Revisiting the five foundational problems of Weinreich, Labov & Herzog (1968) (WBCDL001)

Anne Breitbarth

Abstract

Abstract. In their seminal paper "Empirical Foundations for a Theory of Language Change", Weinreich et al. (1968) set out five problems that according to them, any theory of language change needs to address. The constraints problem deals with the limits to possible changes, while the transitions problem asks what concrete stages are needed to account for a change. The embedding problem is concerned with the language internal and external factors that may influence the course of a change. The evaluation problem zooms in on a particular language external factor: the social evaluation of a change, and the effect of such an evaluation on the change. Finally, the actuation problem consists in finding an answer to the question why a given change occurs at a particular place and time, and why change may fail to happen elsewhere under seemingly similar conditions. In the over fifty years since its publication, Weinreich et al.'s programme has inspired much work, not always explicitly referring to it, which has addressed various subsets of these problems. The question guiding the current chapter is how the necessarily limited historical data can be exploited to find solutions to the constraints, transition, embedding, evaluation, and actuation problems, and how this is often a matter of methodological creativity and theoretical choices. With this aim, the current chapter discusses several case studies from the literature to showcase how research has built and continues to build on the foundations laid by Weinreich et al.

Keywords: constraints problem, transitions problem, embedding problem, evaluation problem, actuation problem, variation, uniformitarianism

1 The fundamental problem(s) of language change

One of the oldest and most fundamental insights of linguistics is that languages change over time, and the question why and how they do is as old as linguistics itself. Since the birth of modern linguistics as a scientific discipline in the 19th century with the discovery of the historical relatedness of the Indo-European languages, and the concomitant development of the comparative method (cf. chapter WBCDL054), it became clear that over time, languages transition from one stage to another.

Coseriu (1958:37) distinguishes three problems posed by the fact that languages change, which according to him are often confounded. The first is what he calls the "rational" problem, that is, the question why languages should change at all, rather than being "immuable" as Saussure called it. Particularly within the structuralist tradition with its strict separation of diachrony and synchrony, there has always been a certain presupposition that linguistic change is somehow unexpected and should not happen unless explicitly triggered (explicitly formulated in "inertial" approaches e.g. to syntactic change as proposed by Longobardi 2001 and Keenan 2002, cf. also chapter WBCDL144). Of course, any account of the causes of change —be they the influence of a substrate, functional considerations such as homonym avoidance, or the interaction of psychological and physiological factors such as the constant conflict between expressivity and ease as identified by Gabelentz (1901:181f; 256)— leads to the opposite problem: how can there ever be stability, or absence of change? The second problem that Coseriu identifies is therefore what he calls the "general" problem, that is, under which conditions changes usually appear in languages. Finally, he identifies the "historical" problem, i.e., accounting for concrete changes in concrete languages.

The most succinct formulation of the fundamental problems any theory of linguistic change should address, and at the same time the most influential one, is the one by Weinreich et al. (1968), who distinguish not three, but five problems:

1. The *constraints problem*: What is the set of possible changes and possible conditions on changes taking place within a given structure? Are there

any constraints that distinguish possible from impossible changes, and determine the direction of change?

2. The *transition problem*: What intervening stages can be observed or must be posited to account for a change from one stage to another?
3. The *embedding problem*: What language internal and external factors influence the course of a change? How is a given change embedded in the linguistic system and what are its social determinants?
4. The *evaluation problem*: What are the effects of observed changes on linguistic structure and communicative efficiency? How do members of the speech community evaluate it, and how does this evaluation affect the change?
5. The *actuation problem*: What factors can account for the change to happen at a particular place and time, but not in other languages under comparable conditions?

The important insight of Weinreich et al. is that "structured heterogeneity" is the normal condition of a language and that variation is much more pervasive than previously acknowledged.

> "The key to a rational conception of language change —indeed, of language itself— is the possibility of describing orderly differentiation in a language serving a community. We will argue that nativelike command of heterogeneous structures is not a matter of multidialectalism or "mere" performance, but is part of unilingual linguistic competence. One of the corollaries of our approach is that in a language serving a complex (i.e., real) community, it is *absence* of structured heterogeneity that would be dysfunctional." Weinreich et al. (1968:101)

Weinreich et al. (1968) argue in great detail with reference to the historical development of ideas within linguistics that this structured heterogeneity cannot be reduced to a community consisting of speakers with (minimally) different, but internally uniform, idiolects, as for instance proposed by Paul (1880:232): "Wir müssen eigentlich so viele sprachen untersuchen als es individuen giebt"

('we have to study as many languages as there are individual speakers' [AB]). Rather, all speakers command to some degree a repertoire of variants for linguistic variables and know which linguistic and social contexts require one variant or the other. This ubiquitous presence of variation regarding linguistic properties is the basic precondition for a language to undergo change. What happens in language change is in fact a change in the distribution of variants over time (Yang 2009:2). The distribution of the variants of linguistic variables (as well as their emergence, which is a change in itself) depends on a complex interplay of factors, as will be discussed in more detail below.

The five problems of Weinreich et al. (1968) address different factors influencing the distribution of variants and diachronic shifts in this distribution. The *constraints* and *transition* problems, as well as the language-systematic part of the *embedding* problem, concern language-internal factors, while the social part of the *embedding* problem and the *evaluation* problem address the language-external, social factors such as gender, age, socio-economic background, ethnicity, or community size. The embedding and evaluation problems furthermore raise questions regarding patterns of communication within communities, as well as transmission across generations and historical periods, and the question of why changes are continued incrementally.

Following the philosophy of the Companion series, this chapter is structured around an inevitably non-exhaustive number of case studies that highlight the way the five problems for a theory of language change have been addressed in work on language variation and change over the past fifty or so years since their original formulation. In doing so, it is intended to shed some light on the role that Weinreich et al. (1968) have had in laying the foundations for an empirically grounded approach to linguistic change that has not only had an impact on theory formation, but to a large extent also on the development of the methods with which linguistic change is now studied empirically, in various frameworks. Many of these influences can be felt throughout the contributions to this *Companion to Diachronic Linguistics*, and I will refer to them wherever appropriate.

2 Bad data and Uniformitarianism

There are two different epistemological interests in diachronic linguistics, as reflected in Coseriu's "general" and "historical" problems: one is to understand the mechanisms or principles of linguistic change in general, through the (comparative) study of different instances of change, the other is to understand how such mechanisms can account for particular changes. Before turning to a further discussion of the five problems of Weinreich et al. (1968) and their role in shaping the field of diachronic linguistics and the formulation of theories of language change, we need to address a number of basic assumptions and terminological as well as methodological issues.

For changes between temporally separate periods in the (more) distant past, or between such periods and today, one might speak about "macrodiachrony". This is more traditionally the way in which historical linguists have looked at diachrony. But while many linguistic changes take several generations of speakers to complete, it may (also) be interesting to investigate overlapping generations where possible, either to zero in on the point of actuation, or to get a more fine-grained picture of intermediate steps in a diachronic development. As particularly work on ongoing changes within variationist sociolinguistics has made clear, linguistic change can affect communities of simultaneous generations of speakers interacting with each other in various ways: older speakers tend to speak differently from younger speakers, and there can also be changes in individual linguistic behavior across the lifespan (e.g. Chambers 1992, Arnaud 1998, as well as Sankoff 2018 for a general overview of the literature, and chapter WBCDL047). We might call this "microdiachronic" change.

Research into language change, particularly when occurring over extended periods of time, and particularly during time periods in the (distant) past, poses a great methodological challenge. If there are any witnesses of older stages of a language transmitted to us at all, they will most likely take the form of written sources, produced by a non-representative part of the population. In the European Middle Ages, for instance, most people were unable to write, creating a skew in the written record towards male clerics, nobility, and later also administrators and traders. Such sources, therefore, only give (very) incomplete access

to the range of variation that characterized the language in question at the point of writing. This is true even where, in more recent time periods, egodocuments (e.g. van der Wal and Rutten 2013) or even speech recordings (e.g. Breitbarth 2022a) exist. It is therefore notoriously difficult to interpret historical data (see also Lass 1997)

In case ongoing or very recent changes are to be investigated and speakers are still alive, both the apparent time construct and real time methods are available. In the former case, the birth year of speakers (and with it the time of language acquisition) is taken as a proxy for diachrony. In the latter case, the language use of the same group of speakers is investigated at several points in time. For historical periods, there are not always individual lifespan data available, though studies like Arnaud (1998) show that it can be done (cf. also chapter WBCDL047). Also taking the birth years of historical authors within the same period into account is a method that has not yet been used very often (Wallenberg 2019 is an example).

With respect to (macro)diachronic change, the five fundamental problems formulated by Weinreich et al. (1968) present both a challenge and an opportunity: On the one hand, much information on how particular linguistic facts that can be observed in the data are influenced by linguistic and extralinguistic factors (embedding) and especially how they were evaluated by members of the speech community (evaluation) is unavailable, certainly for the distant past. Depending on the amount of surviving material, it may be difficult to assess what constraints played a role in shaping the historical development, through what stages a transition developed, and what factors ultimately caused a change or the absence of an expectable change. On the other hand, one can assume that such factors must have been present to produce the observable data. This lies at the heart of the Uniformitarian Principle (at least at the heart of one of the two methodological interpretations of uniformitarianism as they are distinguished from empirical uniformitarianisms by Walkden (2019)) viz. the assumption that "knowledge of processes that operated in the past can be inferred by observing ongoing processes in the present" (Labov 1994:21 citing Christy 1983:ix) (for more discussion on uniformitarianism see chapter WBCDL007, Walkden 2019, and the literature cited therein). This principle is required as a necessary work-

ing assumption to address the fundamental challenge of historical linguistics, formulated by Labov (1994:21) as follows: "The task of historical linguistics is to explain the differences between the past and the present; but to the extent that the past was different from the present, there is no way of knowing how different it was". The Uniformitarian Principle in this interpretation allows one to make use of what little information one can glean from historical sources and interpret it against the background of what is known about constraints, embedding, or even evaluation today, and can therefore better understand (macro)diachronic change.

This has led to a particular focus on searching for answers to problems of diachrony in synchrony, e.g. by looking at dialectal variation as a window on the diffusion of diachronic change in space (cf. also chapter WBCDL048), or by looking at the effect of social factors on present-day linguistic variation and (ongoing) change, because data are more easily accessible and independent variables such as space or social factors easier to control. The affinity between dialectology, sociolinguistics, and historical linguistics is formulated particularly clearly in the following quote from Labov (1982) (cf. also Labov 1994:11).

> "There is a natural alliance between dialect geographers, who study heterogeneity in space; sociolinguists, who study heterogeneity in society; and historical linguists, whose concern is heterogeneity in time. Historical linguistics may be characterized as the art of making the best use of bad data..." (Labov 1982:20)

While historical data are inevitably limited, given the lack of access to balanced samples and therefore lack of control of the distribution of variables in the actual population at inaccessible past stages, historical linguistics working with macrodiachronic data has made great advances with respect to the bad data problem beyond using dialectology or sociolinguistics as proxies. This is especially thanks to the creation of large(r) annotated text corpora, including metadata on the authors, or the development of better statistical methods (e.g. Pintzuk 2003). The use of accountable data, not just attested values of the incoming variant, but of all expressions of the variable including coding of all the

7

internal and external determining factors – allows for quantitative evaluation even of bad data. This is particularly reflected in the methodological extension of variationist methods to syntactic change as initiated by Anthony Kroch (cf. Pintzuk 2003 for an overview).

Ideally, a theory of language change should be predictive (Weinreich et al. 1968, Labov 1994:5). The general consensus is that the close observation of recurrent patterns of variation and change – in the absence of sufficiently "good" historical data, the present is a valid source of information – is able to reveal constraints on the possible developments, and hence also allow one to exclude certain logically possible developments not only in the past, where data may be too sparse or skewed to reach a conclusion, but also in the future.

Conversely, it is also possible to form hypotheses on pathways of change based on developments repeatedly observed in the past, and test them on suitable present-day data, to confirm their validity beyond the limited historical data they were originally based on. This is the path taken in Magistro et al. (2022), who use variation in a present-day dialect continuum to shed light on diachronic processes and zoom in on the start of Jespersen's cycle (see also Magistro and Crocco 2022).

The question guiding the current chapter is how the necessarily limited historical data can be exploited to find solutions to the constraints, transition, embedding, evaluation, and actuation problems. As we will see, solutions to some of these five problems are easier to find than others, and very often, this is a matter of methodological creativity and theoretical choices.

3 The constraints problem

Weinreich et al. (1968:100) formulate the problem as constraints on the transition from one state of a language to an immediately succeeding state. This can mean either (or both) of two things: constraints on **possible states** of languages in principle —certain states should be inaccessible by language change from any previous state— or constraints on the **pathways** transitions may take (in the sense that not all states can be input to all other states). Walkden (2017), building on Lass (1997), calls these legality and process constraints, respec-

tively.

Different sub-disciplines of linguistics seem to set different accents here. From a formalist or generative perspective, on the one hand, the focus is on possible states: Universal Grammar (UG) determines the limits of variation by restricting the possibilities for the kind of grammar a human language can have. This is reflected in proposals such as the one by Roberts and Roussou (2003), who see grammaticalization as upwards reanalysis in a fixed hierarchy of functional projections, or by Kiparsky (2012), who argues for grammaticalization as non-exemplar-based analogy; in essence, analogy with UG. While variation and accommodation can happen at any time, an important role in language change, particularly morphosyntactic change, is given to transmission through first language acquisition under this type of approach, where reanalysis of underlying structures can happen and where incoming variants get amplified by incrementation, leading from one stage to the next (Lightfoot 1997, Yang 2000, Labov 2007, Roberts 2022, Cournane 2019, cf. also chapter WBCDL028 and WBCDL029).

In functionalist and usage-based accounts, on the other hand, there is a stronger focus on possible pathways. Particularly (functionalist) work on grammaticalization has emphasized the universality of grammaticalization clines, and their unidirectionality. Usage-based accounts see language change as being potentially initiated all the time throughout the lifespan, with speakers influencing each other through the frequency of their use of variants (cf. Labov's 2007 diffusion). Under approaches of this kind, there are no or very few limits to possible variation, though some variants are (much) less frequent (e.g. Backus 2015).

Before looking at case studies exemplifying different approaches to, or interpretations of, the constraints problem, it should be noted that Labov (1982) expresses doubts about the status of the constraints problem as a separate problem, and argues that it should rather be subsumed under the embedding problem:

> "The various articulatory, acoustic, psychological and social factors
> evoked here mutually determine the outcome of a given linguistic
> change. If one principle were to determine the outcome without

any possibility of being overridden, it could only be because it op-
erated in total isolation from all others. The search for a strictly
"universal" constraint is therefore a search for an *isolated* faculty of
language, one that is not embedded in the larger matrix of linguistic
and social structure. Nothing that we have found up till now about
language suggests the existence of such totally isolated structures.
It therefore seems to me that the formulation of the "constraints
problem" given in [Weinreich et al. (1968)] [...] was misguided,
and that the constraints problem should be merged with the em-
bedding problem [...]."   (Labov
1982:60)

Nonetheless, we will discuss the two problems separately here, and impose
—perhaps against the intentions of Weinreich et al. (1968)— a distinction be-
tween "universal" constraints as the domain of the constraints problem ("gen-
eral" in Coseriu's sense) and embedding into the system of an individual lan-
guage with its language specific constraints as the domain of the systematic part
of the embedding problem (Coseriu's "historical").

3.1 Possible states

It is a direct consequence of the Uniformitarian Principle that "no proposed lan-
guage state should be synchronically impossible" (Walkden 2017:404). Venne-
mann (1971) for instance argues that it would be unexpected if a language
had only one single phonemic diphthong, and argues therefore that Gothic
<iu> was probably a long monophthong /ɯ/ instead of the standardly assumed
monophonemic diphthong [ɪʊ]. Berent and Lennertz (2010) discuss universal
constraints on sound structures in natural languages more generally, which may
have implications for diachrony, and for the reconstruction of older stages of
languages, such as the sonority hierarchy or possible syllable structures (see
chapter WBCDL002 for more detail).

Work on (diachronic) typology has shown that while many combinations of
linguistic properties are possible, some are much less frequent than others, and
some never seem to occur. Furthermore, linguistic properties are clearly not

freely combinable, but the choice for one option seems to restrict the choice for other options, leading to the formulation of statistical universals (see chapter WBCDL016 for an overview). For diachronic linguistics, this means that the number of possible states that could be assumed is restricted, and, because of the interconnectedness of choices, also the possible transitions between states.

From a generative perspective, the fact that some combinations of properties (in syntax) are excluded is a consequence of the architecture of language. According to the Borer-Chomsky-conjecture (Baker 2008:353), variation is located in the properties of lexical, and in particular functional, items. The order of their merger to build hierarchical structure and the restrictions on possible restructuring delimit the search space of possible changes of state in diachrony. Holmberg (2000:124) for instance observes that in many languages, head-final phrases are banned from dominating head-initial structures (at least as long as they are categorially non-distinct, to allow for languages like German with head-final verbal projections, but head-initial nominal projections), and calls this the Final-over-Final Constraint (see also Biberauer et al. 2007; 2008; 2014, as well as chapters WBCDL026 and WBCDL117; note that Sheehan et al. 2017 now call it a 'condition' instead of a 'constraint').

(1) The Final-over-Final Constraint (FOFC):
    If α is a head-initial phrase and β is a categorially non-distinct phrase immediately dominating α, then β must be head-initial. If α is a head-final phrase, and β is a phrase immediately dominating α, then β can be head-initial or head-final.
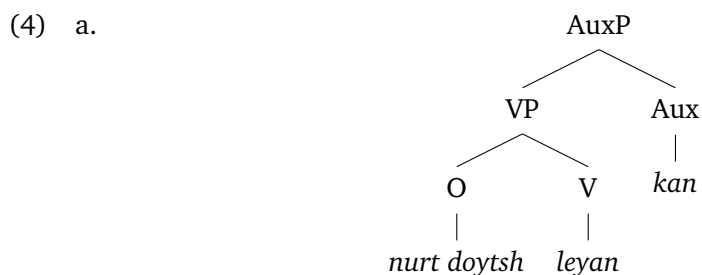
This constraint rules out states like (2), with a head-initial αP and a head-final βP dominating it:

(2)

$$*\beta'$$

$$\alpha P \qquad \beta$$
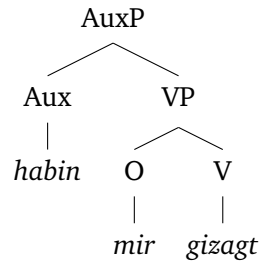
$$\alpha \quad \gamma P$$

Biberauer et al. (2009; 2010) argue that many of the diachronic changes discussed in the literature, such as the change from OV to VO in Germanic languages like English (van Kemenade 1987, Pintzuk 1991), Yiddish (Santorini 1992), or Icelandic (Hróarsdóttir 2000), can be argued to confirm the FOFC. As Santorini (1992) for instance shows, early Yiddish had O-V-Aux order in subordinate clauses (3a), but increasingly shows Aux-O-V (3b) and Aux-V-O or Vfin-Pred-O (3c) orders (the auxiliary / finite verb part is underlined, the nonfinite verb / predicate part is set in bold).

(3)   a.   *ven   der vatr   nurt doytsh   **leyan** <u>kan</u>*
          when the father only German   read   can

          'when the father can only read German'
          (Anshel 1l, ca. 1534; from Santorini 1992:606)

     b.   *az   ihudim <u>habin</u> mir **gizagt***
          that Jews   have   me   shown

          'that people told me'
          (East Yiddish Court testimony 1625–1640; from Santorini 1992:612)

     c.   *die   da   <u>habin</u> **lib**   iri   leybr*
          who there have   dear   their bodies

          'who love their bodies'
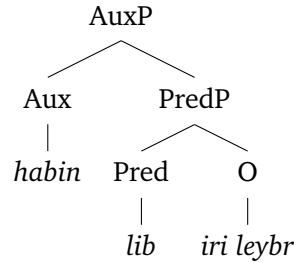   (Ellush n.p. 1704; from Santorini 1992:611)

All attested stages are as predicted by the FOFC (4), and at no point are there V-O-Aux orders, which would contradict it.

(4)   a.

12

b.

```
                    AuxP
                   /    \
                 Aux     VP
                  |     /  \
                habin  O    V
                       |    |
                      mir  gizagt
```

c.

```
                    AuxP
                   /    \
                 Aux    PredP
                  |     /    \
                habin Pred    O
                       |      |
                      lib   iri leybr
```

This has consequences for the transition problem. As Biberauer et al. (2009; 2010) point out, the FOFC predicts that head-initial structures should change bottom-up (whether this likely to happen at all is a question discussed in chapter WBCDL026), while head-final structures, should change top-down. The latter prediction is confirmed by cases of change such as illustrated here for Yiddish. In a change from head-initial to head-final, lower projections should become head-final earlier than higher projections, while in a change in the opposite direction, higher projections (in case of Yiddish: AuxP) should become head-initial before lower projections (here: VP). This way, each individual stage is one that conforms to FOFC, and hence a possible state.

3.2 Possible pathways

The idea of universal constraints on possible pathways has particularly been pursued in the literature on grammaticalization (e.g. Hopper and Traugott 1993, Pagliuca 1994, Lehmann 1995, cf. also chapter WBCDL025), which is concerned with the diachronic development of grammatical categories and their expression. One of the fundamental insights from that literature is that this development follows certain pathways, so-called grammaticalization clines, which are observed in language after language, suggesting universality, and that the devel-

opment of linguistic expressions along these clines seems to be overwhelmingly unidirectional, with developments in the opposite direction being rare. These clines are not universal in the sense that e.g. expressions of the category 'future' *always* develop out of (one type of) modal marker: different modal sources can be involved (5,6), and motion verbs can be a source of future markers, too (7) (though they can also be the source of past markers; Paoli and Wolfe 2022), besides other sources (Bybee et al. 1994). Nonetheless, the clines *volition > future, obligation > future*, and *motion verb > future* are repeatedly attested in unrelated languages (e.g. Kouteva et al. 2019).

(5) volition > future
     Greek *thélo:*   *graphein*   > *θa*   *γráfo*
            want.1SG write.INF   FUT write.1sg
     'I want to write' > 'I will write' > 'I'll be writing'
     (Joseph 2001b:178–183)

(6) obligation > future
     Lat. *cantare **habeo*** 'I have to sing' > Span. *cantar-**é***
     Eng. ***shall*** + inf.

(7) motion verb > future
     Port. *eu **vou*** *cantar* 'I am **going** to sing'

The exact stages in individual languages are more the domain of the transition problem, but the repeated attestation of the same paths in language after language seems to point to the presence of more general constraints.

   The observation of such repeated attestations has lead to the establishment of so-called semantic or implicational maps of grammatical functions, often based on large-scale language comparison (e.g. Bybee and Pagliuca 1985, Haspelmath 1997, van der Auwera and Plungian 1998). These maps capture the fact that grammatical markers often express more than one grammatical function, and that those functions appear to be ordered with respect to each other such that one marker can only express functions that form a contiguous

area on the map, as illustrated in Figure 1. A language such as (a) in this figure, with a marker X for the functions *a* and *b*, and a marker Y for the functions *c*, *d*, and *e*, each forming contiguous areas on the map, would be licit, whereas a language such as (b), with one marker S realising the non-contiguous functions *a* and *e*, would not.
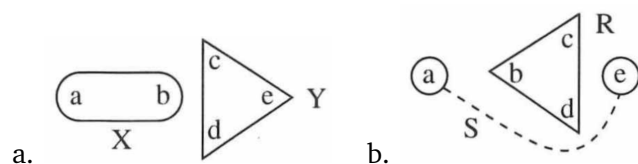

Figure 1: Haspelmath's illustration of semantic maps (extracted from Haspelmath 1997:63)

Such maps do not only capture the synchronic relation between forms and grammatical meanings in languages, but also outline diachronic pathways. For instance, it has been observed for several languages that indefinites expressing "less negative" functions (e.g. (non-)specific, like English *something*) tend to come to express increasingly negative functions over time (from weak NPI-contexts such as questions or conditionals, like English *anything*, to strong NPI contexts such as direct (clause-mate) negation, like English 'nothing'; for the weak/strong distinction in relation to NPIs cf. Zwarts 1998). In Old French, for instance, *rien*, originally a noun meaning 'thing' (8), grammaticalized as an indefinite pronoun used in weak NPI contexts, roughly meaning 'anything' such as *yes/no*-questions (9).

(8) *Et   une   riens les   reconforte   ...*
     and one.F thing 3PL comfort.PRS.3SG

     'And one thing (something) comforts them ...'
     (FRANTEXT; Rutebeuf, *Œuvres complètes*, c. 1249–77, p. 130)

(9)   *Et   vos, seignor, qu   an   volez   dire?   Savez*
      and 2PL sir   what 3.GEN want.PRS.2PL say.INF know.PRS.2PL

      i   vos rien   contredire?
      here 2PL anything reply.INF

      'And you, Sir, what do you want to say about it? Do you have anything to reply?'
      (FRANTEXT; Chrétien de Troyes, *Erec et Enide*, c. 1213, p. 54)

Up to the end of the nineteenth century, non-negative uses of *rien* and other indefinites like *personne* 'anyone, no one' or *jamais* 'ever, never' are still found in conditionals, questions, the restriction of comparatives and superlatives (cf. Breitbarth et al. 2020:155 for examples). In present-day French, indefinites like *rien* or *personne* have become restricted to comparatives, indirect and direct negation, but are no longer available in questions (except rhetorical ones, Rowlett 1998) and conditionals.

    Similar observations have been made in the literature about the expression and diachronic development of modal meanings (Bybee et al. 1994, van der Auwera and Plungian 1998): greatly simplifying, participant-internal possibility (ability) may develop into participant-internal (deontic) possibility or necessessity, and from there to epistemic possibility or necessity, as the examples in (10) from Closs Traugott and Dasher (1986) illustrate (cf. also Roberts 2012:360–1).

(10) a. *wilt ðu, gif ðu* **most**, *wesan usser her   aldordema .. ?*
         will you if you can   be.INF our   army leader

         'Are you willing, if you are able, to be the leader of the army .. ?'
         (8th c., *Genesis*, 2482; from Closs Traugott and Dasher 1986:122)

     b. *Ac ðanne hit is þin wille ðat ic ðe   loc   offrin* **mote***.*
         and then   it   is thy will that I thee sacrifice offer must

         'But then it is Thy will that I must offer Thee a sacrifice.'
         (c1200 *Vices and Virtues* 85.5; Warner 1993: 175; from Closs Traugott and Dasher 1986:124)

    c.   *I have wel concluded that blisfulnese and God ben the soveryn god; for*
        *whiche it **mote** nedes be that sovereyne blisfulnese is sovereyn devynite*
        'I have properly concluded that blissfulness and God are the supreme
        good, therefore it must necessarily be that supreme blissfulness is
        supreme divinity.'
        (c1389 Chaucer, Boece p. 432, l. 124; from Closs Traugott and Dasher
        1986:129)

Formal (generative) approaches, too, have addressed such recurring pathways
of grammaticalization. From a generative perspective, morphosyntactic change
is a reanalysis of the lexicalization (=formal realization) of functional heads.
It is observed that the new function of a given lexical element corresponds to
a higher hierarchical position in the structure. The hierarchical structure of
functional projections is determined by observable scope differences and (cross-
linguistic comparison of) ordering possibilities (Cinque 1999). For instance,
Roberts (2010; 2012) observes that the development of a modal like *must* from
ability/possibility via deontic obligation to epistemic necessity (cf. (10) above)
reflects (part of) Cinque's hierarchy of functional projections, (12a). Similarly,
the development of *should/sollte* from a modal verb to an irrealis marker used
like a conditional subjunctor in German and English (Breitbarth 2015; 2019),
as illustrated in (11), follows a comparable path, (12b).

(11)   a.   Middle High German
        in   dûhte   ein swaere bürde,   ob er sîn   âne   solte
        him seemed a   heavy burden if   he his.gen without should

        sîn.
        be

        'It seemed a heavy burden to him, if he had to be without him.'
        (*Der Trojanische Krieg*, 1230–1275; l.3246–3247; from Breitbarth
        2019:4)

      b.   Present-Day German

Sollten wir tausend   werden, stellen wir Forderungen.
should   we   thousand   become   pose   we   requests

'In case/If we become a thousand, we will make requests.'
(A10/MAR.01716; 2010; from Breitbarth 2019:4)

(12)   a. $\text{Mod}_{\text{epistemic necessity}} \leftarrow \text{Mod}_{\text{obligation}} \leftarrow \text{Mod}_{\text{ability/possibility}}$

     b. $\text{Mood}_{\text{irrealis}} \leftarrow \text{Mod}_{\text{(alethic) possibility}} \leftarrow \text{Mod}_{\text{volitional}} \leftarrow \text{Mod}_{\text{obligation}}$

While the details of each development are rather a solution to the transition problem, addressed in the next section, the assumption of a universal functional hierarchy restricting possible transitions can be considered one solution to the constraints problem.

4   The transition problem

The answer(s) to the constraints problem inform(s) in many cases the approach to the transition problem: once the possible stages and possible pathways in a general sense are determined, one can ask what intervening stages in a concrete instance of change can be observed or need to be posited, and how the transition between them proceeds.

The answer to this question follows in part from the answer to the constraints problem: some stages can be assumed to be impossible (based on a theoretical analysis of typological data, as in the case of FOFC), and should thus never be reached by any instance of change anyway. A case in point was already discussed above in relation to the change of Yiddish from auxiliary-final to auxiliary-medial (Santorini 1992). In part, it also follows from the theoretical framework chosen. For grammaticalization theory, for instance, the availability of a future marker in a language implies that this marker must have developed from a specific lexical source, e.g. a motion verb, an obligation marker, or a volition marker. In case the etymology of a marker is known, or can be reconstructed using e.g. the comparative method (cf. chapter WBCDL054), a more precise reconstruction is possible, in other cases, this answer to the constraints problem can at least narrow down the search space for the transition problem.

The answer to the transition problem lies not only in the reconstruction of the intermediate stages, but also in accounting for the processes making the transitions between them possible. The grammatical functions forming a semantic map, for instance, are connected via implicational relationships. In many cases of grammaticalization, originally conversational implicatures are conventionalized (Eckardt 2006, cf. also chapter WBCDL120). More abstract, grammatical, meanings tend to be inferable by more lexical ones, e.g. 'intention to do something' → 'not having done it yet' → 'future'. Generative approaches to grammaticalization (e.g. (Roberts and Roussou 2003, Gelderen 2004; 2011)), furthermore emphasize the importance of economy constraints. All things being equal, less complex structural configurations are preferred over more complex ones. Under Roberts's (2012) or Breitbarth's (2015, 2019) analyses of the grammaticalization of modal verbs referred to in the previous section, for instance, displacement from lower to higher positions requires two features needing to be checked, first, the one triggering insertion in the lower position, and second, the one triggering (re-)insertion in the higher position. Though not inevitable, loss of movement, and thus reanalysis as a lexicalization of a higher functional head, is therefore more economical, reducing the number of features to be checked.

Given the importance of first language acquisition in grammatical change (Paul 1880:31, Andersen 1973, Lightfoot 1991, Fodor and Ferreira 1998, Yang 2000, Labov 2007, Roberts 2022) the problem of transition from one stage to another is also intimately connected to the mechanisms of transmission, and the question how they get incremented in a common direction across speakers from one generation to the next. Yang (2000) has proposed a learning algorithm that takes the variation inherent in language (Weinreich et al. 1968) into account. Cournane (2015; 2019), Cournane and Pérez-Leroux (2020) have shown how overextension in first language acquisition introduces meaning variability in modal verbs which is then incremented by exploiting meaning inferences (cf. also chapter (WBCDL028)).

A separate question related to the transition between diachronic stages of a language is whether the transitions can be gradual, or whether they are always categorical. Recent work on sound change, for instance, has shown that it starts out as gradient phonetic variation (see e.g. Stevens and Harrington 2014,
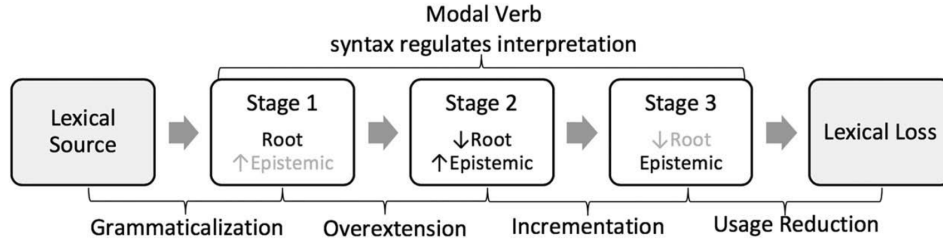
Figure 2: (from Cournane and Pérez-Leroux 2020:272)

Salmons 2021). Jatteau and Hejná (2016), comparing studies on aspiration dissimilation in Halh Mongolian, Georgian, and Aberystwyth English, where the aspiration of a second stop in C^hVC^h sequences is consistently reduced but not deleted when the first consonant is aspirate in these languages conclude that dissimilation can be gradient rather than categorical, and that this gradient reduction can be an intermediate step on the way to complete dissimilation at a later stage (as for instance attested in the dialects of Mongolian, or, historically, in Grassmann's Law of Sanskrit and Ancient Greek) (for more on dissimilation, see chapter WBCDL064).

For syntactic change, particularly generative approaches have struggled to accommodate gradual transitions (e.g. Lightfoot 1997, Hale 1998, even Roberts 2022). But the fact that the same speaker/author can simultaneously use two mutually exclusive variants has led to a search for ways to incorporate variation into syntactic knowledge, starting with Kroch (1989) (see also chapter WBCDL029).

5   The embedding problem

According to Weinreich et al. (1968:185), the embedding problem is central to 'the problem of providing sound empirical foundations for the theory of change'. The essence of this problem is that variation and change in language is dependent upon, or embedded in, a system of linguistic and social relations. Hence the trajectories of language change are conditioned by linguistic and extra-linguistic factors.

5.1 Embedding into the language system

One of the central insights of Weinreich et al. (1968) is the fact that conceptualizing linguistic variables as structural elements of the language system allows the researcher to analyse variation and change as internal to the language system, not as a shift from one system to another. The realization of linguistic variables as particular variants, which may change diachronically, covaries with other linguistic variables, besides extra-linguistic factors (next section). For instance, certain syntactic changes may (initially) be confined to certain clause types. A recurrent idea is that the language system may create pressures, leaving only certain directions for the development of a given variable. While functional pressures may not play a role in creating or removing formal distinctions, as e.g. phonological mergers happen and spread regardless of the problems they may create for intelligibility (cf. Yang 2009, Labov 2010), phonological systems tend to maximize articulatory distinctions between phonemes (which also affects the likelihood and distribution of mergers, cf. Wedel et al. 2013). Joseph (2001a:109–110) for instance wonders whether "the packing of several sounds into a relatively small acoustic and articulatory space (as with Serbian voiceless affricates: dental [c], alveo-palatal [č], and palatal [ć]) [is] likely to lead to a loss of some of these distinctions".

Kokkelmans (2020) discusses a relevant case study illustrating the way linguistic change depends on the surrounding linguistic system. He shows that s-retraction in /rs/-clusters in several Germanic varieties at different times in their history is the result of an interplay between the sibilant inventories of these varieties and the phonetic realization of /r/ as alveolar (contra Hall (2008), according to whom only the phonological properties of /r/ and /s/ are responsible for the retraction, not also phonetic realizations). From ca. the 14th century onwards (Hall 2008:231f, Kokkelmans 2020:215), the cluster /rs/ changed to /rʃ/ in Middle High German dialects (even though this change is not consistently reflected in present-day German as a result of variant selection in the development of the standard language, cf. (13c). The change affects both *rs*-clusters with the inherited Germanic *s* (13a and *rs*-clusters with the *s* that is the result of the Old High German consonant shift */t/ > /(t)s/ (13b).

(13)   a.   MHG *ki*[r̥s̠]*e* > NHG *Ki*[rʃ]*e Kirsche* 'cherry'

    b.   MHG *hi*[r̥s̠] > NHG *Hi*[rʃ] *Hirsch* 'stag'

    c.   MHG *ve*[r̥s̠] > NHG *Ve*[rs] *Vers* 'verse'
      (Kokkelmans 2020:215)

Kokkelmans observes that a similar change is currently productive in some Flemish varieties, even across word boundaries (14), but that it seems to be absent in others.

(14)   a.   *Uw pe*[r̥s̠]*oonlijke mening*
      'your personal opinion'

    b.   *Ande*[r̥z̠]*ijds* (= *ander + zijd- + -s*)
      'on the other hand'

    c.   *Dat er daa*[r] [z̠]*ogezegd*
      '(...) that there, so to say (...)"
      (Kokkelmans 2020:216f)

Kokkelmans shows that there are two conditions that need to be fulfilled for a variety to undergo this *s*-retraction in *rs*-clusters. Phonetically, this is a progressive assimilation of the [apical] (◌̺) tongue shape and [retracted alveolar] (◌̠) place of articulation of [r/ɾ] to a following [(dento)alveolar] and [laminal/apical] [s], which yields an [apical] [retracted alveolar] [s̠]. Phonologically, the retraction amounts to a reanalysis of a perceptually ambiguous phonetic output [r̥s̠] as an underlying /rʃ/ instead of /rs/. This retraction therefore amounts to a reassignment to a different phonological category, and a merger of the originally more apical [s̠] with a more posterior phoneme after /r/. A necessary systematic precondition is the availability of at least two sibilants, an apical one and a more posterior one.

    For this reason, Kokkelmans argues, the retraction never affected Low German: while Middle Low German arguably also had an apical /r/, it only had the /s/ inherited from Germanic, realized as a retracted alveolar [s̠], but not the dental [s̪] that Middle High German had in addition as a result of the Old High German consonant shift and deaffrication after vowels. Furthermore, the

sibilant inventory of Middle High German also contained /ʃ/ < */sk/ (Hall 2008:217), with which the former two could merge in /rs/-clusters. This assimilation is no longer active in (most varieties of) present-day German because, while they retain a sufficiently large sibilant inventory, they no longer have an apical [r] triggering s-retraction, only an uvular [ʁ] (or even only [ɐ]).

5.2 Embedding into the social environment

The fact that linguistic variation is socially determined is a fundamental insight particularly of variationist sociolinguistics. Speakers will use different variants, depending on their own socio-economic background, education, occupation, and gender, but also depending on the concrete (social) situation and interlocutors in which the speech act takes place. By uniformitarian reasoning, the same would have been the case at any given point in the past. Problematically, social factors are (even) more difficult to reconstruct in macrodiachrony than linguistic ones.

> "The difficulty here is that, apart from general political and social history, we have so little precise knowledge of social conditions in the periods when the important changes took place."　(Samuels 1987:249)

Take, for instance, a recurrent observation in variationist sociolinguistics regarding the role of women in leading ongoing change. Labov (1990:205f) formulates the following paradox, summarized in (Labov 2001:293) as "[w]omen conform more closely than men to sociolinguistic norms that are overtly prescribed, but conform less than men when they are not":
  (I) In stable sociolinguistic stratification, men use a higher frequency of non-standard forms than women.
  (II) In the majority of linguistic changes, women use a higher frequency of the incoming forms than men.
Labov (2001:376), discussing the linguistic behaviour of a number of individual speakers, comes to the conclusion that in fact, (I) and (II) concern "two

different sets of women", and that what characterizes leaders of change is not so much their gender, but their nonconforming behavior (Labov 2001:516). He concludes that

> "[T]]he diffusion of systematic linguistic change in large cities is promoted by women who combine upward mobility with a consistent rejection of the constraining norms of polite society."   (Labov 2001:415)

and formulates the following Constructive Nonconformity Principle:

(15)   The Constructive Nonconformity Principle:
        Linguistic changes are generalized to the wider community by those who display the symbols of nonconformity in a larger pattern of upward social mobility.   (Labov 2001:516)

Clearly, to be able to use these insights for the study of the social embedding of language change in the more distant past, one would need sufficient information about what was considered the norm (and what non-conformism), and what was considered upward social mobility. This is where the uniformitarian principle runs into its limits (cf. also Bergs (2012)). Already Labov (1982) cites various studies which indicate that the role of women w.r.t. linguistic change may depend on the specific culture. In cultures where women cannot aspire to have any influence, they seem to behave quite differently at least w.r.t. adherence to the norm (Labov 1982:78f). Cultural differences may mean that the interaction between gender and language change captured in Labov's conformity paradox is not universal, and can therefore not easily be used predictively, or in the reconstruction of macro-diachronic changes. An additional challenge is the fact that most witnesses of language use for distant time periods are texts written by only a very small segment of the society due to the distribution of literacy and social structure. The fact that many ancient or medieval texts are only transmitted in (copies of) copies, which may add their own elements of variation, further complicates the matter. One therefore needs creative ways of "making the best use of bad data".

One approach is to use texts written by female writers, as far as they are available, and compare the development of linguistic phenomena in them to texts written by male writers. For many languages, this will restrict the data to a relatively recent period. Nevalainen and Raumolin-Brunberg (2003), for instance, show female writers to have led a number of morphosyntactic changes in Early Modern English. Another methodological approach is chosen by Blaxter (2015), who uses the speech of fictional characters as a proxy for gender for a language stage and period for which no data from female authors are available, viz. Old (West) Norse. She argues that

> "[d]irect speech in fiction is often designed to highlight the very expressions of social categories in which we are interested and such expressions may represent an important literary tool to give a narrative a sense of reality and immediacy" (Blaxter 2015:352)

and shows that female characters lead male characters and narrative sequences in the change of the expression of negation from *ei(gi)* (and other adverbs) to *ekki* in a corpus of Old Icelandic Sagas and related genres.

While it is encouraging that the leading role of women for linguistic change seems to be confirmed for such a distant period, this method raises an issue related to the evaluation problem to be discussed in the next section: if an author chooses to characterize female speech by exaggerating certain properties, they will presumably pick only very salient features, but neglect less salient ones. Blaxter (2015:352) herself quotes work admitting that "stereotyping may play a role in this". This is the domain of the evaluation problem.

6 The evaluation problem

Labov (2001:3) states that speakers "do not profit in any obvious way from the results of systematic language change" – mergers, for instance, may compromise intelligibility or increase the functional load of phonemes (cf. Labov 2010), yet, they seem to spread regardless. The realization that "speakers are more aware of some variables than others" (Trudgill 1986:11) can help us understand why

some variants spread more readily while others do not. The evaluation problem of Weinreich et al. (1968) addresses the question of how members of a speech community evaluate a linguistic variable, and what effect this evaluation has on linguistic change. Weinreich et al. (1968) stress the importance of appreciating the subjective evaluation of variation for a theory of language change:

> "The theory of language change must establish empirically the subjective correlates of the several layers and variables in a heterogeneous structure. Such subjective correlates of evaluations cannot be deduced from the place of the variables within the linguistic structure. Furthermore, the level of social awareness is a major property of linguistic change which must be determined directly. Subjective correlates of change are more categorical in nature than the changing patterns of behavior: their investigation deepens our understanding of the ways in which discrete categorization is imposed upon the continuous process of change." (Weinreich et al. 1968:186)

Labov (1972a:314) distinguishes three types of variables, depending on the level of social awareness attached to them: indicators, markers, and stereotypes. Indicators are objectively measurable differences between two variants, that is, they distinguish (social, geographic, and by extension, also diachronic) varieties, which are below the conscious awareness of language users and are not evaluated socially. "It is there but it is unseen" Rácz (2013:4). Differently from that, markers are variables that are stylistically as well as socially stratified, and consciously or unconsciously recognized by speakers, that is, speakers will have an attitude (positive or negative) towards them, and may react in their linguistic behavior to avoid them in certain contexts. Stereotypes, finally, are variables that are consciously perceived as being stratified by social group and speech style, and can be the "overt topic of social comment", i.e., they carry social indexation (Labov 1972b:314f). Similarly, Rácz (2013) distinguishes cognitive from social salience, and notes that "socially salient variants are precisely the ones which are used to indicate group membership" (Rácz 2013:142) (cf. also chapters WBCDL015 and WBCDL051)

Both types of salience play an important role in the propagation of change. Erker's (2017) study of the use of Spanish by Puerto Rican heritage speakers born in the US compared to speakers recently arrived from Puerto Rico illustrates this clearly: Socially salient features (= stereotypes) such as coda /s/ deletion, which serves as a group identity marker, are particularly prone to being preserved in language contact situations. In contrast to that, less salient features, such as subject pronoun use or subject position change more easily under contact, and they change in parallel.

The same variable may be a stereotype for one variety, and an indicator for another. For instance, inversionless verb third orders after framesetting adverbials as in (16) are a highly socially salient feature of Kiezdeutsch, an urban multi-ethnolect (Wiese 2013), even though it is only attested in 0.65% of all main clauses in the Kiezdeutsch corpus (Wiese et al. 2012, Wiese and Müller 2018, Wiese et al. 2020; 2022). In spoken standard German, however, where is is equally attested (16b) (Schalowski 2015, Wiese and Müller 2018, Bunk 2016; 2020, Breitbarth 2022b; 2023), with a similar diamesic stratification (Wiese et al. 2022), it is absolutely non-salient. This leads to an overinflation of the feature in the perception of one variety, while it remains completely under the radar of social awareness and in fact seems to be a change in progress outside Kiezdeutsch (Breitbarth 2023).

(16) a. Kiezdeutsch

JETZ **ich** *krieg immer ZWANzig euro*
now I get always twenty euros

'Now, I always get 20 euros.'   (KiDKo MuH17MA, from Breitbarth 2022b:5)

b. Spoken Standard German

Heute, **die Goethe-Institute in Indien** *heißen* *alle Max Müller*
today   the Goethe Institutes in India   are.called all   Max Müller

Bhavan
Bhavan

'Nowadays, the Goethe Institutes in India are are called Max Müller
Bhavan.'   (Radio interview, DLF Nova, from Breitbarth 2022b:8)

Problematically for research into macrodiachronic change, salience or social indexicality cannot easily be observed in more distant historical stages due to the lack of sufficiently stratified data and lack of access to metalinguistic commentary, and uniformitarianism is not of much help, because the social and cultural evaluation of variation is not necessarily uniform across time (cf. comments in Labov (1982) on how the role of women in leading change or not may be culture dependent). One could in fact try use Blaxter's (2015) methodology (viz. using the speech of fictional characters of certain groups) to reverse-engineer saliency, but it would still be rather imprecise.

What Rácz (2013) calls cognitive salience can also be relevant for diachronic change, and it's perhaps more easily deducible from historical data, because frequency plays a role. While it is lost in most cases, it has been observed that in some varieties of languages that underwent Jespersen's cycle, the original negative particle is not lost when the new particle assumes the function of expressing neutral sentential negation, and settles around a low but stable frequency. Not being able to express sentential negation anymore, it can then become co-opted or even reanalysed as the expression of a different grammatical category that is similarly infrequent. Fonseca-Greber (2007) for instance argues that *ne*, which in most varieties of spoken French is simply lost, becomes a marker of emphatic negation in Swiss French. Breitbarth (2022a) traces how *en* in Southern Dutch, particularly Flemish, dialects, first becomes a marker of polarity focus, before it is co-opted as a mirative strategy that is also available outside negative clauses, (17) (on the subject pronoun doubling seen here, cf. Haegeman 1992, Vogelaer 2006). Lass (1990) calls developments such as this *exaptation* (cf. also chapter WBCDL019).

(17) *Ik en had ik ik kunnen blijven wi.*
     I   EN had I   I   could   stay   INT

   '[It may surprise you, but] I could have stayed, you know.'
   (N005p Bergues/Sint-Winoksbergen; Breitbarth 2022a:163)

A final point related to the evaluation problem is the question of why changes
can spread across great geographical distances, and are continued in the same
direction across extended time spans (Labov 2010). According to Labov, this is
a result of culture area formation, where speakers synchronize beyond immedi-
ate inter-speaker contact due to an evaluation of linguistic features as identity
markers (cf. also Salmons 2021).

7   The actuation problem

Without doubt, the actuation problem is the most important, but also the most
intractable problem for Weinreich et al. (1968). Walkden (2017:406) estab-
lishes that a solution to the actuation problem would be "an essential of [a fully]
predictive theory" of language change, adding that Weinreich et al. (1968:99)
themselves concede that only "[f]ew practicing historians of language would be
rash enough to claim that such a theory is possible". Cheshire et al. (2013), too,
concede,

> The problem is unlikely ever to be resolved since, like other phe-
> nomena that can be analysed empirically, we can never be sure to
> have uncovered all the factors that have given rise to a specific lan-
> guage change.   (Cheshire et al.
> 2013:51)

Therefore, in any empirical case studies that might be discussed here, actua-
tion can only be established post-hoc, for (a number of) individual instances of
change, never predictively.

   The actuation problem can be broken down into three questions: (i) why
did a change occur at a particular time in a language rather than at another
time (why then?), (ii) why did a particular change occur in a language at all,

when it didn't occur in another language under seemingly similar conditions (why at all?), and finally, (iii) how can we account for the speed at which it occurred (why so fast/slow?). Walkden (2017) distinguishes between internal and external factors for the actuation of linguistic changes, with internal ones comprising reanalysis, first language acquisition pressures and functional pressures, and external ones, most notably language (and dialect) contact, but also socio-linguistic factors, which, as discussed above, are part of the solutions to the embedding and evaluation problems. He concludes "that internal factors —that is, factors relating solely to the knowledge or behaviour of individuals— are unable to account for the time and place of changes, i.e. to solve the actuation problem" (Walkden 2017:419).

While of course the mechanisms of e.g. first language acquisition should not be subject to change (at least under the methodological interpretation of uniformitarianism used in the current chapter), one may understand "internal factors" also as relating to properties of the language system at a given time, that is, a temporally limited version of the systematic part of the embedding problem. Under such an understanding, answers to the "why then" question become answers to the question of when a given language reached a certain conducive embedding configuration. For instance, Kokkelmans (2020) argues in the case study discussed in section 5.1 that *s*-retraction in *rs*-clusters can only occur when the necessary phonological and phonetic preconditions are met. In this sense, it presents a possible local solution to the actuation problem, and predicts that a similar change will occur in any language once these conditions are met. However, each answer to the *why then* question begs the question of how those preconditions came to be fulfilled exactly at that point.

As for the question why a given change happens at all in one variety, but not another, otherwise very similar one, Cheshire et al. (2013) present a relevant case study. While in many varieties of UK English, *that* has become the default relativizer, spreading at the expense of others such as *which* or zero marking, leaving *who* as the relativizer for animate subjects, only in inner city London, in a multi-ethnic contact setting, has *who* acquired a new function as a topic marker. Cheshire et al. argue that this is an indirect result of language contact. All heritage languages in the inner city district they studied (Hackney) have

some form of topic or discourse prominence marking, ranging from discourse particles to logophoric pronouns, so the extension of *who*'s functions only in that area constitutes a repurposing of the existing variation in the system of relativizers. The authors wonder whether such cases of exaptation (Lass 1997, chapter WBCDL019) always require (short term) language contact, but as cases of what Trudgill (2011) calls additive or spontaneous complexification, like for instance the repurposing of a former negative particle as an emphatic marker or a mirative strategy (cf. section 6), show, this is not necessarily the case.

The question why similar changes happen at different speed in different languages has been given different answers. Many studies point to language or dialect contact (cf. also Labov 1994:23f), in fact, the case study by Cheshire et al. (2013), too, identifies contact as an important factor determining the speed of changes.

The field of sociolinguistic typology deals with the different effects different types of contact situations have on the speed, and also types, of linguistic changes (Trudgill 1989; 2011, cf. also Guy 1990, Ross 1991, Walkden and Breitbarth 2019, and chapter WBCDL046)

But there are also studies which point to properties of the language system for an explanation, effectively (again) a local solution to the (systematic part of the) embedding problem. Hertel (2023) for instance argues that the variation in the timing of the loss of the original preverbal negation particle *ne/en* in various West Germanic varieties undergoing Jespersen's Cycle can be explained by the necessary precondition being met at different times. That precondition is the loss (syncope/apocope) of schwa in unstressed syllables, which itself is a consequence of the reduction of unstressed vowels to schwa following the fixation of the word stress in Germanic. According to Hertel, the apocope of schwa in *ne* first led to the insertion of epenthetic schwa before the *n* and a prosodic integration into the preceding word if that made the creation of a trochaic foot possible, before that epenthetic schwa was lost too. As *n* alone is difficult to syllabify, it was lost. Hertel argues that the different speed at which *ne/en* is lost in the different West Germanic varieties (and the fact that it is still preserved in those that preserved final schwa the longest, i.e., the East, West, and French Flemish ones) can be explained by the fact that the final schwa

deletion happened at different speeds in the different varieties. Again, as in the case of *s*-retraction in *rs*-clusters, this still leaves open what caused schwa to be deleted at different times in different varieties in the first place. Weinreich et al. (1968) therefore conclude

> "... even when the course of a language change has been fully described and its ability explained, the question always remains as to why the change was not actuated sooner, or why it was not simultaneously activated wherever identical functional conditions prevailed. The unsolved actuation riddle is the price paid by any facile and individualistic explanation of language change. It creates the opposite problem of explaining why language fails to change." (Weinreich et al. 1968:112)

Nonetheless, while a fully predictive, explanatory theory of language change will probably remain beyond reach, because inevitably, sufficient access to all language internal and external factors is never available, one may still be able to approach a not too local solution to the actuation problem by finding approximate answers to the other four problems.

8   Summary

This chapter has illustrated how researchers have tried to tackle the five foundational problems set out by Weinreich et al. (1968) and contributed to an empirically adequate theory of language change. While the recognition of the ubiquity of variation in natural language forms an answer to Coseriu's 'rational' problem of language change, his 'historical' (language-specific), and in particular the 'general' and problem are less easily solved. It should have become clear from the discussion above that Weinreich et al.'s five problems as well as their possible solutions are deeply interconnected, as Labov's (1982) own doubts about the independence of the constraints problem from the systematic part of the embedding problem already show. Similarly, constraints on possible pathways of change interact with the transition problem. The social part of the embedding problem is furthermore connected to the evaluation problem,

and all are subordinate to the actuation problem. A truly predictive theory of language change should not only find solutions to the former four problems, but also be able to formulate generalizations over them. Despite methodological choices such as appealing to uniformitarianism, and therefore taking into account as much information as possible (including from dialectology, sociolinguistic studies of currently spoken language(s), or first language acquisition), this may be a goal that is ultimately impossible to reach. Von der Gabelentz therefore remains right in saying,

> Soweit, dass wir sagen könnten: In der Sprachgeschichte ist dies nothwenig, jenes unmöglich – soweit sind wir noch lange nicht. ('The point that we could say: in language history this is necessary, that is impossible: we have not yet reached that point by far.' [AB]) (Gabelentz 1901:178)

But the chapters in this *Companion to Diachronic Linguistics* will give the reader an extensive overview of the amount of knowledge that has so far been gathered in the field of diachronic linguistics, and hopefully convince them that the field has in fact come a very long way.

References

Andersen, H. (1973). Abductive and deductive change. *Language 49*, 765–793.

Arnaud, R. (1998). The development of the progressive in 19th century English: a quantitative survey. *Language Variation and Change 10*, 123–152.

Backus, A. (2015). Rethinking Weinreich, Labov & Herzog from a usage-based perspective. Contact-induced change in Dutch Turkish. *Taal en Tongval 67:2*, 275–306. https://doi.org/10.5117/TET2015.2.BACK.

Baker, M. C. (2008). *The syntax of agreement and concord*. Cambridge University Press.

Berent, I. and T. Lennertz (2010). Universal constraints on the sound structure of language: Phonological or acoustic? *Journal of Experimental Psychology: Human Perception and Performance 36*, 212–223. https://doi.org/10.1037/a0017638.

Bergs, A. (2012). The uniformitarian principle and the risk of anachronisms in language and social history. In J. M. Hernández-Campoy and J. C. Conde-Silvestre (Eds.), *The handbook of historical sociolinguistics*, pp. 83–101. Oxford: Blackwell.

Biberauer, T., A. Holmberg, and I. Roberts (2007). Disharmonic word-order systems and the Final-Over-Final Constraint (fofc). In A. Bisetto and F. Barbieri (Eds.), *Proceedings of XXXIII Incontro di Grammatica Generativa*, pp. 86–105.

Biberauer, T., A. Holmberg, and I. Roberts (2008). Linearising disharmonic word orders: Final-Over-Final Constraint. In J. Y. Yoon and K.-A. Kim (Eds.), *Perspectives on linguistics in the 21st Century*, pp. 301–318. Seoul: Hankook Munhwasa.

Biberauer, T., A. Holmberg, and I. Roberts (2014). A syntactic universal and its consequences. *Linguistic Inquiry 45*, 169–225.

Biberauer, T., G. Newton, and M. Sheehan (2009). Limiting synchronic and diachronic variation and change: the Final-Over-Final Constraint. *Language and Linguistics 10*, 701–743.

Biberauer, T., M. Sheehan, and G. Newton (2010). Impossible changes and impossible borrowings: the Final-Over-Final Constraint. In A. Breitbarth, C. Lucas, S. Watts, and D. Willis (Eds.), *Continuity and Change in Grammar*, pp. 35–60. Amsterdam: Benjamins.

Blaxter, T. (2015). Gender and language change in Old Norse sentential negatives. *Language Variation and Change, 27*, 349–375. DOI: https://doi.org/10.1017/S0954394515000125.

Breitbarth, A. (2015). The development of conditional *should* in English. In C. Gianollo, A. Jäger, and D. Penka (Eds.), *Language Change at the Syntax-Semantics Interface*, pp. 293–322. Berlin/München/Boston: De Gruyter.

Breitbarth, A. (2019). *Should a conditional marker arise ...* The diachronic development of conditional *sollte* in German. *Glossa: a journal of general linguistics 4(1)*, 21.1–23. DOI: https://doi.org/10.5334/gjgl.599.

Breitbarth, A. (2022a). Continuity, change, and linguistic recycling in flemish dialects: Negation, polarity focus, and mirativity. *Taal en Tongval 74*, 149–182. DOI: https://doi.org/10.5117/TET2022.2.001.BREI.

Breitbarth, A. (2022b). Prosodie, Syntax und Diskursfunktion von V>>2

in gesprochenem Deutsch. *Deutsche Sprache 2022(1)*, 1–30. DOI: https://doi.org/10.37307/j.1868-775X.2022.01.02.

Breitbarth, A. (2023). V3 after central adverbials in German: Continuity or change? *Journal of Historical Syntax (to appear)*, ...

Breitbarth, A., C. Lucas, and D. Willis (2020). *The History of Negation in the Languages of Europe and the Mediterranean. Volume II: Patterns and Processes*. Oxford University Press.

Bunk, O. (2016). Adv-S-V_{fin}-Sätze als Form der mehrfachen Vorfeldbesetzung im Deutschen. Syntaktische Struktur und Verarbeitung. Universität Potsdam: Arbeitspapiere *Sprache, Variation und Migration*: Studentische Arbeiten Vol. 5. https://www.uni-potsdam.de/fileadmin/projects/svm/Arbeitspapiere/No5_Bunk_2016.pdf.

Bunk, O. (2020). *'Aber immer alle sagen das': The Status of V3 in German: Use, Processing, and Syntactic Representation*. Ph. D. thesis, Humboldt-Universität zu Berlin. http://dx.doi.org/10.18452/22085.

Bybee, J. L. and W. Pagliuca (1985). Cross-linguistic comparison and the development of grammatical meaning. In J. Fisiak (Ed.), *Historical Semantics, Historical Word Formation*, pp. 59–83. Berlin: De Gruyter.

Bybee, J. L., R. D. Perkins, and W. Pagliuca (1994). *The Evolution of Grammar: Tense, Aspect, and Modality in the Languages of the World*. University of Chicago Press.

Chambers, J. (1992). Dialect acquisition. *Language 68*, 673–706.

Cheshire, J., D. Adger, and S. Fox (2013). Relative *who* and the actuation problem. *Lingua 126*, 51–77.

Cinque, G. (1999). *Adverbs and Functional Heads*.

Closs Traugott, E. and R. B. Dasher (1986). *Regularity in semantic change*. Cambridge: Cambridge University Press.

Coseriu, E. (1958). *Sincronía, diacronía e historia. El problema del cambio lingüístico*. Montevideo: Universidad de la Republica, Faculdad de Humanidades y Ciencias.

Cournane, A. (2015). *Modal development: Input-divergent L1 acquisition in the direction of diachronic reanalysis*. Ph. D. thesis, University of Toronto.

Cournane, A. (2019). A developmental view on incrementation in language change. *Theoretical Linguistics 45*.

Cournane, A. and A. T. Pérez-Leroux (2020). Leaving obligations behind: Epistemic incrementation in preschool english. *Language Learning and Development 16(3)*, 270–291. DOI: https://doi.org/10.1080/15475441.2020.1738233.

Eckardt, R. (2006). *Meaning Change in Grammaticalization. An Enquiry into Semantic Reanalysis*. Oxford: Oxford University Press.

Erker, D. (2017). Contact, co-variation, and sociolinguistic salience: What mister rogers knows about language change. *University of Pennsylvania Working Papers in Linguistics 23*, 68–77. Available at: https://repository.upenn.edu/pwpl/vol23/iss2/9.

Fodor, J. D. and F. Ferreira (1998). *Reanalysis in sentence processing*. Dordrecht: Kluwer.

Fonseca-Greber, B. B. (2007). The emergence of emphatic *ne* in conversational Swiss French. *Journal of French Language Studies 17*, 249–275.

Gabelentz, G. v. (1901). *Die Sprachwissenschaft, ihre Aufgaben, Methoden und bisherigen Ergebnisse. 2. Auflage*. Leipzig: Tauchnitz.

Gelderen, E. v. (2004). Economy, innovation, and prescriptivism: From spec to head and from head to head. *Journal of Comparative Germanic Linguistics 7*, 59–98.

Gelderen, E. v. (2011). *The linguistic cycle: Language change and the language faculty*. Oxford: Oxford University Press.

Guy, G. R. (1990). The sociolinguistic types of language change. *Diachronica 7*, 47–67.

Haegeman, L. (1992). *Theory and description in generative syntax: a case study in West Flemish*. Cambridge: Cambridge University Press.

Hale, M. (1998). Diachronic syntax. *Syntax 1*, 1–18.

Hall, T. A. (2008). Middle high german [rs] > [rʃ] as height dissimilation. *Journal of Comparative Germanic Linguistics 11*, 213–248.

Haspelmath, M. (1997). *Indefinite Pronouns*. Oxford: Oxford University Press.

Hertel, J. (2023). *Von der Syntax zur Phonologie. Der Negationswandel im Mit-*

telhochdeutschen und weiteren westgermanischen Sprachen. Ph. D. thesis, Universität des Saarlandes.

Holmberg, A. (2000). Deriving ov order in finnish. In P. Svenonius (Ed.), *The derivation of VO and OV*, pp. 123–152. Amsterdam/Philadelphia: Benjamins.

Hopper, P. J. and E. C. Traugott (1993). *Grammaticalization*. Cambridge: Cambridge University Press.

Hróarsdóttir, T. (2000). *Word Order Change in Icelandic: From OV to VO*. Amsterdam/Philadelphia: Benjamins.

Jatteau, A. and M. Hejná (2016). Dissimilation can be gradient: evidence from Aberystwyth English. *Papers in Historical Phonology 1*, 359–386. DOI: 10.2218/pihph.1.2016.1737.

Joseph, B. D. (2001a). Historical linguistics. In M. Aronoff and J. Rees-Miller (Eds.), *The Handbook of Linguistics*, pp. 105–129. Oxford: Blackwell.

Joseph, B. D. (2001b). Is there such a thing as grammaticalization? *Language Sciences 11*, 163–186.

Keenan, E. L. (2002). Explaining the creation of reflexive pronouns in english. In D. Minkova and R. Stockwell (Eds.), *Studies in the history of the English language: A millennial perspective*, pp. 325–354. Berlin: Mouton de Gruyter.

Kiparsky, P. (2012). Grammaticalization as optimization. In D. Jonas, J. Whitman, and A. Garrett (Eds.), *Grammatical change: Origins, nature, outcomes*, pp. 15–51. Oxford University Press.

Kokkelmans, J. (2020). Middle High German and modern Flemish *s*-retraction in /rs/-clusters. In G. Vogelaer, D. Koster, and T. Leuschner (Eds.), *German and Dutch in Contrast: Synchronic, Diachronic and Psycholinguistic Perspectives*, pp. 213–238. Berlin: Mouton de Gruyter. DOI: https://doi.org/10.1515/9783110668476-008.

Kouteva, T., B. Heine, B. Hong, H. Long, H. Narrog, and S. Rhee (2019). *World Lexicon of Grammaticalization (2nd ed.)*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/9781316479704.

Kroch, A. (1989). Reflexes of grammar in patterns of language change. *Language Variation and Change 1*, 199–244.

Labov, W. (1972a). The social setting of linguistic change. In W. Labov (Ed.),

Sociolinguistic Patterns, pp. 260–325. Philadelphia: The University of Pennsylvania Press.

Labov, W. (1972b). Some principles of linguistic methodology. *Language in Society 1*, 97–120.

Labov, W. (1982). Building on empirical foundations. In W. P. Lehman and Y. Malkiel (Eds.), *Perspectives on Historical Linguistics*, pp. 17–72. Amsterdam/Philadelphia: Benjamins.

Labov, W. (1990). The intersection of sex and social class in the course of linguistic change. *Language Variation and Change 2*, 205–254.

Labov, W. (1994). *Principles of linguistic change. Vol. I: Internal factors*. Malden/Oxford: Wiley-Blackwell.

Labov, W. (2001). *Principles of linguistic change. Vol. II: External factors*. Malden/Oxford: Wiley-Blackwell.

Labov, W. (2007). Transmission and diffusion. *Language 83:2*, 344–387.

Labov, W. (2010). *Principles of linguistic change. Vol. III: Cognitive and cultural factors*. Malden/Oxford: Wiley-Blackwell.

Lass, R. (1990). How to do things with junk: exaptation in language evolution. *Journal of Linguistics 26*, 79–102.

Lass, R. (1997). *Historical Linguistics and Language Change*. Cambridge: Cambridge University Press.

Lehmann, C. (1995). *Thoughts on Grammaticalization*. Munich: Lincom Europa.

Lightfoot, D. W. (1991). *How to set parameters: Arguments from language change*. Cambridge/Mass.: The MIT Press.

Lightfoot, D. W. (1997). Catastrophic change and learning theory. *Lingua 100*, 171–192.

Longobardi, G. (2001). Formal syntax, diachronic minimalism, and etymology: The history of French *chez*. *Linguistic Inquiry 32*, 275–302.

Magistro, G. and C. Crocco (2022). Phonetic erosion and information structure in function words: The case of *mia*. In *Interspeech 2022*, pp. 91–95. International Speech Communication Association (ISCA). DOI: https://doi.org/10.21437/Interspeech.2022-10305.

Magistro, G., C. Crocco, and A. Breitbarth (2022). Information structure and Jespersens Cycle: The dialects of Veneto as a window on processes of language change. In N. Catasso, M. Coniglio, and C. D. Bastiani (Eds.), *Language Change at the Interfaces: Intrasentential and Intersentential Phenomena*, pp. 35–59. Amsterdam: Benjamins.

Nevalainen, T. and H. Raumolin-Brunberg (2003). *Historical sociolinguistics: Language change in Tudor and Stuart England*. Harlow: Pearson Education Limited.

Pagliuca, W. (1994). *Perspectives on Grammaticalization*. Amsterdam/Philadelphia: Benjamins.

Paoli, S. and S. Wolfe (2022). The go-future and go-past periphrases in galloromance: a comparative investigation. In A. Ledgeway, J. C. Smith, and N. Vincent (Eds.), *Periphrasis and inflexion in diachrony: a view from Romance*, pp. 123–144. Oxford: Wiley Blackwell.

Paul, H. (1880). *Principien der Sprachgeschichte*. Halle: Max Niemeyer.

Pintzuk, S. (1991). *Phrase structures in competition: Variation and change in Old English word order*. Ph. D. thesis, University of Pennsylvania. https://repository.upenn.edu/dissertations/AAI9211987.

Pintzuk, S. (2003). Variationist approaches to syntactic change. In B. D. Joseph and R. D. Janda (Eds.), *The Handbook of Historical Linguistics*, pp. 509–528. Oxford: Wiley Blackwell. DOI: https://doi.org/10.1002/9780470756393.ch15.

Rácz, P. (2013). *Salience in sociolinguistics: A quantitative approach*. Berlin/New York: De Gruyter.

Roberts, I. (2010). Grammaticalization, the clausal hierarchy and semantic bleaching. In E. Traugott and G. Trousdale (Eds.), *Gradience, Gradualness, and Grammaticalization*, pp. 45–73. Amsterdam: Benjamins.

Roberts, I. (2012). Diachrony and cartography: Paths of grammaticalization and the clausal hierarchy. In L. Brugè, A. Cardinaletti, G. Giusti, N. Munaro, and C. Poletto (Eds.), *Functional heads: The cartography of syntactic structures. Volume 7*, pp. 351–367. Oxford/New York: Oxford University Press.

Roberts, I. (2022). *Diachronic Syntax. 2nd. edition*. Oxford: Oxford University Press.

Roberts, I. and A. Roussou (2003). *Syntactic change: A minimalist approach to grammaticalization*. Cambridge: Cambridge University Press.

Ross, M. D. (1991). Refining guy's sociolinguistic types of language change. *Diachronica 8*, 119–129.

Salmons, J. (2021). *Sound Change*. Edinburgh: Edinburgh University Press.

Samuels, M. L. (1987). The status of the functional approach. In W. Koopman, F. van der Leek, O. Fischer, and R. Eaton (Eds.), *Explanation and Linguistic Change*, pp. 239–250. Amsterdam/Philadelphia: Benjamins. DOI: https://doi.org/10.1075/cilt.45.11sam.

Sankoff, G. (2018). Language Change Across the Lifespan. *Annual Review of Linguistics 4*, 297–316.

Santorini, B. (1992). Variation and change in Yiddish subordinate clause word order. *Natural Language & Linguistic Theory 10:4*, 595–640.

Schalowski, S. (2015). *Wortstellungsvariation aus informationsstruktureller Perspektive: Eine Untersuchung der linken Satzperipherie im gesprochenen Deutsch*. Potsdam: Universitätsverlag Potsdam. Working Papers of the SFB 632. Interdisciplinary Studies on Information Structure (ISIS), vol. 18.

Sheehan, M., T. Biberauer, I. Roberts, and A. Holmberg (2017). *The Final-over-Final Condition: a syntactic universal*. Cambridge, MA: The MIT Press.

Stevens, M. and J. Harrington (2014). The individual and the actuation of sound change. *Loquens 1:1*, e003.

Trudgill, P. (1986). *Dialects in contact*. Oxford: Blackwell.

Trudgill, P. (1989). Contact and isolation in linguistic change. In L. E. Breivik and E. H. Jahr (Eds.), *Language change: Contributions to the study of its causes*, pp. 227–238. Berlin: De Gruyter. DOI: https://doi.org/10.1515/9783110853063.227.

Trudgill, P. (2011). *Sociolinguistic Typology*. Oxford: Oxford University Press.

van der Auwera, J. and V. A. Plungian (1998). Modality's semantic map. *Linguistic Typology 2*, 79–124.

van der Wal, M. J. and G. J. Rutten (2013). *Touching the Past. Studies in the historical sociolinguistics of ego-documents*. Amsterdam/Philadelphia: Benjamins.

van Kemenade, A. (1987). *Syntactic Case and Morphological Case in the History of English*. Dordrecht: Foris.

Vennemann, T. (1971). The phonology of the gothic vowels. *Language 47*, 90–132.

Vogelaer, G. D. (2006). *Subjectmarkering in de Nederlandse en Friese dialecten*. Ph. D. thesis, Ghent University.

Walkden, G. (2017). The Actuation Problem. In A. Ledgeway and I. Roberts (Eds.), *The Cambridge Handbook of Historical Syntax*, pp. 403–424. Cambridge: Cambridge University Press. DOI: https://dx.doi.org/10.1017/9781107279070.020.

Walkden, G. (2019). The many faces of uniformitarianism in linguistics. *Glossa: a journal of general linguistics 4(1) 52*, 1–17. DOI: https://doi.org/10.5334/gjgl.888.

Walkden, G. and A. Breitbarth (2019). Complexity as L2-Difficulty: Implications for Syntactic Change. *Theoretical Linguistics 45*, 183–209. DOI: https://doi.org/10.1515/tl-2019-0012.

Wallenberg, J. C. (2019). A variational theory of specialization in acquisition and diachrony. In M. Bouzouita, A. Breitbarth, L. Danckaert, and M. Farasyn (Eds.), *The determinants of diachronic stability*, pp. 245–262. Amsterdam: Benjamins.

Wedel, A., A. Caplan, and S. Jackson (2013). High functional load inhibits phonological contrast loss: a corpus study. *Cognition 128*, 179–186.

Weinreich, U., W. Labov, and M. I. Herzog (1968). Empirical Foundations for a Theory of Language Change. In W. P. Lehmann (Ed.), *Directions for Historical Linguistics*, pp. 95–195. Austin: University of Texas Press.

Wiese, H. (2013). What can new urban dialects tell us about internal language dynamics? The power of language diversity. In W. Abraham and E. Leiss (Eds.), *Dialektologie in neuem Gewand. Zu Mikro-/Varietätenlinguistik, Sprachenvergleich und Universalgrammatik*, pp. 208–245. *Linguistische Berichte* Sonderheft 19.

Wiese, H., A. Alexiadou, S. Allen, O. Bunk, N. Gagarina, K. Iefremenko, M. Martynova, T. Pashkova, V. Rizou, C. Schroeder, A. Shadrova, L. Szucsich, R. Tracy, W. Tsehaye, S. Zerbian, and Y. Zuban (2022). Heritage Speakers as Part of

the Native Language Continuum. *Frontiers in Psychology 12*, 717973. DOI: https://doi.org/10.3389/fpsyg.2021.717973.

Wiese, H., U. Freywald, S. Schalowski, and K. Mayr (2012). Das KiezDeutsch-Korpus. Spontansprachliche Daten Jugendlicher aus urbanen Wohngebieten. http://kiezdeutschkorpus.de/en/.

Wiese, H. and H. G. Müller (2018). The hidden life of V3: An overlooked word order variant on verb-second. In M. Antomo and S. Müller (Eds.), *Non-canonical verb positioning in main clauses*, pp. 201–223. *Linguistische Berichte* Sonderheft 25.

Wiese, H., M. T. Öncü, H. G. Müller, and E. Wittenberg (2020). Verb third in spoken German: A natural order of information? In R. Woods and S. Wolfe (Eds.), *Rethinking Verb Second*, pp. 682–699. Oxford.

Yang, C. (2000). Internal and external forces in language change. *Language Variation and Change 12*, 231–250.

Yang, C. (2009). Population structure and language change. Available at: https://www.ling.upenn.edu/courses/cogs502/YangPopulation.pdf.

Zwarts, F. (1998). Three types of polarity. In F. Hamm and E. Hinrichs (Eds.), *Plurality and Quantification.*, pp. 177–238. Dordrecht: Springer.