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More than Words

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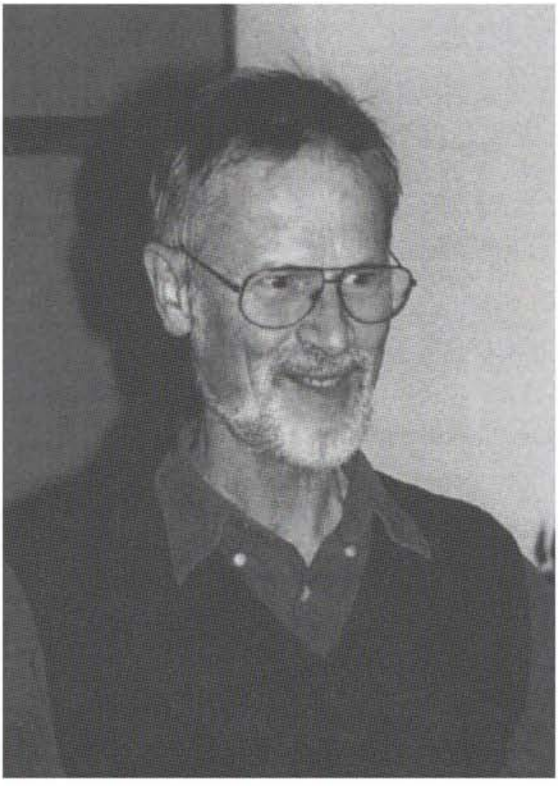

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Introduction

Ingrid Kaufmann and Barbara Stiebels

This volume is dedicated to Dieter Wunderlich on the occasion of his 65th birthday (June 14, 2002). The volume is entitled 'More than Words' for a number of reasons: First of all, Dieter Wunderlich has always strongly defended the view that the lexicon, which has been his main research topic for quite a few years, is more than simply a list of words. His work can be characterized as a constant plea for the lexicon as an autonomous module of grammar. Secondly, Dieter Wunderlich's research extends to various aspects of grammar beyond the domain of the lexicon (see below). Thirdly, he has always been open to approaches which are different from his own. He has had a constant exchange with proponents of other approaches, some of whom have contributed papers to this volume. Finally, Dieter has been a committed, encouraging, influential and devoted linguist, colleague and advisor, and the gratitude that many of those who have had a chance to work with him feel can only be partially reflected in the papers of a Festschrift.

Dieter Wunderlich did not intend to become a linguist in the first place. After obtaining his Abitur in Seebad Heringsdorf (Usedom), he studied Physics in Jena, Leipzig and Hamburg. In 1964 he obtained a diploma in Nuclear Physics at the University of Hamburg. He worked as physicist for one year, but he soon became interested in formal analyses of style and went to Berlin to study German literature and language at the Technical University (TU). His interest in Linguistics developed from his contact with the Linguistics group of the Academy of Sciences in East Berlin, which at the time was one of the places where modern Generative Grammar was practised for the first time in Germany. In 1969 Dieter Wunderlich finished his doctoral dissertation on tense and time reference in German at the TU Berlin. From 1970-73 he was professor for German Linguistics at the Free University of Berlin, and since 1973 he has occupied the chair in General Linguistics at the Heinrich-Heine University in Düsseldorf, where he built up the Institute of Linguistics.

Dieter Wunderlich is one of the few 'Generalists' among the German linguists. His research areas include temporal semantics, speech act theory, intonation, language and space, questions and answers, coordination, modals, comparatives, complex verbs, participles, syntax and semantics of PPs. In the last 12 years he has focused on various aspects of the lexicon (e.g., role of paradigms, stem allomorphy, lexical representation of verbs, lexical and functional categories) and its relation to syntax (e.g. agreement, argument linking, and adjunction). He has always advocated a lexical analysis of agreement, word formation, semantic decomposition of verbs and of complex predicates. Dieter Wunderlich's research is documented in a number of books written or edited by him and in numerous articles. A list of publications is given in the appendix.

Dieter Wunderlich has run several research projects that were funded by the German Science Foundation (DFG). From 1978-80 he directed a project on the function of modalities in discourse and co-directed a project on comparative studies of routine formulas in German and Japanese (with Florian Coulmas). From 1983-86 he co-directed a project on quantifiers in German (with Sebastian Löbner). Projects on sentence intonation and focus structure of wh-questions in German (1985-87) and on the semantics and conceptual structure of spatial localization (1988-90) followed later. Within the project cluster of the Sonderforschungsbereich 282 'Theory of the lexicon', whose speaker and stimulating and integrating spirit he has been since 1991, he has run projects on the lexical foundation of agreement (1991-96), on derivation and lexical semantics (1991-93; with Jürgen Lenerz), on verb meanings (1991-93; with Sebastian Löbner), on verb structures and complex predicates (1994-2002; since 1997 with Barbara Stiebels), and on non-concatenative morphology (2000-2002; with Janet Grijzenhout).

From these projects, three lexically based theories emerged: a lexically based theory of agreement, which – like Head-driven Phrase Structure Grammar (HPSG) – treats agreement as a phenomenon of the syntax-semantics interface. Wunderlich's theory of agreement differs from HPSG in that it takes the morphology into account more thoroughly. Parallel and independent of Chomsky's *Minimalist Program*, Dieter Wunderlich developed a theory of inflectional morphology (*Minimalist Morphology*; MM), which is affix-based, makes extensive use of underspecification, builds on the notion of paradigms, and avoids arbitrary class features and zero morphology. Inspired by the two-level approach to meaning by Bierwisch and his co-workers and Kiparsky's linking theory, Dieter Wunderlich developed the *Lexical Decomposition Grammar* (LDG), a theory of the representation of semantic form and argument structure of lexical entries. LDG was designed in particular to deal with diatheses and argument linking. Both MM and LDG have been reformulated within Correspondence Theory (CT). With respect to inflection, CT-based MM provides an elegant account of gaps and substitutions in paradigms, as Dieter Wunderlich has shown for Yimas and Dalabon, whereas CT-based LDG accounts for the typological range of linking patterns in the languages of the world.

Dieter Wunderlich's involvement in research projects documents his own interest in current problems of Linguistics, as well as his concern for the academic development of his students. He has always provided his students with a stimulating and encouraging scientific environment and has been willing to share his time and knowledge with them. The various M.A. and Ph.D. theses which he has supervised reflect his commitment to the advancement of young academics.[1] His comments on papers by students and colleagues, often written in the very same evening after Dieter was given the paper, generally covered several pages and contained ideas and suggestions for alternative analyses

Whereas in the Seventies and Eighties, Dieter Wunderlich focussed on various aspects of German, his later research is characterized by an increasing interest in typologically and genetically diverse languages. Starting with the analysis of verbal and nominal paradigms in Russian, Latin, and Macedonian (among others), he has carried out case studies on Basque, Japanese, Icelandic, Quechua, Georgian, Potawatomi, Hindi, Yimas, Dalabon, Hungarian, Finnish, Bulgarian, and Yucatec Maya – partly in collaboration with his Ph.D. students and his colleagues.

Recently, Dieter Wunderlich has developed an interest in the evolution of language, and especially in the role that rich morphology has in the historical development of languages. He assumes that rich morphology is characteristic for the early phase of a morphological system, when syntax and morphology start to develop into distinct, separate modules of grammar. He is also interested in the typology of argument linking. For him, inverse systems and prominence/salience-based systems represent an early system of argument linking, whereas case and agreement linking are recent and more elaborate devices.

Besides his research within Theoretical Linguistics, Dieter Wunderlich has shown a strong concern for the application of modern Linguistics in the teaching of German Grammar in secondary schools. He co-edited and contributed chapters of school books for German. In addition, he initiated and co-edited the journal *Studium Linguistik* (1976-88), which aimed at providing students of linguistics with information about the state of the art in the various linguistic subdisciplines, and which, in some sense, was a German forerunner of *Glot.*

Dieter Wunderlich was one of the founding members of the German Linguistics Society (*Deutsche Gesellschaft für Sprachwissenschaft*; DGfS) and its president from 1978-80. From 1977-92 he belonged to the Advisory Board of the Max Planck Institute for Psycholinguistics in Nijmegen. From 1991-92 he was a fellow of the Centre for Advanced Studies (*Wissenschaftskolleg*) in Berlin, where he formed a research group with Manfred Bierwisch and Paul Kiparsky, both of whom have greatly influenced his work.

The papers in this volume relate to various aspects of Dieter Wunderlich's work, either indirectly by reflecting on the role of lexical specifications, or directly by commenting on analyses proposed by Dieter Wunderlich.

Janet Grijzenhout considers regular and irregular stress patterns in different languages and argues in favour of lexical specification of prosodic structure in stems and affixes that display irregular behaviour with respect to stress assignment. Her approach is cast in an Optimality Theoretical framework. She shows that the assumption of

1 The list of doctoral dissertations supervised or reviewed by Dieter Wunderlich is given in the appendix.

Base-Output correspondences does not adequately account for deviating stress patterns. Instead, she argues that stress assignment in morphologically complex words is best captured by means of lexical specifications and concomitant alignment constraints.

Richard Wiese is concerned with the question of how the categorial restriction on conversion in German can be explained. Building on a proposal made in Kiparsky (1982), he argues that three types of conversion exist: root conversion, stem conversion, and word conversion. At each level, conversion is restricted to a certain type: root conversion and word conversion derive nouns, while stem conversion derives verbs.

Veronika Ehrich discusses the verbal and nominal properties of two types of event nominalizations in German, namely *ung*-nominalizations and nominalized infinitives. Her starting point is Wunderlich's (1996c) classification of lexical categories by the features [±art(iculated)] and [±(dep)endent]. Ehrich argues that different degrees of "nouniness" can be connected to the degree of articulatedness of the nominalizations. The grade of articulatedness depends on how many of the grammatical properties that define the feature [±art] are instantiated by the nominalization.

Harald Clahsen et. al. present psycholinguistic evidence for two hypotheses on the morphological representation of strong verb stems, namely that verb forms consisting of strong stems and inflectional affixes have decomposed representations, and that strong stems are represented as subnodes of hierarchically structured entries with underspecified feature content, as proposed in Wunderlich (1996d).

Gereon Müller presents an OT analysis of nominal inflection in German, in which the form and distribution of inflection markers is syntactically determined. He argues for a distinction of case and agreement markers in order to cope with strong and weak inflection respectively. The distribution of markers is determined by constraints that require overt morphological case/agreement markers in certain syntactic domains. The form of the markers is determined by the interaction of the sonority hierarchy with a set of constraints which state that certain sets of morphosyntactic feature combinations are incompatible with certain phonological features.

Albert Ortmann discusses morphosyntactic asymmetries ('splits') in object linking, subject number agreement, and noun-phrase internal agreement. Drawing on the general outline of Aissen (2000), he assumes a number of micro-constraints that are universally ordered by harmonic alignment. He provides an account of a conspiracy of two splits in Hungarian possessor agreement in terms of the interaction of general faithfulness constraints and markedness constraints derived from the alignment of the definiteness scale with a plurality scale. In his analysis, he pursues the idea that cross-linguistic variation in to the specification of inflectional features is partly determined by constraint ranking.

Paul Kiparsky shows that the distribution of pronominals and reflexives is determined by a universal Obviation constraint, which requires coarguments to have disjoint reference, and the economy constraint of Blocking. These constraints interact with a hierarchy of binding domain constraints, thus generating a typology of pronouns. The constraint system predicts the category of obviative reflexives and the novel category of referentially dependent nonreflexive pronouns. It also explains the relationship between the blocking of coargument reflexives, in the non-coargument case, and the ambiguity of reflexives between the bound anaphora and coreferential readings.

Gisbert Fanselow discusses the notion of "quirky subjects" and argues that there is no compelling evidence for such a category in Icelandic, as well as in German. By reconsidering the criteria proposed for quirky subjects (coordination reduction, raising, control, agreement, and islandhood), he shows that the relevant data can simply be explained be reference to the behaviour of case and the role of the argument hierarchy in these languages.

Wolfgang Klein pursues the question of what the function of inflectional morphology, in particular case marking, is. Departing from the observation that languages tend to reduce morphology, and that impoverished morphology is characteristic for the 'Basic Variety' of second language learners, he raises the question of why languages display inflectional morphology at all. With respect to case, Klein's answer is that morphological case-marking serves to identify the argument-time structure of the verb: Default rules determine the morphological case of an argument, depending on its occurrence(s) in the cluster of argument-time pairs that make up the lexical representation of verbs.

Ilse Zimmermann argues that morphological case has to be distinguished from abstract case, and presents an OT analysis of structural case in Russian in terms of Jakobson's case features (to account for morphological case in the output), on the one hand, and the linking theory of LDG (to account for abstract case in the input) on the other. The mapping of these two classes of features is regulated by specific correspondence constraints.

Manfred Bierwisch's paper deals with the question of whether semantic representations can do without the predicate CAUSE, as assumed in LDG. By discussing causative verbs, resultative constructions, and lexical items like *cause*, *because*, *as*, he comes to the conclusion that CAUSE is needed in addition to non-causal conjunction.

Gerhard Jäger discusses issues of computational complexity of Optimality Theory (OT) in its standard and its bidirectional variety. Jäger integrates results on finite state implementation of OT systems by Frank & Satta (1998) and Gerdemann & van Noord (2000). He generalizes the latter construction and shows that it is always applicable if (a) the OT system in question only uses markedness constraints, and (b) the notions of global and local optimality defined by this system coincide. Moreover, he shows that a similar extrapolation of Gerdemann & van Noord's construction to bidirectionality is not possible. Since, in contrast to unidirectional optimization, bidirectional optimization that uses gradient (markedness) constraints goes beyond the bounds of finite state techniques, it is intrinsically more complex than its unidirectional counterpart.

Heinz Vater's paper discusses the various readings of the *sein* 'be' + participle constructions in German, building on the classification proposed in Wunderlich (1997). Vater comes to the conclusion that five types of *sein*+participle constructions have to be distinguished, two of which are non-perfective while the others have a perfective reading. The constructions differ with respect to the status of *sein* (auxiliary or copula) and the category of the participle (verb or adjective).

Two papers in this volume are concerned with the semantics of the German perfect. *Sebastian Löbner* presents evidence for the ambiguity of the German perfect between an aspectual reading ("non-past perfect") and a tense reading ("past non-perfect"), by discussing the interpretation of the perfect in narrative contexts and in temporal clause constructions, as well as the combination of perfect forms with *schon* 'already' and *noch* 'yet'. He thus argues against approaches that assume a uniform semantic analysis of the German perfect.

Arnim von Stechow examines the interaction of the German durative preposition *seit* 'since' with tense, in particular with the perfect. Like Löbner, von Stechow assumes that the German perfect is ambiguous. He provides evidence for a distinction of four perfect readings and proposes an analysis in which the interpretation of the perfect form is determined by the interplay of several combinations of semantic tense and aspect. Von Stechow furthermore shows that *seit* α is ambiguous too: one variant *modifies* an 'extended now' introduced by the perfect, while the other variant *introduces* an 'extended now'.

We would like to thank Jennifer Austin, Miriam Butt, Ray Fabri, Thomas Gamerschlag, Janet Grijzenhout, Wolfgang Kehrein, Ekkehard König, Sebastian Löbner, Ralf Naumann, Albert Ortmann, Martina Penke, Wiebke Petersen, Chris Piñón, Carsten Steins, and Arnim von Stechow for reviewing papers of this volume. We would ALSO like to thank Manfred Bierwisch and the Akademie Verlag for including this volume in the series *Studia Grammatica*. Finally, we would like to thank Dieter Wunderlich himself for discreetly pointing out where the list of publications and supervised dissertations can be found on his computer. It has been both funny and strenuous to listen to his comments on remarkable and awful Festschriften. Hopefully, he will consider this Festschrift to be one of the former kind.

Düsseldorf, March 2002

Stress at the Phonology-Morphology Interface

Janet Grijzenhout

1. Introduction*

Main stress alternations have become an important issue in the last few years; they are interesting for the study of the phonology-morphology interface especially in the light of recent developments within Optimality Theory (OT; Prince & Smolensky 1993). OT is a non-derivational constraint-based framework and current debates center around the question how to account for so-called 'transderivational phenomena' that used to be explained in generative linguistics by means of rule-ordering and level-ordering (see e.g. Kiparsky 1982, 1985). This paper contributes to the debate by investigating phonological and morphological properties of main stress assignment.

Patterns of stress assignment depend on both grammatical and phonological factors. A grammatical factor determining the position of main stress is the morphological boundary (usually the word boundary). In some languages, this is the only relevant factor, so that the placement of stress is completely predictable (e.g. main stress is assigned to the first syllable of a word in Icelandic and to the penultimate syllable in Polish). The placement of stress may also depend on grammatical categories. For example, English main stress is on the first syllable in a bisyllabic noun (*a récord, an ínsult*) and on the second syllable in some bisyllabic verbs (*to recórd, to insúlt*). A phonological factor that often plays a role in stress assignment is syllable weight (e.g. stress is normally assigned to the penultimate syllable in Latin, except when that syllable is light; see Allen 1973).

For languages where the grammatical and phonological factors mentioned above are the only aspects that determine stress placement, elegant accounts have been proposed

* The work presented here was supported by the German Science Foundation (DFG) through the SFB-282 project 'Lexical Phenomena in Correspondence Theory' at the Heinrich-Heine-Universität Düsseldorf. I would like to thank Diana Apoussidou, Dafna Graf, Franc Grijzenhout, René Kager, Martin Krämer and Alexandra Popescu for many discussions on the topic of main stress alternations in different languages. Dafna Graf, Wolfgang Kehrein, Andy Wedel and the editors of this volume read an earlier version of this paper and I thank them for valuable comments. Last but not least, I would like to thank Dieter Wunderlich. It has been a great pleasure to work, wonder, and – on occasion – wander with him in linguistic and other fields.

in the literature (most notably by Hayes 1995; the account he provides can easily be transferred into the framework of OT, see Prince & Smolensky 1993: 38-66). More problematic for non-derivational frameworks are (i) cases where stress determines the selection of affixes and (ii) cases where different morphological categories have different demands on stress placement. The role of stress in the selection of affixes can be illustrated by the following examples from German and English. The German prefixes *be-* and *ge-* do not associate to an unaccented syllable: *studíer – studíert/*gestudíert* 'study – studied (participle)' vs. *régn – gerégnet* 'rain – rained (participle)' (Kiparsky 1966: 70-75) and the English nominalizing suffix *-al* attaches to verb stems that have an unstressed-stressed syllable sequence: *arríve – arríval* vs. *vísit – *visital* (Raffelsiefen 1998). These particular affixes in German and English seem to require a specific prosodic host and this can be accounted for in OT by means of so-called 'alignment constraints'.[1]

The demands of morphological categories on stress placement have been the focus of attention in recent OT-studies, for instance, by McCarthy (1995) for Rotuman, Benua (1997) for English and Kager (2000) for Dutch, as well as in studies carried out in Düsseldorf by Canclini (1999) for Italian, Graf (2000) for Modern Hebrew, Popescu (2000) for Romanian and Apoussidou (2001, 2002) for Modern Greek. Following Prince & Smolensky (1993) among others, these authors all assume that regular stress assignment (or 'default stress assignment') is most adequately accounted for by the interaction of wellformedness and faithfulness constraints; i.e. regular stress placement is attributed to the grammar rather than to the lexicon. Patterns of stress assignment that deviate from the regular pattern (in that they depend on demands of stems and/or affixes) receive different treatments in recent OT-analyses. McCarthy, Benua and Kager account for them by means of correspondence constraints that refer to morphologically related forms, whereas Inkelas (1994) and other authors suggest that they are best analyzed by means of exceptional markings in the lexicon together with concurrent constraints that require faithfulness to prosodic structure in the input. In this paper I will first show that both approaches have shortcomings, i.e. the correspondence constraints alone cannot account for stress in morphologically complex words and neither does it suffice to have underlying metrical structure as the only mechanism to account for irregular stress placement. The most important finding of this paper will be that we do not need correspondence constraints that refer to morphologically related forms to account for stress placement and I will argue that the only devices that a constraint-based theory needs to account for irregular stress patterns are prosodic specifications in the lexicon and morpheme-specific constraints. The issue what lexical markings for stress look like is also relevant in this respect.

The paper is structured as follows. Section 2 discusses different proposals from the literature to account for main stress assignment in morphologically complex words within the framework of Optimality Theory. I will discuss the proposals put forward by McCarthy (1995), Benua (1997) and Kager (2000), respectively, which are all characterized by the use of constraint interaction for stress placement to the exclusion of lexi-

1. Consider as an example the alignment constraint ALIGN (*ge-* Right, σ́ Left) for German which says that the right edge of the suffix *ge-* should coincide with the left edge of a stressed syllable.

cal stress markings; the interaction between phonology and morphology is captured by correspondences between segments in simplex forms and segments in morphologically complex forms. These accounts have some problems and section 3 will consider Inkelas's (1994) alternative proposal to specify main stress in stems and/or suffixes in the lexicon. Her account works for Turkish data, but fails to capture important generalizations in other languages. In section 4 it will be argued on the basis of a case study of stress placement in Dutch that we need both prosodic specifications in the lexicon (i.e. underlying metrical structure) as well as morpheme-specific constraints.

2. Stress in the grammar

In early OT literature, stress placement was explained by means of constraints and constraint rankings and no underlying metrical structure was assumed. Sections 2.1 and 2.2 discuss two accounts for stress alternations in morphologically complex words which use special constraints for stress alternations as well as the assumption of output-to-output relations (McCarthy 1995, Benua 1997). Section 2.3 illustrates Kager's (2000) OT-account which is based on the suggestion that the location of main stress in related words is the result of correspondences between a stress peak in a simplex base and a stress peak in a related morphologically more complex form.

2.1 McCarthy (1995): Output-Output Correspondence and HEAD-MATCH

The two patterns of morphologically determined stress that we find in the world's languages are the following: (i) main stress is either placed on the same syllable in morphologically simplex words and in more complex forms (cf. *párent - párenthood*), or (ii) stress placement depends on the demands of roots, stems and affixes (cf. *párent - paréntal*). With respect to the first possibility, the fact that morphologically related output forms tend to resemble each other was recognized early within Optimality Theory (e.g. Burzio 1994, Kenstowicz 1994, 1996) and gave rise to the notion of 'correspondence' between morphologically related forms; i.e. the assumption is that a certain output form stands in a correspondence relation with other output forms to which it is morphologically related. Within this framework, McCarthy (1995) maintains that main stress in one output form shows up at the same location in related morphologically more complex output forms due to a highly ranked faithfulness constraint which says that a segment which is a prosodic head (i.e. a segment which is marked for main stress) in one output form (α) must surface as a prosodic head in the optimal candidate of a morphologically related form (β):

(1) HEAD-MATCH (McCarthy 1995: 23)
If α is the prosodic head of the word and $\alpha \, \Re \, \beta$,
then β is the prosodic head of the word.

According to McCarthy (1995), correspondence is a relation (ℜ) from segment to segment and there is no prosodic structure in the input; thus, HEAD-MATCH can only have an effect in cases where an output X stands in a correspondence relation with another output form Y and it is satisfied only if the segment which is marked for main stress in output X corresponds to a segment which is the prosodic head of output Y. McCarthy (1995) illustrates the effect of this constraint by an example from the central Oceanic language Rotuman (spoken on an island about 300 miles north of Fiji, see McCarthy 1995: 2 and references cited there). In this language, words have two forms depending on syntactico-semantic properties: one form for the so-called 'complete phase' and one for the so-called 'incomplete phase'. These forms have different phonological manifestations, but stress is usually assigned to the same vowel in both forms (cf. the complete phases *tokíri* 'roll' and *rάko* 'imitate' versus the corresponding incomplete phases *tokír* and *rάk*). According to McCarthy (1995), stress preservation on the vowel is the result of the fact that HEAD-MATCH is ranked relatively highly (e.g. higher than the constraint which says that a segment in the input should have a correspondent in the output: MAX). McCarthy (1995) stipulates that the incomplete phase in Rotuman must end in a monosyllabic foot (INC-PHASE).[2] For the complete phase form [rάko] 'imitate' with stress on the first vowel, this means that the candidate for the incomplete phase with main stress on the same vowel as in the complete phase and without the second vowel is the optimal output. In (2) and subsequent examples, square brackets mark prosodic word edges, round brackets indicate foot boundaries, and a dot indicates a syllable boundary; in accordance with the usual OT-practice, constraint violations are marked by an asterisk and fatal violations have an exclamation mark. Candidates (2a) and (2b) below end in a monosyllabic foot and thus satisfy the constraint INC-PHASE; candidate (2c) consists of a bisyllabic foot and this constitutes a fatal violation of this constraint. In (2b) main stress is not assigned to the same segment as in the complete phase *rάko*, which constitutes a violation of HEAD-MATCH. Even though (2a) has one segment less than the corresponding form *rάko* (and thus violates MAX), it is the winning candidate, because MAX is a lowly ranked constraint:

(2) OT-account of Rotuman main stress (McCarthy 1995)
Complete phase: rά.ko

	INC-PHRASE	HEAD-MATCH	MAX
a. ☞ [(rάk)]			*
b. [ra(kó:)]		*!	
c. [(rά.ko)]	*!		

Liberman & Prince (1977) pointed out that stress is not a property of a segment, but rather of an entire syllable. In McCarthy's analysis, stress as a property of the syllable is accounted for in an indirect way: the vocoid in the nucleus position of a syllable is

2. McCarthy (1995) claims that the Rotuman main-stress foot is a moraic trochee, consisting of a heavy syllable or two lights, aligned at the right edge of the prosodic word. Since there is no report of secondary stress, McCarthy assumes that all syllables except those in the main-stress foot are unfooted and parsed directly by the prosodic word (PrWd).

the 'head' of that syllable and if it is marked for stress, the entire syllable bears stress and is consequently the head of a foot which is the head of a prosodic word. In other words, HEAD-MATCH requires that if a vocoid α is marked for stress in some output, there should be a vocoid β which is stressed in a corresponding output, but other members of the syllable need not be identical (or present even). The implication is that for McCarthy, HEAD-MATCH is an IDENTITY relation rather than another kind of faithfulness relation like MAX (the requirement that an element in a certain string has an overt correspondent); the vocoid in one output should be identical with the vocoid in another corresponding output in one respect only: it must be a prosodic head.

McCarthy's analysis has a number of problems. First, a crucial assumption is that stress is not present in a simplex input form, because the input does not have prosodic structure (prosodic structure is assigned by the grammar, i.e. the constraint ranking) and there are compelling arguments showing that this assumption cannot be maintained (see e.g. Jacobs 1994, Kiparsky 1998 and sections 3 and 4 below). Second, another important assumption is that main stress can be a property of a segment in an output form that functions as the input of a semantically related form, but it is not clear which words can have an output-to-output relationship and whether we actually need such 'output-to-output' relations in the grammar. Third, the assumption that stress is marked on a vocoid is problematic, because in this way stress is only an indirect property of a syllable. The latter problem was also recognized by Benua (1997) and we will consider her analysis of stress placement in morphologically complex forms next.

2.2 Benua (1997): Output-Output Correspondence and recursive constraint evaluation

Instead of using a constraint that refers to a segment which is the head of a prosodic constituent, Benua (1997) employs constraints that refer to the position of segments within prosodic constituents. Before discussing the details of her proposal, we will first look at her explanation of English main stress in morphologically simplex words. Her account primarily involves the two constraints below; the first constraint says that the syllable with main stress should be the last syllable in the word and the second constraint says that the final syllable cannot be part of a foot (this implies that it cannot be stressed, because only syllables that are the head of a foot can bear stress):

(3) ALIGN-HEAD-RIGHT (McCarthy & Prince 1993; Benua 1997: 172)
ALIGN ($\acute{\sigma}$ Right, PrWd Right)
The head of the prosodic word is aligned at the right edge of the word
(the main stressed syllable is at the right).

(4) NONFINALITYSYLLABLE (NONFIN-σ) (Benua 1997: 172)
Word-final syllables are not parsed into a foot.

According to Benua, the English foot is a moraic trochee (i.e.it consists of a heavy syllable or two light ones) and constraints which demand moraic trochees are undominated in English.[3] For ease of exposition, I do not consider candidates with feet other than moraic trochees. Ranking NONFIN-σ higher than ALIGN-HEAD-RIGHT results in optimal candidates with main stress on a penultimate heavy syllable (5) or – if the penultimate syllable is light – on the antepenultimate syllable (6):[4]

(5) Evaluation of words with a heavy penultimate syllable in English

			NONFIN-σ	ALIGN-HEAD-RIGHT
a.		[wis.con.(sín)]	*!	
b.	☞	[wis.(cón).sin]		*
c.		[(wís).con.sin]		**!

(6) Evaluation of words with a light penultimate syllable in English

			NONFIN-σ	ALIGN-HEAD-RIGHT
a.		[(ò.ri).(gín)]	*!	
b.	☞	[(ó.ri).gin]		**

In English, main stress in morphologically complex words is either placed on a different syllable as in the related simplex form (cf. *oríginal* vs. *órigin*) or on the same syllable (cf. *wónderfulness* vs. *wónder*). Complex words with affixes like *-al, -ate, -ic, -ity, -ous, in-* etc. (class 1 affixes; see Siegel 1974) may deviate more from the simplex form with respect to stress assignment than complex forms with affixes like *-able, -er, -ful, -ist, -ness, un-*, etc. (class 2 affixes). In other words, forms with class 1 affixes are 'less faithful' to simplex forms than forms with class 2 affixes; words with class 2 affixes are fully faithful to stress placement in the stem.

Following McCarthy (1997), Benua (1997) claims that simplex forms and complex forms have a so-called 'output-to-output correspondence relationship'. She attributes the phenomenon of non-alternating stress to a positional output-output faithfulness constraint for class 2 affixes which says that if a segment α is the leftmost segment in the foot of output X (the simplex form) and if there is a correspondence relation between segment α and segment β, then β is the leftmost segment in the foot of output Y (the complex form):[5]

(7) $\text{OUTPUTOUTPUT}_{\text{Class 2 Affixes}}$ ANCHOR-LEFT (Foot): OO_2-ANCHOR
If segment α is initial in a foot and α $\Re$ β, then segment β is initial in a foot.

3. This presentation is necessarily a simplification in that it ignores exceptions; for a more extensive OT-account of English stress alternations see Burzio (1994) or Hammond (1999).
4. Violations of ALIGN-HEAD-RIGHT are counted by the number of syllables from the right word edge. Potential candidates in (6) like [o.(rí).gin] or [o.(rí.gin)] with a foot containing one light syllable and a light syllable plus a heavy syllable, respectively, violate the highly ranked constraints that demand moraic trochees.
5. In Correspondence Theory (e.g. McCarthy 1997), faithfulness to prosodic structure is enforced by anchor constraints which demand faithfulness to the edgemost position of correspondent segments within a morphological or prosodic category (see (7) which demands faithfulness to the leftmost position within the prosodic category 'foot').

Consider as an example the output pair *wonder* and *wonderfulness*. According to Benua (1997), paradigms are evaluated asymmetrically against a recursive constraint hierarchy such that each recursion evaluates one member of the paradigm and violation in recursion (A) outranks violation in recursion (B). Highly ranked NONFIN-σ ensures that main stress is on the penultimate syllable in the word *wónder* and, consequently, that the segment which is the onset of the stressed syllable is foot-initial (see candidates (8b,c)). In recursion B, candidate (8a') cannot be a winner because (8a) is a loser in recursion A. In recursion B, OO_2-ANCHOR is violated in (8b'), because the segment /w/ is foot-initial in (8b), but not in the corresponding output form with a class 2 suffix. The candidate pair (8c-c') with the forms *(wón)der* and *(wón)derful* does not violate this constraint (because /w/ is foot initial in both forms) and is thus selected as the optimal pair:

(8) Recursive evaluation for English stress in simplex forms and forms with class 2 suffixes according to Benua (1997)

Recursion (A)

Input: wonder	NONFIN-σ	OO_2-ANCHOR	ALIGN-HEAD-RIGHT	>>
a. won.(dér)	*!			
b. (wón).der			*	
c. ☞ (wón).der			*	

Recursion (B)

>>	wonder + ful + ness	NONFIN-σ	OO_2-ANCHOR	ALIGN-HEAD-RIGHT
	a'. won.(dér).ful.ness			**
	b'. won.der.(fúl).ness		*!	*
	c'. ☞ (wón).der.ful.ness			***

In the tableau below, candidate set (9a-a') violates the highly ranked constraint NON FIN-σ. In contrast to the constraint OO_2-ANCHOR, the constraint OO_1-ANCHOR (for class 1 suffixes) is ranked relatively lowly and, for this reason, the pair *órigin* and *óriginal* (9c-c') is less optimal than the pair *órigin* and *oríginal* (9b-b') that has fewer violations of ALIGN-HEAD-RIGHT:

(9) Recursive evaluation for English stress in simplex forms and forms with class 1 suffixes according to Benua (1997)

Recursion (A)

	NON FIN-σ	OO_2-ANCHOR	ALIGN-HEAD-RIGHT	OO_1-ANCHOR	>>
a. o.ri.(gín)	*!				
b. ☞ (ó.ri).gin			**		
c. (ó.ri).gin			**		

Recursion (B)

>>		NON FIN-σ	OO_2-ANCHOR	ALIGN-HEAD-RIGHT	OO_1-ANCHOR
	a'. o.ri.(gí).nal			*	
	b'. ☞ o.(rí.gi).nal			**	*
	c'. (ó.ri).gi.nal			***!	

This account is an improvement to McCarthy's (1995) account of stress placement in that it recognizes that stress is not a property of a single segment, but rather a relative property that is best captured by means of prosodic constituents (like the syllable and the foot). The analysis involves (i) recursive constraint evaluation, (ii) output-to-output positional faithfulness constraints for different classes of suffixes and (iii) the fact that information with respect to class membership is available for constraint evaluation (e.g. the constraint OO_2-ANCHOR 'knows' that it is vacuously satisfied for every word that does not involve a class 2 suffix and a suffix 'knows' to which class it belongs; i.e. some indication as to class-membership has to be available in the input). A theory that can do without this relatively rich technical apparatus would be superior. The next subsection considers an alternative popular proposal to capture stress placement.

2.3 Kager (2000): Base-Output Correspondence

Another option to account for stress alternations that is widely discussed in the literature is the following. If we can recognize a simpler form in a morphologically complex form, the complex form may have the same stress placement as the simplex form due to the wish to resemble the simplex form in a certain aspect. Kager's (2000) analysis of Dutch word stress crucially relies on the assumption of a correspondence relationship between main stressed segments in morphologically related words (in so far as main stress in complex forms corresponds to the main stress of the simplex form). Before we consider Kager's proposal, it is useful to consider Dutch main stress placement in simplex words first.

Main stress in Dutch morphologically simplex words is located on one of the three final syllables (see e.g. van der Hulst 1984, 1985 and Lahiri & Koreman 1988). In the majority of cases, main stress in nouns and verbs is on the antepenultimate syllable if the penultimate syllable is open and the ultimate one is closed (see (10a)). If the final syllable is superheavy, i.e. if it ends in a long vowel plus a consonant (-VVC) or a short vowel plus two consonants (-VCC), main stress is usually placed on the ultimate syllable (see 10b,c). [6]

6. In Dutch orthography, the long vowels /o:/ and /a:/ are spelled as 'oo' and 'aa', respectively in closed syllables. In this paper I put a stress mark on both letters (which represent one sound).

(10) Antepenultimate and final stress in Dutch monomorphemic nouns

a.	álmanak	'almanac'
b.	kameráád	'comrade'
c.	experimént	'experiment'

In cases where these conditions are not met, simplex words have main stress on the penultimate syllable:

(11) Penultimate stress in Dutch monomorphemic nouns

a.	ceremónie	'ceremony'
b.	agénda	'diary; agenda'
c.	detéctor	'detector'
d.	hértog	'duke'

The regular stress pattern in nouns and verbs is summarized in words as follows:

(12) Dutch Word Stress

a. Main stress is assigned to the final syllable in a PrWd if the final syllable is heavy (-VVC, -VCC);
b. main stress is assigned to the antepenultimate syllable in a PrWd if the final syllable is closed and the penultimate syllable is open or contains schwa;
c. elsewhere, main stress is assigned to the penultimate syllable in a PrWd.

Constraints that account for regular stress placement in Dutch simplex words and their respective ranking are as follows: the constraint that requires main stress on a superheavy syllable (referred to as WEIGHT-TO-STRESS-PRINCIPLE 'WSP' in OT-literature) outranks the constraints FOOTBINARITY (which says that each foot consists of two syllables) and TROCHAIC (which says that the leftmost syllable in the foot is strong).[7] These constraints outrank NONFINHEAD (the constraint that bans main stress on a final syllable) which, in its turn, outranks ALIGN-HEAD-RIGHT.

(13) Dutch constraint ranking for regular main stress placement in morphologically simplex nouns and verbs
WSP » FOOTBINARITY, TROCHAIC » NONFINHEAD » ALIGN-HEAD-RIGHT

Basing themselves on different criteria, different authors have made interesting proposals to classify Dutch suffixes (e.g. Booij 1995, Trommelen & Zonneveld 1989).

7. A Dutch foot usually contains one superheavy syllable, a heavy syllable, or two light syllables. Such feet are preferred to a foot which contains a heavy syllable followed by a light syllable which in turn is preferred to a foot consisting of two heavy syllables. In nouns and verbs, a final foot consisting of one heavy syllable does not bear main stress in the majority of cases (i.e. **(al.ma)(nák)* and **(her)(tóg)* are ruled out by NONFINHEAD), but there are exceptions (see section 4). Feet containing a single light syllable or a light syllable followed by a heavy one are ruled out by FOOTBINARITY and TROCHAIC, respectively. An OT-account of Dutch regular stress involves constraints which are not yet introduced in this paper and to save space I will refrain from presenting a detailed OT-account of Dutch regular stress patterns in simplex words (suffice it to say that the conditions of foot formation mentioned here and the constraint ranking proposed in the text make the correct generalisation).

With respect to stress assignment, four types of suffixes can be distinguished in Dutch:

(14) Four types of suffixes in Dutch
a. *type I: stress changing affixes*
change the stress pattern of the base and conform to regular patterns of stress assignment (*-ief*, *-iteit*, *-ieel*, etc.)
e.g., prodúct 'product' – productíef 'productive'
b. *type II: prestressing suffixes*
require main stress on the preceding syllable (*-(e)lijk*, *-ig*)
e.g., hértog 'duke' – hertógelijk 'ducal'
nóódlot 'fate' – noodlóttig 'fatal'
c. *type III: stress neutral suffixes*
do not change the stress pattern of the base (*-baar*, *-dom*, *-schap*, etc.)
e.g., hértog 'duke' – hértogdom 'duchy'
kameráád 'comrade' – kameráádschap 'companionschip'
d. *type IV: stress attracting suffixes*
attract stress to themselves (*-in*, *-egge*, *-es*, etc.)
e.g., hértog 'duke' – hertogín 'duchess'
barón 'baron' – baronés 'baroness'

Kager (2000) suggests that morphemes that occur as independent lexical words with main stress may function as a base for Base-Output correspondences between segments. Affixes do not occur as independent lexical items and they are therefore not subject to Base-Output correspondences. Kager's treatment of type I suffixes is based on the stipulation these suffixes attach to a root and that roots are not eligible base-forms. According to Kager, this implies that even though the Dutch words *presidént* 'president' and *prodúct* 'product' may occur in isolation (with main stress on the final syllable), these words do not function as bases for *presidentiéél* 'presidential' and *productíéf* 'productive', respectively, because the suffixes *-ieel* and *-ief* select a root and not a stem as their host.[8]

Stress placement in words consisting of a stem plus one of the adjectival suffixes *-elijk* [ə.lək] or *-ig* [əx] is never on the suffix. For suffixes of type II, Kager (2000: 139) introduces the following morpheme-specific constraint (which he calls 'SUFFIX-TO-PEAK'):

(15) ALIGN({*-ig*, *-(e)lijk*} Left, stress peak Right): ALIGN {*-ig*, *-(e)lijk*}
The left edge of the affixes{*-ig*, *-(e)lijk*} coincides with the right edge of the stress peak.

Kager (2000) is mainly concerned with suffixes of type III. Consider as an example of the adjective *beklemtoonbaar* 'accentable', which consists of the verbal prefix *be-*, the nominal stem *klemtoon* 'accent' and the adjectival type III suffix *-baar*. The stem may

8. Other suffixes that have the same properties and behave in the same way (in that they begin with a full vowel, associate to the root, and attract stress) are e.g. *-aal, -age, -ant, -eel, -eer, -ent, -ide -iek, -ist, -uur*. For a more extensive list of these so-called 'stress changing' (or in Booij's terminology 'stress bearing') non-native suffixes the reader is referred to Booij (1995: 75–76).

occur in isolation and has main stress (or a 'stress peak') on its first syllable (*klémtoon*). The stress peak is on the same syllable in *beklémtoonbaar* and this leads Kager to the assumption that related forms have stress on the same syllabic nucleus as smaller forms that can occur in isolation (the bases).[9] To capture this effect, he proposes the following constraints which say that a segment with the main stress peak in the base should have a correspondent with main stress in the output and vice versa:

(16) a. PEAK-MAX (BASE/OUTPUT) (Kager 2000: 127)
Let α be a segment in the Base and β be its correspondent in the Output.
If α is the stress peak of the Base, then β is the stress peak of the Output.

b. PEAK-DEP (BASE/OUTPUT) (Kager 2000: 127)
Let α be a segment in the Output and β be its correspondent in the Base.
If α is the stress peak of the Output, then β is the stress peak of the Base.

In adjectives in which we cannot recognize a smaller unit that may occur in isolation, main stress is assigned to the rightmost full syllable (i.e. any syllable that does not contain schwa): *oranje* [o.ˈrɑɲ.jə] 'orange', *violet* [vi.o.ˈlɛt] 'violet'. Moreover, in adjectives that contain two words that may both occur in isolation, stress is also assigned to the rightmost full syllable: *water.dícht* 'waterproof', *kleur.écht* 'colour-fast'. Kager attributes the location of the stress peak in adjectives to the following constraint which says that main stress is rightmost in adjectives:

(17) ADJ-PEAK: ALIGN (Adjective Right, stress peak Right) (Kager 2000: 131)
Main stress is on the rightmost syllable in adjectives.

A conflict arises when a morphologically complex adjective has a base in which the peak is not rightmost: PEAK-MAX (B/O) requires main stress on a segment which also has stress in the base form and ADJ-PEAK requires main stress on the last syllable. To avoid that a word has more than one stress peak, Kager proposes a highly ranked constraint which requires that each word has one syllable with main stress:

(18) UNI-PEAK (Kager 2000: 130)
Words must have a unique stress peak.

In the following tableau for the adjective *beklemtoonbaar* 'accentable', PEAK-DEP (B/O), PEAK-MAX (B/O) and UNI-PEAK outrank the constraint which demands that adjectives have their stress peak on the final syllable. PEAK-DEP is violated when main stress in the output candidate does not correspond to a stress peak in one of the bases. PEAK-MAX is violated each time when main stress in one of the four bases is not realized in the output:

9. More precisely, in *beklemtoonbaar* we recognise the verb stem '*beklemtoon*' plus the adjectival suffix *-baar*. The verb stem in its turn is related to the nominal stem *klémtoon* and Kager (2000: 130) maintains that the latter is a compound consisting of the two members *klém* and *tóón*. Thus, according to the logic of Kager's argument, *beklemtoonbaar* has in fact four bases: *klém, tóón, klémtoon* and *beklémtoon*.

(19) Kager's (2000) OT-account for a Dutch stem plus an adjectival suffix
Base: [klém], [tóón], [klémtoon], [beklémtoon]

		PEAK-DEP	UNI-PEAK	PEAK-MAX	ADJ-PEAK
a.	beklémtoonbáár	*	*!	*	
b.	beklemtoonbáár	*		*!***	
c. ☞	beklémtoonbaar			*	*
d.	beklemtóónbaar			**!*	*

Note that the burden of explanation for stress assignment in words with a suffix like *-baar* is not on the output per se, but rather on the specification of the bases. The fact that stress placement is exceptional in *beklémtoonbaar* in the sense that the final superheavy syllable is not the main stressed one (as in regular *kannibáál* 'cannibal') is not attributed to the suffix; instead, the stress-determining property is transferred to one of the bases (outputs have to be faithful to one of their bases and suffixes like *-baar* have no effect on stress placement).[10]

PEAK-DEP (B/O) and PEAK-MAX (B/O) guarantee that in nouns and verbs which consist of a stem plus an affix, main stress is placed on the syllable that corresponds to the stressed syllable of the stem in isolation. Compounds consist of two or more stems. Kager introduces the constraint LEFTMOST to ensure that in nominal and verbal compounds the candidate with main stress on the syllable that corresponds to the stressed syllable of the leftmost stem wins:

(20) LEFTMOST: ALIGN (PrWd Left, stress peak Left) (Kager 2000: 130)
The left edge of the word is aligned with the left edge of a stressed syllable (i.e. main stress is on the leftmost syllable in a prosodic word).

Consider as an example the verb *rangschik* 'to arrange, to rank' which has two bases: *rang* 'to rank' and *schik* 'to order'. Each base may occur as a stressed independent lexical item. The tableau in (21) is from Kager (2000: 131); candidate (21c) has no violations of PEAK-MAX (B/O) because both the peak of *ráng* and the one of *schík* has a correspondent. However, this candidate has a fatal violation of highly ranked UNI-PEAK. Candidates (21a) and (21b) each have one violation of PEAK-MAX (B/O) and the candidate that has main stress on the leftmost syllable is selected as the optimal output:

10. Kager (2000) proposes that some bases may affect the selection of suffixes; the suffix *-ig* seems to select a base with final stress, so that *moerás* 'swamp' is an acceptable base for *moerásig* 'swampy', whereas *pías* 'clown' with prefinal stress is not a possible base for **píassig*. However, some native speakers accept *piássig* and we also find forms with a stress shift when the base does not have final stress (e.g. *mísdaad* 'crime' - *misdádig* 'criminal'). Moreover, many nouns with final stress do not accept the suffix *-ig* (e.g. *soldáát* 'soldier', **soldáátig*). Hence, the fact that *pias* does not take *-ig* may be an accidental gap (similar to the fact that *mist* 'fog' is a base for *mistig* 'foggy', whereas the noun *sneeuw* 'snow' never takes the suffix *-ig* (**sneeuwig*)).

(21) OT-account for Dutch compound verbs according to Kager (2000)
Base: [ráng], [schík]

		Peak-Dep	Uni-Peak	Peak-Max	Adj-Peak	Leftmost
a.	rang.schík			*		*!
b. ☞	ráng.schik			*		
c.	ráng.schík		*!			

Since Peak-Dep (B/O) penalizes any output with main stress on the syllable of a non-base, suffixes of type III cannot change the stress pattern of the base. For words which consist of a stem plus a single suffix, this is indeed the case: main stress is on the stem syllable in adjectives like *beklémtoonbaar* and *slápeloos* 'sleepless' (from *slááp* 'sleep' and *-eloos*). However, combinations of one suffix of this type followed by the type III suffix *-heid* give rise to a pattern that is unaccounted for in Kager (2000): main stress is realized on the leftmost suffix in *werkelóósheid* 'unemployment' and *slapelóósheid* 'sleeplessness'. These cases pose a serious problem to Kager's analysis, because they violate highly ranked Peak-Dep (B/O) (a peak is realized on an element that does not have a peak in a base form) as well as Peak-Max (B/O) (the peak in the base is not realized as a peak in the form ending in *-heid*).[11]

Another drawback of the account sketched in this section is that it does not work for the second example that Kager (2000: 124) introduces in his article and which he often quotes, but never explains. Under the assumption that each word that can occur in isolation is a potential base, the word *badhanddoek* 'bath towel' has four bases: *bád* 'bath', *hánddoek* 'towel', *hánd* 'hand', and *dóék* 'cloth' and, hence, four potential peaks to be faithful to.[12] Assuming the constraint ranking assumed by Kager (2000), the candidate that incurs the fewest violations of Peak-Max (22c) is predicted to be the winner. The correct form, however, is the form with stress on the first syllable (22d). I mark a wrong output selected as optimal with a bomb (💣) and the actual (non-selected) output with a sad smiley (☹).

(22) Account according to Kager (2000) with wrong result for Dutch compounds
Base: [bád], [hánddoek], [hánd], [dóek]

		Uni-Peak	Peak-Max	Adj-Peak	Leftmost
a.	bád.hand.dóek	*!	**		
b.	bad.hand.dóek		***!		*
c. 💣	bad.hánd.doek		**		*
d. ☹	bád.hand.doek		***!		

11. Kager's account would work for German where main stress is assigned to the first syllable in *Árbeitslosigkeit* (from *Árbeit* 'work' and *-los* + *-ig* + *-keit*) and *Schláflosigkeit* (from *Schláf* 'sleep' plus *-los* + *-ig* + *-keit*).
12. The assumption that each word that can occur in isolation is a potential base is made explicit in Kager (2000: 134,141) for the adjectives *rangschikbaar* and *noodlottig* which have three bases: [rángschik], [ráng] and [schík] for *rángschikbaar* and [nóodlot], [nóod] and [lót] for *noodlóttig*.

With respect to suffixes of type II, it is easy to see that the constraint ALIGN {*-ig*, *-(e)lijk*}in (15) must be ranked higher than PEAK-MAX (B/O) to ensure that main stress is on a syllable preceding these suffixes (cf. *noodlóttig/*nóódlottig* 'fatal' with the bases *nóódlot* 'destiny', *nóód* 'need' and *lót* 'fate' plus the suffix *-ig*). Kager ranks a constraint which says that every morpheme in the input has a correspondent in the output (MOR-MAX) relatively low, so that a hypothetical form **waarheidig* (from *wáár* 'true' plus the suffix *-heid* plus *-ig*) is correctly ruled out, because stress in a hypothetical output **wáárhéidig* violates UNI-PEAK, **wáárheidig* violates ALIGN {*-ig*, *-(e)lijk*} and **waarhéidig* violates PEAK-DEP, whereas the null-form only violates lowly ranked MOR-MAX. However, as Kiparsky (1998: 20–24) points out, Kager's analysis is inadequate for three cases where *-elijk* and *-ig* actually cause a stress shift. First, combinations of one suffix of type III followed by a suffix of type II give rise to an unexpected pattern: in those cases, main stress is not assigned to one of the bases, but rather to the suffix (cf. *vriendschäppelijk* 'friendly' from *vriéndschap* 'friendship' + *-elijk*). Second, compounds with bound second members exhibit an unexpected stress shift as well (e.g. *aandáchtig* 'attentively' from *áándacht* 'attention' + *-ig*). Third, we find a stress shift in simple words (as *hertógelijk* 'ducal' from *hértog* 'duke' + *-elijk*). Highly ranked PEAK-DEP (B/O) incorrectly rules out forms with main stress on the syllable preceding *-ig* and *-(e)lijk* in the three cases above. Consider as an example the adjective *wonderbáárlijk* 'amazingly' (which has as its base-form the stem *wónder* and involves the suffixes *-baar* and *-lijk*). The next tableau shows how the constraints assumed by Kager give the wrong result.

(23) Account according to Kager (2000) with wrong results for Dutch adjectives
Input: {wonder, -baar, -lijk}
Base: [wónder]

		PEAK -DEP	ALIGN {*-ig*, *-(e)lijk*}	UNI-PEAK	MOR-MAX	PEAK -MAX	ADJ-PEAK	LEFT MOST
a.	wón.der.báár.lijk	*!		*			*	
b. ☹	won.der.báár.lijk	*!				*	*	*
c.	wón.der.baar.lijk		*!				*	
d. 💣	∅				***			

Kager's (2000) analysis is based on the following stipulations: (i) Base-Output correspondences are crucial for stress placement in morphologically complex words and only stems that may occur in isolation qualify as base forms for more complex structures (i.e. structures with suffixes of type III and compounds), (ii) PEAK-MAX is vacuously satisfied in all forms involving roots plus suffixes of type I and (iii) the analysis of stress in words involving the suffixes *-ig* and *-(e)lijk* requires a morpheme-specific constraint (see (15)).

Despite its merits, Kager's (2000) analysis of Dutch word stress suffers from some empirical flaws. It has been pointed out above that he cannot explain words like *slapelóósheid* with main stress on the leftmost stress neutral suffix, nor words like *wonderbáárlijk* and *aandáchtig* with prestressing suffixes and main stress on a syllable that does not have a corresponding stressed base. Moreover, neither can he explain words like *hertogín* 'duchess' (from the stem *hértog* 'duke' plus the feminine suffix *-in*) with main stress on the final syllable.[13] Even though Base-Output correspondence is the most widely used theoretical device to explain the transderivational property of stress, I do not adopt it here because of its empirical flaws. In section 4 I will suggest an OT-solution to the problem of main stress alternations in Dutch which does not rely on the concepts of output-to-output faithfulness or base-forms and which is nevertheless able to account for stress changing suffixes of type I like *-ieel* and *-ief*, the prestressing adjectival suffixes *-elijk* and *-ig*, stress neutral suffixes like *-baar* and *-schap* and stress attracting suffixes like *-in*. Kager uses morpheme-specific constraints only to save a few exceptions. In section 4 I will argue that if we accept one more morpheme-specific alignment constraint, there is no need at all to assume Base-Output correspondences and concurrent faithfulness constraints to account for main stress in morphologically complex words.

Morpheme-specific alignment constraints are a controversial issue in OT. Basing herself on Turkish data, Inkelas (1994) argues against morpheme-specific alignment constraints and claims that irregular stress patterns should be accounted for instead by marking stress (or prosodic structure) on morphemes in the input. We will consider her arguments against morpheme-specific alignment constraint next and in section 4 I will show that her claims cannot be maintained because some grammars actually need both input specifications for stress as well as morpheme-specific alignment constraints.

3. Stress in the lexicon: input to output correspondence

Inkelas (1994; published in 1999) compares two possible analyses to account for stress patterns in Turkish: a grammatical account and a lexical one. The grammatical account does not assume underlying specifications and relies on morpheme-specific constraints only; the lexical account can do without morpheme-specific constraints but assumes prespecified metrical structure in the lexicon.

Inkelas' analysis of Turkish regular stress assignment and stress assignment involving neutral suffixes (i.e. suffixes that conform to regular stress assignment in that main stress is on the final syllable) involves the constraint FINALSTRESS:[14]

13. In a footnote, Kager (2000: 129) suggests that these suffixes 'require brute-force accentuation, presumably by input specification plus top-ranking peak faithfulness'. If Kager accepts 'brute-force accentuation' for some cases, the question is why he doesn't accept input specifications for other cases as well. The theoretical apparatus thus involves (i) Base-Output correspondences, (ii) a morpheme-specific alignment constraint (i.e. (15)) and (iii) input specifications. In section 4 I will return to this point and argue that only two of these three aspects are needed and I will provide an analysis for cases that Kager cannot explain.

14. Note the fact that in the definitions of ALIGN-HEAD-RIGHT (3) and FINALSTRESS (24), the arguments are reversed: ALIGN-HEAD-RIGHT says that every stressed syllable is final in some PrWd, whereas FINALSTRESS demands that every PrWd ends in some stressed syllable. When a prosodic word does not end in a stressed syllable, this counts as one violation of the latter constraint.

(24) FINALSTRESS: ALIGN (PrWd Right, σ́ Right) (Inkelas 1994/1999: 150)
The right edge of the word is aligned with the right edge of a stressed syllable (i.e. each prosodic word ends in a stressed syllable).

More interesting for our present purpose is her analysis of stress patterns that deviate from the regular pattern. Such cases involve exceptional roots and/or exceptional suffixes. Roots can be exceptional in that they display penultimate stress (e.g. *ab.lú.ka* 'blockade', *pen.ǰé.re* 'window') or antepenultimate stress (*pé.nal.tɨ* 'penalty kick'). There are two classes of suffixes with irregular stress: prestressing suffixes like *-mE* (NEG) and *-mI* (INTERROG) that require main stress on an immediately preceding syllable and stressed suffixes like *-Iyor* (PROG) that require main stress on their initial syllable. Before we discuss the two possible accounts, let us first consider some examples. In cases where a prestressing suffix follows a stressed root, stress is assigned to the root syllable (25a). When a prestressing suffix or an initially stressed suffix follows a neutral root, the stress specification of the suffix wins (25b,c). When two suffixes follow a neutral root, the leftmost suffix determines the stress of the word (25d,e):

(25) Turkish word stress (Inkelas 1999: 161)

a.	pen.ǰé.re + -mI	pen.ǰé.re.mi	'window-INTERROG'
b.	a.ra.ba + -mI	a.ra.bá.mɨ	'car-INTERROG'
c.	bɨ.rak + -Iyor	bɨ.rak.ɨ́yor	'leave-PROG'
d.	bɨ.rak + -mE + -Iyor	bɨ.rák.mɨyor	'leave-NEG-PROG'
e.	gel + -Iyor + -mI	gelíyormu	'come-PROG-INTERROG'

Inkelas proposes that in a purely grammatical account, irregular stress placement as in the examples above involves constraints which align one edge of a morpheme with an edge of a prosodic constituent (stressed syllable or foot):

(26) Alignment constraints for Turkish roots and suffixes (Inkelas 1999: 164)
a. ALIGN (penǰere Right, Foot Right):
The right edge of the root *penǰere* coincides with the right edge of a foot.
b. ALIGN (-mI Left, σ́ Right):
The left edge of the suffix *-mI* coincides with the right edge of a stressed syllable.
c. ALIGN (-Iyor Left, Foot Left):
The left edge of the suffix *-Iyor* coincides with the left edge of a foot.
etc.

To account for the fact that the leftmost morpheme determines main stress in the word, we are forced to rank alignment constraints for roots higher than those for suffixes. Moreover, alignment constraints for suffixes like *-mE* that are relatively close to the root should outrank those for suffixes like *-Iyor* that are closer to the right word edge:[15]

15. In (27) and (31), I abstract away from the fact that the final syllable of the suffix *-mE* and the initial syllable of the suffix *-Iyor* are subject to vowel harmony and 'merge', so that the actual output form is [bɨrákmɨyor] 'leave-NEG-PROG'.

(27) Evaluation of Turkish root + prestressing + initially stressed suffix
Input: bɨ.rak + -mE + -Iyor

	ALIGN (-mE Left, σ́ Right)	ALIGN (-Iyor Left, Foot Left)	FINAL STRESS
a. bɨ.rak.ma.(ɨ́yor)	*!		*
b. ☞ bɨ.(rák.ma).ɨyor		*	*
c. (bɨ́.rak).ma.ɨyor	*!	*	*

Inkelas (1999: 167) mentions as a disadvantage of this approach the fact that it is an accident that the morpheme whose alignment constraint is ranked highest occurs to the left of the morpheme whose alignment constraint is ranked lower.

In her lexical account of main stress placement, lexical entries are specified for foot structure. Instead of the morpheme-specific alignment constraints in (26), a lexical account relies on the input specifications in (28). In accordance with the general pattern in Turkish words, all prespecified feet are bisyllabic trochees (the trochaic foot is represented by rounded brackets; the first syllable in the foot is stressed and the second syllable is unstressed):

(28) Lexical entries for Turkish roots and suffixes (Inkelas 1999: 169)
a. roots specified for trochaic foot: pen.(ʤé.re); (pé.nal).ti
b. prestressing suffixes specified for trochaic foot: (σ́.mI); (σ́.mE)
c. stressed suffix specified for trochaic foot: (Í.yor)

To capture the fact that a stressed foot in the input is preserved in the output, Inkelas invokes a faithfulness constraint localized to the foot:[16]

(29) PARSE-FOOT (referred to as 'MAX-FT_S' below) (Inkelas 1999: 152)
Perserve, in the output, any stress feet that are in the input.

In Turkish, MAX-FT_S and UNI-PEAK outrank FINALSTRESS (it is more important to parse an input foot than to build a foot whose head is word-final). When two feet are specified in the input, the leftmost one is parsed. Inkelas proposes the following constraint to capture this fact (called STRESS INITIAL in Inkelas 1999 and rephrased below as ALIGN-HEAD-LEFT in accordance with McCarthy's 1995 and Benua's 1997 proposals discussed in section 2.2):

(30) ALIGN-HEAD-LEFT: ALIGN (σ́ Left, Domain Left) (Inkelas 1999: 170)
The left edge of a stressed syllable is aligned with the left edge of a domain (each stressed syllable is initial in a prosodic word).

When FINALSTRESS outranks ALIGN-HEAD-LEFT, main stress is final when no foot is prespecified in the lexicon. By ranking MAX-FT_S higher than FINALSTRESS, Inkelas

16. MAX-FT_S merely says that a stressed foot in the input should surface in the output, but nothing is said about the location of that foot in the output. This problem can easily be circumvented by adopting an anchor constraint à la Benua (1997) and McCarthy (1997) which says that a segment that is final in a main stress foot in the input has an identical correspondent that is final in a main stress foot in the output (INPUT-OUTPUT ANCHOR-RIGHT (Foot)).

captures the fact that the foot structure of the leftmost foot is preserved when more than one foot is prespecified:

(31) Lexical specifications of prestressing + initially stressed suffix in Turkish
Input: bɨ.rak +(σ́.mE) + (Í.yor)

		MAX-FT$_S$	FINAL STRESS	ALIGN-HEAD-LEFT	DEP-σ
a.	bɨ.rak.(mɨ́.yor)	*	*	**!	
b.	☞ bɨ.(rák.mɨ).yor	*	*	*	
c.	(bɨ́.rak).mɨ.yor	**!	*		
d.	bɨ.rak.mɨ.(yór.σ)	**!		***	*

The grammatical account, which relies on the alignment constraints in (26), and the lexical account, which relies on the input specifications in (28), are both descriptively adequate (cf. (24) and (31)). Inkelas (1994) presents three arguments against morpheme-specific alignment constraints and in favour of the lexical account.

First, the grammatical account captures the generalization that the leftmost morpheme determines main stress placement indirectly by constraint ranking (the top-ranked alignment constraint wins). Under the lexical account, the generalization is captured directly; the fact that the leftmost input foot wins is a consequence of one constraint only (ALIGN-HEAD-LEFT).

Second, the lexical account treats exceptions as a natural class (i.e. they are specified in the lexicon by a trochaic foot). Under the grammatical account, it is an accident that Turkish has alignment constraints such as those in (26) and no others (e.g. ALIGN (suffix Right, σ́ Right) for a final-stressed suffix, ALIGN (suffix Right, σ́ Left) for a post-stressing suffix, etc.). The lexical account correctly predicts that final-stressed suffixes and post-stressing suffixes do not occur in Turkish, because all prespecified suffixes have a trochaic foot, so that the following cases are correctly excluded:

(32) Impossible lexical entries for Turkish roots and suffixes
  a. roots specified for light monosyllabic foot or iamb: *pen.(ʤé).re; *(pe.nál).ti
  b. poststressing suffixes specified for iamb: *(mI.σ́); *(mE.σ́)
  c. final-stressed suffix prespecified for iamb: *(I.yór)

Third, under the grammatical account it is an accident that the constraints FOOT-BINARITY (which says that each foot consists of two syllables) and TROCHAIC (which says that the leftmost syllable in the foot is strong) are ranked higher than all alignment constraints, so that we never find other foot types at the surface. Under a lexical account, these two constraints outrank just one constraint for exceptional stress placement: MAX-FT$_S$. Because FOOT-BINARITY and TROCHAIC outrank MAX-FT$_S$, the prediction is that no underlying foot emerges as monosyllabic or iambic. In other words, which foot can be prespecified is constrained by the grammar; the constraint ranking predicts that all feet are bisyllabic trochees.[17] This generalization may be true for Turkish, but because all constraints are universal and constraint ranking is language-specific, this fact is an "accident" itself. Under OT, a grammar where MAX-FT_S outranks FOOT-BINARITY and TROCHAIC is as natural as the Turkish grammar; i.e. the prediction that no underlying foot emerges as monosyllabic or iambic follows from Turkish constraint ranking, but other foot types are predicted to occur under a different constraint ranking in a different grammar (see Graf & Ussishkin 2001). It is therefore not a universal truth that a grammar constrains which foot can be prespecified. Inkelas considers the fact that Turkish grammar correctly predicts bisyllabic trochees in the input an advantage of the lexical account. If we find a language whose grammar does not predict bisyllabic trochees (because MAX-FT_S outranks other constraints), does this mean that we have one argument less in favour of the lexical account? This question will be addressed in section 4 below.

4. Optimal stress patterns: Dutch revisited

This section provides a case study of irregular stress patterns in Dutch in which an attempt is made to account for main stress placement without 'Base-Output correspondences' and with an explanation for cases that Kager (2000) failed to capture. I will also show that the arguments that Inkelas uses against morpheme-specific alignment constraints cannot be maintained when we consider Dutch irregular stress placement. Section 4.1 discusses irregular stress placement in morphologically simplex words and in words with one type I, type II, or type IV suffix. Section 4.2 concentrates on the complicated issue of stress placement in words with a type III suffix and section 4.3 considers words with more than one suffix.

4.1 Irregular stress placement in morphologically simplex words and in some morphologically complex words

Like Turkish, Dutch also has exceptional stress patterns which involve deviant main stress placement in roots and suffixes. Exceptions to the generalization that main stress is assigned to a final superheavy syllable (cf. (12a) in section 2.3) are a few simplex words like *líchaam* 'body' and *ólifant* 'elephant'. Other exceptions are words with penultimate stress on a light syllable which is followed by a strong syllable (*catamáran*) and in contrast to regular stress placement (cf. (12c)), stress is not penultimate in *Paramáribo, Cánada* and some words of French origin like *Perú* or *chocolá*. With Inkelas (1994), we may suggest that the simplex words that are an exception to

17. Note, however, that under the assumption that all feet are bisyllabic, Inkelas is forced to assume an extra empty 'catalectic' syllable at the right word edge for words that have final main stress. (See also candidate (31d).)

the general pattern have special markings. I suggest that words like *líchaam* and *óli-fant* are prespecified with a weak foot on the final syllable, words like *Cánada* have an antepenultimate strong foot in the input, words like *catamáran* are prespecified with a strong foot on the penultimate syllable and words like *balkón* and *categorié* are prespecified with a strong final foot:

(33) Lexical entries for Dutch roots

a.		Ft_w	
	prespecified final weak foot	o.li.(fant	
b.		Ft_s	Ft_s
	prespecified final strong foot	bal.(kon	ca.te.go.(rie
c.		Ft_s	
	prespecified penultimate strong foot	ca.ta.(ma.ran	
d		Ft_s	
	prespecified antepenultimate strong foot	(ca.na.da	

In contrast to Inkelas (1994), I propose to specify foot structure by means of marking the left edge of a foot in the input. Following McCarthy (1997), Benua (1997) and others, I use the input-output anchor constraints IO ANCHOR-LEFT FT_W and IO ANCHOR-LEFT FT_S which say that the leftmost segment in a weak or strong foot in the input is also the leftmost segment in a weak or strong foot in the output. In order to ensure that the underlying specifications also emerge at the surface, IO ANCHOR-LEFT FT_W must dominate the constraint that says that a superheavy syllable gets main stress (WSP), and because the input foot may dominate a final monosyllabic syllable (see (33b)), the constraint IO ANCHOR-LEFT FT_S must dominate FOOTBINARITY and TROCHAIC. Main stress placement in Dutch words with a prespecified input thus follows from the ranking IO ANCHOR-LEFT FT_W » WSP » IO ANCHOR-LEFT FT_S » FOOTBINARITY, TROCHAIC » NONFINHEAD » ALIGN-HEAD-RIGHT. We now turn to stress placement in suffixed words.

It has been pointed out in section 2.3 that Dutch distinguishes four types of suffixes: one type changes the stress pattern of the root, the second type requires main stress placement on the immediately preceding syllable (and in this respect these suffixes resemble Turkish prestressing suffixes), the third type does not alter stress placement in the stem and the fourth type attracts stress to itself. I here suggest that suffixes of type IV have a strong final foot in their lexical specification and should be treated in exactly the same way as roots with a prespecified strong final foot (see (33b)).

Suffixes that belong to type I conform to regular patterns of stress placement and can thus be explained by the constraint ranking established above for simplex words and no additional stipulations need to be made. For instance, in accordance with regular stress assignment, main stress is assigned to the final syllable in *ceremoniéél* 'ceremonious' (from *ceremónie+ -eel*), because it is superheavy:[18]

(34) Prosodic structure for a simplex noun and for a root plus type I suffix
   a. [(cè.re)(mó.nie)] 'ceremony'
   b. [(cè.re)(mò.nie)(éél)] 'ceremonious'

In (34) every foot is a trochee (i.e. the first syllable is more prominent than the second one) and the last foot is the head of the prosodic word. In (34a) the constraint ranking NONFINHEAD >> ALIGN-HEAD-RIGHT demands that the main stressed syllable is as much to the right as possible within a prosodic word, but not on the final syllable and in (34b) the superheavy syllable is stressed due to the ranking WSP » NONFINHEAD.

Recall from section 3 the fact that Turkish prespecified roots always emerge with main stress on the prespecified syllable when a suffix follows (cf. example (25a)). Dutch is different in this respect. In cases where a prespecified root is followed by a suffix, the word does not have stress on the same position as the root in isolation:

(35) Dutch word stress in prespecified roots plus type I suffix

a.	ca.te.go.ríé + -aal	ca.te.go.ri.áál	'categorial'
b.	Pe.rú + -aan	Pe.ru.áán	'inhabitant of Peru'
c.	Cá.na.da + -ees	Ca.na.dées	'Canadian'

Hence, the fact that an input specification always emerges at the surface and wins in a grammar may be true for Turkish, but not for Dutch. An account of main stress placement in Dutch words with a type I suffix does not need a special provision in the grammar and follows from the ranking IO ANCHOR-LEFT FT_W » WSP » IO ANCHOR-LEFT FT_S » FOOTBINARITY, TROCHAIC » NONFINHEAD » ALIGN-HEAD-RIGHT. Let us now briefly consider suffixes of type II.

Recall from section 2.3 the fact that the adjectival suffixes *-(e)lijk* and *-ig* require that the main stress of the word be located on the syllable preceding the suffix (*hértog + -elijk → hertógelijk* 'ducal'; *áándacht + -ig → aandáchtig* 'attentive').[19] To capture the fact that main stress is always assigned to the syllable immediately preceding these suffixes, I adopt Kager's morpheme-specific alignment constraint in (15) above (ALIGN ({*-ig, -(e)lijk*} Left, stress peak Right)).

To conclude so far, we have seen that no special assumptions need to be made to account for stress placement in words which involve suffixes of type I. Stress placement in words which involve suffixes of type II can be accounted for if we assume Kager's morpheme-specific alignment constraint in (15) and stress placement in words which involve suffixes of type IV is accounted for by marking the left edge of these suffixes by a strong prosodic word boundary in the input and by the concurrent constraint IO ANCHOR-LEFT PRWD_S. We now turn to the more complicated issue of stress placement in words with a type III suffix.

18. Round brackets indicate foot boundaries; square brackets indicate prosodic word boundaries.
19. Another suffix that displays the same behaviour is the adjectival suffix *-end* [ənd].

4.2 Irregular stress placement in morphologically complex words with one suffix of type III

A limited class of nominalizing suffixes (e.g. *-aard, -dom, -heid, -ling, -schap*) and some adjectival suffixes (e.g. *-achtig, -baar, -loos, -zaam*) belong to the suffixes of type III. These suffixes are characterized by the fact that the location of main stress is often the same as the location of stress in the unsuffixed form. Booij (1995) stipulates that suffixes of this type form a prosodic word of their own (see (37b) below) which in OT terms either means that they are specified for a monosyllabic prosodic word in the lexicon, or that they emerge as prosodic words due to the constraint in (36) which requires a prosodic word boundary at the left edge of lexical stems and at the left edge of type III suffixes (called 'semistems' in Grijzenhout & Krämer 2000: 68).[20]

(36) ALIGN (Stem/Semistem Left, PrWd Left): ALIGN STEM
The left edge of every stem and every semistem is aligned with the left edge of some prosodic word.

Let us for the moment tentatively assume that stems and suffixes of type III are not specified by prosodic structure in the input, but emerge as prosodic words in the output due to constraint (36). I will discuss the other option (viz. that type III suffixes are prespecified as prosodic words) in section 4.3 below. The constraint formulated in (36) ensures that all output stems and suffixes of type III have a prosodic word boundary at their left.

(37) Prosodic structure for a simplex noun and for a stem plus type III suffix

a.	[(hér) (tog)]	'duke'
b.	[(hér) (tog)] [(dòm)]	'duchy'

Main stress is assigned to the first syllable in *hertog*, because the constraint NONFINHEAD requires that main stress is not on the last syllable in a prosodic word. We now turn to the question why main stress is assigned to the first prosodic word in (37b) and not to the second one.

In complex nouns and verbs, the leftmost prosodic word is strong (see (39a,b) below). To account for this observation, I follow McCarthy & Prince (1993) and adopt the alignment constraint for nouns and verbs below that aligns one edge of a lexical category (noun or verb) with an edge of a prosodic constituent (in this case a prosodic word):

(38) ALIGN (N/V Left, $PrWd_s$ Left): ALIGN N/V
The left edge of every noun or verb is aligned with the left edge of a strong prosodic word (i.e. the prosodic word which has main stress).

This constraint is satisfied in all nouns and verbs which consist of just one prosodic word (as in (37a)), in all words with one nominalizing suffix of type III (e.g. (37b)), in compounds (see (39a)–(d) for Dutch words meaning 'bath towel', 'wonder lamp', 'to

20. As demonstrated in Grijzenhout & Krämer (2000), this assumption has interesting consequences for an account of voicing assimilation, a point I will not pursue here.

rank', 'to prove' and 'to race walk', respectively) and in compounds with one nominalizing type III suffix (see (40) for the word meaning 'grand duchy'). For ease of exposition, I will graphically represent the prosodic structure with the help of the symbols 'σ' for 'syllable', 'F' for 'foot' and 'PrWd' for 'prosodic word':

(39) Prosodic structure for Dutch compound nouns and verbs

```
a. PrWd_s  PrWd_w  PrWd_w      b. PrWd_s   PrWd_w
     |       |       |               |        |
     F       F       F               F        F
     |       |       |              / \       |
     σ       σ       σ            σ_s  σ_w    σ
     |       |       |             |    |     |
    bád     hand    doek          wón.der    lamp

c. PrWd_s  PrWd_w              d. PrWd_s  PrWd_w      e. PrWd_s   PrWd_w
     |       |                      |       |              |         |
     F       F                      F       F              F         F
     |       |                      |       |              |        / \
     σ       σ                      σ       σ              σ      σ_s  σ_w
     |       |                      |       |              |       |    |
   ráng    schik                   áán     toon           snél    wan.del
```

(40) Prosodic structure for a complex stem plus type III suffix

```
PrWd_s  PrWd_w  PrWd_w
  |       |       |
  F       F       F
  |      / \      |
  σ    σ_s  σ_w   σ
  |     |    |    |
gróót  her.tog   dom
```

Nouns which end in type III suffixes like *-dom* and *-schap* always have main stress on a syllable which is part of the first prosodic word (cf. example (40) and *[(ka.me) (ráád)][(schap)]* 'comradeship'). In other words, main stress assignment in nouns follows from one constraint only, viz. ALIGN N/V (formulated in (38)). Assuming that there is one constraint for nouns and verbs (ALIGN N/V) that has no effect on adjectives helps to explain why main stress is not necessarily found on the initial syllable in adjectives. However, the constraint ranking developed so far does not correctly predict main stress on the penultimate syllable in the adjective *aan.tóón.baar* 'demonstrable; provable' (from the verbal stem *ááantoon* 'to prove' and the adjectival suffix *-baar* '-able').

Before explaining main stress in adjectives that consist of a verbal base plus a type III suffix, I would like to point out first the fact that we saw in section 2.3 that in simplex adjectives and in adjectival compounds, main stress is on the rightmost syllable. This implies that in contrast to compound nouns and verbs where the leftmost prosodic word is strong (in accordance with (38)), the rightmost prosodic word is strong in adjectival compounds (e.g. *goedláchs* 'fond of laughing' from the adjective *goed* 'good; well', the verb *lach* 'laugh' and the adjectival suffix *-s*) and I follow Kager

(2000), who attributes main stress placement in adjectives to the constraint ADJ-PEAK (see (17) in section 2.3).

(41) Prosodic structure for a Dutch compound adjective

$PrWd_w$	$PrWd_s$
|	|
Foot	Foot
|	|
σ	σ
|	|
goed	láchs

Contrary to what can be expected when ADJ-PEAK is ranked highly, the rightmost syllable is not strong in Dutch adjectives like *aan.tóón.baar* and *slá.pe.loos* 'sleepless'. Observe that in both adjectives, main stress is initial in the stem. The particle verb *aantoon* 'to prove, demonstrate' consists of the verbal stem *toon* and the prepositional particle *aan-*.[21] We therefore need a constraint that captures the intuition that stems tend to be prominent and stress bearing. Whereas some affixes tend to be adjacent to a stress peak (cf. Kager's constraint ALIGN ({*-ig*, *-(e)lijk*} in (15)), stems tend to contain a stress peak (PEAK-TO-STEM).

(42) PEAK-TO-STEM
The main stressed syllable belongs to a verbal, nominal or adjectival stem.

It should be pointed out that this constraint is ranked lower than ALIGN N/V, so that main stress is assigned to the first syllable in particle verbs like *áántoon* (see (39d)).

To see how the analysis developed so far works, consider the three tableaux below. ALIGN STEM requires that the left edge of each stem is aligned with the left edge of a prosodic word (see (38)); this constraint is violated in candidate (43c) because the stem *-vrij* is not a prosodic word, it is violated in candidate (44c) because the semistem *-loos* does not form its own prosodic word, and it is violated in (45a,d) because the verbal stem *toon* is not a prosodic word. In tableau (43), the lower ranked constraint which requires that adjectives have main stress on the final syllable in the word rules out candidate (b), and candidate (a) is selected as optimal. In tableau (44), the highly ranked constraint PEAK-TO-STEM which requires main stress on a stem syllable rules out candidate (a) and candidate (b) is selected as the winning candidate. Finally, in tableau (45), candidates (a,c,d) all violate PEAK-TO-STEM because the stem *toon* is not the stress-bearing peak and candidate (b) is selected as the optimal candidate.

(43) Evaluation of Dutch adjectival compound (from *lood* 'lead' plus *vrij* 'free')

	PEAK-TO-STEM	ALIGN STEM	ADJ-PEAK
a. ☞ [(lood)] [(vríj)]			
b. [(lóód)] [(vrij)]			*!
c. [(lood)(vríj)]		*!	

21. For a morphosyntactic analysis of particle verbs see e.g. Stiebels & Wunderlich (1994).

(44) Evaluation of Dutch adjective (from *slaap* 'sleep' plus *-loos* 'less')

		PEAK-TO-STEM	ALIGN STEM	ADJ-PEAK
a.	[(sla)(pe)] [(lóós)]	*!		
b. ☞	[(slá)(pe)] [(loos)]			*
c.	[(slá)(pe) (loos)]		*!	*

(45) Evaluation of Dutch adjective (from *aan-* 'on' + *toon* 'show' plus *-baar*)

		PEAK-TO-STEM	ALIGN STEM	ADJ-PEAK
a.	[(aan)(toon)] [(báár)]	*!	*	
b. ☞	[(aan)] [(tóón)] [(baar)]			*
c.	[(áán)] [(toon)] [(baar)]	*!		*
d.	[(áán)(toon)] [(baar)]	*!	*	*

With respect to stress assignment, adjectives which end in *-baar* (or *-zaam*) exhibit a curious anomaly. Whereas main stress is on the syllable preceding *-baar* in *aantóónbaar*, main stress is on the initial syllable in *rángschikbaar* (from *rángschik* 'to rank' + *-baar*). The verb *rangschik* consists of the two stems (*rang* and *schik*). The fact that main stress is assigned to the first prosodic word may be attributed to a lowly ranked (but sometimes still visible) constraint in Dutch which says that the strongest prosodic word ($PrWd_s$) is left within a domain:

(46) ALIGN ($PrWd_s$ Left, Domain Left): ALIGN-LEFT $PRWD_S$
The main prosodic word is leftmost in a domain.

This constraint is responsible for the fact that candidate (c) is preferred to candidate (b) in the next tableau:

(47) Evaluation of Dutch adjective (two verbal stems plus an adjectival suffix)

		PEAK-TO-STEM	ALIGN STEM	ADJ-PEAK	ALIGN-LEFT $PRWD_S$
a.	[(rang)(schik)] [(báár)]	*!	*		**
b.	[(rang)] [(schík)] [(baar)]			*	*!
c. ☞	[(ráng)] [(schik)] [(baar)]			*	
d.	[(ráng)(schik)] [(baar)]		*!	*	

This concludes the discussion of stress placement in words with one type III suffix. In the next section, we turn to the placement of main stress in words with two suffixes.

4.3 Irregular stress placement in morphologically complex words with two suffixes

Consider first the fact that the type III suffix *-loos* has main stress when the nominalizing type III suffix *-heid* follows (e.g. *slapelóósheid* 'sleeplessness'). With the constraints and the constraint ranking developed so far, the constraint which says that main stress is leftmost in nouns and verbs (see (38)) incorrectly selects a candidate with initial stress (**slápeloosheid*). The correct output *[(sla.pe)][(lóós)][(heid)]* with main stress on the syllable preceding *-heid* illustrates that the suffix *-heid* displays similar behaviour as the suffixes *-ig* and *-elijk* in that the suffix in question is as adjacent to a stressed syllable as possible; this behaviour can be accounted for in OT with an alignment constraint. Similar to Kager's (2000) morpheme-specific constraint for the suffixes *-ig* and *-(e)lijk* in (15), his syntactic-category-specific alignment constraints for adjectives in (17) and the alignment constraint for nouns and verbs in (38), one could formulate an alignment constraint for this nominal suffix as follows:

(48) ALIGN (*-heid* Left, $PrWd_s$ Right): ALIGN -HEID
The left edge of the suffix *-heid* coincides with the right edge of the main stressed prosodic word.

Now note the fact that under the influence of *-heid*, the suffix *-loos* may receive main stress, but suffixes like *-baar* and *-zaam* do not have main stress when they precede *-heid* (as in *[(wérk)][(zaam)][(heid)]* 'activity, industry' and *[(dráág)][(baar)][(heid)]* 'bear-able-ness'). As a solution to this discrepancy, I would like to advocate the position that adjectival suffixes like *-baar* and *-zaam* are prespecified for a weak prosodic word in the lexicon, whereas the adjectival suffix *-loos* is not. If the constraint requiring faithfulness to prosodic structure (IO ANCHOR-LEFT $PRWD_W$) outranks ALIGN -HEID, it follows that the suffixes *-baar* and *-zaam* will not have main stress before the suffix *-heid* (because they are weak prosodic words), whereas main stress will be assigned to *-loos* (because it is not specified as a weak prosodic word in the input). The examples of words with main stress on the syllable preceding the suffixes *-zaam* and *-baar* indicate that faithfulness to prosodic structure in the lexicon is more important than having main stress on the syllable preceding *-heid*. Conversely, the suffixes *-baar* and *-zaam* will receive main stress when a suffix of type II follows (e.g. *wonderbáárlijk*). This implies that IO ANCHOR-LEFT $PRWD_W$ is ranked below the constraint that demands main stress on a syllable preceding type II suffixes. Thus, we arrive at the following partial constraint rankings:

(49) Partial constraint ranking for Dutch
a. IO ANCHOR-LEFT $PRWD_W$ » ALIGN -HEID
b. ALIGN {*-ig*, *-elijk*} » IO ANCHOR-LEFT $PRWD_W$

Nouns like *gróóthertogdom* 'grand duchy' with main stress on the first syllable, show that ALIGN N/V in (38) is a relatively highly ranked constraint. Nouns like *[(sla.pe)][(lóós)][(heid)]* with stress on the syllable preceding the suffix *-heid* illustrate that ALIGN -HEID outranks ALIGN N/V:

(50) Partial constraint ranking for Dutch
ALIGN -HEID » ALIGN N/V

Words that involve a type III suffix like *-baar* or *-schap* plus an adjectival suffix of type II have main stress on the syllable preceding the type II suffix and not on the stem syllable: *wonderbáárlijk* 'amazingly' and *kameraadscháppelijk* 'companionable'. This observation implies that ALIGN ({*-ig*, *-(e)lijk*} Left, $\acute{\sigma}$ Left) (see (17)) outranks PEAK-TO-STEM. Words that involve a type III suffix plus the type III suffix *-heid* do not always have an initial main stressed prosodic word; the output *[(sla.pe)][(lóós)][(heid)]* with main stress on the syllable preceding *-heid* illustrates that the alignment constraint in (48) outranks PEAK-TO-STEM:

(51) Partial constraint ranking for Dutch
  a. ALIGN {*-ig, -elijk*} » PEAK-TO-STEM
  b. ALIGN –HEID » PEAK-TO-STEM

Finally, words like *zoetsáppigheid* 'sweetness' (from *zoet* 'sweet' *sap* 'juice' plus the adjectival suffix *-ig* and the nominalizing suffix *-heid*) and *gemeenscháppelijkheid* (from the stem *geméénschap* 'community' plus the adjectival suffix *-elijk* and the suffix *-heid*) illustrate that (17) outranks ALIGN -HEID:

(52) Partial constraint ranking for Dutch
  ALIGN {*-ig, -elijk*} » ALIGN -HEID

Let us now review the evidence for constraint ranking in Dutch. In this section we saw that in addition to the morpheme-specific alignment constraint proposed by Kager for the suffixes *-ig* and *-elijk*, we need an alignment constraint for the suffix *-heid*. These two constraints are ranked with respect to each other (see (53a)) as well as to a prosodic faithfulness constraint which says that the left edge of a weak prosodic word in the input should correspond to the left edge of a weak prosodic word in the output. The semistems that are specified for a weak prosodic word in the input are *-baar* and *-zaam*. In addition, we saw that ALIGN -HEID outranks PEAK-TO-STEM

(53) Words that show how two constraints are ranked with respect to each other

a.	zoetsáppigheid	ALIGN {*-ig, -(e)lijk*}	»	ALIGN -HEID
b.	wonderbáárlijk	ALIGN {*-ig, -(e)lijk*}	»	IO ANCHOR-LEFT PRWD_W
c.	spáárzaamheid	IO ANCHOR-LEFT PRWD_W	»	ALIGN -HEID
d.	slápeloosheid	ALIGN –HEID	»	PEAK-TO-STEM

Section 4.2 provided evidence for the ranking of the following constraints:

(54) Adjectives that show how two constraints are ranked with respect to each other

a.	slápeloos	PEAK-TO-STEM	»	ADJ-PEAK
b.	ááantoon	ALIGN N/V	»	PEAK-TO-STEM
c.	aantóónbaar	PEAK-TO-STEM	»	ALIGN-LEFT PRWD_S
d.	loodvríj	ADJ-PEAK	»	ALIGN-LEFT PRWD_S

In the constraint ranking that we arrive at for Dutch, morpheme-specific constraints and constraints that take effect in compound words (ALIGN N/V, PEAK-TO-STEM) outrank constraints that refer to prosodic word internal structure. In this way, constraints for morphologically complex words are always higher ranked than constraints which apply to morphologically simplex words.

(55) Constraint ranking for Dutch
ALIGN {*-ig, -(e)lijk*} » IO ANCHOR-LEFT PRWD$_W$ » ALIGN -HEID » ALIGN STEM, ALIGN (N/V) » PEAK-TO-STEM » ADJ-PEAK, IO ANCHOR-LEFT FT$_W$ » ALIGN-LEFT PRWD$_S$ » WSP » IO ANCHOR-LEFT FT$_S$ » FOOTBINARITY, TROCHAIC » NONFINHEAD » ALIGN-HEAD-RIGHT.

An important conclusion of this section is the fact that (in contrast to what Inkelas assumes for Turkish) we need lexical specification of metrical structure in stems (see (33a)–(d)) and suffixes (*-baar* and *-zaam* are prespecified for PrWd$_w$) as well as morpheme-specific alignment constraints for the suffixes *-ig*, *-(e)lijk* and *-heid.*

(56) Four types of suffixes in Dutch and an OT-account

a. *Type I: stress changing affixes*
conform to regular patterns of stress assignment
- accounted for by the same constraint ranking as for simplex words (e.g., WSP forces main stress on the last syllable in the simplex word *prodúct* 'product' as well as in the complex word *productíef* 'productive')

b. *Type II: prestressing suffixes*
require main stress on the preceding syllable (no exceptions)
- accounted for by the highest ranked morpheme-specific constraint ALIGN ({*-(e)lijk, -ig*} Left, stress peak Left)

c. *Type III: stress neutral suffixes and stems in compounds*
do not usually change the stress pattern of the simplex stem
- accounted for by

(i) a constraint that requires main stress in a stem (PEAK-TO-STEM),
(ii) prespecification of two suffixes as weak prosodic words (viz. *-baar* and *-zaam*) plus the assumption of a concurrent prosodic faithfulness constraint (IO ANCHOR LEFT PRWD$_W$) and
(iii) a lower ranked morpheme-specific constraint for one suffix (ALIGN -HEID)

d. *Type IV: stress attracting suffixes*
attract stress to themselves
- accounted for by prespecification of strong feet and the assumption of a concurrent prosodic faithfulness constraint (IO ANCHOR LEFT FTS) that is also needed for irregular stress placement in simplex words (like *categoríe*)

Following Inkelas (1994), I claim that lexical markings for stress take the form of prespecified prosodic constituents: a stem or an affix may be marked for a weak or strong foot or a weak or strong prosodic word. Following McCarthy (1997) and Benua (1997), I adopt the view that faithfulness to prespecified prosodic structure is best expressed by anchor constraints demanding that a leftmost or rightmost segment of a prespecified foot or prosodic word is also leftmost or rightmost of the same constituent in the output.

The Dutch data presented in this section provide evidence for the fact that we do not only need underlying metrical structure, but also morpheme-specific alignment constraints. Kager (2000) also assumes lexical specifications for some suffixes (e.g. he proposes that *-in* in *hertogín* has a prespecified foot) as well as a morpheme-specific alignment constraint (ALIGN ({*-ig, -(e)lijk*} Left, stress peak Right)). Most importantly, Kager adopts in addition Base-Output correspondences to explain main stress placement in Dutch. Instead of three theoretical devices, I hope to have shown that two suffice; a theory that does not adopt Base-Output correspondence but is based on lexical specifications and only a few morpheme-specific alignment constraints adequately accounts for exceptional stress patterns in morphologically complex words.

References

Allen, W. Sidney (1973). *Accent and Rhythm. Prosodic Features of Latin and Greek: A Study in Theory and Reconstruction.* Cambridge: Cambridge University Press.

Apoussidou, Diana (2001). *Optimaler Wortakzent im Neugriechischen.* Master's thesis, Heinrich-Heine-Universität Düsseldorf.

—(2002). Unpredictable Accent Patterns in Correspondence Theory. In Arbeiten des Sonderforschungsbereichs 282 'Theorie des Lexikons' 120, Düsseldorf.

Beckman, Jill N., Laura Walsh Dickey, and Suzanne Urbanczyk (eds.) (1995). University of Massachusetts Occasional Papers 18: Papers in Optimality Theory, University of Massachusetts, Amherst: GLSA.

Benua, Laura (1995). Identity Effects in Morphological Truncation. In Jill N. Beckman et al. (eds.), 77–136.

—(1997). Transderivational identity: Phonological relations between words. Doctoral dissertation, University of Massachusetts, Amherst.

Booij, Geert (1995). *The Phonology of Dutch.* Oxford: Clarendon Press.

—(1998). Phonological output constraints in morphology. In *Phonology and Morphology of the Germanic Languages*, Wolfgang Kehrein and Richard Wiese (eds.), 143–163. Tübingen: Niemeyer.

Borowsky, Toni and Mark Harvey (1997). Vowel length in Warray and weight identity. *Phonology* 14, 161–175.

Burzio, Luigi (1994). *Principles of English Stress.* Cambridge: Cambridge University Press.

Canclini, Emanuela (1999). Die italienische Verbflexion: Eine morphophonologische Analyse. Master's thesis, University of Düsseldorf.

Dekkers, Joost, Frank van der Leeuw, and Jeroen van de Weijer (eds.)(2000). *Optimality Theory: Phonology, Syntax, and Acquisition.* Oxford: Oxford University Press.

Graf, Dafna (2000). Stress assignment in the nominal system of Modern Hebrew. In *IATL 7, Proceedings of the Fifteenth Annual Conference of the Israeli Association for Theoretical Linguistics*, 51–70.

—; and Adam Ussishkin (2001). Emergent Iambs: Stress in Modern Hebrew. Ms., in submission.
Grijzenhout, Janet and Martin Krämer (2000). Final devoicing and voicing assimilation in Dutch derivation and cliticization. In *Lexicon in Focus*, Barbara Stiebels and Dieter Wunderlich (eds.), 55–82. Berlin: Akademie Verlag.
Hammond, Michael (1999). *The Phonology of English*. Oxford: Oxford University Press.
Hayes, Bruce (1995). *Metrical Stress Theory: Principles and Case Studies*. Chicago: The University of Chicago Press.
Hulst, Harry van der (1984). *Syllable Structure and Stress in Dutch*. Dordrecht: Foris Publications.
—(1985). Ambisyllabicity in Dutch. In *Linguistics in the Netherlands*, Hans Bennis and Frits Beukema (eds.), 57–66. Dordrecht: Foris Publications.
Inkelas, Sharon (1994). Exceptional stress-attracting suffixes in Turkish: representation vs. the grammar. Ms. University of California, Berkeley. Published (1999) in *The Prosody Morphology Interface*, René Kager, Harry van der Hulst, and Wim Zonneveld (eds.), 134–187. Cambridge: Cambridge University Press.
Jacobs, Haike (1994). How optimal is Italian stress? *Linguistics in the Netherlands*, Reineke Bok-Bennema and Crit Cremers (eds.), 61–70. Amsterdam: Benjamins.
Kager, René (1989). A Metrical Theory of Stress and Destressing in English and Dutch. Doctoral dissertation, Utrecht University.
—(2000). Stem Stress and Peak Correspondence in Dutch. In Joost Dekkers et al. (eds.), 121–150.
Kenstowicz, Michael (1994). Cyclic vs. Noncyclic Constraint Evaluation. Ms., Cambridge, Mass., MIT.
—(1996). Base-Identity and Uniform Exponence: Alternatives to Cyclicity. In *Current Trends in Phonology: Models and Methods*, Jacques Durand and Bernard Laks (eds.), 363–393. University of Salford publications.
Kiparsky, Paul (1966). Über den deutschen Akzent. In *Untersuchungen über Akzent und Intonation im Deutschen*, 69-88. Berlin: Akademie Verlag.
—(1982). Lexical morphology and phonology. In *Linguistics in the morning calm*. I.-S. Yang (ed.), 3–91. Hansin, Seoul.
—(1985). Some Consequences of Lexical Phonology. *Phonology Yearbook* 2, 82–138.
—(1998). Paradigm effects and opacity. Ms., Stanford University.
Lahiri, Aditi and Jacques Koreman (1988). Syllable weight and quantity in Dutch. *Papers from the West Coast Conference on Formal Linguistics* 7, 217–228.
Liberman, Mark and Alan Prince (1977). On stress and linguistic rhythm. *Linguistic Inquiry* 8, 249–336.
McCarthy, John (1995). Faithfulness in Prosodic Morphology and Phonology: Rotuman revisited. Ms., University of Massachusetts, Amherst.
—(1997). Faithfulness and prosodic circumscription. Ms., University of Massachusetts, Amherst. Published in Joost Dekkers et al. (eds.), 151–189.
—; and Alan Prince (1993). Generalized Alignment. In *Yearbook of Morphology* 1993, Geert Booij and Jaap van Marle (eds.), 79-153. Dordrecht: Kluwer.

—;—(1995). Faithfulness and reduplicative identity. In Jill N. Beckman et al. (eds.), 249–384.

Nespor, Marina and Irene Vogel (1986). *Prosodic Phonology*. Dordrecht: Foris.

Prince, Alan and Paul Smolensky (1993). Optimality Theory: constraint interaction in generative grammar. Progress Report #2, Rutgers University, New Brunswick and University of Boulder, Colorado.

Popescu, Alexandra (2000). Rumänische Verbextensionen. Paper presented at the Phonology Circle, 10 and 17 April 2000, Heinrich-Heine-Universität Düsseldorf.

Raffelsiefen, Renate (1998). Phonological Constraints in English Word-Formation. In *Yearbook of Morphology 1998*, Geert Booij and Jaap van Marle (eds.), 225-287. Dordrecht: Kluwer.

Selkirk, Elisabeth (1995). The Prosodic Structure of Function Words. In Jill N. Beckman et al. (eds.), 439–470.

Siegel, Dorothy (1974). *Topics in English Morphology*. Doctoral dissertation, MIT.

Stiebels, Barbara and Dieter Wunderlich (1994). Morphology feeds syntax: the case of particle verbs. *Linguistics* 32, 913–968.

Trommelen, Mieke and Wim Zonneveld (1989). *Klemtoon en metrische fonologie*, Muidenberg: Coutinho.