Tobias Scheer
CNRS 6039, Université de Nice
scheer@unice.fr
this handout and many of the references quoted at
www.unice.fr/dsl/tobias.htm

Ealing 07
ENS, Paris
24-27 September 2007

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

Handout no2

VII. Direct Interface

(1) No mediation - hence no diacritics
- a. the output of the Translator's Office are only truly phonological units.
- b. 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-phonological information.
- c. hence, are ruled out:
  - omegas, the Prosodic Hierarchy
  - boundaries
  - brackets

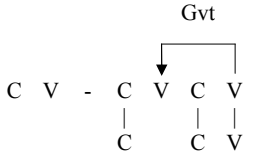
(2) phonological theories may be evaluated according to their behaviour at the interface
- a. unlike all other theories (except Direct Syntax), Direct Interface does not impose any interface vocabulary.
- b. its representational vocabulary are the units of whatever phonological theory is used.
- c. different phonological theories have different vocabulary, and hence make different predictions how the interface works and what is a possible interface event.
- d. hence they may be evaluated according to their behaviour at the interface.
- e. structuralism and SPE did exactly the right thing:
  1. here is what my phonological theory looks like
  2. hence my interface vocabulary will be one of my phonological units
     - phonemes in structuralism
     - segments in SPE
  3. this predicts absurd interface events: # → p etc.
  4. conclusion: the phonological theory must be wrong.
     - The objects which it offers for the incarnation of higher level information are the wrong ones.
     - ==> phonological theory must have other objects, of a kind that have not been discovered yet.
     - ==> autosegmental representations could have been discovered on these grounds.
- f. Scheer (2005a,b, 2006a,b, forth a,b)

(3) the DIRECT effect
true phonological objects make predictions in phonology precisely because phonology reacts on them, and in any theory this reaction may be calculated beforehand.
- a. diacritics do not make any prediction: "#" could trigger or block any phonological process and its reverse. A CV unit cannot.
- b. example

  language A: ø → V / #C__C

  language B: V → ø / #C__C

  are both possible natural languages when using #: the object "#" does not rebel against language B, which of course is non-human. Because "#" does not make any prediction at all, it has no predictable effect on phonology: it could trigger any process and its reverse.
  By contrast, CVCV and # = CV make a clear prediction:



erasing the vowel is impossible because this leads to a situation where the initial V remains orphan: the structure is ill-formed.

(4) possible output of the Translator's Office
- a. melody is invisible for morpho-syntax
  higher levels cannot intervene below the skeleton, i.e. manipulate melody.
- b. this is Phonology-free Syntax in the opposite direction
- c. empirical grounds
  1. phonotactic and suprasegmental effects are plethoric at the edge of morphemes: extrasyllabicity, extraprosodicity, the restriction of word-initial clusters to obstruent-sonorant sequences, the allowance for heavy clusters at the right edge (e.g. English sixths [sɪksθs]) etc.
  2. no melodic influence on record: p → l / __# is unheard of.

(5) edge-interior asymmetry
- a. phonological law alone governs the phonological behaviour inside morphemes.
- b. both regular domestic phonological law and extra-phonological law (i.e. the representational output of the Translator's Office) determine the phonological behaviour of morpheme edges.

(6) asymmetry between the two edges
- a. edges are special, but not in the same way
  Rubach & Booij (1990)
- b. CVCV
  1. only Nuclei are phonological actors
  2. a string cannot begin with an empty Nucleus, but it can end in an empty Nucleus.

(7) intervention is local:
domains cannot be non-diacritic
a. what could a non-diacritic domain look like?
b. McCawley's (1968:55) boundary-based domains
1. /#pat#atak#/
t → d / V__V
produces [patadak]
2. boundaries come in pairs and flank morphemes.
3. pairwise insertion of boundaries is necessarily diacritic: a non-diacritic implementation makes the outlandish prediction that the same effect should also occur at the other end of the morpheme.
==> the Direct Effect rules out pairwise insertion.
c. the domains of the Prosodic Hierarchy
1. the 4 higher layers (U, IP, PhPr, PWd) do not qualify anyway because they are diacritic: their only purpose is to store morpho-syntactic information (the buffer).
2. the two lower layers (feet, syllables, morae in some versions) are not diacritic: unlike the 4 upper layers, they are bottom-up constructions and owe NOTHING to the Translator's Office: were there no interface, they would still exist.
3. if they exist independently of any morpho-syntactic impact, they cannot carry any morpho-syntactic information.
4. ==> domains are either diacritic (and may carry m-synt information) or not. In the latter case, they are legitimate interface objects, but precisely for that reason cannot carry any extra-phonological load.
5. also, domains are necessarily created sinside the phonology - precisely what feet and syllables are not (they are bottom-up constructions).
==> domains are neceesarily derived categories, i.e. the result of phonological computation. Hence they could not be the output of the Translator's Office.

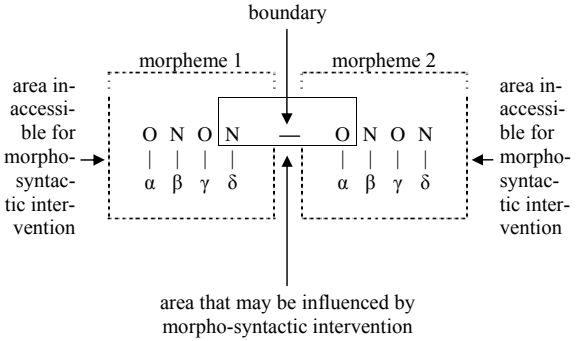
(8) non-diacritic intervention is necessarily privative
a. because of the Direct Effect: unlike diacritics, true phonological objects has a (predictable) effect.
b. every object that is sent down to the phonology has thus a phonological effect, which means that morpho-syntactic divisions that are phonologically irrelevant cannot have a phonological existence.

(9) phonology cannot distinguish between different origins of pieces
a. this follows from modularity
b. hence pieces over which phonological computation operates must not be distinguishable (e.g. diacritics vs. non-diacritics).

(10) the interface has no authority over phonological processes
a. it cannot create, eliminate or modify phonological computation, which exists independently of any interface consideration.
b. it can only modify the conditions of application of the phonological computation: by altering the pieces over which phonology operates.

(11) domestic phonological solutions for edge effects that do not appeal to any extra-phonological information must be wrong.
Example: extrasyllabicity
a. the pattern regarding the dual behaviour of word-final consonants and final closed syllables is usually explained by
1. extrasyllabicity
2. Peripherality Condition:
extra-X objects (extrasyllabic, extramoraic, extraprosodic, extrapedal etc.) can only occur at word-(morpheme-) edges.
Clements (1990:290), Hayes (1995:57s).
==> a purely phonology-internal account.
b. which must be wrong because the special behaviour at edges is not due to edges, but to the fact that edges are in contact with morpho-syntactic divisions.
Edge effects must thus derive from higher level intervention.

(12) window left when combining locality and melodic restrictions

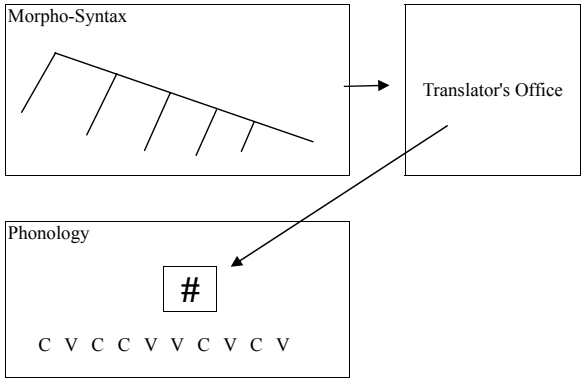


(13) summary: consequences of non-diacritic intervention
a. competition of phonological theories
Evaluation of individual phonological theories according to their behaviour at the interface
b Direct Effect
. the vectors of morpho-syntactic information make predictions in the phonology. Anything and its reverse cannot be the consequence of higher level intervention anymore.
c. locality of intervention
morpho-syntactic intervention is necessarily local; domains do not qualify as vectors of higher level information
d edge-interior asymmetry
. local intervention explains why phonology is different morpheme-internally and at adges
e. privativity
morpho-syntactic intervention is necessarily privative

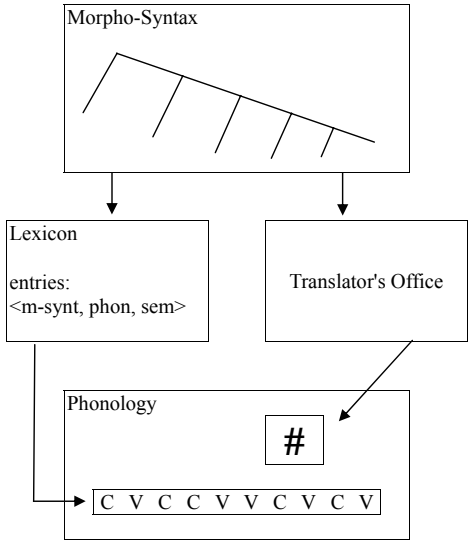
VIII. One-Channel Translation: the Translator's Office is a (modular) monster and has to go

1. Two-channel vs. one-channel translation

(14) general architecture SPE-Prosodic Phonology (incomplete picture)



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



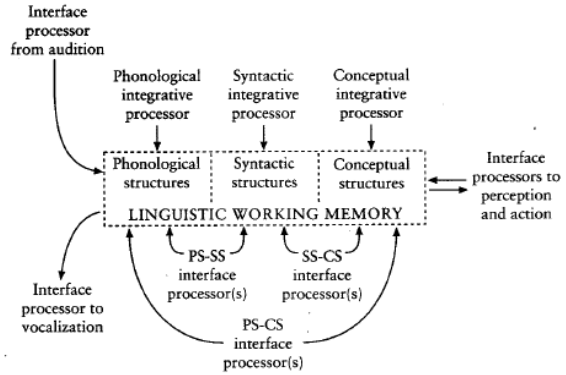
2. The Translator's Office is a Big Brother, hence a modular monster

(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.

3. 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.

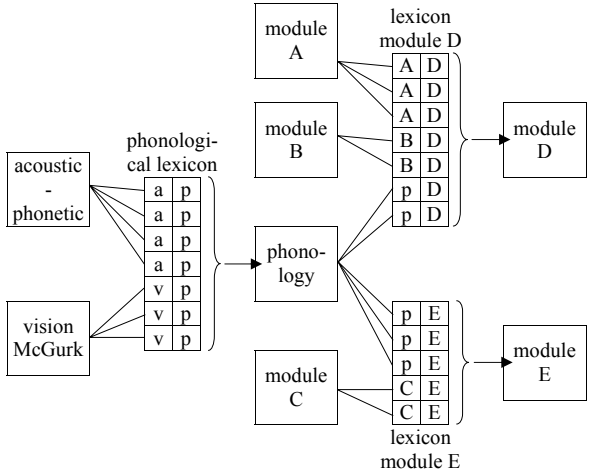
(21) arguments for one-channel translation through the lexicon
   Making the translational device a Big Brother is neither natural nor the default
   a. no violation of modularity by Big Brothers.
   b. economy
      a slimmer grammar: two translational processes for the price of one
      1. the lexicon 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.

4. (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

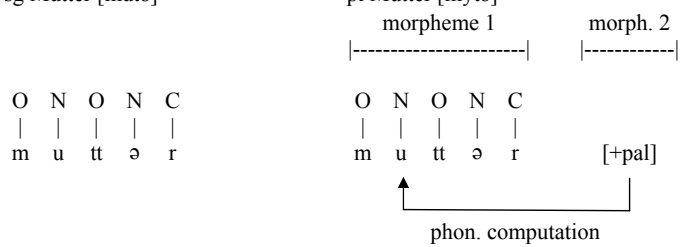
impossible lexical entries contain
1. diacritics
2. (syllable) structure without vocabulary (melody)
g. this disqualifies the Prosodic Hierarchy as an output of the translational process
1. the Prosodic Hierarchy is made of structure alone
2. not to mention the fact that it is a diacritic (cf. below)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

References

Clements, George 1990. The role of the sonority cycle in core syllabification. Papers in Laboratory Phonology I, edited by John Kingston & Mary Beckmann, 283-333. Cambridge: Cambridge University Press.

Fodor, Jerry 1983. The modularity of the mind. Cambridge, Mass.: MIT-Bradford.

Hayes, Bruce 1995. Metrical Stress Theory. Principles and Case Studies. Chicago, London: University of Chicago Press.

Ingleby, Michael & Ali Azra 2003. Phonological Primes and McGurk Fusion. Proceedings of the 15th International Congress of Phonetic Sciences, 2609-2612.

Jackendoff, Ray 1997. The Architecture of the Language Faculty. Cambridge, Massachusetts: MIT Press.

Jackendoff, Ray 2002. Foundations of Language. Brain, Meaning, Grammar, Evolution. Oxford: Oxford University Press.

McGurk, H. & J. MacDonald 1976. Hearing Lips and Seeing Voices. Nature **264**, 746-748.

Rubach, Jerzy & Geert Booij 1990. Edge of constituent effects in Polish. Natural Language and Linguistic Theory **8**, 427-463.

Scheer, Tobias 2005. We need a translator's office, but the buffer has to go: Direct Interface. Paper presented at the 36th Poznań Linguistic Meeting, Poznań 22-24 April.

Scheer, Tobias 2005. When higher modules talk to phonology, they talk to empty Nuclei. Paper presented at the conference Sounds of Silence, Tilburg 19-22 October.

Scheer, Tobias 2006. The balance of representation and computation at the Interface. Paper presented at the 14th Manchester Phonology Meeting, Manchester 25-27 May.

Scheer, Tobias 2006. Interface Dualism. Paper presented at the 37th Poznan Linguistic Meeting, Poznan 20-23 April.

Scheer, Tobias in press. Why the Prosodic Hierarchy is a diacritic and why the Interface must be Direct. Sounds of Silence, edited by Jutta Hartmann, Veronika Hegedus & Henk van Riemsdijk. Amsterdam: Elsevier.