they significantly prefer the open-mid vowel [ɛ-ɛ:] when the previous or following sound is nasal rather than a liquid or an obstruent. Also striking in Table 6 is that in long *e*-words, speakers use the [æ:] vowel significantly more often than for short *e*-words.

Table 6. Best-fit GLMM for main effects on /ɛ-ɛ:/ ($n = 311$, with [ɛ-ɛ:] as reference value for dependent variable)

Variable	Est.	SE	z-value	p-value	n	% [ɛ-ɛ:]
(Intercept)	-2.07	.71	-2.92	<.01		
LMI	-1.14	.23	-4.99	<.001		Continuous
LPT						
(Reference level: norm-oriented)					208	.5%
Comprehension-oriented	-1.16	.36	-3.25	<.01	103	68.9%
Previous sound						
(Reference level: nasal)					38	68.4%

(Continued)

Table 6. (Continued.)

Variable	Est.	SE	z-value	p-value	n	% [ϵ - ϵ .]
Liquid	1.34	.56	2.40	<.05	91	58.2%
Obstruent	1.16	.48	2.39	<.05	182	52.7%
Following sound						
(Reference level: nasal)					51	78.4%
Vowel	.63	.80	.79	.43	16	56.2%
Liquid	1.48	.63	2.36	<.05	65	60%
Obstruent	1.81	.51	3.52	<.001	179	48.6%
Vowel length						
(Reference level: long)					184	44.6%
Short	-1.06	.32	-3.31	<.01	127	73.2%

Note. Number of observations = 311, random effect of speaker (variance = .36, SD = .60), R^2 (marginal) = .42, R^2 (conditional) = .47, AIC = 338.2.

In the alternative model using level of education in place of LMI, the AIC-value of the alternative model is 347, which is worse than the LMI-containing model reported above. The R^2 -value including the random intercept did not change significantly .477, however, the R^2 -value incorporating the fixed effects is only .328, much lower than for the LMI model.

Discussion and concluding remarks

Our results have demonstrated how powerful the LMI is in accounting for variability in spoken Swiss Standard German. For all the variables considered, the variants specific to spoken Swiss Standard German correlate strongly with speakers having a low LMI score—those for whom speaking Standard German is not an important characteristic of their working lives. Phonetic-phonological forms based on Federal German Standard German are most often used by people for whom proficiency in Standard German is an important aspect of their professional life.

The results also vindicate our decision to explicitly operationalize linguistic market as a constraint in our statistical model, since it lends empirical weight and precision to the idea that position in the linguistic market is variable and not simply a general characteristic of economically active adulthood. Our index placed considerable weight on educational achievement—this is, especially in diglossic societies like Switzerland, particularly important since it is in the education system where individuals first acquire, and are then most exposed to, and most constrained to use the standard language. Thus, the longer individuals are in the education system, the greater they are exposed to, the better they are expected to command, and the more they are expected to use the standard. Those with greater educational achievement in the Swiss system are bound to possess greater capital in those parts of the market where competence in the standard is deemed a necessity for the performance of the role.

At the same time, the results also showed that level of education is only part of the story. For all four linguistic variables, alternative models in which the LMI was replaced by level of education showed that the overall amount of variation explained was similar

but the model fit was worse (see AIC values). Furthermore, for three out of four linguistic variables, the R^2 -values describing the explained variation by fixed effects was significantly lower for the education level models. This indicates that with the help of the LMI, we were able to explain more interindividual variation within the fixed-effects-structure of the models as compared to the alternative models in which this variation needs to be accounted for by the random-intercept-structure of the models. Our index has therefore gone beyond education to consider individuals' assessments of their own personal competence in the standard, as well as their evaluations—knowing better than anyone the very specific employment roles they perform—of just how important speaking Standard German is to successfully execute their jobs. In diglossic German-speaking Switzerland, where L1 dialects are the default for almost all routine spoken communication, very high competence levels in spoken Standard German in the workplace are *by no means* necessary for all. So, education is not solely responsible for the outcomes we saw—what is clearly important is what people with different educational backgrounds do later in the workplace and the extent to which their careers necessitate the use of the spoken standard.

Task formality was also an important constraint for some of the variables, though intriguingly not always in the expected direction. For /k/ and /ç/, speakers with low LMI scores used fewer Federal German Standard German forms in the more formal norm-oriented tasks than they did in the more informal comprehension-oriented tasks. For /ɛ-ɛ:/, this was the case for all speakers, which might be the result of a spelling pronunciation. Remember that only tokens which orthographically have <ä> were considered. We have come to expect a direct correlation between the use of the standard and what we believe to be the most formal forms of language, those where most attention is being paid to speech (Labov, 1972). Some have, however, questioned the universality of this correlation (e.g., Milroy, 1987), arguing that the role of literacy and of reading aloud in some speech communities might disrupt this apparently self-evident hierarchy. Arguably, this is also the case for German-speaking Switzerland. On the one hand, speaking standard German with another Swiss person—the in principle “less formal” task—is a marked activity to say the least,⁷ and requires the speaker to personally construct fluid talk in what is a non-native second variety for them. Similarly, reading aloud a standard German text is typically a school-based activity, and is probably less common and more marked as an activity among the less educated in adulthood. On the other hand, reading aloud provides fewer active production challenges to the speaker—they are not having to construct speech in this other variety, just read it. One possible explanation, therefore, for our “formality” results is that for Swiss German speakers (especially those not often needing the standard) conversational Standard German with another Swiss person requires more attention to speech production than simply reading out a text that they have not had to construct themselves.

Furthermore, the other formal tasks (e.g., the translation task) permit more processing time than what is possible in conversational speech. For variables /k/ and /ç/, formality did not play a role for speakers with high values on the LMI, who used Federal German Standard German variants at extremely high frequencies. These five speakers with LMI scores above .6 work in jobs where language (including, self-reportedly, the standard language) plays a crucial role (e.g., product manager, teacher). Thus, it may well be that the smaller amount of variability among those with higher LMI scores is a result of a shared need at work to speak in a particular way.

In conclusion, then, we have been able here to demonstrate that a sensitively devised LMI is able to explain sociolinguistic variation in spoken Swiss Standard German. Our index, the first based primarily on self-assessments, and operationalized as a variable constraint, very ably captures “the ‘social’ component” (Sankoff & Laberge, 1978:249) of linguistic variation in German speaking Switzerland, and does so more powerfully than other social constraints. Thus, our study provides robust empirical evidence that variationist analyses based on an LMI can give more satisfying and explainable results than “objective” stratification criteria such as social class or gender, at least in diglossic contexts.

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Competing interests. The authors declare none.

Notes

1. The default variety for emergency calls according to Christen et al. (2010:27) is not the standard language but the various Swiss German dialects. The standard language is mainly used if an interlocutor (i.e., one of the callers) is not proficient in Swiss German dialect. Thus, in their corpus, they found that just 7.3% of the conversations took place solely in the standard language (cf. Christen et al., 2010:38).
2. Backed variants are not exclusive to spoken Swiss Standard German. Although the frontier [a:] is more common in Federal German Standard German, regional variation is also found in Germany (König, 1989:97) and Austria (Moosmüller, 1991).
3. The following jobs are featured in our sample: medical practice assistant/kinesiologist (S1_W.S), security guard (S2_W.S), flight attendant (S3_W.S), health-care specialist (S4_W.S), technical sales employee (S5_M.S), metalwork project manager (S6_M.S), metal worker (S7_M.S, S8_M.S), student/security company worker (S9_W.T), high school teacher (S10_W.T), radio editor (S11_W.T), special needs teacher (S12_W.T), product manager (S13_M.T), property manager (S14_M.T), security specialist (S15_M.T), project manager (S16_M.T).
4. Our coding process involved several control mechanisms adapted for each variable respectively. For the analysis of the consonantal variables, the coders met for both briefing and debriefing. Briefing comprised coding training as well as an independent analysis of 15 minutes of speech to enable a comparison of results. Except for one token, the coders obtained the same results. The rest of the data was divided between the two coders. In debriefing, both coders provided inconclusive cases which were then discussed and coded together once they agreed upon the variant produced. The coding process for the two vocalic variables was accompanied by a supplementary instrumental analysis performed by the Institut für Schallforschung of the Austrian Academy of Sciences. Two distinct recordings were analyzed auditorily and instrumentally. Results were then compared. From this comparison, three inferences could be drawn: (a) the differences found in the auditory analysis between variants for the variables /a:/ and /ɛ-ɛ:/ were reflected in the instrumental analysis; (b) according to the instrumental analysis, [a:] and [a:ɔ] for /a:/ as well as [ɛ-ɛ:] and [æ-æ:] for /ɛ-ɛ:/ have clearly identifiable focal points in vowel space which are separated from each other; (c) the instrumental analysis showed that vowels in unstressed syllables are most often produced with schwa-like qualities. We consequently focused only on tokens found in stressed syllables.
5. We checked whether there are any correlations between the different questions used. Pearson's correlation tests were used to check for correlations between QS1, QS2, and QS3, and a *t*-test to check whether there are differences with respect to the level of education in the values given for QS1, QS2, and QS3. None of the tests applied revealed any significant effects.
6. Note that the variance of the random intercept is rather large indicating that there is a great amount of differences between the speakers. We have explored and discussed this interindividual variation for the variables /k/ and /ç/ in Bülow et al. (2021).
7. This effect could be mitigated by having an interviewer who does not speak or understand Swiss dialects—for example a speaker of Federal German Standard German; however, this does not come without

disadvantages either. This would possibly put speakers in a situation in which they feel a strong urge to accommodate.

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