SPELL-OUT, POST-PHONOLOGICAL

(1) purpose
   a. to conceive the phonology-phonetics interface as a regular instantiation of the modular architecture.
   b. to construe a consistent global picture where all interfaces respond to the same logic.
      In our case: to apply what we know from the workings of the upper interface (with morpho-syntax) to the lower interface (with phonetics).
   c. main prediction:
      the relationship between phonological categories and phonetic exponents thereof is arbitrary.
      Just as is the relationship between morpho-syntactic categories and their phonological exponents.
   c. this perspective is in line with minimalist and biolinguistic tenets:
      grammar-internal properties are shaped and explained by extra-grammatical, more generally cognitive constraints, typically relating to the interface(s) (third factor explanations, see Chomsky 2005).
      See also intermodular argumentation: Scheer (2008, 2009, 2010)
   d. the application of modularity to the phonology-phonetics interface produces what is known as "phonetic interpretation" in Government Phonology (Harris & Lindsey 1990, Gussmann 2007).
   e. disclaimer
      there will be no comparison with other interface models in this talk.

1. Modularity in Cognitive Science

(2) general description
the mind (and ultimately the brain) is made of a number of computational systems that are
   a. specialized in a specific task
   b. non-teleological
   c. symbolic
core properties of cognitive modules according to Segal (1996: 145)
a. **domain specificity**
b. **informational encapsulation**
c. obligatory filtering
d. fast speed
e. shallow outputs
f. limited inaccessibility
g. characteristic ontogeny
h. dedicated neural architecture
i. characteristic patterns of breakdown

modules are **domain-specific**
a. they work with a specific symbolic vocabulary that is distinct from the vocabulary of other modules.
  ==> different languages of the mind
b. for example, the input to visual and auditory computation is made of distinct items, which will be unintelligible by modules that they do not belong to.
c. That is, an auditory input to the visual system will provoke no reaction at all: the data are simply ignored since they cannot be parsed.
d. ==> every module can only parse items that belong to its own proprietary vocabulary.

modular computation
a. based on their domain-specific input vocabulary, modules perform a computation whose output is structure.
b. for example, syntactic computation (whose central tool is Merge in current minimalism) takes as its input features such as gender, number, person, tense etc., and outputs hierarchized syntactic structure, i.e. trees.

domain specificity requires **translation**
a. a direct consequence of the fact that different modules speak different languages (of the mind) is their inability to understand each other. Modules can only parse objects that belong to their own language, i.e. which are part of the domain-specific vocabulary that they are designed to process.
b. "'Mixed' representation[s] should be impossible. Rather, phonological, syntactic and conceptual representations should be strictly segregated, but coordinated through correspondence rules that constitute the interfaces." Jackendoff (1997: 87ff)
c. ==> intermodular communication must rely on translation of items from one vocabulary into another.

2. Properties of the upper spell-out

Spell-out
also called vocabulary insertion or lexical insertion
e.g. Marantz (1997), Embick (2010)

lexical access
a. the match between the input and the output of this translational process is achieved through a lexical access.
b. morpho-syntactic structure that describes, say, past tense of a weak verb in English is realized as \(-ed\) because there is a lexical entry stored in long-term memory that specifies this equivalence.

\[
\text{past tense [weak verbs] } \leftrightarrow \text{-ed}
\]

c. \(\Rightarrow\) translation is list-type, not computational

(9) arbitrariness
a. since lexical properties by definition do not follow from anything (at least synchronically speaking), the relationship between the input and the output of spell-out is arbitrary:

b. there is no reason why, say, \(-ed\), rather than \(-s\), \(-et\) or \(-a\) realizes past tense en English.

(10) conversion is exceptionless

a. there is no variation or irregularity in how morpho-syntactic pieces are transformed into phonological material.

b. past tense of weak verbs is converted into \(-ed\) no matter what:

- no specific syntactic or morphological conditions
- no "lexicalization"

3. Are phonetics and phonology distinct computational systems?

(11) two distinct computational systems?

a. if they are not, there is no interface in the first place, and hence no point in applying the workings of the other interface.

b. the question whether phonetics is just low-level phonology, rather than ontologically distinct, is the subject of a long-standing debate.

c. coming from connectionism (Smolensky 1988), OT is genetically endowed with a **scrambling tropism** that blurs or does away with modular contours, on both ends of phonology: morphological and phonetic constraints are typically interspersed with phonological constraints in the same constraint hierarchy, and characteristics of two domains (phonology-phonetics, phonology-morphology) often co-occur in the formulation of constraints.


d. The alternative view that upholds a modular distinction between phonology and phonetics is also represented in the literature, though: Zsiga (2000)

[see the overview in Kingston 2007].

e. we proceed on the assumption that phonology and phonetics are

- two distinct computational systems
- two distinct modules
- with two distinct vocabularies
- hence that can communicate only through translation

(12) consequence

a. there must be a **spell-out** operation that converts the output of phonology into units of the phonetic vocabulary.

b. as was shown, modular spell-out has a number of properties that then must also apply to its post-phonological instantiation, and which entail a number of consequences.
4. Properties of post-phonological spell-out

(13) #1
Lexical access: list-type conversion
a. the match between phonological structure and phonetic exponents thereof is done through a lexical access. That is, the conversion is list-type, or one-to-one: a phonetic item $a$ is assigned to a phonological item $x$.
b. the dictionary-type list in question is hard-wired, i.e. stored in long-term memory and not subject to any influence from (phonological or any other) computation. It does undergo diachronic change, though.

(14) fragment of grammar involving phonology

(15) #2
No computation
a. the difference between list-based and computational conversion is the absence of an input-output relationship in the former: the two items of the correspondence are not related by a computation that is based on an independently stored list of instructions and modifies one in order to produce the other.
b. nothing is said about the nature and the size of the phonological structure $x$ and its phonetic exponent $α$.
   1. Namely, there is no segment-based implicit: the phonological units that are screened by the spell-out mechanism may comprise one or several timing units ($x$-slots).
   2. Basic autosegmental principles apply: only those melodic items that are associated to timing/syllable structure are transmitted to the phonetics (i.e. floating melody is not). This property of the spell-out mechanism is universal.

(16) #3
The match is arbitrary
a. this follows from the fact that translation is list-based (or lexical): like in a multilingual dictionary, there is no reason why "table" has the equivalent "stól" in Polish, "Tisch" in German or "udfïrk" in some other language.
c. A consequence of arbitrariness is what Kaye (2005) calls the "epistemological principle of GP"
1. the only means to determine the phonological identity of an item is to observe its (phonological) behaviour. Its phonetic properties will not tell us anything.
2. That is, in case spell-out "decides" to have a given phonological structure pronounced by a rather distant phonetic exponent, its phonetic properties may be opposite to its phonological identity and behaviour.
3. therefore they must not be taken seriously when phonological identities are established. For example, if an /u/ is pronounced [i], it will not palatalise despite its being front phonetically. Relevant examples are discussed below.

(17) #4
Conversion is exceptionless
a. a basic criterion for classifying alternations as morpho-phonological, allomorphic, phonological, analogical, lexical or phonetic is the presence of exceptions.
b. the whole notion of exception makes only sense when both alternants are related by computation: an exception is an exception to an expected result, i.e. the application of an algorithm that transforms X into Y.
c. if, say, electric and electricity are two distinct lexical items, it does not make sense to say that antique - antiquity is an exception to the k - s-ity pattern: there is no such pattern in the first place.
d. hence talking about exceptions supposes computation. Since the match of phonological structure and its phonetic exponent does not involve any computation, it must be exceptionless.
e. this is indeed what we know from the morpho-syntax - phonology spell-out: there is no variation, there are no exceptions in the assignment of phonological material to morpho-syntactic structure.
f. ==> what that means is that among all alternations found in language, only those that are exceptionless qualify for being the result of post-phonological spell-out.

(18) exceptionlessness = phonetic proximity
The idea that exceptionlessness and "proximity" to phonetics are strongly related is a long-standing insight:
a. exceptionless alternations are often called
  1. "low level",
  2. "surface palatalization" (e.g. in Polish, Rubach 1981) or,
  3. quite aptly (for bad reasons though), "late".
b. Kiparsky's (1968-73: 18) Alternation Condition:
  "if a form appears in a constant shape, its underlying form is that shape, except for what can be attributed to low-level, automatic phonetic processes."
c. example
  aspiration of voiceless stops in English (as in \( \text{politics} \) - \( \text{politician} \)): automatic, exceptionless and hence close to phonetics.

(19) "late": inside vs. outside of phonology
a. the literature in question continues to place the processes and hand in the phonology: "late" means "towards the end of the application of ordered rules" in SPE.
b. in the present modular approach
   1. "late" means "outside of the phonology"
   2. the alternations in question arise during post-phonological spell-out.

c. our example
   1. there is no rule or constraint that converts p,t,k into \( p^h, t^h, k^h \) in appropriate (initial and stressed) contexts.
   2. rather, aspirated and plain p,t,k are identical objects in the phonology: the result of phonological computation is p,t,k in all contexts; these consonants are then spelled out as aspirated in initial and stressed contexts, while they have a plain phonetic exponent elsewhere.

(20) post-phonological spell-out
puts a cognitive name on what is known in Government Phonology as *phonetic interpretation*

5. Issues addressed by post-phonological spell-out
5.1. How much of the alternation basket is phonological?

(21) how much of the alternations that we observe on the surface is exactly the result of phonological computation?
   a. answers
      1. SPE: big is beautiful
         close to 100%, including "alternations" like *eye* - *ocular* or *sweet* - *hedonistic*
         Also with a modern offspring: Hale & Reiss (2008)
      2. since the 70s
         constantly decreased, in order to constrain the generative power of SPE:
         - the abstractness debate (internal revision): Kiparsky (1968-73) and following
         - Natural (Generative) Phonology
      3. small is beautiful
         very little labour is left for phonology
         This perspective is worked out and theorized by Gussmann (2007), especially for Polish.

   b. outsourcing
   how do alternations work that are not the result of phonological computation?
      1. no computation
         - distinct lexical entries (*electri*[k]c - *electri*[s]ity)
         - post-phonological spell-out
      2. non-phonological computation (grammatical)
         - allomorphy (the root has two allomorphs, *electri*[k]- and *electri*[s]-)
         - post-phonological spell-out (e.g. so-called surface palatalization in Polish)
      3. non-phonological computation (non-grammatical)
         analogy
   c. post-phonological spell-out shows that there is life after all phonological computation is done, and how this life is organized.
an example:

shifting labour from phonological computation to post-phonological spell-out (phonetic interpretation)

a. in Polish, [e] behaves in three different ways
   1. palatalizing e lot - loci-e "flight Nsg, Lsg"
   2. non-palatalizing e lot - lot-em "id. Nsg, Isg"
   3. post-velar e in recent loans kelner "waiter", kemping "camping"

b. classical analysis (Rubach 1984)
   1. one-to-one match between phonological behaviour and phonetic substance:
      - any item that is phonologically [+front] (or [-back]) palatalizes
      - only items that are phonologically [+front] (or [-back]) palatalize
   2. consequences
      - palatalization is only triggered by [+front] (or [-back]) items
      - in case a phonetically [+front] (or [-back]) item fails to trigger palatalization, it cannot be [+front] (or [-back]) by the time the palatalization process applies.
   3. ==>
      - Isg -em is /-ym/ (where /s/ is a back unrounded vowel, distinct from /s/ through roundness).
      - rule ordering:
         1. palatalization (/-ym/ has no effect)
         2. context-free transformation of /-ym/ into /-em/ by phonological computation
      - hence there is an additional vowel in the inventory of Polish, /s/, which is absolutely neutralized

b. Gussmann (2007: 56ff)
   1. there are three phonologically distinct [e]'s
      - palatalizing e (lot - loci-e "flight Nsg, Lsg"): I--A
      - non-palatalizing e (lot - lot-em "id. Nsg, Isg"): ___--I--A
      - post-velar e in recent loans (kelner, kemping): A--I
   2. which all bear the palatal agent I, though in different function (no automaticity of palatalization in presence of the palatal agent)
   3. the "surface neutralization" occurs during post-phonological spell-out (phonetic interpretation), rather than in the phonology (by phonological computation).

5.2. Virtual length

virtual length

a. the length of phonologically long vowels and phonological geminates may be marked in the phonetic signal by duration, but also by other means: there is no reason why phonological length should always be flagged by duration. Virtually long items do not betray their length by phonetic cues related to duration, but by other properties that can be read off the signal.

b. examples from English
   1. agma
      [ŋ] is /ng/:
      - it occurs only after short vowels
      - it does not occur word-initially
      Gussmann (1998), Dressler (1981) for German
2. distribution of short/lax vs. long/tense vowels in English
short/lax vowels occur in closed syllables, hence the phonetically simplex t in city
must be a geminate. NOT an ambisyllabic consonant.

=> ambisyllabicity is the analysis of people back in the 70s where it could not be
conceived that a phonetically simplex consonant is related to two skeletal slots.
The unbreakable rule was a one-to-one mapping between x-slots and phonetic
duration. Hammond (1997)

<table>
<thead>
<tr>
<th>(24)</th>
<th>a. English agma</th>
<th>b. length = non-reduction</th>
<th>c. length = shortness of the preceding vowel</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td>after phonological computation</td>
<td>( x \ x \ x \ x )</td>
<td>( \alpha \ \alpha )</td>
<td>( c \ i \ t \ y )</td>
</tr>
<tr>
<td>spell-out</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>phonetic exponent</td>
<td>([\eta])</td>
<td>([\alpha])</td>
<td>([\omega])</td>
</tr>
</tbody>
</table>

(25) phonetic vectors of phonological length
a. vowel length has been found to be expressed by
   1. ATRness in French
      Rizzolo (2002)
   2. vowel reduction
      - Semitic (Lowenstamm 1991, 2011)
      - Ge'ez (Old Ethiopian) (Ségéral 1996)
      - Kabyle Berber (Bendjaballah 2001, Ben Si Saïd 2011)
   3. stress
      in Apulian dialects of Italian (Bucci in press)
b. phonological geminates have been found to be expressed by
   1. the length of the preceding vowel
      - German (Caratini 2009)
      - Cologne dialect of German (Ségéral & Scheer 2001)
      - English (Hammond 2007)
   2. the (non-)inhibition of a preceding vowel-zero alternation
      Somali (Barillot & Ségéral 2005)
   3. aspiration
      English (Ségéral & Scheer 2008)
   4. preaspiration
      Icelandic and Andalusian dialects of Spanish (Curculescu 2011)

5.3. Laryngeal realism: the "default" value is acquired during spell-out

(26) laryngeal realism
Iverson & Salmons (1995), Honeybone (2005), Harris (2009)
a. it is fairly consensual today that there are two distinct systems of laryngeal, or voice-
related oppositions: what is traditionally called a voice vs. voiceless contrast may in
fact involves two distinct sets of primes,
   1. \([\pm \text{voice}] \) vs. \([\pm \text{spread glottis}] \) in feature-based systems
   2. L- or H-active systems in monovalent approaches
hence there are two types of languages: voicing and aspiration.
b. voicing languages
   (e.g. Romance and Slavic)
   1. voiced consonants are "truly voiced", i.e. voicing is the result of explicit laryngeal
      action.
   2. a prime, [+voice] or L, provides voicing, while voiceless items are the default:
      they are produced by the absence of explicit action ([−voice], absence of L).

c. aspiration languages
   (e.g. Germanic)
   1. voiceless consonants are the result of explicit laryngeal action: a prime, [+spread
      glottis] or H, enforces voicelessness.
   2. voiced consonants are only voiced by default, i.e. because they lack the prime
      responsible for voicelessness/aspiration, H (or experience the minus value of
      [spread glottis]).

d. ==> in this setup, "by default" means "during phonetic interpretation": obstruents that
   are phonologically voiceless, i.e. which lack H (or are specified [−spread glottis]), are
   pronounced voiced.

(27) how to identify voice vs. aspiration languages?
   a. the standard answer in the literature is that this may be decided by looking at the
      VOT of word-initial pre-vocalic plosives (e.g. Harris 2009).
   b. voicing languages
      "voiced" items are prevocalized (long lead-time, i.e. negative VOT), while "voiceless
      items" have a zero or slightly positive VOT.
   c. aspiration languages
      "voiced" plosives have a zero VOT, while their "voiceless" counterparts have a
      strongly positive VOT (long lag-time).

(28) a universal phonetic correlate is incompatible with post-phonological spell-out
   a. because, recall, the match between phonological items and their phonetic exponents
      is arbitrary.
   b. in recent work, Cyran (2012) has argued that a well-known peculiarity of voicing in
      external sandhi that is found in South-West Poland (so-called Cracow voicing, or
      Poznań-Cracow voicing) is not the result of phonological computation.
   c. he shows that it may be derived by simply assuming that the Warsaw-type system is
      L-based (true voicing), while the Cracow-type system is H-based. When injected into
      the same computational system, these opposite representations produce the surface
      effect observed.
   d. a consequence of Cyran's analysis is that there cannot be any cross-linguistically sta-
      ble phonetic correlate for H- or L-systems.
      1. these systems may not be identified by spectrograms, VOT or any other property
         contained in the phonetic signal: Warsaw and Cracow consonants are phonetically
         identical.
      2. the only way to find out which type of laryngeal opposition a surface voice-
         voiceless contrast instantiates is to observe is behaviour.
      3. ==> This is what is also predicted by post-phonological spell-out: phonetic correlates
         of phonological structure are arbitrary.
e. a word of caution
   1. it may not be the case that Warsaw and Cracow consonants are phonetically identical.
   2. VOT is the most popular cue for identifying plosives (because it is easy to identify and to measure), but it may not be the only one that is present in the signal.
   3. pitch may also cue voicing
      Haggard et al. (1970)
   4. Geoff Schwartz (p.c.) reports that when tokens are doctored so that their VOT is identical (for Polish this means erasing the pre-voicing), the voice-voiceless contrast is still identified by natives.
   5. Schwartz (2012, Ms) proposes an alternative analysis of Cracow voicing in the framework of Onset Prominence.

5.4. Melodic primes: how much slack between a prime and its pronunciation?

(29) how much slack ought to be allowed between the phonological identity of a segment and its pronunciation?
   a. we know that the same phonetic object may have distinct phonological identities across languages: [ɛ] may be
      1. I.A
      2. A.I
      3. I.A
      (using GP representations where the head of the expression is underscored).
      But may it also be
      4. I alone?
      5. A alone?
      6. or even U alone?
   b. intuitively, there must be limitations on how things can be pronounced, since otherwise a three vowel i-a-u system could in fact be flip-flop where [i] is the pronunciation of A, [a] of U and [u] of I.
   c. the arbitrariness of post-phonological spell-out enforces a counter-intuitive position, though: yes, flip-flop is indeed a possible situation.
   d. not a very plausible one, though
      1. a flip-flop system will have to take the hurdle of transmission to the next generation.
      2. in order to reconstruct the phonological identities of the vowels, children need some kind of cue to understand that what they hear is not what they need to store.
      3. for example, if in the flip-flop system described [i] does not palatalize (because it is in fact an U) but [a] does (because it realizes I), children have evidence from processing that allows them to correctly identify phonological units.
      4. if there is no such evidence, though, the flip-flop system will be eliminated by the next generation: children will simply store what they hear.
      5. hence the decay (or lexicalisation) of palatalization in our flip-flop system can sign its death.
(30) chain shifts
   a. flip-flop systems are real:
      South-East British posh girls
      Uffmann (2010) reports that in the speech of this group,

"vowels are currently shifting quite dramatically, with back/high vowels fronting and unrounding, and a counter-clockwise rotation of most of the remainder of the system, leading not only to vowel realisations that are quite distinct from traditional Received Pronunciation, but also, at least for some speakers, to near-merger situations (e.g. /i:-u:, ey-ow, e-æ/"
(abstract of Uffmann 2010).
Hence posh girls will pronounce "boot" as [biit].

b. this kind of chain shift is not isolated or rare in the evolution of language:
   The Great Vowel Shift that occurred in early modern English is a case in point (e.g. Wolfe (1972), Roca & Johnson (1999: 214ff).

(31) "r"
   a. in some languages the sonorant "r" is pronounced as a uvular fricative [ʁ,χ] or trill [R]. French, German, Norwegian and Sorbian are cases in point.
   b. in these languages, [ʁ,χ] undergo voice assimilation:
      they receive their voice value from adjacent obstruents, e.g. French [tʁwa] trois "thee"
      vs. [dʁwa] droit "law"
   c. and like all other obstruents devoice word-finally in case this process is present in the grammar (as in varieties of German that do not vocalize r, Ripuarian).
   d. phonologically, however, [ʁ,χ] "continue" to behave like a sonorant: only sonorants can engage in a branching onset, but the uvular fricative or trill does so jollily.
   e. when looked at through the lens of post-phonological spell-out, there is nothing wrong with that: for some reason the languages in question have decided to pronounce the phonological item /r/ as a uvular:
      r ↔ [ʁ,χ]
      This does not change anything to its phonological properties or behaviour.
   f. the transmission to further generations is no problem since children who know (via UG or some inference) that obstruents cannot occur as second members of branching onsets will automatically conclude that what they hear cannot be real: they will store [ʁ,χ] as the sonorant /r/.

(32) "exotic" segments: ingressive, clicks etc.
   a. surface-bound classical phonological analysis takes these articulatory artefacts seriously.
   b. clicks for example are sometimes implemented with a specific melodic prime, [±suction] in Halle (1995: 8ff).
   c. in the perspective of post-phonological spell-out, ingressive and clicks are but funny pronunciations (garden varieties as Jonathan Kaye would say) of regular phonological objects that occur in other languages as well.
   d. but of course it must be secured that there are enough distinct phonological representations for all items that contrast in such a language.
e. being a click is not a piece of phonological information, and phonological computation does not know what a click is.
f. the specifics of clicks are only introduced when regular phonological representations receive a phonetic value upon spell-out.

6. So why do 90% of phonological items match their phonetic exponents??
6.1. The lower, but not the upper spell-out crosses a grammaticalization boundary

(33) Why?
a. if cases can indeed be found where the phonetic and phonological identities of an item are (dramatically) distant and unpredictable, it is true nevertheless that in the overwhelming majority of cases they are not.
b. this is precisely why the minority of incongruent cases are so baffling.
c. in something like 90% of all spell-out relations, the way a structure is pronounced is more or less closely related to its phonological value (i.e. there is little slack).

(34) upper vs. lower interface
a. this situation at the lower end of phonology stands in sharp contrast with the properties of the same spell-out mechanism at its upper end: the relationship between morpho-syntactic structure and its exponent phonological material is 100% unrelated.
b. ==> At first sight, this dramatic difference does not speak in favour of the idea that both translating devices are identical, and that the only difference is the nature of the items involved.

(35) similarity calculus
there is an intuitive similarity calculus for the input-output relation at the lower, but not at the upper interface.
===> why?

(36) #1 kind of vocabulary that is manipulated
a. uncontroversially, the most important ontological gap within subcomponents of grammar is between syntax, morphology and semantics on one side, and phon(-ology, -etics) on the other.
e.g. Jackendoff (2002: 218ff), Chomsky (2000: 118)
b. when items such as gender, tense, number, case, person, animacy etc. are mapped onto items such as labial, occlusion, palatal etc., the relationship cannot be anything but 100% arbitrary.
c. it is not even obvious how the degree of kinship between any item of one pool and any item of the other set could be calculated: any match is as unmotivated as any other.
d. by contrast, phonology and phonetics share a number of categories (which does not mean that the vocabulary items are identical). For example, labiality is certainly relevant on both sides.
e. therefore the calculus of a greater or lesser distance between phonological structure and its phonetic exponent is immediate and quite intuitive.
ontological difference between the upper and lower spell-out
a. phonology is the grammaticalized version of phonetics but
b. morpho-syntax is not the grammaticalized version of phonology
c. \[\Rightarrow\]
   the lower spell-out crosses a grammaticalization-boundary (obvious similarity calculus)
   the upper spell-out does not: it is grammar-internal (no similarity calculus)

real world and grammar
a. grammar is a cognitive system that codes real-world properties through a process known as grammaticalization.
   e.g. Anderson (2011)
b. the real-world properties in question are of two kinds:
   1. semantic (eventually pragmatic) and
   2. phonetic.
c. experience (real world) \[\Rightarrow\] semantics (grammar)
   the symbolic vocabulary of morpho-syntax and semantics is the grammaticalized version of real-world semantic experience such as time, speakers, the difference between living and non-living items, between humans and non-humans, etc.
d. phonetics (real world) \[\Rightarrow\] phonology (grammar)
   on the other hand, phonetic categories are grammaticalized in terms of phonological vocabulary.
   1. it is therefore obvious and unsurprising that the output of the grammaticalization process that turns phonetic into phonological items is akin to the phonetic input, and also uses the same broad categories.
   2. this is also the reason why the default of the relationship between a phonological category and its phonetic exponent is complete identity: this is what grammaticalization produces.
e. by contrast, the relationship between the items related by the upper spell-out is not one of grammaticalization: tense, person, number etc. are not the grammaticalized versions of labial, occlusion etc. Therefore there is no way to even imagine any similarity.

6.2. Grammaticalization produces complete identity

the life-cycle
a. phonological rules come into being through phonologization, i.e. the grammatical knighting of some variation that is present in the phonetic signal.
b. this is the neogrammarian as well as the Saussurian take on language change:
   Paul (1880: 32): "Die eigentliche Ursache für die Veränderung des Usus is nichts anderes as die gewöhnliche Sprechätigkeit." [what really causes the change of usage is nothing else than ordinary speech activity]
   Saussure (1916: 37) "c'est la Parole qui fait évoluer la Langue" ([it is Parole that makes Langue evolve].
c. and the first step of what is known as the life-cycle of phonological processes:
d. alternations are born as phonetic regularities, then move into grammar where they are first phonological but at some point start to add morphological conditions, followed by lexical factors. Finally they are levelled out or eliminated from the language by some other means.

e. during this life-cycle, alternations become less and less regular: they apply to 100% of those items that satisfy the triggering conditions in their initial stage, but adding morphological and/or lexical conditions subtract more and more items from their influence.

(40) how grammaticalization works: the Labovian perspective

b. inherent phonetic variation that is present in the signal (i.e. which is produced by computation of the phonetic module) is arbitrarily selected for grammatical knighting in the interest of social differentiation that fosters group identity.

c. hence a village, or a group adhering to some urban culture, or any other socially defined community, seeks to be different and marks that difference with whatever variation that is offered by the signal.

d. it does not matter in which way they are different (by a spirantisation, a palatalization etc.), it only matters that they are.

(41) phonological processes: correlation between regularity and age
a. life-cycle: the younger the process, the more regular
when alternation patterns are born, i.e. when a phonetic variation is knighted by grammar and comes to stand under grammatical control, they are
- 100% regular and
- follow a clear causal pattern.

b. that is,
k $\rightarrow$ $\text{i}$ / __i

is a possible product of grammaticalization, but
k $\rightarrow$ $\text{u}$ / __u

is not.

c. the aging of a phonological process then implies its being gradually estranged from its real-world roots.
1. this is what the Saussurian opposition Langue vs. Parole is about,
2. reference

and this is what we also know from the other types of grammaticalization: there is an obvious relationship between time (real-world) and tense (grammar), or between $\text{dog}$ (real-world) and $\text{dog}$ (concept), which however is intricate and anything but one-to-one (when a dog is changed into a frog by a witch, it still remains a dog).

d. phonological processes that were phonetically plausible at birth may thus undergo modifications in further evolution of the language, and after some time look quite outlandish, or even crazy.
e. this is the insight formulated by Bach & Harms (1972): there are crazy rules, yes, but they are not born crazy – they have become crazy while aging.

1. for example, a context-free change that turns all i's of a language into u's may transform our phonetically transparent rule k → i̯ / __i into the crazy rule k → i̯ / __u.
2. hence it takes some historical accident and telescoping in order to produce a crazy rule (posh girls most certainly produce some).
3. example: l̯l̯ / V__V in external sandhi in Sardinian Molinu (2009), Scheer (in press)

(42) spell-out mismatch is only a product of diachronic evolution

a. it takes quite some historical accident and telescoping in order to produce the distance between a phonological item and its phonetic realization that baffles phonologists.

b. mapping relations between phonology and phonetics are not born crazy – they may become crazy through aging.

c. most of them do not, though, and this is the reason why the overwhelming majority of mapping relations show little slack.

References

Items followed by the mention WEB are available at http://sites.unice.fr/scheer.


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