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HOW MORPHO-SYNTAX TALKS TO PHONOLOGY: ONE-CHANNEL TRANSLATION AND DIRECT INTERFACE

I. SPE sets the standards for 40 years

(1) readjustment
- a. Σ' - later known as mapping, Indirect Reference, non-isomorphism (Prosodic Phonology)
- b. motivation: non-isomorphism - the cat-rat-cheese example

(2) boundaries
are [-segment] segments (#,+,=)

(3) cyclic spell-out
earliest version: the transformational cycle (Chomsky et al. 1956:75), later called the phonological cycle, Phase theory.

(4) Phase Impenetrability
- a. Strict Cyclicity: proposed by Chomsky (1973) for syntax
- b. adapted to phonology by Kean (1974) and Mascaró (1976) under the label of the Strict Cycle Condition (SCC)
- c. taken over by all theories that operate with just one phonology (see below):
  - Government Phonology (Kaye 1995)
  - Distributed Morphology
  - Phase Theory

  [but not by theories which accommodate distinct computational systems: Lexical Phonology, OTed versions thereof, indexed constraints, co-phonologies]

(5) Interface Dualism
there are two ways of talking to the phonology.
SPE encodes extra-phonological information
- a. procedurally - the phonological cycle
- b. representationally - boundaries
- c. illustration of the interplay: parent - parental - parenthood

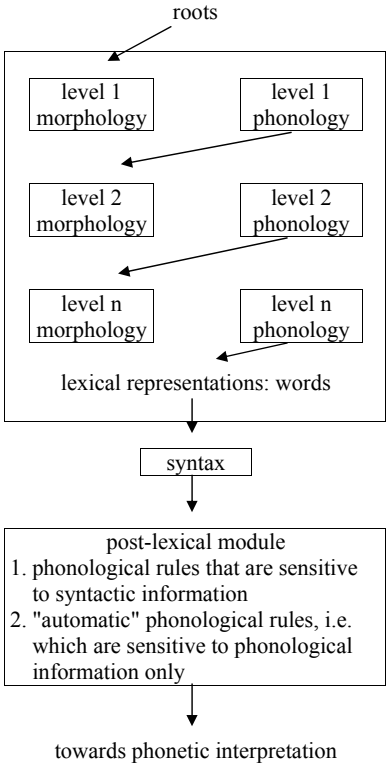
II. Lexical Phonology: a purely procedural world

(6) Lexical Phonology
- a. is the synthesis of
  1. affix ordering (Siegel 1974)
  2. cyclic spell-out
- b. affix classes in English
  [watch out, class membership is subject to much debate, the list below follows Mohanan (1986:16). Classes run under various headings in the literature: level 1 vs. level 2, neutral vs. non-neutral, cohering vs. non-cohering, cyclic vs. non-cyclic and others.]

class 1	class 2
in-	un-
-ity	-ness
-ic	-less
-ian	-hood
-ory	-like
-ary	-dom
-ion	-ful
-ate	-ship
-al (adjective-forming)	-ed (adjectival)
-y (noun-forming)	-ing (noun-forming)

(7) interactionism
- a. captures the phonological cycle and the fresh facts from morphology regarding affix ordering:
  this is why Kiparsky's (1982) article is called "From Cyclic Phonology to Lexical Phonology"
- b. is the interspreading of word formation rules with phonological rules:
  first you do some phonology, then you concatenate an affix, then you do some more phonology, then you concatenate another affix etc.
- c. materialises as the Lexicon:
  1. every affix class corresponds to a lexical level (or stratum)
  2. levels are procedurally ordered: first level 1 (= class 1) affixes are concatenated at level 1, THEN level 2 (= class 2) affixes are concatenated at level 2.
  3. ==> crucially, level 2 affixes are absent at level 1, but some phonology is already going on.

(8) Lexical Phonology: basic architecture



Lexicon
1. morphological word-formation rules
2. phonological rules that are sensitive to morphological information

(9) non-cyclic implementation of cyclic spell-out
- a. serially ordered levels instead of embedded (hierarchical) cycles
  level 1 = affixes in the inner cycle
  level 2 = affixes in the outer cycle
- b. domain assignment
  rules are "lexically" specified for applying at a given level (level 1 rules, level 2 rules)
- c. ==> selective rule application.
  1. LP accommodates several distinct phonological computations
  2. in many cases, a rule crucially applies at stratum X, but not at stratum Y.
- d. example: parent - parental - parenthood

(10) stratal (LP) vs. cyclic (SPE) implementation of cyclic spell-out

	SPE	Lexical Phonology
a.	morpho-syntactic hierarchy matters: cycles (phases) are a proper subset of the tree.	morpho-syntactic hierarchy is irrelevant: at no point in the derivation does it play a role.
b.	affix grouping is done by the morpho-syntactic hierarchy, which defines the chunks of phonological interpretation. ==> killing two birds (place of affixes in the tree, their phonological behaviour) with one stone (lexical specification where affixes are merged)	affix grouping is done by lexical identification of affixes, which are specified for being attached at level X. ==> two birds and two stones: no relation between the location of affixes in the tree and their phonological behaviour.
c.	multiple interpretation of affixes inner affixes are interpreted by PF in their cycle, and again in all higher cycles.	no multiple interpretation of affixes affixes are only interpreted once, i.e. at their stratum.
d.	there is only one phonology there is only one set of phonological rules, which applies to all chunks that are submitted to phonological interpretation.	selective rule application there are multiple phonologies: every stratum has a (potentially) different set of phonological rules.
e.	Phase Impenetrability a "no look-back" device needs to be implemented.	nothing of the kind needs to be implemented: the labour is done by selective rule application.

==> Phase Impenetrability and selective rule application do the same job and hence are in complementary distribution among interface theories:

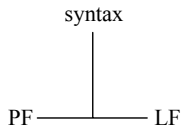
SPE	vs.	Lexical Phonology
Government Phonology		OT indexed constraints
Distributed Morphology		OT co-phonologies

illustration: parent - parental - parenthood
special case: Stratal OT, which has a bit of everything.

- d. the (ir)relevance of morpho-syntactic structure operates the same split among interface theories.

(11) lexical vs. post-lexical phonology
- a. continuation of the Praguian concept of word phonology vs. sentence phonology
- b. that is,
  phonology interacts with morphology and syntax in different ways:
  1. not at the same moment in the derivation
  2. not in the same location
  3. potentially according to different principles
  4. sound and meaning are computed twice:

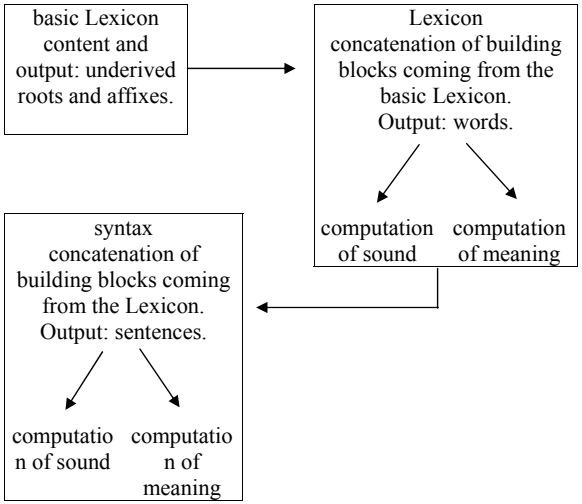
c. ==> Disunion of Morphology and Syntax
   1. Disunion is a direct consequence of interactionism
   2. Disunion is a violation of the deepest layer of generative principles: the basic architecture of grammar is according to the "inverted T model":



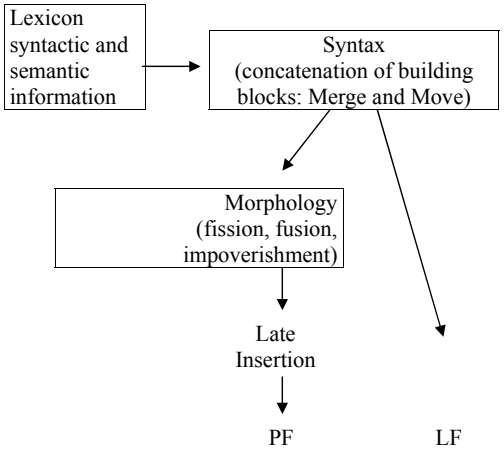
   which means "ALL concatenation before ALL interpretation"
   3. it has provoked strong reactions in the late 80s and during the 90s:
   - Halle & Vergnaud (1987) - a non-interactionist version of Lexical Phonology
   - Distributed Morphology

(12) Distributed Morphology
   a. Unity of Morphology & Syntax
   b. "No escape from syntax"
   "Syntactic hierarchical structure all the way down"
   c. concatenation is done by Merge in syntax, the only concatenative (and recursive) module, and concerns all building blocks, i.e. morphemes and words alike.

(13) architecture of grammar in Lexical Phonology



(14) architecture of grammar in Distributed Morphology



(15) privativity
[on the representational side]
sending all morpho-syntactic divisions to phonology, or only those that are phonologically relevant
   a. privative
   Chomsky et al. (1956)
   b. non-privative
   SPE
   Lexical Phonology (brackets)

(16) a purely procedural world
   a. Lexical Phonology makes the interface exclusively procedural: the representational means to talk to phonology is thrown over board
   b. the concurrence between level ordering and boundaries was clearly expressed in the earliest source of Lexical Phonology:

> "To intrinsically order the levels of the morphology as they apply and to identify them uniquely with boundaries at the same time, would be overkill, since the boundaries themselves can do the work of ordering affixation processes. […] I will, therefore, take the perhaps uncautious step in this section of assuming that boundaires are not linguistic units, and will generally assume an ordering hypothesis." Pesetsky (1979:16s)

c. level ordering does away with boundaries
Mohanan (1982:24s,94), Halle & Mohanan (1985:64), Szpyra (1989:24,27) and Mohanan (1986) for example are explicit on this:

> "Originally postulated in order to account for morphological distribution, the conception of lexical strata also yields a way of dealing with morphological information in phonology. SPE makes use of boundary symbols like +, # and ## to refer to morphological information. Instead of using such symbols, the phonological rules in Lexical Phonology (a) refer to the beginning and the end of morphological forms, and (b) are specified for their domain of application in terms of lexical strata." Mohanan (1986:18)

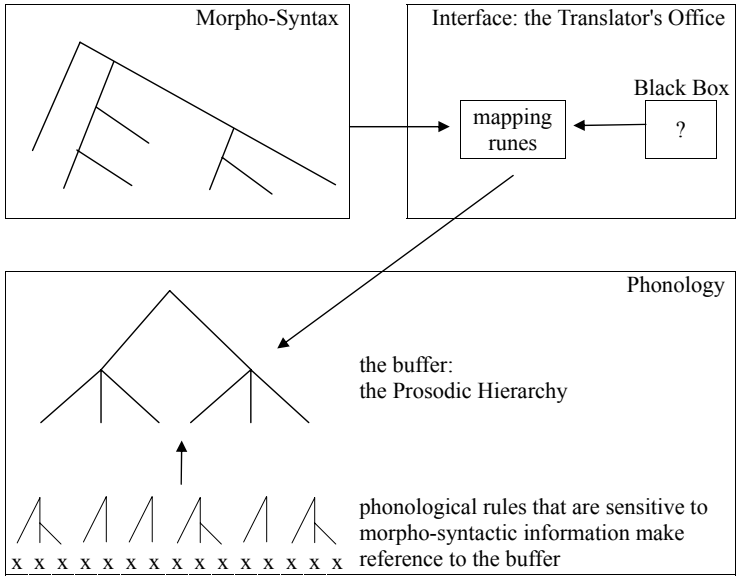
d. but there is a price to pay:
1. domain assignment of rules by a diacritic
2. brackets

III. Prosodic Phonology: a purely representational world

(17) roots
a. earliest source of inspiration: domains
Liberman (1975) and Liberman & Prince (1977)
multi-layered arboreal structure (syllables, feet and words) which expresses rhythmic (linguistically "musical") properties of the linear string and allows to assign relative prominence (strong vs. weak status) to individual chunks.
b. two strands:
1. Selkirk (1981a [1978], 1984)
2. Nespor & Vogel (1986)

(18) Indirect Reference and its consequence, the Prosodic Hierarchy
a. phonological processes make only indirect reference to morpho-syntactic information.
1. reference to functions and labels (argument, adjunct, DP etc.) is prohibited altogether.
2. reference to structure is allowed, but only indirectly:
true morpho.syntactic structure is translated into the Prosodic Hierarchy (which lies inside the phonology), to which phonological rules then make reference.
b. major debate of the early-mid 80s: Direct Syntax vs. Indirect Reference
Direct Syntax: phonological rules make reference to DPs, adjuncts etc. (Kaisse 1985, Odden 1987).

(19) general architecture of Prosodic Phonology



(20) a good and a bad reason for Indirect Reference
a. the bad reason (put forth by Prosodic Phonology)
non-isomorphism.
[Selkirk 1981 [1978], Nespor & Vogel 1986: all through the book, 4s,34ss,124ss etc., Vogel & Kenesei 1990, Nespor et al. 1996 etc.]
1. some phonological rules make reference to information that is not contained in morpho-syntactic structure. That is, to domains that do not represent any single node on the morpho-syntactic side.
2. ==> morpho-syntactic structure needs to be readjusted before it can be used by phonology
3. SPE's readjustment component = mapping rules, the Black Box
4. SPE-example: cat-rat-cheese
b. the good reason: modularity
[which, quite surprisingly, is never invoked in the PP literature]

(21) non-isomorphism (and hence the Prosodic Hierarchy) evaporates when boundaries are used
a. cat-rat-cheese: every CP starts a new intonational unit.
b. if phonological rules make reference to boundaries, rather than to domains, there is no argument at all: the Prosodic Hierarchy and the mapping mechanism are redundant.
c. non-isomorphism is a mirage created by the domain-a priori
morpho-syntactic and phonological structure is necessarily isomorphic when looked at through the prism of boundaries (rather than of domains).

(22) The Prosodic Hierarchy is a diacritic (if an autosegmental one)
   a. the four higher layers serve no other purpose than the interface. They are constructed exclusively top-down: any chunk that phonological rules need to make reference to is a constituent.
   [the two lower layers, syllable and feet, are constructed bottom-up: were there no interface, they would still exist (for domestic phonological purposes)]
   b. the Prosodic Hierarchy is the modern continuation of boundaries:
   > "Working within the SPE framework, Selkirk [1972] modifies the original proposal by showing that at least in certain types of phonological phenomena, interaction between the two components is only indirect. Word boundaries (#'s) inserted into a string on the basis of syntactic structure determine where external sandhi rules apply. Phonological rules thus do not directly 'see' syntactic structure, but rather access only strings of segments and boundaries." Vogel & Kenesei (1990:344)

(23) what is a diacritic?
   a. in module X, something that serves no other purpose than stocking and restoring information from other modules that is needed for the computation in module X.
   b. in module X, something that is created without any contribution of module X.
   ==> the genesis of boundaries and the Prosodic Hierarchy does not require any kind of phonological information.

(24) the real debate (which has never taken place):
   local vs. non.local intervention in phonology
   a. boundaries are local and diacritic
   b. boundaries are local, domains are not
      1. they define the relation between two adjacent morphemes or words..
      2. domains span a number of elements of the linear string and thereby create labelled clusters
      3. an individual element of the linear string belongs to a domain, but it cannot "belong" to a boundary.
      4. a boundary is precisely located in the linear string and can influence only adjacent objects: the one immediately preceding and the one immediately following.
      5. it does not make sense to talk about domains that intervene, or are located between two elements of the linear string.
   c. boundaries and domains are both diacritic
   as soon as one needs to represent boundaries, a diacritic object enters the scene.
   d. the difference is not diacriticity, but locality of intervention.
   e. ==> Prosodic Phonology has thrown out the local baby with the diacritic bathwather.
   f. what we need is **non-diacritic boundaries** (sic).

IV. Optimality Theory: new house, new and old furniture

(25) the core of mapping: Align & Wrap
   a. as is the case for all other representational objects that were present at the end of the 80s (such as features or syllable structure), OT has taken them over into the new constraint-based environment without major changes.
   b. the Prosodic Hierarchy is present in all versions of OT.
      1. The way it intervenes in the derivation, though, has been adapted to the new environment: prosodic constituency is not created by mapping rules anymore, and truly phonological rules do not make reference to it in their structural description. This is because there are neither rules nor structural descriptions anymore.
      2. rather, a set of specialised constraints of the Align and the Wrap families express the "desire" of a certain matching between units of the Prosodic Hierarchy and other units such as syntactic, morphological or syllabic constituents.
      These constraints, as violable as all others, are then in competition with other (purely phonological) constraints, the result of which determines the kind of morpho-syntactic influence that phonology experiences.

(26) anti-cyclicity
   a. anti-derivationalism being the cornerstone of OT, the derivational interactionism (= cyclicity) practised in SPE and Lexical Phonology is intolerable.
   ==> hence literature on cyclicity-killers
   b. solution 1
   phonology is derivational
   DOT: Rubach (1997,2000,2003), Booij (1997)
   Stratal OT: Kiparsky (2000), Bermúdez-Otero & McMahon (2006), Bermúdez-Otero (forth)
   Roughly, these approaches are constraint-based versions of Lexical Phonology, although they are actually more than just OTed versions of Lexical Phonology.
   c. solution 2: cophonologies, indexed constraints
   various waterproof mini-grammars
   Itô & Mester (1995), Orgun (1996), Inkelas (1996,1998), Orgun & Inkelas (2002), Anttila (2002), Kiparsky (forth).
   d. solution 3: Interface Constraints = Direct Syntax
   direct reference to designated morphological categories in the body of phonological constraints.
   Example: Kager's (2000:146s)
   "NonRecStem: No Stem (affixed by -eer, -iteit etc.) immediately dominates a Stem."
   Antilla (2002), Raffelsiefen (1996:207s), Hammond (1995), Russell (1999)
   e. solution 4: Output-Output correspondence = analogy.
   f. solution 5: enriched representations
   Oostendorp (1999,2002,2004) argues that at least some of the effects at hand, namely in Dutch, have a purely phonological solution. This perspective, however, supposes a sufficiently rich system of phonological representations.

(27) Modularity I
General landscape: modularity is blurred or violated
a. as in Lexical Phonology, phonological and morphological instructions, constraints in OT, are freely interleaved.
b. in addition, it is not so clear anymore which constraint "belongs" to morphology, and which to phonology.
c. Yip (1998) for example is explicit on this:

> "These results make it hard to identify a clear dividing line between morphology and phonology. What is more, they go much further to blur the distinction than does the interleaving of phonology and morphology found in lexical phonology. In lexical phonology, each component has its own character: the entities are different, and the rules are different. In Optimality Theory, this is not necessarily the case. Alignment is the most striking example. Alignment appears to play a role in pure morphology, in pure phonology, and at the interface." Yip (1998:219)

d. radical option: the abolition of modularity
Russell (1999) proposes one single constraint ranking for all phonological, morphological and syntactic constraints
e. Stratal OT on the contrary holds up modularity, cf. above.

(28) Modularity II
mapping is done IN the phonology - impossible on modular grounds
a. the Translator's Office must stand in modular no-man's land. Any other conception is a violation of modularity and Indirect Reference: modules do not "see" what is going on in other modules.
b. the Translator's Office has always been based in modular no-man's land in Prosodic Phonology.
c. in all versions of OT (as far as I can see), constraints responsible for mapping (Align and Wrap) cohabitate with purely phonological constraints in the same constraint hierarchy.
Hence the Translator's Office has been moved into the phonology.
d. ==> phonological assessment (by phonological constraints) and mapping (by Align and Wrap) are done simultaneously.

V. Phase Impenetrability

(29) the existence of PI depends on selective rule application:
yes if just one phonology, no if several phonologies..
In case it does exist, the following questions arise
a. do phonological and syntactic (semantic) phases coincide?
==> probably not:
1. an affix is too small a chunk for a syntactic phase
2. the mapping puzzle is hardly compatible with rigidly node-defined Phases (DP, vP, CP)
3. Marušič (2005), Caha & Scheer (2007).
b. are phonological phases at least a proper subset of syntactic phases (i.e. no overlap)?
c. is there a phonological equivalent of phase edges that are spelt out only on the following pass?
==> nothing in sight.

d. phonological phases appear to be piece-driven, rather than node-driven.
1. node-driven: certain labels trigger a phase: DP, vP, CP
2. piece-driven: the merger of a given piece triggers a phase
e. node-driven Phase in phonology: Marvin (2002)
xPs are Phase heads.
Problem: this fails to derive the most basic English data:
1. main stress: origin - original - originality
certain class 1 affixes such as -al and -ity provoke reassignment of main stress regardless of where in the structure they are attached, i.e. even when they occur after a class 2 (stress-neutral) affix:
góvern - góvern-ment - govern-mént-al

==> PIC à la carte: Marvin argues that the PIC does not apply to main stress.
Not really convincing: "the PIC applies whenever it suits the analyst".
2. all cyclic effects: parent- parental - parenthood etc.
Marvin does not talk about them.
f. strong and weak versions of PI
a. strong
earlier cycles are entirely invisible to later computation: no property of a string that has already been interpreted may be modified.
b. weak
an object that has been modified by a process on an earlier cycle cannot be touched on a later cycle (but items that remain unmodified on the first pass may be altered)
Piggott & Newell (ms) argue for a weaker version.

VI. Lessons from interface theories

(30) issues that appear to be settled
a. no boundaries inside morphemes
b. no phonetic correlate of boundaries
c. Interface Dualism
d. modularity, i.e. Indirect Reference
e. No Diacritics
phonology can only make reference to phonological, i.e. non-diacritic objects.

(31) issues under debate - general
a. division of labour between representational and procedural communication

(32) issues under debate I
on the representational side
a. translation is done by a Translator's Office in modular no-man's land
Jackendoff's (2002) interface processors
b. local vs. non.local intervention in phonology (boundaries vs. domains)
c. privativity
d. the mapping puzzle

(33) issues under debate II
on the procedural side
a. Unity of Morpho-Syntax
1. interactionism
2. Praguian segregation
b. implementation of cyclic spell-out:
1. stratal (morpho-syntactic structure is irrelevant) vs.
2. hierarchical (morpho-syntactic structure matters)
c. selective rule application
several distinct phonologies or just one phonological computation?
d. Phase Impenetrability
1. its existence depends on the take on selective rule application.
2. isomorphism of syntactic and phonological pahses?
3. node- or piece-driven?
4. strong vs. weak version(s)
5. phonological equivalent of phase edges?

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