A Radically Non-Morphemic Approach to Bidirectional Syncretism

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Abstract

This paper addresses the question of how certain kinds of overlapping syncretisms in inflectional paradigms can be accounted for that Baerman et al. (2005) refer to as *convergent/divergent bidirectional syncretisms* (based on earlier work by Stump (2001)). Bidirectional syncretism strongly resists accounts in terms of standard rules of exponence (or similar devices) that correlate inflection markers with (often underspecified) morpho-syntactic specifications (such rules are used in many morphological theories; e.g., Anderson (1992), Halle & Marantz (1993), Aronoff (1994), Wunderlich (1996), and Stump (2001)). The reason is that it is difficult to capture overlapping distributions by natural classes. In view of this, rules of referral have been proposed to derive bidirectional syncretism (Stump (2001), Baerman et al. (2005)). In contrast, I would like to pursue the hypothesis that systematic instances of overlapping syncretism ultimately motivate a new approach to inflectional morphology – one that fully dispenses with the assumption that morphological exponents are paired with morpho-syntactic feature specifications (and that therefore qualifies as radically non-morphemic): First, rules of exponence are replaced with feature co-occurrence restrictions (FCRs; Gazdar et al. (1985)). For phonologically determined natural classes of exponents, FCRs state incompatibilites with morpho-syntactic feature specifications. Second, marker competition is resolved by a principle of Phonology-driven Marker Selection (PMS). PMS takes over the role of the Specificity (Blocking, Elsewhere, Panini) Principle of standard analyses.

Empirically, the main focus is on Bonan declension; the analysis is subsequently extended to Gujarati conjugation and Latin *o*-declension, with further remarks on bidirectional syncretism in other inflectional paradigms.

1. A Problem

Baerman et al. (2005, 136-144) discuss the following inflectional paradigm from Bonan (Altaic; Mongolian).[2]

(1) *Bonan declension*

	noun ('foliage')	pronoun ('he')
NOM	labčon-Ø	ndžan-Ø
GEN	labčon-ne	ndžan-ne
ACC	labčon-ne	ndžan-de
DAT	labčon-de	ndžan-de
ABL	labčon-se	ndžan-se
INS	labčon-Gale	ndžan-Gale

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[2] The data are taken from Todaeva (1997); also see Baerman (2005, 815).

The exponents for nominative, ablative, and instrumental contexts are identical for nouns and pronouns; they correspond to what one would assume to be an ordinary state of affairs in a typical agglutinative system. However, the exponents for genitive, accusative, and dative contexts with nouns and pronouns show an overlapping syncretical distribution that raises severe problems for standard accounts of syncretism that rely on correlating inflectional exponents with underspecified feature specifications, in one way or another.[3] The reason is that it is hard to see how the distribution of the markers *ne* and *de* can be captured by referring to natural classes.[4] Thus, a standard account of the case syncretisms with *ne* (genitive/accusative with nouns) and *de* (accusative/dative with pronouns) in (1) in terms of underspecification would have to rely on the assumption that at least one of the two relevant distributions in (1) can be described as a natural class; the remaining distribution could then be slightly more general, including an additional cell that is blocked in the course of marker competition. For instance, the three contexts GEN.NOUN, ACC.NOUN, and GEN.PRON would have to emerge as a natural class that is captured by some appropriate feature specification accompanying the exponent *ne*, and one could then assume *de* to be a more general marker for ACC and DAT contexts (e.g., encoded by a feature specification like [–subj,+obj], assuming that this specification fully characterizes the natural class of the two cases at hand), which is blocked by the more specific marker *ne* whenever the latter marker fits. The problem with such an approach is that is highly unclear whether a property can be found that, say, GEN.NOUN, ACC.NOUN, and GEN.PRON contexts have in common, and that separates these contexts from all the other ones in the paradigm. Of

[3] The concept of underspecification as a means to account for syncretism is employed in most recent theories of inflectional morphology. In what follows, I briefly consider Distributed Morphology, Minimalist Morphology, and Paradigm Function Morphology. In Distributed Morphology (see, e.g., Halle & Marantz (1993), Halle (1997), Noyer (1992)), functional heads in syntax provide contexts for insertion of vocabulary items; and whereas the former are characterized by fully specified morpho-syntactic features (ignoring impoverishment), the vocabulary items can be (and often are) underspecified with respect to these features; a Subset Principle ensures that a vocabulary item can only be inserted if its features are compatible with those in the functional morpheme in syntax. Similarly, underspecification is considered to be one of the central assumptions of Minimalist Morphology (see Wunderlich (1996, 2004)). Even though Minimalist Morphology differs from Distributed Morphology in being an "incremental" approach, where the inflection marker contributes features to the whole word that would otherwise not be present (see Stump (2001) for the terminology), Wunderlich manages to integrate underspecification of inflection markers into the system, and in doing so invokes a Compatibility requirement that has effects which are similar to those of the Subset Principle. Finally, in Paradigm Function Morphology (see Stump (2001)), inflection markers are added to stems by morphological realization rules, which take the abstract form $\mathbf{RR}_{n,\tau,C}(<\mathbf{X},\sigma>) = <\mathbf{Y}',\sigma>$. Here, τ is the set of morpho-syntactic features associated with the inflection marker (the inflection marker emerges as the difference between the stem X and the inflected word Y′); τ can be underspecified. In contrast, σ is the set of morpho-syntactic features that the fully inflected word form bears (the analogue to the insertion contexts provided by functional morphemes in Distributed Morphology). Importantly, a constraint on rule/argument coherence ensures that σ is an *extension* of τ; this is comparable to the subset and compatibility requirements of Distributed Morphology and Minimalist Morphology, respectively. – Thus, in all these approaches, inflectional exponents are paired with (possibly underspecified) feature specifications, independently of whether or not the overall theory qualifies as "lexical" (Distributed Morphology, Minimalist Morphology) or "inferential" (Paradigm Function Morphology) in Stump's (2001) sense.

[4] As noted, (1) is based on Todaeva's work. Todaeva (1963, 1966, 1997) is mainly concerned with one of the two

course, the same problem arises if the distribution of *ne* is assumed to be more general (covering all GEN and ACC contexts), and the distribution of *de* is restricted to DAT.NOUN, DAT.PRON, and ACC.PRON contexts.[5] The underlying reason for these problems is that the natural classes in question here would have to span instances of two distinct grammatical categories (i.e., they would have to be "trans-categorial"), viz., a certain instance of case and a certain instance of part of speech/categorial label, and all this under the exclusion of other instances of the respective grammatical categories.[6]

In view of this situation, various steps can be taken. One obvious possibility would be to assume that the distribution of *ne* and *de* in (1) reflects accidental homonymy rather than systematic syncretism. However, such an approach does not seem empirically motivated – the pattern is evidently systematic: Taken separately, both the GEN.NOUN/PRON distribution, and the GEN/ACC.NOUN distribution of *ne*, would qualify as perfectly regular syncretisms that any morphological theory wants to derive in a systematic manner. (Similarly for the separate DAT.NOUN/PRON and ACC/DAT.PRON syncretisms with *de*.) Another option would be to assume different rule orderings for nouns and pronouns. This option is also quite unattractive for obvious reasons (among them the fact that rule ordering plays no role anymore in most current morphological theories); see Baerman et al. (2005, 138) for discussion.

Finally, the solution that Baerman et al. (2005) themselves offer for overlapping domains of syncretism in Bonan declension relies on two directional rules of referral; such rules state that (in the simplest case) some form for a given morpho-syntactic context is taken over from the form determined by standard rules of exponence (correlating exponents and feature specifications) for some other morpho-syntactic context. The two rules of referral can be formulated as

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main dialects, viz., Gansu Bonan. The other dialect, Qinghai Bonan, is described in Wu (2003). The declension markers of Qinghai Bonan are not fully identical to those of Gansu Bonan in (1), with *da* instead of *de*, *sa* instead of *se*, and G*(w)ala* instead of G*ale* (*ne* is the same in both varieties). However, these minor differences can be ignored in what follows (as they do not affect the analysis to be presented in section 2 below): Whereas the *form* may differ minimally in some cases, the *distribution* of the relevant markers is the same in Gansu Bonan and Qinghai Bonan. In particular, the pattern of bidirectional syncretism (see below) is identical; see Wu (2003, 335-336). – That said, Fried's (2010) recent study of Qinghai Bonan describes a variety (on p. 113) in which only some pronominal forms (1.Sg., 2.Sg., and 3.Sg.Logophoric) have the exponent *da* in accusative contexts, whereas others take the marker *ne* (rendered *nə*) from the noun paradigm. This may be an instance of Bonan-internal micro-variation, or an instance of recent language change towards a more uniform system that does without bidirectional syncretism (or both). I will not explicitly accomodate the pattern identified by Fried (2010) in the analysis to be developed below; but technically it would suffice to identify the three pronominal contexts that use the dative marker as a natural class of pronouns that can be referred to by some feature, and then add that feature in the feature co-occurrence restriction FCR 2 in (9-b) in section 2 below.

[5] Based on remarks by Jonathan Bobaljik, Baerman et al. (2005) develop (and subsequently abandon) a version of such an approach (that must have this type of entry for both markers since it dispenses with the idea of resolving marker competition by some notion of specificity). In doing so, they invoke an abstract feature [X] that is supposed to stand for GEN and ACCUSATIVE.NOUN, and an abstract feature [Y] that encodes DAT and ACC.PRON contexts; *ne* can then be specified as [X], and *de* as [Y]. However, there is no independent justification for these features [X] and [Y], so the syncretism is stipulated rather than derived.

[6] Accordingly, there seem to be very few analyses where a case for a natural class involving instances of separate grammatical categories has convincingly been made. Wiese's (1999) approach to determiner inflection in German may belong to this group. Here, an instance of the grammatical category gender – FEM – and an instance of the grammatical category number - PL – are treated as a natural class, which is encoded by the feature [–standard].

in (2) (minimally deviating from the notation in Baerman et al. (2005)). Since these exponent take-overs seem to go in two directions (from GEN to ACC, and from DAT to ACC), Baerman et al. (2005) call this syncretism *bidirectional*.

(2) a. The exponent for ACC.NOUN contexts is the exponent determined by the rules of exponence for GEN contexts.
b. The exponent for ACC.PRON contexts is the exponent determined by the rules of exponence for DAT contexts.

The rules of exponence that underlie the system are given in (4).[7]

(3) a. NOM = STEM + /Ø/
b. GEN = STEM + /ne/
c. DAT = STEM + /de/
d. ABL = STEM + /se/
e. INS = STEM + /Gale/

Note that there is no rule of exponence for accusative contexts; therefore, the system would actually create paradigmatic gaps, if not for the effect of rules of referral.[8]

Such an analysis in terms of rules of referral succeeds in deriving the paradigm in (1). However, the rules in (2) stipulate what arguably should be derived (but see section 3.2 below), and the resulting number of rules overall is the same as the number that results from treating the overlapping syncretisms via separate rules of exponence (i.e., two rules for /ne/, and two rules for /de/).

Given (a) the systematicity of syncretism in (1), (b) the failure of classic analyses in terms of natural classes and underspecification, and (c) potential problems of explanatory adeaquacy for alternative analyses (in terms of rule ordering or rules of referral), I would like to conclude that the Bonan data suggest that a radically new approach to inflectional paradigms might be worth pursuing – one that gives systematic accounts of instances of syncretism without invoking the idea that syncretism is to be captured by underspecification of morphological exponents with respect to morpho-syntactic features. More specifically, I will develop an analysis that is truly non-morphemic, in the sense that it abandons the standard assumption that exponents are correlated with morpho-syntactic feature specifications in one way or the other.

Also compare the role of higher-order markedness features in Trommer's (2005) account of the same empirical domain.

[7] Here and henceforth, I render exponents (outside paradigms) in the / / notation.

[8] Such a state of affairs would not be possible in theories that always postulate a radically underspecified elsewhere marker for each paradigm; compare, e.g., Stump's (2001) Identity Function Default rule. However, the question of whether rules of exponence should initially also provide some marker for all ACC contexts in Bonan declension is orthogonal to our main concerns here as long as it is ensured that rules of referral also override the outcome of rules of exponence; see, e.g., Stump (2001) for such an approach. – That said, it is interesting to note that the approach to bidirectional syncretism developed in Weisser (2007) presupposes that the absence of a marker introduced by rules of exponence is the defining characteristic of all instances of bidirectional syncretism. On this view, the presence of a paradigmatic gap induces a search in immediately adjacent cells (defined by a concept of feature minimality). This ultimately leads to the same effect as a rule of referral: A form is borrowed from some other paradigm cell.

2. A Solution

Most current approaches to inflectional morphology correlate inflectional exponents with feature specifications. Inferential theories like those developed in Anderson (1992), Aronoff (1994), Stump (2001), and Corbett & Fraser (1993) or Baerman et al. (2005) differ from lexical theories (like Distributed Morphology or Minimalist Morphology) in that inflection markers are not assumed to have morpheme status, or to exist as separate objects; rather, inflection markers are introduced by rules of exponence. However, even here inflectional exponents are clearly correlated with morpho-syntactic feature specifications. I would therefore like to contend that many inferential approaches are not as radically non-morphemic as is sometimes made out. Accordingly, the gist of an inferential analysis can often be transferred to a lexical analysis without major changes (and vice versa), with most of the important differences being confined to suprasegmental exponents – e.g., umlaut or consonant mutation –, or the technical means to override the effects of basic rules of exponence (in inferential approaches) or marker entries (in lexical approaches) – e.g., rules of referral vs. impoverishment rules (which can produce similar effects, but are not necessarily equivalent).

Suppose now that the assumption is abandoned that there is a correlation between an inflectional exponent and a specification of morpho-syntactic features that captures the distribution of the exponent (more precisely, the *potential* distribution, given that an exponent may be blocked in a context in which it would fit in principle, by a more specific marker). For concreteness, assume that each language has a given inventory of exponents for each of its inflectional domains, but there is no feature specification directly associated with the exponents. Thus, in Bonan there is an initial set of possible exponents for nominal and pronominal declension, as in (4).

(4) *Inventory of declension markers in Bonan*
{/Ø/, /ne/, /se/, /de/, /Gale/}

The question then is how these markers can be assigned to the twelve paradigm cells in (1) if there are no rules that correlate them with feature specifications characterizing the cells (possibly via underspecification). I would like to suggest that the distribution of exponents of an initial inventory over the cells of a paradigm is brought about by a system composed of two main ingredients: First, there are (negative) *feature co-occurrence restrictions* (FCRs, see Gazdar et al. (1985)) that block the use of (phonologically defined) natural classes of exponents in certain morpho-syntactic environments (which are also captured by natural classes – natural classes of cases, in the case at hand). And second, there is a general principle that selects, for each cell, the most phonologically well-formed exponent among those that are not blocked by a feature co-occurrence restriction. I call this principle *Phonology-driven Marker Selection* (PMS); see (5). Thus, FCRs take over the role of rules of exponence or lexical entries (or vocabulary items), and PMS replaces the Specificity (Blocking, Elsewhere, Panini) Principle as a means to resolve a competition of markers as it automatically arises in underspecification-based approaches. Evidently, if the idea is given up that exponents pair phonological form and morpho-syntactic features, with only the form remaining, a selection principle for cases of marker competition

can only be sensitive to aspects of form, not to aspects of function.[9]

(5) *Phonology-driven Marker Selection* (PMS):
An exponent α is selected for a fully specified morpho-syntactic context Γ iff (a)-(c) hold:
   a. α is part of the inventory that belongs to Γ's domain.
   b. α is not blocked in Γ by a FCR.
   c. There is no other marker β such that (i)-(iii) hold:
      (i) β satisfies (5-a).
      (ii) β satisfies (5-b).
      (iii) β is more phonologically well-formed than α.

(5) presupposes that the markers of the inventory in (4) can be ordered according to relative phonological wellformedness.[10] Phonological wellformedness of strings of segments naturally varies from language to language, with general preferences emerging nonetheless, and the concept of *sonority* playing an important role (but not the only role; see the last footnote). A simple way of determining phonological wellformedness of an exponent (and one that I will presuppose in what follows) is to adopt an optimality-theoretic approach: An exponent α is more phonologically well-formed than another exponent β in a given language Γ if α has a better constraint profile than β vis-à-vis the set of ranked constraints (particularly markedness constraints) in Γ.

For Bonan, it can be assumed that the exponents can be ordered as in (6).

(6) *Phonological wellformedness scale*
/Ø/ $>$ /ne/ $>$ /se/ $>$ /de/ $>$ /Gale/

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[9] Müller (2002) is a predecessor of the present approach, which contains an analysis along these lines for determiner, adjective, and noun inflection in German. The analysis derives all instances of syncretism, including ones that at first sight seem to illustrate a discontinuous pattern (e.g., the the marker /er/ shows up in NOM.MASC.SG, DAT/GEN.FEM.SG, and GEN.PL contexts, and the marker /en/ occurs in ACC.MASC.SG and DAT.PL environments). This approach is couched in an optimality-theoretic framework, where radically non-morphemic analyses of inflection are independently motivated by conceptual considerations if one takes seriously the assumption that "the functional lexicon is slave to the syntax" (see Legendre et al. (1998)). (A side remark: The reason is that if syntactic constraint rankings are responsible for determining whether or not a language has, say, case markers, it would be strange if inflectional exponents existed independently, with associated feature specifications. This way, the situation could arise that a language's morphology has independently provided a rich system of case markers with morpho-syntactic specifications which can never be used because syntactic constraints block case markers in general; alternatively, we might end up with the situation that syntactic constraints require case markers in a language but the morphological component has simply failed to provide them. These kinds of problems (which arguably arise in approaches like Aissen (1999, 2003)) disappear in a radically non-morphemic approach where (potential) inflectional exponents never carry morpho-syntactic feature specifications to begin with.) However, the analysis in Müller (2002) has been shown not to depend on specific optimality-theoretic assumptions; see Müller (2003), where a version of the approach is laid out that takes the same basic form as the one developed below.

[10] In an earlier version of the present paper, the order of morphological exponents according to their relative phonological wellformedness was simply taken to follow from the concept of decreasing sonority throughout; instead of Phonology-driven Marker Selection (PMS), the relevant constraint selecting among the markers of the inventory was consequently called Sonority-driven Marker Selection (SMS). However, as noted by Caroline Féry, Jochen Trommer, and the two reviewers, relying exclusively on sonority in (5) would arguably stretch the concept of sonority too far. For one thing, "more sonorous" must be understood as "less consonantal" so as to integrate the

/Ø/ is most phonologically well-formed among all the case markers in Bonan because it does not add a segment to the inflected form and thereby ensures perfect alignment of right edges of two phonological domains (root, foot). At the other end of the spectrum, /Gale/ contains a highly marked uvular consonant, whereas the other exponents contain unmarked coronals. For the remaining exponents, sonority is the decisive factor: Nasals (/n/) are more sonorous than fricatives (/s/), and fricatives are more sonorous than stops (/d/); and highly sonorous consonants are phonologically preferred in the environment where the exponents appear.

Turning next to the FCRs, it must first be clarified how natural classes of cases can be described. I assume that syntactic cases result from a cross-classification of more primitive, decomposed case features. By combining aspects of the proposals in Bierwisch (1967) (for German), Wiese (2003b) (for Latin), and Wiese (2003a) (for Russian and Lithuanian), the four primitive binary case features [±subj(ect)], [±obj(ect)], [±obl(ique)], and [±adv(erbial)] can be postulated for Bonan. A cross-classification of these features inter alia yields the six complete case specifications in (7), which correspond to Bonan's six cases.[11]

(7) *Decomposition of cases*

	subj	obj	obl	adv
NOM	+	−	−	−
GEN	+	+	−	−
ACC	−	+	−	−
DAT	−	+	+	−
ABL	−	+	−	+
INS	−	+	+	+

bisyllabic marker /Gale/ and the null marker /Ø/ into the order in their required positions. For another, given that sonority is a property of segments, not of strings of segments, it is not a priori clear whether there is a principled way of determining which of the two (or more) consonants counts for determining sonority with exponents that are composed of more than one consonant (like /Gale/). Finally, the order of exponents required for the analysis of bidirectional syncretism in Gujarati conjugation developed in section 3.3.1 below turns out not to be fully determined by evidence from sonority-driven stress in the language (see de Lacy (2002)); for determining stress, the language makes no difference between vowels of the same height, as it would be required for the non-morphemic approach to syncretism developed below. The present, more general (and flexible) approach in terms of phonological wellformedness closely follows one reviewer's suggestion, for both Bonan and Gujarati.

[11] Four binary case features yield 16 possible cases. A more parsimonious approach to Bonan might make do with three binary case features, yielding 8 potential cases of which 6 are used in the language. However, I will not attempt to develop such a more parsimonious approach here, for the following two reasons. First, an approach that relies on only three primitive case features would require additional assumptions to make it possible to group all non-nominative cases into a natural class, as it will be shown to be required for Bonan. (Note incidentally that the same problem arises with weak declensions in languages like Icelandic and German – weak feminine and weak masculine declensions, respectively –, where genitive, accusative, and dative must form a natural class excluding nominative that can be referred to by morphological rules.) This problem may in principle be solved, though, by assuming that complements of natural classes also qualify as natural classes (see Zwicky (1970)). Second, the exact nature of the primitive case features active in a language can only be determined by close inspection of the syntax, and the relevant information does not seem available in the case of Bonan at this point. Future research in this area may reveal that an approach in terms of three rather than four primitive case features is warranted – or it may suggest that even more primitive case features should be postulated. Given that the classes of cases that are presupposed by the analysis to be developed in the main text are simple and coherent, I take the issue of properly

Relevant consequences of (7) for natural classes of cases are these: First, all non-nominative cases form a natural class since they all prototypically show up in object positions (i.e., VP-internally); this class is referred to by the primitive case feature [+obj]. Second, accusative and dative form a natural class (excluding nominative, genitive, ablative, and instrumental) that is defined by the features [–subj,–adv] (nominative and genitive are [+subj], the latter because it shows up with highly prominent arguments/possessors in the NP domain; ablative and instrumental are [+adv] – note that the feature [+obj] is thus not necessary to refer to accusative and dative alone). Third, dative and instrumental form a natural class defined by [+obj,+obl]; the assumption here is that genitive (a structural case NP-internally) and ablative do not inherently qualify as oblique.[12] And fourth, ablative and instrumental form a natural class because these are the adverbial cases ([+adv]). Still, it is worth pointing out that the system is restrictive: Various other combinations of cases do not form natural classes. For instance, nominative and accusative do not form a natural class in Bonan, given that disjunction is not permitted (as I assume throughout): [–obl,–adv] also includes the genitive, and there is no other feature shared by nominative and accusative.

Finally, since the FCRs correlate case environments with natural classes of exponents that are phonologically defined, something needs to be said about these latter classes, and the phonological features that encode them. Three classes will be relevant. First, there is the class of exponents that do not have any phonological realization: /Ø/. The second class is composed of exponents that are [–continuant]: /ne/, /de/ (alternatively, the feature [–strident] could be used). These two are straightforward, but it turns out that a bit more must be said about the third class, which contains /ne/ and /se/ but not /de/. Nasals and fricatives do not form a natural class excluding stops in standard feature systems (e.g., the one in Chomsky & Halle (1968)). However, note that nasals and fricatives occupy adjacent positions on the sonority scale, and in this sense they qualify as a natural class. As shown by de Lacy (2002, 97-99), a sonority scale can be decomposed into a series of binary scales. Furthermore, de Lacy notes that assuming (as he does) that there is a direct correspondence of scales and features, each binary scale can be encoded by a feature with value "–" to the left of $>$, and value "+" to the right of it. Thus, focussing on the case at hand, the sonority scale /n/ $>$ /s/ $>$ /d/ implicit in (6) can be broken down into two binary scales, as in (8). For each binary scale, items to the left of an ordering symbol $>$ are assigned value "–" of the respective sonority feature, and items to the right of $>$ are assigned value "+" (de Lacy calls these features [$\pm f_a$], [$\pm f_b$], etc., but I will call them here [$\pm cons_a$], [$\pm cons_b$], – this is not to be confused with the non-indexed standard feature [$\pm$consonantal] that distinguishes proper consonants from vowels, glides, glottal stops, etc.).

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setting up an underlying system of abstract case features to be ultimately independent of the main task, which is to account for the bidirectional syncretism in Bonan declension.

[12] The fact that the ablative is used in comparative constructions (see Wu (2003, 333)) may arguably be viewed as an argument for its structural, non-oblique nature in Bonan. Still, if one does not want to classify the ablative as prototypically non-oblique, alternatives are readily available. For instance, in Jakobson's (1962) system, dative and instrumental also form a natural class (characterized by the features [+marginal,–quantified]). Similarly, and even closer to the system adopted in the main text, Franks (1995, 51) derives a natural class of dative and instrumental (in Russian) by invoking the features [+obl,+phrasal]; an ablative would then qualify as [–phrasal], on a par with the locative in Russian. The feature [$\pm$phrasal] (which Franks takes to stand for "assigned in the phrasal domain of a category") might then either replace or accompany the feature [$\pm$obl] in the present analysis.

(8) *Binary sonority scales*

a. /ne/ $>$ /se/, /de/ [–cons$_a$] $>$ [+cons$_a$]

b. /ne/, /se/ $>$ /de/ [–cons$_b$] $>$ [+cons$_b$]

Consequently, nasals and fricatives form a natural class excluding stops; this class is defined by the feature [–cons$_b$].[13]

With these assumptions about natural classes of exponents and natural classes of cases in place, consider the following four FCRs for nominal and pronominal declension in Bonan.

(9) *Feature co-occurrence restrictions* (FCRs)

a. FCR 1: [+obj] $\supset \neg$[Ø] */Ø/

b. FCR 2: [–subj,–adv],[+pron] $\supset \neg$[–cons$_b$] */ne/, */se/

c. FCR 3: [+obj,+obl] $\supset \neg$[–cons$_b$] */ne/, */se/

d. FCR 4: [+adv] $\supset \neg$[–continuant] */ne/, */de/

FCR 1 in (9-a) blocks /Ø/ in the non-nominative ([+obj]) cases; see (10).[14]

(10) *Effects of FCR 1*

	[–pron]	[+pron]
NOM: [+subj,–obj,–obl,–adv]		
GEN: [+subj,+obj,–obl,–adv]	*/Ø/	
ACC: [–subj,+obj,–obl,–adv]		
DAT: [–subj,+obj,+obl,–adv]		
INS: [–subj,+obj,+obl,+adv]		
ABL: [–subj,+obj,–obl,+adv]		

FCR 2 in (9-b) states that pronominal [–subj,–adv] (i.e., accusative and dative) contexts are incompatible with a more sonorous (i.e., [–cons$_b$]-marked) exponent of the inventory (i.e., /ne/ and /se/); cf. (11).

[13] Two remarks. First, de Lacy ultimately abandons the account just sketched in favour of his "xo-theory", according to which sonority is a multivalued feature; interestingly, one of his reasons for doing so is that he does not see evidence for a feature like [–cons$_c$] encoding a natural class. Second, as before, it should be kept in mind that alternative ways of defining the required natural class are readily available. Again, Zwicky's (1970) assumption that complements of natural classes also qualify as natural classes is an obvious candidate (the natural class at hand would then be definable as $\neg$[–sonorant,–continuant]).

[14] In order to show the effects of the FCRs more clearly, the table rows for dative, instrumental, and ablative are rearranged in (10)–(13).

(11) *Effects of FCR 2*

	[–pron]	[+pron]
NOM: [+subj,–obj,–obl,–adv]		
GEN: [+subj,+obj,–obl,–adv]		
ACC: [–subj,+obj,–obl,–adv]		*/ne/, */se/
DAT: [–subj,+obj,+obl,–adv]		
INS: [–subj,+obj,+obl,+adv]		
ABL: [–subj,+obj,–obl,+adv]		

According to FCR 3 in (9-c), the same class of exponents (i.e., the more sonorous ones, which are marked [–cons$_b$]: /ne/, /se/), is blocked in [+obj,+obl] (i.e., dative and instrumental) contexts.

(12) *Effects of FCR 3*

	[–pron]	[+pron]
NOM: [+subj,–obj,–obl,–adv]		
GEN: [+subj,+obj,–obl,–adv]		
ACC: [–subj,+obj,–obl,–adv]		
DAT: [–subj,+obj,+obl,–adv]	*/ne/, */se/	
INS: [–subj,+obj,+obl,+adv]		
ABL: [–subj,+obj,–obl,+adv]		

Finally, it follows from FCR 4 in (9-d) that exponents that are [–continuant] (i.e., /ne/ and /de/) are incompatible with [+adv] (i.e., ablative and instrumental) environments; this is shown in (13).

(13) *Effects of FCR 4*

	[–pron]	[+pron]
NOM: [+subj,–obj,–obl,–adv]		
GEN: [+subj,+obj,–obl,–adv]		
ACC: [–subj,+obj,–obl,–adv]		
DAT: [–subj,+obj,+obl,–adv]		
INS: [–subj,+obj,+obl,+adv]	*/ne/, */de/	
ABL: [–subj,+obj,–obl,+adv]		

Note that the instrumental marker /Gale/ is not blocked by any FCR: It is not [–continuant] (given that /l/ is [+continuant]); and it is not [–cons$_b$] either.[15]

Given (i) the inventory of possible exponents for nominal and prominal declension in Bonan in (4), (ii) the principle of Phonology-driven Marker Selection (PMS) in (5), and the four FCRs in (9), the paradigm in (1) is derived. For each paradigm cell (more precisely, each fully specified morpho-syntactic context), PMS selects the most phonologically well-formed marker out

[15] However, even if a segment of /Gale/ would fall under a FCR, one might plausibly argue that the marker as a whole does not because it remains outside the scope of this segment-based system; see footnote 10.

of the set of those markers of the basic inventory which are not blocked in this cell by a FCR. Thus, in nominative environments, where no exponent is excluded by a FCR, the exponent /Ø/ is chosen (alternatively, no exponent is chosen). In genitive contexts, /Ø/ is blocked, so the next best marker /ne/ is used. In accusative contexts, /ne/ is blocked for pronouns but not for nouns, so it is chosen in the latter context and abandoned in the former. Since /se/ is also blocked in accusative contexts for pronouns, the less sonorous marker /de/ must be used. The exponent /de/ is also the most phonologically well-formed marker that can be used in dative contexts (where less consonantal /Ø/, /ne/, and /se/ are blocked throughout, with nouns and pronouns); this accounts for the bidirectional syncretism that characterizes the system. In ablative environments, only /se/ can be used since all other markers (except for /Gale/) are excluded. And finally, /Gale/ is chosen in instrumental contexts where FCR 3 and FCR 4 interact to block all other, phonologically preferable, exponents. All this is shown schematically in (14) (where markers blocked by a FCR are crossed out, and markers chosen by PMS have boxes around them).

(14) *Deriving the paradigm*

	[–pron]	[+pron]
NOM	[Ø] > ne > se > de > Gale	[Ø] > ne > se > de > Gale
GEN	~~Ø~~ > [ne] > se > de > Gale	~~Ø~~ > [ne] > se > de > Gale
ACC	~~Ø~~ > [ne] > se > de > Gale	~~Ø~~ > ~~ne~~ > ~~se~~ > [de] > Gale
DAT	~~Ø~~ > ~~ne~~ > ~~se~~ > [de] > Gale	~~Ø~~ > ~~ne~~ > ~~se~~ > [de] > Gale
ABL	~~Ø~~ > ~~ne~~ > [se] > ~~de~~ > Gale	~~Ø~~ > ~~ne~~ > [se] > ~~de~~ > Gale
INS	~~Ø~~ > ~~ne~~ > ~~se~~ > ~~de~~ > [Gale]	~~Ø~~ > ~~ne~~ > ~~se~~ > ~~de~~ > [Gale]

3. Discussion and Outlook

3.1 The PMS/FCR-Based Approach to Bidirectionality

To sum up so far, I have shown that the declension system of Bonan, including particularly its overlapping syncretism domains in the genitive, accusative, and dative, can straightforwardly be accounted for in a radically non-morphemic approach where exponents are not associated with any morpho-syntactic feature specification. In the present approach, the task of correlating form and function is mainly accomplished by four feature co-occurrence restrictions (FCRs). However, the FCRs talk about natural classes of exponents rather than about exponents as such, and the classes are phonologically defined, not in terms of morpho-syntactic features. Furthermore, the FCRs do not state what specification an exponent can have; rather, they state what specifications it is incompatible with. In addition, marker competition is resolved by Phonology-driven Marker Selection (PMS) rather than by some notion of Specificity Principle. The resulting analysis requires four simple rules (viz., the partly overlapping FCRs), plus one principle resolving the competition, to correctly account for the distribution of five exponents. I take this to be an optimal state of affairs.

At this point, the central remaining question is whether this result can be generalized, i.e., whether a PMS/FCR-based approach to inflectional morphology may prove tenable for other inflectional systems – both those instantiating "standard" patterns of syncretism, and those instantiating patterns of bidirectional syncretism that have proven difficult to account for in

well-established approaches based on underspecification and specificity. As for the former, the issue can of course be decided only if many more inflectional systems are considered in detail from the present perspective. However, all instances of syncretism in the system of German declension (which does not instantiate bidirectionality, but nevertheless involves discontinuous occurrences of markers in a paradigm that pose insurmountable problems for a unified treatment of all markers in standard approaches) can be derived systematically in the approach in Müller (2002) (see footnote 9). This fact may arguably be taken to hold some promise; and I do not foresee any major problems with less complicated systems of inflection either.

As for other instances of bidirectional syncretism as they are discussed in Stump (2001) and Baerman et al. (2005), I think that the question must be addressed on a case-by-case basis. The present approach to bidirectional syncretism differs from the approaches given in Stump (2001) and Baerman et al. (2005) in that it does not assume that there is anything inherently "bidirectional" going on in the paradigms that should be reflected in a synchronic analysis. However, closer inspection reveals that things are not so clear in the approaches just mentioned either. To see this, let me briefly digress, and pursue the question as to what extent Stump's and Baerman, Brown, & Corbett's analyses reflect bidirectionality.

3.2 Bidirectional Syncretism and Rules of Referral

Stump (2001, 219) develops an intricate and, in my view, elegant analysis of bidirectional syncretism that centers around a *Bidirectional Referral Principle*. This meta-principle ties the existence of one rule of referral to the existence of another, complementary rule of referral. It is given in (15).

(15) *Bidirectional Referral Principle*
The existence of a rule of referral '$RR_{n,\tau,\mathbf{C}}(<X,\sigma>) =_{def} <Y,\sigma>$, *where* $Nar_n(<X,\sigma/\rho>) = <Y,\sigma/\rho>$' with referral domain D entails the existence of a second rule of referral '$RR_{n,\tau/\rho,\mathbf{D-C}}(<X,\sigma>) =_{def} <Y,\sigma>$, *where* $Nar_n(<X,\sigma/\tau>) = <Y,\sigma/\tau>$' with referral domain D.

Here, RR stands for a realization rule that is a rule of referral which states that the exponent for some fully specified morpho-syntactic context σ is going to be the one determined independently (by some other RR) for a minimally different fully specified morpho-syntactic context in which σ is changed by ρ; n designates the number of the block in which the rule applies (this becomes relevant when more than one inflection marker is added to the stem, and it mimicks morpheme positions in other approaches; see Anderson (1992)); τ encodes a (possibly underspecified) well-formed set of morpho-syntactic features that the rule realizes by its application; C is the domain in which the rule is applicable (e.g., nouns, or certain kinds of nouns); X stands for the wordform before the application of the rule, and Y stands for the form yielded by the application of the rule (simplifying a bit, Y differs from X in that it has the exponent introduced by the rule added to X); and Nar_n designates the most specific rule that is applicable in block n.

So far, this is the canonical approach to inflectional morphology in Stump (2001). However, in the context of the Bidrectional Referral Principle, one important additional stipulation must be made, viz., that every rule of referral $RR_{n,\tau,C}$ has a *referral domain* D associated with it, in addition to the domain in which it can apply (C). C must be a subset of D. Two possibilities

arise: C may be a proper subset of D, or it may be identical to D. If there is a proper subset relation (i.e., referral domain (D) and domain of application (C) are not identical in a rule), the Bidirectional Referral Principle implies the existence of an inverse rule in which the domain of application is changed from C to the complement of C in D (the relevant items are set in boldface in (15)). On the other hand, the referral domain D may be identical to the domain of application C (i.e., C may not be a proper subset); in that case, (15) does not have any further consequences because the inverse rule triggered by (15) must apply to an empty set of expressions.

Stump illustrates the Bidirectional Referral Principle with data from Rumanian verb inflection: In all verb inflection classes except conjugation 1, 1.SG and 3.PL exponents are identical in indicative paradigms. Sometimes, 3.PL is considered the dependent part (based on evidence from conjugation 1, where the same ending (*-u*) shows up *only* in 1.SG contexts); but with the verb *a fi* ('to be'), 1.SG. is assumed to be the dependent part (because the stem *sínt* for both 1.SG and 3.PL occurs throughout in the plural). Stump argues that there is a rule of referral as in (16-a), which has only the verb *a fi* as its application domain, and which has associated with it a domain of referral V (i.e., the set of all verbs). The Bidirectional Referral Principle then predicts that there must also be the inverse rule of referral in (16-b), with V-*a fi* as the application domain. Whereas (16-a) assigns the 3.PL exponent to 1.SG contexts, (16-b) assigns the 1.SG exponent to 3.PL contexts. (Both rules are slightly simplified here.)

(16) a. $RR_{0/1,\{agr(su):\{per:1,num:sg\}\},a\ fi}(<X,\sigma>) =_{def} <Y,\sigma>$, where
$Nar_n(<X,\sigma/\{AGR(su):\{PER:3,NUM:pl\}\}>) =$
$<Y,\sigma/\{agr(su):\{per:3,num:pl\}\}>$ Referral domain: V

b. $RR_{0/1,\{agr(su):\{per:3,num:pl\}\},V-a\ fi}(<X,\sigma>) =_{def} <Y,\sigma>$, where
$Nar_n(<X,\sigma/\{AGR(su):\{PER:1,NUM:sg\}\}>) =$
$<Y,\sigma/\{AGR(su):\{PER:1,NUM:sg\}\}>$ Referral domain: V

Turning next to the Bonan paradigm in (1), one might hope that the same kind of analysis can be given. However, this is not the case. Thus, suppose that there is a rule of referral like (17-a) with the set of nouns as the application domain (= C) and a more comprehensive referral domain comprising nouns and pronouns (= D), that states that the exponent for ACC contexts is the exponent determined by the most specific rule applicable in GEN contexts (see (2-a)). The Bidirectional Referral Principle would then predict the existence of the inverse rule in (17-b) with the complement of the set of nouns in D (i.e., only the set of pronouns) as the domain of application, and the choice of the exponent for GEN determined by the exponent selected for ACC contexts. But this is not what we want to derive: It is not the GEN exponent that is introduced by referral in the case of pronouns in Bonan, but the ACC exponent, and the referral does not go to ACC, but to DAT (see (2-b)).

(17) a. $RR_{1,\{acc\},N}(<X,\sigma>) =_{def} <Y,\sigma>$, where $Nar_n(<X,\sigma/\{gen\}>) =$
$<Y,\sigma/\{gen\}>$ Referral domain: N∪Pron

b. $RR_{1,\{gen\},N\cup Pron-N}(<X,\sigma>) =_{def} <Y,\sigma>$, where
$Nar_n(<X,\sigma/\{acc\}>) = <Y,\sigma/\{acc\}>$ Referral domain: N∪Pron

In view of this different behaviour of two kinds of bidirectional syncretisms, Baerman et al.

(2005) propose to distinguish between *divergent* bidirectional syncretism (as in Rumanian conjugation), and *convergent* bidirectional syncretism (as in Bonan declension). Only the former type lends itself to an analysis in terms of the Bidirectional Referral Principle. We may thus conclude that an account of convergent bidirectional syncretism in Stump's (2001) approach will most likely involve referral, but the two relevant rules must be stipulated separately (more or less as in (2)). Consequently, the concept of bidirectionality is not built into the analysis of a bidirectional syncretism in this case.[16]

This latter consequence holds more generally in Baerman et al.'s (2005) approach. To the extent that formal analyses of instances of (either kind of) bidirectional syncretism are provided, these analyses rely on rules of referral that are not intrinsically related. Thus, it seems fair to conclude that bidirectionality as a concept of grammatical theory is in fact not incorporated into Baerman et al.'s (2005) analysis at all. More generally, this may be taken to indicate that there is nothing a priori wrong with an analysis of bidirectional syncretism that does not reflect bidirectionality in the analysis itself. This leads me back to the present approach.[17]

3.3 Further Cases of Bidirectional Syncretism

On this basis, I would like to return to the original question of whether the present approach can be applied to other instances of bidirectional syncretism (of either the convergent or the divergent type). I will go through two further relevant paradigms, and consider what the PMS/FCR-approach might have to say about them.

3.3.1 Gujarati Conjugation

Consider first another convergent bidirectional syncretism, viz., future tense verb inflection in Gujarati (see Baerman et al. (2005, 70) and literature cited there). The paradigm is given in (18).

(18) *Gujarati conjugation, future tense*

	I	II
1.SG	-iš	-iš
2.SG	-iš	-še
3.SG	-še	-še
1.PL	-š(i)ũ	-š(i)ũ
2.PL	-šo	-šo
3.PL	-še	-še

[16] Strictly speaking, there is nothing in the *structure* of the paradigm in (1) that makes the bidirectional syncretism in Bonan convergent (Lennart Bierkandt, p.c.). If the paradigm is rotated by 90 degrees, it looks exactly like all the paradigms instantiating divergent bidirectional syncretism in Baerman et al. (2005). That the syncretism cannot be accounted for by invoking the Bidirectional Referral Principle is solely due to the fact that in (15), τ would have to encode part of speech (N vs. Pron) (rather than case) as the (possibly underspecified) feature set characterising an exponent, and C would have to encode case (rather than, e.g., N) as the application domain.

[17] Note, however, that even if bidirectionality is not reflected in the synchronic analysis, the present approach is perfectly compatible with the possibility that patterns of bidirectional syncretism may have arisen historically as a result of some referral-like process.

Note that I and II are not inflection classes in the traditional sense; rather, they represent two freely alternating strategies of realizing 2.SG (I and II are otherwise identical): 2.SG exponents may be taken over from 1.SG contexts (I) or from 3.SG contexts (II). Here is a sketch of what may be said about this paradigm in a PMS/FCR-based approach. First, /iš/ is an onset-less VC form whereas the other exponents take the form CV; therefore /iš/ will form a coda and violate the markedness constraint demanding alignment with a left syllable boundary. Second, given that round vowels are more marked than unround vowels, /še/ is phonologically preferable to /šo/ and /šũ/. Third and finally, /šo/ is more phonologically well-formed than /šũ/ as far as sonority is concerned (thereby providing a better nucleus). Taken together, this yields the order in (19).

(19) *Phonological wellformedness scale for vowel exponents in Gujarati verb inflection*
/še/ $>$ /šo/ $>$ /šũ/ $>$ /iš/

Next, consider the following three FCRs:[18]

(20) a. FCR 5: [–1,–3],[+pl] $\supset$ ¬[–back] */še/, */iš/
b. FCR 6: [+1,–3] $\supset$ ¬[–high] */še/, */šo/
c. FCR 7: [+1,–3],[–pl] $\supset$ ¬[onset] */še/, */šo/, */šũ/

Given PMS, these FCRs derive the paradigm of future verb inflection in Gujarati, except for 2.SG forms in option I. Here, two possibilities arise. The first one is that the optionality of choosing pattern I or pattern II is derived by assuming that the feature [+1] is only optionally present in FCR 7: If it is, /-še/ is used in 2.SG contexts; if it is not (i.e., if only [–3] remains), all the more phonologically well-formed markers are blocked both in 1.SG *and* 2.SG contexts, and /-iš/ is chosen instead. Alternatively, it could be assumed that since I and II represent different inflectional patterns, they instantiate two separate inflection classes, with all verb stems freely alternating between the two classes. On this view, there could be an additional FCR 8 that blocks */še/, */šo/, and */šũ/ in 2.SG contexts. FCR 7 might then perhaps be slightly restricted in its application; cf. (21) (where FCR 7′ would replace FCR 7).

(21) a. FCR 7′: [+1,–3],[–pl] $\supset$ ¬[+high,+back] */šũ/
b. FCR 8: [–3],[–pl],[I] $\supset$ ¬[onset] */še/, */šo/, */šũ/

[18] A few remarks are due on the features employed by these FCRs. Since 1. and 2. person may systematically be syncretic in the world's languages (see Cysouw (2001), Baerman et al. (2005)), there is good reason to assume that these two persons form a natural class; I follow Trommer (2006a,b) in assuming that this class can be referred to by the feature [–3] (where [+3] stands for 3. person); see also Nevins (2007). The difference between 1. and 2. person can then be captured by a feature [$\pm$1]. (In order to account for 1./3. person syncretisms – as, e.g., in SG.PAST contexts in the Germanic languages – and to define 1.INCL properly, reference to a third feature [$\pm$2] is probably unavoidable, but I will abstract from that in the present context.)
As for the phonological features, the FCRs freely draw on both segmental information (features of the exponent's vowel in FCR 5 and FCR 6) and suprasegmental information (whether or not the exponent is per se equipped with an onset, in FCR 7).

Under both approaches, the picture in (22) arises; note that neither of the analyses employs more rules than markers.

(22) *Deriving the paradigm*

	I	II
1.SG	~~še~~ > ~~šo~~ > ~~šũ~~ > [iš]	~~še~~ > ~~šo~~ > ~~šũ~~ > [iš]
2.SG	~~še~~ > ~~šo~~ > ~~šũ~~ > [iš]	[še] > šo > šũ > iš
3.SG	[še] > šo > šũ > iš	[še] > šo > šũ > iš
1.PL	~~še~~ > ~~šo~~ > [šũ] > iš	~~še~~ > ~~šo~~ > [šũ] > iš
2.PL	~~še~~ > [šo] > šũ > ~~iš~~	~~še~~ > [šo] > šũ > ~~iš~~
3.PL	[še] > šo > šũ > iš	[še] > šo > šũ > iš

3.3.2 Latin Declension

Consider next the divergent bidirectional syncretism in the singular of Latin *o*-declensions that figures prominently in Baerman et al. (2005, 134-136 & 139-142) (also see Xu (2007)). The paradigm is shown in (23).

(23) *Latin o-declension, singular*

	NEUT_a	MASC	NEUT_b
	bell- (‘war’)	serv- (‘slave’)	vulg- (‘crowd’)
NOM	-um	-us	-us
ACC	-um	-um	-us
GEN	-ī	-ī	-ī
DAT	-ō	-ō	-ō
ABL	-ō	-ō	-ō

Assuming the masculine noun stems that take /us/ in the nominative and /um/ in the accusative to be basic, the regular neuter inflection (NEUT_a) in these environments can be described in terms of a take-over of the accusative marker for nominative contexts. However, for the few neuter noun stems that instantiate the third pattern (NEUT_b), the take-over then goes in the opposite direction, such that the nominative marker is also used for accusative contexts. On this view, there is a bidirectional syncretism in (23).[19]

A proper account of this bidirectional syncretism will ultimately have to be embedded in an analysis of the whole system of Latin declension, which is beyond the scope of the present paper. In addition, I take it to be far from clear that the pattern associated with NEUT_b is to be viewed as fully systematic, and to be treated on a par with other syncretisms; and even if full systematicity is assumed, one might still make a case that this kind of syncretism with virtually all neuters in Indo-European languages should be accounted in some different way that reflects its probable functional origin (essentially, the absence of a need for differential object marking;

[19] This syncretism can be derived by invoking the Bidirectional Referral Principle if we assume that the application domain (C) of one rule of referral is the set of regular neuter noun stems, with the whole set of neuter noun stems as the referral domain (D). This justifies labelling the syncretism as “divergent”.

see Comrie (1978)).[20] Still, abstracting away from these caveats, it is at least worth noting that the pattern in (23) can be derived in a PMS/FCR-based analysis without much ado.

First, closer scrutiny of the complete system of declension in Latin reveals that there is good reason to assume that seemingly primitive exponents are to be broken up into sequences of smaller exponents with segmental (and even suprasegmental) status; such a subanalysis has been argued for in detail by Wiese (2003b). In line with this, I assume that markers like *um* and *us* are composed of two exponents – a first vowel exponent /-u/, and a second consonant exponent /-m/. Accordingly, there are also two slots in genitive, dative, and ablative contexts, with the first posistion occupied by a vowel marker, and the second one occupied by /Ø/ (equivalently, remaining empty). Since bidirectional syncretism only shows up with the second exponent, the main focus can be on FCRs affecting the distribution of /Ø/, /m/, and /s/ for present purposes.

As far as the FCRs are concerned that govern the distribution of these subanalyzed markers, we must ensure that they hold only for certain slots in a sequence of inflectional exponence. Note that this consequence is completely analogous to the comparable situation with standard morphological approaches that correlate exponents with feature specifications, and one may technically implement this in more or less any of the ways that have been proposed in standard approaches. Thus, one may assume that FCRs bear block indices (in analogy to rule blocks, as in Anderson (1992), Stump (2001)). Another possibility would be to assume FCRs to restrict insertion of maximally phonologically well-formed into specific functional heads; these could be encoded as features in the part to the left of $\supset$ in the respective FCR's statement (in analogy to insertion contexts in Distributed Morphology, as in Halle & Marantz (1993)).

For the sake of concreteness, suppose that there is a set of FCRs for block I whose interaction with PMS ensures the occurrence of /oː/ in dative and ablative contexts (possibly because no FCR_I is active here); of /u/ in nominative and accusative contexts (perhaps because a FCR_I blocks /o/ in nominative and accusative contexts); and of /iː/ in genitive contexts (where /oː/ and /u/ may be blocked by a second FCR_I). Next, by assumption, the inventory of markers available for block II is the set {/Ø/, /m/, /s/} (as long as we restrict attention to *o*-declension noun stems, that is), with PMS favouring /Ø/ over /m/, and /m/ over /s/. The three FCRs for block II in (24) then account for the distribution of these three exponents.

(24) a. FCR_II 9: [–obl] $\supset \neg$[Ø] */Ø/

[20] The only exception seems to be the case of animate neuters in Russian, which exhibit different forms for nominative and accusative in the plural; see Corbett & Fraser (1993) and Krifka (2009), among others. Note incidentally that Russian also exhibits a bidirectional syncretism that looks very much like the one in Bonan: With (regular) masculines in the singular, and with all kinds of nouns in the plural, the accusative takes the form of the nominative with stems that are [–animate], and it takes the form of the genitive with stems that are [+animate]. This looks a lot like an instance of functionally motivated differential object marking, and it is not clear to me whether an attempt should be made to account for it by regular rules of exponence, or whether it should be treated by some separate mechanism (like, e.g., rules of referral, or feature-changing impoverishment). See Corbett & Fraser (1993) and Müller (2004) for versions of the latter option; Wunderlich (2004) for the former approach; and Baerman et al. (2005, 145-150) for a critique of Wunderlich (2004) that inter alia argues that his analysis depends on more than mere rules of exponence (viz., feature deletions brought about by optimality-theoretic competitions). I will leave this matter undecided; but the Russian case should in principle be amenable to the same kind of analysis as its Bonan counterpart under present assumptions.

b. FCR_{II} 10: [–masc,–fem,+α] $\supset$ ¬[+sonorant] */m/

c. FCR_{II} 11: [+subj,–obj,–obl],[+α] $\supset$ ¬[–cons$_b$] */Ø/, */m/

Here, [–cons$_b$] encodes the natural class formed by the two exponents (out of the three exponents of the inventory for block II) that are less consonantal than the third one (here I make the controversial assumption that Ø is integrated into the sonority hierarchy, at least for the purpose of natural class determination; see footnote 10 above). The specification [+subj,–obj,–obl] identifies the nominative, as above; suppose that [–obl] covers accusative and nominative (but not genitive, unlike what is the case in Bonan).[21] Furthermore, we must be able to refer to (i) the exceptional neuter declension as an inflection class, and (ii) a natural class of inflection classes composed of the masculine declension and the exceptional neuter declension. I adopt the view that natural classes of inflection classes can be formed by decomposing standard inflection class features into primitive binary features (see Halle (1992, 38), Oltra Massuet (1999, 11), Stump (2001, 34), Alexiadou & Müller (2008, 108ff), and Trommer (2008, 212ff), among others). The masculine and exceptional neuter declensions can then be assumed to share an abstract inflection class feature [+α] that separates them from other declensions (including the regular neuter declension); neuter itself can be defined as [–masc,–fem] (although nothing depends on this in the present context).[22]

(25) shows how the (partial) paradigm in (23) can be derived by PMS on this basis. The divergent bidirectional syncretism is accounted for, and in a simple way: The analysis does not rely on more rules than there are markers.

(25) *Deriving the paradigm*

	[–masc,–fem,–α]	[+masc,–fem,+α]	[–masc,–fem,+α]
NOM	~~/Ø/~~ > **/m/** > /s/	~~/Ø/~~ > ~~/m/~~ > **/s/**	~~/Ø/~~ > ~~/m/~~ > **/s/**
ACC	~~/Ø/~~ > **/m/** > /s/	~~/Ø/~~ > **/m/** > /s/	~~/Ø/~~ > ~~/m/~~ > **/s/**
GEN	**/Ø/** > /m/ > /s/	**/Ø/** > /m/ > /s/	**/Ø/** > ~~/m/~~ > /s/
DAT	**/Ø/** > /m/ > /s/	**/Ø/** > /m/ > /s/	**/Ø/** > ~~/m/~~ > /s/
ABL	**/Ø/** > /m/ > /s/	**/Ø/** > /m/ > /s/	**/Ø/** > ~~/m/~~ > /s/

3.4 Concluding Remarks

On the basis of the analysis of convergent bidirectional syncretism in Bonan noun inflection, and of the sketches of analyses of convergent bidirectional syncretism in Gujarati verb inflection and divergent bidirectional syncretism in Latin noun inflection, I think one can venture the hypothesis that an PMS/FCR-based approach to bidirectional syncretism in inflectional morphology is an appropriate means to account for bidirectional syncretism more generally. Other cases of bidirectional syncretism that have been reported in the literature do not appear to pose

[21] More generally, the genitive has properties of both oblique and non-oblique cases across languages, so it does not come as a surprise if there is some variation in this domain. Note furthermore that beyond these considerations, the issue of how the cases are fully characterized by primitive case features in Latin does not have to be decided here.

[22] See, e.g., Bierwisch (1967) for independent evidence that masculine and neuter form a natural class (that can be referred to by [–fem]) for morphological purposes in Indo-European languages.

a new obstacle for the present approach, and lend themselves to the same kind of analysis. For instance, this holds for the convergent bidirectional syncretism in Lak declension (see Baerman et al. (2005, 50)), for the divergent bidirectional syncretism in Rumanian conjugation (see Stump (2001, 213-222)), and for the divergent bidirectional syncretism in Classical Arabic declension (see Baerman et al. (2005, 142-143)). As a matter of fact, there is at least one case of a putatively divergent bidirectional syncretism that raises problems for an approach in terms of bidirectional referral but would seem to lend itself to an analysis in terms of FCRs, viz., noun declension in Diyari (see Baerman et al. (2005, 143-144), with data taken from Austin's (1981) grammar). The following paradigm is taken from Bierkandt (2006, 51) (it is slightly more comprehensive than the version in Baerman et al. (2005)).

(26) *Diyari declension*

	NOUN.SG	NOUN.NON-SG	NAME.MALE	NAME.FEM
ERG	-li	-li	-li	-ndu
NOM	-Ø	-Ø	-ɳa	-ni
ACC	-Ø	-ɳa	-ɳa	-ɳa
DAT	-ja	-ɳi	-ɳi	-ɳa-ŋka
ALL	-ja	-ŋu	-ŋu	-ɳa-ŋu
LOC	-ɳi	-ŋu	-ŋu	-ɳa-ŋu
ABL	-ndu	-ŋu-ndu	-ŋu-ndu	-ŋu-ndu
	PRON.1/2.SG, 3FEM	PRON.3.SG, NON-FEM	PRON.1/2.NON-SG	PRON.3.NON-SG
ERG	-ndu	-li	-Ø	-li
NOM	-ni	-Ø	-Ø	-Ø
ACC	-ɳa	-ɳa	-ɳa	-ɳa
DAT	-ɳi	-ɳi	-ɳi	-ɳi
ALL	-ŋu	-ŋu	-ŋu	-ŋu
LOC	-ŋu	-ŋu	-ŋu	-ŋu
ABL	-ŋu-ndu	-ŋu-ndu	-ŋu-ndu	-ŋu-ndu

Baerman et al. (2005, 144) observe that the Diyari paradigm involves overlapping syncretism domains. On their view, /-ɳa/ is an accusative form that one inflection class (viz., male personal names) also uses in nominative (absolutive) contexts; and /-Ø/ is a nominative (absolutive) form that is also used in the accusative by singular nouns. Notwithstanding the problem posed by the slightly more general distribution of /-Ø/ (which Baerman et al. (2005) tackle in a footnote), it seems clear that /-ɳa/ has inherently a much wider distribution than just the accusative, in the female name declension: Exactly the same exponent shows up as the first part of a composite marker in dative, allative, and locative contexts with female names (with two different exponents able to follow it). It is therefore unclear why an occurrence of /-ɳa/ in the nominative in one declension should be treated differently (viz., as an instance of a bidirectional syncretism) from an occurrence of /-ɳa/ in other object cases in another declension. Consequently, there is no

pattern of bidirectionality left in the data: There are three types of occurrences of /-n̪a/ that must be captured by three distinct rules (or lexical entries) in standard underspecification-based approaches (as they are in the Distributed Morphology analysis advanced in Bierkandt (2006, 58), with /-Ø/ as the elsewhere marker). An approach in terms of directional rules of referral will minimally have to postulate two separate rules of referral to cover the distribution of /-n̪a/, with no bidirectionality involved (since spreading goes from a single source – accusative – to two different domains – nominative, oblique). In contrast, it seems that the present analysis might have a chance of deriving all occurrences of /-n̪a/ systematically, via various FCRs that block this marker in many paradigm domains, each of which corresponds to a natural class. But again, for reasons of space of coherence, I will have to leave it at that for now (the declension system of Diyari is fairly complex, and would certainly require a separate, in-depth investigation).

3.5 Conclusion

To conclude, in this paper I have developed a radically non-morphemic approach to syncretism (bidirectional and other) that relies on sonority-driven marker selection (PMS) and feature co-occurrence restrictions (FCRs), and that does not correlate exponents directly with a morpho-syntactic specification, like virtually all existing theories do. That said, closer inspection suggests that the present approach is not exactly outrageously original (even abstracting away from the direct predecessor mentioned in footnote 9 above). From a more general point of view, it can be noted that the analyses developed here are to some extent reminiscent of optimality-theoretic approaches to phonologically conditioned allomorphy; see McCarthy (2002) for an overview. In particular, it resembles the approach to allomorphy developed in Mascaró (1996), where, e.g., the Catalan personal article is represented by a set containing two forms in the input ({/*en*/, /*l*′/}), and the choice among them is determined by markedness constraints encoding restrictions on phonological wellformedness (which require syllables to have onsets, in the case at hand); similarly for the choice from the allomorph set {/*bo*/, /*bɛl*/} ('beautiful') in French, where the optimal output may be unfaithful to gender information in the input in order to accomodate phonological wellformedness restrictions. There is one important difference, though: Of the initially competing items, only those are subject to selection by phonological wellformedness constraints that pass the system of feature co-occurrence restrictions in the present approach; in contrast, in optimality-theoretic approaches to allomorphy of the type just mentioned, phonological wellformedness constraints select among all initially competing items.

At this point, I would like to contend that the present approach is currently the only one that can derive bidirectional syncretism in the same way that it derives standard instances of syncretism. It may therefore be well worth pursuing, even though it clearly requires a radical rethinking of many traditional concepts and analyses in morphological theory (most specifically, the assumption that inflection markers are accompanied by morpho-syntactic specifications); and it goes without saying that it raises many new questions. To end this paper, let me briefly mention a few obvious ones: First, will all inflectional morphology have to be viewed as radically non-morphemic? Here the most straightforward answer would seem to be affirmative, from a conceptual point of view. The selection procedures would typically be simpler than the ones discussed in the present paper in those cases where there is no apparent mismatch between form and function as it arises with syncretism (bidirectional or otherwise). Neverthe-

less, it is conceivable that unexpected problems may arise in this domain (concerning, e.g., the availability of phonologically defined natural classes of exponents required in each case for a FCR), which might then perhaps argue for a more standard approach that pairs phonological with morpho-syntactic features on an inflectional exponent.

Second, what about sequences of distinct inflectional markers, as they are standardly modelled by invoking separate functional heads as targets for morphological realization (in Distributed Morphology), by invoking the concept of rule blocks (in, e.g., Paradigm Function Morphology), or by invoking templates consisting of sequences of designated (numbered) positions (in more descriptive approaches)? Here it will presumably suffice, for simple cases, to assume that (i) the FCRs are restricted to single slots (functional heads, rule blocks, etc.), and (ii) there are separate inventories of inflectional exponents for each of these slots, more or less as envisaged for Latin declension above. However, it is not immediately clear whether this approach can be generalized from the simple cases, where the different slots correspond to clearly defined grammatical categories (e.g., one slot for case, one for number, etc.), and slots are uniquely matched by exponents, to more complex configurations. In the latter, two or more slots may correspond to only one grammatical category (i.e., cases of extended exponence, in the sense of Matthews (1972, 1974); but see Müller (2007) for an analysis of extended exponence that would avoid the problem for the present approach); or it may look as though there is a mismatch of slots and exponents (e.g., two or more slots correspond to only one exponent, as in portmanteau contexts, or two or more exponents correspond to only one slot, as in cases of subanalysis that can be derived by feature decomposition and Noyer's (1992), Trommer's (1999), and Frampton's (2002) concept of fission in Distributed Morphology). Still, in each of these cases, it would seem likely that solutions that have been proposed in the literature may in principle also work for the radically non-morphemic approach.

Finally, how does acquisition of inflectional systems take place under the present perspective? It is clear that algorithms as they have been proposed for standard (underspecification-based) approaches (see Pertsova (2007), Bank & Trommer (2011)) cannot be maintained in the non-morphemic approach. For the time being, I will have to leave open the question of whether a simple learning algorithm (that would mainly have to target the sequence of FCR generation) is readily available.

References

Aissen, Judith (1999): Markedness and Subject Choice in Optimality Theory, *Natural Language and Linguistic Theory* 17, 673–711.

Aissen, Judith (2003): Differential Object Marking: Iconicity vs. Economy, *Natural Language and Linguistic Theory* 21, 435–483.

Alexiadou, Artemis & Gereon Müller (2008): Class Features as Probes. In: A. Bachrach & A. Nevins, eds., *Inflectional Identity*. Oxford University Press, Oxford, pp. 101–155.

Anderson, Stephen (1992): *A-Morphous Morphology*. Cambridge University Press, Cambridge.

Aronoff, Mark (1994): *Morphology by Itself*. MIT Press, Cambridge, Mass.

Austin, Peter (1981): *A Grammar of Diyari, South Australia*. Cambridge University Press, Cambridge.

Baerman, Matthew (2005): Directionality and (Un)Natural Classes in Syncretism, *Language* 80, 807–824.

Baerman, Matthew, Dunstan Brown & Greville Corbett (2005): *The Syntax-Morphology Interface. A Study of Syncretism*. Cambridge University Press, Cambridge.

Bank, Sebastian & Jochen Trommer (2011): Learning and the Complexity of Ø-Affixation. Ms., Universität Leipzig.

Bierkandt, Lennart (2006): Kasusmorphologie des Diyari. Ein Ansatz im Rahmen der Distribuierten Morphologie. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 43–62.

Bierwisch, Manfred (1967): Syntactic Features in Morphology: General Problems of So-Called Pronominal Inflection in German. In: *To Honor Roman Jakobson*. Mouton, The Hague/Paris, pp. 239–270.

Chomsky, Noam & Morris Halle (1968): *The Sound Pattern of English*. MIT Press, Cambridge, Mass.

Comrie, Bernard (1978): Morphological Classification of Cases in the Slavonic Languages, *The Slavonic and East European Review* 56, 177–191.

Corbett, Greville & Norman Fraser (1993): Network Morphology: A DATR Account of Russian Nominal Inflection, *Journal of Linguistics* 29, 113–142.

Cysouw, Michael (2001): The Paradigmatic Structure of Person Marking. PhD thesis, Katholieke Universiteit Nijmegen. Revised version published 2003: Oxford University Press.

de Lacy, Paul (2002): The Formal Expression of Markedness. PhD thesis, University of Massachusetts, Amherst.

Frampton, John (2002): Syncretism, Impoverishment, and the Structure of Person Features. In: M. Andronis, E. Debenport, A. Pycha & K. Yoshimura, eds., *Papers from the Chicago Linguistics Society Meeting*. Vol. 38, Chicago, pp. 207–222.

Franks, Steven (1995): *Parameters of Slavic Morphosyntax*. Oxford University Press, New York and Oxford.

Fried, Robert Wayne (2010): A Grammar of Bao′an Tu, a Mongolic Language of Northwest China. PhD thesis, State University of New York, Buffalo.

Gazdar, Gerald, Ewan Klein, Geoffrey Pullum & Ivan Sag (1985): *Generalized Phrase Structure Grammar*. Blackwell, Oxford.

Halle, Morris (1992): The Latvian Declension. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 1991*. Kluwer, Dordrecht, pp. 33–47.

Halle, Morris (1997): Distributed Morphology: Impoverishment and Fission. In: B. Bruening, Y. Kang & M. McGinnis, eds., *Papers at the Interface*. Vol. 30, MITWPL, pp. 425–449.

Halle, Morris & Alec Marantz (1993): Distributed Morphology and the Pieces of Inflection. In: K. Hale & S. J. Keyser, eds., *The View from Building 20*. MIT Press, Cambridge, Mass., pp. 111–176.

Jakobson, Roman (1962): Morfologičeskije Nabljudenija. In: *Selected Writings*. Vol. 2, Mouton, The Hague and Paris, pp. 154–181.

Krifka, Manfred (2009): Case Syncretism in German Feminines: Typological, Functional and Structural Aspects. In: P. Steinkrüger & M. Krifka, eds., *On Inflection*. Mouton de Gruyter,

Berlin, pp. 141–172.

Legendre, Géraldine, Paul Smolensky & Colin Wilson (1998): When is Less More? Faithfulness and Minimal Links in Wh-Chains. In: P. Barbosa, D. Fox, P. Hagstrom, M. McGinnis & D. Pesetsky, eds., *Is the Best Good Enough?*. MIT Press and MITWPL, Cambridge, Mass., pp. 249–289.

Mascaró, Joan (1996): External Allomorphy as Emergence of the Unmarked. In: J. Durand & B. Laks, eds., *Current Trends in Phonology: Models and Methods*. European Studies Research Institute, University of Salford, Salford, Manchester, pp. 473–483.

Matthews, Peter (1972): *Inflectional Morphology: A Theoretical Study Based on Aspects of Latin Verb Conjugation*. Cambridge University Press, Cambridge.

Matthews, Peter (1974): *Morphology*. Cambridge University Press, Cambridge.

McCarthy, John (2002): *A Thematic Guide to Optimality Theory*. Cambridge University Press, Cambridge.

Müller, Gereon (2002): Remarks on Nominal Inflection in German. In: I. Kaufmann & B. Stiebels, eds., *More than Words: A Festschrift for Dieter Wunderlich*. Akademie Verlag, Berlin, pp. 113–145.

Müller, Gereon (2003): Zwei Theorien der pronominalen Flexion im Deutschen (Versionen Standard und Mannheim), *Deutsche Sprache* 30, 328–363.

Müller, Gereon (2004): A Distributed Morphology Approach to Syncretism in Russian Noun Inflection. In: O. Arnaudova, W. Browne, M. L. Rivero & D. Stojanovic, eds., *Proceedings of FASL 12*. University of Ottawa.

Müller, Gereon (2007): Extended Exponence by Enrichment. Argument Encoding in German, Archi, and Timucua. In: T. Scheffler, J. Tauberer, A. Eilam & L. Mayol, eds., *Proceedings of the 30th Annual Penn Linguistics Colloquium*. Vol. 13.1 of *Penn Working Papers in Linguistics*, University of Pennsylvania, Philadelphia, pp. 253–266.

Nevins, Andrew (2007): The Representation of Third Person and Its Consequences for Person-Case Effects, *Natural Language and Linguistic Theory* 25, 273–313.

Noyer, Rolf (1992): Features, Positions, and Affixes in Autonomous Morphological Structure. PhD thesis, MIT, Cambridge, Mass.

Oltra Massuet, Isabel (1999): On the Notion of Theme Vowel: A New Approach to Catalan Verbal Morphology. Master of science thesis, MIT, Cambridge, Mass.

Pertsova, Katya (2007): Learning Form-Meaning Mappings in Presence of Homonymy: A Linguistically Motivated Model of Learning Inflection. PhD thesis, UCLA, Los Angeles.

Stump, Gregory (2001): *Inflectional Morphology*. Cambridge University Press, Cambridge.

Todaeva, Buljaš X. (1963): Einige Besonderheiten der Paoan-Sprache, *Acta Orientalia Academiae Scientarium Hungaricae* 16.

Todaeva, Buljaš X. (1966): *Baoanʹskij jazyk*. Nauka, Moskva. pp. 22-28.

Todaeva, Buljaš X. (1997): Baoanʹskij jazyk. In: *Jazyki mira: mongolʹskie jazyki, tungusomanʹčžurskie jazyki, japonskij jazyk, korejskij jazyk*. Indrik, Mosvka, pp. 29–26.

Trommer, Jochen (1999): Morphology Consuming Syntax' Resources. In: *Procceedings of the ESSLI Workshop on Resource Logics and Minimalist Grammars*. University of Nijmegen, pp. 37–55.

Trommer, Jochen (2005): Markiertheit und Verarmung. Ms., Universität Leipzig. Presented at

the Honorary Doctorate Colloquium for Manfred Bierwisch, Leipzig 2005.

Trommer, Jochen (2006a): Plural Insertion is Constructed Plural. In: G. Müller & J. Trommer, eds., *Subanalysis of Argument Encoding in Distributed Morphology*. Vol. 84 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 197–228.

Trommer, Jochen (2006b): Third-Person Marking in Menominee. Ms., Universität Leipzig.

Trommer, Jochen (2008): A Feature-Geometric Approach to Amharic Verb Classes. In: A. Bachrach & A. Nevins, eds., *The Bases of Inflectional Identity*. Oxford University Press, Oxford, pp. 206–236.

Weisser, Philipp (2007): Case Borrowing. In: J. Trommer & A. Opitz, eds., *1 2 Many*. Vol. 85 of *Linguistische Arbeitsberichte*, Universität Leipzig, pp. 23–41.

Wiese, Bernd (1999): Unterspezifizierte Paradigmen. Form und Funktion in der pronominalen Deklination, *Linguistik Online* 4. (www.linguistik-online.de/3_99).

Wiese, Bernd (2003a): Russian Noun Morphology and Underspecified Paradigms. Ms., IDS Mannheim.

Wiese, Bernd (2003b): Zur lateinischen Nominalflexion: Die Form-Funktions-Beziehung. Ms., IDS Mannheim. www.ids-mannheim.de/gra/personal/wiese.html.

Wu, Hugjiltu (2003): Bonan. In: J. Janhunen, ed., *The Mongolic Languages*. Routledge, New York & London, pp. 325–345.

Wunderlich, Dieter (1996): Minimalist Morphology: The Role of Paradigms. In: G. Booij & J. van Marle, eds., *Yearbook of Morphology 1995*. Kluwer, Dordrecht, pp. 93–114.

Wunderlich, Dieter (2004): Is There Any Need for the Concept of Directional Syncretism?. In: G. Müller, L. Gunkel & G. Zifonun, eds., *Explorations in Nominal Inflection*. Mouton de Gruyter, Berlin, pp. 373–395.

Xu, Zheng (2007): An Optimality-Theoretic Account of Full and Partial Identity of Forms. In: T. Scheffler, J. Tauberer, A. Eilam & L. Mayol, eds., *Proceedings of Penn Linguistics Colloquium*. Vol. 13.1, University of Pennsylvania, pp. 421–434.

Zwicky, Arnold (1970): Class Complements in Phonology, *Linguistic Inquiry* 1, 262–264.