Why phonology is the same

Harry van der Hulst

1. Introduction

In this short contribution I would like to discuss and defend the idea that phonology and (morpho-)syntax are organized in parallel ways. Thus, I take issue with views that explicitly regard phonology as different, or implicitly adopt different theoretical models in both domains. The idea that phonology and syntax are parallel is, of course, hardly new, and the following discussion will identify some relevant sources. I felt, however, that to address this subject in a volume that is dedicated to a linguist who has always shown a vivid interest in both areas, regarding them as equally important and theoretically sophisticated, is especially fitting. Henk van Riemsdijk is one of the few linguists who, although being mainly active in the area of syntax, would systematically attend all phonology talks at, for example, GLOW conferences. Even though trying to do the opposite is more demanding for someone who is primarily a phonologist, I have always found his presence in linguistics inspiring and admirable.

2. The general organization of the grammar

I adopt the view that the two fundamental units of language are *words* and *sentences*. Even though the distinction as such is riddled with theoretical issues, problems and borderline cases, I believe that generally accepted distinctions such as the following testify to the fundamental nature of the separation:

Table 1

	Word	**Sentence**
Syntax	Morphology	Syntax
Phonology	Lexical phonology	Post-lexical phonology
Semantics	Lexical semantics	Sentence semantics

Of course, providing labels for this distinction proves nothing in itself, in particular since some of them are just restatements of the distinction at

some specific level. Traditional terminology does not necessarily hold 'the truth'. Despite such objections (and many others that could be made), I take the distinction as a fruitful directive in thinking about the organization of mental grammars, not only in research, but also in explaining issues to students (see Van der Hulst 2005). The lexicon plays a role in this distinction but hardly a defining one. It all depends on what one takes the lexicon to be. Certainly, if the lexicon contains idiomatic expressions and the like, it can hardly be said that it contains all and only words. Side stepping this issue as well (referring for further discussion to Van der Hulst, to appear a), let us look at the internal organization of grammatical modules, of which we now postulate six (three at each level).

Each component appears to have at least the following two ingredients:

(1) a. Basic units, primitives
    b. Combination rules

Thus, each module accounts for a compositional structure of some sort in either words or sentences. Putting the semantic modules aside for the moment, I will adopt the following terminology for the basic units and combination rules in each of the remaining modules:

Table 2: The organization of grammatical components

	Basic units	*Combination rules*
Word phonology	phonemes	phonotactic rules
Sentence phonology	word forms	prosodic rules
Morphology	morphemes	word formation rules
Syntax	words	phrase structure rules

Let us now move on and take into consideration some facts of language that we have so far ignored. We have assumed that the basic units combine into larger chunks while remaining unchanged. However (some might say: unfortunately) more is going on. In particular, it would appear that basic units sometimes change in the combinations that they occur in. I refer to this phenomenon as **the variability of linguistic units** (cf, also Van der Hulst, to appear c). Linguistic units are like chameleons. They adapt to the environment that they appear in. Let us consider the variability of phonemes and words. We find two types of variability:

(2) a. Variability in the inherent properties
    b. Variability in the distributional properties

At the level of words, variability of inherent properties refers to *inflection*. We note, for example, that in English verbs takes on various endings and the crucial point to take home is that these endings are 'forced upon' the verb by the properties of the sentence context that the words appear in. Hence we have a set of rules that add endings to verbs. These rules look a lot like word formation rules but they are not word formation rules. The inflectional rules specify affixation of words that is necessary for these words to occur in sentences, in combination with other words; they do not make new words. Since we will encounter rules with a similar function in the other components of the grammar, I will use the general term **adjustment rules**.

The second type of adjustment rules that we appear to need in syntax is the transformational rule. The distributional properties of words differ in different sentential contexts. In a statement, for example, we find the direct object next to the verb, while in sentences we have to look for it at the beginning of the sentence. Transformations are adjustments, like inflectional rules, in the sense that they modify the basic structures that are delivered by the combinations rules.

Let us now look at the need for adjustment rules in phonology. Let us assume that English has a phoneme /p/ which occurs in words such as *pin*, *spin*, *nap*, *floppy* etc. Close examination of the way in which this phoneme is pronounced in these various words reveals that there are differences. In particular, the /p/ that occurs at the beginning of a syllable with stress is pronounced with a little puff of air (called aspiration). To account for this variability we need rules that adjust the properties of the phoneme /p/ to its environment. We call the different realizations of a phoneme **allophones**, and the rules that account for them **allophony rules**. Allophony rules are adjustment rules that play a role which is analogous to inflectional rules. What about the second type of adjustment rules, those that would be analogous to transformations in syntax? It seem to me that all phonological rules that affect segments as a whole, substituting them by others (as in *electric – electricity*), deleting them, inserting them or, in rare cases, reversing their order, qualify for this category; I will call them P-rules for short. It has of course long been noted that P-rules *are* transformational rules in terms of their formal properties, just like it has long been noted that phonotactic rules are analogous to phrase structure rules. Let us, then, add the adjustment rules to our model:

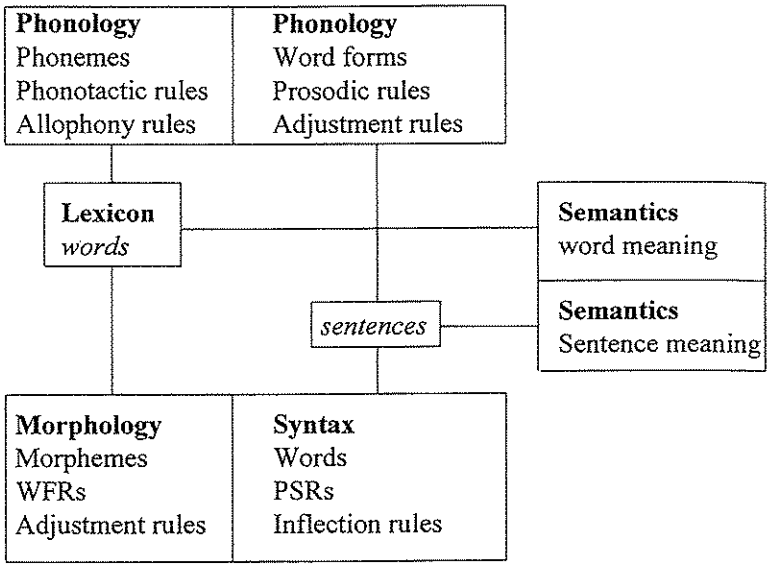
Table 3: The organization of grammatical components (take 2)

	Basic units	*combination rules*	*adjustment rules*
Word phonology	phonemes	Phonotactic rules	allophony rules P-rules
Sentence phonology	word forms	prosodic rules	
Morphology	morphemes	Word formation rules	
Syntax	words	Phrase structure rules	inflectional rules T-rules

Table 3 raises the obvious question as to whether the two open cells also contain adjustment rules. Numerous studies in the area of 'prosodic' or 'post-lexical' phonology have shown that, indeed, there is a lot of phonological action at the level of the sentence. However, I will not here try to classify such processes in inherent and distributional. As for morphology, for inherent adjustment rules, we could think of rules adding so-called linking units in compounds (*hond-e-hok, schaap-s-wol*). However, I'll leave it to the morphologists among us to develop the (underdeveloped) notion of adjustment rules in this module. (Crucially, one should not place rules that change the phonological shape of morphemes in this category; those are phonological P rules. Morphological adjustment rules must deal with morphological units.)

What about semantics? On the one hand, one might expect to see that both semantic modules will contain a set of basic semantic units as well as a set of rules according to which these units can be combined; and then, in addition, we expect to need adjustment rules. The search for basic semantic units at the world level is ongoing and regarded by many, turning to prototype theories, as fruitless. Certainly, both morphemes and words, when combined into larger units shows variability of meaning, which suggest rules that manipulate inherent properties. Sentence level scope relations also suggest rules that are analogous to syntactic transformations. If we regard semantics are the third pillar of grammar (as suggested in Jackendoff 2002), we arrive at the following diagram:

(3) The organization of the grammar and of the grammatical components



In the two semantic boxes I have left undecided exactly what kinds of basic units and rules are needed. In all other boxes we find three things: basic units, combination rules and adjustment rules (WFRs = word formation rules; PSRs is phrase structure rules).

The bottom line appears to be this: We have *words* and we have *sentences* and at both levels we have three systems of rules that assure that each unit (word or sentence) is wellformed phonologically, morpho-syntactically, and semantically. All six systems (or at least those that regard phonology and syntax) appear to be organized in a very similar way.

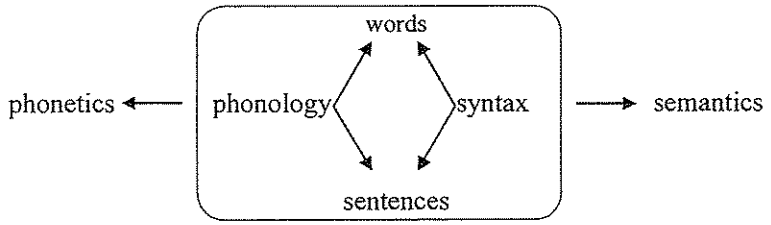
3. Bringing in phonetics

As an alternative to viewing semantics as the third, independent pillar of the grammar, many linguists have sought to establish a close and direct relationship between syntax and semantics, for example in the tradition of Montague-grammar and many more recent approaches. Syntactic structures are constructed and hand-in-hand a semantic representation (or interpretation) is constructed. This view creates an asymmetry between phonology and syntax. A distinct property of phonology is that it deals with

units and structures that, as such, have no meaning. (Alas, we phonologists spend out lives on dealing with meaningless matters; may be that's what's different) But wait, just like syntactic units and constructions have *cognitive content* (i.e. meaning), totally and utterly independent from their phonological form, phonological units and constructions have *phonetic content*. Thus, one would expect an analogous situation on the side of form: phonology specifies units and complex structure and as such structures are formed, phonetic rules compute the sum total phonetics. Indeed, explicit parallels between the hand-in-hand efforts of syntax and semantics and of phonology and phonetics have been explored in Wheeler's *Categorial Phonology* (Wheeler 1981, explicitly based on a conception inspired by Montague style grammar) and we find the same parallelism in Declarative Phonology (cf. Scobbie 1997, Scobbie et al.1996). (This whole class of approaches both to syntax-semantics and phonology-phonetics share the characteristic of being skeptical of adjustment rules, but that could just be a coincidence.)

One might argue that both cognitive content and phonetic content are external to grammar in a narrow sense, and that precisely in this sense, grammar is a mechanism to link cognitive content and phonetic content (or, as we say, meaning and form). Hence, I would like to revise the diagram in (7), leaving out details:

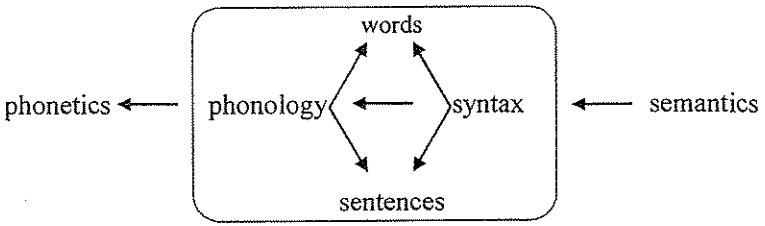
(4)



The thin arrows simply means 'characterize' or 'check', i.e. the role of phonology and syntax is to check the wellformedness of linguistic expressions (words and sentences). The fat arrows imply a *dependency relation*. The phonetic and semantic-cognitive side of language is (if the arrows point the right way) dependent on the phonology and syntax, respectively. In this diagram there is no dependency between phonology and syntax, no central engine that drives the system (as in standard Chomskyan models). One might argue that this is wrong, that syntax drives the whole thing. However, one might then, in addition, argue that what really drives the whole thing is semantics, without any doubt the central

aspect of human language. Thus, we revise the structure again. This diagram expresses an implicational hierarchy in that semantics (in the general sense of cognitive structure) does not presuppose anything. Looking at the other end of the implicational chain one might say that each step presupposes all prior steps:

(5)



Also, given the close link between phonetics and phonology on the one hand and between syntax and semantics on the other, we expect that it is not always clear how certain phenomena on one side (form) or the other (meaning) are best dealt with. Syntacticians quarrel with semantic colleagues or their own semantic alter ego, and phonologists do the same with reference to phonetics (cf. Van der Hulst, to appear c). Needless to say that all the above issues are heavily dependent on the specific theories that one is committed to, although no such commitment should keep one from seeing the importance of the issues at hand and exploring alternatives.

Whatever one likes to see as the central engine, and however one resolves the boundary conflicts and divisions of labor, the above has made clear, I hope, that there is not much difference between phonology and syntax. Indeed, from the very start, Chomksy himself argued for a parallel design, especially with regard to the recognition of the class of adjustment rules, claiming that his ideas for the design of syntax were inspired by his ideas for the design of phonology. Subsequent developments have shown a divergence, at least in what is sometimes called 'mainstream generative grammar' (Van der Hulst 2004). Whereas, for example, the distinction between lexical and post-lexical phonology flourished and lead to the recognition of certain diagnostic properties of both classes of rules, a similar distinction in syntax worked out rather differently (mainly to recognizing word formation as lexical, but not so-called bounded transformation relations) (cf. Kiparsky 1978, Hoekstra, Van der Hulst and Moortgat 1981). More recently, we have seen a spectacular acceptance of Optimality Theoretic approaches of phonology language, while approaches to syntax have not been affected in the same way. This, of course, makes no

rational sense, unless it is the case that *people doing phonology* are genetically different from *people doing syntax*. This seems unlikely (as I'm sure Henk van Riemsdijk would agree). More likely is it that such different theoretical choices have everything to do with fashion, good public relations and Chomsky's dominance in syntax. All things being equal, given that phonology and syntax are parallel in the ways suggested here, it would be highly unlikely that OT is good for phonology and bad for syntax. It is either good for both, or for neither (cf. Van der Hulst and Ritter 2000, Van der Hulst 2004).

4. Structural analogy

The idea that phonology and syntax are analogous is, as mentioned at the beginning of this article, neither mine nor new. I simply adopt it as a working hypothesis and I believe that it leads to fruitful results. The idea has received a name in the work of John Anderson, the developer of so-called dependency approaches to both morphology, syntax and phonology: structural analogy (cf. Anderson 1992, Van der Hulst, 2000, 2003, to appear b). Anderson is meticulous in tracing the roots of this idea in linguistics. Without going into specific formulations, let us say that the assumption of structural analogy holds that different modules of the grammar are organized in the same way, making use of the same structural relations. Modules differ due to the fact that they start out with different sets of primitives. In addition, Anderson reckons with differences that are due to the interaction between components. I take this to mean that differences in dependency between modules might affect the organization of one or the other module. Due to Anderson's work I personally got convinced by the idea that phonology and syntax are not different at all, but in fact, highly parallel. The parallelism in his dependency approach go far beyond the idea that both modules deal with hierarchical structure and include specific claims concerning the kind of relationship (one of dependency) that holds between the units in such structures. Very similar ideas have been pursued in a related model, Government Phonology. Most of mainstream generative phonology has ignored this important line of research and thus a chance to explore the parallelism between syntax and phonology. In extreme cases, this parallelism has been explicitly denied (cf. Bromberger and Halle 1989 cf. Van der Hulst, 2000, to appear a).

Why would structural analogy exist? It was once expressed to me by Morris Halle (p.c.) that this idea is at odds with the idea of modularity. If modularity is taken to mean that different components have their own

specific vocabularies and tasks, why would one expect similarities in their internal organization, he said, adding: one would expect the opposite. True, it is all a matter of expectation (based on general considerations). My expectation of structural analogy is based on the idea that it would be unreasonable to assume that the different modules of the mind use dramatically different mechanisms. A lot has been learned in the recent decades about the development of biological organisms. One thing that I am thinking of here is the idea (pushed especially in the *evo-devo* approach –evolutionary developmental biology- that differences between organisms do not arise because they are genetically totally different, but because the same genes are used in different ways, at different points in the development, more or less often in different places of the structure and so on. This idea squares nicely with the discovery that organisms turn out to have much less genes than was previously believed. One can do a lot with a relatively small number of genes if they are recycled, used over and over again within the same organism. If, as is now generally believed, the mind (including the mental grammar) is based on a genetic substrate (and develops environmentally), it makes sense to expect that different modules use and recycle the same types of neuronal connections.

If the idea that phonology and syntax (and other mental modules) are similar because they are based on a neural substrate that emerges on the basis of reactivating the same genetic instructions we might want to say that the similarities are not just analogies, but, stretching the term, homologies. The resemblance is due to common *genetic* decent.

There is another reason for expecting similarities, however, one which goes beyond considerations regarding grammatical modules or, indeed, mental modules in general. As Abler (1989) points out there are far-reaching similarities between the organization of language grammars and the organization of, for example, chemistry and physics. In all these domains we find discrete units that combine into ever larger structures. Indeed, this almost seems a point of logic. How else can complex structures be understood? Others such as Simon (1996) and Volk (2002) have pointed out that certain structural patterns are pervasively recurrent not just in the human mind, but in the (human) universe. It is tempting to speculate on the consequences of such broad-ranging similarities but it would seem that my time is up.

References

Abler, William 1989. On the pariculate principle of self-diversifying systems. *Journal of Social and Biological Structures* 12: 1-2.

Anderson, John M. 1992. *Linguistic representation: Structural analogy and stratification.* Berlin and New York: Mouton de Gruyter.

Bromberger, Sylvain and Morris Halle 1989. Why phonology is different. *Linguistic Inquiry* 20/1: 51-70.

Hulst, Harry van der. 2000. Modularity and modality in phonology. In *Phonological knowledge: its nature,* ed by N. Burton-Roberts, P. Carr and G. Docherty, 207-244. Oxford: Oxford University Presss.

Hulst, Harry van der. 2003. Cognitive phonology. In Germania at alia. A linguistic Webschrift for Hans den Besten on the occasion of his 55th birthday.

Hulst, Harry van der 2004. Phonological dialectics: A short history of generative phonology. In *Linguistics today – Facing a greater* challenge, ed. by P.G.J. van Sterkenburg, 217-243. Amsterdam: John Benjamins Publishing Company.

Hulst, Harry van der. 2005. *A mind for language.* Kendall/Hunt Publishing Company.

Hulst, Harry van der. to appear a. On the parallel Organization of linguistic components. In *Phonology and syntax- the same or different.* Special issue of the journal Lingua, ed by R. Bermudez-Otero and P. Honeybone.

Hulst, Harry van der. to appear b. Dependency Phonology. In: *The encyclopedia of language and linguistics.* 2nd edition. Elsevier.

Hulst, Harry van der. to appear c. De vorm van taal. *Nederlandse Taalkunde.*

Hulst, Harry van der and Nancy Ritter. 2000. The SPE-heritage of OT. *The Linguistic Review* 17/2-4: 259-290.

Hoekstra, Teun, Michael Moortgat and Harry van der Hulst. 1980. Introduction. In *Lexical Grammar*, ed by T. Hoekstra, H. van der Hulst and M. Moortgat, 1-48. Dordrecht: Foris

Jackendoff, Ray. 2002. *Foundations of language. Brain, meaning, grammar, Evolution.* Oxford: Oxford University Press.

Kiparsky, Paul. 1978. Recent development in generative phonology. In *The Nordic Languages and Modern Linguistics.* Vol. 3, ed by J. Weinstock, 42-50. University of Texas, Austin Texas.

Scobbie, James. 1997. *Autosegmental Representation in a Declarative Constraint-based Framework.* New York/London: Garland press. [Original dissertation: Attribute Value Phonology. Edinburgh, 1991]

Scobbie, James, M., John S. Coleman and Steven Bird. 1996. Key aspects of Declarative Phonology. In *Current trends in phonology: Models and methods, Vol. II,* ed by Jacques Durand and Bernard Laks, 685-710. European Studies Research Institute (ESRI) and Manchester: University of Salford.

Simon, Herbert. 1996. *The sciences of the artificial.* 3rd edition. Cambridge etc.: The MIT Press.

Volk, Tyler. 1995. *Metapatterns across space, time and mind.* New York: Columbia University Press.
Wheeler, Deirdre. 1981. *Aspects of a categorial theory of phonology.* PhD dissertation, Umass.

Recursively linked Case-Agreement: from accidents to principles and beyond

Riny Huybregts

1. Introduction

All languages incorporate a fair amount of 'noise'. Chaotic relics from the past without obvious systematic links to their core systems. An example may be the inflected complementizers of numerous Germanic dialects. Sometimes, however, these historical accidents and dialect mixtures can be shown to systematically interact with more principled, internally directed, systems of language. Here we will argue that the morphosyntax of complementizers is crucially implemented in core systems of basic recursion and interface conditions imposed on 'narrow syntax.' Properties of Case valuation of 'parallel' argument chains are recursively linked to Agreement processes, which, we will argue, define the (im)possibility of *that*-trace effects. Using Chomsky's (2005b) intriguing terminology, we might say that '1st factor' chance properties interact with '3rd factor' general language-independent principles to explain '2nd factor' conditions of I-languages, including UG.[1]

2. An analysis of complementizer-trace effects

As is well-known subject extraction across an adjacent complementizer behaves differently across the world's languages. For example, *that*-trace effects occur in English (1) and French (2) but not in Spanish (3) or West-Flemish (4). These different behaviors reflect to some extent effects of the path-dependent evolutionary history of the language. Romance complementizers (*que, che*) differ idiosyncratically from Germanic complementizers (*that, da*) and are homophonous with interrogative rather

[1] Already in 17th century Cartesian rationalism these issues were insightfully discussed. The title of a famous study of those days, *Grammaire générale et raisonnée*, a mentalistic interpretation of universal grammar, clearly suggests that there was a deep concern for the 'three factors' in the growth of language. An attempt was made to explain language-dedicated, universal properties of language ('générale') in terms of general, internally directed mechanisms of the mind ('raisonnée').