Special issue

Linguistic knowledge: perspectives from phonology and from syntax

Edited by

Patrick Honeybone[a] & Ricardo Bermúdez-Otero[b]
[a] *University of Edinburgh / Edge Hill College of Higher Education,* honeybop@edgehill.ac.uk
[b] *University of Newcastle,* R.Bermudez-Otero@ncl.ac.uk

Contents

Phonology and syntax: a shifting relationship

Ricardo Bermúdez-Otero[a] & Patrick Honeybone[b]
[a] *University of Newcastle,* R.Bermudez-Otero@ncl.ac.uk
[b] *University of Edinburgh / Edge Hill College of Higher Education,* honeybop@edgehill.ac.uk

Keywords: history of linguistics, syntax, phonology

1 Introduction

In their day-to-day research practice, phonologists and syntacticians are guided —implicitly or explicitly— by ontological and epistemological assumptions about their respective objects of study.[1] These views of phonology and syntax are in turn inscribed within wider conceptions of the nature of language in general and of the proper conduct of linguistic research. Beyond this point, however, uncertainties loom: it is not immediately apparent how much similarity there ought to be between phonology and syntax simply because both are components of language (in the ordinary sense), nor is it clear whether the conceptions of language current in the two disciplines coincide or conflict with each other. This Special Issue[2] provides a platform for the exploration of these questions, which have been repeatedly raised by developments in linguistic theory but have found little space for discussion elsewhere. In the early 1980s, for example, the rise of Principles and Parameters syntax and the attendant birth of Government Phonology prompted a flurry of interest in comparisons between the nature of syntax and phonology (see §4 below). More recently, the advent of the Minimalist Program and of Optimality Theory (OT) has again brought these issues into sharp focus. Minimalism, it would be fair to say, is primarily inspired by a reflection upon the nature of syntax, whereas OT was first conceived in response to fairly specific phonological problems. Both frameworks, however, have profound general implications: Minimalism, for example, has stimulated a vigorous re-examination of the division of labour between syntax and phonology, while there has been a concerted effort to extend the application of OT from phonology to syntax (see §5 below).

An opportunity to address these questions was created in May 2001 at the Ninth Manchester Phonology Meeting. On that occasion, one of us (Patrick Honeybone) organized a special session under the title 'Phonology and syntax — the same or different?'. The current volume collects some of the papers presented at that session alongside specially commissioned contributions.[3] Thus, although the proportion of phonologists and

[1] We are grateful to Noel Burton-Roberts for his comments and suggestions on this article. Ricardo Bermúdez-Otero gratefully acknowledges the support of a British Academy Postdoctoral Fellowship held at Manchester until September 2001 and of an AHRB research leave award held at Newcastle during 2003.

[2] Citations of individual articles should mention the Special Issue thus: 'in Patrick Honeybone & Ricardo Bermúdez-Otero (eds), *Linguistic knowledge: perspectives from phonology and from syntax*, Special Issue of *Lingua*, **xx**'.

[3] Henceforth, we refer to individual articles within the Special Issue giving the author's surname in small capitals. Early versions of the papers by BERMÚDEZ-OTERO & BÖRJARS, BURTON-ROBERTS & POOLE, and CARR were presented at the special session of the Ninth Manchester Phonology Meeting. The session also included presentations by Monik Charette and Elisabeth Delais-Roussarie, which unfortunately could not be included in this Special Issue. The articles by ANDERSON, TALLERMAN, and VAN DER HULST have been specially commissioned. As will be apparent, several of these articles deal with crucial points of data and

syntacticians in this Special Issue is almost exactly balanced, the first impetus for the volume came from a gathering of phonologists. This fact should not be regarded as surprising. Much of the debate on the problems mentioned above has taken place in what is primarily phonological literature, particularly in connection with the degree of formal similarity that can be expected to exist between the theoretical objects posited in the two disciplines: see e.g. Kaye *et al.* (1985, 1990), Bromberger & Halle (1989), and Goldsmith & Laks (2000). Indeed, following this trend, the original session at the Manchester Phonology Meeting was partly inspired by a volume that focused specifically on the status of phonology within language in general: Burton-Roberts *et al.* (2000).

In this Special Issue, however, we have deliberately taken a broader perspective: alongside discussions of phonology (ANDERSON; BERMÚDEZ-OTERO & BÖRJARS; BURTON-ROBERTS & POOLE; CARR; VAN DER HULST), we include articles that address the nature of syntax (ANDERSON; BERMÚDEZ-OTERO & BÖRJARS; BURTON-ROBERTS & POOLE; TALLERMAN), the evolution of the language faculty (TALLERMAN), and the development of linguistic theory (this article; sections of ANDERSON and of VAN DER HULST). All the contributors, however, share a concern with the following key questions:

(i) Do phonologists and syntacticians entertain the same range of ideas as to what language is?
(ii) What are the difficulties faced by overarching conceptions of language that seek to encompass both syntax and phonology?
(iii) To what extent can both disciplines rely upon analogous conceptual and technical resources?
(iv) How much (conscious or subconscious) crossfertilization is there between the two fields?

The authors' collective reflection upon these problems has produced striking results. Notably, it turns out that the answers to questions (i) to (iv) are largely determined by each author's position on a small number of foundational issues:

(a) To what extent is phonological and syntactic knowledge autonomous from, or grounded on, extralinguistic reality?
(b) To what extent does Plato's Problem arise in phonology and in syntax, and, concomitantly, how much of phonological and syntactic knowledge must be innate?
(c) Which aspects of the surface form of linguistic expressions are governed by syntax, and which by phonology?
(d) Are linguistic properties such as hierarchical constituency, recursion, headhood, and linearity equally present in syntax and in phonology, and what is their relationship with nonlinguistic phenomena (e.g. perceptual prominence)?

In §6 below we discuss how these basic challenges are interconnected and how they have been met in the articles included in the volume.

As a further contribution to the debate, this article seeks also to set the concerns of the Special Issue in their wider historical context. Accordingly, sections 2 to 5 discuss how phonology and syntax have influenced each other historically, and which of the two disciplines has fostered the dominant conception of language at each stage in the development of linguistic thought. In line with the concerns of most of the contributors to the volume, we focus largely, but not exclusively, on developments within the generative paradigm. However, the questions addressed here cannot be completely cut loose from their longer-term historical context, and section 2 briefly reviews the situation in the long pre-Chomskyan period.[4]

---

illustrate how linguistic evidence can weigh on the issues discussed; the authors were also encouraged to grapple with the foundational issues, however.

[4] See ANDERSON for further discussion of pre- and non-generative ideas.

2 Linguistics before the 1950s

It has often been argued (e.g. by Robins 1997 and Lightfoot 1999) that the origins of contemporary linguistics may reasonably be sought in the diachronic explorations of the early nineteenth century. From pioneering contributions such as Bopp (1816), Rask (1818), and Grimm (1822-37) there gradually developed a systematic approach to linguistic research that culminated in the scientific achievements of the neogrammarians (e.g. Osthoff & Brugmann 1878, Paul 1880). This work left a deep mark upon twentieth-century linguistics. Indeed, an aspect of the neogrammarian legacy that endured until the Chomskyan Revolution (Newmeyer 1986) was the relative pre-eminence of phonology over syntax in linguistic theorizing.[5] Admittedly, morphology was also an essential focus of attention for the neogrammarians, and important syntactic studies were published during this period (e.g. Delbruck 1871-88). Nonetheless, phonology was thought to be the better understood of the two disciplines, and it was in phonology that the neogrammarians achieved their most influential results. Notably, the Regularity Hypothesis has been a powerful catalyst for much later work, playing an important rôle in the development of twentieth-century structuralist phonology (see Kiparsky 1988) and directly informing the transformational framework developed in Chomsky (1951) and Chomsky & Halle (1968); see §3 below.

The early twentieth century continued to see spectacular advances in the field of phonology. Some of these crucial developments underpin all subsequent reflection upon language in general. First, Saussure's (1916) call for synchronic analysis was effectively put into practice in the work of European and American structuralist phonologists, notably Trubetzkoy (1939) —even if many of the fundamental ideas that supported this shift towards synchrony had already been explored, if not overtly expressed, in earlier work designed to guide historical investigation (e.g. Sievers 1876) and in descriptive phonetic work (e.g. Sweet 1877). Moreover, European structuralist phonologists articulated the view that linguistic form can —indeed should— be studied apart from external substance. This was again a crucial break, which would later have a considerable impact on the study of syntax within the generative paradigm.

It is therefore hardly surprising that, during the structuralist period, the relationship between phonology and syntax was largely one-sided, with phonology exerting a direct influence upon syntax. This was particularly evident in America, where phonology openly played the rôle of the 'pilot science' in linguistics (Murray 1994). In consequence, much of the American structuralist work on syntax (e.g. Harris 1946) built on analogies to phonemicization. On the strength of this fact, Goldsmith & Laks (2000: 3) go as far as to claim that "phonology constituted the theoretical and methodological cornerstone of modern linguistics. The most contemporary concepts and models have derived from it, as have the formalizations, and they have been first applied there".

This indicates that the objects of study of phonology and syntax were taken to be highly analogous and, in essence, subject to identical principles. In fact, this assumption went beyond the attempt to apply phonemicization procedures to syntax. As Durand (1990: 281)

---

[5] The disciplinary distinction between 'phonology' and 'phonetics' was not sharply drawn until the twentieth century; see Durand & Laks (2002), among others. This does not mean, however, that ideas which would now be recognisable as 'phonological' did not exist before the start of the last century. Rather, they were simply subsumed within a unified discipline concerned with sound in language, which has since given birth to two connected but distinct approaches to its subject matter. In this paragraph, we use the term 'phonology' to refer to this early undifferentiated discipline. For the continuity between pre-twentieth century scholarship and current work in phonology, see again Durand & Laks (2002).

observes (following John Anderson), Hjelmslev (1948) explicitly formulated an 'analogie du principe structurel', according to which the units and structural properties needed to describe one aspect of language (such as syntactic relations within sentences) should be expected to be fundamentally the same as those required by the analysis of other aspects of language (e.g. relationships between syllabic constituents in phonology). Hjelmslev's idea was later to prove highly influential in phonology. In the current volume, ANDERSON explores the implications of taking the Structural Analogy Assumption seriously (see also Anderson 1987). Several other articles (especially those by CARR, TALLERMAN, and VAN DER HULST) argue for or against contemporary neo-Hjelmslevian positions, whose background we explore further in §4 below.

Interestingly, Hjelmslev expected to find close analogies between phonology and syntax precisely because he took both to be subject to purely formal laws of structure, quite independent from the substance of sound and thought. In contrast, BERMÚDEZ-OTERO & BÖRJARS, who are skeptical about the extent of such purely formal analogies, explore the possibility that phonology and syntax may be similar in their relationship with extralinguistic domains, which they take to be mediated by grounded markedness constraints.

3 Transformational grammar: rules in phonology and syntax

Insofar as phonology was pre-eminent in the structuralist circles from which Chomsky emerged, it is not surprising that his first substantial work (Chomsky 1951) should have addressed issues in this field. Indeed, the work was not incompatible with structuralist concerns, as witnessed by the fact that Bloomfield (1939) had already contemplated the idea of relating levels of representation by means of extrinsically ordered rules. Through this channel phonology was to exert an important influence upon initial developments in generative syntax. As reported in Bromberger & Halle (1989: 68), Chomsky (1988) "notes that his work on the phonology of Modern Hebrew naturally led him to explore whether some of the devices he had used there might also have a use in syntax". This exploration led to Chomsky (1955), where some of his key phonological ideas (later expounded in Chomsky & Halle 1968) were applied to a syntactic investigation.

This suggests that the fundamental conception of language at the heart of transformational grammar was felt to be equally applicable to phonology and to syntax. Indeed, as Burzio (1995) and others have noted, the transformational framework provided a homogeneous formal treatment for phonological and syntactic phenomena. In the light of subsequent developments (§4 and §5 below), it is significant that, in the process of acquisition, transformational theory still accorded a relatively small rôle to deduction (from a universal set of representational primitives and rule formats); language-specific constructions in the form of (ordered) rules were still dominant.

By providing a workable frame for the exploration of syntax, however, Chomsky achieved a major breakthrough with respect to structuralism. Newmeyer (1986) argues further that the true significance of this development was in fact to situate syntax at the centre of language. This had the effect that, in later periods, many of the key ideas in linguistic theory would come from syntactic research. The assumed centrality of syntax (dubbed 'syntactocentrism' by Jackendoff 2002) would also encourage a growing feeling that syntax was 'special' and, concomitantly, that phonology was 'different'. This trend has been accentuated in the Minimalist Program (see §5 below) and is carried to its ultimate conclusion in the Representational Hypothesis formulated by Burton-Roberts (1994, 2000) and further developed by BURTON-ROBERTS & POOLE. The Representational Hypothesis effectively equates the language faculty with narrow syntax and characterizes phonological

systems as language-particular systems of conventions for representing internal syntactic-semantic objects externally in the phonetic medium.

It should be noted, however, that 'syntactocentrism' has not remained unchallenged in subsequent work within the generative paradigm. Notably, Jackendoff (2002), echoed by VAN DER HULST, argues forcefully for the view that phonology and syntax are parallel generative systems. Jackendoff's conception of syntax is in fact closely allied to the nonderivational frameworks that BERMÚDEZ-OTERO & BÖRJARS discuss in an optimality-theoretic context (e.g. OT versions of Lexical Functional Grammar: LFG-OT). In this connection, it is highly significant that Jackendoff's approach to the architecture of grammar was inspired by key ideas in the theory of representations developed by autosegmental and metrical phonologists (see §4).

4 Principles and Parameters syntax and the persistence of rules in phonology

We have seen that, while transformational grammar remained in the ascendant, phonology and syntax developed more or less in tandem. This state of affairs came to an abrupt end with the advent of Chomsky's second conceptual shift and the rise of the Principles and Parameters framework, heralded by the publication of Chomsky (1981). Most, if not all, of the foundational and conceptual work behind this revolution in generative linguistics was carried out by syntacticians and supported with empirical arguments from syntax. At this point, therefore, syntax takes the lead in theorizing about the nature of language, at least within the generative paradigm. In this connection, it is probably not accidental that Chomsky has not undertaken any major piece of phonological research since Chomsky (1951) and Chomsky & Halle (1968).[6]

The Principles and Parameters framework arose from a perceived need to provide a more radical answer to Plato's Problem in language acquisition than was possible in transformational grammar (see e.g. Chomsky 1986). In the latter, the formal space to be searched by the child during the acquisition process was unbounded and, more importantly, poorly organized, as Universal Grammar (UG) provided no more than a format for grammatical rules and an evaluation measure for choosing between competing grammatical hypotheses; induction from primary linguistic data still played a major rôle in the framing of those hypotheses. In Principles and Parameters syntax, in contrast, the space of possible grammars is tightly constrained and richly structured. As a result, the deductive component of the acquisition task increases dramatically. One of the ways in which this result is achieved is by purging core grammar of language-specific constructions acquired by inductive means. In Principles and Parameters syntax, constructions are treated as epiphenomena of innate universal principles, interacting with a limited number of language-specific parameter settings.

At the same time as these developments were beginning to revolutionize generative syntax, phonology was also undergoing a period of burgeoning innovation, with the rise of nonlinear theories of representation and lexicalist approaches to the phonology-morphology interface. Yet, far reaching though these developments were, Plato's Problem and poverty-of-the-stimulus arguments played a negligible rôle in the argumentation, indicating a divergence between the paths of phonology and syntax. This point can be brought home by inspecting two reference works that summarize the achievements of 1980s (pre-OT) phonology: a student textbook such as Kenstowicz (1994), and a handbook for professionals such as

[6] Anderson *et al.* (1996: 74) note the fact and suggest that generative phonology is all the poorer for it. For some insight into Chomsky's personal motives, see Chomsky (1982: e.g. 57, 98).

Goldsmith (1995). The introduction to Kenstowicz's book (pp. 1-11) explicitly invokes Plato's Problem as providing the rationale for postulating the existence of UG. Kenstowicz then proceeds to list a number of considerably abstract phonological representations and processes, and asserts that, in attempting to account for the acquisition of these, one incurs a form of Plato's Problem; this is taken as grounds for assuming that UG has a phonological component. After this point, however, there is no further mention of Plato's Problem in the body of the text. More clearly, the index to Goldsmith (1995) does not contain entries for either 'Plato's Problem' or 'poverty of the stimulus'.

In this volume, the incidence of Plato's Problem is taken up by CARR, BERMÚDEZ-OTERO & BÖRJARS, and ANDERSON. CARR —who subscribes to the Representational Hypothesis implemented by BURTON-ROBERTS & POOLE— claims explicitly that no poverty-of-the-stimulus argument can be constructed for phonology. This is flatly contradicted by BERMÚDEZ-OTERO & BÖRJARS, who argue that the knowledge embodied in phonological representations and markedness constraints transcends the limits of induction. It must be observed, however, that CARR and BERMÚDEZ-OTERO & BÖRJARS discuss Plato's Problem in slightly different ways. For CARR, the outcome of a poverty-of-the-stimulus argument must be the postulation of a piece of innate, specifically linguistic knowledge. BERMÚDEZ-OTERO & BÖRJARS, in contrast, think about the poverty of the linguistic stimulus in more general terms: viz. as the form that Hume's 'problem of induction' (see e.g. Popper 1934: ch. 1, §1) takes in the case of linguistic knowledge. Thus, although BERMÚDEZ-OTERO & BÖRJARS claim that the phonological knowledge of mature native speakers lies beyond the reach of inductive generalization, they countenance a rôle for both neuroconstructivist and nativist approaches in the solution to this problem. In contrast, ANDERSON goes further, claiming that the postulation of innate, specifically linguistic knowledge is *never* necessary, either in phonology or in syntax: for ANDERSON, therefore, poverty-of-the-stimulus arguments in CARR's strict sense do not exist at all.

The existence of Plato's Problem in phonology is thus surrounded by controversy. In this light, it is somewhat ironic, as Lightfoot (1999: 149) points out, that 1980s phonology should have fostered the development of perhaps the most fully articulated model of parameter setting in language acquisition: Dresher & Kaye's (1990) learning model for metrical phonology. This work has been well received by some syntacticians immediately concerned with learnability issues (e.g. Sakas & Fodor 2001). Nonetheless, it is hardly accidental that Dresher & Kaye should have chosen to develop a model for the acquisition of metrical structure. As we shall see presently, suprasegmental structure was the one area of phonology where parametrization made deep inroads from fairly early on. Moreover, some major elements of metrical organization (e.g. foot boundaries) lack phonetic exponence and hence, like syntax, pose the problem of acquiring covert structure. From this viewpoint, then, perhaps no other area of phonology offered such a fertile ground for developing a parametric learning model.

In fact, most phonological theories of the 1980s may be described as *quasiparametric*. They retained the full apparatus of extrinsically ordered language-specific rules (i.e. constructions) of transformational grammar, but made increasing appeal to a few canonical templates (particularly at syllable and foot level) in order to restrict the application of those rules. These canonical templates introduced an element of parametrization in the theory. The syllable template of a language, for example, was taken to be defined by universal principles (e.g. sonority sequencing, the obligatory character of the nucleus constituent) interacting with a number of binary parameters (e.g. codas permitted or banned, branching onsets permitted or banned). Furthermore, canonical templates were regarded as imposing persistent constraints on derivations (e.g. Dresher & Lahiri 1991) and, to this extent, achieved similar effects to

syntactic parameters. Hayes's work on metrical stress theory (see e.g. Hayes 1995) provides a prime example of this quasiparametric approach to phonology.

In this sense, the similarities between mainstream generative work in phonology and syntax in the 1980s are rather superficial. Not surprisingly, this divergence did not pass without comment. Notably, Bromberger & Halle (1989) argued in favour of the status quo, claiming that, for ontological as well as empirical reasons, phonological theory could not dispense with language-specific rules and extrinsic ordering. In their view, this reflected the fact that "the subject of matter of phonology is intrinsically different from that of syntax" (Bromberger & Halle 1989: 69). However, others disagreed and undertook to remodel phonology, in whole or in part, on Principles and Parameters syntax and, more specifically, on the theory of Government and Binding (GB). This is particularly clear in the case of Government Phonology: Jonathan Kaye, a key figure in the development of the framework, has explicitly acknowledged the influence of Chomsky's syntactic work on the evolution of Government Phonology (see Cheng & Sybesma 1999). In fact, Bromberger & Halle (1989) is in part a reaction against some of the early ideas which led to the creation of Government Phonology, which had been developing since, perhaps, Lowenstamm & Kaye (1982).[7]

In this effort to bridge the widening gap between phonology and syntax in the aftermath of Chomsky's second conceptual shift, Hjelmslev's 'analogie du principe structurel' (see §2 above) was frequently invoked not only by some adherents of Government Phonology but also by researchers in broadly commensurable frameworks such as Dependency Phonology (e.g. Anderson & Ewen 1987, ANDERSON this volume) and Radical CV or Head-Driven Phonology (van der Hulst & Ritter 1999, VAN DER HULST this volume). Under this neo-Hjelmslevian aegis, parallels between phonology and syntax have been drawn in three main ways:

- The structure of syllables has been likened to that of sentences, on the basis of an analogy between the onset/rhyme distinction and the NP/VP split. In the current volume, ANDERSON and VAN DER HULST regard this analogy as valid, whereas CARR and TALLERMAN criticize it as either vacuous or misleading. In particular, TALLERMAN emphasizes the problems that arise on the syntactic side of the equation. As she points out, it is but a short step from the assumption of structural analogy between phonology and syntax to assigning a rôle to such putative similarities in the phylogenesis of the language faculty. Indeed, Carstairs-McCarthy (1999) has recently argued for a direct evolutionary connection between phonology and syntax, which would underpin the assumption that the two are, in some fundamental aspects, the same. TALLERMAN's article, however, lists a number of severe challenges to Carstairs-McCarthy's position, particularly in connection with the syntax of verb-initial languages.

- In Government Phonology it has been assumed that positions in syllable structure enter into formal relationships analogous to those holding between syntactic constituents, and that phonological and syntactic computations are subject to similar restrictions. These parallelisms have been closely pursued, with practitioners of Government Phonology invoking phonological applications of several elements of GB syntax: e.g. government (e.g. Kaye *et al.* 1985, Kaye 1990), the Empty Category Principle (Kaye *et al.* 1990: §4.1), the Minimality Condition (Charette 1989), and the Projection Principle (Kaye *et al.* 1990: §4.2). In this volume,

[7] The status of this framework remains controversial. Rennison (2000: 138) ruefully notes the current widespread ignorance of Government Phonology in the United States, but the tradition remains vigorous elsewhere, particularly at a number of European institutions.

however, CARR argues that the notion of government deployed in Government Phonology has little to do with the syntactic relationship (see also Honeybone 1999). In this connection, it is notable that much recent work in the Government tradition strays from the syntax-phonology parallelisms that were proposed at its inception, its focus having shifted to the exploration of Lowenstamm's (1997) strict CV framework (see e.g. Ségéral & Scheer 2001).

- Finally, VAN DER HULST further argues that phonological representations obey the principles of X-bar theory at all levels of constituency. This claim is again vigorously contested by CARR, who asserts that the notions of specifier and complement have no meaning in phonology other than metaphorically. ANDERSON, however, does not take this to indicate that syntax and phonology are formally heterogeneous, as he points out that the concept of specifier is not well-defined even in syntax.

Research in these frameworks continues today, although the (American) mainstream has turned to follow different directions; see §5. Moreover, there are at least two further areas where phonology and syntax have actively engaged with each other since the 1980s. In that decade, for example, work on the syntax-phonology interface underwent unprecedented growth (see e.g. Selkirk 1984, 1986 and Nespor & Vogel 1982, 1986). Researchers in this field have actively debated whether or not the same constituents are available on each side of the interface, and whether information flows uni- or bi-directionally across it.

In addition, the 1980s witnessed important advances in feature theory, which had been a focus of phonological research since Trubetzkoy and Jakobson (see e.g. Trubetzkoy 1939, Jakobson & Halle 1956). Key innovations in this area included the development of feature geometry (e.g. Clements 1985, Sagey 1986) and of 'particle' or 'element' theories (e.g. Anderson & Ewen 1987; Kaye *et al.* 1985, 1990; Schane 1984). Interestingly, these proposals have been echoed in syntactic work. The idea that linguistic units have a complex featural makeup was of course exported from phonology to syntax quite early on, with the introduction of features such as [±Noun] and [±Verb]; see e.g. Ouhalla (1999). During the 1980s, work on syntactic features gained momentum with the rise of GB: consider, for example, the crucial rôle of [±anaphoric] and [±pronominal] in the theory of empty categories (Chomsky 1981, 1982). Crucially, however, recent work on φ-features has directly borrowed concepts and techniques developed in the phonological research of the 1980s: notably, Harley & Ritter (2002) and Heap (2002) argue that significant syntactic generalizations can be expressed only if φ-features are subject to feature-geometrical arrangement.

5 Minimalism and OT: a farewell to phonological rules

In the early 1990s, linguistics reached another turning point. Within approximately a year, Chomsky (1992) and Prince & Smolensky (1993) exploded upon the linguistic scene. Whether in agreement or in sometimes scandalized opposition, today's linguists inhabit to a considerable extent the landscape of problems and concerns which these two epoch-making works opened. Their influence, as we shall see in this section, extends to the relationship between phonology and syntax.

Though technically quite different from GB, Minimalist syntax represents a natural — if radical— development of the ideas that led to the Principles and Parameters framework. Notably, the drive towards reducing the language-particular content of syntax, which began in earnest with the abolition of constructions in GB, reaches its logical conclusion in

Minimalism, where parametrization is exported from the syntax into the lexicon and the morphology. Minimalism, in this sense, attempts to give substance to the claim that "there is, in effect, only one human language" (Epstein *et al.* 1996: 3). In addition, the Minimalist Program accelerates the drive towards formal streamlining: its declared goal is to eliminate all devices that are not directly motivated by legibility conditions at the interface with other mind-internal systems. The result, as BERMÚDEZ-OTERO & BÖRJARS emphasize, is an entrenchment of the doctrine of autonomous syntax: insofar as syntax is purged of all language-particular stipulation and responsible only to mind-internal interface conditions, it is fully insulated from the facts and pressures of communication and use.

Questions about the ontology of phonology have played no rôle in these developments, but Minimalist assumptions raise a host of problems about phonology and its relationship with syntax. In this volume, BURTON-ROBERTS & POOLE adopt the radically Minimalist position that the syntactic computational system is not only universally invariant but also solely driven by the need to serve the LF interface. Accordingly, BURTON-ROBERTS & POOLE regard syntactic representations as purely hierarchical and non-linear, and consequently claim that it is not the business of syntax to generate word-order patterns. It is clear that a syntactic system so constituted will not accommodate many of the phenomena traditionally regarded as falling within the syntactician's province. As both BERMÚDEZ-OTERO & BÖRJARS and BURTON-ROBERTS & POOLE observe, this raises the possibility of phonology (or 'PF') being used as a waste-paper basket for the rejects of Minimalist syntacticians. BURTON-ROBERTS & POOLE tackle precisely this problem in their analysis of Stylistic Fronting in Icelandic. They argue that Stylistic Fronting, having no interpretable consequences, cannot be a syntactic phenomenon, but they observe that, for equally powerful reasons, it cannot be handled by phonology in the traditional sense of the word (i.e. a phonology concerned with prosody, melody, and the like). They suggest that a solution to this dilemma is available under the Representational Hypothesis, which claims that phonological systems consist of sets of language-particular conventions for representing the hierarchical non-linear objects generated by syntax in the linear medium of speech.

The Representational Hypothesis effectively equates UG with the syntactic computational system and places phonology (with its conventions for linearly representing hierarchical syntactic objects) outside UG. This radical claim is developed in CARR's article, which argues that, whilst syntax is entirely innate, phonology must be treated in thoroughly empiricist terms: in other words, phonology (in BURTON-ROBERTS & POOLE's extended sense) is learnt on the basis of no more than (i) access to the syntactic-semantic objects present at the LF interface and (ii) general, not specifically linguistic cognitive abilities.

Other articles in the Special Issue bear on CARR's claim. TALLERMAN makes no commitment as to whether or not there is a phonological component to UG, but her view of the phylogenesis of the language faculty is broadly compatible with the position adopted by BURTON-ROBERTS & POOLE and CARR, for she asserts that the evolutionary histories of phonology and syntax are distinct. BERMÚDEZ-OTERO & BÖRJARS, however, query the character that CARR's strictly empiricist phonology will take. As we saw in §4 above, they assert that the phonological knowledge of mature native speakers raises Plato's Problem, in that it lies beyond the reach of inductive generalization. BERMÚDEZ-OTERO & BÖRJARS develop this argument in response to Hale & Reiss's (2000) charge that the use of markedness constraints in OT violates Ockham's Razor. In Hale & Reiss's view, markedness is a mere epiphenomenon of performance-driven change and should therefore play no rôle in the grammar. However, BERMÚDEZ-OTERO & BÖRJARS argue that phonological markedness does not consistently match phonetic difficulty and that markedness constraints set boundaries to both phonologization and analogical change. If these claims are correct, then the acquisition of phonology cannot be explained within narrowly empiricist frameworks

(using the term in Karmiloff-Smith's 1998 sense). Nevertheless, BURTON-ROBERTS & POOLE and CARR state that UG has no phonological component. If so, how do learners manage to transcend the limitations of induction during phonological acquisition in the ways identified by BERMÚDEZ-OTERO & BÖRJARS? It seems that, in any answer to this question, neuroconstructivist mechanisms and developmental processes must play a prominent rôle. This is a possibility that BERMÚDEZ-OTERO & BÖRJARS are prepared to countenance, as they note that some markedness constraints may plausibly be acquired on the basis of performance self-monitoring by the child.

Our discussion so far has shown how Minimalist approaches to language put long-held views of the relationship between syntax and phonology in question. OT, the other big player in linguistics since the 1990s, is sometimes regarded as intrinsically antithetical to Minimalism. This is arguably a richly ironic situation, for OT goes much further than the quasiparametric phonological theories of the 1980s (see §4 above) in implementing some key ideas of the Principles and Parameters framework: notably, OT claims, as a matter of principle, to entirely eliminate language-specific constructions (i.e. rules) from phonology and to vastly increase the formal articulation of the grammar space that the child searches during phonological acquisition. In this connection, Tesar & Smolensky (2000: 45) point out that a complete ranking of CON can be described in terms of a set of dominance parameters. In their analysis of the learnability of optimality-theoretic grammars, Tesar & Smolensky conclude that one of the main advantages of the framework is the rich formal structure of the grammar space it defines; this structure even enables the child to exploit a type of implicit negative evidence.[8] In addition, Prince & Smolensky (1993: 2) themselves draw attention to the affinity between the notion of optimality and the principles of representational and derivational economy of early Minimalism (Chomsky 1989, 1992).

Why, then, should OT and Minimalism be perceived as antithetical? Whatever links exist between OT and connectionism fail to explain the fact, given Prince & Smolensky's (1993: §10.2.1) explicit condemnation of eliminativist connectionism and their decision not to address the issue of the connectionist implementation of symbolic models. We suspect that, in fact, the main point of contention is the autonomy *vs* function debate (see §6 below). As we have pointed out above, Minimalist syntax is radically autonomous. In contrast, OT encourages a more conciliatory approach to the debate insofar as constraints can be specifically grammatical objects and yet be grounded on nonlinguistic factors. This point is developed by BERMÚDEZ-OTERO & BÖRJARS.

It is not clear, however, that OT logically implies any answer to the question 'Are syntax and phonology the same or different?' OT is merely a theory of grammatical mappings and presupposes no particular theory of representations, nor does it require any particular configuration of levels or modules in the grammar. Nonetheless, BERMÚDEZ-OTERO & BÖRJARS adduce empirical evidence to show that the advantages and disadvantages of OT cut across the syntax-phonology divide as traditionally understood. This can be taken to provide implicit support for syntactic theories where all computations can be implemented optimality-theoretically, such as LFG (e.g. Bresnan 2000). The interpretation of BERMÚDEZ-OTERO & BÖRJARS's results may however be disputed. As we saw above, Minimalists and, in particular, the proponents of the Representational Hypothesis (including in this Special Issue BURTON-ROBERTS & POOLE and CARR) draw the line between syntactic and nonsyntactic phenomena in ways which differ sharply from traditional demarcations. They would accordingly argue that some of the analogies between syntax and phonology drawn by

[8] Any acquisition datum is, by the very fact of its grammaticality, more harmonic than all the possible competitors produced by GEN. The learner can rely on the implicit ungrammaticality of these failed competitors to establish constraint rankings.

BERMÚDEZ-OTERO & BÖRJARS actually involve comparisons between phenomena external to narrow syntax.

6 The main issues: a synoptic view

So far, we have shown that current views of the nature and relative standing of phonology and syntax are deeply rooted in the development of linguistic theory during the twentieth century, to the point that some aspects of the contemporary debate may seem incomprehensible to those unfamiliar with its historic background. To redress the balance, therefore, it may be useful at this juncture to provide a synoptic view of the problem field as it appears to be constituted today in the light of the articles included in this volume.

Although our contributors address a great variety of issues, the autonomy of language emerges, in effect, as the master question. To a large extent, each author's stance in respect of the autonomy debate determines his or her response to questions concerning (i) the origins of phonological and syntactic knowledge, (ii) the presence or absence of formal analogies between phonology and syntax, and (iii) the division of labour between the two. The key gauge of opinion, therefore, is whether phonology and syntax are regarded as autonomous from, grounded on, or emergent from nonlinguistic reality (where the latter includes the physics and physiology of speech, the circumstances of communication, world knowledge, etc.) On this point, the articles included in this volume set out three different positions:

- According to the Representational Hypothesis expounded in BURTON-ROBERTS & POOLE and CARR, syntax is strictly autonomous and purely formal. Phonology is, in contrast, the locus of communicative function, as its sole *raison d'être* is to enable the external representation of radically internal syntactic objects in the medium of speech.

- In contrast, VAN DER HULST regards both syntax and phonology as autonomous systems. Notably, he conceives of phonology as an innate system of primes and modes of combination that is deployed in the course of language acquisition to provide a mental representation for linguistic signifiers. Crucially, VAN DER HULST asserts that these primes and their combinations are independent from the substance of signifiers; they are modality-independent and can be used equally to conceptualize sounds (in spoken language) or gestures (in signed language); see also van der Hulst (2000).[9]

- Finally, ANDERSON and BERMÚDEZ-OTERO & BÖRJARS argue that neither syntax nor phonology is fully autonomous. BERMÚDEZ-OTERO & BÖRJARS stake a carefully nuanced position: they claim that both syntax and phonology are largely governed by markedness constraints, which are formulated in terms of specifically linguistic categories but stand in a nonarbitrary relationship with the facts of language use. More radically, ANDERSON aligns himself with the view that all aspects of linguistic knowledge can be subsumed under general cognition.

[9] Interestingly, whilst Carstairs-McCarthy argues that syllable structure played a critical rôle in the phylogenesis of the human capacity for syntax (see §4 above), he explicitly rejects the claim that syllables, as units of phonological organization, are modality-neutral (Carstairs-McCarthy 2001). He asserts that the syllables of spoken and signed languages are only superficially and coincidentally similar.

As might be expected, the degree of autonomy accorded to phonology and to syntax directly determines the extent to which either is regarded as innate. As we saw in §5, the proponents of the Representational Hypothesis take the syntactic computational system to be innate, whilst phonology is acquired by empiricist means (in CARR's sense). In turn, VAN DER HULST assumes that the combinatorial systems driving phonology and syntax are both innate; language acquisition involves setting up relationships between prime combinations and the substance of thought, sound, or gesture. BERMÚDEZ-OTERO & BÖRJARS, in contrast, sketch a complex picture: some aspects of linguistic knowledge, they suggest, are learnt by induction over primary linguistic data; others emerge in the course of development through the child's self-monitoring of her own performance; a third type may be innate. Their main point is that, whether in phonology or in syntax, assuming a false dichotomy between innateness and induction will cloud the issues surrounding grounded linguistic patterns. Finally, ANDERSON asserts that UG has no content at all, either phonological or syntactic. As we saw in §4 above, an interesting aspect of this controversy is the wide range of approaches that our contributors adopt with regard to the question whether or not phonological knowledge is subject to poverty of the stimulus.

Less obviously, it turns out that an author's stance in the autonomy debate will also inform his or her judgement of putative formal analogies between phonology and syntax. As we have seen, the Representational Hypothesis opposes autonomous syntax to functional phonology. The logic of this position leads CARR to condemn all parallels between phonology and syntax as either vacuous or spurious —a task in which he is assisted by TALLERMAN's reflections upon the phylogenesis of the language faculty. For VAN DER HULST, in contrast, both syntax and phonology constitute purely formal combinatorial systems; it is this very fact that, in his view, confers plausibility upon the existence of neo-Hjelmslevian homologies between the two. Indeed, VAN DER HULST speculates that some of the similarities between phonology and syntax may reflect general properties of particulate hierarchical systems (what Abler 1989 called 'Von Humboldt systems'). In an apparent paradox, ANDERSON reaches the same conclusion —namely, that the Structural Analogy Assumption is correct— from entirely different premises: the similarities between phonology and syntax captured by Dependency Grammar stem, in his view, from principles of general cognition, of which both phonology and syntax are particular instances.

Finally, assumptions about autonomy also bear upon the division of labour between phonology and syntax. As we saw in §5, the radicalization of the doctrine of autonomous syntax in the Minimalist Program has led to an empirical retrenchment, whereby syntacticians decline responsibility for a number of phenomena that have traditionally fallen in their province. If phonology is to pick up the bill, it will have to be thoroughly reconstituted. It is precisely this that BURTON-ROBERTS & POOLE attempt to do through the Representational Hypothesis. Their central claim is that the relationship between syntax and phonology is not 'realizational' but 'representational': syntax is not derivationally targeted on the PF interface; rather, phonology, as a system of representational conventions, is targeted on the LF objects generated by the language faculty (see further Burton-Roberts 2000: 54, 62, and *passim*).

7 Conclusion

To conclude, let us briefly return to the questions posed in §1:

Do phonologists and syntacticians deploy in their research the same range of ideas as to what language is? On the whole, the answer seems to be 'yes'. Both disciplines are currently in the grip of a strong polarization between autonomist and functionalist positions.

In the case of phonology, this was dramatically demonstrated by the range of papers included in Burton-Roberts *et al.* (2000); see Bermúdez-Otero (2002).

To what extent is there crossfertilization between the two fields? This volume provides clear proof of keen mutual awareness between phonology and syntax. As we have seen in this article, this is a stable feature of modern linguistics. Interestingly, the arrow of influence is prone to swerve in unpredictable ways. As we have seen, Hjelmslev formulated his 'analogie du principe structurel' (§2) at a time when linguists looked on phonology as their pilot science; yet the neo-Hjelmslevian efforts undertaken in theories such as Government Phonology sought to restore the parity between phonology and syntax when the latter, following the advent of the Principles and Parameters framework, seemed to have outstripped the former (§4).

In this light, can both disciplines rely upon analogous conceptual and technical resources? Here, it seems that mutual awareness does not by itself necessarily lead to convergence. By emphasizing the radical autonomy of syntax, Minimalism appears destined to subscribe to the view that "phonology is different". OT, in contrast, relies on the recognition of a substantial set of similarities that come to light when it is applied to the two fields. The similarities that emerge from optimality-theoretic modelling, however, are very different in nature from those which derive from the assumption that phonology and syntax share formal principles and representational resources, as has been argued by proponents of Government Phonology, Dependency Phonology, and Head-Driven Phonology.

In view of such diversity of opinion, we feel that the relationship between syntax and phonology should remain a focus of linguists' attention in future. Regardless of whether the paths that the two disciplines follow in the future prove to be parallel or divergent, mutual awareness is essential if conceptual coherence is to be maintained across linguistics as a whole.

References

Abler, W., 1989. On the particulate principle of self-diversifying systems. Journal of Social and Biological Structures 12, 1-2.

Anderson, John, 1987. 'Structural analogy and dependency phonology' In: Anderson, John & Durand, Jacques (eds) Explorations in Dependency Phonology. Dordrecht, Foris.

Anderson, John & Ewen, Colin, 1987. Principles of Dependency Phonology. Cambridge, Cambridge University Press.

Anderson, Stephen R., Chung, Sandra, McCloskey, James & Newmeyer, Frederick J., 1996. 'Chomsky's 1962 programme for linguistics: a retrospective'. In: Newmeyer, Frederick J., Generative linguistics: a historical perspective. London, Routledge, pp. 66-97.

Bermúdez-Otero, Ricardo, 2002. Review of Burton-Roberts, Carr & Docherty (2000). Journal of Linguistics 38, 403-410.

Bloomfield, Leonard, 1939. 'Menomini Morphophonemics' Etudes dédiées à la mémoire de M. le Prince N. S. Trubetzkoy. Travaux du Cercle Linguistique de Prague 8, 105-115.

Bopp, Franz, 1816. Über das conjugationssystem der Sanskritsprache. Reprinted 1975. Hildesheim, Olms.

Bresnan, Joan, 2000. 'Optimal syntax'. In: Dekkers, Joost, van der Leeuw, Frank & van de Weijer, Jeroen (Eds), Optimality Theory: phonology, syntax and acquisition. Oxford, Oxford University Press.

Bromberger, Sylvain & Halle, Morris, 1989. 'Why phonology is different'. Linguistic Inquiry 20, 51-70.

Burton-Roberts, Noel, 1994. 'Ambiguity, sentence and utterance: a representational approach'. Transactions of the Philological Society 92, 179-212.
Burton-Roberts, Noel, 2000. 'Where and what is phonology? A representational perspective'. In Burton-Roberts, Carr & Docherty (2000), pp. 39-66.
Burton-Roberts, Noel, Carr, Philip & Docherty, Gerard (Eds.), 2000. Phonological Knowledge: Conceptual and Empirical Issues. Oxford, Oxford University Press.
Burzio, Luigi, 1995. 'The rise of Optimality Theory' Glot International 1:6, 3-7.
Carstairs-McCarthy, Andrew, 1999. The Origins of Complex Language: An Inquiry into the Evolutionary Beginnings of Sentences, Syllables, and Truth. Oxford, Oxford University Press.
Carstairs-McCarthy, Andrew, 2001. 'ASL "syllables" and language evolution: a response to Uriagareka'. Language 77, 343-349.
Charette, Monik, 1989. 'The Minimality Condition in phonology'. Journal of Linguistics 25, 159-187.
Cheng, Lisa & Sybesma, Rint, 1999. Interview with Jonathan Kaye. Glot International 4:9/10, 3-5.
Chomsky, Noam, 1951. Morphophonemics of Modern Hebrew. Master's thesis, Department of Linguistics, University of Pennsylvania. Published 1979, New York, Garland.
Chomsky, Noam, 1955. The logical structure of linguistic theory. PhD dissertation, University of Pennsylvania. Published (1975) New York, Plenum Press.
Chomsky, Noam, with Huybregts, Riny & van Riemsdijk, Henk, 1982. The Generative Enterprise. Dordrecht, Foris.
Chomsky, Noam, 1981. Lectures on Government & Binding. Dordrecht, Foris.
Chomsky, Noam, 1982. Some Concepts and Consequences of the Theory of Government and Binding. Cambridge, Mass., MIT Press.
Chomsky, Noam, 1986. Knowledge of Language: its Nature, Origin, and Use. Westport, Praeger.
Chomsky, Noam, 1988. 'A personal view'. Paper presented at the conference 'The Chomskyan Turn' Jerusalem, April 1988. Reported in Bromberger & Halle (1989).
Chomsky, Noam, 1989. 'Some notes on economy of derivation and representation'. MIT Working Papers in Linguistics 10, 43-47.
Chomsky, Noam, 1992. A Minimalist Program for Linguistic Theory. (MIT Occasional Papers in Linguistics) Cambridge, Mass., MIT.
Chomsky, Noam & Halle, Morris 1968. The Sound Pattern of English. New York, Harper and Row.
Clements, G. N., 1985. 'The geometry of phonological features'. Phonology Yearbook 2, 225-253.
Delbruck, Berthold, 1871-88. Syntaktische Forschungen. 5 volumes. Halle, Waisenhaus.
Dresher, B. Elan & Kaye, Jonathan D., 1990. 'A computational learning model for metrical phonology'. Cognition 34, 137-195.
Dresher, B. Elan & Lahiri, Aditi, 1991. 'The Germanic foot: metrical coherence in Old English'. Linguistic Inquiry 22, 251-286.
Durand, Jacques, 1990. Generative and non-linear phonology. London, Longman.
Durand, Jacques & Laks, Bernard, 2002. 'Phonology, phonetics and cognition'. In: Durand, J. & Laks, B. (Eds.), Phonetics, Phonology and Cognition. Oxford, Oxford University Press, 1-50.
Epstein, S., Thrainsson, H. & Zwart, C., 1996. 'Introduction.' In: Abraham, W., Epstein, S., Thrainsson, H. & Zwart, C. (Eds.), Minimal Ideas. Amsterdam, John Benjamins.
Goldsmith, John, 1995. The Handbook of Phonological Theory. Cambridge, Mass., Blackwell.

Goldsmith, John & Laks, Bernard, 2000. 'Introduction' In: Goldsmith. J. & Laks, B. (Eds.), Folia Linguistica 34, Special Issue: The History of Phonology in the Twentieth Century, 1-10.

Grimm, Jacob, 1822-37. Deutsche Grammatik. 4 volumes. Göttingen, Dieterich'sche Buchhandlung.

Hale, Mark & Reiss, Charles, 2000. 'Phonology as cognition'. In: Burton-Roberts, Carr & Docherty (2000), 161-184.

Harley, H and Ritter, E., 2002. 'A feature-geometric analysis of person and number'. Language, 78, 482- 527.

Harris, Zellig, 1946. 'From morpheme to utterance'. Language 28, 1-30.

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

Heap, David, 2002. 'Split subject pronoun paradigms: feature geometry and underspecification' In: Teresa Satterfield, Christina Tortora & Diana Cresti (eds.), Current issues in Romance languages: selected papers from the 29th Linguistic Symposium on Romance languages (LSRL), Ann Arbor, 8-11 April 1999. Amsterdam: John Benjamins. 129-144.

Hjelmslev, Louis, 1948. 'Le verbe et la phrase nominale' In: Mélanges de philologie, de littérature et d'histoire ancienne offerts à J. Marouzeau, 235-81. Reprinted in Essais Linguistiques, 165-91. (Travaux du circle linguistique de Copenhague 12.)

Honeybone, Patrick, 1999. 'I blame the government' Language Sciences 21, 177-221.

Hulst, Harry van der, 2000. 'Modularity and modality in phonology'. In Burton-Roberts, Carr & Docherty (2000), 207-243.

Hulst, Harry van der & Ritter, Nancy, 1999. 'Head-Driven Phonology' In: Hulst, Harry van der & Ritter, Nancy, (Eds.), The Syllable: Views and Facts. Berlin, Mouton de Gruyter, 113-168.

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

Jakobson, Roman, and Halle, Morris, 1956. Fundamentals of language. The Hague, Mouton.

Karmiloff-Smith, Annette, 1998. 'Development itself is the key to understanding developmental disorders'. Trends in Cognitive Sciences 2, 389-98.

Kaye, Jonathan, 1990. 'Government in phonology: the case of Moroccan Arabic'. The Linguistic Review 6, 131-159.

Kaye, Jonathan, Lowenstamm, Jean & Vergnaud, Jean-Roger, 1985. 'The internal structure of phonological representations: a theory of charm and government'. Phonology Yearbook 2, 305-328.

Kaye, Jonathan, Lowenstamm, Jean & Vergnaud, Jean-Roger, 1990. 'Constituent structure and government in phonology'. Phonology 7, 193-231.

Kenstowicz, Michael, 1994. Phonology in Generative Grammar. Cambridge, Mass., Blackwell.

Kiparsky, Paul, 1988. 'Phonological change' In: Newmeyer, F., (Ed). The Cambridge Linguistics Survey. Volume 1. Cambridge, CUP.

Lightfoot, David, 1999. The Development of Language: Acquisition, Change, and Evolution. Cambridge, Mass., Blackwell.

Lowenstamm, Jean, 1997. 'CV as the only syllable type.' In: Durand, J. & Laks, B., (Eds). Current Trends in Phonology: Models and Methods. Volume 1. Salford, The European Studies Research Institute, pp. 419-442.

Lowenstamm, Jean & Kaye, Jonathan, 1982. 'Compensatory lengthening in Tiberian Hebrew'. Paper presented at the minifestival on compensatory lengthening, Harvard University.

Murray, Stephen, 1994. Theory Groups and the Study of Language in North America; a Social History. Amsterdam, John Benjamins.

Nespor, Marina & Vogel, Irene, 1982. 'Prosodic domains of external sandhi rules'. In: van der Hulst, Harry & Smith, Norval, (Eds.), *The Structure of Phonological Representations*. Volume 1. Dordrecht, Foris, pp. 222-255.

Nespor, Marina & Vogel, Irene, 1986. *Prosodic Phonology*. Dordrecht, Foris.

Newmeyer, Frederick, 1986. Linguistic Theory in America. Second edition. San Diego, Academic Press

Ouhalla, Jamal, 1999. Introducing Transformational Grammar: from principles and Parameters to Minimalism. Second edition. London: Arnold.

Osthoff, Hermann & Brugmann, Karl, 1878. Morphologische Untersuchungen. Leipzig.

Paul, Hermann, 1880. Prinzipien der Sprachgeschichte. Halle, Niemeyer.

Popper, Karl R., 1934. Logik der Forschung. Vienna. First English edition (1959): The Logic of Scientific Discovery, Hutchinson Education.

Prince, Alan & Smolensky, Paul, 1993. Optimality Theory: Constraint Interaction in Generative Grammar. Rutgers University Center for Cognitive Science Technical Report #2, New Brunswick, NJ. Revised (2002), Rutgers Optimality Archive #537.

Rask, Rasmus, 1818. Undersogelse om det Gamle Nordiske eller Islandske Sprogs Oprindelse. Copenhagen, Gyldendalske.

Rennison, John, 2000. 'OT and TO – On the status of OT as a theory and a formalism'. The Linguistic Review 17, 135-141.

Robins, R. H., 1997. A Short History of Linguistics. Fourth edition. London, Longman.

Sagey, E., 1986. The Representation of Features and Relations in Nonlinear Phonology. PhD, MIT. Published 1990. New York, Garland.

Sakas, William, G. & Fodor, Janet Dean, 2001. 'The structural triggers learner' In: Bertolo, S., (Ed). Language Acquisition and Learnability. Cambridge, Cambridge University Press.

Saussure, Ferdinand de, 1916. Cours de Linguistique Générale. Paris. Second edition, 1922.

Schane, Sanford, 1984. The fundamentals of particle phonology. Phonology 1, 129-155,

Ségéral, Philippe & Scheer, Tobias, 2001. 'La Coda-Miroir'. Bulletin de la Société de Linguistique de Paris 96, 107-152.

Selkirk, Elisabeth, 1984. *Phonology and Syntax: The Relation between Sound and Structure*. Cambridge, Mass., MIT Press.

Selkirk, Elisabeth, 1986. 'On derived Domains in Sentence Phonology'. *Phonology Yearbook* **3**, 371-405.

Sievers, Eduard. 1876. Grundzüge der Lautphysiologie zur Einführung in das Studium der Lautlehre der indogermanischen Sprachen. Leipzig, Beitkopf und Härtel.

Sweet, Henry, 1877. Handbook of Phonetics. Oxford, Clarendon.

Tesar, Bruce & Smolensky, Paul, 2000. Learnability in Optimality Theory. Cambridge, Mass., The MIT Press.

Trubetzkoy, N., 1939. Grundzüge der Phonologie. Translated by Baltaxe, C. (1969) as Principles of Phonology. Berkeley, University of California Press.