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'I blame the government'

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Abstract

There are many competing theories of phonology, each seeking to best explain the range of phonological processes and types of segmental inventories which are attested in the languages of the world. This paper seeks to investigate the claims and assumptions of one such theory: 'Government Phonology'. The starting point for discussion is Shohei Yoshida's monograph *Phonological Government in Japanese*, in which the author endeavours to apply the theory to a range of phonological and morphophonological data from Japanese. Certain of Yoshida's specific claims are discussed, but the aim of this piece is wider than a simple review. The chief theoretical concepts used in the theory are introduced and critically discussed, and various connections to other theories of phonology in particular and language in general are investigated.

Keywords: Generative phonology; Japanese phonology; Principles and parameters approach; Syllables; Universal grammar

1. Introduction

Government Phonology is an intriguing approach to the study of phonological processes and organisation; it is a model of phonology which combines some unique and challenging aspects of real innovation with certain theoretical constructs which have been developed and accepted in various other phonological frameworks.

As is variously reported in Government Phonology (henceforth 'GP') texts, the first exposition of the ideas that were later to cohere and form the theory came in Vergnaud (1982) and Lowenstamm and Kaye (1982). The key texts for the

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description and development of the framework are Kaye, Lowenstamm and Vergnaud—henceforth 'KLV'—(1985) and (1990). The book which forms the starting point of discussion for this piece, Yoshida (1996), is the latest in a gradually extending line of monographs which seek to apply GP to specific aspects of the phonology of various languages, others in this line are Charette (1991) on French, Harris (1994) on English, and Brockhaus (1995a) on German.[1]

The first chapter of Yoshida (1996) (henceforth 'Y'—unattributed page references are from Y, 1996) is a convenient, if brief, summary of the key characteristics of GP. There are several sub-theories within the GP whole, each of which allows separate discussion, and I plan to take advantage of this below.

Y's book consists of eight chapters in total. Following his scene-setting first chapter, the structure of the remainder of the book is as follows: chapter two, ''Representations of Segments in Japanese'', details Y's assumptions regarding the basic segmental inventory of Japanese, including his key proposals for the famously unrounded back high vowel [ɯ] and the geminates and long vowels; chapter three, ''Consonant Deletion'', deals with paradigm irregularity in verbal inflection; chapter four, ''the Syllable Structure of Japanese'', which is by far the longest, includes Y's most important and original claims—he attempts to exclude the mora from the phonology of Japanese, using only the consciously restricted phonological inventory recognised in GP; chapter five, ''Past Tense Verbs'', deals with several morphophonological alternations, including vowel epenthesis and the alternation between [b] and [n]; chapter six discusses ''Compensatory Lengthening in Japanese'' which occurs following certain types of suffixation; chapter seven accounts for paradigm irregularities in ''Adjectival Inflection'', and chapter eight, ''Segmental Decomposition'', analyses various consonantal lenitions (from both standard Japanese and two regional dialects).

The individual chapters are relatively self contained, and the book does not exhibit any great exposition or development of a specific claim, rather it ''represents a large-scale application of a phonological theory to Japanese'' (p. xi). The theory (GP) is presented with a series of data (which are generally not new to the phonological community) to determine whether it can account for them—if it can, perspicaciously and cleverly, the argument runs, then the theory itself is more likely to be true. Thus, for me, the underlying interest of Y's book is theoretical; for that reason this article will not merely be concerned with Y's analyses, although several of his proposals will be discussed and evaluated, but it will also (perhaps primarily) investigate the conceptual assumptions which he makes and sets out to test, and their theoretical bases.

Given GP's relatively low profile, and the novelty of some of its claims, it will prove necessary to provide a brief outline of the framework and the most important assumptions made in its sub-theories so that they might submit to

[1] Although Harris (1994) and, to a lesser extent Brockhaus (1995a), are not cast in 'classical' GP, they overtly ascribe to the key basic assumptions of GP and can reasonably be counted as part of the GP canon.

reasoned discussion; this will also form the vital background to the exploration of Y's analyses—it will only be possible to do them justice if they are seen in the light in which they are intended. Of course, GP is not a monolithic whole, and there are disagreements amongst its practitioners; in the discussion to follow, I note this where I believe it to be relevant, but, due to the unavoidable constraints of space, it will be far from possible to evaluate every theoretical claim made under the GP banner; this piece no doubt runs the inevitable risk of being accused of portraying GP as being slightly more homogenous than it really is. I hope, where possible, to have avoided this.

The basic structure of the remainder of this article is as follows. Section 2 sets the scene for the discussion to come by situating GP in the global scheme of things. It will be seen that GP is in principle a tightly constrained, generative, abstract theory of phonology. Section 3 investigates the sub-theories of GP, one by one, to demonstrate and critically evaluate both how they function and how Y's work fits into them. Finally, Section 4 draws together the various parts of the discussion to provide a verdict on GP in general and on Y's book in particular; this will include a few brief points on the editing and general presentation.

This article is thus not merely intended to be a simple review of Y (1996), rather it hopes to provide a general evaluation of Y's contribution to phonological debate and of the nature and validity of his GP theoretical assumptions. As a side point, it is hoped that the piece might serve to introduce GP to a wider audience and to show what problems the theory faces in achieving its stated aims—whatever our final view of Y's analyses in particular and the theory in general, there is no doubt that GP represents an important, innovative and challenging set of ideas.

2. What kind of phonology is 'Government Phonology'?

GP is an 'abstract' theory of phonology. As we shall see, this abstractness manifests itself in various ways within the theory, such that the phonological representations which it allows exhibit a definite distance from their putative phonetic correlates. This abstractness is not a product of intricate derivations involving multiple intermediate representations between underlying ('systematic phonemic') representations and surface ('systematic phonetic') representations, familiar from standard generative phonology, popular since Chomsky and Halle (1968), and the subject of much debate in phonological circles (perhaps the most well-known contribution to this debate is Kiparsky, 1968). GP is principally an 'abstract' theory in that it takes the object of study to be abstract—a substantial body of work from the GP tradition (eg, Harris, 1994; Harris and Lindsey, 1995; Ploch, 1997) places great importance on precisely this point, claiming at times quite explicitly that there is no linguistically relevant level of phonetic representation. This derives from a rejection of the 'standard generative' view that the processes studied by phonologists serve to turn abstract, psychological,

phonological entities (which are arguably part of a Chomskyan 'competence') into physically-oriented phonetic items (arguably part of 'performance').[2]

The standard generative view of phonology is strongly defended by Bromberger and Halle (1989), partly in response to GP counter-arguments. They maintain that phonology does involve two conceptually distinct levels; they claim specifically that "phonetic surface representations are generated only when a word figures in an actual utterance" (p. 53). From a GP perspective, however, Harris and Lindsey (1995) point out that this view suffers from certain conceptual problems if the technical notion of generativity (that a grammar 'checks' the grammaticality of a linguistic expression) is taken seriously in linguistic theory. They argue that Bromberger and Halle's standard generative view seems to place the whole of phonology outside of linguistic competence, turning it into a performance system which produces phonetic forms (in real time?) as part of speech production, and yet it is typically claimed in generative circles that the 'start' of phonology is most definitely to be viewed as part of a static knowledge of a language.

This leaves phonology as a kind of bridge over the ontological gulf between what is stored in the mind and the physics of speech. As Burton-Roberts and Carr (1997, in press) point out, this seems a somewhat confused position from a generative perspective, as the object of study in phonology resides partly in competence and partly in performance. Harris and Lindsey show how GP avoids this possible source of confusion by assuming a great conceptual break, such that all of phonology is situated on the competence side of the gulf. This means that phonological processes only map like on to like and do not somehow turn the phonological into the phonetic. GP claims that only constructs which are motivated on purely phonological grounds should be used in phonology. Ploch (1997) even goes so far as to talk of "the phonological irrelevance of phonetics" (p. 222).

2.1. The implications of a non-phonetic phonology

GP's 'non-phonetic' conceptual bent has several implications for the theory. As we shall see in Section 3.3, GP typically eschews underspecification in phonology, partly because there is no idea that representations become gradually more phonetic as a derivation goes on. In addition to this, as there is no real concept of derivation from underlying to surface representations, there should be no 'intermediate forms' within any given morphophonological domain (which is basically equivalent to a lexical morpheme) on which a later process may operate; GP does not in principle allow for the ordering of processes at all, as Y notes in his preface—rather, all processes are

[2] In Chomsky's current work (eg, Chomsky, 1995) the distinction between 'competence' and 'performance' has generally been reformulated into a distinction between 'I-language' and 'E-language', such that, in his opinion, I-language is the true object of research for linguistics, as previously 'competence' was. Whilst his current distinction is perhaps terminologically more apt, both sets of terms are used in Chomsky (1995), and I do not believe that the shift in terms represents a fundamental shift in interpretation; hence in this article I use the older terms, largely because they are likely better known to the linguistic community.

predicted to occur whenever they can (we shall return to this point in Section 3.5 below, when discussing Y's analyses of the past tense morphology of Japanese verbs).

The types of representations used in GP analyses are also somewhat abstract. As the theory is not tied to a surface level of phonetics, it is free to use a sub-theory of syllable structure which is clearly not surface-true, to replace phonetically motivated 'distinctive features' with a more abstract, phonologically motivated system and to make use of concepts which have no obvious phonetic correlate. In this regard, Y states his belief that "the phonological structure of a given string cannot be uncovered by phonetic inspection; it is obtained through analytic work" (p. 60).

The nature of the connection between phonetics and phonology is indeed a moot point, and sadly one which we lack the space to discuss here in full. Many have argued, against GP, that the 'performance' attributes of articulatory or acoustic phonetics do directly inform and constrain phonology, not only dictating what may occur phonologically, but also responsible for what kind of entities it is that phonology deals with. The proponents of GP are right to point out that the standard generative view is problematic in its own terms if the phonological is thought to gradually become the phonetic, as this mixes the different ontological categories of competence and performance, but it remains to be seen quite whether the GP position is a successful solution to the problem. If phonology *is* entirely distinct from phonetics conceptually, then, we might ask, what exactly is the nature of the relation that exists between them, for it need hardly be said that there is some connection. As we shall see in Section 3.3, GP gives explicitly phonetic definitions for the phonological building blocks which it uses, and this might leave us wondering how these definitions are to be interpreted if not as 'intrinsic phonetic content' which is familiar from standard generative phonology.

Possible evidence against the extreme GP position is the fact that many connected speech phenomena, such as gradient nasalisation and assimilations (which seem clearly to be caused by resolutely phonetic factors, such as the pressures of articulation) bear a definite resemblance to the categorical processes which are taken to be the subject of phonology (a recent reference in this regard is Myers, 1997). It is also difficult to see how results obtained from the study of articulatory or acoustic phonetics can be used as evidence for the existence of particular phonological processes if phonetics is 'irrelevant' to phonology, as Ploch (1997) claims; how can a child acquire a language-specific phonology if it does not abstract evidence for it in some way from the phonetic signal with which it is confronted? Whilst we might note that there are conceptual worries concerning this aspect of GP, we will not pursue them further here, as this aspect of GP is not central to Y's research.

One corollary of the fact that GP does not recognise qualitatively distinct levels of representation (i.e., there is no contrast between systematic phonemic and systematic phonetic levels) is that practitioners of GP often make no use of any distinction between slanted and square brackets, which are often used to indicate the difference between 'underlying' and 'derived' segments, or phonemic versus phonetic transcriptions, respectively. Y does not use slanted brackets; he uses either no brackets at all, so that it is sometimes uncertain whether the forms cited are meant to be phonological or orthographic (transliterated from Japanese characters) or else he

just uses square brackets (on page 30, for example, he writes that "I assume that [h] in Japanese is underlying [p]"). Elsewhere, Y occasionally makes unexplained use of pointed brackets which can hardly be meant to represent orthographic forms (eg, on page 137 [ʃinda] is derived from ⟨sin + ta⟩ 'died', but is later on the same page given as ⟨ʃin⟩⟨da⟩). This may seem a small point, but it makes Y's book both inconsistent and confusing at times and perhaps betrays a fundamental problem. In an attempt to avoid confusion in this article, I have chosen to follow common GP practice and use exclusively square brackets, even when referring to non-GP work. This is an attempt to maintain consistency and should not be taken as evidence of any theoretical claim on my part.

2.2. Some other important aspects of the GP approach

One final point which must be noted before we proceed to consider the precise mechanics of GP is a key assumption which seems to have provided one of the chief motivations for the original development of the theory. As noted in KLV (1990), and enthusiastically discussed and developed in Charette (1989) and (1991), GP explores the idea that certain key aspects of phonology are driven by the same forces that can be seen to be active in syntax.

GP is resolutely a generative theory of phonology—as such, it has liberally borrowed concepts from generative syntactic theory and put them to use in phonology. As Y notes in his preface, GP views phonological knowledge as the result of a set of universal principles and parameters; these principles are conceived of as part of an innate phonological 'Universal Grammar'. The theory does away with phonological rules of the type used in standard generative phonology, and this is seen as a highly important achievement in the theory and is the chief means by which analyses involving extrinsic ordering are forbidden. It is, of course, no coincidence that GP found its first expression at a time when Chomskyan syntax was developing from a system which made use of ordered syntactic rules (the 'Standard Theory' model—see Chomsky, 1965) to the 'Principles and Parameters' model (see Chomsky, 1981 and 1982) in an attempt to provide more universalist explanations and restrict the type of analyses which could be made in the theory to those which correspond to processes which actually occur in natural languages. Given a modular understanding of language, such as that generally assumed in generative linguistics, where different aspects of language are thought to be organised into specific cognitive modules, the hypothesis that certain basic principles are active across these modules is a perfectly reasonable basis for a research programme. The possibility that certain concepts are relevant to both syntax and phonology has also been investigated in other phonological frameworks, in Dependency Phonology, for example (Anderson and Jones, 1974; Anderson and Ewen, 1987—as we shall see below, GP shares several key ideas with Dependency Phonology), and the terms 'structure preservation' and 'strict cyclicity' (both originally used in generative syntax) are common in discussions of the Lexical Phonology model (eg, Kiparsky, 1982). I shall briefly investigate the basis of this claim within GP below (largely in Section 3.2), to see whether the claims made on its behalf in this regard are valid.

We might note at this point already, however, that the very name of the theory, *Government* Phonology, immediately lays claim to a position of this type, bringing to mind the terminology used in Chomsky's Principles and Parameters approach to syntax (also called the 'Government and Binding'—henceforth 'GB'—approach, partly after Chomsky, 1981 and 1982). As we shall we, the relation of 'government' is crucial in GP; it is the notion which dictates what is viewed as a possible phonological entity in the theory and it is the motor which drives the vast majority of phonological processes, Y clearly recognises the importance of the idea to the theory, hence the title of his book: *Phonological Government in Japanese*.

In GP, parallel to the developments in generative syntax, a particular concern has been the development of a theory which constrains what grammars can be written, and which would thus better match what is assumed to be the range of possible human languages. Concerns of this type are familiar within generative phonology from its very inception; the famous chapter nine of Chomsky and Halle (1968) attempts to deal with them and, as is well known, much time and space has been devoted to the development of a theory of sub-segmental structure which best characterises both (i) natural phonological inventories and (ii) possible phonological processes. GP's 'element' theory, discussed in Section 3.3, is specifically intended to confront these concerns.

In accordance with several theoretical movements which have sought to reduce the great power of standard generative phonology, a typical GP position would banish such 'standard generative' phenomena as Trisyllabic Laxing and Vowel Shift (eg, deriving *divinity* and *divine* from underlying [dɪvin]) and Velar Softening (deriving *electri*[s]*ity* from *electri*[k]) from synchronic phonology, where they are placed by Chomsky and Halle (1968, pp. 50–55, for example). GP theorists typically maintain that such alternants are simply listed suppletively in the lexicon (Harris, 1994 is quite explicit on this point) and generally seek to reject the notion of derivationality which might often involve several 'intermediate' forms in a given morphophonological domain. Kaye (1995) describes how GP allows certain types of morphological concatenation to create a new domain so that phonological processes have another chance to apply, but this is still very different in principle from the extrinsic ordering of standard generative phonology.

It is against this background that GP in general, and Y's study in particular should be understood; to do any differently would be unreasonable. In the next section, I discuss the precise mechanics of GP and investigate both how consistent they are, and also in what way and how convincingly Y is able to implement them to explain various aspects of Japanese phonology.

3. Government, phonology and Yoshida (1996)

Set in its 'non-phonetic' place, we may now proceed to discuss GP, Y's use of it, and, interconnectedly, the theoretical assumptions which Y subscribes to. We will see that Y's analyses are sometimes persuasive and sometimes less so, and this will in part be due to the workings of the various 'sub-theories' which make up the GP whole.

Whilst they are closely interrelated, these sub-theories can be dissected for discussion into the following (the terms in italics are the technical designations used in the GP literature):

(i) the theory of syllable structure
(ii) the theory of the relations which hold between segments or syllabic positions (*the theory of government*)
(iii) the theory of sub-segmental structure (*element theory*)
(iv) the theory of the relations which hold between sub-segmental elements and of how they may combine (*charm theory*)
(v) the theory of what constitutes a possible phonological process.

I discuss each of these in turn in Section 3.1–3.5.

The GP framework has now existed long enough for various modifications to have occurred in some of its sub-theories. Despite this, although it was published in 1996, Y's book "is essentially couched in the standard Government Phonology" (p. xii)—the version described in KLV (1990). This derives from the fact that the volume is a development of Y's PhD dissertation (Yoshida, 1991), written several years ago. In the discussion to follow, where I believe it to be relevant or instructive, I intend to show how some of the aspects of GP which Y employs have been modified or improved by others; if justification for this is needed, we might note Y's claim in his preface that, in preparing the work for publication, "the revision has mainly involved updating [...] some theoretical concepts and references" (p. xii). The discussion of the various revisions of GP should not, however, necessarily be taken as an endorsement of them or as a criticism of Y; in certain points it might be reasonable to claim that Y's analyses could be fruitfully re-interpreted in the light of recent developments in GP, but equally, the newer ideas could turn out to be flawed.

At certain points I shall discuss what seem to me to be problems for Y in particular or GP in general. These are by no means intended as an attempt to 'disprove' GP; this would, it might easily be argued, be absurd—the most such argumentation can do within a scientific framework is to disprove a particular analysis—a framework can only be rejected out of hand if another is shown to be manifestly better at doing what the original set out to do (capturing generalisations, for example, or reducing stipulation, or limiting the number of theoretical constructs required to account for a range of data).

It will, of course, not be possible to discuss all of the analyses which Y proposes due to lack of space, but in the spirit of the preceding paragraph, this section investigates the following aspects of Y (1996): the fundamentals of the theory (largely from Y's chapter one) in Section 3.1, 3.2 and 3.4; the syllable structure of Japanese (from chapter four) in Section 3.1; the representations which Y uses for the segments of Japanese and the type of segmental processes he allows (from chapters two and eight) in Section 3.3 and 3.5; and the more general types of phonological processes used by Y (largely from chapters five, six and seven) in Section 3.5.

3.1. The syllable in Government Phonology

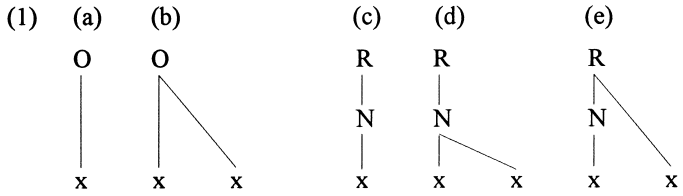
One of the clearest ways in which GP, unconstrained by direct connection to speech, diverges from what might be taken to be 'surface facts' is in terms of the syllabic structures which are recognised and allowed by the theory. Perhaps the most startling claim in this regard is that GP does not overtly recognise the syllable as a phonological unit, as we shall see below. GP's suprasegmental theory is a truly novel aspect of the framework, certain aspects of which offer unique solutions to well-known phonological problems.

3.1.1. Syllabic constituents without the syllable

In his first chapter, Y explains how GP recognises only three 'syllabic' constituents: the onset, the nucleus and the rhyme (where the nucleus is the 'head' of the rhyme). These constituents immediately dominate skeletal 'timing slots' on to which segments may attach; these timing slots form a separate tier of representation and depict segmental quantity. Harris (1994) explains how these were developed in early GP work (Kaye and Lowenstamm, 1984) from earlier 'CV' slots (originally in McCarthy, 1979) which were a definite enrichment to phonological theory, but also included a certain redundancy in specifying the consonantality or syllabicity of the segments which they dominated.

GP does not recognise an independent constituent of the type 'coda', familiar from much work on the syllable, just as the syllable itself is not granted any formal status in the theory. These two points are derived from underlying principles which regulate the class of possible phonological objects and processes in GP. The key notion here is that of government, which is vital in GP but, given the definition adopted in GP (discussed here in Section 3.2), it could not operate within a constituent with the traditional structure assigned to syllables or codas. The theory also rejects the 'mora', as developed, for example by Hyman (1985); this is one of Y's central claims. He describes the principle motivation for his position thus: "the mora is claimed to be indispensable in prosodic phenomena of some languages but completely irrelevant in other languages" (p. 81); this conflicts with the GP principle of universalism, which claims that phonology fundamentally functions in the same ways in all the world's languages.

In a further departure from 'standard' syllable theory, syllabic constituents are also allowed no more than two branches. This state of affairs is derived from two principles which are thought to comprise part of Universal Grammar: the 'Strict Adjacency Condition' and the 'Strict Directionality Condition' (these are conditions on the relation of government and thus dictate what skeletal positions may be licensed in the syllabic constituents); they allow for the following types of construction, where 'O' stands for onset, 'N' for nucleus, 'R' for rhyme, and 'x' for one timing slot:



Structures (1a) and (b) are used to represent non-branching and branching onsets respectively, the structure in (1c) for short vowels and that in (1 d) is typically used for long vowels and heavy diphthongs; (1e) might show a short vowel followed by a single consonant. Vowels are typically associated to nuclei and consonants to non-nuclear positions.

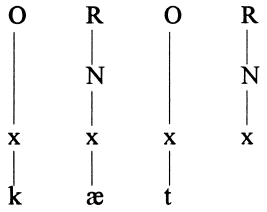
This quite restricted inventory of syllabic constituents gives GP a rather restrictive theory of what can constitute a possible phonological object in terms of prosodic structure. This is definitely a desirable result if the overgeneration inherent in the standard generative phonology model is taken seriously and if it is perceived to be a real problem. Of course, the structures shown in (1) will not adequately describe the 'surface' forms familiar from many languages and the abstractness of the phonological representations which are needed in GP to square these two factors is compounded by the fact that syllable structure is also constrained by a 'Coda Licensing Principle' which stipulates that, while the structures in (1c) and (d) may occur as the final element in a word or morphophonological domain, the type of rhyme shown in (1e) may not occur unless it is followed by an onset.

These factors all contribute to GP's 'abstractness' as a phonological theory; in order to account for the types of syllabification found in the world's languages using the constituent templates in (1), GP makes frequent recourse to units which are allowed to be 'phonetically empty', that is, items which are present in the phonology and may take an active role there, but which have no obvious phonetic correlate.

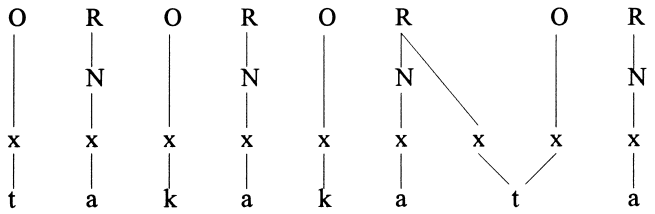
The most commonly encountered 'empty' constituent in GP is the empty nucleus. These are nucleic positions which exist within syllabic structures but normally have no individual phonetic manifestation. The theory does not allow for an entirely unconstrained proliferation of empty items; we shall see in Section 3.2 that this point is taken seriously within the theory, as would be expected from a framework which lays great emphasis on the reduction of overgeneration and on the construction of a tightly constrained theory of phonology. There have been various attempts in GP to derive a set of general principles which account for exactly where empty nuclei may occur. One such environment is the end of a morphophonological domain.

The GP principles of syllabic structure conspire to dictate such syllabifications as the following (from Y p. 8 and 162):

(2) *cat* (English)



takakatta (Japanese: 'high + past inflection')



The final consonant in *cat* could not be in the rhyme of the preceding syllable, but instead must be accommodated in an onset which is followed by a domain-final empty nucleus. These 'domain final empty nuclei' are only allowed in certain languages (Kaye, 1990a and Brockhaus, 1995b are explicit in this regard), and Japanese is not one of these and hence does not allow word final consonants.[3]

The diagrams in (1) and (2) also demonstrate GP's rejection of the syllable as a separate constituent in its own right. The reasoning for this is partly theory-internal—as will become clear during our discussion of the concept of 'government' in Section 3.2—but also because GP seeks to make categorical claims as to which segments may occur together within a constituent; this is part of the theory's attempt to constrain phonology and phonological analyses by explicitly describing what may constitute a possible phonological object on any specific level of analysis. As KLV (1990) discuss, there seem to be no restrictions as to which well-formed onsets and nuclei within any particular language may combine to form syllables (this observation is called 'the Principle of Free Occurrence' in the GP literature), and this is taken as evidence against the syllable as a 'real' phonological item as, if an onset and a rhyme formed a true constituent, GP would expect co-occurrence restrictions to hold between the two. Additionally, the claim is made, for example in Harris (1994), that no phonological processes need be formulated to explicitly refer to the syllable as such, but only need refer to the onset or rhyme separately; if shown to be true, this claim would be highly persuasive. Despite this, Y is not unusual in freely using the term 'syllable' throughout his book "as shorthand for 'the sequence of an onset and a following rhyme'" (p. 5).

[3] A word-final 'moraic nasal' in such words as *mikan* 'orange' is dealt with separately by Y (pp. 92–95), as we shall see shortly.

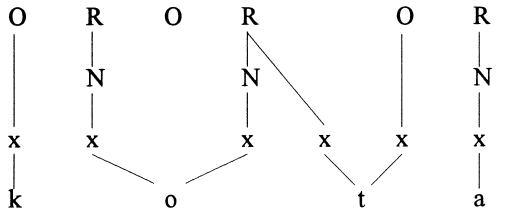
Whether this perceived need to continue to refer to 'the syllable' weakens the GP claim that there is no such entity is rather a moot point.

It is stipulated in the theory that the presence of a nucleus implies the presence of a rhyme, which implies the presence of an onset (even if it is empty), and vice versa, so GP does seem to have the notion 'syllable', even if the concept is not formally recognised. The term 'coda' is also used in the GP literature to refer to the post-nuclear position in the rhyme constituent, shown in (1e)—which, due to the 'Coda Licensing Principle', may only exist if followed by an onset—even though no formal constituent 'coda' is recognised. This position is used by Y as the first part of certain types of geminates, as shown in his analysis of *takakatta*, given in (2).

3.1.2. Japanese syllable structure, long vowels and geminates

Not all of the theoretically possible constituent types, shown in (1), are encountered in Japanese; specifically, the structure in (1b) is disallowed. GP recognises a series of parameters along which languages may vary in terms of constituent branching. A given language will either allow onsets, rhymes and nuclei to branch or not, depending on the relevant parameter settings which are active in the language; English, for example, allows branching in all constituents. According to the analyses presented by Y, Japanese allows only nuclei and rhymes to branch,[4] although it is noticeable that Y only uses branching nuclei to account for long vowels occasionally (geminates, too, are not always represented as in the word *takakatta* in (2)). In dealing with different Japanese phonological phenomena, Y represents both long vowels and geminates in two different ways. A key aspect of Y's argument against the mora is his claim that most Japanese long vowels and diphthongs are not syllabified in branching nuclei, but rather, as shown in (3), they are sequences of two distinct, non-branching nuclei (*haitta* 'entered' is fitted onto exactly the same syllabic structure; both words also contain geminates—the representation is taken from Y's p. 85):

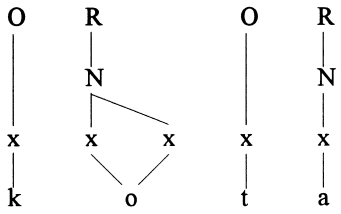
(3) *kootta* ('was frozen' [ko:t:a])



The same word, however, "in less careful speech" (p. 90) is given the representation in (4), below (from p. 91):

[4] Although glides in words such as *kyaku* 'visitor' are often thought to occupy the second position in a branching onset (Y mentions, for example, that Poser, 1984 proposes this analysis), Y analyses them as the first part of a 'light diphthong' and thus the first part of a nucleus.

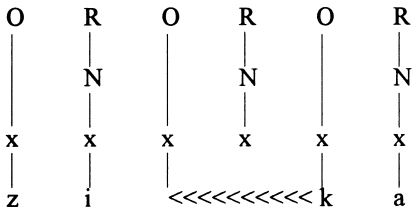
(4) *kootta* ('was frozen' [ko:ta])



Y derives this structure from that in (3) through a process which he names 'Nuclear Fusion'. This, he explains, is a process whereby "two successive nuclear constituents are fused into one by the application of the Obligatory Contour Principle under certain circumstances" (p. 89), which then, given the GP position on what constitutes a possible constituent, also forces loss of gemination. We shall return to the part played by the Obligatory Contour Principle ('OCP') in the framework in Section 3.5, but we might note here already that this analysis requires a rather peculiar understanding of the constraint, such that a sequence counts as 'the same' (and thus qualifies for deletion by the OCP) in rapid speech, but clearly counts as 'different' (i.e., forms a 'contour') in slow speech. We might well expect that an 'abstract' theory, such as GP, which conceives of phonology as part of competence (as we saw in Section 2), should not allow such performance factors as 'speech speed' to alter the phonology at all, so this aspect of Y's analysis seems a little odd.

Like his treatment of long vowels, Y employs two different syllabic structures in the representation of geminates. In addition to the way that [t:] is dealt with in (2) and (3)—attached to two timing slots from two neighbouring constituents—the geminates in such words as *zittai* 'actual state' and *zikka* 'one's original home' are represented by Y as in (5):

(5) *zikka* ('one's original home' [zik:a])



This analysis claims that the [k] from the final onset spreads into the onset preceding it, ignoring the skeletal slot of the intervening nucleus, which becomes 'empty' and thus receives no phonetic interpretation. This analysis is partly motivated by the fact that *zikka* is morphologically complex, derived from *zitu* 'reality' and *ka* 'home' and that resyllabification, such as would be necessary to represent the [k:] in *zikka* in the same way as [t:] in *kootta* in (3), is not allowed in

GP. Nonetheless, we might think that the fact that segments of the same phonetic length are represented phonologically in two very different ways is perhaps a little peculiar.

Y recognises this infelicity and discusses the point in his conclusion (p. 188). He declares that it is his underlying belief that, in fact, Japanese only uses constituents of types (1a) and (c), which would give a very 'neat' phonological analysis, such that no constituent may branch in the language, and using only the type of representations for long vowels given in (3) and for geminates in (5); this would give a single simple underlying CVCV syllable structure type. This is an interesting suggestion, appealingly pure on one level,[5] but it would clearly make the analyses needed even more abstract, raising the question of empirical testability, and we might argue that it would perhaps be wise to admit that some aspects of languages are 'messy', and might not admit of a clear-cut, neat analysis, such that branching constituents are only needed at the margins of Japanese phonology; such claims do not sit easily in GP clothing, however.

Y's analysis of 'long' segments in Japanese neatly demonstrates the non-phonetic, abstract bias of GP. As work in the theory does not take the apparent 'surface' facts to be self-evidently applicable to the description of phonology without further comment, Y can postulate that a long vowel is in fact linked to two separate nuclei or a geminate consonant to two onsets, both separated by 'empty' constituents which have no phonetic effect. The positive side of this is that it provokes a refreshingly questioning approach to phonology, which might well serve to shake us out of credulous acceptance of intuitively appealing but nonetheless unenlightening analyses. A possible downside is that, freed from the tightest constraints of a presumed phonetic surface 'reality', the phonologist is free to postulate analyses which, many would think, have little reasonable claim to psychological reality.

3.1.3. Morae, syllables and phonological intuitions

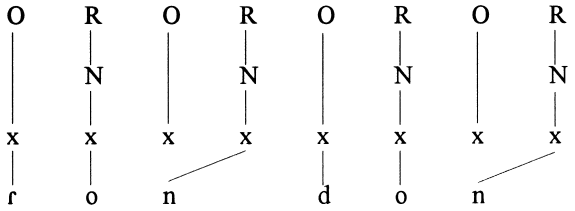
Amongst others, Clark and Yallop (1995) note that it is often claimed that speakers of a language such as English have linguistic intuitions as to the number of syllables which any individual lexical item contains; this is familiar from the tip-of-the-tongue phenomenon when a speaker might be able to access the syllabic pattern of a word, but not the segmental content. Tsujimura (1996), however, points out that, whereas an English speaker would recognise two 'parts' or 'beats' to a word such as *London*, a speaker of Japanese would recognise four parts. This

[5] It is perhaps interesting to note in this regard that Lowenstamm (1997) has recently made the proposal that, cross-linguistically, CV is the only possible syllable type (see also Scheer, 1995): that is, the only possible constituent structures are those in (1a) and (1c); much of Y's analysis of Japanese would fit in with this revised model, but not the long vowel in (4) or the geminate in (3). Lowenstamm (1997) attempts to show that even languages like English can be productively re-analysed as CVCV. It could well be argued, however, that this would lead to an unjustifiably large proliferation of 'empty' phonological items—a large number would be needed to account for the consonant clusters of English or Polish, for example.

discrepancy cannot be reconciled with the simple notion 'syllable' if the post-vocalic nasals in the word (which, following Tsujimura, we could transcribe for Japanese as [ɾondon]) are allocated to a traditional type coda constituent. Tsujimura (1996) gives a standard explanation for the difference in the intuitions between speakers of Japanese and speakers of English by invoking the concept of the 'mora' and claiming that Japanese is what might be termed a 'mora language'—where many phonological processes make reference to the mora—whilst English, in contrast, is a 'syllable language'. Thus a speaker of Japanese counts four morae in *London* whereas an English speaker counts the two syllables in the word.

It is standardly claimed that the mora can be realised in three different ways in Japanese: as a (C)V sequence, as the first part of a geminate or as a 'moraic nasal' (the segment [n] occurring in syllable final position). The sequence [ɾondon] thus contains two CV sequences and two moraic nasals and hence four morae. As we have already noted, GP does not recognise the mora as a linguistic constituent, and Y develops an argument against the mora in his chapter four (much of the argument is also discussed in Yoshida, 1990). We have already encountered the basis of Y's claim in the structures given in (3) and (5): he proposes to re-analyse each mora as a GP-type separate 'syllable'. Thus long vowels and diphthongs which are typically claimed to constitute two morae are, under Y's analysis, normally understood to be segmental material attached to two separate nuclei and the first part of a geminate spreads across a whole syllable (with an empty nucleus). In a word such as [ɾondon], the final nasal cannot be in a coda in GP, of course, nor can it, in fact, be in a word-final onset, as in *cat*—shown in (2), as Y claims that Japanese does not license word-final empty nuclei. In Y's analysis, the final nasal is lexically stored in a word-final onset, but moves to occupy the following nucleus; this is, he claims, forced by the fact that final nuclei cannot be empty in Japanese. Y also carries over this word-final analysis to account for word-internal moraic nasals, which would give [ɾondon] the representation in (6):

(6) *London* (Japanese: [ɾondon])

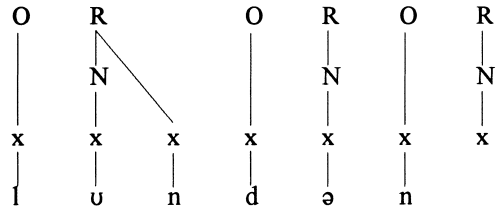


This raises a tantalising possibility: it might seem that, as a spin-off from this analysis, Y could achieve a unification of the Japanese speaker's intuitions as to the number of 'parts' or 'beats' in the word with the intuitions of the English

speaker: on Y's analysis, the Japanese word simply has four syllables ('onset-rhyme sequences'). However, Y is quiet on this point, and it seems that, in fact, GP is unable to capture these intuitions.

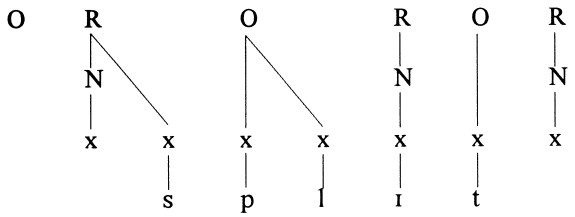
On a rather simplistic level, we might note that, despite the fact that English speakers would divide the word *London* into two parts, the word has three 'syllables' on a GP analysis, given the fact that word-final empty nuclei are allowed in English:

(7) *London* (English - northern England: [lʊndən])



The picture is further complicated by the existence of words such as *split* in languages like English, which have three segments in an onset on 'the surface'. As Y explains in chapter one, words of this type must be represented in GP with a word-initial empty onset and nucleus, giving a total of three 'syllables', as in (8):

(8) *split* (English: [splɪt])[6]



It would be perfectly possible in the GP framework, of course, to claim that the native speaker intuitions discussed above do not reflect the brute number of onset-rhyme sequences in a word, but rather, more likely, the number of non-empty nuclei in a word. This would be four in Japanese *London*, two in English *London* and one in English *split*—the correct result. However, this would still pose a problem for Y, given his analysis of geminates. According to Tsujimura (1996), a word like *zikka* 'one's original home' [zikːa], shown in (5), would have three

[6] Kaye (1992) presents an interesting array of evidence for this analysis, and we shall return to words of this type in Section 3.2.3.

morae and hence three 'beats', yet on Y's analysis, there are only two filled nuclei, so the relevant intuition cannot be captured in this way, which leaves us with a somewhat dissatisfying situation.

An objection could be raised against this criticism of GP, related to the nature of the intuitions discussed. It could be argued that the intuitions might reflect some aspect of psycholinguistic organisation and speech planning, whereas GP, as discussed in Section 2, is purely concerned with linguistic competence and thus makes no claims as to such aspects of performance. However, it is frequently claimed in GP work that the lexical representation of a linguistic expression must include information as to which segments are attached to nuclei (see, for example, Brockhaus, 1995b), thus this syllabic concept is thought to be relevant to all aspects of linguistic knowledge, along with explicit information as to the number of filled nuclei in a given lexical item. Additionally, we might note that much of generative syntactic theory is based on native speaker intuitions. The GP claim that phonology has much more in common with syntax than is generally presumed might lead us to think that the theory should be able to capture such phonological intuitions as these. If this type of intuition does not directly reflect linguistic knowledge, then we might wonder what precisely they do represent and why there should be a difference in this regard between a speaker of Japanese and a speaker of English. The worrying point is that Y's analyses (unintentionally) account for 'beat counting' *nearly* but not quite.

3.1.4. Summary on syllabicity

In assessing the GP theory of syllabic structure in general we should note that analyses with domain final empty nuclei for languages like English, as in (2), allow GP to neatly explain such phenomena as the 'extrametricality' of word-final consonants in stress assignment and their failing to trigger 'closed-syllable shortening', as Harris (1994) demonstrates. This and word-initial coda consonants, as in *split* in (8), explain the frequently discussed aberrant behaviour of such structures in terms of the sonority hierarchy and other phonotactics, so there is some explanatory motivation for these ideas.

Y's contribution, which has as its goal the elimination of the mora from phonological theory, almost succeeds in allowing GP to explain intuitions as to the number of beats in linguistic expressions without reference to the mora, following naturally from the independently motivated, highly restricted syllable structure assumed within the theory. In his chapter four, he re-analyses other evidence which is frequently given in favour of the mora as a phonological entity (such as 'initial tonal lowering' and psycholinguistic evidence involving speech errors) in terms of his assumption of bisyllabicity in long segments. There are a few questions left concerning Y's current analysis, however, as illustrated above, and it also remains to be seen how well these results might be carried over to explain other mora-related phenomena in other languages. It must be conceded, though, that the successful eradication of the non-universal mora from

phonological theory would be an impressive result of GP's impulse to constrain phonological theorising.

3.2. Government and Licensing—how syntactic is phonology?

As implied above, GP is constrained by a series of universal principles, some of which are parameterised to account for cross-linguistic variation. Although the theory recognises empty elements, these may not be postulated just anywhere, but rather they must be 'licensed' in certain specific phonological environments.

The above discussion has also shown that, as part of an attempt to reduce the overgeneration inherent in much of standard Generative Phonology, GP strives to produce a restrictive theory of what can constitute a phonological entity or process. Specifically, the claim is made that *all* phonological positions in a given morphophonological domain (except its head) must be licensed, else they cannot exist. The chief mechanism through which this licensing occurs is *government*.

3.2.1. Government in phonology

Several types of government are recognised: 'constituent' government exists between the two skeletal position in branching constituents (as shown in (1b), (1 d) and (1e); 'interconstituent' (or, 'transsyllabic') government exists between constituents (eg, between a nucleus and its onset); 'internuclear' government (also called 'nuclear projection government') exists between neighbouring nuclei; 'interonset' government between neighbouring onsets. Government proceeds from head to complement, and it is through government that a head 'licenses' its complement. In Section 3.1 we saw that GP postulates conditions on phonological government which function to dictate that constituents can have maximally two branches: the 'Strict Directionality Condition' dictates that government can proceed in only one direction—rightwards in constituent government and leftwards in interconstituent government—and the 'Strict Adjacency Condition' dictates that the head must be next to its complement on the relevant level. In a language which allows branching constituents such as (1b), (1 d) and (1e), the head of a constituent licenses a single complement which must follow it in the linear string; it is through interconstituent government that a nucleus licenses a preceding onset and that a following onset licenses a preceding rhymal post-nucleic consonant, such as in (1e), as in the 'Coda Licensing Principle'. Only one item does not need to be licensed through government—the 'head' of a morphophonological domain; this is said to be 'directly' licensed.

We shall see in Section 3.3 that phonological processes in GP are principally described as occasions of autosegmental-type spreading and, in the theory, this spreading is claimed to be a 'manifestation of government'; thus spreading can only take place under government.

These two points serve to elevate the relationship of government to a status of key importance in the theory; government can be 'blamed' for practically all aspects of phonology. It is the chief mechanism through which skeletal positions

(and hence segments) are licensed to exist in any lexical item, it is responsible for fusing onsets and nuclei together in the absence of a syllable node, and it provides the 'connections' between segments through which segmental material can spread in assimilations.

3.2.2. Government in phonology vs government in syntax

The notion of government was borrowed from GB-style generative syntactic theory, and this point has been taken to be an important piece of support for the GP approach. If it can be shown that the principles which are active in syntax are also active in phonology, then this, it is claimed, would provide support for a coherent generative whole. Not only would it provide evidence in favour of the GB syntactic assumptions from an unexpected quarter, but also it might imply that the GP model of phonology is more likely than any other generative model to be the 'correct' one. In this spirit, not only government, but also the notions of 'proper government', the 'minimality condition', the 'projection principle' and the 'Empty Category Principle' have been put to use variously in GP work.

These notions are highly important in Y's analyses. It is the relation of government that dictates GP syllabic structure and Y's chapter four, by far the longest in the book, is devoted to this subject; GP's projection principle (which forbids resyllabification by maintaining that governing relations between segments may not be changed in a derivation) underlies all Y's analyses; especially chapters two and eight, which deal with segmental processes, crucially rely on the notion of government. As a means of assessing the validity of the cross-modular support claimed for GP, it might be instructive to compare the syntactic and phonological formulations and uses of these concepts.

Government in GB syntax is based around the concept of 'c-command'. This is a relation that exists between two elements of a constituent when both are contained under a phrasal node which immediately dominates one of them.[7] Chomsky (1986) formalises the relation thus:

(9) α c-commands β if α does not dominate β and every γ that dominates α dominates β.

The typical definition of GB-style syntactic government uses this notion of c-command in its formulation of government as follows (from Chomsky 1982):

(10) α governs β if a = X^0 (in the sense of X-bar theory), α c-commands β, and β is not protected by a maximal projection.

Thus, syntactic government is an entirely structurally defined idea: in effect, a 'lowest level' (X^0) category governs elements which are contained within the 'top-

[7] This discussion is informed by Cook and Newson (1996), as is the formulation of the ECP in (12). It should be noted in this regard that the relation of c-command was later replaced in the definition of government by 'm-command' which extends the field of influence of a governor slightly. This does not greatly affect what is said here, except, perhaps to make syntactic and phonological government seem even less alike.

level' ('maximal') projection of the governor, i.e., within one constituent—for example, a verb governs its complement in a VP, a preposition governs its NP complement in a PP. Government is a crucial part of GB theory and is essential, for example, for the assignment of case from a governor to a governee. If we compare this with the conception of government in GP, there is a definite similarity of description in the case of 'constituent government'. Thus, in a branching onset, as in (1b), the governor (head) can be conceived of as an X^0 category (as a skeletal position which 'projects up' to form an onset) and it does c-command its complement (governee); likewise the head of a branching nucleus (1 d) c-commands its complement—and it could be argued that a nucleus c-commands a post-nucleic rhymal position (1e).

However, if we consider the relation of 'inter-constituent government', which is thought to exist between a nucleus and a preceding onset and between an onset and a preceding post-nucleic rhymal consonant, it is clear that the syntactic definition no longer suffices, if only because, for example, the nucleus and an onset do not form a constituent. If GP does not recognise the syllable node, then there are no nodes which dominate both items and hence the relation of c-command cannot be contracted between a head and its complement. Equally, the other forms of government recognised in GP, eg, internuclear government and interonset government, do not involve c-command. Charette (1989) is perfectly clear about this and explicitly describes the motivations for using a different definition of government in phonology.

Y (p. 4) summarises this definition thus: in GP terms, α governs β, depending on the type of government involved (here just for the two most frequently important types) if the following conditions are met:

(11) The Strict Adjacency Condition
The governor must be adjacent to the governee at the P^0 projection, i.e. the projection containing every skeletal point.

The Strict Directionality Condition
Directionality of government at the skeletal level is universal and not subject to parametric variation:
(i) Constituent government is head-initial
(ii) Interconstituent government is head-final.

It is clear that this set of definitions bears little resemblance to the way in which the term 'government' is used in syntax. Moreover, the very fact that several different types of government (with different characteristics) are recognised in GP indicates further that the usages of the term are, in fact, radically different. One of the vital points about GB government is that it is *not* directional, but is defined in structural terms, so that it accounts equally, without further stipulation, for both head-initial languages (like English, with VO order and prepositions) and head-final languages (like Japanese, with OV order and postpositions).

Furthermore, Section 3.5 will show that spreading occurs equally under both types of government mentioned here, sometimes involving both types in the same analysis; also, spreading may be either from the head to its complement or vice versa, whereas in syntax, the traffic is all one-way: from governor to governee.

GP's notion of government thus seems to have little in common with the syntactic relation with which it shares a name. This might well lead us to think that the relationship is in fact purely terminological and that the two are really qualitatively different things. There is a further problem in this regard for GP which could well make it even less likely that clear parallels can be drawn between syntax and phonology. In the Minimalist Programme, the most recent work in generative syntax (see Chomsky, 1995), the notion of government, which is so vital in GP, has been abandoned and replaced by more basic concepts and relationships; grammatical case, for example, is now 'checked' in a more simple configurational relationship after syntactic movement. It thus seems even less likely that the connection between GP-style phonology and syntax is theoretically interesting.

3.2.3. Emptiness in phonology and syntax

A further GP concept which seems to have found its initial motivation in GB syntax is the notion of an 'Empty Category Principle' (ECP). This principle is important in GP as in GB, as it is the way in which an undue proliferation of empty elements is prevented. In GB syntax, empty elements are such things as the traces left by the movement of a constituent or phonetically empty pronouns; in GP, empty nuclei, for example, are used in the theory to licence word-final consonants or otherwise illicit surface consonant clusters. One notable difference between the functioning of the different ECPs in syntax and phonology is that in syntax, if an empty category is not licensed, a linguistic expression is ungrammatical; in GP, if an empty nucleus is not licensed, it surfaces as a schwa (or similar).

The GB ECP reads thus:

(12) An empty category must be properly governed
α properly governs β if and only if
1. α governs β and
2. α is lexical or an antecedent

Kaye (1992) formulates the 'Phonological ECP' thus, describing the phonological ('p') licensing of segments which are phonologically active, but phonetically null:

(13) A p-licensed (empty) category receives no phonetic interpretation.

P-licensing: 1. Domain-final (empty) categories are p-licensed (parameter: **true** German Polish Arabic, **false** Italian Japanese Vata)

2. Properly governed (empty) nuclei are p-licensed.

Proper government:
α properly governs β if
1. α and β are adjacent on the relevant projection,
2. α is **not itself** licensed, and
3. No governing domain separates α from β.

There is clearly something in common between the two, despite the differences in the means of formulation, but it is (at the very least) questionable whether this similarity really indicates any actual psychological unity. It is quite possible that here, too, the similarity between the two concepts should rather be ascribed to a kind of metaphor, such that the two concepts do not have anything substantive in common. We can call a cat 'Fido', but it does not become a dog.

We have already encountered the first clause of the phonological ECP—the Domain-Final Empty Nucleus parameter. This seems more a stipulation than anything else and is furthermore quite unlike anything found in syntax. Y does not need to use this parameter in his analysis of Japanese, although he does discuss its theoretical implications, as we saw in Section 3.1. In chapter five, he also states that proper government is inoperative in Japanese, so that the only empty nuclei which may occur in the language are those 'in the middle' of geminates, as shown in *zikka* in (5) above. Y describes this as an 'inter-onset governing domain' where one onset governs another (this relation is needed so that a segment can spread to a preceding onset and thus become a geminate)—the stipulation is simply that empty nuclei may occur between two such onsets. This third type of licensing is, in effect, a third clause to the phonological ECP (given in (13) above). This aspect of GP is even further weakened in Kaye (1992), the main point of which is to provide justification for the type of structure shown in (8), which includes a word-initial empty nucleus. Despite certain evidence in favour of the analysis, Kaye recognises that there is a theory-internal problem regarding the licensing of the empty nucleus and leaves it as a stipulation that sC clusters have this licensing power in some languages.[8]

Although they may be necessary to account for various data in the theory, such stipulations represent a real weakening of the theory. As we saw above, one of the great claims of GP, repeated by Y in his preface, is that it is a highly constrained theory; if empty elements can be postulated at will, to explain away anything that is problematical for the theory, then GP loses an argument in its favour. It is reasonable to put aside certain puzzles which seem to be at odds with the tenets of any theory for a while, in order to formulate the theory coherently, but these points cannot be ignored entirely.

[8] Recognising the stipulative nature of this, he terms this by-now fourth clause of the phonological ECP 'magic licensing' in the hope that this will spur attempts to find theory-internal motivation for it. To my knowledge, no such justification has yet been offered.

3.2.4. Summary on syntax

The main claim examined in this section, that phonology exhibits some of the same principles as syntax—a claim which could be taken as evidence in favour of the relevant theories of both, does not seem highly convincing, as we have seen. In itself this is not necessarily a problem for GP, of course—many would say that there is no reason why phonology should have anything to do with syntax; Bromberger and Halle (1989) claim explicitly that phonology is 'different', and Burton-Roberts and Carr (1997 and in press) consider a model of language where phonology is of an entirely different ontological status to much of what is linguistic in the strictest sense. If the relations of government described above, and the other assumptions which make up GP (to which we turn below), function coherently together to provide a wide range of satisfactory phonological analyses, then that is justification enough for the postulation of the concepts. It might well be thought to be stretching a metaphor, however, to claim that the theoretical assumptions made in GP are any more likely to be 'true' because of certain putative parallels in GB syntax.

3.3. Segments and their spreading—element theory

While the GP conception of syllabic organisation is quite unique, the theory of subsegmental structure has much in common with those adopted in certain other phonological frameworks, although there are aspects of the GP model which set it apart from other approaches. Akin to the Dependency Phonology (Anderson and Jones, 1974; Anderson and Ewen, 1987) and Particle Phonology (Schane, 1984) models, the atoms of phonological structure are seen as holistic units which differ substantially from standard feature theory in that they can be interpreted, or 'realised' separately, without needing to be combined with other features. This contrasts with the 'standard' position, found in Chomsky and Halle's (1968) system of distinctive featural primitives (which, of course, was based on earlier work, such as Trubetzkoy, 1939), where the segment [ɪ], for example, crucially has the specification [+high], but in order for this feature to be phonetically interpretable, it requires a host of other specifications, some predictable (or 'redundant'), some not. In the approach adopted in GP, [ɪ] comprises only one 'feature', which is written as 'I^{o}'—the meaning of the diacritic refers to the element's 'charm value', which dictates the possibilities of phonotactic combinability and which we return to in Section 3.4.

3.3.1. The elements and how they are understood

These basic segmental atoms are termed 'elements' and it is proposed that segments are made up of either one single element, as in the case of [ɪ], or are created through the 'fusion' of two or more elements to give 'compound segments'; in this way [e] is made up of I^{o} and another element, A^{+} which can also function independently (when it would be pronounced [ɑ]). When two elements combine, one functions as the 'head' of the compound, defining the

greater part of the segment, and the other, an 'operator', only contributes its most important attribute.

KLV (1985) describe these elements as fully specified matrices of features, which cannot be separated from each other and hence function as units, as in (14), where underlining indicates the 'hot feature' or 'salient property' which an element contributes to a segment when it functions as an operator:

(14)

$$I^{o} = \begin{bmatrix} -\text{round} \\ \underline{-\text{back}} \\ +\text{high} \\ -\text{ATR} \\ -\text{low} \end{bmatrix} \qquad A^{+} = \begin{bmatrix} -\text{round} \\ -\text{high} \\ \underline{-\text{high}} \\ -\text{ATR} \\ +\text{low} \end{bmatrix}$$

This approach is exclusively privative, in that an element is either present in the representation of a segment or absent, where it has no effect; the notion of, for example, '[–I°]' is not expressible in the theory. A further consequence of the use of this type of primitive is that there is no notion of underspecification in lexical representations; as we saw in Section 2, this is an important idea in the theory. Amongst other things, it means that no 'default rules' are required to fill in lexically unspecified values, and as GP is dedicated to the elimination of the need for ordered rules in phonology, this is a desirable result. Both of these points are seen as demonstrated by the fact that the elements are in principle 'independently pronounceable'.

As Y notes in his preface, despite the clear articulatory bent of the definition in (14), the elements of GP are now generally related in the GP literature to specific *acoustic* properties which can be abstracted from the signal, such that I^{o} represents a 'dip' on a spectrogram reading and A^{+} corresponds to 'mass'.[9] These acoustic definitions have demonstrated an applicability to automated speech recognition systems which, as Y notes, does give them a certain empirical respectability. Indeed, it is this aspect of GP—the element sub-theory—that has seen the greatest theoretical innovations and advances since the framework was first formulated.

However, Y has not updated his analyses to include such new developments. In chapter one, he gives a simple definition of the elements he uses in two ways: firstly in terms of the articulatory 'hot features'—the full specifications from this early articulatory approach to elements, translated into standard distinctive features as in (14), have never been given for most of the elements, to my knowledge; secondly in terms of the segments which consist of each individual

[9] Harris (1994, p. 140) gives fuller definitions thus: I^{o} is translated as "low first formant coupled with a spectral peak (representing the convergence of Formants 2 and 3) at the top of the sonorant frequency zone" and A^{+} is translated in a process of phonetic realisation to "a spectral peak (representing the convergence of Formants 1 and 2) located in the middle of the sonorant frequency zone".

element alone ('independent manifestation'), Y's table is reproduced here (slightly amended) as (15):

(15)

Element	Hot feature	Independent manifestation
A^{+}	non-high	ɑ
I^{o}	non-back	ɪ/y[10]
U^{o}	round/labial	ʊ/w
ɪ^{+}	ATR	*n/a*
v^{o}	*none*	ɯ/ɯ̟
R^{o}	coronality	ɾ
$ʔ^{o}$	occlusion	ʔ
h^{o}	noise	h
N^{+}	nasality	*n/a*
H^{-}	stiff vocal cords	high tone
L^{-}	slack vocal cords	low tone

As might be deduced from the third column, the same elements are used in the representations of both vowels and consonants; to take one example, the element U^{o} is realised as [ʊ] when it occurs as the sole segment in a nucleus and as [w] elsewhere; also, importantly, U^{o} functions as the 'place' element in labial segments, such as [p] and [ɸ]. Other elements which indicate consonantal place are: I^{o} (palatality), v^{o} (velarity), and, of course, R^{o}. The element v^{o} is accorded a special place in the theory, the full implications of which we lack the space to discuss here, however, it can be seen in (15) that this segment has no 'hot property', which means that it only clearly contributes to a vowel when it is the head of a segment.

Certain elements only occur in consonants, to describe their 'manner of articulation'—h^{o} occurs in obstruents (if no other 'manner' element is present, then the segment is a fricative) and stops also include $ʔ^{o}$ to indicate oral closure; N^{+} indicates nasality in both consonants and vowels.

The elements H^{-} and L^{-} have a dual role: in vowels they represent high tone and low tone respectively, whereas when they occur in the elemental inventory of consonants they indicate the various laryngeal states in languages with more than one series of obstruents; in most languages this is described as a difference between voiced segments (with L^{-}) and voiceless segments (with H^{-}). This seems to be the distinction which Y draws between c2onsonants in Japanese, a point to which we shall return below.

This makes a total of just eleven elements, and, as we shall see in Section 3.4, their combinability is somewhat restricted. This means that the theory is relatively constrained in terms of the segments it can generate. As Kaye (1990b) points out, the overgeneration is far less than in a system of distinctive features with twenty binary features, for example, which could express a total of 1,048,576 different segments. One of the characteristic features of GP is the aim to eliminate overgeneration in phonology and, although the set of elements given in (15) is not perfect and makes some strange predictions regarding the types of segmental inventory which might be expected, as Coleman (1990a,b and 1995) points out, they represent a close approximation to the empirical needs; and segmental overgeneration is limited, even if not entirely eliminated.

One clear problem for Y's variant of element theory is conspicuous in (15), although this does not seem to trouble Y himself: the notion of elemental 'independent manifestation' is deemed to be 'not applicable' to the elements $\mathbf{I}^{+}$ and N^{+}. This might strike the reader as somewhat bizarre, given the fact that Y claims in the paragraph preceding his list of elements that "the atoms, or primary units, of phonology are univalent and independently pronounceable elements" (p. 23). This is no insignificant point in the theory; one of the attractions of GP is its proclaimed ability to capture a wide range of phonological generalisations with a highly constrained and simple set of assumptions; any weakening in these assumptions is a weakening of the attractiveness of the whole theory. There are theoretical reasons to allow for one 'unusual' element—v^{o}—to account for vowel-zero alternations and as a 'place-filler' in segmental representations, but, unless some other principled reason can be given, we might expect the other elements to behave identically.[10]

Recent work in GP has addressed these issues; Harris (1994) and Harris and Lindsey (1995) do away with the element $\mathbf{I}^{+}$ altogether[11] and Brockhaus (1995a), in part following Harris, also claims that N^{+} does have an independent

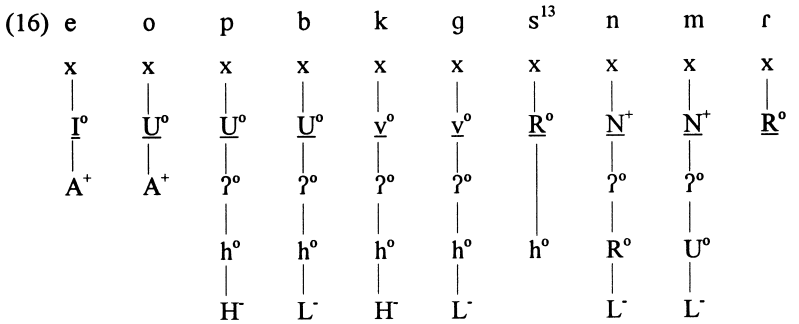
[10] Throughout most of the book, Y uses the symbol [y] to represent the palatal glide, however, confusingly, he starts to use the IPA symbol [j] in chapter seven, when describing a dialect of Japanese which has front rounded vowels; this makes the decision to use [y] in the earlier parts of the book seem a little peculiar.

[11] This is part of a substantial revision of element theory. In this formulation, the segments [i] and [u] are thought to be simple, made up of the equivalent to I^{o} and U^{o}, respectively (although charm is also dispensed with, as we shall see in Section 3.4) and [ɪ] and [ʊ] are derived by the addition of the equivalent of v^{o} (which is called '@'). This renders element theory more akin to Dependency Phonology, which in any case played an important role in the development of GP. It also reduces the impact of Coleman's (1990a, 1990b) criticisms that KLV's (1985) element theory makes somewhat bizarre predictions in terms of markedness, claiming that [ɪ] and [ʊ] are less marked and more simple than [i] and [u]. Also relevant in this regard, Kaye (1997) writes that "[c]urrent work in GP...posits six elements: A, I, U, H, L, ? and an identity element"—apart from this one comment, however, I have not seen any discussion of this intriguing flavour of element theory and thus cannot make any assessment of it.

realisation, namely [ŋ].[12] Although Y does not follow this revision of element theory, he does seem to perceive a certain infelicity inherent in the ATR element. In chapter two, he states that, as there is no ATR contrast in Japanese vowels, he does not intend to show the $\mathbf{I}^{+}$ element in any segmental representations, thus, in effect, making the representations seem more simple than his theory predicts them to be. As ATR is also not an active property in Japanese phonology, it seems a little strange that Y does not confront the problem, but this is a minor criticism, as his analyses stand (if in a slightly less attractive form) whether or not $\mathbf{I}^{+}$ is recognised within the wider theory.

3.3.2. Elements in the segments of Japanese

Y's 'classic' form of GP element theory gives the segments of Japanese representations such as those in (16):



The order of elements in each representation should not be taken as significant as, except for the head of a segment (which is underlined in (16)), the elements are not subject to any real organisation in GP (although Harris, 1994 and Brockhaus, 1995a again diverge from 'classical' GP on this point).

One of GP's major claims, given such representations as these, is that the phonological processes which a theory describes should not be arbitrary. Y's key criticism of traditional generative phonology—a model whose analyses he has tried to improve upon in his book—is that it is based on rewrite rules and extrinsic ordering, which is "unsatisfactory as it is arbitrary and unconstrained" (p. xi). This is closely tied in with the notion that one of the key mechanisms by

[12] This response to the problem might also seem a little unexpected in terms of markedness, given the general acceptance that the unmarked place of articulation is coronal (see, for example, Paradis and Prunet 1991). GP could not have [n] as the independent realisation of N^{+}, as coronal place of articulation is represented by the element R^{o}; velarity is represented by v^{o} (or @), which is already an 'unusual' element, partly functioning as a 'place holder'.

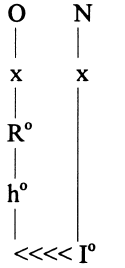
[13] Y's representation for [s] (on p. 30) includes the occlusion element $\mathbf{ʔ}^{o}$ but this must be a (somewhat confusing) misprint. It is also important for some of Y's analyses that [s] lacks the element H^{-} in Japanese; this is problematical, however, as we shall see in Section 3.3.4.

which phonological processes are described in GP is through autosegmental-style spreading of elements from one segment to another, "as a manifestation of government". Perhaps Harris (1990) is clearest in this regard, claiming that "only two types of phonological operation are formally expressible: COMPOSITION, in which elements spread from one segment and fuse with elements contained in a neighbouring segment; and DECOMPOSITION, in which elements are lost from the internal representation of a segment" (Harris, 1990, p. 255). As we shall see in Section 3.5, and as is often tacitly admitted in the GP literature, the theory is not quite as constrained as this, but it is true that these processes are the GP ideal and do account for most of the analyses proposed in the framework.

The notion of spreading is widespread in phonology and is common to most modern theories; it was first proposed in generative phonology by Goldsmith (1976). The chief advantage of this approach over 'linear' rewrite rules is that, in principle, the phonologist is constrained in the type of explanation which may be given for any process, thus, as is clear from the quotation from Harris (1990), if something spreads to a segment in an assimilation, it must have spread from another segment in its near vicinity (in GP terms, the two must be connected through government). The quest for non-arbitrariness is not limited to GP, of course, the idea is also implicit in other phonological models, including various models of feature geometry (see, for example, Clements, 1985) some of which also adopt privative features (see Steriade, 1995).

GP has made the pursuit of non-arbitrariness an explicit goal, and many of Y's analyses comply with this. For example, the Japanese palatalisation of [s] to [ʃ] before [i] is simply accounted for:

(17) [ʃi] 'flour'



The palatalisation is provided by the element I^{o} here, as Y explains in chapter two; this is a classic and transparent example of how a spreading analysis, such as this GP formalisation by Y, is superior to a simple re-write rule. A simple phonemic rule could easily be written for this process (for example, [s] → [ʃ]_i) but this does not include any reference to the obvious connection that exists between the process and the environment in which it occurs. The GP ideal would be to characterise all such clearly segmental processes either in this way or in terms of the simple loss of elements, which should also be motivated by the type of

environment in which the process occurs (as we shall see directly in connection with the GP conception of lenition).

3.3.3. Problems of ambience

Some of the analyses which Y proposes run counter to this principle of non-arbitrariness, however, and the problems which he faces in this regard are far from unique in the GP literature. The dilemma lies in the fact that it is not always possible to find a source for the elements which seem to have been acquired by segments in what looks like something that 'should' be explicable as a spreading process. In chapter five, for example, Y deals with the various types of morphophonological alternations that occur in the formation of the past tense in Japanese. Many of these are straightforward: for example, the alternation exhibited in *tor* 'take' is basically an unproblematical case of spreading of the elements in the initial [t] in the past tense suffix *ta*: "tor + ta → [totta]" (p. 115). However, Y cannot provide a non-arbitrary explanation for the nasality which appears in the past tense form of *tob* 'fly': "tob + ta → [tonda]" (p. 116).

Y resolves this dilemma in a way familiar from other GP texts. KLV (1990), for example, recognise that certain phonological facts can only be captured if 'ambient' elements are assumed. These are elements with a somewhat uncertain theoretical status, which are assumed to be generally 'floating' in 'the phonology' of a language, not attached to any word, let alone a segment; they may be attached to segments if need be. It should be clear that if such 'ambient' elements and processes are allowed, then this is a major retreat into arbitrariness, which diminishes GP's claims to be a novel theory of phonology. If such elements are only needed very infrequently, then it might be hoped that they will submit to future explanation, but if the principles of GP are taken seriously then they should be treated with great caution. To be fair, we should note that such analyses are clearly recognised as problematical in the theory and are only chosen as the last resort. It is, of course, fair to put aside certain facts which are problematical for a theory for a while; if not, then the theorist risks being overpowered by data. As we have already noted, however, such side-lined counter-evidence may not be forgotten for ever, and it should not become standard practice to dismiss problems in this way. If work in GP needs to resort to ambient elements frequently, then the theory loses its claim to non-arbitrariness and becomes just like any 'standard' phonological theory, where it is often possible to see a connection between a process and its environment, but some rules simply introduce features or segments from nowhere. GP would then be no worse than other theories in this regard, but no better, either.

Y uses ambient elements three times, in three separate analyses. In chapter four, lexical [ɾ] acquires the element ʔ^{o} "in order to satisfy the governing requirement" (p. 103) such that, for example, [ɾ] → [d̥] in words such as *neNree* [nend̥ee] 'age'; in chapter five, in words such as [da ʃi̥ta] 'took out' (from *das* + *ta* 'take out + past tense suffix') an empty nucleus is inserted, which must then attract an

ambient I^o to be realised as [i][14] (as Y proposes that v^o—which comes for free with an empty nucleus in the theory because of its special status—is not pronounceable by itself in Japanese), and as we saw above, Y explains the morphophonological alternation between [b] and [n] in terms of acquisition of ambient N^+.

Whether GP can get by without ambient elements or not remains to be seen, but we might note in this regard that some of the best evidence for element theory also seems beset with such problems. It is frequently claimed, for example by Harris (1994), that processes of historical change can be productively approached though an element-type approach. For example, Harris shows that the diphthongisation of [eː] to [eɪ] which occurred in the history of (most dialects of) English in such words as *mate* can easily be explained, as [ɪ] (I^o) is already 'in' the make-up of the segment [eː], all that need occur, in fact, is that A^+ becomes detached from the second timing slot in the nucleus; equally the monophthongisation of [au] to [ɔː] in such words as *caught* can be explained as the fusion of the elements A^+ and U^o, which were originally attached to separate slots in the nucleus. This type of explanation for diachronic change in phonology seems like compelling evidence for an element-type approach, but even this attractive kind of analysis runs into problems when confronted with further data. One of the developments of the Great Vowel Shift in the history of English was that high vowels diphthongised; thus in *mine*, [iː] first became [əɪ], which later became [aɪ] in most dialects. A very similar yet separate change has occurred in the history of German and Dutch. At some stage in the historical analysis the well known changes cannot be explained without recourse to a (historically) ambient element A^+. The argumentation and evidence presented in favour of an approach to segmental structure based on elements is attractive, but far from water-tight.

3.3.4. Lenition and the loss of elements

Let us now turn to the other main type of process recognised within segmental phonology in GP—the loss of elements from the internal make-up of a segment. This approach to phonology, coupled with the principle that each element is pronounceable both individually and in combination with most other elements,[15] has allowed those who work within the GP framework to devise a description of lenition phenomena which is worthy of serious consideration and nearly succeeds in unifying the various disparate types of segmental lenition as one basic type of process. Harris (1990) and (1994) and Brockhaus (1995a) are fine examples of this, and Y turns to such phenomena from various dialects of Japanese in his chapter eight.

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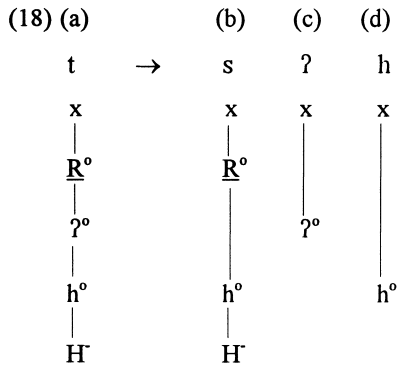
[14] This form also illustrates a process of vowel devoicing, which we cannot discuss here due to the constraints of space.

[15] This is the ideal, although we have seen above that there are problems with this principle, given the set of elements assumed by Y. We return to discuss what combinatorial possibilities GP allows for elements in Section 3.4.

'Lenition' is a term applied to a range of phonological processes, both synchronic and diachronic, which are (often intuitively) viewed as involving some kind of 'weakening' in the segments involved. Generally, a segment is said to have lenited if there has been an increase in aperture or sonority or if it has moved down a scale of phonological strength (see, for example Escure, 1977; Bauer, 1988 and also Hooper, 1976). For example, a voiceless stop segment such as [t] might spirantise to become [s] or become voiced as [d], and fricatives, such as [s], frequently debuccalise to [h].

Y discusses lenition in his chapter one, and analyses three types of lenitions in chapter eight, two from non-standard dialects and one from standard Japanese: firstly, in the Oshima dialect of Japanese "the voiceless velar stop *k* is converted to the glottal fricative *h* intervocalically" (p. 176)—this seems to be a standard debuccalisation of [k] to [h] in forms like Oshima [ahi] 'autumn' versus standard [aki]; secondly, he describes how "[i]t is well known that *t* and *k* become voiced intervocalically in some dialects of Japanese" (p. 176) which explains such dialectal differences as the Kesennuma forms [agi] 'autumn' and [neda] 'slept' versus the standard [aki] and [neta]; and thirdly, he deals with "the *dz–z* alternation found in many dialects throughout Japan including standard Japanese" (p. 177) such that [dz] which occurs word-initially and after the moraic nasal alternates with [z] intervocalically, accounting for forms like *zoo* [dzoo] 'elephant' against *aza* [aza] 'bruise'.

These can all be seen as examples of lenitions and, as Y explains in chapter eight, GP seeks to capture what all these processes have in common by characterising them all as the simple loss of elements. Thus, spirantisation can be seen as the loss of ʔ° and debuccalisation is neatly expressed as the loss of place element. The glottaling of oral stops to [ʔ], familiar from many accents of (especially British) English can also be characterised as lenition through the loss of all elements except ʔ° which are present in the structure of a stop. The segment [t], shown in (18a) might thus become, perhaps diachronically, [s] (18b), [ʔ] (18c) or [h] (18 d):



GP also seeks to formulate a relationship between the sites of lenition and the type of process which occurs: Harris and Kaye (1990) and Harris (1990) claim that the common lenition sites can be unified as one type of environment; this is where a consonant occurs between two nuclei which form an (internuclear) governing domain. The claim is that a consonant in this position comes under pressure to simplify (i.e., to lose elements), as it is a barrier of a type to the internuclear government. Y cites this approach as motivation for the three types of lenition phenomena which he describes, although we might note that Harris (1994) has since reformulated this notion into a theory of 'licensing inheritance'. The metaphor whereby lenition occurs in segments which are 'barriers to government' is in any case a peculiar one: internuclear government exists perfectly well across intervening consonants and only sometimes are segments 'forced' to simplify (where lenition is seen to occur); in addition, consonants do not project up to the level of internuclear government, by definition, so it is difficult to see how they could be barriers to the type of government.

Harris's (1994) conception of licensing inheritance is more compelling, however, and it is possible that Y's proposals might be re-analysable along these lines. The theory of 'licensing inheritance' relies on the idea, important in GP and discussed in Section 3.2 above, that everything must be licensed (bar the head of a domain). Harris extends the notion from the licensing of skeletal positions to claim that the elements which occur in a segment must also be licensed. Lenition is predicted to occur in those segments which inhabit skeletal positions which inherit their ability to licence at second or third hand. As we saw in Section 3.2, only one position is directly licensed in each morphophonological domain; this is generally equated with the nucleus which bears primary stress (in stress languages such as English). A foot-internal consonant such as the [t] in English *matter* must be in the onset of the second 'syllable', given the GP assumptions concerning syllable structure, and is thus licensed by the (unstressed) final nucleus which has 'inherited' its licensing power from the (stressed) directly-licensed nucleus. The [t] is thus predicted to lenite, which indeed it does in many accents of English, as Harris and Kaye (1990) and Harris (1990) discuss.

If we assume that it is the first nucleus in [ahi] which receives the direct licensing,[16] then the analysis of the lenition of [k] to [h] in Oshima Japanese is unproblematic, although Y presents no evidence to show that the dialect data which he uses does in fact reflect synchronic processes rather than diachronic reflexes of once active lenitions.

Intervocalic voicing processes, such as seem to occur (or have occurred) in the Kesennuma dialect are, however, not so easy to express in this GP lenition

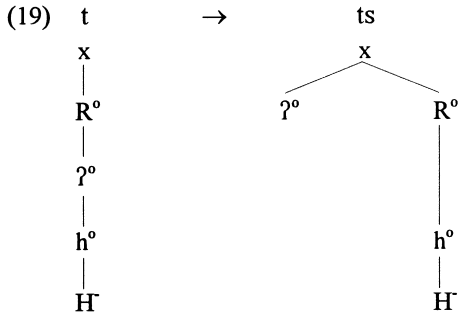
[16] This is, in fact, not an unproblematic assumption, as Y assumes that internuclear government proceeds from right to left in Japanese, unlike in English. If this is true, then the intervocalic consonant would be licensed by a directly licensed nucleus and so the pressure to lenite would be less in terms of the theory of licensing inheritance. Whilst this asymmetry is a problem for Harris's (1994) revised theory of the motivation for lenition, we shall not press this point further here.

framework. Given the typical types of representations in (16), it might seem that voicing should involve the loss of H^- and the gain of L^-, which (as it is not present in the make-up of vowels in a non-tone language)[17] would have to be viewed as an ambient element; worse than the arbitrariness that this entails is the fact that the whole process does not fit in with the idea of 'lenition as element loss'. Y seeks to get around this problem by claiming that the lenition of [t] to [d] and [k] to [g] can be accounted for in terms of the loss of H^- from the make-up of the [k] and [g]. Technically, this makes the stop in Kesennuma [neda] a neutral stop, with no glottal specification, like the lexically neutral stops of Korean which contrast with aspirated and glottalised series; Y argues that neutral consonants are usually transcribed as voiced and so can reasonably be postulated in words such as [neda], although it is odd in this regard that Y transcribes the stops using the symbol [d] which he has elsewhere used for a fully voiced segment rather than [d̬] or some segment which differs from 'lexical' [d]. It is also perhaps peculiar that [s] in words such as [mosu] 'burn (nonpast)' is not interpreted as a 'voiced' consonant, given that Y claims that it lacks any laryngeal element (p. 30 and 38). It would also be interesting in this regard to discover whether the Kesennuma speaker perceives any difference between a lexical [d] in a word like [eda] 'branch' and a lenited [t] such as Y postulates in [neda], but Y supplies no information in this regard. If no difference is noted then it would be likely that either the stop in Kesennuma [neda] must contain L^-, *contra* Y, or Kesennuma [d] must also lenite, losing L^- itself.

Y's lenition approach to the alternation between the affricate [dz] and [z] is straightforward, but his general approach to the affricates of Japanese is not compelling. In addition to lexical [dz], Y also derives affricates from underlying [d] and [t] before [i] and [ɯ]. He claims that this is due to the fact that an onset's ability to license particular elements is dictated by the following nucleus, and stipulates that in Japanese "an alveolar stop cannot be licensed by a following I^o or U^o" (p. 182). This is an unmotivated claim which seems counter to the spirit of GP, as does its result: as specifically alveolar stops, Y compels [t] and [d] to "make the minimum amount of modification by means of decomposition in order to make them 'licensable'" (p. 182). However, [t] and [d] do not 'decompose' on the standard GP definition of lenition—in GP, affricates are represented as complex segments, attached to one timing slot. The process of affrication is referred to by Harris (1990) as 'breaking', and the representation for [t] → [ts] (before [ɯ]) would be as in (19):

[17] Y does not discuss the 'pitch' or 'tone' accent of Japanese in any great depth. The brief discussion (pp. 109–114) centres around the interaction of tones with what had previously been described as morae. Whilst Japanese is not a 'classical' tone language (unlike, for example, Chinese, where tone is lexically contrastive), it does have tonal (*or* 'pitch pattern') accent, quite unlike the stress accent of English (see, for example, Duanmu, 1996); Y describes this using an unexplained 'H' which spreads from nucleus to nucleus and makes no attempt to discuss the connection between this and how H^- and L^- represent tone in segmental representations in lexical tone languages.

(19)



As can be seen from (19), this is unlike any other kind of lenition in GP, in that it does not involve the loss of elements; although Harris (1994) tries to overcome this problem by claiming that affrication has in common with other types of lenition a reduction in the degree of fusion contained in the segment, this is clearly a retreat from the strong and appealing position that lenition equals element loss, and it is unclear why other elements are never 'de-fused' in this way. The standard Japanese change from [dz] to intervocalic [z] can be described as a lenition in terms of the loss of ʔ^{o} from the first part of the affricate, but Y's derivation of the affricates from [t] and [d] demonstrates a general problem which GP faces in trying to accommodate affrication as a lenition process.

The 'breaking' shown in (19) is rather reminiscent of the diphthongisation processes discussed above, but these have never been described as lenition phenomena to my knowledge. Nonetheless, such affrication does seem to be a type of lenition process; the Old High German 'consonant shift' which saw [p, t and k] affricate and then spirantise in some environments is but one famous case in point. Whilst the GP description of lenition is tantalisingly appealing, it does not (yet?) seem capable of unifying all lenition processes.

3.3.5. [ɯ], [h] and [p]

A clear illustration of the way in which Y's analyses have been influenced by GP's guiding principle of non-arbitrariness is shown in his treatment of the Japanese high back vowel, which is typologically unusual in that it is generally unrounded (often being realised as [ɯ], but in certain circumstances also as [u]), and of the morphophonological alternations between [h] and [p]. These are both accounted for in terms of 'unattached elements' which are present in the lexical representations of the segments, but are not attached to a skeletal point. Y claims that they only become 'attached' (and hence audible) when the segment that they are part of is required to govern another segment. This seems a somewhat peculiar claim, given the conception of government discussed here in Section 3.2. Y claims that the element U^{o} can remain unattached in a word like [kɯ] 'nine' because, presumably, the vowel does not govern the preceding consonant, but yet must be attached in [ɸu] 'wheat-gluten bread' because the vowel must govern the consonant, as it also gives the fricative (which is 'underlyingly' [h]) its place of

articulation. Something seems rather peculiar in the way that Y formulates this, however—given his standard description of government in chapter one, interconstituent government should exist between any nucleus and its onset; it is this government which binds the constituents together. This means that the vowel must govern the preceding consonant in both [kɯ] 'nine' and [ɸu] 'wheat-gluten bread' regardless of whether any spreading 'manifests' this government or not. This means that it is unclear exactly how the lexically present but 'unattached' element is associated in forms where lip rounding is evident.

The alternation between [h] and [p] (where "[h] is underlyingly [p]" shown, for example, in such morphological concatenations as: *taN* 'short' + *ha* 'wave' → [tampa] 'short wave'—from Y's p. 30) is characterised by Y in the same way as the behaviour of [ɯ]. He claims that 'the three elements H^{-}, $ʔ^{o}$, U^{o} are dissociated from the skeletal point' (p. 30) when the segment is realised as [h], but the elements are associated when the segment is called on to govern another. This further complicates the picture for Y's explanation of the [ɯ] ~ [u] alternation: why should [h] have to acquire U^{o} from a following [ɯ], when the element already exists in its own internal make-up (even if dissociated)? Y's proposals on these points would benefit from being clearer.

3.3.6. Rendaku and laryngeal considerations

A further point might be made as regards the segmental and elemental phonology of Japanese. It is noticeable that Y has no discussion of *rendaku*. It would, of course, be unfair to expect Y to discuss all aspects of Japanese phonology, but *rendaku* is a fairly well known and often discussed aspect of the phonology of Japanese (see, for example, Iverson and Salmons, 1995; Tsujimura, 1996 and Itô and Mester 1986—the following data is taken from Itô and Mester). *Rendaku* is a voicing process, whereby the initial consonant in the second element of a compound is voiced (under certain morphological conditions, unless it is a loan-word, not fully integrated into native Japanese phonology); thus [origami] 'paper folding', composed of [ori] and [kami] exhibits the process, as does [yozakura] 'blossoms at night', from [yo] 'night' and [sakura] 'cherry'. However there is a constraint on the process such that it does not occur if the second element of the compound contains a voiced consonant (on GP terms, this would be segments containing L^{-}), the one exception being the nasals, hence it does not occur in [kamikaze] 'divine wind' ([kami] + [kaze]) or [monoʃizuka] 'tranquil' ([mono] + [ʃizuka]) but does occur in [origami] and [garasudana] ([garasu] + [tana]). This means in GP terms that the only segments with L^{-} in their segmental make-up which fail to inhibit *rendaku* are the nasals. This consideration might cause us to question whether [m] and [n] really need L^{-} to indicate 'voicing' as Y claims (see (16)); if we answer no, then the generalisation involved in prohibiting *rendaku* is simple; if not, then it seems arbitrary. Harris (1994) argues for a distinction between 'active' voicing, which is predominantly involved in phonological processes, and 'spontaneous' voicing in sonorants, which could potentially be used to banish the laryngeal segments L^{-} and H^{-} from the

representations of sonorants. L^- is not used in GP to represent 'voicing' in vowels (which is thought to be spontaneous) and Japanese does not contrast 'voiced' versus 'voiceless' nasals, if indeed any language does—so why should nasals need to include L^-, given a GP perspective?

The whole question of laryngeal specification in segments is one which has received quite some consideration recently (see, for example, Iverson and Salmons, 1995 and Jessen, 1997). The general thrust of much of the argumentation in this connection is that the distinction which has been made between the series of obstruents in most languages, which has generally been viewed as a simple distinction of voicing, is really reflective of a rather more complex situation. There is, in fact, a tradition in 'Germanic' literature of using the distinction 'fortis' versus 'lenis' rather than 'voiced' versus 'voiceless'. Many dialects of English and German, it is claimed, typically involve aspiration in 'voiceless' stops and have 'voicelessness' and an active phonological property; these differ from most varieties of languages such as French and Russian, where there is no such great aspiration in stops, and voicing tends to be the active laryngeal property. This is an important point, especially for a theory such as GP which seeks to do away with arbitrariness in segmental representations and to characterise the full set of occurring segments using a highly restricted inventory of elements—the different occurring types of laryngeal contrasts must be captured somehow. Harris (1994) takes up this idea from an essentially GP perspective and proposes a typology of this aspect of phonology by proposing that languages like English only use H^- (in 'voiceless' segments) and have neutral 'voiced' stops, whereas languages like French only use L^- (in 'voiced' stops) and have neutral 'voiceless' stops.

The element H^- is not called upon to spread individually in any of Y's analyses and Tsujimura (1996) reports that there is no aspiration in Japanese stops. We might well conclude from this that Japanese only uses the element L^- and hence Y's 'voiceless' Japanese stops are in fact neutral, and should be represented without any laryngeal element. This would be problematical for Y's analysis of Kesennuma voicing lenition, but we have already seen that this is problematical anyway, and we cannot be certain that it represents a synchronic fact in any case: we should take great care in claiming that modern dialects of any language are derived synchronically from the standard form of that language.

3.3.7. Summary on segments

I hope to have shown in this section that GP's 'element' theory of segmental structure is thought-provoking and certainly worthy of serious consideration. We have seen that there are certain problems with the version which Y uses, some of which have been resolved by others working in the GP framework, some of which seem perhaps more serious. Y's analyses are typical of much work in GP in that he has succeeded in describing much of the phonology of Japanese as either elemental spreading or element loss, although it should be noted that many of these analyses could be expressed equally well in other theories, such as

Dependency Phonology. Some of the problems which he faces, such as the need for ambient elements and the failure to unify all types of lenition (as might have been hoped) are common in GP and might indicate that the theory cannot fully maintain its grand claims (to non-arbitrariness, for example). It is also possible that Y's analyses might benefit from some of the revisions to element theory that have occurred recently, particularly as far as the laryngeal specifications are concerned.

3.4. The possibilities of combination—the theory of charm

The 'plus', 'minus' and 'zero' diacritics shown with each element in Section 3.3 refer to an element's 'charm' value. Y makes quite some use of the concept of charm in his analysis, and this is typical for 'classical' GP—as embodied in KLV (1990). Each element has one of the three values for charm, as can be seen from the list of elements in (15), and it is claimed that a segment inherits a charm value from the value of the elements in its structure.

On one level, the values of charm correspond very roughly to the traditional idea of sonority—a 'plus' value indicates high sonority, so, for example, the vowel [ɑ], generally thought to be the most sonorous, consists only of the element A^{+}, and other vowel elements are typically either plus or neutral. Obstruents, generally thought to be the least sonorous segments, typically contain H^{-} or L^{-} which give the whole segment a 'minus' charm. But charm is not merely intended to express sonority—in the version of GP which Y works with, charm has an important role to play in defining what may constitute a possible phonological entity. Firstly, it is charm that is chiefly responsible for defining which elements may combine to produce compound segments, and relatedly, it determines which segments may combine together under the relations of government to form syllabic constituents. Thus charm is called upon to reduce the possibilities of segmental overgeneration in GP and to account for phonotactic constraints on 'syllable' structure; it is also claimed by Y to be 'active' in phonology as the cause of certain phonological processes.

The claims in this regard are that (a) elements with the same charm value (where 'zero' does not count as a value) cannot combine to form a segment; (b) a compound segment inherits its charm value from its head—except where $\mathbf{I}^{+}$ is involved in the make-up of vowels and L^{-} and H^{-} in the make-up of consonants, when they always contribute their charm value; (c) positively or negatively charmed segments may be governors, and uncharmed segments may be governed.

As implied, this idea has been seen as quite fundamental to the theory; Y uses charm to motivate several analyses, for example, he claims in chapter three that [ɾ] deletes in certain adjectival inflections (eg, in [kak + ɾu] 'write + nonpast suffix') because the [ɾ] is charmless (it contains only R^{o}) and [k] is negatively charmed; this means that [ɾ] cannot function as an interconstituent governor of [k] in the onset-rhyme structure that would be produced by simple concatenation.

He claims that due to this, the suffix-initial [ɾ] does not associate to a skeletal point and hence is not phonetically realised, giving [kaku], the desired result.

There are certain real problems with the idea of charm, however. The way in which a segment inherits its charm from its constituent elements seems almost arbitrary and is certainly not as simple as we might expect. Charm is mostly inherited from a segment's head, but not if the element $\mathbf{I}^{+}$ occurs in a segment; in obstruents, H^{-} and L^{-} determine a segment's charm value even if they are not its head, but in nasals they cancel out the positive charm of the head N^{+}. Also, the constraints which charm places on the combinability of elements seem at odds with reality. The principles of charm combination should predict that A^{+} and N^{+} cannot combine, but they clearly do in for example, [ɑ̃], a common vowel in French and other languages; if charm theory is right, then no low nasalised vowels at all should exist. Equally, as the dictates of charm preclude an uncharmed segment from governing, then such diphthongs as [ʊə] and [ɪə], for example, should not be possible, as they would constitute a constituent governing domain where the charmless first segment governs the second, but these are common in many accents of English.

No doubt for such reasons as these, recent work in the GP framework (eg, Harris, 1994; Brockhaus, 1995a, especially p. 96) has abandoned the concept of charm, replacing it with the concept of 'complexity'. This relies on a simple numerical count of elements, and claims that segments may only govern other segments which are no more complex than themselves. It seems that Y's analyses could also be recast in this model (for example, [ɾ] has only the element R^{o} whereas [k] has at least three), so this aspect of charm may well prove to be unnecessary, but, of course, if charm is entirely abandoned, then the other aspects of phonology which it tries to capture will be lost. This would mean that a further restrictive aspect of GP would disappear and the theory loses some of its constraints on segmental overgeneration; whilst it is possible that overgeneration is not really too great a phonological sin, GP has claimed that it is, so the theory might be expected to seek to avoid it.

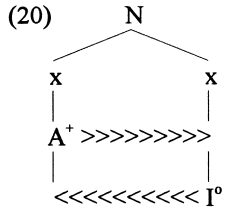
3.5. What is a possible phonological process in GP?

We have seen that GP claims to be a highly constrained theory of phonology. Part of this claim lies in the assertion that GP does not allow processes which would resemble arbitrary rewrite rules, and partly the claim is that processes may not be extrinsically ordered in GP, unlike in standard generative phonology. It is argued that both of these points make GP superior to many other theories of phonology as it is simpler and hence more likely to correspond to the psychological reality. In this final discussion section, I shall briefly consider this claim that GP only allows for a restricted theory of phonological processes.

It will be remembered that the relation of government between skeletal points is said to be responsible for the spreading of elements. Government is strictly directional: constituent government proceeds from left to right and inter-constituent government from right to left. Given this, it might seem a little strange

that there is no consistent correlation between the direction of government and the direction of spreading. On page 170, for example, Y derives the vowel in the regional form [takee] from the diphthongal sequence in [takai] within a single nuclear constituent. As is shown in (20), adapted from page 170, this involves spreading in both directions, whilst government is only from left to right within a constituent:

(20)



Equally, if we bring in further data for consideration: GP would need a rather complicated analysis to account for the well known allophony between [ç] and [x] in German (discussed variously in the literature, for example in Hall, 1989). This allophony might best be analysed such that [ç] is derived from underlying [x] before front high vowels[18] (through the spreading of I^o from the vowels), and yet the derived palatal fricatives in words such as *mich* [mɪç] 'me' and *nicht* [nɪçt] 'not' occur in quite different syllabic environments on GP assumptions. In *mich* the fricative is in an onset (like the [t] in *cat* in (2)), where the onset must govern the preceding nucleus through interconstituent government, whereas in *nicht*, the fricative is in a post-vocalic rhymal position (as illustrated in 1e) and the following [t] is in a word-final onset. This means that, for what looks like one simple assimilation process, GP would need to posit two different kinds of spreading of I^o—through constituent government in *nicht* and through interconstituent government (against the flow of the government) in *mich*.

It is also notable that Y allows processes to be more complex than simple spreading. In deriving [ʃinda] 'die + past tense suffix' from [sin + ta] (p. 137), Y claims that the element L^- spreads from stem-final [n] to suffix-initial [t] and H^- is lost from [t] at the same time. Aside from the fact that L^- is thus claimed to spread under no government, or the 'wrong way' under interconstituent government, this state of affairs is somewhat peculiar: as we saw in Section 3.3.4, GP strives to establish a relationship between a process and its environment; element loss is seen as lenition, and this is motivated by the claim that the skeletal position which hosts a lenited segment has diminished licensing power. But if elements are lost because of lack of licensing power, then we might wonder why

[18] It is perfectly possible that this only represents a historically valid state of affairs and that the alternation has been re-analysed by speakers such that [ç] is now the underlying segment and [x] derived, given the fact that [ç] now occurs in more types of environment than [x], as has been variously argued; nonetheless, the historical facts and comparative data clearly indicate that the original underlying segment was velar and thus even if the state of affairs discussed here no longer represents the current situation, the assimilation was clearly synchronically active at one stage of the language.

an element should spread to replace the one which was lost, if both spreading and loss occur in the same environment.

GP could reasonably claim to be highly constrained if it could explain all processes as either composition or decomposition, as we saw Harris (1990) claim in Section 3.3.2, however, this is not the case. It is to his credit that Y does not make such a claim: he states that GP has "an extremely restricted theory of phonological processes in which only three types of non-arbitrary operations are formally permitted" (p. 22); these are composition (spreading), decomposition (element loss) and switching the head-operator relation. This third type of process does not alter the inventory of elements in a segment, but rather demotes the head element to become an operator and promotes an operator to become head. Although Y provides no examples of this, two processes which would likely receive this type of explanation in GP are one part of the Great Vowel Shift in the history of English, where [ɛː] became [eː] and the change in certain central dialects of German, where [ç] has become [ʃ] (Brockhaus, 1995a, gives GP representations for these segments).

We have already seen that Y allows for more than just these two operations, however. The 'breaking' of stops to affricates which we saw in Section 3.3.4 and which is common in the world's languages would seem to be a fourth type of phonological process, and also, in chapter five, Y allows for a process of 'empty nucleus insertion' which, for example, combines with the ambient element I^{o} (as we saw in Section 3.3.3) to derive [da$\int_{o}$ita] 'took out' from *das* + *ta* 'take out + past tense suffix'. This process seems rather ad hoc and is rather reminiscent of a standard-generative-phonology-type epenthesis rule like 'ø → [i]' which GP would normally try to explain as the loss of licensing of a lexically present empty nucleus, which must then be phonetically realised (see, for example, Charette, 1991).

More serious, perhaps, are the problems presented by Y's derivation of [koida] 'rowed' from *kog* + *ta* 'row + past tense suffix' on pages 136 and 137. Y uses three processes to do this: '*t*-voicing' (to give [kogda]), 'empty nucleus insertion' (to give [kogida]) and 'velar delinking' (to give [koida]). All three processes are unusual in GP terms, but worse is the fact that Y seems to stipulate an extrinsic ordering for them: 'empty nucleus insertion' and '*t*-voicing' could have their conditions met in either order, but if 'empty nucleus insertion' applied first, it would seem to destroy the environment for '*t*-voicing' and hence bleed it. It is possible, although far from obvious, that Y could rescue this analysis by appealing to an interaction with the morphology, following Kaye (1995), but he makes no attempt to do this. This is a serious problem according to the principles of GP; it is also quite possible that he is seeking to derive something synchronically which might be more profitably viewed as a diachronic fossilisation, which would simply be stored in the lexicon according to Harris (1994) and Kaye (1995).

One final point in this regard is the rather frequent recourse made to the Obligatory Contour Principle (OCP). Since McCarthy (1979), the OCP has a relatively well established place in phonology as a principle which states that, for

example, one of two items which are identical and next to each other at one level of structure will tend to be deleted or changed in some way, to maintain a 'contour', and yet it is not always clear when two items are seen as identical (and hence subject to the OCP) and why the same sequence is often not viewed as identical in another language. Y has several analyses where constraints on structure or segmental deletion is motivated by the OCP. For example, on page 28 he claims that the lack of attested [yi] and [ye] sequences in Japanese is attributable to the OCP: "two contiguous I^o's are banned by the OCP, preventing [i] and [e] from occurring after the palatal glide" because [y] contains I^o (as do both [i] and [e]); he also extends this analysis to bar [wi], [we], [wo] and [wɯ] which are also not attested (unlike [wa]), by claiming that both I^o and U^o occur on the same ('back/round') tier in Japanese and that "[i]n the case of [w], that is, when the U^o element is followed by a vowel, any two contiguous elements on the BACK/ROUND tier are viewed as identical by the OCP. As a result, the OCP prohibits the occurrence of any element on this line after U^o, permitting A^+ which resides on the different tier" (p. 29). However, this seems at odds with the fact that in [yo], for example, which is a common sequence in Japanese, I^o is directly followed by U^o—it seems odd to claim that the sequence 'U^o I^o' is banned because it does not form a 'contour' while the sequence 'I^o U^o' is fine. Also, in chapter five, Y introduces a 'common head OCP' which deletes a segment when it is next to another which has the same element as head, but this formulation seems too restrictive, as it should also forbid words such as *boku* 'I (male)' and *bu* 'section' which would both seem to begin by a [b], which has U^o as its head, followed by [o] or [ɯ]/[u], both of which have U^o as head, too. We have already considered (in Section 3.1.2) the fact that Y allows the OCP to be sensitive to speech rate—this too seems a highly peculiar conclusion.

If we consider the range of processes discussed in this section, it seems that GP is not as constrained as has been claimed. Of course, it would be possible to dismiss some of the more problematic analyses discussed here to maintain GP's claim to restrictiveness, but only if these analyses can be re-interpreted in line with a more tightly constrained GP. If the data prove to be intractable without the kind of analyses discussed here, then GP starts to look much more like other 'normal' theories of phonology, and many of its novel claims seem precariously balanced. If GP cannot maintain its claim to be tightly constrained, then it becomes less interesting as a theory of phonology.

4. General comments and conclusion

We have seen, as a *leitmotif* running through this discussion of GP, that the various aspects of the theory are designed to constrain what types of analyses may be proposed in the framework. We have also seen that there are certain problems accounting for certain phonological processes and entities if these assumptions are adhered to explicitly, but it should also be clear that the very fact that these are

recognised to be problems could on one level be taken as evidence that the theory is doing its job. If a theory can capture and express any conceivable process without any pause for thought, then it would doubtless be uninteresting. If GP forces us to think long and hard before accepting an analysis that seems arbitrary, then that also is doubtless a good thing. However, if the principles which form GP are manifestly unable to cope with the data presented to them by natural languages, then the theory can hardly be completely correct.

If we consider what we have seen here then it seems that either some of Y's analyses cannot be right, or some of the tight principles of GP will have to be loosened. A fair amount of data has been described in the GP literature, some of it in an extremely compelling manner. This might well be taken to indicate that certain aspects and claims of the theory could well be on the right lines. In contrast, it seems unlikely that the parallels which have been drawn with syntax in some GP work stand up to scrutiny or that charm theory can be upheld in the face of prima facie counter-evidence to its claims (which anyway seem somewhat inconsistent).

Even if some of the more individualistic aspects of the theory may need to be (or have already been) modified, this does not necessarily make the revised framework any worse than any other, and there still remain some unquestionably tantalising results, such as the possible unification of all lenition processes. If the syllable is really unnecessary (as opposed to the onset and the nucleus) then that is an interesting result of the theory, as is the possible elimination of the mora, which is due to Y's work here, although the 'syllabic' or 'moraic' intuitions must then inhabit a rather uncertain position in phonological theory. Element theory provides many interesting and often compelling analyses, especially given certain revisions, touched upon above.

Y has provided some intriguing and sometimes radical and challenging proposals in the GP framework and for this he should be commended. It is often well to reconsider things which were once thought settled; new analytical techniques can often shed new light on 'old' phonological phenomena. Y's reconsideration of the mora and his attempts to motivate certain 'insertion' and 'deletion' processes non-arbitrarily is to be welcomed, but it seems that some of his claims do not fit all too well with GP's principle of non-arbitrariness.

It must also unfortunately be noted that the book is rather let down by poor editing. Several works referred to in the text are not listed in the 'references' section and a few sentences stop half finished, which is rather confusing, as are at times the quite frequent misprints, particularly those in examples and transcriptions, where it is sometimes uncertain quite what is meant: for example *sin* + *yoo* 'let us die' is transcribed as ['inoo] (p. 98), *hoN* 'book' + *ka* 'the interrogative particle' as [ho4ka] (p. 138) and *das* + *ta* 'took out' [da'i∞ta] (p. 30). It is possible that this is due to some unfortunate problem with fonts, and is perfectly plausible that the faults of editing do not reflect on Y at all—they would not be worthy of mention were they not common in the book.

The key question for this conclusion is, of course, whether Y succeeds in his attempt to apply GP to Japanese. The answer? Yes and no. He succeeds in

providing interesting analyses for a wide range of Japanese phonological and morphophonological phenomena, many of which are clearly original, but some of these analyses conflict with what we might expect from Government Phonology. If this article appears a little harsh on Y at times, then that is maybe somewhat unfair—I have tried to assess his analyses not only on their own terms but also in terms of the GP whole, and I have also sought to assess some of the claims made in GP's name by people other than Y; he would seem to subscribe to these ideas, though, as he describes them and refers to the work which contains them in his first chapter and preface.

Y's book makes interesting reading and deserves to be considered, along with other work in GP, as a contribution to phonological theorising. It contains some bold hypotheses and will no doubt appeal to those with an interest in the phonology of Japanese. It is also clear that more challenging and innovative work will spring from the GP tradition. I look forward to it.

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