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this handout and many of the references quoted at www.unice.fr/dsl/tobias.htm

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(DIRECT) INTERFACE WITHOUT BIG BROTHERS

(1) purpose
   a. to show that the traditional generative interface model (between morpho-syntax and phonology) that is in place since SPE-Prosodic Phonology (SPE-PP) is not viable in a modular environment.
   b. SPE-PP relies on a Translator's Office, which is a modular monster.
   c. linguistis have always found that translation is arbitrary: the absence of cross-linguistic generalizations made them desperate (no "natural classes of boundaries"). Arbitrariness, however, points towards lexical activity.
   d. the standard way of conceiving of intermodular communication is a lexical access anyway. An option which for some reason has never been explored.
   e. hence the proposal (also work by Michal Starke):
      one-channel translation = only via the lexicon
      instead of two-channel translation = via the lexicon for morphemes, via a Translator's Office for boundary information

1. Traditional two-channel translation: SPE-PP

(2) Interface Dualism
morpho-syntactic information can reach phonology by two means
   a. representationally
      SPE: boundaries #, + etc.
      Prosodic Phonology: the Prosodic Hierarchy (omegas, phis etc.)
   b. procedurally
      SPE: the phonological cycle
      Lexical Phonology: strata
      Distributed Morphology: Phase Impenetrability (modern version of the Strict Cycle Condition, Mascaró 1976)

(3) Translation only concerns the representational means
   a. everything that follows thus is only about representational communication.
   b. Phase Theory, i.e. procedural chunk submission, remains untouched.

(4) what happens upon spell-out?
There are various theories, but everybody agrees that
   a. morpho-syntactic features are transformed into phonological material
   b. the input are features, the output are morphemes. Their relation is not necessarily one-to-one.

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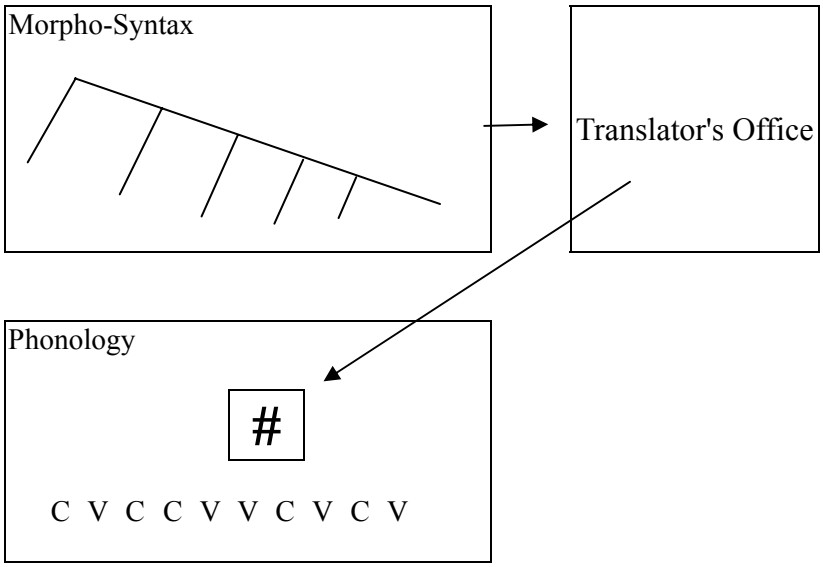
c. in addition, there are morpho-syntactic properties that do not ride on morphemes.
==> boundary information
1. #, + in SPE
2. the Prosodic Hierarchy since Selkirk (1981 [1978])
I use "boundary information" as a cover term that does not necessarily refer to SPE-type boundaries.
3. Jackendoff's (1997) correspondence rules.

d. hence morpho-syntactic information is translated into phonological material through two channels:
1. the lexicon: morphemic information
2. a Translator's Office: boundary information

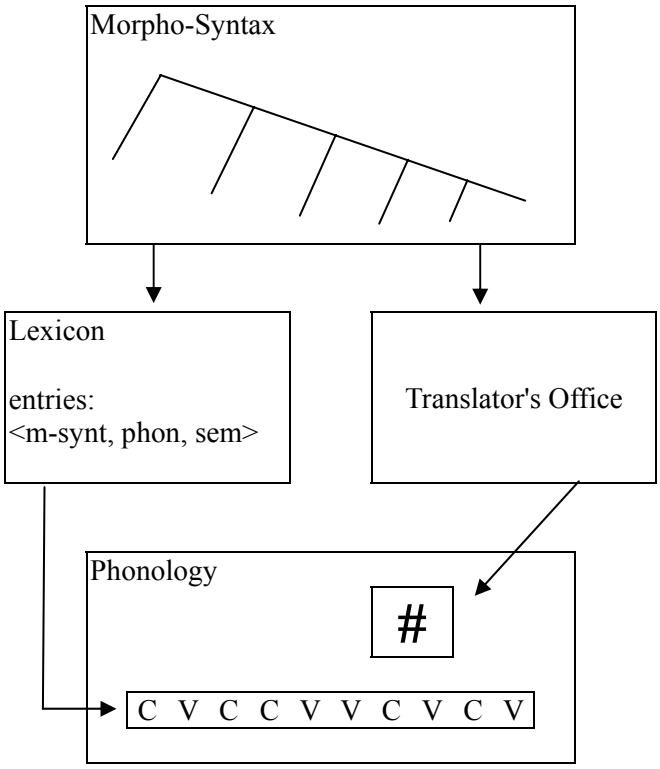
e. history of the Translator's Office:
1. readjustment component in SPE
2. mapping rules in Prosodic Phonology (Nespor & Vogel 1986), which sit in a box that is distinct from both morpho-syntax and phonology.

(5) one channel is missing in interface theories
despite the existence of two channels that do a translating job, (phonological) interface theories only talk about one: the Translator's Office.

(6) general architecture SPE-Prosodic Phonology (incomplete picture)
a. # is shorthand for any kind of boundary information.
b. the string of Cs and Vs represents all phonological material that morphemes are made of.



(7) general architecture SPE-Prosodic Phonology (complete picture)



2. Modularity and the Translator's Office

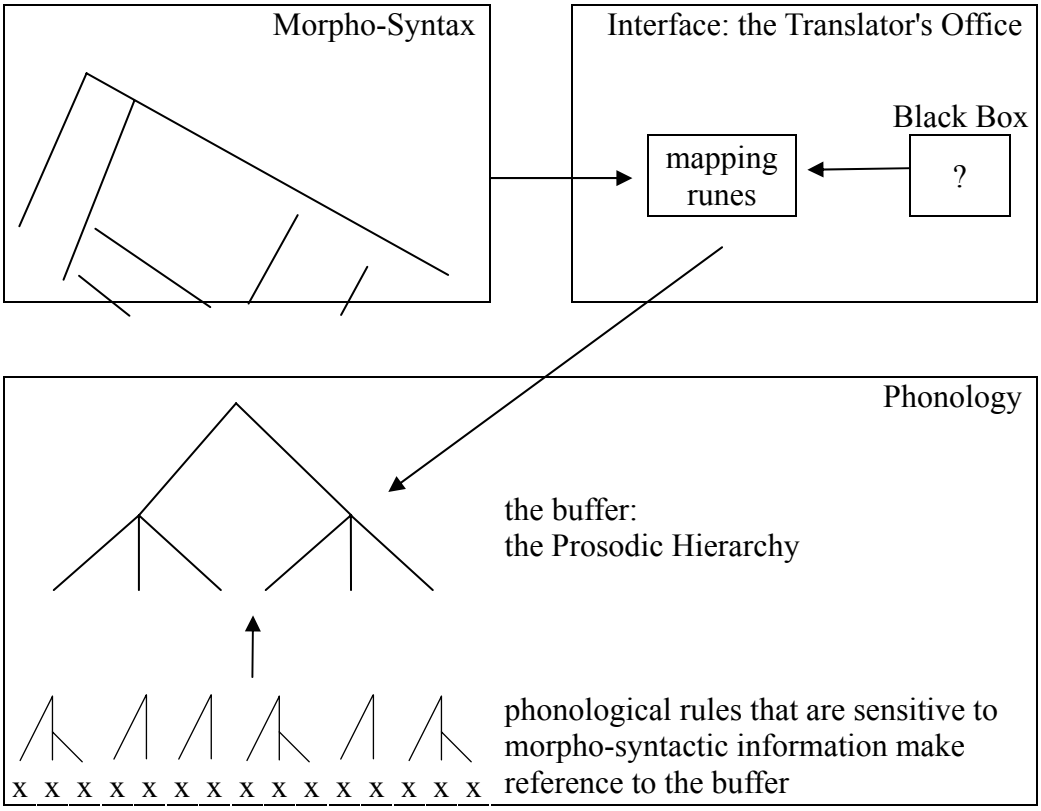
(8) content of section 2:
Indirect Reference
   a. surprisingly, modularity is completely absent from the argumentation that has given birth to the Translator's Office in Prosodic Phonology.
   b. instead, a bad argument has been put forth: non-isomorphism.

(9) The spine of the classical approach (SPE, Pros Phon): **Indirect Reference**
   a. since Selkirk (1981 [1978]), interface theory regarding the communication between phonology and the other modules of grammar is dominated by the central idea of Prosodic Phonology (PP): Indirect Reference..
   b. That is, phonological processes make only indirect reference to morpho-syntactic information. The latter is thus transformed into the Prosodic Hierarchy (which lies inside the phonology), to which phonological rules make reference.

(10) hence the central idea of PP: prosodic constituency, which I call the buffer (or the sponge) because its only function is to store morpho-syntactic information
   a. mapping rules
      are the translator's office: they transform morpho-syntactic information into prosodic constituency, which lies inside the phonology. They are the construction worker of the buffer.
   b. crucially (cf. non-isomorphism below), morpho-syntactic information is not conditioning mapping rules alone: boundary-grouping may also be a function of genuine and language-specific instructions.
      This is what I call the Black Box.

c. the nature of the buffer is a secondary question: the grid (Selkirk 1984) or the regular arboreal constituency of PP.
d. this general picture has not been modified by OT - it was only adapted to the new environment (tension between Wrap and Align, parametric variation of phrasing expressed by constraint interaction/ factorial typology, anti-cyclicity (OO, co-phonologies, etc.)

(11) general architecture of Prosodic Phonology



2.1. A bad reason for Indirect Reference: non-isomorphism

(12) non-isomorphism: why the buffer exists
a. why should reference to morpho-syntactic structure be indirect? Why should phonology be burdened with several extra layers of arboreal structure and an extra mapping mechanism? Isn't this redundant?
b. **direct-syntax approach**
Kaisse (1983,1985,1990), Chen (1990), Odden (1987,1990), Pyle (1972), Rotenberg (1978), Clements (1978), also in the Prosodic Phonology tradition: Napoli & Nespor 1979).
Competition of direct syntax approaches and Prosodic Phonology in the special issue of the Phonological Yearbook edited by Kaisse & Zwicky (1987).
c. basic argument against direct-syntax which has been repeated over and over again: **non-isomorphism**.
[Selkirk 1981 [1978], Nespor & Vogel 1986: all through the book, 4s,34ss,124ss etc., Vogel & Kenesei 1990, Nespor et al. 1996 etc.]

d. non-isomorphism is the claim that some phonological rules make reference to information that is not contained in the morpho-syntactic structure. That is, to domains that do not represent any single node on the morpho-syntactic side.
e. let us examine two examples:
   1. mismatch of phonological and morpho-syntactic domains
      [this is the one originating in SPE p.371 that runs all through the literature]
      This is [the cat that caught [the rat that stole [the cheese]]]
      [This is the cat] [that caught the rat] [that stole the cheese]
   2. reference to the domain of two sentences: there is no morpho-syntactic node that dominates two sentences. Nespor & Vogel's (1986) explanation here: the semantic relation between the two sentences of the second example is not tight enough.
      There's my mothe[r]. I've got to go.
      There's my mothe*[r]. I've got two cats.

f. both examples indeed show that phonological domains are non-isomorphic with morpho-syntactic structure. Therefore, goes the argument,
   1. the domains to which phonology makes reference must first be created: we need a parallel domain structure in phonology, the buffer, and its construction worker, mapping rules.
   2. the input to mapping rules is certainly morpho-syntactic structure, but not only: mapping rules take sovereign decisions how to build phonological domains that do not rely on the morpho-syntactic input.
      ==> this is what I call the Black Box.
g. ==> hence the existence of the buffer crucially hinges on non-isomorphism.

(13) non-isomorphism evaporates when boundaries are used
   a. both examples above (and all others) have a straightforward explanation when boundaries are used instead of domains:
      1. every CP starts a new intonational unit.
      2. semantics/ pragmatics distribute boundaries that allow or block the linking of r.
   b. hence if phonological rules make reference to boundaries rather than to domains, there is no argument at all.
   c. in this case all the prosodic constituency and the mapping mechanism are redundant.

2.2. A good reason for Indirect Reference: Modularity

(14) If the Prosodic Hierarchy is redundant and non-isomorphism not a problem anymore, why don't we make direct reference to morpho-syntax?
Why do we need a translator's office at all?
Indirect Reference and the Translator's Office are needed for 2 good reasons:

a. modularity
   1. as the general organization of the mind/ brain
      Fodor (1983): a module is a hard-wired computational system that is built on fixed neural architecture, domain-specific, autonomous, automatic, stimulus-driven and insensitive to central cognitive goals.
      It is designed for a special purpose: it "solve[s] a very restricted class of problems, and the information it can use to solve them with is proprietary" (Fodor 1998).
      Overview literature includes Pinker (1997), Plotkin (1998) and Fodor (2000).
      Evidence for this cognitive architecture: it is a documented fact that the dysfunction of some cognitive capacities does not impede others. Subjects with the Williams syndrome for example show serious deficits in spatial cognition, number and problem solving, but perform well on language and face recognition tasks (Karmiloff-Smith et al. 1995).
   2. the modular postulate disables different modules to see what is going on in each other. Selkirk (1984) for example uses this argument:

      "The syntax and the phonology are entirely autonomous components, the rules of syntax making no appeal to phonology and vice versa. Mediating between these components, however, are two others that define the relation between the syntactic and phonological representations of a sentence. The principles of these components have a mixed vocabulary." (Selkirk 1984:410f)
   3. correspondence rules = the Translator's Office

      > "The theory of Representational Modularity [posits], in addition to the representation modules proposed above, a system of interface modules. An interface module communicates between two levels of encoding, say L1 and L2, by carrying out a partial translation of information in L1 form into information in L2 form" Jackendoff (1997:42)

      > "Correspondence rules perform complex negotiations between two partly incompatible spaces of distinctions, in which only certain parts of each are 'visible' to the other." Jackendoff (1997:221)

b. phonology and syntax do not speak the same language
   [closely related to modularity]
   1. as far as I can see, this argument is entirely absent from the PP literature. It has been extensively used by Jackendoff (1992,1994,1997,2002) and Starke (who is not good friends with ink).
   2. number, person, verbs, nouns, quantification, aspect and so forth are categories that are understood and processed in syntax as well as in morphology and semantics. Phonology does not even know what quantification etc. is. On the other hand, the higher modules do not know what occlusion, palatality or an Onset is.
      ==> phonology-free syntax

3. this is what Jackendoff calls Representational Modularity

> "The overall idea is that the mind/ brain encodes information in some finite number of distinct representational formats or 'languages of the mind.' Each of these 'languages' is a formal system with its own proprietary set of primitives and principles of combination, so that it defines an infinite set of expressions along familiar generative lines. For each of these formats, there is a module of mind/ brain responsible for it. For example, phonological structure and syntactic structure are distinct representational formats, with distinct and only partly commensurate primitives and principles of combination. Representational Modularity therefore posits that the architecture of the mind/ brain devotes separate modules to these two encodings. Each of these modules is domain specific.
> […] The generative grammar for each 'language of the mind,' then, is a formal description of the repertoire of structures available to the corresponding representational module." Jackendoff (1997:41)

> "'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 (1997:87ss)

(15) In sum, thus, Prosodic Phonology did exactly the right thing - introducing Indirect Reference as a major principle of interface architecture, installing a Tranlator's Office and mapping rules - but for the wrong reason (non-isomorphism).

3. The Translator's Office is a Big Brother, hence a modular monster

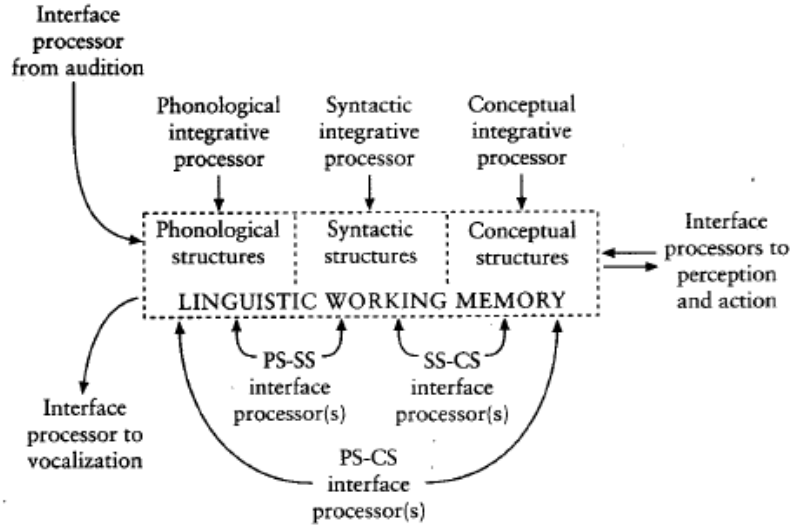
(16) properties of modules
Fodor (1983) et passim
   a. carries out a computation: on the grounds of an input, produces an output
   b. is domain-specific
      - it operates over a vocabulary that is found nowhere else
      - it understands only its own language (vocabulary)
   c. intermodular communication is trough a lexical access
      since they do not understand anybody else's language, modules can communicate only via translation
   d. is encapsulated (autistic)
      the computation can only work on information that has been present in the input: no new information can be taken into account in the course of the computation.

(17) properties of the SPE-PP Translator's Office
   a. the translating device is an extra unit, i.e. different from the modules that it relates, and from the lexicon
   b. the translating device is a module
   c. the translating device is a computational unit

d. the translating device needs to have access and to understand both morpho-syntax and phonology.
   It is a Big Brother who sees everything and can do everything.
   ==> violation of modularity (domain-specificity)
e. it makes sovereign decisions
f. hance it cannot be a module
g. in a modular environment, what else could it be?
   Modular theory recognizes only
   1. modules
   2. the "Central System" (disputed)
   3. lexica
h. the Translator's Office cannot be a lexicon either because it carries out computation.
   ==> it is a modular monster

(18) translation through the lexicon
   a. translation is necessary, but Big Brothers do not qualify as translational devices.
   b. alternative: boundary information is translated just like morphemic information, i.e. through the lexicon.
   c. why has this alternative never been seriously considered, given that the default for intermodular communication is a lexical access?
      Probably
      1. the translation of boundary information is reputed to require a very complicated computation (of which linguists have only an embryotic understanding)
      2. and access to all possible information from different modules.
      3. A dummy Lexicon where no computation is performed at all could not possibly stand up to this task.

(19) Jackendoff (2002) proposes Big Brother translation as the standard for all intermodular communication
   a. without discussion of the lexical alternative.
   b. modular structure of language according to Jackendoff (2002:199)



   c. his answer to the question what Big Brothers are: they are modules.

d. modules which are bi-domain specific: they can read and write in several languages.
e. "relative modularity": modules can be more or less domain specific, more or less modular.
f. ==> destruction of modularity
g. informational encapsulation of Jackendoff and Prosodic Phonology
    1. they were contemporary in the 80s and are still today
    2. Posodic Phonology does not take advantage of the modular argument
    3. Jackendoff (1997 et passim) does not quote the Big Brother interface that SPE-PP have developed, even though he is often talking about the phonology - morpho-syntax interface, and although this would perfectly illustrate his general purpose: SPE-PP is a perfect ally in Big Brotherhood.

4. One-channel translation: how it works and why it is warranted

(20) properties of the translational process
a. not just for the morpho-syntax - phonology interface, but for all intermodular communication: Jackendoff (2002:220ss).
b. arbitrariness
    1. any structure of the input module can be translated into any structure of the output module.
    2. This is precisely what has made linguists desperate, see appendix. There do not seem to be any robust cross-linguistic generalizations. To the effect that, after a period of intense activity in the second half of the 80s and first half of the 90s, research on the core mapping mechanism has declined.
c. partiality
    1. only a subset of the structure of the origin- and the target-module is visible for the translator. The translational channel between two modules may have a more or less narrow "information bottleneck" (Jackendoff's 2002:229 term).
    Example: in perception, phonology has an input from
        - acoustic phonetics
        but only a (small) subset of the acoustic signal is linguistically relevant.
        - vision
        but only a (small) subset of the visual signal is linguistically relevant.
        The so-called McGurk effect (McGurk & MacDonald 1976, Ingleby & Azra 2003): when exposed to auditory and visual information that simultaneously provide conflicting information, subjects consistently perceive something different from what reaches their ears: either the visual input overrides the auditory stimulus ([ba] is witnessed from auditory [da] and visual "[ba]"), or the perceived sound is a compromise ([da] is witnessed from auditory [ga] and visual "[ba]").
    2. translation into phonology is indeed partial
        - morpheme-internal properties are never modified by boundary information.
        - melody (i.e. phonology below the skeleton) is never modified by boundary information.

(21) arguments for one-channel translation through the lexicon
Making the translational device a Big Brother is neither natural nor the default
a. no violation of modularity by Big Brothers.
b. economy
a slimmer grammar: two translational processes for the price of one
1. the lexicon is needed anyway
2. only one (instead of two) translational devices
3. from the viewpoint of phonology: translation is uniform.
Before: phonological material has two different origins and results from two different translational processes.
Now: all phonological objects have the same origin and have been created by the same translational process.
c. arbitrariness of translation
is precisely what is awaited from lexical activity. Is certainly not what is awaited from a regular computational activity.
d. the standard way for modules to communicate is a lexical access.

(22) properties of one-channel translation
a. the translational device is a lexicon
b. it is not a module
c. translation is not a computational process
d. it does not make any decisions
e. only modules (and eventually the Central System) exist in a modular environment
f. the translational job for morphemic and non-morphemic information is done by the same lexicon

(23) modular network
a. multiple inputs and outputs in a modular network
1. modules may draw on information coming from a range of other modules
2. modules may be the source of information for many other modules.
b. example: audition
provides information for
1. all-purpose audition (e.g. perception of animal sounds)
2. voice recognition (trying to identify humans according to their voice)
3. auditory affect perception (emotion detector)
4. perception of linguistically relevant phonetic material
c. example: phonology
receives information at least from
1. acoustic-phonetic perception
2. vision (McGurk effect)
d. Jackendoff (2002:223ss)
takes advantage of the need for multiple inputs and outputs in order to argue for Bigh Brother interface modules: a number of them provides a given module with information of different origins, and a number of them read from a given module. Nothing more needs to be said because Big Borhter translators are all-powerful.

(24) lexical option:
the input and output of modules is distinct from the input and output of lexica

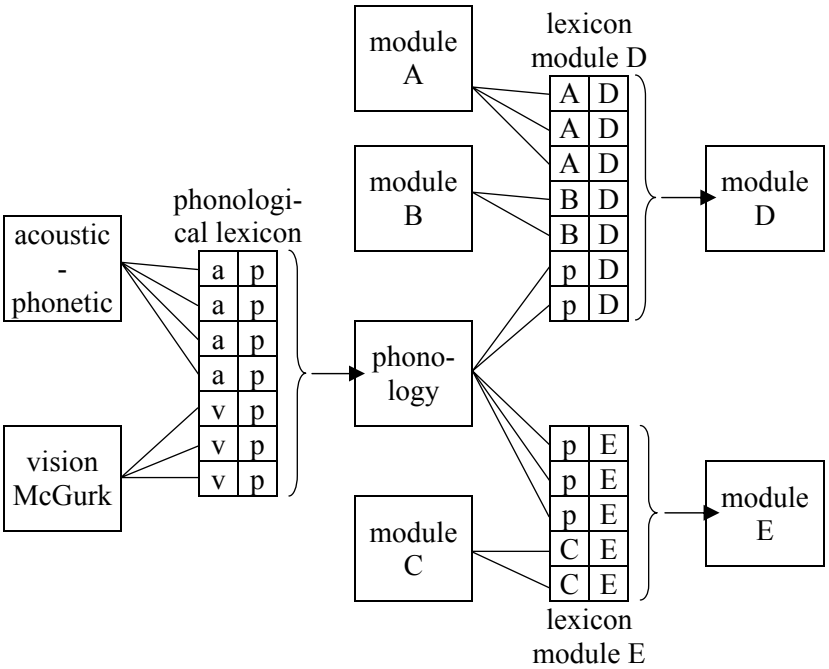
a. translation necessarily has a uniform output, but may have variable inputs.
A module X receives stimuli from many different modules, hence which are formulated in many different languages. However, it can only understand its own language, which is different from all input languages.
==> there must be a multiple-to-one translation into the language of the receiving module.

b. hence each module has, on its input side, a proprietary lexicon whose output belongs to its domain.

c. The arbitrary association of the two items of a lexical entry is precisely what makes a lexicon.

d. for a given module, however, the origin and the language of the stimulus that has provoked the injection of some element is neutralised: it only sees the output side of its lexicon.

(25) intermodular communication through lexical access
a - pieces of the acoustic-phonetic vocabulary
v - pieces of the visual vocabulary
p - pieces of the phonological vocabulary
A - pieces of the vocabulary of module A
etc.



(26) morphemic and boundary information is the same

a. linguists have always strictly dissociated the consideration of morphemic and non-morphemic (i.e. boundary) information.

b. in a lexical perspective, they are not any different:
- they come from the same module (morpho-syntax)
- they associate a piece of morpho-syntactic with a piece of phonological structure

c. their identical status has significant consequences, cf. below.

5. (Practical) consequences of one-channel translation

(27) consequences - overview

a. boundary information (just as morphemic information) must be able to exist as a lexical entry.
This is not true when all-powerful Big Brothers do translation: since they are completely unconstrained, they can produce any output.

b. boundary information (just as morphemic information) must be identifiable as a piece in the linear string.
This is not true when all-powerful Big Brothers do translation: since they are completely unconstrained, they can also modify the phonological properties of morphemes, i.e. be linearly unidentifiable.

c. the lexical existence of boundary information enforces Direct Interface: Big Brothers can output anything, including diacritics, but the lexicon can only inject phonological material into phonology.
Looked at from a broader modular perspective, it is obvious that every module has a proprietary lexicon whose output can only feature vocabulary that belongs to the domain of the module in question.
No Diacritics follows from one-channel translation.

(28) boundary information must be a good lexical entry
What is a good lexical entry? A lexical entry

a. may contain domain-specific vocabulary (in phonology: melody)
b. [trivial:] may not contain any computation
c. may contain structure
definition "structure": the result of a computation
example phonology: melody = vocabulary, syllable structure, feet etc. = structure.
d. c) is subject to debate
   1. in syntax (work by Michal Starke)
      e.g. idioms
   2. in phonology
      - classically, syllabification algorithms operate over unsyllabified strings.
      - Government Phonology has always argued for fully syllabified lexical entries.
e. may not contain structure alone, i.e. in absence of vocabulary
this is a trivial consequence of computation: structure is the result of some computation, and computation operates over vocabulary. Hence structure could not exist without vocabulary: its properties are determined by the vocabulary.
f. summary:
possible lexical entries of the phonological lexicon contain
1. vocabulary (melody) alone
2. vocabulary (melody) plus (syllable) structure

impossible lexical entries contain
1. diacritics
2. (syllable) structure without vocabulary (melody)
g. this disqualifies the Prosodic Hierarchy as an output of the translational process
   1. the Prosodic Hierarchy is made of structure alone
   2. not to mention the fact that it is a diacritic (cf. below)

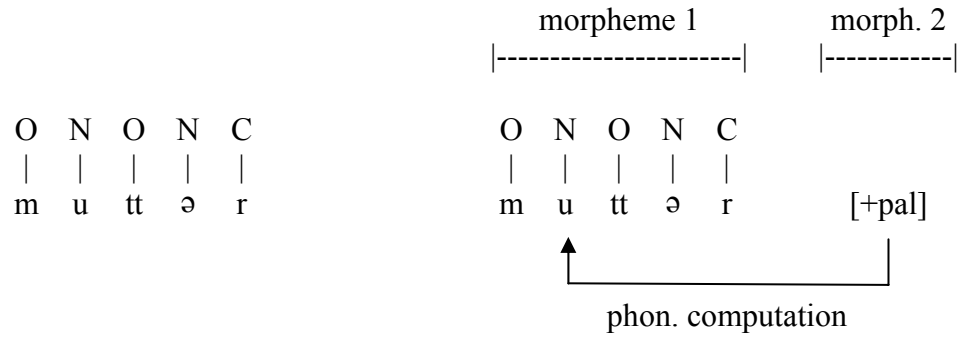
h. **this is the difference with a Big Brother translator:**
his output can be structure alone since anything can be an output (probably even computation?? - nobody knows).

(29) no melody in boundary information
a. we know independently from observation (but we do not know why) that melody is never part of the output of the translational process (cf. (20))
b. hence different options are available for morphemic and boundary information:
1. morphemic information
the output of the phonological lexicon may be made of
- vocabulary (melody) alone
- a combination of vocabulary (melody) and structure
2. non-morphemic information
the output of the phonological lexicon may be made of
- ???
may not be made of:
- melody
- melody plus structure
c. hence what could boundary information be made of?
- is there any domain-specific vocabulary that is NOT melody?
- well, that depends on your individual phonological theory.
- CVCV: CV units are part of the basic vocabulary but are not melody. They are not structure either since they are not the result of any computation: they are given.

(30) what does "linearization at PF" mean?
a. how does linearization work? Where is the linearization algorithm?
Syntacticians usually talk about "linearization at PF", but this does not mean anything since no phonological theory in this world does a linearization job.
b. whoever does linearization and wherever its it done, one thing is for sure: the input into phonology is linearized. All phonological theories operate over a linerized string.
c. also, it is for sure that morphemes are phonological pieces which come from the lexicon.
d. if the same is true for boundary information, "linearization at PF" is
1. either what happens upon spell-out: lexical entries are accessed in a specific order which is determined by the spell-out mechanism. That is, every lexical access inserts a piece into the phonology, and the linear string of the pieces in phonology reflects the chronological order of their respective lexical access.
2. or what happens between the output of the phonological lexicon and the input into phonology.
This is odd: some extra computational device would be needed.

(31) lexical entries must be independent objects in the linear string
a. since there is no difference between morphemes and boundary information, the latter necessarily materializes exactly in the same way as a morpheme: as a piece of the linear string.
b. hence boundary information cannot modify edges of morphemes, as I have suggested before (cf. below).

c. true: melody and tone can be floating objects that are injected into the phonology in a specified linear order. Upon phonological computation, they then "melt" with some other morpheme and produce a global result.
Crucially, however, only regular phonological computation can "melt" them. Their bare injection into the phonological string is necessarily linear and leaves all other pieces untouched.
Example: the classical autosegmental analysis of German Umlaut



d. but this is not an option for boundary information since, recall, it cannot feature melody. And only melody can float.
==> boundary information is always identifiable as a piece of the linear string, after phonological computation as much as before.

e. a Big Brother translator does not need to respect pieces of the linear string: it may also intervene on edges of morphemes in order to modify their phonological properties. It is the lexical origin of boundary information that imposes the linear restriction.

(32) conclusion
one-channel translation

a. imposes important restrictions on the translational process:
   1. boundary information cannot materialize as structure without vocabulary.
      ==> exit the Prosodic Hierarchy
   2. boundary information cannot modify edges of morphemes

b. makes a very strong prediction:
   boundary information always realizes some morpho-syntactic structure
   this also follows from the lexical origin of boundary information:
   1. if a lexical unit has been inserted into the phonology, a lexical access has occurred.
   2. Lexical access, however, only occurs if some stimulus has been produced on the input-side of the lexicon.
   3. only the spell-out mechanism can produce such a stimulus on the morpho-syntactic side.
   4. spell-out means that some structure is spelt out.
   5. ==> every time a linguist can identify the presence of some boundary information in phonology, there must be some syntactic property in the language that is absent from languages where the boundary information at ahnd does not occur.

c. this is a very futuristic prediction:
linguistis have a hard time establishing, for a given language, a reasonably generalized catalogue of morpho-syntactic environments that give rise to boundary information.
They are very far from correlating this catalogue with morpho-syntactic behaviour in the same language, let alone the contrast with other languages.

6. One-channel translation, Direct Interface and CVCV

(33) Direct Interface
Scheer (2005a,b, 2006a,b, forth, in press)
a. No Mediation = No Diacritics
b. unlike all other interface theories (except Direct Syntax), no specific interface vocabulary is imposed (#, omegas etc.).
c. the vocabulary of the representational device is the vocabulary of the phonological theory:
==> only truly phonological objects can be the output of the translational process.
d. definition of "truly phonological object"
a truly phonological object is a unit that is needed for the purpose of domestic phonology and in absence of any issue related to extra-morphemic (i.e. boundary) information.
Example: palatalization.

(34) effects of one-channel translation on Direct Interface
a. feeding of independently reached conclusions
1. the Prosodic Hierarchy does not qualify
2. representational intervention is only local and linear (domains do not qualify)
b. edges of morphemes cannot be touched by the translational process at all.
There is no need for a theory-dependent definition of "edge of a morpheme".
Direct Interface becomes entirely theory-neutral.
c. arrows do not qualify as an output of the translational process
1. wrong: "FEN are externally governed (by the TO)"
2. wrong: "FEN receive orders that modify their phonological properties"

(35) the Prosodic Hierarchy does not qualify
a. old argument:
because it is a diacritic (Scheer in press)
1. applies only to the upper layers (from the Phonological word upwards)
2. does not apply to those layers which are bottom-up constructions: morae, syllable, feet. These satisfy the requirements of truly phonological objects.
b. new argument:
because it is structure alone and hence cannot sit in the lexicon.
==> applies to all layers

(36) non-local intervention (domains) does not qualify

a. old:
domains do not qualify as the output of the translational process because they are necessarily created by phonological computation. However, the Translator's Office carries out a computation in its own right which is different from phonological computation.
==> even non-diacritic domains do not qualify

b. new:
domains do not qualify as the output of the lexicon because they are structure alone.

c. new:
the lexicon imposes a linear order, hence locality is automatic: boundary information cannot intervene in any other way than between two morphemes.

e. **==> representational intervention is necessarily LOCAL**

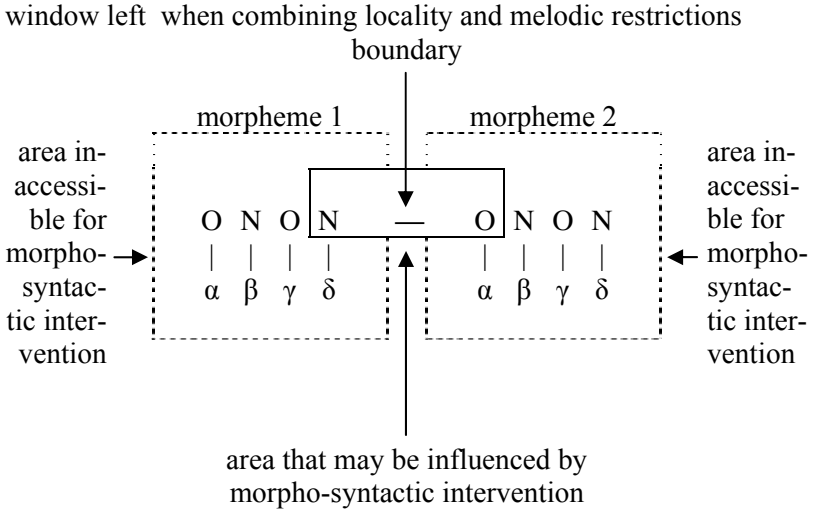
(37) morpheme-internal intervention

a. recall one of the two core observations regarding partiality of translation (cf. (20)): boundary information has no bearing on morpheme-internal material. Only edges of morphemes react on boundary information.

b. this "morpheme-internal no-touch zone" remained unexplained: the TO could well have modified morpheme-internal properties.
Now it has an obvious explanation: boundary information is a linear object that is inserted only between morphemes.

c. the morpheme-internal observation was translated by a restriction on the area accessible to the TO: only edges of morphemes.
This, however, supposes a definition of what an "edge of a morpheme" is: the definition is necessarily theory-dependent, i.e. ugly.
Now:
no definition is needed anymore.

(38) old definition of "edge of a morpheme": "first and last constituent"



(39) lateral relations are out of business I
  a. Kaye's (1990) "parametric licensing of FEN" was transformed into "parametric Government of FEN".
     The parametric decision was made in the TO, which in some languages goverend FEN, in others didn't.
  b. hence Government was an output of the translational process.
  c. this is only possible with a Big Brother: Government is part of phonological computation, and as such cannot sit in the lexicon.
  d. the parameter regarding FEN must be expressed in some other way: the translational process does not contribute.

(40) lateral relations are out of business II
  a. old:
     the TO could modify the phonological properties of FEN through instructions:
     1. "although unable to govern on phonological grounds, you are a good governor"
     2. "although unable to license on phonological grounds, you are a good licensor"
  b. new:
     impossible because the edge of morphemes cannot be touched.
  c. what is phenomenology covered in the old version?
     1. extrasyllabicity - a language-specific parameter
     2. the existence of RT# clusters - a language-specific parameter

(41) what, then, is left for the phonological representation of boundary information?
  a. the only thing that is
     - neither a piece of melody
     - nor a piece of structure
     is a CV unit
  b. ==> the properties of CVCV predict that the only phonological vector of (on-line computed) boundary information are CV units.

(42) summary
  a. all actions of the TO regarding lateral relations that are disqualified by one-channel translation
     1. concern language-specific parameters:
        - phonetic realization of FEN
        - ability of FEN to govern and license
     2. concern FEN
  b. it makes sense that an interface theory refuses to treat them:
     1. they simply do not concern interface activity
     2. they are language-specific **phonological** parameters
     3. they do not depend on the result of morpho-syntactic computation: whatever the sentence, the reaction of FEN will be the same.
     4. no translational activity is involved.
  c. on-line computed interface information and lexically recorded (in some parameter lexicon) phonological parameters are two distinct things that must not be confused.

(43) conclusion
  a. one-channel translation offers serious benefits and does away with modularity-violating Big Brothers.
  b. its consequences confirm previous conclusions (of Direct Interface):
    1. the Prosodic Hierarchy does not qualify
    2. representational intervention is only local
    3. diacritics do not qualify
  c. it does away with the awkward task of defining what an "edge" is
  d. it points out the contrast between on-line translation and phonological parameters. Any interface theory must not (should be unable to) treat the latter.

Appendix
The mapping puzzle: still a mystery today

(44) How exactly does the mapping mechanism work?
  a. are there cross-linguistic generalisations regarding the portions of the morpho-syntactic structure that are phonologically relevant ?
  Or regarding those that cannot be relevant ?
  b. Why does a mapping rule group this or that portion of the morpho-syntactic structure and not others ?
  Is the mapping mechanism restricted in any principled way ?
  According to which rationale are mapping decisions are taken ?
  The cross-linguistic variation of mapping rules has proven to be rather inflational.
  c. mapping is very poorly understood:

> "the study of postlexical rules sensitive to syntactic or prosodic structure is still in its infancy. Phonologists know comparatively little about the range of phenomena that can be encompassed by such rules, compared for instance with what is known about word-internal phonological processes or rules of syntax. At the moment theories must be advanced on the basis of data that are, from the language-internal point of view, rich and complex, but are also, from the cross-linguistic point of view, sparse and diverse." Kaisse & Zwicky (1987:4)

  d. example: French liaison, whose optional and impossible morpho-syntactic contexts to date may not be characterised as a natural class.
  e. methodology in Prosodic Phonology
    1. regarding a particular phonological process, establish the list of triggering and blocking boundaries.
    2. equate the size of the chunks delimited by blocking boundaries to some hierarchic level of the prosodic constituency.
    3. a mapping rule is written that specifies which parts of the morpho-syntactic structure are grouped together in order to achieve the phonologically relevant chunk of the linear string, which will then be called a unit of the prosodic hierarchy
    4. the mapping job, thus, amounts to boundary grouping.
  f. empirical situation
    1. empirical studies are concentrated from the mid 80s until the mid 90s, cf. below.
    2. the early Prosodic Phonology period (before 1985) has not produced much empirical material, and the still seemingly anarchic situation after a decade of empirical work has produced a loss of interest since the mid 90s.

3. since the advent of OT, the focus of mapping has been shifted to "soft" factors such as the size of prosodic constituents and information structure. These do not continue the inquiry on morpho-syntactic conditions (cf. below).

(45) Selkirk (1986): end-based mapping theory
[based on Chen (1985)]

a. first (and only) serious attempt at reducing mapping to a small number of principles that account for all mapping activity in all languages.
"up to now there has been no general theory of the mapping between syntactic structure and prosodic structure" (Selkirk 1986:384).

b. application of end-based mapping to various languages
Hale & Selkirk (1987), Cowper & Rice (1987), Selkirk & Tateishi (1988), Selkirk & Shen (1990)

c. Alignment, the dominant mapping system in OT, is directly inspired by Selkirk (1986), cf. McCarthy & Prince (1993,2001:vii):
both systems rely on edges:
"the syntax-phonology mapping can be defined simply by reference to the ends of syntactic constituents" (emphasis in original, Selkirk 1986:386).

d. how it works:
1. Selkirk assumes
- X-bar theory
- the irrelevance of morpho-syntactic labels
2. there are 3 and only 3 phonologically relevant segmentations of the linear string: each node of an XP can enforce the beginning of a new phonologically relevant unit.
3.

	left end	right end	result on the phonological side
X0	Word[	]Word	phonological word
X'	Xhead[	]Xhead	"small phonological phrase"
X"	Xmax[	]Xmax	phonological phrase

4. whether the left or the right edge of an X-bar level determines the segmentation depends on a parametric choice made by languages.
5. awkward intermediate level:
Selkirk (1986:394) claims that it "has been discerned in a variety of languages. It is one which includes the head of a phrase and preceding or following specifier material, but not any complements (arguments) to the head" (also, functional words do not count as words). She calls it the "small phonological phrase", for which she provides evidence from French liaison.
6. Selkirk's end-based theory only concerns the middle area of the classical prosodic hierarchy. Are absent
- phonological utterance and the intonational phrase
- syllable, feet
Selkirk believes that intonational phrases are semantically defined rather than morpho-syntactically, something that has not varied since Selkirk (1984:27s).
Syllables and feet are out of business for mapping anyway (cf. above).

e. main advantage: simplicity
Example: a reanalysis of vowel length in Chi Mwi:ni (Bantu) shows how effective her system is: compare Hayes' (1989 [1984]) (a text which circulated as a manuscript since 1984) formulation of the relevant mapping with Selkirk's (1986:397):
1. relation-based (Hayes 1989 [1984]:211)
   - in [X0Y"…]X", where X0 is the head of X" and Y" is an adjacent complement, the sequence X0Y" forms a P-phrase.
   - all clitic groups unaffected by 1) form P-phrases.
2. end-based
   ]Xmax
   that is, a new phonological phrase begins after the last word of each maximal projection.

f. end-based vs. relation-based
Selkirk calls the regular way of doing mapping "relation-based" because it invokes the linear order of constituents, as opposed to her mechanism which does not appeal to relations between consecutive constituents in surface syntactic structure.

g. a consequence of end-based mapping: boundaries are the real interface currency.
"End-based" means "at a certain boundary": phonologically relevant chunks of the linear string are defined by a local transition from a certain morpho-syntactic category to another. Kaisse & Zwicky (1987) put it this way:

> "Reference to constituent edges also plays a central role in end-based approaches to prosodic domain determination […]. These approaches represent a return in spirit to the word-boundary theory of Chomsky & Halle (1968) and Selkirk (1972), which held that only an impoverished subset of the information provided by syntax is available to phonology." Kaisse & Zwicky (1987:10)

(46) evolution of mapping

a. from universal statements with little or no variation to the recognition of a frustrating variety of specific situations.

b. the growing body of evidence from various genetically unrelated languages that has been accumulated since the late 70s, especially regarding the level above the word, is highly dissuasive for anybody who believes in a world where a few basic principles define what a possible grouping of phonologically relevant chunks of the linear string is.
Cross-linguistically stable patterns simply do not appear to emerge, and the availability of more data seems to make the overall picture more and more foggy, instead of clearing it up.

c. Phonological Phrase formation
Selkirk (1981a [1978]:126)
1. An item which is the specifier of a syntactic phrase joins with the head of the phrase.
2. An item belonging to a "non-lexical" category (cf. Chomsky 1965), such as Det, Prep, Verbaux, Conjunction, joins with its sister constituent."

d. Selkirk (1980b:580) still writes that "the conception of mapping between syntax and phonology is an eminently simple one".

e. Nespor & Vogel (1982)

> "we propose a series of mapping conventions for Italian which we will then argue are sufficiently general to be able to account for any X-bar type language once the values of certain syntactic parameters have been assigned." Nespor & Vogel (1982:227)

f. Nespor & Vogel (1986:5)
the degree of universality is proportional to the rank in the prosodic hierarchy: cross-linguistic variation is most important for the phonological word and decreases as we move up in the prosodic tree: the phrasing of the phonological utterance, then, is almost universal.

g. Phonological Phrase Formation
Nespor & Vogel (1986:168)
1. φ domain
   The domain of φ consists of a C which contains a lexical head (x) and all Cs on its nonrecursive side up to the C that contains another head of the maximal projection of X.
   [C = Clitic Group]
2. φ construction
   Join into an n-ary branching φ all Cs included in a string delimited by the definition of the domain of φ."

h. but there seems to be much more cross-linguistic variation than that.
Cho (1990) for example considers a phonological process in Korean whereby obstruents voice in intervocalic position depending on the type of adjacent boundary.[1]
In Korean, an underlying word-initial plain voiceless obstruent that occurs after a vowel-final word

is voiced in	remains voiceless in
determiner - noun	subject - verb
adjective - noun	subject - object
possessive noun - noun	object - object
(John's book)	conjunction - noun
verb of a relative clause - noun	Topic-NP - S'
object - verb	(apples, they throw away)
verb - verb	Subj-sent.Adj
	subject - sentential adverb

i. mapping rule for Phnological Phrases according to Cho (1990:57)
apply the following rules cyclically to all maximal projections, proceeding from the bottom up. At any given stage (1) applies before (2). Let the maximal projection under consideration on a given cycle be M.
1. if M branches, combine the head of M into a phonological phrase with all adjacent unphrased material, up to and including the closest XP, or if no such phrase is present, the left edge of M.
2. phrase any focused word with the next word, unless that word is already phrased.

After (1) and (2) have applied in all possible environments, (3) applies.
3. unphrased words form phonological phrases of their own.

[1] Korean has three constrastive sets of obstruents, so-called plain, aspirated and tense. Only the former undergoes the process at hand.

j. Detailed studies of the mapping mechanism in other languages have produced similar results: the variational space is atomised, and every language seems to have its own idiosyncratic way of grouping morpho-syntactic divisions into prosodic constituents.

Examples are Neijt (1985, Dutch), Cowper & Rice (1987, Mende), Vogel (1988, Hungarian), Vogel (1990), Condoravdi (1990, Greek), Chen (1990), Poser (1990, Japanese), Bickmore (1990, Kinyambo, Bantu), Kidima (1990, Kiyaka, Bantu), Peperkamp (1995, Italian), Selkirk (2000, English), Kanerva (1990, Chichewa, Bantu), the latter focusing specifically on the issue regarding the unpredictablility of the mapping mechanism.

k. regarding Selkirk's (1986) end-based mapping, Bickmore (1990) (who adheres to Selkirk's end-based model) concludes that

> "we are still in search of a parameterized cross-linguistic phonological phrase-construction rule with descriptve adequacy (let alone explanatory adequacy)." Bickmore (1990:17)

Kanerva (1990:150s) and Bickmore (1990:3ss) provide an interesting overview of the various attempts that have been made in order to define the Phonological Phrase.

Quite surprisingly, Inkelas & Zec (1995:539) agree that the mapping mechanism is by and large mysterious for intonational phrases and phonological utterances, but claim that the two smaller units, the phonological word and the phonological phrase, "exhibit impressive cross-linguistic similarities; […] the attested range of variation appears sufficiently small to be viewed as parametric in nature."

l. currently linguists do not understand how mapping works.
All they can do is to record amorphous lists of blocking and non-blocking environments that are regularly produced by empirical observation.
Only progress on the morpho-syntactic side can entertain hope that one day linguists will be able to make sense of what languages do when they decide which chunks of the linear string are phonologically relevant.

m. selling Prosodic Phonology for a maximally simple and constrained interface theory whose instrument, the Prosodic Hierarchy, is universal.
This is sweeping the mapping-anarchy which creates the universal arborescence under the rug.

1. Talking about intervocalic s-voicing in Italian (which they abbreviate ISV), Nespor & Vogel (1986) write that

> "we can formulate ISV as a ω span rule in a maximally simple way as seen in (64), whereas the expression of the domain of application of this rule in terms of morphological constituents would not amount to more than a list of disparate environments." Nespor & Vogel (1986:129)

Nespor & Vogel thus simply forget to mention that in order to achieve the maximally simple structural description of the ω span rule they first need to create the ω by a maximally complicated and unnatural mapping rule which transforms the list of disparate environments into an ω.

2. More of the same is found in Booij (1985a):

> "This theory [Prosodic Phonology] is superior to both standard and natural generative phonology in its approach to the influence of morphological boundaries on phonological processes. […] It excludes the rather arbitrary use of boundaries made possible in the SPE-framework." Booij (1985a:34)

n. Prosodic Phonology resigns from morpho-syntax
It entertains a comfortable dustbin: the Black Box, non-isomorphism, which allows for "phonological" solutions when the problem is evidently morpho-syntactic.
We don't understand mapping. This can be due to

1. the fact that we haven't found the right morpho-syntactic generalization: the solution will come from a better morpho-syntactic understanding/ theory.
2. some activity in the Black Box (which is responsible for non-isomorphism).

under non-isomorphism, thus, there is a non-syntactic escape-hatch: we don't need to do more syntax in order to understand, this may all be due to the Black Box.
==> this is not good: phonologists must not be able to entertain the mirage of a miraculous Black Box. The only solution lies in a better understanding of morpho-syntax.

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