THE MECHANICS OF PHONOLOGICAL CHANGE

1. Summary of my Handbook chapter and purpose

(1) crazy rules
   a. the input-output relation of synchronically active phonological processes may be melodically arbitrary
   b. but is marshalled by phonological universals regarding syllabic properties
   c. hence
      1. there are melodically crazy rules, e.g. $l \rightarrow s / V__)V$ in Sardinian
      2. but no syllabically crazy rules, i.e. closed syllable lengthening, compensatory shortening etc.
      3. this is what the empirical record of crazy rules shows (Bach & Harms 1972 and following): syllabic properties are never crazy.
   d. Hale & Reiss (2008) are right: big is beautiful is correct
      proponents of small is beautiful (among which Government Phonology) are wrong.
   e. evidence
      1. against phonetic determinism of phonological rules, or phonetic (or substantive) reductionists (as Bermúdez-Otero 2006 calls them)
      2. in favour of the existence of an autonomous phonology, i.e. a computational system that does not care for the phonetic properties of the items that it manipulates (e.g. Anderson 1981, Hyman 2001).

   ==> phonology is phonetically arbitrary, as Bermúdez-Otero (2006: 498) puts it.

(2) what, then, is the source of regularity and naturalness in synchronic phonological patterns?
   a. there is no synchronic or grammatical device that enforces (melodic) naturalness
   b. crazy (or unnatural) processes are not born crazy – they become crazy through aging:
      \[
      k \rightarrow ts / __i
      \]
      then the language loses affricates and the rule becomes crazy:
      \[
      k \rightarrow s / __i
      \]
      (Bach & Harms' 1972 scenario)
   c. ==> melodic processes are natural and regular because they are young:
      1. rules are always born natural and regular
      2. irregularity, opacity, unnaturalness, and eventually craziness arise when processes undergo aging
      3. at any given point in time, the processes at hand are synchronic: there is no diachronic computation, there are only modifications thereof over time
   d. life-cycle of phonological processes
      Baudouin de Courtenay (1895), Vennemann (1972), Bermúdez-Otero (2007, 2014)
(3) purpose below
   a. to look at the big bang: what happens when phonological processes are born (through grammaticalization):
      1. before they enter phonology
      2. why they enter phonology
      3. how they spread through a social body
   b. Weinreich et al. et al.'s (1968: 102) actuation problem
      "why do changes in a structural feature take place in a particular language at a given time, but not in other languages with the same feature, or in the same language at other times?"
      in fact falls into two distinct questions:
      1. initiation: how does change begin?
      2. transmission: how does it spread through the body of speakers?
      Ohala & Greenlee (1980)

2. Misperception vs. Labovian change

(4) contrasting properties
   misperception                  Labovian change
   a. origin
      19th century: Schleicher (1861)
      generative thinking: Halle (1962)
      [see Foulkes & Vihman (Handbook)
      for a detailed history]
   b. rationale
      listeners misperceive speech (for various reasons) and then implement the misperceived property into their grammar.
      a piece of the inherent variation that is present in the signal is selectively (and arbitrarily) picked and admitted into grammar
      under social pressure, i.e. to foster group identity.
   c. change performed by
      L1 learners during first language acquisition.
      [in some rare cases in the literature, adults are also held to misperceive]
      change performed by young adults.
   d. some relevant literature
   some relevant literature
      Labov (1994, 2001), see D'Arcy (Handbook)
2.1. Transmission

(5) social identity of change-performers
   a. transmission is led by socially influential groups (see above)
   b. speakers do not have much of a social identity during first language acquisition, at least not in the relevant sense: babies do not form influential social groups
   c. Aitchison (2003: 739), Foulkes & Vihman (Handbook)

(6) transmission I
   a. social parameters of change are firmly documented
      1. women are leaders in diachronic change, sometimes a generation ahead of men (Labov 2001: 306)
      2. the origin of change is found in the midst of the socioeconomic hierarchy (Labov 2001: 190)
   b. there is of course no reason to believe that women and middle class speakers are particularly prone to misperception in comparison to men and lower and upper class speakers.

(7) transmission II
   a. a given change may span several generations
      1. it may take a rather long time, several centuries, for some changes to be complete.
      2. maintaining the direction of the change over several generations, and keeping it going, can only be explained by social factors.
   b. there is no reason why errors made by children (or adults for that matter) should be replicated over generations.

(8) transmission III
   misperception has a problem with transmission anyway:
   there is no reason why large groups of speakers should collectively misperceive, i.e.
   a. accidentally misperceive X as Y (rather than as Z)
   b. be prone to the same misperception at the same time
   c. be prone to no other misperception during that time span
   d. Foulkes & Vihman (Handbook) quote Saussure:
      “what prompts a generation to retain certain mistakes to the exclusion of others that are just as natural is not clear. From all appearances the choice of faulty pronunciations is completely arbitrary, and there is no obvious reason for it. Besides, why did the phenomenon break through at one time rather than another?” (Saussure 1915 [1974: 149])
(9) split between initiation and transmission?
   a. the misperception-based literature is only about initiation
      "It should be emphasized that this [their] model is intentionally incomplete in that it
      only attempts to account for 'changes' that occur between a speaker and a hearer. Other
      models, presumably sociolinguistic ones, will have to be invoked to account for the trans-
      mission of the sound change once it has been initiated." Ohala & Greenlee (1980: 285)
      "The distinction we are making here is that between the initiation of sound change and the
      transmission or spread of sound change (Weinreich, Labov, and Herzog 1968). We would
      claim that all speakers, children and adults, by virtue of shared articulatory and perceptual
      constraints, are eligible to be the initiators of 'mini' sound changes of the type documented
      here. But whose sound changes, once initiated, spread to other speakers to become "maxi" sound changes, i.e., sound changes proper, characteristic not only of an isolated speaker, but of whole speech communities?" Ohala & Greenlee (1980: 297, emphasis in original)
   b. a theory of initiation without a solution for transmission does not make a theory of
      sound change, though.
   c. ==> one could then argue that initiation is due to misperception, while transmission follows the Labovian scenario.

2.2. Initiation

(10) only Labovian change is documented
   a. the causal relationship between social parameters and change is abundantly docu-
      mented.
   b. misperception-induced change is only a logical possibility that is based on specula-
      tion.
   c. nobody has ever documented or measured an actual misperception as the source of
      language change:
      1. it is easy to show that a subject may be exposed to X in a speech signal but per-
         ceives Y (i.e. initiation, e.g. [ku] is perceived as [pu], Winitz et al. et al. 1972,
         Ohala & Greenlee 1980)
      2. but how could it be shown that for this reason a speaker replaces X by Y in his
         grammatical system?
   d. purely speculative character of misperception
      – discussion in Labov (2001: 422)
      – D'Arcy (Handbook) recalls the argument, which was already made explicit by
      – Bybee (2001: 202f)
misperception does not match the diachronic record

a. the obvious way to test the child-based misperception scenario is to see whether the set of deviances with respect to the adult target that are produced by children during first language acquisition matches the set of attested diachronic change.

b. Foulkes & Vihman (Handbook) show that this is not the case.

See also Hock (1991: 636) and Kiparsky (1988):
"the class of typical or potential sound changes does not match the class of typical or potential child language processes" (Kiparsky 1988: 390).

c. Foulkes & Vihman (Handbook) document that

1. typical diachronic processes do not occur in child patterns (e.g. local assimilations such as V-to-C palatalisations)
2. typical developmental processes are rare in adult and diachronic patterns (e.g. consonant harmony)

d. worse, Foulkes & Vihman (Handbook) document that those events that occur on both sides may follow opposite directions:

1. long word reduction
   - children eliminate entire syllables
   - diachronic evolution targets vowels, but leaves the consonantal skeleton in place
2. cluster reduction
   - historical change (and synchronic computation):
     the linear order of major categories matters: sonority sequencing defines solidary groups, and coda consonants (typically sonorants) are attacked, rather than following onset consonants.
   - children do not care for syllable structure or linear order: clusters are reduced in such a way that stops (which together with nasals are also the first major category to be acquired) will survive. Hence a sonorant-stop cluster reduces to the stop as much as a stop-sonorant cluster.

e. also:
   – Drachman (1978)
   – Bybee (2001: 202f)

hence

a. it is not enough to show that some diachronic processes are also reproducible in the laboratory when subjects are convicted of misperception.

b. these processes exist: e.g. the confusion of [n] and [l], which also alternate in diachronic patterns (Ohala & Greenlee 1980)

c. but their existence loses its persuasiveness when appraised in the light of a more complete pool of child and diachronic patterns, whose intersection is extremely poor.

adult misperception?

a. if the errors of children do not contribute anything to sound change, we are left with the logical possibility that the misperception of adults plays a role in the initiation of diachronic change.

b. as was mentioned, the misperception literature typically restricts the relevance of misperception to L1-acquirers.

Ohala & Greenlee (1980) are an exception:
"We would claim that all speakers, children and adults, by virtue of shared articulatory and perceptual constraints, are eligible to be the initiators of 'mini' sound changes of the type documented here." Ohala & Greenlee (1980:297)
change is initiated and promoted by (young) adults

a. flip-flop

1. Foulkes & Vihman (Handbook) document cases where developmental patterns that are found in 4-year olds are also ongoing sound changes in the adult target language, but where the process was lost as the speech matured, before re-emerging in pre-adolescent age.
2. Milton Keynes (South England): l-vocalization and the substitution of f,v for /θ,ð/ is found in 4-year olds, where it disappears from their speech and in later pre-adolescent age reappears (Kerswill 1995).
3. Foulkes & Vihman (Handbook) conclude that "peer influence during adolescence exerts an especially strong effect on linguistic patterns, with non-standard forms transmitted most readily at this stage in life" and that "differences between generations are less likely to be seen at the earliest stages of acquisition than they are during later development."

b. artificial grammar experiments

- show that adult speakers are able to detect, memorize and reproduce patterns that they are exposed to in training sessions, but of which they are not aware consciously (they are unable to describe them).

- Labovian change

- the fact that change is due to (young) adults follows from the Labovian scenario: in order to become a social leader, you need to have a social status.


(14) change is initiated and promoted by (young) adults

positive evidence

a. flip-flop

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3. Darwinian change: selection of the fittest?

(16) selection of the fittest in language change
   a. species and language are imperfectly replicating systems
   b. change is based on random variation:
      1. in biology: due to genetic mutations
      2. in language: due to inherent (phonetic) variation in the signal or to misperception
   c. note that the Darwinian perspective is affiliated to the misperception-based scenario:
      both rely on a replication error (whether in language this is due to phonetics or misperception plays no role).
      By contrast on the Labovian count (replication) errors play no role.

(17) a popular idea
   a. neogrammarians aimed to establish linguistics as a natural/biological science, based on the Darwinian model.
      E.g. Paul (1880: 32)
   b. in the modern literature
      Labov (2001: 3) offers an informed overview.

(18) there is no selecting environment
   a. a generator that produces random variation is indeed a the starting point of biological and linguistic innovation.
   b. however, Darwinian and linguistic ways part when it comes to the rationale behind selection.
   c. selecting environment
      1. biology
         the environment selects among pre-existing variants.
      2. language
         the choice of a linguistic variant is arbitrary: nobody has ever been able to document a correlation between a specific variant chosen and an external factor.
         Speculating on this kind of correlation was popular in the 19th century and sometimes crops up today on TV or in grand-mother science:
         – mountain-climbing Germanic tribes explaining Grimm's Law (e.g. Meyer-Benfey 1901).
         – spirantization due to Black Death in the 14th century
         – Atlantic breeze responsible for Portuguese nasal vowels
         – small vowel inventories (i,a,u) because you don't want to open your mouth when it's very hot or very cold.
         – etc.
   d. consequences
      1. biology
         reproductive success of the fitter variant.
      2. language
         no consequence: there is no such thing as a more or less successful variant since there is no evaluation by any environment.
         A group of speakers that has chosen to innovate, say, a spirantisation rather than a palatalization does not have greater or lesser reproductive success than a parallel group that has made the opposite choice.
(19) change
   – is not deterministic
   – is not teleological
   a. biology
      species do not strive after any ex-cathedra-defined "ideal state".
   b. language
      1. the evolution of languages does not converge, not even a little bit or locally
      2. language change cannot be predicted: neither the moment of its occurrence nor
         the direction it takes.
         There is no answer to the questions
         Why now?
         Why here?
         Why this?
      3. this is an obvious observation and an established fact: overviews are available e.g.
      4. disclaimer: this does not mean that all evolutions are equally common/frequent,

(20) why?
   a. answer in biology:
      the direction of evolution depends on the environment, and environments are random.
   b. language:
      this explanation is not available for language change because there is no such thing as
      a selecting environment.

(21) selecting environment?
   a. as was mentioned, nobody has ever documented any correlation between a change
      and external factors.
   b. but this does not mean that there is no such correlation.

(22) creating a selecting environment
   a. the only way to construe a selecting mechanism that rates phonetic variants as better
      or worse is to appeal to universal and deterministic criteria that, just by themselves,
      predict convergence.
   b. candidate selectional criteria:
      1. communicational advantages
         X is better suited than Y for communication.
      2. word length
         shorter words are rewarded because they enhance communication
      3. in phonology: (muscular) effort
         putting less energy into articulating a sound is rewarded (e.g. Kirchner's 1998
         Lazy constraint)
c. counterbalancing force needed
   1. these views need to be blended with counterbalancing forces in order to avoid the prediction of convergence.
   2. candidates
      – the wish to differentiate
      – the strive for expressive power
   3. a spirantization, then, may be picked rather than a palatalization (or the reverse) on the grounds of the relative (muscular) effort, according to the state in which the counterbalancing forces are.

d. Natural Phonology for example is a classical instantiation of this perspective.

(23) prediction: language change IS deterministic
   a. the convergence cum counterbalance perspective thus holds that the selection of variants is in fact not random: the day we will be able to measure all factors, including
      1. the counterbalancing forces as well as
      2. the (muscular) effort, change becomes predictable.
   b. unless empirical advances are made in the direction of quantifying convergence- and counterbalancing forces, this scenario rests on speculation.
   c. the burden of proof lies on proponents of this view.

(24) compare with the Labovian scenario
   a. Labovian change offers an explanation
      1. for the absence of a selecting environment
      2. for the fact that language evolution is not deterministic
      3. for the fact that it cannot be predicted
   b. Labovian scenario:
      it does not matter how groups change their grammar, the only thing that matters is that they change it.
      Hence
      1. selection of variants is random (no selecting environment)
      2. language evolution does not go anywhere: its direction is random (no determinism)
      3. language evolution cannot be predicted
   c. ==> we do have a sound theory that
      1. explains the facts at hand and also
      2. offers a consistent answer to the transmission issue
      3. solves the Why now? Why here? Why this? question (there is no reason)
      Labov's insight is that change is caused outside of language: the mechanism follows a social, not a grammatical agenda. And it is activated whenever there is a need to mark a social difference in language.
      So why would we want to entertain an alternative that is based on speculation?
4. Initiation: how is variation generated?
4.1. GEN external: grammar-external initiation

(25) where does variation come from?
   a. deterministic scenario (convergence cum counterbalance):
      does not need any pool of variation. The particular change that does occur needs to
      occur: there is no alternative given the interaction of contradicting forces at that point
      in time.
   b. non-deterministic scenario:
      everybody agrees that a pool of variants is the starting point of phonologization, i.e.
      of change:
      1. the misperception scenario:
         only some misperceived items make it into grammar;
      2. Labovian change:
         agnostic regarding the question how variation comes into being.
      3. usage-based variation:
         variable pronunciations for a give token due to register, speech rate, careful-to-
         casual continuum, frequency.
         Not every usage-based variant leads to a different grammar.

(26) a popular view: initiation comes from Parole (language use)
   a. Paul (1880. 32)
      "Die eigentliche Ursache für die Veränderung des Usus is nichts anderes as die
      gewöhnliche Sprechtätigkeit" [what really causes the change of usage is nothing else
      than ordinary speech activity];
   b. Saussure (1916: 37)
      "c'est la Parole qui fait évoluer la Langue" [it is Parole that makes Langue evolve].
   c. inherent variation in the phonetic signal
      what reaches the ear of a listener is not a faithful phonetic blueprint of the grammatici-
      cal structure that the speaker has sent to the articular-motor system. Rather, the pho-
      netic signal represents what this system has made of it. That is, the listener is ex
      posed
      variation inherent in the phonetic signal:
      coarticulation
   a. initiation is due to phonetics and nothing else
      variation comes into being without any contribution of the cognitive system. No er-
      rors anywhere, no misperception.
      e.g.
      – Ohala (1993)
      – the Change option of Blevins' (2004: 261) CCC model (Change, Chance, Choice)
   b. the execution of a phonological object by the articular-motor system introduces spe-
      cific properties into the signal that are absent from the target of articulation.
   c. normally the listener abstracts away from this coarticulation by filtering it out and
      compensating for it in order to retrieve the only thing that is relevant for morpheme
      identification, i.e. the phonological structure that was originally encoded by the
      speaker.
d. the misperception-based scenario then builds on the hypothesis that sometimes such compensation fails. That is, the listener mistakenly considers the coarticulation at face value and encodes it into his grammatical system.

(28) ambiguity inherent in the phonetic signal
   a. the Chance option of Blevins' (2004: 261) CCC model (Change, Chance, Choice)
      "a particular sound pattern is ambiguous with respect to the localization of a particular segment or feature."
   b. [ʔaʔ] is inherently ambiguous: the glottal stop may be heard only before or only after the vowel, on both sides or not at all (Blevins' example).

(29) cue-based: more or less "difficult" items
   a. initiation is due to language use and the reaction of the cognitive system: "difficult" items, error, misperception.
   b. difficult items in general
      Phonological structures (which, unlike coarticulation, enjoy grammatical status) that are "difficult" or "less salient" in terms of articulation and/or perception are misperceived because either the speaker did not encode the relevant cues well enough, or the listener did not have sufficient cues in the signal due to its intrinsic properties (e.g. poor VOT in coda position).
   c. difficult items and the strategic reaction of L1 learners
      Children develop strategies for adapting the adult target during first language acquisition because of their restricted production abilities. These strategies are based on production difficulties that the children have experienced, and which they thus try to elude.
      Hayes & Steriade (2004: 26f)

(30) usage-based variation
   a. the Choice option of Blevins' (2004: 261) CCC model (Change, Chance, Choice)
   b. an L1 learner hears a number of distinct pronunciations of the same token in different usage-based contexts:
      – register
      – careful-to-casual continuum
      – speech rate
      – frequency
      etc.
   c. he then needs to pick one variant for lexicalization.

4.2. GEN internal: grammar-internal initiation

(31) grammar-internal initiation
   a. the division of Labov's (1994, 2001) vol.1 and vol.2 is according to internal vs. external factors.
   b. where
      - internal = non-social
      - external = social
   c. but initiation is only ever phonetic
      [in the broad sense of section 4.1: Paul & Saussure, Parole causes Langue to change]
(32) Paul's and Saussure's picture is incomplete: there is also grammar-internal initiation
   a. this is the classical generative view:
      grammar is a system of rules, hence innovation is the result of a modification of the
      rule system through
      1. rule addition
      2. rule suppression or
      3. rule reordering
      e.g. Halle (1962), Kiparsky (1968: 174f), King (1969: 39ff), Dresher (Handbook)
   b. if you don't like rules, you can also reorder constraints (though not add or suppress, at
      least in standard OT).

(33) new rules out of the blue?
   a. the question is where new rules comes from.
   b. surely not from Parole, i.e. phonetics, misperception etc. Only from Langue.
   c. in SPE, anything and its reverse can be a rule.
      Hence anything and its reverse can be innovated.

(34) grammar-internal initiation reduces to syllable-based processes
   a. the constraints problem:
      what is the set of possible sound changes?
      Implying that there IS such a set: anything and its reverse is not possible.
      Weinreich et al. (1968)
   b. if
      1. melodic computation is arbitrary
         (crazy rules, result of my Handbook chapter)
      2. syllable-related processes are not arbitrary
         (there are no crazy syllable-based processes)
   c. then only the latter are possible "rule additions", i.e. grammar-internal initiation.
   d. this is because grammar does not impose any constraint on melodic computation: it
      does not control melodic properties of input-output relations and hence cannot be the
      origin of any such relation.
      ==> the only origin for melody-based processes is extra-grammatical, i.e. Parole.

(35) Labovian change with grammar-internal and grammar-external initiation
   a. change is always socially motivated:
      1. a group of speakers that wishes to foster group identity picks a random item of
         existing variation and makes it a piece of grammar.
      2. there are two variation generators: external and internal GEN
   b. external GEN
      phonetics: coarticulation
      misperception
c. internal GEN
   1. the set of potential syllable-based processes
   2. e.g. l-vocalization in weak position (coda or coda and intervocalic)
      it is not the case that laterals were living on the sunny side until one day they were
      struck by vocalization.
   3. rather, laterals in weak position are always under pressure.
      Positional pressure is universal and permanently present: positions do not become
      strong or weak all of a sudden when some effect is observed.
   4. l-vocalization occurs when a language decides not to resist anymore and to give in
      to positional pressure.

d. hence the options for a group of speakers in search for a vehicle of group identity are
   1. to pick an item from Parole: a physically existing alternation;
   2. to pick an item from Langue: give in to existing positional pressure.

(36) consequences
   a. change is not always the result of phonologization
      1. based on external GEN: yes
      2. based on internal GEN: no
   b. internal and external factors of sound change
      1. linguistic change is social change
         speakers change, not language, e.g. Milroy (1992, 1993)
      2. Labovian change:
         sure, change has always a social motivation, but resources may be external (GEN)
         and internal (GEN)
   c. the life-cycle observation that young computation is regular and transparent has noth-
      ing to do with phonetics:
      1. the life-cycle is the same for all changes, i.e. based on external and internal GEN
      2. internal GEN-based change is not known to take exception to the life-cycle
         ==> regularity and transparency are due to the age of the process and to nothing else:
         young processes are regular and transparent.

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