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Modules and Interfaces

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Reviewers

prof. dr hab. Henryk Kardela, UMCS

dr hab. Eugeniusz Cyran, KUL

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Agnieszka Gawryszuk

Typesetting

Bartosz Mierzyński

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Wydawnictwo KUL
ul. Zbożowa 61, 20-827 Lublin
tel. 81 740-93-40, fax 81 740-93-50
e-mail: wydawnictwo@kul.lublin.pl
<http://wydawnictwo.kul.lublin.pl>

Druk i oprawa
elpil
ul. Artyleryjska 11
08-110 Siedlce
e-mail: info@elpil.com.pl

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List of Contributors

Artur Bartnik

Department of English Historical and Applied Linguistics
John Paul II Catholic University of Lublin, Poland
bartnikart@kul.lublin.pl

Anna Bloch-Rozmej

Department of English Historical and Applied Linguistics
John Paul II Catholic University of Lublin, Poland
abloch@kul.lublin.pl

Maria Bloch-Trojnar

Department of Celtic Studies
John Paul II Catholic University of Lublin, Poland
bloch@kul.lublin.pl

Anna Bondaruk

Department of Theoretical Linguistics
John Paul II Catholic University of Lublin, Poland
bondaruk@kul.lublin.pl

Magdalena Charzyńska-Wójcik

Department of English Historical and Applied Linguistics
John Paul II Catholic University of Lublin, Poland
mcwojcik@kul.lublin.pl

Gréte Dalmi

Department of English Studies
Eszterhazy College, Eger, Hungary
grete@t-online.hu

Janneke Diepeveen

Institute of German and Dutch Languages and Literatures
Freie Universität Berlin, Germany
j.diepeveen@fu-berlin.de

Anna Malicka-Kleparska

Department of English and Polish Contrastive Linguistics
John Paul II Catholic University of Lublin, Poland
malic@kul.lublin.pl

Renáta Panocová

Department of British and American Studies
P.J. Šafárik University, Košice, Slovakia
renata.panocova@upjs.sk

Maria Rosenberg

Department of Language Studies
Umeå University, Sweden
maria.rosenberg@sprak.umu.se

Tobias Scheer

Université de Nice - Sophia Antipolis
and CNRS 6039 Bases, Corpus, Langage
scheer@unice.fr

Alexandra Soares Rodrigues

Instituto Politécnico de Bragança; CELGA - Universidade de Coimbra
University of Coimbra, Portugal
afsr@ipb.pt

Pius ten Hacken

Department of Languages, Translation and Media
Swansea University, UK
p.ten-hacken@swan.ac.uk

Jerzy Wójcik

Department of English Historical and Applied Linguistics
John Paul II Catholic University of Lublin, Poland
jwojcik@kul.lublin.pl

Editors' Preface

Modules and Interfaces is a collection of papers by linguists of different persuasions, dealing with languages such as English, Dutch, German, Swedish, Hungarian, Portuguese, Ecuador Quichua, Zoque, Yamato Japanese, Warao and Polish, from both a synchronic and a diachronic perspective. What all contributors to the volume at hand share are the beliefs that lie at the heart of generative grammar, namely that the structure of grammar is universal and modular. It is true that, as argued by the American structuralists, 'languages could differ from each other without limit and in unpredictable ways' and that there could be no 'pre-existent scheme of what a language must be' (Joos 1957: 96), thus rendering linguistic investigation an arduous and daunting task. However, Chomsky's (1981) Universal Grammar, which says that languages are alike in basic ways and subject to parametric variation, gives a firm foothold to those who wish to construct a model of linguistic competence. The principle of modularity (Chomsky 1981) implies that the grammatical subcomponents are independent, each having its own primitives and principles of organisation. The interaction between them is such that the output of one is input to another, which requires the appropriate interface system, a set of principles mapping one level to the other. The contributors to this volume address a number of issues relating to the exact number of independent generative modules, their prominence, internal structuring, and mutual interactions. Some papers are more theoretically oriented, whereas others present empirical evidence in favour of their respective models.

The model advocated by Chomsky (2005) gives pride of place to the computational/syntactic component of grammar, which extracts words from the lexicon and combines them into more complex structures. The output of the syntactic component is then processed by the semantic component, which is responsible for mapping the syntactic structure into a corresponding semantic representation (meaning), and by the phonological PF component, which generates the phonetic spell-out for each word. The semantic representation interfaces with systems of thought, whereas the PF representation interfaces with systems of speech. As regards the fundamental concept of language, various theoretical approaches concur with Chomsky's assumptions. It is on the questions of detail regarding the structure of grammar that they part company. Nevertheless, Chomsky's model is referred to, if only to be questioned or refined.

Whereas the existence of the syntactic, semantic and phonological modules is beyond question, the morphological domain is contested territory. In the

early days of generative linguistics there was no independent morphological component, its functions being taken over, and shared by, phonology and syntax. In the 1970s the study of morphology gained a new impetus. Adherents of strong lexicalism perceived all morphology as being located in the lexicon (Halle 1973, Jackendoff 1975), whereas supporters of weak lexicalism conceived of morphology as being bifurcated into word formation, whose locus was the lexicon, and inflection, which fell under the purview of syntax (Aronoff 1976, Siegel 1979). Siegel's (1979) proposal of Level Ordering cast a new light on the phonology–morphology interface, and gave rise to Kiparsky's (1982) Lexical Phonology. The two competing lexicalist positions also diverge with regard to the way they view the lexicon and render morphological generalisations. Those who argue for a unity of morphology regard morphemes as linguistic signs listed in the lexicon, and concatenated in accordance with their subcategorisation frames, along the same lines as words are combined to construct phrases (Lieber 1981, Selkirk 1982). On account of its inherent economy and simplicity, the idea that word structure is like phrase structure gained immense popularity amongst non-morphologists, and is employed in research at the morphology–syntax interface and is echoed clearly in the study of compounding, noun incorporation in particular (cf. Spencer 2005). The advocates of split morphology argue for a realisational approach, where morphology is a system of rules spelling out abstract morphological markings. In this approach, the one-to-one correspondence between form and meaning, characteristic of word syntax, is abandoned, and the semantic-syntactic and phonological aspect of morphological operations are considered separately (Matthews 1972, Anderson 1982, 1992, Beard 1988, 1995, Aronoff 1994). Halle and Maranz's (1993) Distributed Morphology framework can be regarded as an attempt at combining the separationist approach with the tradition which insists on similarities in morphological and syntactic structure.

The long-lasting research endeavours, though still far from giving us conclusive solutions, have documented the fact that the (morpho)syntax–phonology interface has a solid empirical basis. Amongst the earlier collections of studies that should not be overlooked in this respect are Selkirk (1984) and Inkelas and Zec (1990). As pointed out in Inkelas and Zec (1995: 535), the two phenomena manifesting the phonology–syntax interface pertain, on the one hand, to the existence of 'rules that operate over syntactically defined domains, showing that constituency in one component (syntax) is relevant to the processes in another (phonology)' and, on the other, to phonological constraints that may be relevant to syntactic processes. Their studies challenge, at least partly, the position taken by Pullum and Zwicky (1988) who propose a specific asymmetry, maintaining that some syntactic information can indeed be available to phonology, but that the opposite direction of information

transmission, namely from phonology to syntax, is impossible. More recent studies concerning the phonology–syntax interaction include Selkirk (2001, 2005), Truckenbrodt (2007), Chomsky (2004), Pietroski and Uriagereka (2002), Kahnemuyipour (2004) and many others.

A bird's eye view of the literature focusing on the organisation of grammar allows us to note two divergent trends. One, as indicated above, assumes the possibility of inter-modular communication. Scheer (2005) observes that 'since Selkirk (1984) and Nespor & Vogel (1986), the interface between phonology and the other modules of the grammar has been dominated by the idea that phonological processes make only indirect reference to morpho-syntactic information.' This indirect reference is enabled by prosodic constituency. Thus, no direct reference to morpho-syntactic structure itself is ever made. Scheer maintains that there is only one argument in favour of prosodic constituency, according to which the domains where phonological processes operate and those established by morpho-syntax do not overlap. He refers to this argument as non-isomorphism. In his theory, the prosodic constituency is treated as a buffer to be abandoned. Modularity, in turn, should be perceived as being ontologically independent, non-interactive. Put differently, the modules of grammar exist as separate ontological spaces that 'speak different languages'. Consequently, to use a metaphor, phonology will not understand such categories as case, number or aspect, while nucleus or noise will mean nothing to syntax. This state of affairs calls for the introduction of the concept of the Translator's Office, whose output, in the case of morpho-syntax to phonology translation, must be 'true phonological categories, i.e. categories which exist in phonology independently of any translating process'. This type of interface is direct. Scheer's definition of modularity belongs to the most recent developments in linguistic theory. Other valuable contributions in this research area include Kiparsky (2000), Booij (2000), Rubach and Booij (2001), Ito and Mester (2001), Hay (2002), and Kaisse (2005).

Do the modules of grammar communicate? Do they make reference to the information from the other domains, either directly or indirectly? How are they internally structured? Which phenomena testify to the interfaces between the modules? What are the outcomes of inter-modular relations? These and many other questions will be addressed in the following pages. With this collection of articles we invite the inquisitive reader into the interior of grammar, whose intricate workings, we hope, will be revealed in the in-depth analyses of the phenomena involving the interaction between phonology, morphology, syntax and semantics.

Syntactic considerations in the Chomskyan spirit are offered by Anna Bondaruk and Artur Bartnik. **Anna Bondaruk** undertakes to resolve the conflicting views as to whether the *Person Case Constraint* (Bonet 1991), which holds for

a number of typologically unrelated languages such as French, English, Greek, Swiss German, Basque and Georgian, is operative in the double object construction in Polish. A satisfactory account of the possible combinations of clitics and pronouns in accordance with the Minimalist Program (Chomsky 2000, 2001) requires certain refinements of the model, that is the introduction of a new functional projection, namely a light applicative head, and the recognition of the special status of the dative as a combination of a structural and lexical case. **Artur Bartnik** focuses on nominative resumptives and tests the universal validity of the *Highest Subject Restriction* (McCloskey 1990, 2005), which can be observed at work in languages such as Irish, Hebrew, Polish or English. The author amply exemplifies and carefully examines the phenomenon of resumption in Old and Middle English. His findings indicate that nominative resumptives were an option in Old English, alongside the adverbial interpretation, whereas the Middle English period witnessed their gradual elimination. Understanding the factors that triggered the change in question may hold the key to a different parameter setting in languages which do not conform to the *Highest Subject Restriction*, such as Urhobo (Nigeria), Yiddish or Spanish.

The cartographic approach, which is the framework chosen by Gréte Dalmi, offers an insight into the interface between syntax and semantics-pragmatics, in particular the constraining effects of semantics on syntax (cf. Cinque and Rizzi 2008). Its emergence coincided with the rise of Chomsky's (1995) Minimalist Program in response to the proliferation of functional heads in its predecessor – the Principles and Parameters framework (Chomsky 1986). Whereas Minimalism focuses on the rudimentary mechanisms which are involved in syntactic computations, the cartographic approach focuses on the details of the generated structures. **Gréte Dalmi** addresses the question of the categorial status of the word *vajon* 'whether' in polarity and non-polarity questions in Hungarian. In contradistinction to its opposite number in South Slavic languages, *vajon* is characterised by optionality, flexible syntactic positioning, and co-occurrence with the interrogative clitic, none of which is typical of ordinary complementisers. Instead, *vajon* is argued to be an expletive interrogative scope marker. The proposed analysis also has broader theoretical ramifications, since it gives additional support to the different syntactic nature of Long and Partial *wh*-movement.

The analysis of Involuntary-state constructions (ISCs) in Polish is another paper which raises interesting issues relating to the syntax-semantics interface. Polish ISCs display a number of puzzling features, such as the occurrence of the dative argument in the absence of the nominative subject, its human/animate character and lack of control over the event, the default verbal form showing no agreement, the necessity of manner modification, and the presence of the resumptive *się*. To account for these properties **Anna Malicka-Kleparska** employs the model of Semantics in

Generative Grammar (Heim and Kratzer 1998), and presents convincing arguments against the analysis involving the circumstantial modal, as proposed by Rivero, Arregui and Frąckowiak (2010).

Inter-modular interactions involving the phonological component are prominent in the papers by Tobias Scheer, Jerzy Wójcik and Anna Bloch-Rozmej. **Tobias Scheer** discusses problems inherent in chunk definition in phonology. This paper gives us a glimpse of his extensive and impressive research project on the morphosyntax–phonology interface, as laid out in Scheer (2011). The author provides a critical outline of the ongoing debate concerning the definition of chunks that are relevant for phonological processing. In the article, an attempt is made to settle the argument between the representation- and derivation-oriented approaches to the delineation of phonologically significant domains. The solution that emerges from the in-depth critical analysis of the theoretical guises of Distributed Morphology, Lexical Phonology or Prosodic Phonology is the postulate that the Prosodic Hierarchy should be abandoned. Scheer argues that the pieces of representation that are subject to phonological computation have to be defined by phase theory. Put differently, there exist no representational means for identifying phonologically-relevant chunks. Such an approach has serious consequences for our understanding of modularity and the 'co-operation' between phonology and morpho-syntax. They are also addressed in the article.

Jerzy Wójcik in his article conducts a phonological investigation into one of the most intriguing phenomena in the history of the Germanic languages, namely, umlaut. The numerous studies devoted to this development can be divided into two distinct categories: those that assume the exclusively phonological conditioning of umlaut effects, and those where morpho-phonological factors play a crucial role. The author presents yet another perspective on the origin and nature of umlaut that attaches considerable importance to the phonetic conditioning of this effect. More precisely, at least in its initial stages, umlaut turns out to be deeply rooted in phonetics, whereas its morpho-lexical conditioning develops later, and differently in different dialects. Jerzy Wójcik's original contribution to the umlaut-related debate consists in postulating that the development was initiated due to the weakening of the triggers.

The problem of the morphology–phonology interface is also addressed in the article by **Anna Bloch-Rozmej**. The author discusses the phonological status of selected phonological primitives, relying on the evidence provided by the phenomena operating in cross-morphemic contexts. We find out how cross-domain factors contribute to the process of establishing the phonological code of the elements of nasality and low tone (voicing). The author outlines the arguments in favour of the N-L merger and its consequences for the representation of melodies. The discussion is couched in the framework of Government Phonology, which acknowledges the fact

that analytic morphology exerts an impact on the establishment of phonologically-relevant domains.

There are a number of papers which raise contentious issues relating to the categories of the lexicon, the word formation component (compounding and affixation), and the place of morphology in grammar.

Whereas the status of nouns, verbs and adjectives as prototypical major class lexical items is uncontroversial, the categorial status of adverbs is far less so. In English, their behaviour is not uniform (manner vs. spatio-temporal adverbs) and it is not clear whether it is the lexical or syntactic component which underpins their formation. There are languages in which they constitute a clear closed class. **Janneke Diepeveen** investigates the formation of modifying lexemes with derivational suffixes in genetically-related Dutch, English and German. In present-day Dutch and German, unlike in English, there is no formal distinction between adjectives and adverbs. The author offers a diachronic analysis of the Dutch and German derivational suffixes *-gewijs/-weise*, *-erwijs/-erweise* and *-matig/-mäßig*, and argues that the adjectives and adverbs in those languages are just one class of modifiers, in effect positional variants.

Magdalena Charzyńska-Wójcik is concerned with the problem of a comprehensive classification of ditransitive verbs featuring a PP argument in Old English. Visser's classical typology, distinguishing three basic types of subcategorisation patterns, is argued to be inadequate. Instead, a richer system is proposed and its internal structuring explicated.

Pius ten Hacken offers a concise presentation of Jackendoff's (2002, 2010) Parallel Architecture (PA) model, and considers its implications for morphology. It is a model which challenges the central role of syntax, and envisages three independent components which generate the phonological, syntactic, and conceptual representations of an expression in a parallel fashion. The lexicon is not merely a repository of basic forms, but a storehouse for words, multi-word expressions, as well as word-formation and syntactic rules. As regards morphological phenomena, Pius ten Hacken points out that PA can account for the semantics of compounds with greater dexterity than previous treatments by Selkirk (1982) or Levi (1978). However, he identifies certain problems which stem from the failure to distinguish between morphological and syntactic rules, and from placing morphological and syntactic productivity on the same footing. Facts relating to productivity and lexicalisation, illustrated with data from Dutch, lead him to the conclusion that the architecture needs to be amended with a separate word formation component.

Renáta Panocová introduces the basic tenets of the onomasiological approach to word formation (Štekauer 1998, 2005), and develops an analysis of English neoclassical compounds in this framework. It is a meaning-based model, going back to the

Prague school of linguistics (Dokulil 1962), where word formation is an independent component situated outside, but having links with, the lexicon. An adequate analysis of neoclassical compounding has to come to grips with the unclear status of their constituent parts, which are referred to as classical roots, bound stems, affixoids, combining forms, etc., and the relationship between neoclassical and native word formation.

Another type of compounding whose status is debated are compounds with verbal heads, found in a variety of language families such as Algonquian, Australian, and Polynesian. They are analysed as either arising in the lexicon or else being generated by syntax. Similar controversies surround the interpretation of noun incorporation in Swedish. **Maria Rosenberg** analyses various types of N+V structures in Swedish and, contrary to Josefsson (1997), argues in favour of their lexical status. She also demonstrates that Swedish NV compounding does not fit well into the typologies of noun incorporation put forward by Mithun (1984) and Rosen (1989).

Alexandra Soares Rodrigues focuses on the problem of the lack of a one-to-one relationship between word formation rules (WFRs) and affixations, in particular in the cases where a single affix operates in more than one WFR. She conducts a detailed analysis of the behaviour of the affix *-ão*, which operates in Portuguese agent and event deverbal formations, and weighs the pros and cons of different theoretical approaches. She considers inadequate both the separationist process-oriented approaches (e.g. Beard 1995), which view affixes as a simple phonological spell-out of WFRs, as well as the output-oriented models (e.g. Plag 1999), in which affixes bear total responsibility for the construction of derivatives. In her view, the form of the derivative is the result of a complex interaction of, and a maximal semantic compatibility between, the features of the affix, the base and the WFR. Consequently, word formation is a domain, which has interfaces with the main structures (semantics, syntax, phonology), and which involves micro-interfaces between the tiers of those structures.

Category shift or transposition, and especially the formation of action nominalisations, is a recurrent issue in the lexicalist-(neo)transformationalist debate. **Maria Bloch-Trojnar** subjects to close scrutiny the aspectual, grammatical and formal properties of deverbal nominalisations in English, and demonstrates that there are no neat one-to-one correspondences between (a)telicity, (un)countability and morphological marking. She deploys the analytical tools of the non-isomorphic model of Lexeme Morpheme Base Morphology (LMBM) as developed by Beard (1995), in which 'semantics, derivation, and affixation represent three distinct levels of morphological operations, which require two distinct mapping systems' (Beard 1998: 55).

The motivation for this volume was to create a platform for an exchange of ideas, which is often hindered by the fact that technical jargon increases rapidly as

new frameworks and models mushroom. It was also meant to serve as a window on different approaches and to create an opportunity for everyone to decide for themselves whether they are simply restating old problems in new terminology or are offering genuine solutions. This book will be of interest to syntacticians, semanticists, morphologists, phonologists, as well as general linguists.

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Maria Bloch-Trojnar and Anna Bloch-Rozmej

References

- Anderson, S. R. 1982. Where is morphology? *Linguistic Inquiry* 13: 571–612.
- Anderson, S. R. 1992. *A-morphous morphology*. Cambridge: Cambridge University Press.
- Aronoff, M. 1976. *Word formation in Generative Grammar*. Cambridge, MA: MIT Press.
- Aronoff, M. 1994. *Morphology by itself. Stems and inflectional classes*. Cambridge, MA: MIT Press.
- Beard, R. 1988. On the separation of derivation from morphology: Toward a Lexeme/Morpheme Based Morphology. *Quaderni di Semantica* 9: 3–59.
- Beard, R. 1995. *Lexeme Morpheme Base Morphology*. Albany, NY: SUNY Press.
- Beard, R. 1998. Derivation. In A. Spencer, and A. M. Zwicky (eds.), *The handbook of morphology*, 44–65. Oxford: Blackwell Publishers Ltd.
- Bonet, E. 1991. Morphology after syntax: Pronominal clitics in Romance. Ph.D. diss., Cambridge, MA, MIT.
- Booij, G. 2000. The phonology-morphology interface. In L. Cheng, and R. Sybesma (eds.), *The first glot international state-of-the-article book*, 287–307. Berlin: Mouton de Gruyter.
- Chomsky, N. 1965. *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. 1980. *Rules and representations*. New York: Columbia University Press.
- Chomsky, N. 1981. *Lectures on government and binding*. Dordrecht: Foris.
- Chomsky, N. 1986. *Barriers. Linguistic Inquiry Monograph Thirteen*. Cambridge, MA and London: MIT Press.
- Chomsky, N. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
- Chomsky, N. 2000. Minimalist inquiries: The framework. In R. Martin, D. Michaels, and J. Uriagereka (eds.), *Step by step*, 89–155. Cambridge, MA: MIT Press.
- Chomsky, N. 2001. Derivation by phase. In M. Kenstowicz (ed.), *Ken Hale. A life in language*, 1–52. Cambridge, MA: MIT Press.
- Chomsky, N. 2004. Beyond explanatory adequacy. In A. Belletti (ed.), *Structures and beyond: The cartography of syntactic structures, Vol. 3*, 104–131. Oxford: Oxford University Press.
- Chomsky, N. 2005. Three factors in language design. *Linguistic Inquiry* 36: 1–22.
- Cinque, G., and L. Rizzi. 2008. The cartography of syntactic structures. CISCL Working Papers, *STiL* 2: 42–55.
- Dokulil, M. 1962. *Tvoření slov v češtině I. Teorie odvozování slov*. Praha: Nakladatelství ČSAV.
- Halle, M. 1973. Prolegomena to a theory of word formation. *Linguistic Inquiry* 4: 3–16.
- Halle, M., and A. Marantz. 1993. Distributed Morphology and the pieces of inflection. In J. Cole, and S. J. Keyser (eds.), *The view from building 20: Essays in honour of Sylvain Bromberger*, 111–176. Cambridge, MA: MIT Press.
- Hay, J. 2002. From speech perception to morphology: Affix ordering revisited. *Language* 78: 527–555.
- Heim, I., and A. Kratzer. 1998. *Semantics in Generative Grammar*. Malden, MA: Blackwell Publishers Inc.
- Inkelas, S., and D. Zec. 1990. *The phonology-syntax connection*. Chicago: University of Chicago Press.
- Inkelas, S., and D. Zec. 1995. Syntax-phonology interface. In J. Goldsmith (ed.), *The handbook of phonological theory*, 535–549. Cambridge, MA: Blackwell Publishers.
- Ito, J., and A. Mester. 2001. Structure preservation and stratal opacity in German. In L. Lombardi (ed.), *Segmental phonology and Optimality Theory*, 235–276. Cambridge: Cambridge University Press.
- Jackendoff, R. 1975. Morphological and semantic regularities in the lexicon. *Language* 51: 639–671.
- Jackendoff, R. 2002. *Foundations of language: Brain, meaning, grammar, evolution*. Oxford: Oxford University Press.
- Jackendoff, R. 2010. *Meaning and the lexicon: The Parallel Architecture 1975–2010*. Oxford: Oxford University Press.

- Joos, M. (ed.) 1957. *Readings in linguistics: The development of descriptive linguistics in America since 1925*. Washington: American Council of Learned Society.
- Josefsson, G. 1997. *On the principles of word formation in Swedish*. Lund: Studentlitteratur.
- Kahnemuyipour, A. 2004. The syntax of sentential stress. Ph.D. diss., University of Toronto.
- Kaisse, E. 2005. Word-formation and phonology. In P. Štekauer, and R. Lieber (eds.), *Handbook of word-formation*, 25–47. Dordrecht: Springer.
- Kiparsky, P. 1982. From Cyclic Phonology to Lexical Phonology. In H. van der Hulst, and N. Smith (eds.), *The Structure of phonological representations*, 130–175. Dordrecht: Foris.
- Kiparsky, P. 2000. Opacity and cyclicity. *The Linguistic Review* 17: 351–365.
- Levi, J. N. 1978. *The syntax and semantics of complex nominals*. New York: Academic Press.
- Lieber, R. 1981. *On the organization of the lexicon*. Bloomington: Indiana University Press.
- Matthews, P. H. 1972. *Inflectional morphology: A theoretical study based on aspects of Latin verb conjugations*. Cambridge: Cambridge University Press.
- McCloskey, J. 1990. Resumptive pronouns, A'-binding, and levels of representation in Irish. In R. Hendrick (ed.), *Syntax and semantics. The syntax of the Modern Celtic languages*, 199–248. New York: Academic Press.
- McCloskey, J. 2005. Resumption. In M. Everaert, and H. van Riemsdijk (eds.), *The Blackwell companion to syntax*, vol. IV, 94–117. Oxford: Blackwell.
- Mithun, M. 1984. The evolution of noun incorporation. *Language* 60: 847–894.
- Nespor, M., and I. Vogel. 1986. *Prosodic phonology*. Dordrecht: Foris.
- Pietroski, P., and J. Uriagereka. 2002. Dimensions of natural language. In J. Uriagereka (ed.), *Derivations: Exploring the dynamics of syntax*, 266–287. London and New York: Routledge.
- Plag, I. 1999. *Morphological productivity. Structural constraints in English derivation*. Berlin, New York: Mouton de Gruyter.
- Pullum, G. K., and A. M. Zwicky. 1988. The syntax-phonology interface. In F. J. Newmeyer (ed.), *Linguistics: The Cambridge survey, Volume I, Linguistic theory: Foundations*, 255–280. Cambridge: Cambridge University Press.
- Rivero, M. L., A. Arregui, and E. Frąckowiak. 2010. Variation in circumstantial modality: Polish versus St'át'imcets. *Linguistic Inquiry* 41(4): 704–714.
- Rosen, S. T. 1989. Two types of noun incorporation: A lexical analysis. *Language* 65: 294–317.
- Rubach, J., and G. Booij. 2001. Allomorphy in Optimality Theory: Polish intonation. *Language* 77: 26–60.

- Scheer, T. 2005. When higher modules talk to phonology, they talk to empty nuclei. Paper presented at the Sounds of Silence Conference, 19–22 October, Tilburg/Pays-Bas.
- Scheer, T. 2011. *A guide to morphosyntax-phonology interface theories. How extra-phonological information is treated in phonology since Trubetzkoy's Grenzsignale*. Berlin: Mouton de Gruyter.
- Selkirk, E. 1982. *The syntax of words*. Cambridge, MA: MIT Press.
- Selkirk, E. 1984. *Phonology and syntax: The relation between sound and structure*. Cambridge, MA: MIT Press.
- Selkirk, E. 2001. The syntax-phonology interface. In N. J. Smelser, and P. B. Baltes (eds.), *International encyclopedia of the social and behavioral sciences*, 15407–15412. Oxford: Pergamon.
- Selkirk, E. 2005. Comments on intonational phrasing in English. In S. Frota, M. Vigário, and M. João Freitas (eds.), *Prosodies*, 11–58. Berlin: Mouton de Gruyter.
- Siegel, D. 1979. *Topics in English morphology*. New York, London: Garland Publishing, Inc.
- Spencer, A. 2005. Word-formation and syntax. In P. Štekauer, and R. Lieber (eds.), *Handbook of word-formation*, 73–97. Dordrecht: Springer.
- Štekauer, P. 1998. *An onomasiological theory of English word-formation*. Amsterdam/Philadelphia: John Benjamins.
- Štekauer, P. 2005. Onomasiological approach to word-formation. In P. Štekauer, and R. Lieber (eds.), *Handbook of word-formation*, 207–232. Dordrecht: Springer.
- Truckenbrodt, H. 2007. The syntax-phonology interface. In P. de Lacy (ed.), *The Cambridge handbook of phonology*, 435–456. Cambridge: Cambridge University Press.

- Sadock, J. M. 1985. Autolexical syntax: A proposal for the treatment of noun incorporation and similar phenomena. *Natural Language and Linguistic Theory* 3: 379–439.
- Sapir, E. 1911. The problem of noun incorporation in American languages. *American Anthropologist* 13: 250–282.
- Verkuyl, H. J. 1972. *On the compositional nature of the aspects*. Dordrecht: Kluwer.
- Wellander, E. 1915. Ett par produktiva typer av skriftspråklig nybildning. *Språk och Stil* 15: 26–52.

Chunk definition in phonology: prosodic constituency vs. phase structure

Tobias Scheer

1. Introduction¹

Everybody agrees that the linear string is cut into a number of chunks that are phonologically relevant in the sense that they delineate the application of phonological processes. Everybody also agrees that chunk definition is done outside of the phonology: the existence of chunks is a prerequisite for phonological computation to run. The question that is addressed in the pages below is whether chunks are defined derivationally, i.e. by cyclic derivation which today is called phase theory, or representationally, i.e. by the constituents of the Prosodic Hierarchy.

The two ways of defining chunks have been competing with each other for about three decades, but the competition was systematically downplayed, and the theories that are affiliated to each option since the 80s, namely Lexical Phonology on the derivational side and Prosodic Phonology on the representational, were officially declared to peacefully coexist. That they are in conflict, however, is obvious: Occam commands that there be only one way in which chunks are defined. While peaceful coexistence was practised until recently and both sides tried not to raise the issue (with two notable but short-lived exceptions in the 80s, and one modern attempt to predict the assignment of interface phenomena to either means of chunk definition), the conflict has again come to the fore as phase theory developed on the syntactic side.

Below, the historical situation is recalled and the recent debate is described: the origin of the latter are phase-based interface theories such as Distributed Morphology, which argue that phase theory is needed for independent (syntactic) reasons, while there is no syntactic or other independent motivation for prosodic constituency. Therefore the Prosodic Hierarchy is redundant and needs to be done away with (Pak 2008, Samuels 2009). A related question is whether translation

¹ The present article is a reorganised piece of Scheer (2012), and makes constant reference to Scheer (2011) where relevant topics from (the history of) interface theory are discussed at greater length. The author is affiliated to Université de Nice - Sophia Antipolis and CNRS 7320 Bases, Corpus, Langage (scheer@unice.fr).

(i.e. the conversion of morpho-syntactic into phonological vocabulary), and hence modularity (Indirect Reference), is to be abandoned together with the Prosodic Hierarchy, and whether we therefore move back to the Direct Syntax approaches of the 80s (where phonology may directly refer to morpho-syntactic categories). It is shown that there is no necessity or urge to go that way: the fate of the Prosodic Hierarchy is entirely independent of the question regarding the modular architecture of grammar. It is argued that the Prosodic Hierarchy, indeed, does need to be abandoned, but for yet another reason: because it is a diacritic, and hence ruled out on modular grounds anyway. But this does not mean that phonology can make direct reference to syntax: if grammar is modular, it cannot.

The overall result regarding chunk definition, then, is that chunks are only delineated procedurally: the input to phonological computation are pieces of increasing size, and these pieces are defined by phase theory. There is no representational way of identifying phonologically relevant pieces. Finally, the consequences of this position are examined: since syntactically and phonologically relevant chunks only marginally coincide (the only good match is the CP), phase theory needs to be adapted to phonological needs.

2. Two options for defining phonologically relevant chunks

The two competing ways of defining phonologically relevant chunks, as well as the fact that they have been around for quite some time, may be illustrated by nasal assimilation in English. In this language, the nasal of *in-* does, but the nasal of *un-* does not, assimilate to a following stop: compare *un-predictable* with *im-possible* (and *in-audible*). This contrast must be due to an idiosyncratic property of the prefixes, whereby *in-* is in some way “closer” to the root than *un-* and therefore behaves like monomorphemic NC clusters, which are always homorganic (e.g. *dump*, *rent*, *sink*). The classical derivational solution of Lexical Phonology proposes that this more or less intimate relationship be expressed by the fact that *in-* is a class 1 affix, while *un-* belongs to class 2. Nasal assimilation is a level 1 rule, and hence absent from level 2 where *un-* is fed into the derivation. Since *un-predictable* is absent from level 1, it remains unaffected by the rule. By contrast, *in-*, being a class 1 affix, concatenates with the root at level 1 and is then subject to nasal assimilation, which is active at this level.

Another derivational implementation is found in Kaye (1995), whose theory of the interface is along the lines of what today is known as phase theory (Uriagereka 1999, Chomsky 2000 and following), even though it predates the syntactic version by a couple of years (see Scheer 2011:§287 for the historical background). Kaye

holds that the contrast between the two prefixes is that they induce different domain structure (i.e. phase structure in modern terminology): [[un] [predictable]] vs. [in possible]. *Un-* being spelt out in isolation,² its nasal is “frozen” by the PIC (Phase Impenetrability Condition) and cannot assimilate to the following stop on the outer phase. Kaye’s phonological version of the PIC is a no look-back device that prohibits further modification of material that was already subject to computation in a previous cycle.³ By contrast, *in-* and the root cohabit in the same phase and are therefore computed together: the nasal assimilates. Note that, unlike in Lexical Phonology, there is only one computational system (rather than two sets of rules, i.e. level 1 and level 2); therefore nasal assimilation applies to every phase. In Kaye’s system, the more or less intimate relationship of the two prefixes with the root is thus directly expressed by phase structure.

The competing representational solution builds on contrasting prosodic phrasing: while *un-* is a Prosodic Word (PrW) in its own right, *in-* is part of the PrW of the root, as shown under (1) below. Nasal assimilation is then specified for applying only within PrWs (Rubach and Booij 1984, Rubach 1984: 221ff, Vogel 1991).

- (1) Representational solution: separate PrW for *un-*



The difference between the derivational and the representational solution is the way in which it is decided that *un-* has a less intimate relationship with the root than *in-*. Prosodic constituency is the result of mapping. Following modular principles, morpho-syntactic structure cannot be accessed directly by the phonology (more on this below). It is therefore translated into vocabulary that can be interpreted by the phonology, prosodic constituency, to which phonological instructions make reference.

By contrast, nothing is translated on the phase-based account: phase structure is created by the spell-out mechanism, which is sensitive to lexically (or universally) defined phase heads: vP and CP on Chomsky’s original count, but many more and lower functional projections have been granted phase head status in the literature since then (see the summary in Section 8.3).

² Newell and Scheer (2007) and Newell (2008:178ff) discuss the syntactic aspects of this analysis.

³ Scheer (2011:§302) discusses further details and provides comparison with the syntactic PIC.

3. The landscape in the 80s: peaceful coexistence that was rarely challenged

3.1. Direct Syntax: no modules, hence no need for translation

In order to describe how chunk definition worked in the 80s, it is useful to begin with the so-called Direct Syntax. Direct Syntax was a movement in the late 70s and early 80s that grew out of the feeling that something was wrong with SPE-type boundary theory, which seemed to lead nowhere (Rotenberg 1978, Clements 1978, Pyle 1972, Hyman 1978: 459, Kenstowicz and Kisseberth 1977, Scheer 2011:§131 provides an overview). The alternative was to do away with translation altogether: instead of storing morpho-syntactic information in a sponge – hash marks, at that time – and then having phonological processes make reference to that buffer, phonology could take a shortcut and *directly* mention morpho-syntactic information in its instructions. Hence, instead of “the phonological event X happens in the presence of #”, with # representing the beginning of an adjunct, the phonological instruction would directly say “the phonological event X happens at the beginning of an adjunct.”

That is, there are no hash marks or any other carriers of morpho-syntactic information anymore: phonology makes direct reference to any morpho-syntactic information that is required.

The founding battle of Prosodic Phonology was against Direct Syntax. The central claim was *Indirect Reference*, i.e. the assertion that SPE (and all other interface theories since the 19th century) were right in providing for carriers of morpho-syntactic information in phonology (hash marks in SPE): translation (of morpho-syntactic into phonological vocabulary) exists, and this is the only way that morpho-syntactic information can reach phonology. The direct mention of morpho-syntactic categories in phonological rules is therefore prohibited.

Representatives of Direct Syntax at that time were, for example, Kaisse (1983, 1985) and Odden (1987, 1990). The conflict was decided in favour of Indirect Reference within a couple of years, and Prosodic Phonology has stood (almost) unchallenged since then.⁴

An issue that, for some reason, did not play any role in the debate between Direct Syntax and Indirect Reference is modularity (Scheer 2011:§414). The former approach violates modularity, while the latter applies it to language. Translation is a necessary consequence of modularity, i.e. the idea that the mind and grammar are organised in a number of distinct computational units each

⁴ This episode in the history of the interface is discussed at greater length in Scheer (2011:§407).

of which works with a domain-specific vocabulary. Hence, there is no way in which phonological computation could understand, parse or process any morpho-syntactic vocabulary such as “adjunct”. In Cognitive Science, the fact that each computational system works with a proprietary vocabulary (and hence does not understand the vocabulary of other modules) is called domain specificity (e.g. Gerrans 2002, Fodor 2000: 58ff).

Modularity thus defines a major front line among interface theories: those that practice translation (e.g. Prosodic Phonology) are instantiations of modularity, while those which believe that translation does not exist (e.g. Direct Syntax) are incompatible with the modular architecture of grammar that has defined the generative enterprise since its inception in the 50s (the inverted T is made explicit in Chomsky 1965: 15ff, see also Gardner 1985).

3.2. Peaceful coexistence I: only prosodic constituents define chunks at the word level and above

Since the establishment of representational, and hence translation-created chunk definition in the early 80s by virtue of Indirect Reference and in terms of prosodic constituents (Selkirk 1981 [1978], 1984), the question arose – or rather should have arisen – in which relationship the new domains stand with the regular chunks that are defined by cyclic derivation. Derivationally defined cycles had been known under various labels (the transformational cycle in SPE, the phonological cycle in Mascaró 1976, see Scheer 2011:§100) since Chomsky *et al.* (1956: 75).

The reason why this obvious issue was hardly debated, and why the “official” solution was one of peaceful coexistence, is the non-cyclic nature of postlexical phonology. A headstone of Lexical Phonology is that there are two distinct computational systems that assess strings of morphemes (i.e. chunks up to the size of words) and strings of words (i.e. chunks of word size and larger). The former set of rules defines lexical, the latter postlexical, phonology.

Associated with this distinction is the idea that lexical phonology is cyclic, while postlexical phonology is not. This fundamental claim was never motivated or explained as far as I can see (Scheer 2011:§791), but is supported by the pervasive absence of no look-back phenomena above the word level. That is, there does not appear to be any phonological process among words that is influenced by the fact that a more embedded item was already spelled out earlier (while phenomena of that kind below the word level are well known: affix class-based effects). Today, one would say that, for some strange reason, there are no PIC effects observed when words and larger chunks are spelled out, while they are frequent below the

word level. This was called the word spell-out mystery in Scheer (2009b) (see also Scheer 2011:§786).

Whether the empirical generalisation is true or not (i.e. whether there are really no PIC-effects in external sandhi phonology) and, if so, whatever the mysterious reason for that, the fact is that postlexical phonology is non-cyclic according to the standards of Lexical Phonology. This means that there are no cyclicity-defined chunks above the word level. Hence, there is no competition between Lexical Phonology and Prosodic Phonology above the word: the only way that chunks can be defined for words and bigger pieces is by the prosodic constituents of the Prosodic Hierarchy.

In the ideal world of peaceful coexistence, then, chunk definition is both derivational and representational, and the two means of identifying phonologically relevant stretches of the linear string are in complementary distribution according to the size of the items at hand: the grouping of small pieces (morphemes) is defined by cyclic derivation, while the grouping of bigger pieces (words) is done by translation-born domains.

3.3. Peaceful coexistence II: the demarcation line between prosodic and cyclic phenomena

Peaceful coexistence, in fact, comes in a number of flavours, and the question is how it can be determined whether a given interface phenomenon is driven by a procedural (i.e. cyclic, phase-based) or representational (prosodic constituency) mechanism. The base line answer was reported in the previous section: smaller chunks (morphemes) are the matter of cyclic management, while bigger chunks (words) are dealt with by prosodic categories. This is Hayes' (1989 [1984]) line of attack, which has the merit of drawing a clear demarcation line.

Another approach is Nespors and Vogel's (1986: 18f, 27ff): these authors try to divide processes according to whether they make "reference to morphological structure and/or specific morphological elements" (Nespor and Vogel 1986: 18). It is shown in Scheer (2011:§435) that this distinction is inoperative: Nespor and Vogel (1986) do not mention that, on the count of Prosodic Phonology, mapping rules decide whether or not (and how) morpho-syntactic structure is transformed into prosodic structure. Prosodic constituency encodes "morphological structure and/or specific morphological elements" just as much as cyclic structure does.

Alongside with Nespor and Vogel's soft version of peaceful coexistence, there is a radical version advocated by Rubach and Booij (1984) (among others, see Scheer

2011:§440). On this account, below the word level phonological rules make random reference to either morphological (cyclic) structure or prosodic constituency, and there is no principle that defines which phenomena use one or the other strategy. Lexical Phonology and Prosodic Phonology are thus both candidates for managing everything that is going on below the word level; whether one or the other comes to bear is random and thus unimportant.

This is what the landscape looked like in the 80s, and there were no innovations for about 30 years. However, in the recent Stratal OT literature that adapts the Lexical Phonology heritage to the modern constraint-based environment (see Scheer 2011:§483), serious effort is made to develop a consistent synthesis of the cyclic and the prosodic constituency-based approach to the interface. In order to make both compatible, the old question regarding the division of labour is addressed anew by Bermúdez-Otero (2011: 2025ff) and Bermúdez-Otero and Luís (2009).

These authors develop three criteria in order to tell cyclic from prosodic effects.⁵

- (2) Division of labour according to Bermúdez-Otero and Luís
 - a. gradience
prosodic categories can trigger gradient (nondiscrete) phonetic effects; cyclic domains cannot.
 - b. cyclic locality
phonology cannot access the internal morphosyntactic structure of cyclic domains, but it can access all levels of prosodic structure.
 - c. coextensiveness
every cyclic domain is exactly coextensive with some morphosyntactic constituent; a prosodic category need not be.

This is an interesting catalogue, which needs to be checked against a larger empirical record. In any case, as far as I can see, it is the first attempt to tell two classes of interface phenomena apart on the grounds of pre-theoretical criteria. These two classes are then equated with the two means by which morpho-syntax can have a bearing on phonology, i.e. procedural and representational.

⁵ There is also a fourth criterion based on sociolinguistic variation, which, however, is theory-dependent.

3.4. Elimination of cycles: prosodic domains below the word level

The relationship between procedural and representational devices as conceived in the 80s, though, is asymmetrical: while there is no way to make postlexical phonology cyclic (its non-cyclicality is one of the founding statements of Lexical Phonology), nothing in principle stops prosodic constituents from extending below the word level, i.e. also from grouping sequences of morphemes.

This is precisely the line of attack of Selkirk (1984: 412ff) and Inkelas (1990): the title of the latter work is "Prosodic Constituency in the Lexicon". Both argue that there must not be several devices that do the same job, i.e. chunk definition. Either all pieces are grouped by prosodic domains, or they are grouped by cyclic spell-out.

Inkelas (1990) therefore argues that the technology which works for all piece types and sizes should be generalised, and the other abandoned. In order to do so, she introduces a new set of prosodic constituents which, just like their higher level peers, are created by mapping rules (Inkelas 1990: 33f). Inkelas holds that there are as many layers below the word as there are lexical levels (strata) in Lexical Phonology.⁶

4. Constraint-based instead of rule-based mapping

4.1. Mapping is done in modular no-man's-land

In order to approach the modern situation of prosodic constituency, let us have a closer look at the evolution of the central operation of translation, which is a direct consequence of the aforementioned Indirect Reference, and hence of modularity. In a modular perspective, mapping cannot be located in either morpho-syntax or phonology. In the original rule-based environment of the 80s, mapping rules do the job of translation, and have therefore access to both morpho-syntactic and phonological structure: they can read the former, and create part of the latter (the Prosodic Hierarchy). Since modules do not understand the language of other modules, the interface is necessarily located in modular no-man's-land, i.e. somewhere after morpho-syntax and before phonology. This location of translation was consensual (e.g. Nespor and Vogel 1986).

⁶ Selkirk's and Inkelas' economy-based argument in favour of generalised prosodic domains is discussed at greater length in Scheer (2011:§429).

4.2. Constraint-based mapping: ALIGN

In the new constraint-based environment of the 90s, Prosodic Phonology was adapted to the general OT architecture where phonological well-formedness is defined in relative, rather than in absolute, terms: the interaction of a set of ranked constraints defines the least contravening solution amongst a set of candidates. Applied to the interface, the new perspective may be introduced like this: the Prosodic Hierarchy is a device that represents the (mis)match of morpho-syntactic constituency and phonologically relevant chunks of the linear string. The operation that relates both, mapping, may thus be described as the (mis)alignment of the edges of morpho-syntactic constituents with the edges of prosodic constituents.

This perspective on mapping was introduced by Selkirk (1984: 52ff), who builds prosodic structure by alignment rules (e.g. Basic Beat Rules, Demi-Beat Alignment DBA, see Scheer 2011:§426). Constituent margins then become the centre of interest two years later in Selkirk's (1986) edge-based mapping (Scheer 2011:§386). Finally, McCarthy and Prince (1993) generalise alignment to more empirical situations, and make it the central tool for the interface with morpho-syntax (see Itô and Mester 1999, McCarthy and Prince 2001: vii, Peperkamp 1995: 227ff for a historical overview).

Today, ALIGN is a constraint family with a uniform template: the left or right edge of a given unit coincides with the left or right edge of another unit. The units in question may be phonological, morphological or syntactic, and both units involved in an alignment constraint may belong to the same area (phonology, morphology, syntax, see, for example, Yip 1998).

4.3. Parallel mapping: translation and reference to prosodic constituency are conflated

The following example from German provides an illustration of how alignment works (Kleinhenz 1998: 39f). The word *auf-essen* 'to eat up' is made of a stem (*essen*) and a prefix (*auf*). It is realised with an epenthetic glottal stop *auf-ʔessen*. The glottal stop is non-contrastive: it is always filled in word-initially in case the word begins with a vowel underlyingly.

According to Kleinhenz' analysis, the pronunciation at hand is the result of the ranking ONSET >> ALIGN (Stem, L, PrWd, L) >> DEP. The alignment constraint demands that the beginning of the stem coincides with a prosodic word; regular mapping would express the same requirement by assigning two separate prosodic words to the prefix and the stem.

Now, ONSET demands the presence of a consonant in the first syllable of *essen* – hence the epenthetic glottal stop. The competing solution that syllabifies the prefix-

final consonant into the onset of the stem fails because of ALIGN: in *au.fessen* the stem and the prosodic word would be misaligned, and this is fatal since ALIGN outranks the epenthesis-hostile DEP. In a language with the reverse ranking, *au.fessen* without the glottal stop would be optimal.

Regular rule-based mapping would describe this variation by a parameter on the assignment of the prosodic word, which will or will not encompass prefixes. That is, the domain of glottal stop insertion is the prosodic word: glottal stops are inserted at their left edge. In German, the prefix makes a prosodic word of its own; the prefix-final consonant cannot join *essen* because there is no syllabification across prosodic word boundaries in German. *Essen* will therefore be subject to glottal stop insertion. In the hypothetical language where *au.fessen* is encountered, the prefix and the stem cohabit within a single phonological word: this allows the prefix-final consonant to join *essen*, and no glottal stop will be inserted.

As may be seen, OT produces the winner without mentioning any particular process, and thus without any process (or rule) making reference to the Prosodic Hierarchy. The effect is achieved by the interspersing of alignment with regular phonological constraints that are not involved in issues related to the interface (ONSET and DEP).

This system significantly contrasts with rule-based mapping: it conflates a two-step procedure into one single constraint. On the regular account, prosodic constituency is *first* created by mapping; phonological rules *then* make reference to the prosodic structure. These steps are procedurally ordered, and phonological rules refer to the carrier of morpho-syntactic information in the description of their environment, as much as they may refer to truly phonological conditions.

Neither of these mechanisms survives in constraint-based mapping: there is no procedural difference between the translation of morpho-syntactic into prosodic constituency, and there is no reference made by phonology to this structure. Furthermore, the instructions responsible for phonological computation, constraints instead of rules, do not mention prosodic constituency anymore: ONSET, DEP or other constraints do not make reference to the Prosodic Hierarchy. Prosodic structure appears only in one constraint family, ALIGN, which specialises in importing morpho-syntactic information into phonology.

4.4. Parallel mapping transfers the translation *into* the phonology, and thereby gives up on modularity

On the face of it, the constraint-based architecture looks like an interesting simplification of the mapping mechanism: a two-step procedure whereby mapping precedes reference to prosodic constituency is incompatible with

anti-derivationalism, and is therefore replaced by an entirely parallel one-step mechanism.

The extension of the parallel philosophy to intermodular relations, however, gives up on modularity altogether. Mapping rules have access to both morpho-syntactic and phonological structure since they convert one into the other. Modules are domain specific and hence cannot understand the vocabulary of other modules, or parse their categories. Therefore, translation cannot be done in either morpho-syntax or phonology: it must be done in modular no-man's-land.

The effect of parallel mapping, however, is that translation is done *in* the phonology: ALIGN constraints are interspersed with regular phonological constraints in the same constraint ranking. This situation is incompatible with a modular architecture. Also note that ALIGN is deeply rooted in OT: together with syllable-related constraints (ONSET, NoCODA), it is one of the rare constraint families that are accepted and practised in all OT quarters. Doing OT without, say, LAZY or NoSTRUCTURE is one thing and certainly workable (there are many versions of OT from which these constraints are absent); doing it without ALIGN is an entirely different job, and it is hard to see today how this could work.

5. Prosodic constituency vs. phases

5.1. Phase-based mapping: phases are "prosodic islands"

More recently, constraint-based mapping was impacted by, and adapted to, syntactic phase theory. Kratzer and Selkirk (2007) introduce the idea that chunks which are defined by the syntax as phases also roughly correspond to constituents of the Prosodic Hierarchy. Specifically, they propose that "the highest phrase within the spellout domain is *spelled out as a prosodic major phrase*" (Kratzer and Selkirk 2007: 106, emphasis in original). We are thus still in the environment that was defined by Selkirk (1986) where three prosodic constituents are recognised: the major phrase (called prosodic phrase then, and corresponding to X'' in an X-bar structure), the prosodic word (corresponding to X^o), and an intermediate item called the minor phrase (small phonological phrase then, corresponding to X'). Hence note that what Kratzer and Selkirk call phrases are regular constituents of the Prosodic Hierarchy (in Selkirk's 1986 version of prosodic constituency), while a phase is a procedurally (and syntactically) defined chunk (also called the spellout domain in the quote).

On Kratzer and Selkirk's (conservative: see the discussion in Section 8.3) assumption that only CP and vP are phases, the idea is thus that spell-out

domains, i.e. CPs and vPs, correspond to major phrases on the phonological side. This is supposed to be a universal equivalence, and the result of mapping. Language-specific variation in prosodic phrasing is then achieved, not by the syntax-phonology mapping as before (see Section 4.3), but purely phonologically by “prosodic markedness constraints, which operate to produce surface prosodic structures that are more nearly phonologically ideal” (Kratzer and Selkirk 2007: 126). This is a significant departure from a Prosodic Phonology essential: mapping becomes universal and phase-driven, while the great amount of language-specific variation in prosodic phrasing is achieved *in* the phonology by purely phonological mechanisms.

Familiar mapping is thus broken into two pieces: one that is done by phases, and hence outside of the phonological computation, and another that (as before, in constraint-based mapping) is located *in* the phonology. Kratzer and Selkirk’s mapping thus continues to violate modularity, which commands that translation be done in modular no-man’s-land.⁷

Other work along the idea that phases form “prosodic islands” includes Piggott and Newell (2006), Dobashi (2003), Ishihara (2007) and Kahnemuyipour (2009) (Elordieta 2008: 274ff offers an informed survey).

5.2. Equating prosodic constituents with phases is dangerous for the former: another round of Direct Syntax is lurking

The idea that phases – which did not exist in the 80s when Prosodic Phonology was developed – and constituents of the Prosodic Hierarchy are identical is obviously appealing: both delineate chunks of the linear string that serve as domains for the application of phonological processes, and this is what prosodic constituency is all about. The Occam-based argument that having two independent means of chunk definition is not an option had already been made on several occasions. Hence the modern idea, in a phase-based environment, that when Prosodic Phonology talked about prosodic constituents in the 80s, what was really meant were phases.

⁷ Another issue is the fact that there are more layers of the Prosodic Hierarchy than just the major phrase: what happens with them if mapping reduces them to the equivalence “phase = major phrase”? In a footnote, Kratzer and Selkirk (2007: 125) hint at the possibility that the “prosodic word could be understood as the spellout of lexical (not functional) heads, while intonational phrase could be the spellout of ‘comma phrase’.”

This move is dangerous for Prosodic Phonology, though: the question arises as to what prosodic constituency is good for in the first place if the job can be done by phase theory, which is needed anyway since phases are a general architectural property of grammar that is also central in current minimalist syntax. If having both is redundant and one has to go, no doubt the loser is the phonology-specific prosodic constituency, which can be reduced to phases (but the reverse is not true).

Therefore, quite unsurprisingly the equation of prosodic constituents with phases has led to another round of Direct Syntax: the redundancy-based objection against the Prosodic Hierarchy was made in the mid-80s by defenders of this approach (e.g. Kaisse 1985: 156 note 1, 110 note 1, 1990: 128f, see Scheer 2011:§409). Prosodic Phonology has burdened phonology with an extra arboreal structure plus extra computation, that is, the mapping rules (or, today, alignment constraints). These devices have no other purpose than making morpho-syntactic structure available inside the phonological module. By contrast, the alternative solution that makes direct reference to morpho-syntactic categories achieves the same result without any additional structure or computation.

This is exactly the line of attack of Pak (2008: 42ff, in a Distributed Morphology environment) and Samuels (2009: 284ff), who are dissatisfied with prosodic constituency and make the obvious point that, if all information necessary is provided by phase structure, the Prosodic Hierarchy is redundant and needs to be done away with (see also Seidl 2001).

In an additional move that does *not* follow from the absence of the Prosodic Hierarchy, Samuels and Pak throw out translation and hence leave modular grounds. This, however, is inconsistent with their own framework, since phase theory is the central device of *intermodular* communication and therefore supposes a modular environment. How could one argue for modularity plus phase theory on the one hand, and violate modularity on the other by eliminating translation and hence domain specificity?

5.3. Reaction by orthodox Prosodic Phonology: prosodic constituents ≠ phases

In the view of some proponents of regular Prosodic Phonology, Selkirk’s move to equate prosodic constituents with phases locates her in the camp that strives to abolish prosodic constituency by dissolving it into phases. While this is the reverse movement with respect to Inkelas’ (1990) elimination of cyclic structure through the extension of prosodic constituency below the word (see Section 3.4), it shows that the peaceful coexistence of cyclic and prosodic chunk definition that was

alleged in the 80s has no standing anymore. The conflict is now clearly visible, and this is all to the good: the two options are clearly characterised, and under Occam's rule one will have to go if they do the same labour.

The reaction against the equation of prosodic constituents with phases is led by Lisa Cheng and Laura Downing: one of their talks is called "Prosodic domains do not match spell-out domains" (Cheng and Downing 2011a, see also Downing 2010 and Cheng and Downing 2011b).

The alternative that Cheng and Downing (2007, 2009) propose works with alignment constraints that take phases as an argument: *ALIGN-L(PHASE, INTp)* "align the left edge of a phase with the left edge of an Intonational Phrase." On this view, phase theory also impacts chunk definition, albeit only indirectly: the independence of prosodic constituency through its genesis via *ALIGN*-based mapping is preserved.

6. The Prosodic Hierarchy is a diacritic

6.1. Interim summary

Up to this point, the historical development of the two chunk-defining mechanisms has been reviewed. Thus far, the conclusion is that

- prosodic constituency and phase structure are in competition. Both cannot be correct, and one will have to go;
- all actors agree that phase theory is a valid and necessary ingredient of grammar: it mediates between morpho-syntax and phonology;
- therefore, implicitly, they agree that grammar is modular, and hence that translation exists.

What could an alternative look like if prosodic constituency is done away with, but translation maintained? In other words: what will the output of translation look like? This is the question that we turn to now, and which provides an independent argument in the debate between the two chunk-defining mechanisms: the Prosodic Hierarchy does not qualify because it is a diacritic. Hence, phonologically relevant chunks of the linear string are defined by phase structure, and what we need is a non-diacritic output of translation.

The argument made is thus conceptual. Of course, the empirical situation needs to be carefully considered independently, but this will have to be done elsewhere. The approach to the representational side of the interface (i.e. non-diacritic translation) that is outlined below is called Direct Interface (because

there is no buffer between morpho-syntactic and phonological objects; see Scheer 2009a, c, 2012).

6.2. Prosodic Phonology lays claim to boundaries: they are the old buffer, prosodic domains are the modern buffer

In an overview article that anchors the legitimacy of Prosodic Phonology (with respect to Direct Syntax), Vogel and Kenesei (1990: 344) review the arguments in favour of Indirect Reference. One point they make is historical: all interface theories have been indirect thus far, so there is probably something to this approach. They single out SPE as a forerunner of Indirect Reference.

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 and Kenesei 1990: 344)

Representatives of Prosodic Phonology thus lay claim to the equivalence of hash marks (#s) and prosodic constituency. The same line of reasoning is found in another overview article by Inkelas and Zec (1995). The authors call p-structure the level of representation that mediates between morpho-syntax and phonology; they explicitly identify boundaries as the ancestor of this mediating structure, whose more recent incarnation is the Prosodic Hierarchy.

An early version of p-structure was proposed in SPE and developed in subsequent work (Selkirk, 1972, 1974; Rotenberg, 1978). According to this view, domains of phonological rules are expressed in terms of phonological boundary symbols, generated by rules. [...] Far more constrained is the 'prosodic' view of p-structure. Under this view, p-structure occupies a level with its own hierarchical organization and a high degree of autonomy.

(Inkelas and Zec 1995: 537f)

If, thus, prosodic constituency is but a more advanced version of boundaries that presents a number of advantages, it must have the same formal properties as its predecessor. The two quotes clearly show that prosodic constituency, just like hash marks, is a diacritic: it serves no other purpose than replicating phonologically relevant morpho-syntactic information in phonology. This is the essence of diacritic

translation, which is based on a buffer (or a sponge): phonologically relevant information is stored into a diacritic, which is transported into phonology where its load is released. We have seen that this is true for the original implementation of the Prosodic Hierarchy where translation was rule-based, as much as for the OTed version thereof, constraint-based mapping.

Although proponents of Prosodic Phonology are prompt to point out that SPE-style boundaries are odd because they are diacritic (Scheer 2011:§373), nobody seems to wonder whether the Prosodic Hierarchy could be a diacritic as well. Nobody seems to worry either when the Prosodic Hierarchy is advertised as the direct surrogate of arbitrary and diacritic boundaries (see also Scheer 2008).

6.3. Definition of the term “diacritic”

6.3.1. *A diacritic is an alien*

A formal definition of what exactly counts as a diacritic must rely on the alien status of the object in question in the environment where it evolves. A workable definition appears under (3) below.

(3) Definition of the term “diacritic”

a diacritic is a non-native object in module X: it is only used when information from outside of X is processed. It is absent from events that do not appeal to extra-Xal information.

Hash marks and omegas ω (i.e. prosodic words) meet these conditions: they are non-phonological intruders in the phonological world which are introduced for the *exclusive* purpose of storing extra-phonological information.

Also, they are systematically absent from phonological processes that do not use extra-phonological information. For example, an ordinary palatalisation that turns *k* into *tʃ* before front vowels involves consonants, vowels, velarity, palatality, occlusion, affrication and the like, i.e. all pieces of the domain-specific vocabulary that is used and managed in phonological computation. Such a process does not appeal to any extra-phonological information: this would only be the case if the description were, say, “*k* turns into *tʃ* before front vowels, but only in the case where there is a morpheme boundary between the trigger and the target.”

Hence, there is an objective and pre-theoretical means to tell processes apart that do or do not use extra-phonological information. Therefore, we can be sure that *only* domain-specific vocabulary, i.e. the one that is used in the computational

system which carries out phonological computation, occurs in the latter. By contrast, in the former the information that is processed by phonological computation is blended: the specifically phonological vocabulary cohabits with carriers of extra-phonological information.

If some item, then, never occurs in the “pure” processes, i.e. those that only use specifically phonological vocabulary, we can safely conclude that it is an alien. Obviously, hash marks, as much as omegas (prosodic words), phis (prosodic phrases) or any other prosodic constituent from the prosodic word upwards,⁸ are never found to participate in processes that do not use morpho-syntactic information. For example, there is no palatalisation of the pure kind “*k* turns into *tʃ* before front vowels” where a hash mark, an omega, a phi or anything of that kind is needed. Therefore, all of these items are diacritics.

6.3.2. *Apples and bananas in phonology, but not in syntax*

Another obvious issue is that, like boundaries, the units of the Prosodic Hierarchy are arbitrarily chosen and named: “ ω ” (the phonological word), “ ϕ ” (the phonological phrase) etc. are not any less arbitrary than “+” or “#”. Calling a unit whose exclusive purpose is to store and release some information a hash mark, an omega, a banana or an apple is irrelevant: any name will do the job.

Saying that an omega is only shorthand for a real linguistic object, the phonological word, does not help: the same may be said about + and #, only that a regular scientific-sounding terminology has never been introduced for these objects.

Finally, pointing out that omegas and phis represent certain stretches of the linear string which coarsely correlate with morpho-syntactic divisions does not make them less arbitrary. Everybody knows that the linear string is chunked into stretches that define the domain of application of phonological processes, and that these stretches more or less closely follow morpho-syntactic structure. The issue is not the rough equivalence between morpho-syntactic structure and phonologically relevant stretches – it is the nature of the items that are supposed to be inserted into the phonology in order to carry this information.

⁸ The heterogeneous character of the Prosodic Hierarchy, i.e. the cohabitation of bottom-up (syllables, feet, morae) and top-down constructions (prosodic words and higher) is admitted and made explicit in the literature (e.g. Nespor and Vogel 1986: 109, Nespor 1999: 119, see also Scheer 2011:§401). While syllables, feet and morae are projections of (phonological) terminals, higher units of the Prosodic Hierarchy are not: they dominate terminals, but are not their projection in any way – a unique situation in linguistic structure (more on that in Scheer 2012).

Finally, it is interesting to observe that only phonologists seem to be happy to live with apples and bananas in their theory: there is no equivalent in morphology, syntax or semantics. No representative of these disciplines would accept, say, an ω P (omega phrase), a #P (hash mark phrase) or a 🍌 P (banana phrase). Nodes in morpho-syntactic structure project something, and this something is recorded in the lexicon: items only qualify if they belong to the domain-specific vocabulary of the morpho-syntactic computational system (number, gender, person etc.).

6.3.3. *The output of translation has always been a diacritic*

The phonological literature stigmatises some diacritics as arbitrary diacritics, while others are advertised as “truly phonological objects”. Nespov and Vogel (1986: 3) for example call boundaries “pseudo-phonological terms” and argue that phonology should only be able to refer to truly phonological objects (just as syntax can only make reference to truly syntactic objects). Selkirk (1984: 32, 409f) and Nespov and Vogel (1986: 27ff, 110ff) are along the same lines.

I have only come across one voice that clearly identifies the Prosodic Hierarchy for what it is. It is no surprise that this voice comes from the Direct Syntax quarters where, of course, no buffer is needed: Kaisse (1990: 128) calls attention to the redundant and diacritic character of prosodic constituency. She points out that the direct syntax option “does not require the postulation of constituents that are needed only to describe the sandhi phenomena in question.”

In a broader historical perspective, then, the output of translation has always been diacritic, with various degrees of camouflage, though. Structuralism has tried to make the carrier of morpho-syntactic information a truly phonological object that has got nothing to do with morphology. Juncture phonemes were the result of the descriptivism-rooted requirement of Level Independence: the bottom-up discovery procedure did not allow phonology to contain any morpho-syntactic information. Much effort was put into the camouflage of the extra-phonological identity of morpho-syntactic information: as indicated by their name, juncture phonemes were supposed to be phonemes, that is, truly phonological objects (Scheer 2011:§§59, 61).

SPE basically does the same thing, only that the phonological currency has changed: phonology is now made of segments (rather than of phonemes), which means that boundaries are [-segment] segments. The generative camouflage is not really less outlandish than its structuralist predecessor: # is not any more a segment than it is a phoneme. The unwarranted consequences of its alleged segmental status were made explicit early on, namely by Pyle (1972) (see Scheer 2011:§136). This

time, however, the masquerade was entirely transparent right from the start: unlike in the structuralist theory, where the phonemic status was given real credit, hardly anybody took the [-segment] camouflage seriously. The naked # was taken for what it really is in all phonological quarters: a unit whose only purpose is to store and release morpho-syntactic information.

Finally, in the early 80s when all areas of phonology were autosegmentalised, linear diacritics (boundaries) were replaced by autosegmental diacritics (the Prosodic Hierarchy). As we have seen, the argument which was used in order to promote this move was precisely the idea that diacritics do not qualify (Scheer 2011:§373).

In sum, since structuralist times and up to the present day, the output of translation has always been a diacritic. The choice of the diacritic was according to whatever was the basic representational currency of the time: phonemes in structuralism, segments in SPE, autosegmental domains when phonology became autosegmental. Protagonists of the respective theories were aware of the diacritic character of carriers of morpho-syntactic information to various degrees: high for SPE-type boundaries, choked but sensible for juncture phonemes, not at all for prosodic constituency.

7. Non-diacritic translation and the Direct Effect

7.1. An output of translation that qualifies: syllabic space

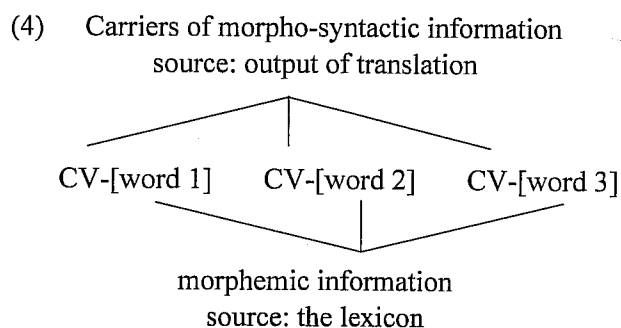
If the Prosodic Hierarchy is a diacritic, and if diacritics do not qualify for the output of translation, what is the alternative? What would non-diacritic translation look like? We have seen that a non-diacritic is an object that exists in phonology anyway, even in absence of any appeal to extra-phonological information. Lass' (1971) proposal that a boundary materialises as the feature [-voice] in phonology therefore satisfies the non-diacritic requirement: [-voice] exists in phonological processes that have got nothing to do with extra-phonological information. However, we know that melodic primes are not good candidates for the output of translation, because melody and morpho-syntax are incommunicado altogether. Nobody (except Lass), and no interface theory, has ever tried to make features the carrier of morpho-syntactic information: the fact that morpho-syntax and the area below the skeleton are incommunicado is a well-established (if tacit) fact (see Scheer 2011:§660).

Lowenstamm (1999) has introduced another type of carrier: syllabic space. He argues that the beginning of the word materialises as an empty onset-nucleus pair, the so-called initial CV. Syllabic space is certainly not a diacritic, since it is a necessary

ingredient of phonology even in the absence of extra-phonological factors. The idea that carriers of morpho-syntactic information in phonology identify as syllabic space can be implemented in any (phonological) theory. In the particular theory of CVCV (Lowenstamm 1996, Scheer 2004, Cyran 2010, among others), it identifies as the initial CV because of the internal logic of this framework, where the minimal (and actually maximal) building block of constituent structure is a CV unit. In other theories, syllabic space will take on other forms: x-slots, morae, regular syllabic constituents such as onsets, etc.⁹

Another interesting property of syllabic space is that it is linear (local), rather than autosegmental (more on this distinction in Scheer 2009a, b, 2012): just like SPE-type boundaries, syllabic space is necessarily inserted into the linear string at morpho-syntactic divisions. An individual piece of the linear string *belongs* to an autosegmental domain (such as the prosodic word), but it cannot *belong* to a boundary. On the other hand, a boundary (or some piece of syllabic space) has a linear location: it follows some piece, and precedes some other piece. It does not make sense to talk about domains that intervene between two pieces: domains are *made* of pieces, but they are not defined by a linear precedence relation with the items that they dominate.

Table (4) below provides a schematic representation of how syllabic space (here the initial CV), representing non-morphemic information, concatenates with regular morphemic material.



Carriers of morpho-syntactic information can thus be both local and non-diacritic. Contrary to what early Prosodic Phonology claimed, nothing withstands the existence of *non-diacritic boundaries*.

⁹ This is all to the good, because different predictions will be made by the different vocabulary chosen, and hence competing phonological theories may be assessed according to their behaviour at the interface (see Scheer 2009a, c, 2012).

7.2. Diacritic sleepers vs. phonologically meaningful objects

An intrinsic property of diacritics such as hash marks or omegas is their inability to make predictions. This is because they are empty shells: they do not carry any information except the morpho-syntactic load that they are designed for. Phonology does not react on the simple presence of a hash mark or a prosodic word – these items can only affect phonology if the analyst has made a phonological process sensitive to them.

Hash marks, omegas and the like may thus be described as passive sleepers. They merely sit in phonological representations without producing any effect by themselves: nothing happens unless a phonological instruction makes reference to them. For example, there is no way of knowing whether they rather favour or disfavour consonant clusters in their vicinity. In principle, they can trigger (or inhibit) any phonological process and its reverse.

By contrast, if non-diacritic objects, i.e. phonologically meaningful vocabulary, carry morpho-syntactic information, phonological computation will react on their bare presence. This is what I call the Direct Effect (see Scheer 2009a, c, 2012): the simple presence of phonologically meaningful objects makes predictions. Let us consider the following example in order to flesh out the difference between diacritic sleepers and phonologically meaningful items.

(5) Equally probable rules?

- a. $V \rightarrow \emptyset / \#C_CV$
- b. $\emptyset \rightarrow V / \#C_CV$

Both rules under (5) are equally probable and equally natural from the point of view of a theory that uses diacritic boundaries: no property of the theory favours or disfavors the epenthesis into an initial cluster, or the deletion of a vowel in this context. Every phonologist knows, however, that (5b) is an attested phonological process, while (5a) is not on record. That is, there is no “masochistic” language that would delete vowels in initial clusters (and only in this context).¹⁰

Therefore, theories that cannot discriminate between (5a) and (5b) have a problem, and the reason why they are in trouble is that the critical information, i.e. word-initiality, is conveyed by a diacritic hash mark. The result is the same in the case where the prosodic word or some other prosodic constituent carries this information: anything and its reverse may happen at the left edge of a prosodic constituent.

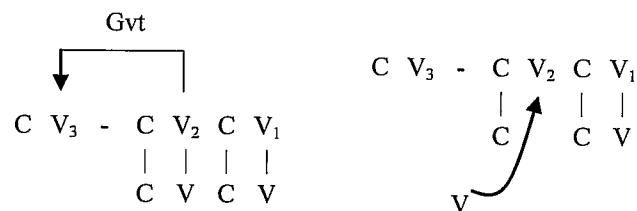
¹⁰ Note that rule (5a) says that vowels are deleted *only* when they occur in word-initial clusters. Of course, there are languages where vowels are deleted in this context (e.g. Czech *pes* – *ps-a* ‘dog Nsg, Gsg’), but they will then also be deleted elsewhere (Czech *loket* – *lokt-e* ‘elbow Nsg, Gsg’).

A look at a non-diacritic alternative shows that the two rules at hand are discriminated as soon as the extra-phonological information comes as a real phonological object that impacts on phonology directly, and does not need to be explicitly mentioned in rules (or constraints) in order to produce an effect. Suppose that an empty CV unit carries the information regarding word initiality along the lines of Lowenstamm (1999) that were discussed above, and in the syllabic environment of Government Phonology.

(6) Deletion vs. insertion of the first vowel in a word in CVCV

a. deletion: ill-formed

b. insertion: structure saved



The leftmost CV unit under (6a, b) is the representative of the beginning of the word in phonology. Being a truly phonological object, it is parsable by phonological computation. Under (6b) where the first nucleus of the root is empty, its presence creates a sequence of two empty nuclei. Since V₁ can only govern V₂, V₃ will remain ungoverned, which means that the structure is ill-formed. Therefore, an epenthesis into V₂ will rescue the word.

On the other hand, the structure under (6a) is well-formed: V₂ governs V₃, and no empty nucleus remains orphan. The deletion of the content of V₂, however, creates a sequence of two empty nuclei and therefore makes the structure ill-formed: this is the “masochistic” option.

It is thus predicted that the deletion rule (5a) is impossible, while the epenthesis rule (5b) is regular – exactly what we find across languages. Hence, there is a clear difference between non-predictive diacritics which allow anything, and its reverse, to happen in their vicinity, and truly phonological objects that have a predictable effect on the well-formedness of phonological structure.

7.3. Stable effects of the beginning of the word

The beginning of the word is well suited to illustrate the fact that morpho-syntactic information (at least sometimes) has predictable and cross-linguistically stable, rather than arbitrary, effects. Table (7) below shows the three effects that the left edge of the word produces in language after language (Scheer 2004:§87, 2009a, c, 2012, Ségéral and Scheer 2008).

(7) Stable effects of the beginning of the word across languages

- a. word-initial clusters
 - in some languages initial clusters are restricted to #TR. In others they have the same distribution as internal clusters. But there is no language where they are restricted to non-#TR clusters (i.e. to #RT, #TT and #RR).¹¹
- b. strength of word-initial consonants
 - in some languages word-initial consonants are especially strong. In others, they do not have any peculiar behaviour regarding strength. But there is no language where they are especially weak.
- c. deletion of the first vowel of the word
 - in some languages the first vowel of words is unable to alternate with zero. In others it does not show any peculiar behaviour when compared to other vowels. But there is no language where non-initial vowels are unable to alternate with zero, while initial vowels do.

Languages seem to make a binary choice: either the beginning of the word is in no way peculiar in comparison to what happens morpheme-internally, or else it is outstanding and allows for only a characteristic subset of the options that are well-formed elsewhere.

The conclusion is that if the effect of the beginning of the word is not arbitrary, the representational identity of the object by which it is represented must not be arbitrary either. Rather, we are looking for one single object that produces the three effects at hand: three for the price of one. In any event, objects such as the hash mark or some prosodic constituent that do not produce any effect at all (or rather, that tolerate any effect and its reverse under the appropriate rule or constraint) do not qualify. If the effect is predictable, the identity of its trigger cannot be arbitrary.

8. Phase theory adapted to the demands of phonology

8.1. Desiderata for phase-based chunk definition

Let us now have a closer look at what phase theory needs to be able to do when the perspective is seriously entertained that phase structure is the only chunk-defining mechanism. In short, phase structure must delineate chunks that are small enough so that every phonologically relevant stretch is a phase. Phase heads, and hence phase structure, however, are only determined on the basis of morpho-syntactic evidence in current phase theory.

¹¹ T is shorthand for any obstruent, R for any sonorant.

Recall from Sections 3.2 and 3.3 that the issue does not arise below the word level, i.e. for sequences of morphemes. For this chunk size, the definition of phonologically relevant pieces has always been done derivationally. The issue here is how to adapt the traditional mechanisms of Lexical Phonology, where the PIC plays no role (see the analysis of English nasal assimilation in Section 2), by the phase-based analysis, where visible traces of phase structure are PIC effects – but this is a different question (see Scheer 2011:§647 for discussion).

At and above the word level, phases need to take over the function of prosodic constituency. Since the 80s, the basic argument against the perspective where morpho-syntactic divisions alone define phonologically relevant chunks is so-called non-isomorphism. The following section discusses this point.

In order to be able to define the domains of application of phonological processes, phases need to be able to block their application across relevant boundaries. The phase-based technology for this task is the PIC, which “freezes” previously interpreted strings. How exactly the adaptation of the PIC to the blocking of processes across chunk boundaries is to be operated needs to be worked out.

Finally, one issue is the fact that, by and large, morpho-syntactic evidence for phases does not coincide with phonological evidence. This is workable as long as there is an inclusive relationship, i.e. as long as all “phonological phases” are a proper subset of “morpho-syntactic phases”. This also depends on the evolution, or rather atomisation, of phase theory in current minimalist syntax. All that is discussed in Section 8.3 below.

8.2. Non-isomorphism evaporates if looked at through the prism of local boundaries

Since Chomsky and Halle (1968: 371f), what would be called non-isomorphism in the 80s has been illustrated by an example that is about a cat, a rat and cheese. In Prosodic Phonology, the argument was made in Selkirk’s (1981 [1978]: 138) founding article and runs through the entire literature up to the present day (e.g. Nespor and Vogel 1986: 37ff, Vogel 1999: 117ff).

- (8)
- a. This is [the cat that caught [the rat that stole [the cheese]]]
 - b. [This is the cat] [that caught the rat] [that stole the cheese]

The major syntactic divisions of the sentence under (8a) do not coincide with its intonational structure under (8b). Hence, goes the argument since SPE, whatever drives phonology to decide that intonation is as it is under (8b), it is not the output of the syntactic module: there is no node in the syntactic tree that uniquely dominates

every intonational span of the sentence. This discrepancy between (8a) and (8b) is what Prosodic Phonology (and the generative mainstream since then) calls non-isomorphism: syntactic structure and the structure that is necessary in order to properly run phonology do not always coincide.

Upon closer inspection, however, it appears that non-isomorphism is a fact about the prism that Prosodic Phonology uses in order to look at the evidence, rather than about the linguistic fact itself. When we look at the same evidence through the glasses of local boundaries (instead of the domain-based prism), non-isomorphism evaporates: intonational chunks simply begin with every CP. Hence, it is enough to say that the intonation-building mechanism starts a new unit every time it hits a CP-boundary upon spell-out. Intonational and syntactic structure are thus perfectly isomorphic, and no specific autosegmental constituency on the phonological side is needed in order to express the relevant generalisation (see Scheer 2011:§419 for further discussion).

8.3. Phonological and morpho-syntactic evidence for phases

Let us now consider how morpho-syntactic phase structure correlates with the phonological demand for chunk definition in case this definition is also done by phases. The field that we are talking about is the one from the word size upwards, and phase theory needs to be flexible enough to define all chunk sizes that are needed in order to take over the chunk-defining function from prosodic constituency. That is, there must be a phase for every domain in which some phonological process applies (and whose boundaries it cannot cross).

In order to evaluate the situation, let us first have a brief look at the kind of phases that are defined for purely morpho-syntactic purposes in current syntactic discussion. Chomsky’s (2000) original take on phasehood identifies CP and vP, and maybe DP (Chomsky 2005: 17f.), as phase heads. Since then there is a constant trend to grant phasehood to smaller and smaller chunks (den Dikken 2007: 33 and Grohmann 2007 provide an overview, see also Scheer 2011:§773): the DP track is followed, but DP-internal phases are also argued for (Matushansky 2005). TP is another item under debate: while Chomsky (e.g. 2000: 106, 2004: 124) is explicit on the fact that TP does not qualify as a phase head (because it is not propositional), den Dikken (2007) points out that, according to Chomsky’s own criteria, this conclusion is far from obvious. TP is indeed assumed to act as a phase head in a growing body of literature, and nodes below TP such as Voice⁰ (Baltin 2007, Aelbrecht 2008) and AspP (Hinterhölzl 2006) are also granted phasehood. The vanishing point of the atomisation of phasehood is the situation where all nodes trigger interpretation; or,

in other words, where interpretation occurs upon every application of Merge. This radical position – Spell-out-as-you-Merge – is defended by Samuel Epstein and colleagues (Epstein *et al.* 1998, Epstein and Seely 2002, 2006).

The field is in steady movement, and the atomisation of chunks that are granted phase status continues. At some point, all the chunks that are needed for phonological purposes may also be found to be morpho-syntactically motivated phases. In case there is a phonological demand for a given chunk to be a phase, but there is no morpho-syntactic response, this may be taken to be genuinely phonological evidence for phasehood. In current practice, phase heads are detected only on morpho-syntactic grounds, but, of course, there is no reason for this monoculture. If phases transport chunks between morpho-syntax and phonology, it is to be expected that they leave traces in the latter that betray their existence.

In any event, we know that external sandhi is process-specific (Scheer 2011:§823). If the PIC is responsible for blocking word stress computation across word boundaries in English, it applies to stress, but not to external sandhi phenomena such as t-flapping (Scheer 2009c). Therefore, it is not true that a given boundary, the word in our case, is a barrier to all processes. In terms of phase theory, phases do or do not come with a PIC: the word is a phase (in English), but only stress sees the barrier – t-flapping does not.

In other words, the PIC applies à la carte: there is a decision made somewhere regarding the armament of phases and processes with a PIC: some phases will be made visible in the phonology by the association of a PIC effect for some processes, others will not. These choices produce the parametric variation that is known as variation on prosodic phrasing in Prosodic Phonology. In all cases, the non-intervention of morpho-syntax, i.e. the absence of a PIC on a given phase, produces a situation where phonology applies across word boundaries, i.e. where external sandhi occurs. Note, however, that in addition to derivational sandhi-blockers (the PIC) there are also representational sandhi-blockers (the aforementioned syllabic space that may be inserted at morpheme breaks; see Scheer 2009c).

8.4. Spell-out is symmetric, but allows for free rides

If the perspective that was outlined is on the right track, phase boundaries may, but do not need to, be accompanied by phonological effects. This is interesting in the context of the debate regarding asymmetric spell-out, i.e. the independent access of LF and PF. A basic (if often tacit) assumption of phase theory is that LF and PF phases are always concomitant: when a given node is spelled out, its content is sent to, and interpreted at, both LF and PF. It is obvious that phase theory would

be significantly weakened if it turned out that a given node could be independently spelled out at LF and PF. Chomsky (2004) is explicit on this.

Assume that all three components are cyclic. [...] In the worst case, the three cycles are independent; the best case is that there is a single cycle only. Assume that to be true. Then Φ [the phonological component] and Σ [the semantic component] apply to units constructed by NS [narrow syntax], and the three components of the derivation of <PHON, SEM> proceed cyclically in parallel. L [language] contains operations that transfer each unit to Φ and Σ . In the best case, these apply at the same stage of the cycle. [...] In this conception there is no LF: rather, the computation maps LA [lexical array] to <PHON, SEM> piece-by-piece cyclically.

Chomsky (2004: 107)

Responding to empirical pressure from various sides, though, independent LF and PF spell-out is proposed or considered by, among others, Marušič (2005), Marušič and Žaucer (2006), Felser (2004), Matushansky (2005), den Dikken (2007), Megerdooonian (2003) and Caha and Scheer (2008).

There is no doubt that simultaneous phases are to be preferred. The question is whether they resist empirical pressure. The parametric scenario of the above discussion maintains simultaneous spell-out, but in fact allows for interpretation to be vacuous: the phase structure of a sentence is uniquely defined at the morpho-syntactic level. Every time a phase head is hit upon spell-out, its content is sent to both LF and PF. Every phase is thus processed by both interpretational modules, but this does not mean that an effect is systematically encountered: there are “free rides”. That is, at least for PF, a phonological footprint is only left behind if either a PIC condition or a representational unit (such as syllabic space) is associated to a phase. Whether this is the case or not is a matter of a parametric choice. In other words, all phases are treated in the same way by morpho-syntax, but not by PF and LF.

9. Conclusion

On the preceding pages it was argued that of the two currently entertained mechanisms which compete for the definition of phonologically relevant chunks, prosodic constituency (representational) and phase structure (procedural), only one can survive: the same labour must not be done twice. After about three decades of peaceful coexistence, the bringing to the fore of the competition is a virtue in itself. Leaving the empirical assessment for another time, two conceptual arguments are made in disfavour of prosodic constituency: for one thing, phase theory is needed independently in current minimalist syntax, and for the communication between

morpho-syntax and phonology, while prosodic constituency has no motivation outside of phonology. But also, prosodic constituency is disqualified on modular grounds by the fact that it is a diacritic. Modularity-violating Direct Syntax is not an option either.

The article then inquires about two issues that beg the following questions when this reasoning is followed: 1) what, if any, is the output of translation, i.e. which representational objects that carry morpho-syntactic information are inserted into phonological representations?, and 2) how does phase theory need to be adapted in order to be able to serve its new phonological function? The answer to the former question is syllabic space, and to the latter that there is a phase skeleton common to morpho-syntax and phonology, but that not every phase necessarily leaves a trace in the phonology. Whether or not a phonological footprint is left behind depends on parametric choices that concern the armament of phases à la carte with either a PIC (derivational) or a unit of syllabic space (representational).

What is gained at the end of the day is this: 1) an interface theory where the same labour is not done twice, 2) a somewhat weakened, but unified phase theory that does labour both in morpho-syntax and phonology, and 3) a phase theory where evidence for phasehood may be both phonological and morpho-syntactic (while, thus far, only the latter domain is phase-defining).

References

Items followed by “WEB” are available at www.unice.fr/scheer/.

- Aelbrecht, L. 2008. Licensing ellipsis as Agree. Paper presented at the 27th West Coast Conference on Formal Linguistics, UCLA 16-18 May.
- Baltin, M. 2007. Deletion versus Pro-forms: A false dichotomy? Ms., New York University.
- Bermúdez-Otero, R. 2011. Cyclicity. In M. van Oostendorp, C. Ewen, E. Hume, and K. Rice (eds.), *The Blackwell companion to phonology*, 2019–2048. Malden, MA: Wiley-Blackwell.
- Bermúdez-Otero, R., and A. Luís. 2009. Cyclic domains and prosodic spans in the phonology of European Portuguese functional morphs. Paper presented at OCP 6, Edinburg 24 January. Handout available at <http://www.bermudez-otero.com/bermudez-otero&luis.pdf>.
- Caha, P., and T. Scheer. 2008. The syntax and phonology of Czech templatic morphology. In A. Antoneko, J. Bailyn, and Ch. Bethin (eds.), *Annual Workshop*

- on Formal Approaches to Slavic Linguistics. The Stony Brook Meeting 2007*, 68–83. Ann Arbor: Michigan Slavic Publications. WEB.
- Cheng, L., and L. Downing. 2007. The prosody and syntax of Zulu relative clauses. *SOAS Working Papers in Linguistics and Phonetics* 15: 51–63.
- Cheng, L., and L. Downing. 2009. Where’s the topic in Zulu? *The Linguistic Review* 26: 207–238.
- Cheng, L., and L. Downing. 2011a. Prosodic domains do not match spell-out domains. Paper presented at Phonology in the 21st century: In Honour of Glyne Piggott, Montreal 7-9 May.
- Cheng, L., and L. Downing. 2011b. To phrase or not to phrase: On the (non-) congruence of focus and prosody. Paper presented at GLOW 34, Vienna 27 April - 1st May.
- Chomsky, N. 1965. *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. 2000. Minimalist inquiries: The framework. In R. Martin, D. Michaels, and J. Uriagereka (eds.), *Step by step. Essays on Minimalist Syntax in honor of Howard Lasnik*, 89–155. Cambridge, MA: MIT Press.
- Chomsky, N. 2004. Beyond explanatory adequacy. In A. Belletti (ed.), *Structures and beyond. The cartography of syntactic structures, Volume 3*, 104–131. Oxford: Oxford University Press.
- Chomsky, N. 2005. Three factors in language design. *Linguistic Inquiry* 36: 1–22.
- Chomsky, N., and M. Halle. 1968. *The sound pattern of English*. Cambridge, MA: MIT Press.
- Chomsky, N., M. Halle, and F. Lukoff. 1956. On accent and juncture in English. In M. Halle, H. Lunt, H. McLean, and C. van Schooneveld (eds.), *For Roman Jakobson. Essays on the occasion of his sixtieth birthday*, 65–80. The Hague: Mouton.
- Clements, G. 1978. Tone and syntax in Ewe. In D. J. Napoli (ed.), *Elements of stress, tone and intonation*, 21–99. Washington, D.C.: Georgetown University Press.
- Cyran, E. 2010. *Complexity scales and licensing in phonology*. Berlin: Mouton de Gruyter.
- den Dikken, M. 2007. Phase Extension: Contours of a theory of the role of head movement in phrasal extraction. *Theoretical Linguistics* 33: 1–41.
- Dobashi, Y. 2003. Phonological phrasing and syntactic derivation. Ph.D. diss., Cornell University.
- Downing, L. 2010. An edge-based approach to the alignment of syntactic phases and prosodic phrases. *Transactions of the Philological Society* 108: 352–369.
- Elordieta, G. 2008. An overview of theories of the syntax-phonology interface. *Journal of Basque Linguistics and Philology* 42: 209–286.

- Epstein, S., E.M. Groat, R. Kawashima, and H. Kitahara. 1998. *A derivational approach to syntactic relations*. Oxford: Oxford University Press.
- Epstein, S., and T.D. Seely. 2002. Rule applications as cycles in level-free syntax. In S. Epstein, and T. D. Seely (eds.), *Derivation and explanation in the Minimalist Program*, 65–89. Oxford: Blackwell.
- Epstein, S., and T. D. Seely. 2006. *Derivation in Minimalism*. Cambridge: Cambridge University Press.
- Felser, C. 2004. Wh-copying, phases, and successive cyclicity. *Lingua* 114: 543–574.
- Fodor, J. 2000. *The mind doesn't work that way: The scope and limits of computational psychology*. Cambridge, MA: MIT Press.
- Gardner, H. 1985. *The mind's new science: A history of the cognitive revolution*. New York: Basic Books.
- Gerrans, P. 2002. Modularity reconsidered. *Language and Communication* 22: 259–268.
- Grohmann, K. 2007. Spelling out dynamic interfaces. *Linguistic Analysis* 33: 197–208.
- Hayes, B. 1989 [1984]. The prosodic hierarchy in meter. In P. Kiparsky, and G. Youmans (eds.), *Manuscript circulated since 1984, published 1989 in Rhythm and Meter*, 201–260. Orlando, Florida: Academic Press.
- Hinterhölzl, R. 2006. The phase condition and cyclic spell-out: Evidence from VP-topicalization. In M. Frascarelli (ed.), *Phases of interpretation*, 237–259. Berlin: de Gruyter.
- Hyman, L. 1978. Word demarcation. In J. Greenberg (ed.), *Universals of human language, Vol 2*, 443–470. Stanford: Stanford University Press.
- Inkelas, S. 1990. *Prosodic constituency in the lexicon*. New York: Garland.
- Inkelas, S., and D. Zec 1995. Syntax-phonology interface. In J. Goldsmith (ed.), *The handbook of phonological theory*, 535–549. Oxford: Blackwell.
- Ishihara, S. 2007. Major phrase, focus intonation, multiple spell-out. *The Linguistic Review* 24: 137–167.
- Itô, J., and A. Mester 1999. Realignment. In R. Kager, H. van der Hulst, and W. Zonneveld (eds.), *The prosody-morphology interface*, 188–217. Cambridge: Cambridge University Press.
- Kahnemuyipour, A. 2009. *The syntax of sentential stress*. Oxford: Oxford University Press.
- Kaisse, E. 1983. The syntax of auxiliary reduction in English. *Language* 59: 93–122.
- Kaisse, E. 1985. *Connected speech. The interaction of syntax and phonology*. London, New York: Academic Press.
- Kaisse, E. 1990. Toward a typology of postlexical rules. In S. Inkelas, and D.

- Zec (eds.), *The phonology-syntax connection*, 127–143. Chicago: Chicago University Press.
- Kaye, J. 1995. Derivations and interfaces. In J. Durand, and F. Katamba (eds.), *Frontiers of phonology*, 289–332. London and New York: Longman. Also in *SOAS Working Papers in Linguistics and Phonetics* 3, 1993, 90–126. WEB.
- Kenstowicz, M., and Ch. Kisseberth. 1977. *Topics in phonological theory*. New York: Academic Press.
- Kleinhenz, U. 1998. On words and phrases in phonology. A comparative study with focus on German. Ph.D. diss., University of Tübingen.
- Kratzer, A., and E. Selkirk. 2007. Phase theory and prosodic spellout: The case of verbs. *The Linguistic Review* 24: 93–135.
- Lass, R. 1971. Boundaries as obstruents: Old English voicing assimilation and universal strength hierarchies. *Journal of Linguistics* 7: 15–30.
- Lowenstamm, J. 1996. CV as the only syllable type. In J. Durand, and B. Laks (eds.), *Current trends in phonology. Models and methods*, 419–441. Salford, Manchester: ESRI. WEB.
- Lowenstamm, J. 1999. The beginning of the word. In J. Rennison, and K. Kühnhammer (eds.), *Phonologica 1996*, 153–166. La Hague: Holland Academic Graphics. WEB.
- Marušič, F. 2005. On non-simultaneous phases. Ph.D. diss., SUNY, Stony Brook.
- Marušič, F., and R. Žaucer. 2006. On the intensional feel-like construction in Slovenian. *Natural Language and Linguistic Theory* 24: 1093–1159.
- Mascaró, J. 1976. Catalan phonology and the phonological cycle. Ph.D. diss., MIT.
- Matushansky, O. 2005. Going through a phase. *MIT Working Papers in Linguistics* 49: 157–181.
- McCarthy, J., and A. Prince. 1993. Generalized alignment. In G. Booij, and J. van Marle (eds.), *Yearbook of Morphology 1993*, 79–153. Dordrecht: Kluwer. Abridged version in J. McCarthy, (ed.) 2004. *Optimality Theory in phonology*, 451–463. Oxford: Blackwell.
- McCarthy, J., and A. Prince. 2001. Prosodic morphology. Constraint interaction and satisfaction. Ms, ROA #482.
- Megerdoomian, K. 2003. Asymmetries in form and meaning: Surface realization and the interface conditions. Paper presented at Approaching Asymmetry at the Interfaces, UQAM, Montreal.
- Nespor, M. 1999. Stress domains. In H. van der Hulst (ed.), *Word prosodic systems in the languages of Europe*, 117–159. Berlin: Mouton de Gruyter.
- Nespor, M., and I. Vogel 1986. *Prosodic phonology*. Dordrecht: Foris.
- Newell, H. 2008. Aspects of the morphology and phonology of phases. Ph.D. diss., McGill University Montreal.

- Newell, H., and T. Scheer. 2007. Procedural first. Paper presented at the 38th Poznań Linguistic Meeting, Poznań 13-16 September. WEB.
- Odden, D. 1987. Kimatuumbi phrasal phonology. *Phonology* 4: 13–26.
- Odden, D. 1990. Syntax, lexical rules and postlexical rules in Kimatuumbi. In S. Inkelas, and D. Zec (eds.), *The phonology-syntax connection*, 259–277. Chicago: University of Chicago Press.
- Pak, M. 2008. The postsyntactic derivation and its phonological reflexes. Ph.D. diss., University of Pennsylvania.
- Peperkamp, S. 1995. Prosodic constraints in the derivational morphology of Italian. *Yearbook of Morphology 1994*: 207–244.
- Piggott, G., and H. Newell 2006. Syllabification and the spell-out of phases in Ojibwa words. *McGill Working Papers in Linguistics* 20: 39–64.
- Pyle, Ch. 1972. On eliminating BM's. In P. Peranteau, J. Levi, and G. Phares (eds.), *Papers from the eighth regional meeting of the Chicago Linguistic Society*, 516–532. Chicago: Chicago Linguistic Society.
- Rotenberg, J. 1978. The syntax of phonology. Ph.D. diss., MIT.
- Rubach, J. 1984. *Cyclic and lexical phonology: The structure of Polish*. Dordrecht: Foris.
- Rubach, J., and G. Booij. 1984. Morphological and prosodic domains in lexical phonology. *Phonology Yearbook* 1: 1–27.
- Samuels, B. 2009. The structure of phonological theory. Ph.D. diss., Harvard University.
- Scheer, T. 2004. *A lateral theory of phonology. Vol.1: What is CVCV, and why should it be?* Berlin: Mouton de Gruyter.
- Scheer, T. 2008. Why the prosodic hierarchy is a diacritic and why the interface must be direct. In J. Hartmann, V. Hegedüs, and H. van Riemsdijk (eds.), *Sounds of silence: Empty elements in syntax and phonology*, 145–192. Amsterdam: Elsevier. WEB.
- Scheer, T. 2009a. External sandhi: What the initial CV is initial of. *Studi e Saggi Linguistici* 47: 43–82. WEB.
- Scheer, T. 2009b. Intermodular argumentation and the Word-Spell-Out-Mystery. In K. Grohmann (ed.), *Explorations of phase theory: Interpretation at the interfaces*, 23–65. Berlin: Mouton de Gruyter. WEB.
- Scheer, T. 2009c. Representational and procedural sandhi killers: Diagnostics, distribution, behaviour. In M. Dočekal, and M. Ziková (eds.), *Czech in formal grammar*, 155–174. München: Lincom. WEB.
- Scheer, T. 2011. *A guide to morphosyntax-phonology interface theories. How extra-phonological information is treated in phonology since Trubetzkoy's Grenzsignale*. Berlin: Mouton de Gruyter.

- Scheer, T. 2012. *Direct interface and one-channel translation. A non-diacritic theory of the morphosyntax-phonology interface*. Vol.2 of *A lateral theory of phonology*. Berlin: de Gruyter.
- Ségéral, P., and T. Scheer. 2008. The coda mirror, stress and positional parameters. In J. Brandão de Carvalho, T. Scheer, and P. Ségéral (eds.), *Lenition and fortition*, 483–518. Berlin: Mouton de Gruyter. WEB.
- Seidl, A. 2001. *Minimal indirect reference: A theory of the syntax-phonology interface*. London: Routledge.
- Selkirk, E. 1972. *The phrase phonology of English and French*. Ph.D. diss., MIT, published 1980 by Garland Press.
- Selkirk, E. 1974. French liaison and the X-bar notation. *Linguistic Inquiry* 5: 573–590.
- Selkirk, E. 1981 [1978]. On prosodic structure and its relation to syntactic structure. In T. Fretheim (ed.), *Nordic prosody II*, 111–140. Trondheim: TAPIR.
- Selkirk, E. 1984. *Phonology and syntax: The relation between sound and structure*. Cambridge, MA: MIT Press.
- Selkirk, E. 1986. On derived domains in sentence phonology. *Phonology* 3: 371–405.
- Uriagereka, J. 1999. Multiple spell-out. In S. Epstein, and N. Hornstein (eds.), *Working minimalism*, 251–282. Cambridge, MA: MIT Press.
- Vogel, I. 1991. Level ordering in Italian lexical phonology? In P. M. Bertinetto, M. Kenstowicz, and M. Loporcaro (eds.), *Certamen Phonologicum II*, 81–101. Torino: Sellier and Rosenberg.
- Vogel, I. 1999. Subminimal constituents in prosodic phonology. In S. Hannahs, and M. Davenport (eds.), *Issues in phonological structure*, 249–267. Amsterdam: Benjamins.
- Vogel, I., and I. Kenesei. 1990. Syntax and semantics in phonology. In S. Inkelas, and D. Zec (eds.), *The phonology-syntax connection*, 339–363. Chicago: University of Chicago Press.
- Yip, M. 1998. Identity avoidance in phonology and morphology. In S. Lapointe, D. Brentari, and P. Farrell (eds.), *Morphology and its relation to phonology and syntax*, 216–246. Stanford: CSLI Publications.