Language as Infrastructure

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Starting from a general working definition of infrastructure as "matter that enable the movement of other matter,"[1] the relationship between language and infrastructure can be approached from several perspectives: First, language in its spoken or written form is the basic means for exchanging information. As such, it enables individuals among many other things to pass on knowledge to others or to organize collaborative action which would be hard to achieve without language. Thus, language itself represents an infrastructure par excellence that paves the way for communication among human beings. Second, as any other form of infrastructure, languages are to a certain extent consciously constructed by the members of respective communities. Communities undertake numerous actions to take care of their language or to maintain it. These efforts manifest themselves in language planning or other forms of language policy. Third, languages interact dynamically with their environment, be it other languages or their own speakers coming from various social or regional backgrounds. This leads to language change or the emergence of social ("slang") and regional varieties ("dialects") of a language. However, language change may be driven not only by external sources, but also stipulated by internal processes like analogical levelling of irregular forms or other types of language-internal developmental dynamics related to language typology (e.g. the development of definite and indefinite articles in languages from demonstrative pronouns or numerals). Fourth, language overlaps with classically understood material infrastructures: Information signs indicating directions of travel, place/street names, names of institutions, warnings or advertisements crucially build on language. Visible language on public signs does not only facilitate perception of material infrastructures, but can also function as an index of representation and power of different parts of the inhabitants of this city/district etc.

In this essay we elaborate more on three of the above-mentioned aspects of language as infrastructure. We start from language as a basic infrastructure for communication itself and the relationship between its different forms of existence (oral

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1   Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology* 42, no. 1 (2013): 329, https://doi.org/10.1146/annurev-anthro-092412-155522.

vs. written language), then turn to a discussion of measures undertaken by the respective communities to develop and maintain languages as common infrastructure, and close with issues regarding the role of language on material infrastructures in contexts of marginalization and struggles of representation by linguistic minorities. By doing so, we try to apply the notion of "infrastructure" as an analytical tool and organizing concept that provides a way for crossing disciplinary boundaries within linguistics and to counterbalance tendencies towards a separate analysis of systemic and social aspects of language.

From Biology to Oral and Written Forms of Language

The production of language as the most widely used medium of communication and information exchange crucially depends on the physiological infrastructure of the human body: Speech sounds are produced through the manipulation of the pulmonal airflow by means of articulators in the larynx (vocal folds), the velum, the tongue and the lips.[2] The resulting acoustic signals are in turn perceptually and cognitively decoded by the listener through the perceptual apparatus (organs of the outer, middle and inner ear) organ and neuronal processes in the brain[3]: "Language processing consists of a complex and nested set of subroutines to get from sound to meaning (in comprehension) or meaning to sound (in production), with remarkable speed and accuracy."[4] While oral forms of language fulfil the basic function of an infrastructure for exchanging information and represent the basis of natural language transmission from one generation to the next, many communities have developed a special infrastructure to fix the elusive nature of oral language use by inventing writing systems.

Building on a system of written signs that either iconically represent the concepts denoted (cf. Egyptian hieroglyphics) or symbolically map units of sound (syllables, individual phonemes) onto graphical units (letters), the invention of writing systems has made it possible to extend the infrastructural potential of language by allowing communication across distances and times. Further, a writing system lends power to the oral language that is encoded. Not surprisingly, one typical distinction between a dialect and a standard language is that the latter has a codified writing system. Writing systems not only allow communication across space and time, but they are also able to reach a large range of people (pupils) that are initiated

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2   Bernd Pompino-Marschall, *Einführung in die Phonetik* (Berlin: Walter de Gruyter, 2009).

3   Anne Cutler, *Native Listening* (Cambridge: MIT Press, 2012).

4   Peter Hagoort and David Poeppel, "The Infrastructure of the Language-Ready Brain," in *Language, Music, and the Brain*, ed. Michael A. Arbib (Cambridge: MIT Press, 2013), 233, https://doi.org/10.7551/mitpress/9780262018104.003.0009.

in its use. Germany is a country with a diverse set of historically derived dialects, but the Standard German writing system is quite distinct from the oral systems used in different dialectal areas. Due to its high prestige, its use in media (radio, TV), and possibly the availability of natural language processing devices (translation, automatic speech recognition, dictation systems), Standard German is on its way to replace the dialectal variants. Pröll even argues that "Standard German is in the process of becoming a nativized variety of German after centuries without native speakers."[5] If this was the case, then the tension between Standard and regional varieties is predicted to decrease. However, from our research on the development of children's lexical representations, we know that parents do speak regional varieties, in particular in more rural areas.[6] Once the standard is acquired, the standard becomes an infrastructure as self-evident to the language user as the regional variants in the generation before. The situation in Germany is not unique and is found in many European countries (e.g. Italy, the Czech Republic).

Language Policy and the Struggle for a Unified vs. Diversified Linguistic Infrastructure

Standard varieties are taught in schools, by authorities that enforce it.[7] This power differential can lead to defiant reactions and to the formation of groups that violate the rules on purpose. Examples are the development of youth language, sociolects (e.g. Kiezdeutsch) or the resurrection of dialects (e.g. "Förderverein bairische Sprache und Dialekte e. V.," http://fbsd.de). This goes together with an increase in heterogeneity and individualism and more identification with the local community or region than with the wider society of a country. The discrepancy is even more obvious in areas, in which local community languages were systematically disfavoured. There are many examples in the literature, the most recent being the reduction of

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5   Simon Pröll, "Die Nativierung Des Standarddeutschen. Mikrotypologische Evidenz für suprasegmentalen Wandel," *Zeitschrift für Angewandte Linguistik* 2021, no. 75 (2021): 305–29, https://doi.org/10.1515/zfal-2021-2068, 305.

6   Bettina Braun et al., "Remote Testing of the Familiar Word Effect with Non-Dialectal and Dialectal German-Learning 1–2-Year-Olds," *Frontiers in Psychology: Empirical Research at a Distance: New Methods for Developmental Science* 12 (2022): 714363, https://doi.org/10.3389/fpsyg.2021.714363.

7   Lisa Fairbrother, "A Language Management Approach to Language Problems," *A Language Management Approach to Language Problems*, 2020, 1–283, https://doi.org/10.1075/wlp.7.01fai; Vít Dovalil, "Processes of Destandardization and Demotization in the Micro-Macro Perspective," in *A Language Management Approach to Language Problems: Integrating Macro and Micro Dimensions*, eds. Goro Christoph Kimura and Lisa Fairbrother (Amsterdam: John Benjamins Publishing Company, 2020), 177–96.

formal education in Basque or Catalan in Spain or the abandonment of Russian language-based education in Estonia or Latvia.[8]

The current debate about gender sensitive language makes the power struggle immediately obvious: on the one hand, there are conservative language users that learnt a particular standard grammatical system during their school time and point out its efficiency, on the other hand, there are more progressive language users that interpret the male forms as exclusive. That this debate is a power struggle is evident from the emotionality with which the debate is conducted and from the suspicion with which arguments from the other side are met. For supporters of gender sensitive language, language is either seen as a means to change reality (a more inclusive language leading to a more inclusive society) or as a means to reflect the change in reality (from a binary gender image to less binary concepts). Critics of gender sensitive language argue that the linguistic forms become more complicated, making the language less inclusive. No matter which side one takes, it is clear that there is a fight about a new standard, which will have winners and losers.

Inclusion is, however, not restricted to debates about gender sensitive language. It also applies to attempts for making linguistic diversity more visible. Due to the influx of several immigration waves after World War II, including the recent waves of refugees fleeing wars in different parts of the world (Syria, Afghanistan, Ukraine, to mention only a few), Germany has become a linguistically diverse country. According to recent surveys, 27% of all inhabitants of Germany have a "migration background," i.e., they immigrated from other countries to Germany themselves or have at least one parent who did so.[9] Thus, they normally speak other languages than German. While the debate regarding the integration (or rather linguistic assimilation) of guest workers (Gastarbeiter) in Germany in the second half of the 20th century centred around issues concerning the acquisition of German as a prerequisite for integration into the host society and individual success on the labor market, recent discussions also underline the benefit of being bi- or multilingual not only for the individual, but also for the host society.[10] This calls for measures to secure that the following generations can also benefit from their early acquisition of another language. The benefits include, but are not limited to, being an asset on the job market, having access and being part of the culture of their ancestors, thus fostering intercul-

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8   Monika Wingender, "Russisch als neue Minderheitensprache im östlichen Europa. Die ECRM und die Diskussion um das Russische in Nachfolgestaaten der UdSSR," in *Die Sprachpolitik des Europarats*, eds. Franz Lebsanft and Monika Wingender (Berlin: De Gruyter, 2012), 165–90, https://doi.org/10.1515/9783110276695.165.

9   Statistisches Bundesamt, "Bevölkerung nach Migrationshintergrund und Geschlecht," Statistisches Bundesamt, 2022, https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Migration-Integration/Tabellen/liste-migrationshintergrund-geschlecht.html.

10   Cf. contributions in Ingrid Gogolin and Ursula Neumann, eds., *Streitfall Zweisprachigkeit — The Bilingualism Controversy* (Wiesbaden: VS Verlag für Sozialwissenschaften, 2009).

tural sensitivity. Maintaining individual bilingualism that arises from growing up in families where another language than German is commonly used, requires specific efforts from the individual, their parents and close relatives, i.e., by engaging in joint reading of books or consumption of media in the home language (especially in early childhood), by attending community schools offering additional instruction in the home language and aspects of the home culture etc. Language minority groups face the problem that "their" language is mostly restricted to communication within the family domain which serves only restricted functions. From a longitudinal perspective, the likelihood that the language is kept, and maybe even passed over to the following generations, depends on the possibility to use it outside of the family domain, i.e. it requires a certain infrastructure supporting the use of the minority language for special purposes.[11] Research on the concept of ethnolinguistic vitality of minority languages stresses the importance of several extralinguistic factors that facilitate the maintenance of home (or "heritage") languages, including the number of speakers of the minority language in the host country, its prestige in the host society, institutional support for the acquisition of these languages (community schools, heritage language instruction in public schools), the range of sociolinguistic domains where the minority language can be used (workplace, shops, church services, leisure activities etc.), contacts to people residing in the countries of origin etc.[12] The degree to which minority communities manage to establish a certain infrastructure differs considerably among the individual minority communities. Russian can be seen as an example of a linguistic minority group in Germany which succeeded in establishing an extensive infrastructure in Germany (mostly in bigger cities, but even in Konstanz) that facilitates Russian language maintenance to a remarkable extent.[13] This infrastructure includes Russian-speaking lawyers, doctors, grocery stores offering typical food and other items from Eastern Europe, community schools and bilingual nursery schools, clubs organizing cultural and sport activities, church communities etc. It remains to be seen how the current war in Ukraine and the subsequent damage of the international prestige of Russian will affect the future development of this infrastructure, although Russian is the dominant language for most of the refugees coming from Eastern and Southern Ukraine, which leads to a replenishment of the Russian-speaking community in Germany.

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11   Such usage extends beyond just family small-talk, cf. Monika S. Schmid and Elise Dusseldorp, "Quantitative Analyses in a Multivariate Study of Language Attrition: The Impact of Extralinguistic Factors," *Second Language Research* 26, no. 1 (2010): 125–60, https://doi.org/10.1177/026 7658309337641.

12   Jörn Achterberg, *Zur Vitalität slavischer Idiome in Deutschland* (Munich: Peter Lang International Academic Publishers, 2005), https://doi.org/10.3726/b12748.

13   Bernhard Brehmer, "Maintenance of Russian as Heritage Language in Germany: A Longitudinal Approach," *Russian Journal of Linguistics* 25, no. 4 (2021): 855–85.

Material Infrastructures and Language Use

In the introductory section, we already stressed the importance of visible language for classically understood material infrastructure. Apart from language being the key to understanding public signs, the presence of language in the visual landscape of all kinds of settlements also gains additional symbolic value, especially in case of linguistically diverse populations (cf. debates about bilingual place name signs in areas where minorities live, e.g., in the Sorbian settlements in Brandenburg and Saxony). This is the subject matter of linguistic studies dealing with so-called "linguistic landscapes." Research on linguistic landscapes is nowadays a well-established branch of sociolinguistics that deals with language usage in public space and how language constructs public space mostly in urban areas.[14] For the purpose of the current paper, this adds another dimension to the topic of language and infrastructure, where infrastructure is meant to denote classically understood material infrastructure: the significance of material infrastructure for making (diverse) languages visible. While in its earlier stages the focus of linguistic landscape studies has been on areas where language use on public signs is a socially and politically controversial issue[15] it has now turned into the most influential paradigm in the study of visible language in urban areas.[16] The relation between the linguistic landscape of a city or urban area and minority communities is a classical topic in linguistic landscape research, but in earlier studies the main focus was on the quantitative presence of minority languages on public signage and whether the use of these minority languages

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14   Rodrigue Landry and Richard Y. Bourhis, "Linguistic Landscape and Ethnolinguistic Vitality: An Empirical Study," *Journal of Language and Social Psychology* 16, no. 1 (1997): 23–49, https://doi.org/10.1177/0261927X970161002, 25.

15   E.g., Quebec: Rodrigue Landry and Richard Y. Bourhis, "Linguistic Landscape and Ethnolinguistic Vitality: An Empirical Study," *Journal of Language and Social Psychology* 16, no. 1 (1997): 23–49, https://doi.org/10.1177/0261927X970161002; the Basque region: Jasone Cenoz and Durk Gorter, "Linguistic Landscape and Minority Languages," *International Journal of Multilingualism* 3, no. 1 (2006): 67–80, https://doi.org/10.1080/14790710608668386; Ukraine: A. Pavlenko, "Linguistic Landscape of Kyiv, Ukraine: A Diachronic Study," in *Linguistic Landscape in The City*, ed. Elana Shohamy, Eliezer Ben-Rafael, and Monica Barni (Bristol: Multilingual Matters, 2010), 133–54; Israel: Bernard Spolsky and Robert L. Cooper, *The Languages of Jerusalem* (Oxford: Clarendon Press, 1991).

16   Elana Shohamy and D. Gorter, eds., *Linguistic Landscape: Expanding the Scenery*, 1st ed. (New York: Routledge, 2009); Adam Jaworski and Crispin Thurlow, *Semiotic Landscapes: Language, Image, Space* (A&C Black, 2010); Elana Shohamy, Eliezer Ben-Rafael, and Monica Barni, *Linguistic Landscape in the City*. (Bristol: Multilingual Matters, 2010); Peter Backhaus, *Linguistic Landscapes: A Comparative Study of Urban Multilingualism in Tokyo* (Clevedon: Multilingual Matters, 2007); Elana Shohamy, "Linguistic Landscapes and Multilingualism," in *The Routledge Handbook of Multilingualism*, ed. Marilyn Martin-Jones et al. (New York: Routledge, 2012), 538–551.

served communicative purposes or symbolic functions.[17] Contemporary research on linguistic landscapes has started to incorporate aspects of the visual, material, and spatial properties of signs into the analysis. Thus, questions like where the sign is fixed (its indexical relations to the shops, objects etc. it is referring to), how it is designed (including aspects of granularity, i.e. the visibility of a sign from different viewing distances, and, thus, the range of potential recipients it is addressed to), and how the material it is made of indexes types of institutional authority are increasingly taken into account.[18] Quantitative research on the linguistic landscape of several German cities has shown that while some minority languages (e.g. Turkish or Arabic) are rather well-represented on public signs, especially in districts where the respective communities form a considerable part of the inhabitants, other minority language communities (e.g. Polish), despite their high representation in the local districts, are almost absent from public signage, both with regard to official ("top-down," e.g. signposts, prohibition signs, commemorative plaques) and unofficial ("bottom up," e.g. shop names, advertisements, posters, graffiti) signs.[19] The visibility of their language in urban landscapes certainly has an impact on the perception of the respective communities by other groups, e.g. whether the presence and diversity of languages on public signs reflects the real diversity of the urban population, whether this distribution and presence of languages is treated as an indication of linguistic segregation (or ghettoization) or as a positive outcome of multicultural (and multilingual) urban settings and what arguments are used in favour or against the existence of multilingual infrastructures (which go beyond the classical linguae francae in the tourism sector like English or French) by representatives of different social groups. It comes as a surprise that these issues have been addressed only very recently, adding a new dimension to classical linguistic landscape research by focusing on the agency of readers in reinterpreting the cultural, historical, political, and social background of the linguistic landscape.[20]

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17   Eliezer Ben-Rafael et al., "Linguistic Landscape as Symbolic Construction of the Public Space: The Case of Israel," *International Journal of Multilingualism* 3, no. 1 (2006): 7–30, https://doi.org/10.1080/14790710608668383.

18   Peter Auer, "Sprachliche Landschaften. Die Strukturierung des öffentlichen Raums durch die geschriebene Sprache," in *Sprache intermedial. Stimme und Schrift, Bild und Ton*, eds. Arnulf Deppermann and Angelika Linke (Berlin: De Gruyter, 2010), 271–298.

19   For Hamburg: Claudio Scarvaglieri et al., "Capturing Diversity: Linguistic Land-and-Soundscaping," in *Linguistic Superdiversity in Urban Areas: Research Approaches*, ed. Joana Duarte and Ingrid Gogolin (Amsterdam: John Benjamins, 2013), 45–73; for the Ruhr area: Tirza Mühlan-Meyer, "Mehrsprachigkeit in der Linguistic Landscape der Metropole Ruhr mit besonderer Berücksichtigung des Polnischen," in *Sprachbildung und Sprachkontakt im deutsch-polnischen Kontext*, eds. Britta Hufeisen et al. (Berlin: Peter Lang, 2018), 259–295.

20   See Evelyn Ziegler, Ulrich Schmitz, and Haci-Halil Uslucan, "Attitudes towards Visual Multilingualism in the Linguistic Landscape of the Ruhr Area," in *Expanding the Linguistic Landscape*, ed. Martin Pütz and Neele Mundt (Bristol: Multilingual Matters, 2018), 264–99, https://doi.

Conclusion

In this chapter, we argued that the term "infrastructure" can be applied to language on very different levels and that language shows all typical defining features of infrastructures: (1) Language serves as the basic means for information exchange among human beings, thus it functions as a basic infrastructure that enables human beings to get their messages across; (2) Production and perception of spoken and written language makes use of certain routines which are tied either to universal physiological processes (sound production and perception) or cultural practices that have to be acquired by every individual (e.g. spelling rules); (3) Language as an infrastructure interacts dynamically with its speakers and their social environment (resulting in different varieties of a language) or other types of infrastructures, especially classically understood material infrastructures (cf. language use on public signs); (4) Languages are characterized by external and internal dynamics leading to language change, but they are also subjected to external manipulations that regulate which changes make their way into the standard variety and which fail in getting accepted by the respective authorities (language policy).

The concept of "infrastructure" has not received much attention in linguistic research yet. The term might be used as an overarching framework allowing to combine different subfields of linguistics that are normally treated in isolation (e.g. sociolinguistics and the systematic description of individual language levels like phonology, morphology or syntax). Furthermore, conceptualizing language as infrastructure would make activities regarding language planning and language policies less emotional because they may be seen as investment in the infrastructure, rather than as unruly intrusion into our human lives. Finally, seeing the body as an infrastructure may help to evaluate regional and foreign accent as an issue of the external (body) system, rather than a cognitive deficit.

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org/10.21832/9781788922166-015; Jakob R. E. Leimgruber and Víctor Fernández-Mallat, "Language Attitudes and Identity Building in the Linguistic Landscape of Montreal," *Open Linguistics* 7, no. 1 (2021): 406–22, https://doi.org/10.1515/opli-2021-0021.