Matthew Baerman

Published by Linguistic Society of America

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<https://muse.jhu.edu/article/641201>

SERI VERB CLASSES: MORPHOSYNTACTIC MOTIVATION AND MORPHOLOGICAL AUTONOMY

MATTHEW BAERMAN

Surrey Morphology Group, University of Surrey

The verbal suffixes of Seri (a language isolate of Sonora, Mexico) divide the lexicon into classes of unparalleled complexity. The paradigm has only four forms, which mark subject number and aspect (or event number), yet there are over 250 distinct types in a corpus of just under 1,000 verbs. This relation of forms to types means that by information-theoretic measures this is among the most complex inflection class systems yet studied. In part this complexity is due to the sheer wealth of allomorphs and the freedom with which they combine within the paradigm; however, these properties can be found in all inflection class systems of any complexity. The unique property of Seri is that although the suffix morphology and the morphosyntactic paradigm have the same featural content, the two systems are not directly coordinated. Both suffix morphology and verbal morphosyntax are based on the concatenation of markers of plurality, and an increase in the morphological marking of plurality reflects a morphosyntactic accumulation of subject and predicate plurality (i.e. aspect). In this sense, morphology is a direct exponent of featural content. But there is no consistent mapping between the two systems, and the precise calibration between morphological form and morphosyntactic function must be lexically specified; it is this specification that increases dramatically the number of inflectional types. Seri therefore represents a middle ground between the conceptual extremes of morphosyntactically motivated and morphologically autonomous morphology that serve as a basis for much of our theory building.*

Keywords: inflection, complexity, paradigms, allomorphy, Seri

1. INTRODUCTION. The suffix paradigms of verbs in Seri, a language isolate spoken in the state of Sonora, Mexico, exhibit a proliferation of inflection class distinctions that is probably unmatched by any other known language. The partial paradigms in Table 1 lay out the basic parameters: suffixes mark a combination of subject number (singular ~ plural) and aspect (perfective ~ imperfective), and these suffixes display different allomorphs depending on the lexeme.¹

3SG PFV	3SG IPFV	3PL PFV	3PL IPFV	
intíta	intíta-t	intíta-tox	intíta-toŋka	'go away'
itpím	itpím-tim	itpím-ŋam	itpím-ŋkam	'make leather sandals'
tapóti	tapóti-koŋ	tapóti-tx	tapóti-xam	'duck to avoid'
itapéne	itapéne-tim	itapéne-tax	itapéne-taŋka	'remove thorns (from cactus)'

TABLE 1. Representative allomorphy of subject number and aspect suffixes
(dependent realis forms; Moser & Marlett 2010).

The four types illustrated in Table 1 represent just a small sample of the possible types. In Moser and Marlett's dictionary of 2010, verbs fall into 255 classes (at least) just according to the suffix behavior of these four paradigmatic cells. To give an impression of

* Thanks are due in the first instance to Steve Marlett for extensive discussion and comments on this work, and to the speakers of Seri I consulted in El Desemboque: Mayra Estrella Astorga, Debora Perales Morales, Maria Louisa Astorga, and Karelía Perales Hoeffler. Several colleagues provided valuable input on earlier drafts: Oliver Bond, Patricia Cabredo Hofherr, Marina Chumakina, Greville Corbett, Sebastian Fedden, and Tim Feist. A careful reading by two anonymous referees and *Language* associate editor Karlos Arregi did much to improve the manuscript. I also benefited from the input of audiences at the University of York (2013) and the International Morphology Meeting in Budapest (2014). Special thanks are also due to Cathy and Steve Marlett for the warm welcome they provided me in El Desemboque. The work reported here was funded by the European Research Council (grant ERC-2008-AdG-230268 MORPHOLOGY), whose support is gratefully acknowledged.

¹ Abbreviations used throughout: DECL: declarative, DIST: distal (tense), FL: flexible, HZ: horizontal, PFV: perfective, PL: plural, PX: proximal (tense), SG: singular, VT: vertical. Acute accent indicates stress in polysyllabic words.

what is involved here, the top twenty patterns by frequency (i.e. number of lexical entries in the dictionary) are shown in Table 2.

SG PFV	SG IPFV	PL PFV	PL IPFV	# OF LEXEMES
∅	tim	tox	toŋka	81
∅	tim	tox	tox	37
∅	tim	∅	tam	36
∅	tim	χam	χam	29
∅	tim	k	ŋka	27
∅	tim	tox	tam	26
∅	tim	∅	toŋka	24
∅	tim	tax	tax	23
∅	tim	tam	tam	23
∅	tim	ɬ	ŋka	19
∅	tim	to	tam	19
∅	tim	x	xam	16
∅	tim	k	kox	16
∅	tim	kox	kox	16
∅	tim	kox	tam	16
∅	tim	t	toŋka	16
tim	tim	tam	tam	16
∅	tim	k	k	15
∅	tim	tax	toŋka	15
∅	tim	x	toŋka	12

TABLE 2. Most frequent patterns in Moser and Marlett’s dictionary (2010), out of 952 lexemes.

Although inflection class distinctions are no rarity in the languages of the world, such a wealth of patterns is typologically quite remarkable. To put this in perspective, consider the languages listed in Table 3. These are the ten languages Stump and Finkel (2013) use to represent the range of typological variation in inflection classes. Seri stands out from these both in the sheer number of classes, and in the way that these classes are concentrated within such a small paradigm.² It is the most extreme example of inflection class proliferation that we are aware of.

	# OF CLASSES	EFFECTIVE # OF FORMS IN PARADIGM
Kwerba	4	4
Tulu	6	7
Ngiti	10	8
Koasati	12	5
Latin	19	13
Fur	19	9
Dakota	20	3
Sanskrit	38	13
Comaltepec Chinantec	67	12
Icelandic	146	21
Seri	255 (suffixes only) 539 (all exponents)	4

TABLE 3. Inflection classes of verbs in the ten languages studied by Stump and Finkel (2013), compared to Seri.³

² In all of these cases the actual paradigm consists of more forms than the number given here, which represents the minimal number of forms needed to describe the inflection classes (the *distillation*, in Stump and Finkel’s terms). Additional forms not tabulated here are trivially predictable, either because (i) they are the same for all classes, or (ii) they are mutually interpredictable with forms drawn from the minimal set.

³ For Seri I have broken the number down into classes defined by suffixes alone, since these are the primary focus of this article, and classes as defined by all inflectional exponents, which is more comparable to what Stump and Finkel (2013) have done in their evaluation.

Inflectional classes are not generally considered an optimal design feature of language, because they impose on the language user the needless burden of arbitrary morphological variation that must simply be memorized. The goal of most theoretical treatments has therefore been to arrive at an analysis that reduces both the number of inflection classes and the complexity of their organization. These treatments follow either of two strategies. In the first instance one can ask whether inflectional allomorphy is related to some other property of the word form, such as its phonology or semantics. For example, in Czech, nouns whose inflection is otherwise identical show predictable differences based on the phonology of the stem-final consonant, so that the contrast of nominative singular suffixes between the palatal stem *řůž-e* ‘rose’ and the nonpalatal stem *žen-a* ‘woman’ is not a fact that needs to be known about individual lexemes. In Latin, the difference in nominative singular suffixes between masculine *port-us* ‘door’ and neuter *bell-um* ‘war’ is predictable from their gender.

Explaining inflectional allomorphy in terms of outside conditions is a standard approach in morphological analysis, so that inflection classes in the strict sense are what is left over after this technique has been exhausted. Here the second strategy comes into play. Within an inflectional paradigm one form may well serve to predict another, so that even where allomorphy is arbitrary it should not be necessary to memorize each and every allomorph of each and every morphosyntactic value for each and every lexeme. Consider the partial paradigms in Table 4, again from Czech, representing the three major inflection classes. The subject person-number markers are different for each type, but since each allomorph is unique to its class, it is enough to know just one word form to predict what the remaining forms will be, on the assumption that awareness of these inflectional patterns forms a component of the knowledge of Czech grammar; thus if a word has its first-person singular in *-ám*, its third-person plural will be *-ají*, but if it has a first singular in *-u*, its third plural will be *-ou*, and so forth.

1SG	2SG	3SG	1PL	2PL	3PL	
děl-ám	děl-áš	děl-á	děl-áme	děl-áte	děl-ají	‘make’
soud-ím	soud-iš	soud-í	soud-íme	soud-íte	soud-í	‘judge’
ved-u	ved-eš	ved-e	ved-eme	ved-ete	ved-ou	‘lead’

TABLE 4. Czech verb present-tense forms (Janda & Townsend 2000:36).

On this approach inflectional allomorphy, although arbitrary in the sense that it does not express any meaningful content, may still be motivated by the purely morphological relationships that obtain within a language. Starting at least with Wurzel’s (1984) notion of paradigm structure conditions, linguists have been exploring the properties of inflectional paradigms, generally with an aim to show that surface complexity can be derived or predicted from simpler structures, or is bound by tight constraints. Representative examples include Carstairs (1983), Corbett and Fraser (1993), Noyer (2005), Blevins (2006), Bonami and Boyé (2006), Müller (2007), Baerman (2012, 2014), Brown and Hippisley (2012), Ackerman and Malouf (2013), and Stump and Finkel (2013).

However, such perspectives do not provide the key to understanding how the Seri verbal paradigms are organized. This is because allomorphy is only a part of the problem. What sets the Seri verbal suffixes apart from more familiar inflectional systems is the apparent discrepancy between what the morphology appears to be marking and the morphosyntactic functions that it is actually performing in the context of individual verbal paradigms. Morphologically, the suffixes mark degrees of plurality, while morphosyntactically, the whole paradigm can also be construed as relating to plurality, in that aspect represents a kind of ‘action number’ (Marlett 1981), which is then concatenated with subject number. But there is no fixed relationship between the two systems: the suffixes con-

trast with each other in relative degree of plurality, but each suffix can fill essentially any cell of the paradigm. Much of the complexity of the system results from the multiple mappings between two parallel systems with similar organizing principles. Both the morphological paradigm and the morphosyntactic paradigm follow a relatively simple scheme of concatenative number marking, with plural marking added onto plural marking, but the mapping between the two is idiosyncratic. What this means for the inflection classes is that not only do they differ in the suffixal allomorphs, but they also differ in the way the allomorphs are distributed in the paradigm, so that any attempt to pick out predictable relationships is aiming at a moving target. The total complexity of the inflection class system is then a product of these two properties, namely (i) inflectional allomorphy and (ii) the various paradigmatic configurations these allomorphs assume.

It is important here to emphasize exactly what it is that distinguishes the Seri verbal suffix system from other inflection paradigms that the reader may be familiar with. While its allomorphic variation is striking (see §4.1), it does have parallels in other languages of the world (e.g. the Nilo-Saharan language Murle has roughly sixty classes of nouns based just on the allomorphy of singular and plural suffixes; Arensen 1982). But the way in which Seri's paradigms are organized is, to the best of my knowledge, highly exceptional. If my analysis here is correct, these properties are both typologically novel and theoretically challenging, since they go to the heart of how we conceive of and formalize inflectional forms.

In brief, both descriptive and formal linguistic analyses treat inflectional forms in one of two ways: either they are understood as expressing some particular morphosyntactic value (e.g. the *-s* in *walks* marks 3SG present) or they are regarded as elements of pure form, only secondarily associated with some morphosyntactic value or set of values (e.g. Estonian nominals are said to distinguish weak and strong stems, whose actual distribution in any one paradigm depends on inflection class; Blevins 2008). Of course, it is not hard to think of apparent deviations from these two basic possibilities: we find instances where inflectional formatives have an undeniable morphosyntactic correspondence (so that interpreting them as pure elements of form would be decidedly un insightful), but they cannot be pinned down to any precise value, appearing to vacillate across different contexts. Yet these deviations are still plausibly understood as discrete modifications of two basic possibilities. For example, in Tundra Nenets, the same set of person-number markers may realize subject, object, or possessor, depending on word class and syntactic context (Ackerman & Bonami 2017), so that it is impossible to give a single definition of what these markers mean. Nevertheless, there is a constant invariable core, namely the person-number value itself, so that we can construe them as underspecified person-number markers, subject to further constraints by additional morphological rules. Equally, morphological formatives with seemingly incontestable morphosyntactic pedigrees may at times be forced into a purely morphological pattern. For example, in Russian nominals, genitive markers may be used for the accusative case under certain well-defined conditions (involving gender, number, and inflection class), so that there may be a mismatch between their primary function and their contingent distribution within any given paradigm. In both of the aforementioned instances, Tundra Nenets and Russian, what we have are morphological formatives with clearly defined morphosyntactic functions, which are necessary but possibly not sufficient criteria to describe the full extent of their distribution.

What we find with the Seri verbal suffixes does not fit well to this model. With very few exceptions (two, in fact), they cannot be associated with any single morphosyntactic value, so understanding them as direct exponents of morphosyntax—even with mod-

ifications—cannot be the right approach. But the paradigmatic relationship of the forms themselves follows a strict hierarchy, which in turn neatly maps onto the morphosyntactic paradigm, so to understand these patterns as pure morphology would amount to ignoring a blindingly obvious correspondence. This appears to be a system where morphology and morphosyntax lead separate but parallel lives.

The article is structured as follows. Background information is given first (§2), followed by a description of those elements of the morphology, morphophonology, and morphosyntax necessary for understanding the suffix patterns (§3). Section §4 gives a detailed description of the system of suffixes, and these are related to the marking of plurality in nouns in §5. From this it becomes clear that the simple MORPHOLOGICAL marking of plurality maps onto a range of MORPHOSYNTACTIC values. Other morphological exponents of subject number and aspect, which show varying degrees of affinity to the suffix system, are described in §6. Section §7 concludes and highlights the relevance of the analysis to morphological theory. The corpus of the verbs that form the basis of this study, along with the analysis assumed here (segmentation, underlying forms), is given in a separate appendix available online.⁴

2. LANGUAGE, SPEAKERS, AND SOURCES. The Seri language (*kmi̯ke itom* in Seri) is a language isolate currently spoken by around 900 people (2007 estimate per *Ethnologue*; Lewis 2009), primarily in the two villages of El Desemboque and Punta Chueca in Sonora State, Mexico. Formerly, the range of Seri speakers was much larger, covering substantial portions of both the mainland and the adjacent islands. Whatever major dialect differentiation that once may have existed has now been lost, and variation among speakers is limited (Marlett 2016:11–12). Although the number of speakers is relatively low, its status is classed as ‘vigorous’ by *Ethnologue*, and it continues to be acquired by new generations of speakers.

The data here—lexemes and frequency—are almost entirely derived from Moser and Marlett’s dictionary of 2010; unless otherwise specified, the forms presented here come from this source. This has been supplemented by other publications by Marlett, in particular his thesis of 1981 and (draft) grammar of 2016, and my own fieldwork from 2014, as well as earlier works by Moser (1961) and Moser and Moser (1976). There is currently a practical orthography in use, also employed in the dictionary and grammar, but this has been replaced in the current article by an IPA representation that will be more accessible to the expected readership.

3. ELEMENTS OF THE SYSTEM. In order to understand the context within which the suffix paradigm operates, I outline here the morphosyntactic, morphological, and morphophonological components of verbal inflection, and the selection criteria for the data.

3.1. MORPHOSYNTACTIC PARADIGM. The verbal suffixes, along with the other exponent types discussed below (§6), compose a four-cell paradigm defined by two features: subject number and aspect. The significance of subject number is clear enough: verbs, whether intransitive or transitive, agree with the number of their subject, distinguishing singular and plural. But the feature that Marlett (2016) has termed *aspect* requires some explanation. In earlier works he calls it *action number*, reflecting the sort of contrast that it typically expresses. For example, in 1 the perfective indicates a single stroke of the hammer, while in 2 the imperfective indicates multiple strokes.

⁴ Available for download at <http://muse.jhu.edu/article/637151>.

- (1) xosé ki? inół kop e:nm_iká:tx ki?
 J. the.FL.SG 3.finger the.VT.SG hammer the.FL.SG
 k^w-i-m-á:fk.
 3.IO-3:3-PX-pound(SG.PFV)
 ‘José hit his finger with the hammer.’ (Marlett 2016:442)
- (2) kma:m kix ʔast kix ʔéʔe kom k^w-i-m-á:faxk-im.
 woman the.SG stone the stick the.HZ.SG 3IO-3:3-PX-pound-SG.IPFV
 ‘The woman is pounding the stick with the stone.’ (Marlett 2016:443)

Where the object and action are sufficiently individuated, aspect matches object number, with perfective corresponding to a singular object and imperfective to plural objects, as in 3.

- (3) SG PFV iʔjanó:kax ‘I carried him/her (e.g. a baby)’ (distal tense)
 SG IPFV iʔjanó:kałim ‘I carried them’
 PL PFV ʔajanó:kʃił ‘we carried him/her’
 PL IPFV ʔajanó:kʃiłka ‘we carried them’ (own fieldnotes)

Some verbs lack an aspect contrast for obvious semantic reasons. Stative verbs, unless recategorized, appear to have only perfective forms, while verbs describing inherently repetitive or multiple activities (such as ‘comb’) have only imperfective forms (Marlett 2016:443).

3.2. ADDITIONAL EXPONENTS OF THE NUMBER-ASPECT PARADIGM. Suffixes are the primary exponent of subject number and aspect: except for one or two lexemes, every verb that marks these features does so with suffixes. Smaller numbers of verbs employ additional means. In order of their frequency in the lexicon, these are (i) alternations of the stem-final segments, (ii) syncope of post-tonic short vowels, (iii) ablaut, and (iv) infixation of <to:> or <ko:>. These are discussed in §6 below.

3.3. THE LARGER PARADIGMATIC CONTEXT. While the suffix paradigm can be restricted to four cells, an actual Seri verb can have nearly two hundred forms, a result of its rich prefixal inflection, marking, for example, subject, object, tense-mood, negation, and passive, along with various nominalizations that are regularly employed in verbal constructions. We will, however, ignore these for the purposes of this study. First, prefix behavior is orthogonal to the rest of the verb stem: any set of values marked by the prefixes can occur with any set of values marked by the suffixes. The only point of interaction arises with first- and second-person subject prefixes, which distinguish number, lining up with subject number as marked by the verb suffixes, as seen in the paradigm in 3, with 1SG ʔ- (the initial *i-* in the example is an epenthetic vowel inserted before initial consonant clusters of decreasing sonority) and 1PL ʔa-. Second, although some of the prefixes exhibit allomorphy, this is predictable on the basis of the immediate phonological environment (either the beginning of the stem, or the preceding or following prefixes). I have not done a separate evaluation of the relationship of stem-INITIAL phonology to suffixation, but informal observation has given no indication that there is one—any given suffix pattern of sufficient size will show a mixture of short and long vowel-initial stems and consonant-initial stems of various sorts, which are the parameters relevant to prefix allomorphy. Henceforth the verb forms will be presented stripped of any prefixes.

3.4. MORPHOPHONOLOGY. Following Marlett (1981, 2016), I assume the operation of four morphophonological rules. First, there is a rule affecting suffixes: the initial /t/ of a suffix—and *t*-initial suffixes are by far the most frequent—surfaces only in a restricted set of phonologically defined contexts, outlined in Table 5.

-tème-tox	‘run out.PFV.PL’	after V
-mék-tox	‘warm.PFV.PL’	after single C, following stressed syllable
-ká:kop-ox	‘pound.IPFV.PL’	after single C, following unstressed syllable
-á:om-ox	‘ask for gift.PFV.PL’	after trimoraic syllable
-mónx-ox	‘go in zigzag.PFV.PL’	after C cluster

TABLE 5. Morphophonological conditioning of suffix-initial /t/, assuming suffixation of *-tox*.

A word about stress is in order here, since it figures into these rules, as well as the phenomenon of vowel syncope (§6.2). By default, stress occurs on a root-final heavy syllable (ending in a consonant cluster, or with a long vowel), otherwise on the root-penult syllable; lexical exceptions do occur though (Marlett 2008b).

Second, where a stem ends in /xk/ and is followed by a suffix beginning with /to/, this regularly results in the sequence /xo/. Table 6 illustrates this rule, in conjunction with the preceding *t*-deletion rule.

	SG PFV	SG IPFV	PL PFV	PL IPFV	
SURFACE FORM	-késexk	-késexk-im	-késex-ox	-késexk-am	‘gnaw’
UNDERLYING FORM	-kesexk	-kesexk + tim	-kesexk + tox	-kesexk + tam	

TABLE 6. Morphophonological conditioning of stem-final /xk/.

The third rule affecting stems arises in those verbs which undergo an alternation between stem-final /x/ and /ʃ/ (see below). When followed by a *ʃ*-initial suffix, stem-final /ʃ/ dissimilates to /j/, and an epenthetic /i/ is inserted. This rule is apparent when we compare the plural subject forms of the two derivationally related verbs in Table 7, one with *ʃ*-initial suffixes, the other without. Note that there is at least one verb where the same alternation occurs even without a *ʃ*-initial suffix (SG PFV *-a:i* ~ PL PFV *-á:ʃi* ‘do’), so this is a stem alternation that predictably occurs given a certain suffix type, but that occurs independently as well.

	SG PFV	SG IPFV	PL PFV	PL IPFV	
SURFACE FORM	-atá:i:x	-atá:ʃi-im	-atá:ʃi-ʃ	-atá:ʃi-ʃka	‘carry on shoulder’
UNDERLYING FORM	-ata:i:x	-ata:ʃi + tim	-ata:ʃi + ʃ	-ata:ʃi + ʃka	
SURFACE FORM	-itá:i:x	-itá:ʃi-im	-itá:ʃi-kox	-itá:ʃi-oʃka	‘sway’
UNDERLYING FORM	-itai:x	-itai:ʃi + tim	-itai:ʃi + kox	-itai:ʃi + toʃka	

TABLE 7. Morphophonological processes associated with stem-final alternation of /x/ ~ /ʃ/.

Finally, in cases where a stem vowel /o/ has undergone syncope (see §6.2) adjacent to a velar consonant, it leaves a trace in labialization of the consonant; for example, from Table 12 below, compare the plural subject forms for ‘be vertical & right side up’: IPFV *-ó:ʔoxk-am* ~ PFV *-ó:ʔx^wk*. Marlett (2016:314, n. 22) suggests that all labialized consonants in Seri go back historically to a syncopated /o/.

It should be stressed that although morphophonological rules such as these are expressed in terms of concatenation and transformation, I am not necessarily advancing this as a morphological model. The rules express robust generalizations in convenient shorthand and allow us to factor out some surface variation in what is already an extraordinarily varied set of paradigms. That said, there is also a drawback to this approach, in that some surface forms will lend themselves to more than one underlying representation. For example, the data make clear that the suffixes *-tx* and *-x* both exist, for example, PL PFV *-ató:ka-x* ~ PL IPFV *-ató:ka-toʃka* ‘order to do (something)’, vs. PL PFV *-ʔiká:-tx* ~ PL IPFV *-ʔiá:i-toʃka* ‘have abscess’, but the assumption of suffix-initial *t*-deletion means that many instances of *-x* are ambiguous. As indicated below (§4.1), an alternative analysis using surface data alongside the more abstract representation does

not substantially alter our observations, suggesting that this degree of ambiguity is not a serious drawback.

3.5. SELECTION AND ANALYSIS OF DATA. This study is based on a corpus of verbs gleaned from Moser and Marlett's (2010) dictionary. The dictionary does not provide a morphological classification as such. Rather, each lexical entry includes the third-person realis dependent forms as principal parts. For the purposes of the present study, segmentation and analysis into underlying forms, and the resulting classification, have been undertaken following the morphological and morphophonological assumptions outlined in §3.4.

For consistency and ease of comparison this study has been restricted to a portion of the verbs given in Moser & Marlett 2010. First, as noted above, about half of the verbs listed there lack an overt aspectual distinction. It is not always clear whether this is because an aspectual contrast would be irrelevant for semantic reasons, or whether it is simply not marked morphologically. Both are possible, but only verbs of the second sort would be relevant for the present study. To be on the safe side, only verbs for which an aspectual contrast is explicitly noted in the dictionary are included. (Equally, there are a few verbs that appear to make further aspectual distinctions within the imperfective; for example, compare the two singular subject forms *-fai:tkim* 'tie up (multiple objects, once)' and *-fai:tkim* 'tie up (one or more objects, multiple times)'; Marlett 2016: 215, n. 14. These are omitted as well.) Second, there are a few verbs that are sufficiently irregular (e.g. suppletive) to defy ready segmentation and hence classification in the terms understood here. Fifteen of these have been set aside. Third, the set of kinship verbs (forty-seven lexemes) has been left out, such as *-ita* 'have X as mother', which on the whole show distinctive morphological peculiarities in their inflection, and which are currently going out of use (as are the corresponding nouns). Fourth, the dictionary entries give the inflection of some prefixally derived verbs through a cross-reference to the base. These have not been counted as separate lexemes for the purposes of determining frequency. Fifth, some lexical entries list variant forms. In these cases the variants have been ignored in determining classes and frequency (though I do consider them to elucidate certain points), and only the first listed form is taken. In the end this gives us a corpus of 952 verbs to consider, which are given in the online appendix, along with their analysis.

I construe this as a corpus of 'regular' verbs, to the extent that the notion of 'regular' even applies to this system. As shown in the following sections, there is no obvious way to separate out a regular or default pattern here. Even Spanish loanwords provide few clues (these are vanishingly rare in the dictionary); see Table 8. Two things can be noted here: (i) vowel-final stems favor *-x* suffixation outside of the singular perfective, and (ii) none of the examples have an aspectual distinction with plural subjects. (Note that some of these examples lack any indication of an aspectual distinction in the dictionary, so to be on the safe side these have been interpreted as monoaspectual, rather than syncretic.) But the heterogeneity of even this small sample does not provide sufficient material for proposing a productive default pattern.

4. SUFFIX CLASSES. The proliferation of inflection classes in Seri has three sources: (i) the number of allomorphs that can appear in each cell of the paradigm, (ii) the freedom with which the allomorphs can combine within the paradigm, and (iii) the freedom with which individual allomorphs can be distributed across different cells of the paradigm. The first two properties characterize inflection classes as normally understood and are discussed first (§4.1). The third, discussed in §4.2, is a more unusual property and will be of key importance in understanding the Seri inflectional system.

SG PFV	SG IPFV	PL PFV	PL IPFV	SPANISH SOURCE	
-apré:nt	-apré:ni-tim	-apré:ne-tx	-apré:ne-tx	prender (<i>archaic</i>)	'pawn'
-aramóŋni	—	-aramóŋx-ox	—	limosna	'beg' ^a
-apásiro	—	-apásiro-x	—	pasear	'stroll'
-itró:ki	-itró:ki-x	-itró:ki-x	-itró:ki-x	troque (<i>regional</i>)	'have truck'
-ikápota	—	-ikápota-x	—	capota	'have jacket'
—	-argwéjo-tim	—	-argwéjo-tax	vagar	'wander'
-aró:ko-t	-aró:ko-tim	-aró:k ^w -ɣam	-aró:k ^w -ɣam	loco	'make crazy'
-itóm	-itóm-tim	-itóma-tx	-itóma-tx	tomín (<i>archaic</i>)	'have money'
-ipáfa:tox	-ipáfa:toł-im	-ipáfa:toł-kox	-ipáfa:toł-kox	zapato	'have shoes' ^b

TABLE 8. Loanwords with (mostly nominal) Spanish sources from Moser & Marlett 2010.

^a The final *-nV* of the source has been interpreted as a stem-final /n/ plus epenthetic /i/, which undergoes a singular ~ plural alternation; see 'gather' in Table 34.

^b The singular perfective incorporates the plural suffix *-x* from *páfa-tox* 'shoe-s'.

4.1. COMPLEXITY OF ALLOMORPHY. The number of possible allomorphs for each cell is large: sixteen for the singular perfective, twenty for the singular imperfective, twenty-five for the plural perfective, and thirty for the plural imperfective, given the segmentation assumed here. That means there must be at least thirty classes simply on account of raw allomorphy of the largest set. That we find more than eight times this number is due to the way in which the allomorphs cross-classify. Consider the distribution of the plural subject suffixes in Table 9. This table shows three plural perfective suffix allomorphs and two plural imperfective allomorphs. Each of the plural perfective suffixes can occur with each of the plural imperfective suffixes, yielding $3 \times 2 = 6$ classes.

PL PFV	PL IPFV	
-akáp-x	-akáp-tołka	'be able to pick up'
-á:ko-x	-á:ko-xam	'mark'
-káp-tox	-káp-tołka	'fly'
-iʔéʔe-tox	-iʔéʔe-xam	'be chief'
-jéɣe-tax	-jéɣe-tołka	'make scratch'
-atóne-tax	-atóne-xam	'declare oneself owner of unripe fruit'

TABLE 9. Cross-classification of suffix allomorphs.

This contrasts with the sort of system illustrated by the singular Polish verb forms in Table 10. For the sake of comparison I take only a fragment of the total paradigm, in this case third singular and third plural present tense. As with the Seri example in Table 9, one value has three allomorphs and the other two. But because these allomorphs line up with each other rather than cross-classify, there are only three classes rather than six. There is thus a degree of internal structure and hence predictability to this (fragment of a) system that is lacking in the Seri fragment in Table 9, where anything can cooccur with anything.

3SG	3PL	
czyt-a	czyt-aǵa	'read'
pisz-e	pisz-ǵ	'write'
mów-i	mówi-ǵ	'speak' ^a

TABLE 10. Coordinated allomorphy in Polish verbal inflection.

^a The /i/ preceding the third plural suffix here is an orthographic convention that indicates palatalization of the preceding consonant.

A body of recent work has used quantitative measures to assess inflectional paradigms, allowing the direct comparison of such diverse inflection class structures (e.g. Sims 2011, Ackerman & Malouf 2013, Stump & Finkel 2013, Blevins 2015, Cable

2015). Two such metrics will be useful here, namely conditional entropy (Ackerman & Malouf 2013) and the number of principal parts (Stump & Finkel 2013). The principles and methods behind these metrics are amply explained in the aforementioned works, so I limit myself here to the briefest explication.

Entropy as such is a quantification of uncertainty, measured in bits. Complete certainty has a value of zero, while adding any degree of uncertainty increases the entropy value. For example, if it is twice as likely to rain as not to, this situation has an entropy value of 0.91, while if it is just as likely to rain as not to, then the entropy increases to 1, because the outcome is less certain. More options increase entropy, so that an equally probable three-way choice between ‘rain’, ‘snow’, and ‘neither’ has an entropy of 1.58, and so on. CONDITIONAL entropy is an augmented metric that considers the role of other factors that may influence probabilities. For example, it might be that the likelihood of rain increases or decreases over the course of the year, so that we can speak of fluctuations in conditional entropy according to the month or season.

As applied to inflection classes, entropy can be used to assess the likelihood of different competing forms. For example, in the three Czech inflection classes illustrated in Table 4, the 1SG has the allomorphs *-ám*, *-ím*, and *-u*. On the simplifying assumption that all three inflection classes are equally likely, this translates to an entropy value of 1.58. But say we recourse to some additional information—for example, we already know the 3SG form. In that case all uncertainty vanishes, provided the repertoire of inflection class patterns is taken as a given: if the 3SG is *-á*, the 1SG must be *-ám*; if the 3SG is *-í*, the 1SG must be *-ím*; and so on. The conditional entropy of the 1SG, with the 3SG form acting as the condition, is thus zero. The same applies equally in the reverse direction, as indeed it does for every possible pairing, so that the average entropy for present-tense inflection is likewise zero.

Any deviation from this state of mutual implicature involves an increase in conditional entropy. Table 11 breaks down the conditional entropy calculations of the Polish fragment from Table 10. First, consider the 3PL. Its conditional entropy is zero, because if the 3SG form is already known, then it is clear what the correct 3PL form should be. But the reverse does not hold: given this particular repertoire of three inflection classes, having a 3PL *-ą* still allows in theory the choice of either 3SG *-a* or 3SG *-i*. The 3PL for each of these inflectional classes therefore has a conditional entropy of 1 bit, reflecting an equal choice between these two options. The conditional entropy of the 3SG is thus 0.67 (averaged over 0 + 1 + 1), and average conditional entropy for the entire Polish fragment is 0.33.

CLASS	CONDITION	REMAINING OPTIONS	ENTROPY	
‘read’	3SG is <i>-a</i>	3PL must be <i>-ąją</i>	0	} 3PL conditional entropy = 0
‘write’	3SG is <i>-e</i>	3PL must be <i>-ą</i>	0	
‘speak’	3SG is <i>-i</i>	3PL must be <i>-ą</i>	0	
‘read’	3PL is <i>-ąją</i>	3SG must be <i>-a</i>	0	} 3SG conditional entropy = 0.67
‘write’	3PL is <i>-ą</i>	3SG may be <i>-e</i> or <i>-i</i>	1	
‘speak’	3PL is <i>-ą</i>	3SG may be <i>-e</i> or <i>-i</i>	1	
				AVERAGE CONDITIONAL ENTROPY = 0.33

TABLE 11. Conditional entropy of the Polish fragment in Table 10.

In the case of the Seri fragment in Table 9, the conditional entropy for the plural imperfective is 1: given this system of classes, each plural perfective suffix allows either of two imperfective plural suffixes, *-toŋka* or *-xam*, equally distributed (each suffix occurs with three classes). The conditional entropy for the plural perfective is 1.58, because each

plural imperfective suffix allows three different plural classes, again equally distributed across the six classes. The average conditional entropy is thus $1.29 (1 + 1.58 / 2)$. Because the suffix allomorphs in this fragment cross-classify freely, the conditional and unconditional entropy measures are in fact the same.

Counting principal parts yields a distinct but allied metric. A principal part is a form that is diagnostic of the behavior of the rest of the paradigm and so can be used to predict the other forms. In the Czech and Polish fragments one principal part is enough to predict the rest of the paradigm: if a dictionary were to give, say, the 3SG form of each verb, its inflection class will have been unambiguously identified. But in the Seri fragment we need two principal parts, because only then can we be sure what the actual paradigm is.

By this metric, a lower number indicates a tighter paradigmatic organization, a more deterministic inflectional structure. One observation made both by Ackerman and Malouf and by Stump and Finkel is that for all the apparent surface diversity in inflection class systems, they are surprisingly similar by these metrics. In particular, they tend toward the low end (like the Czech fragment) rather than the logically possible extreme (like the Seri fragment in Table 9). For the suffixal system alone, Seri has a conditional entropy value of 2.32 bits and an average of 2.38 principal parts per inflection class.⁵ On its own this is a rather abstract measure, because the suffixation may be accompanied by other inflectional formatives (see §6); if these are factored in, the entropy is reduced to 2.03 bits and 1.8 principal parts. In Figure 1 and Figure 2 this second set of metrics is compared to those from Stump and Finkel's (2013) sample (outlined in Table 3). Seri is clearly at the high end, in particular because of its conditional entropy value, which is more than twice that of the highest registered in this sample (Dakota, at 0.88 bits). The average number of principal parts is just shy of the highest (Comaltepec Chinantec, at 1.84), a number that becomes more striking when we consider that the effective size of the Seri paradigm is just four forms, as opposed to the twelve of Comaltepec Chinantec. Note that the difference in conditional entropy persists even if we factor in frequency. That is, if a particular inflection class is more frequent than others (here assessed in terms of number of lexemes represented in the dictionary), its probability is increased, thus reducing uncertainty. Weighted for frequency the entropy is lowered to 1.92 bits, still more than twice that of the highest entropy value from Stump and Finkel's study. (For the sake of comparison, unweighted entropies are given in Fig. 1, which corresponds to Stump and Finkel's practice.)

The implication is that the Seri inflection classes are without structure, at least relative to other languages. If so, the resulting complexity, as reflected in these metrics, could well be a problem of psycholinguistic interest, for example, the question of how it is acquired or processed, but there would be little of general interest to say about it beyond listing the many forms and their many combinations. But as already hinted at in §1, the suffix system is indeed governed by a definite structure, one of considerable novelty and theoretical interest, just not one that emerges from these metrics. Before exploring this in detail, we should first address the possibility that there are other, more familiar, explanations for the complexity of Seri suffix classes. As a number of researchers have pointed out (e.g. Carstairs-McCarthy 1994, Blevins 2006, Baerman 2012, 2014, Stump & Finkel

⁵ The entropy and average principal part values used here have been generated using Raphael Finkel and Gregory Stump's 'Analyzing principal parts software', available at: <http://www.cs.uky.edu/~raphael/linguistics/analyze.html>. For the languages other than Seri in Figs. 1 and 2, the values have been derived using the data sets accompanying Stump & Finkel 2013.

FIGURE 1. Conditional entropy, in bits, for the inflection class systems given in Table 3, compared to Seri.

FIGURE 2. Average number of principal parts for the inflection class systems given in Table 3, compared to Seri.

2013), it may be misleading to look at systems of inflectional exponents in isolation, because words have other properties that are related to the choice of allomorph or inflection class, either properties of content, such as lexical semantics or valence, or properties of form, such as stem phonology, stem composition, or the behavior of other inflectional exponents. In such cases, even if the system is internally unpredictable and hence highly complex, this is resolved by system-external factors. I argue below that such an approach helps chip away at the complexity of the Seri system, but does not substantially alter the picture presented so far.

We can swiftly dismiss properties of content as a noticeable factor affecting suffix allomorphy, other than the effects of predicate type (stative vs. dynamic, and within the

latter, action type) on the expression of aspect, discussed above. I have not otherwise been able to observe any semantic or syntactic effects on suffixation. For example, alternations in transitivity, which readily occur, do not alter the suffix pattern, or indeed anything else in the nonsuffixal areas of verbal inflection. Of course, the possibility that verbal semantics plays a role in allomorphy cannot be ruled out absolutely; I can only say that neither prior observers nor I have been struck by anything.

As for properties of form, the most important interaction between the suffix and the rest of the verb form has already been dealt with above, namely suffix-initial *t*-deletion under certain phonological conditions. This is so regular and predictable that it has been factored out of the analysis. Otherwise I have not been able to observe any absolute phonological effects that are not also sensitive to the paradigmatic context (for which, see below). There is one weak morphological effect: around one fifth (c. forty out of c. 200)⁶ of the verbs (typically causatives) derived using a multipurpose derivational prefix, variously realized as *a-*, *ak-*, *k-*, *ako-*, and *aʔ-* (Marlett 2016:534), have a singular perfective suffix *-ot* (realized as *-t* after a vowel) that is not found with other verbs (see discussion around Table 27). Since the majority of verbs with this morphological structure do not take the *-ot* suffix, it still must be lexically specified, and so the correlation does not noticeably increase predictability.

That leaves the stem-final alternations, which do have a noticeable effect on suffixation. Since I have deferred discussion of stem alternations until now, the notion warrants some discussion and justification. It is not a trivial matter, because the segmentation is not always obvious. Largely following Marlett (1981, 2016), I assume a distinction between terminal affixes and the inflected material that precedes them, labeled *suffixes* and *stem-final segments*, though the names as such are not crucial. Around half of the corpus (470/952) has been analyzed here as undergoing a stem-final alternation of some sort. The reason for this division is that these two parts of the word form appear to follow distinct cross-classifying patterns that can be isolated by means of this segmentation. For example, the verbs in Table 12 all share the same pattern with regard to the terminal suffix, but differ in the behavior of the preceding segments (alongside other exponents such as infixes or vowel syncope, more easily segmentable).

SG PFV	SG IPFV	PL PFV	PL IPFV	
-ápot	-ápot-im	-apt	-ápot-am	'dig out'
-kánax	-kánał-im	-kánał	-kánał-am	'chew with back teeth'
-ta:x	-tá:x-im	-ta<tó:>ł	-ta<tó:>ł-am	'despair'
-ó:ʔk ^w	-ó:ʔoxk-im	-ó:ʔx ^w k	-ó:ʔoxk-am	'be vertical & right side up'
-í:saχ	-í:saχ-im	-í:stoχ	-í:stoχ-am	'have life'
-tímoʃ	-tímoʃ-im	-timx ^w k	-tímoxk-am	'have opinion about'

TABLE 12. Various types of stem-final alternations with a single suffix pattern.

Equally, positing this segmentation allows us to recognize common patterns of stem behavior across multiple suffix classes, for example, in the case of the /x/ ~ /ł/ pattern seen in Table 13 (which will be of some significance below).

There is a nontrivial relationship between stem-final alternation and suffixation patterns, in that certain stem-alternation types may be associated with particular suffix allomorphs. But the effect of this is largely to divide the lexicon into smaller domains within which miniature versions of the same kind of complexity are on display. In order to see this, it will be instructive to divide the data into representative chunks.

⁶ Part of the uncertainty with the numbers is that *-ot* must in some cases be interpreted as a stem- or root-final element, as in *-aʔ-ósot* 'make narrow', whose base is *-ósot* 'be narrow', where *-ot* is clearly part of the root.

SG PFV	SG IPFV	PL PFV	PL IPFV	
-kána _x	-kánał-im	-kánał	-kánał-am	'chew with back teeth'
-anámx	-anáml-k	-anáml-kox	-anáml-kam	'hurry to do something carelessly'
-i?inex	-i?ineł-im	-i?ineł-ka	-i?ineł-kox	'be exposed'
-ak ^w sx	-ákosł	-ák ^w sł-kox	-ákosł-am	'shake'
-ʔána _x	-ʔánał-im	-ʔánał-k	-ʔánał-kox	'gossip'
-sitx	-sitł-ka	-sitʃi-ł	-sitʃi-łka	'tie sticks to frame for a cradleboard'
-á?x ^w -im	-á?oł-im	-á:oʔʃi-ł	-á:oʔʃi-łka	'choke (on liquid)'

TABLE 13. Various suffix patterns with a single stem-final alternation type.

First, let us consider the behavior of suffixes with verbs whose stems LACK a stem-final alternation. There are 488 such verbs, falling into 139 classes, with an average conditional entropy of 1.81. This suggests that the complexity described so far is not merely a by-product of a segmentation that omits important supplementary information.

Second, consider the behavior of suffix allomorphs within a given stem-alternation type. For example, *-k*, *-ka*, *-kam*, *-kox*, *-ł*, and *-łka* occur after an ALTERNATING stem-final /*ʔ*/ or /*χ*/. Around half of the alternating stems (284/489) have these as part of the alternation. This means that these suffixes can be excluded from the pool of suffix options for the rest of the lexicon. This indeed reduces the number of possible classes for lexemes that lack these stem-final alternants, but not profoundly: instead of 253 classes we now have 'only' 168, spread over 711 lexemes. And within each stem-final alternation pattern we get much the same picture of inflection class proliferation. Consider the largest of these classes, with the alternation /*x*/ (SG PFV) ~ /*ʔ*/ (elsewhere), as in Table 13 above, found with 121 lexemes. It is associated with some distinctive suffix classes, such as any pattern involving the suffix *-ł*. But still, a wide variety of suffix classes occur here too: thirty-eight, with an average conditional entropy of 1.5 (or 1.26 with frequency factored in). We do slightly better with around sixty verbs that are characterized by the infixation of <C> (the value of C varies) before a stem-final /*χ*/. These are robustly associated with the plural subject suffix pattern *-k* ~ *-łka*. Even so, this only accounts for forty-six out of sixty lexemes. And since the behavior of the singular subject forms is not covered by any relevant generalization, we still get nineteen classes and an average conditional entropy of 1.22 (or 0.87 with frequency factored in). This is a greater degree of predictability than we have seen till now (though still quite high by comparative standards!), but the lexical coverage is limited.

In Table 14 I summarize the effects of various types of segmentation on class proliferation and complexity. In particular, note that the inclusion of information about the stem-final alternation does lower conditional entropy with regard to just looking at the suffixes alone, but only slightly. Two methods of segmentation have been illustrated here, as shown in Table 15: one involves concatenating the abstract representations (as represented in the online appendix), and the other involves looking directly at the surface forms.⁷ (The reason for the difference in conditional entropy between the two methods is that the morphophonological rules sometimes neutralize distinctions assumed in the abstract representation, so as a result the surface representation is often less informative.) What one can conclude from this is that factoring in the behavior of stem-final alternations only slightly increases predictability of the inflection class system, and that the inclusion of other exponents that participate in the inflectional system

⁷ Factoring out any morphophonological alternations not connected with the juncture between stem and suffix. For example, syncope of post-tonic /*o*/ in 'make thumping sounds' results in labialization of the stem-final velar consonants. Since we have separated out syncope as an inflectional operation distinct from suffixation and stem-final alternations, the consonants are represented in their unlabialized state.

(see §6) slightly reduces predictability. In other words, from this perspective the system looks much the same no matter how you slice it.

	# OF CLASSES	CONDITIONAL ENTROPY
suffixes alone	255	2.32
stem-final alternations alone	132	1.63
stem-final + suffix (abstract representation)	419	1.97
stem-final + suffix (surface representation)	417	2.13
all exponents (abstract representation)	539	2.03

TABLE 14. Comparative metrics of various components and segmentation techniques of the 952-verb corpus.

SG PFV	SG IPFV	PL PFV	PL IPFV	
-á:spox	-á:sipt̪	-atós:sipt̪ox	-atós:sipt̪ox	‘write’
-ké:tk	-ké:txk	-ké:txox	-ké:txox	‘make drip’
-táχox	-táχot̪im	-táχot̪	-táχot̪am	‘scrape’
-í:pkʷ	-í:poxkim	-í:pxʷk	-í:poxkam	‘make thumping sound’

METHOD 1: ABSTRACT REPRESENTATION:								METHOD 2:				
STEM-FINAL PATTERN				+	SUFFIX PATTERN				SURFACE REPRESENTATION			
x	ɬ	ɬ	ɬ	#	#	tox	tox	x	ɬ	ɬox	ɬox	
x	xk	xk	xk	#	#	tox	tox	k	xk	xox	xox	
x	ɬ	ɬ	ɬ	#	tim	#	tam	x	ɬim	ɬ	ɬam	
x	xk	xk	xk	#	tim	#	tam	k	xkim	xk	x	

TABLE 15. Two methods of representing the combination of stem-final alternations and suffixiation.

4.2. COMPLEXITY OF DISTRIBUTION. Clearly, a great deal of the complexity of the Seri suffix system comes from the sheer proliferation of allomorphs and the freedom with which they cross-classify within the paradigm. This is striking, though not qualitatively different from what one sees in many other languages. But there is something more interesting going on here, connected with the mapping between morphosyntactic features and their morphological expression, and which lends Seri verb inflection its particular theoretical and typological interest. To see this more clearly we need to cut through the thicket of allomorphy, which we can do by restricting ourselves to looking at the most frequent suffixes. Table 16 gives the full list (again, note that this is provisional on the particular segmentation adopted here).

SUFFIX	COUNT	SUFFIX	COUNT	SUFFIX	COUNT
∅	989	ɬ	46	om	3
tim	816	to	39	ix	2
tox	337	kam	31	in	2
tam	263	ka	31	koŋka	2
toŋka	263	am	28	ɬkox	2
k	123	koŋ	21	taŋkox	2
kox	122	ot	19	tix	2
ta	112	taŋka	19	im	1
tax	106	xox	15	kaŋ	1
ɬka	95	i	13	ɬa	1
x	79	tx	13	ɬiŋka	1
χam	76	at	8	ɬoŋka	1
t	61	an	5	taŋk	1
xam	54	ɬkam	3		

TABLE 16. Suffix inventory, with number of occurrences in the four-cell paradigm of the 952-verb corpus employed here.

Note that there is fairly sharp break between the fifth most frequent suffix (-toŋka) and the next (-k), which is only half as frequent. Nearly a third of the verbs make use

only of these five most frequent suffixes, so they allow for a robust sample, shown in Table 17. Over these 299 verbs, twenty-seven different classes are found. With an average conditional entropy of 1.28 (0.93 with frequency factored in), this is an improvement against the overall figure for the entire lexicon, but the surprising fact is that all of this is generated through the distribution of just five distinct suffixes. What Table 17 makes especially clear is that the suffixes do not have a fixed morphosyntactic value: *-tox* and *-tołka* are found with all values except the singular perfective, and *-tam* is found with either of the plural subject values, while *-tim* ranges over all values (as does zero, for that matter). To a large measure, the wealth of classes is generated by variations in this distribution, a pattern repeated across the less frequent suffixes as well.

SG PFV	SG IPFV	PL PFV	PL IPFV	# of lexemes	SG PFV	SG IPFV	PL PFV	PL IPFV	# of lexemes
∅	tim	tox	tołka	81	∅	tim	tam	tox	3
∅	tim	tox	tox	37	tim	tim	tox	tam	3
∅	tim	∅	tam	36	∅	∅	∅	tam	2
∅	tim	tox	tam	26	∅	∅	tox	tołka	2
∅	tim	∅	tołka	25	∅	tim	tam	tołka	2
∅	tim	tam	tam	23	tim	tim	tox	tox	2
tim	tim	tam	tam	16	tim	tim	tox	tołka	2
∅	tim	∅	∅	7	∅	∅	tam	tam	1
∅	∅	tox	tox	6	∅	tox	tox	tox	1
∅	tim	∅	tox	4	∅	tox	tox	tołka	1
∅	tim	tołka	tołka	5	tim	tim	∅	tam	1
∅	∅	∅	∅	4	tim	tim	∅	tołka	1
∅	tim	tim	tam	4	tim	tim	tam	tox	1
∅	∅	tox	tam	3					

TABLE 17. Patterns generated by the top five most frequent suffixes.

This variable distribution is of two sorts, disjunctive and syncretic, which lend themselves to potentially different interpretations. By disjunctive distribution is meant that the suffix has one value with one lexeme and a different value with a different one. For example, with some lexemes *-tox* is used for plural perfective but not plural imperfective, and for others it is the reverse, as with ‘throw (stones) at’ vs. ‘lap up’ in Table 18. One might propose this to be an instance of accidental homophony, but since many of the suffixes exhibit such distribution, that would merely be avoiding the problem. By syncretic distribution is meant that a suffix which occupies one cell in the paradigm of one lexeme occupies multiple cells in the paradigm of another, as with ‘be face to face’ in Table 18, where *-tox* is used for both plural perfective and plural imperfective.

PL PFV	PL IPFV	
-tím-tox	-tím-tołka	‘throw (stones) at’
-oáłka-tam	-oáłka-tox	‘lap up’
-jái-tox	-jái-tox	‘be face to face’

TABLE 18. Disjunctive and syncretic distribution of suffixes (*-tox*).

In such instances it makes sense to ask whether this altered distribution is only a morphological property, or reflects a failure to distinguish the values at the level of morphosyntax. Perhaps the distinction between perfective and imperfective is irrelevant for plural subjects with this verb. Given that aspectual distinctions are sensitive to semantic properties that are not yet adequately understood, it is not always easy to say. But there are a number of examples of verbal paradigms that display syncretism at the level of suffixation but distinguish the forms through other morphological means, as seen in

Table 19, for example, post-tonic vowel alternation, infixation, or ablaut. The forms here are thus morphologically distinct, so it is clear that the morphosyntactic values themselves are distinct. Therefore syncretism of the suffixes does not indicate conflation of the underlying morphosyntactic values.⁸

PL PFV	PL IPFV		STEM ALTERNATION TYPE
-mí:pł-ox	-mí:pał-ox	'be bad'	post-tonic vowel syncope
-akók-m-ołka	-akókam-ołka	'help put'	post-tonic vowel syncope
-ó:kt-am	-ó:kat-am	'look at'	post-tonic vowel syncope
-áks-im	-ákas-im	'chew (& spit out fiber)'	post-tonic vowel syncope
-á:mł-am	-a<tó:>:mł-am	'be closed'	<to:> infix
-a<(tó:>)mł-kam	-ámł-kam	'fight hand to hand'	<to:> infix
-fíj-χam	-f<kó:>:j-χam	'make knot'	<ko:> infix
-akó:j-ax	-akóij-ax	'praise'	ablaut (diphthongization)

TABLE 19. Syncretic suffixation with alternating stems.

The initial impression of the suffix distribution may be that of a free-for-all, but there is a structure to it, just not the kind we are accustomed to seeing. Consider the relative distribution of the suffixes *-tox* and *-tołka* in Table 20. Although the function of each suffix varies from paradigm to paradigm, if we assume this left-to-right linear order of morphosyntactic features, then (i) each repetition of a given suffix occupies adjacent cells, and (ii) *-tox* occurs to the left of *-tołka*. That is, we can speak of distinct morphosyntactic and morphological paradigms, which bear a definite relationship to each other, but one that resembles more the links in a chain shift than a normal form-function mapping.

SG PFV	SG IPFV	PL PFV	PL IPFV		paradigmatic distribution of <i>tox/tołka</i>		
-atáskar	-atásikar	-atáskar-ox	-atáskar-ox	'make tortillas'	tox	tox	
-monxk	-mónax-ox	-mónx-ox	-mónx-ox	'go in zigzag'	tox	tox	tox
-á:fp	-á:fp-ox	-ató:fp-ox	-ató:fp-ołka	'unfasten'	tox	tox	tołka
-mí:?	-mí:?	-mí?:tox	-mí?:tołka	'be scarce'		tox	tołka
-aksípχ-a	-aksípχ-ox	-aksípχ-ołka	-aksípχ-ołka	'glue'	tox	tołka	tołka
-íχpχ-ax	-íχpχ-ołka	-íχipχ-ołka	-íχipχ-ołka	'be soft'	tołka	tołka	tołka

TABLE 20. Relative paradigmatic ordering of suffixes.

What lies behind this, I claim, is a degree of morphosyntactic indeterminacy in the suffixes. In brief, in morphosyntactic terms we have a number paradigm. The SG PFV is

⁸ Although nouns are a story of their own, it is still worth noting in this context that many of them fail to distinguish singular and plural morphologically, but do distinguish them morphosyntactically, as evidenced by agreement (source: own fieldnotes).

- (i) a. ?-itá:mt ki? kó:pł í?a
1SG-sandal the.FL.SG black.SG DECL
'My sandal is black.'
- b. ?-itá:mt koi kó:pł í?a
1SG-sandal the.FL.PL black.PL DECL
'My sandals are black.'
- (ii) a. ?-itá:mt ki? ?ant í?-jó:katχ
1SG-sandal the.FL.SG ground 1SG-DIST.drop.SG.PFV
'I dropped my sandal.'
- b. ?-itá:mt koi ?ant í?-já:itχ
1SG-sandal the.FL.PL ground 1SG-DIST.drop.SG.IPFV
'I dropped my sandals.'

(Note that 'sandal' does in fact have a plural form, but it marks plurality of the possessor; see Table 23.)

singular and the remaining values are all plural in a sense, with the plurality coming from different sources, namely combinations of subject and event number (aspect). I suggest that plurality can be concatenated, so that the values to the right show greater aggregate plurality than those to the left. Equally, the suffixes mark degrees of plurality, but this is only relative to each other: *-toŋka* is ‘more plural’ than *-tox*, but either one is compatible with the full range of plural values contained in the morphosyntactic paradigm. Crucially, this is distinct from underspecification in the usual sense, because relative plurality potentially plays a role in the paradigmatic distribution of the suffixes. Fuller justification and details are given in the next section.

5. NUMBER SUFFIXES IN VERBS AND NOUNS. Many if not most of the verbal suffixes correspond to the number suffixes used with nouns, as illustrated in Table 21. This is equally true of the other inflectional exponents such as the stem-final consonant alternations and the processes of post-tonic vowel syncope and ablaut, discussed in §6.2 below.

VERBS			NOUNS		
SG PFV	PL PFV		SG	PL	
-askíta	-askíta-x	‘refuse to share’	kó:pa	kó:pa-x	‘drinking glass’
-okósi	-okósi-xam	‘bite and suck’	ʔaɣ	ʔáɣa-xam	‘fresh water’
-aʔi:ʔom	-aʔi:ʔom-xox	‘ambush’	isʔi:k	isʔi:k-xox	‘left hand/arm’
-apoá:ɣ	-apoá:x-k	‘lean’	i:ɣ	i:x-k	‘water’
-iʔinex	-iʔinex-ka	‘be exposed’	ʃa:x	ʃáɬ-ka	‘cave’
-atá:iɣ	-atá:iʃi-ɬ	‘spin (a top)’	isʔá:x	isʔá:iʃi-ɬ	‘(his/her) shoulder’
-sítoɣ	-sítoɣ-ɬka	‘strike (a match)’	naxó:	naxó:ɬka	‘spotted sand bass’
-a:kx	-a<tó:>kaɬ-kam	‘do twice’	ʔakáʃoɬ	ʔakáʃoɬ-kam	‘piece of cloth’
-é:fe	-é:f-kox	‘be hook-shaped’	i:f	i:f-kox	‘nose, beak’
-kes	-kés-ikoɬ	‘cover completely’	kset	ksét-ikoɬ	‘magnificent frigatebird’
-a	-a-t	‘come’	ʔéʔe	ʔéʔe-t	‘plant’
-akésɣ	-akésɣ-xa	‘distribute to everyone’	i:ɣ ^u t	i:ɣot-a	‘sea current’
-aɣá:ʃa	-aɣá:ʃa-tax	‘drip (something thick)’	kanóa:	kanóa:-tax	‘boat’
-o:nɬ	-ó:nɬ-o	‘stir’	oiɬ	ó:iɬ-o	‘(its) crest’
-éme	-éme-tox	‘run out’	ɣtá:si	ɣtá:si-tox	‘estuary’
-sap	-sáp-ɣam	‘swat at’	nop	nóp-ɣam	‘bobcat’

TABLE 21. Number suffixes in verbs and nouns.

Since the history of Seri is not known, I cannot say for sure if this reflects a system that was shared at the outset, or if the morphology was originally purely nominal. The latter seems possible, because (i) denominal verbs are numerous (e.g. possessed nouns can productively be converted to verbs; see Marlett 2008a), and (ii) the derivation of verbs from nouns involves the retention of their number suffixes, with the possible addition of new ones (see Tables 25, 26, and 27 below).

The surprising thing is that what is simply plural marking with nouns may be found in any of the nonsingular perfective cells of the verbal paradigm. Consider the suffixes in Table 22.

VERB FORMS		NOUN FORMS			
‘hurry to do something carelessly’		‘Pacific bottle-nosed dolphin’		‘little blue heron’	‘piece of cloth’
SG PFV	-anámx	SG	takx	sʔenápɣ	ʔakáʃoɬ
SG IPFV	-anámɬ-k	PL	takɬ-k	—	—
PL PFV	-anámɬ-kox	PL	—	sʔenápɣɬ-kox	—
PL IPFV	-anámɬ-kam	PL	—	—	ʔakáʃoɬ-kam

TABLE 22. Three cells of the verbal paradigm correspond to noun plurals.

There is one set of nouns, however, that shows evidence of a functional distinction between different plural markers, namely (inalienably) possessed nouns, as seen in Table 23. These mark possessor person by a pronominal prefix and may distinguish between possessum and possessor number, for example, *ito* ‘his/her eye’, *itox* ‘his/her eyes’, *itołkox* ‘their eyes’. The morphological resemblance to the verbal paradigm is clear, as is the morphosyntactic agglomeration of multiple pluralities.

SG POSSESSUM	PL POSSESSUM	SG/PL POSSESSUM	
SG POSSESSOR	SG POSSESSOR	PL POSSESSOR	
itá:mt	itá:mt	itá:mat-x	‘sandal’
isk	isxk	isx-ox	‘body louse’
i?mí:ʔa	i?mí:ʔa-x	i?mí:ʔa-łkam	‘footprint’
itó	itó-x	itó-łkox	‘eye’
janópx	janópl-k	janópał-kox	‘fist, hand’
i:sx	i:sł-ka	i:sł-kox	‘Seri basket’
inʃé:t	inʃé:t-ikoł	inʃé:t-kox	‘heel’
istá::x	istá:iʃi-ł	istá:iʃi-łka	‘shoulder’
itá:ka	itá:k-t	itá:ka-tx	‘side of face’
íp-ot	íp-tax	ípi-łkox	‘calf (of leg)’
íʃ-tim	íʃ-tax	íʃ-tałka	‘hipbone’
insitxk	insitix-ox	insitx-ox	‘shoulder blade’

TABLE 23. Possessor and possessum plurality with possessed nouns (third-person possessor shown).

Possessed nouns are common sources of denominal verbs, which allows us to directly compare the content of the two types of paradigm. Consider the noun ‘fist’ and the verb ‘have fist’ (inflected in the proximal tense) in Table 24. Possessor number corresponds to subject, and possessum number corresponds to aspect. The lack of distinct forms for plural possessor/subject here is no doubt semantically motivated.

NOUN	VERB (PROXIMAL REALIS FORMS)
janópx ‘his/her fist’	injanópx ‘s/he has a fist’
janópl-k ‘his/her fists’	injanópl-k ‘s/he has fists’
janópał-kox ‘their fists’	injanópał-kox ‘they have fists’

TABLE 24. Possessed nouns and derived verbs.

If the paradigms of denominal verbs differ from their base nouns it is usually in the imperfective forms. This may involve the addition of the suffix *-tim* in the singular, as in Table 25, or, in the case of nouns that have just a simple singular ~ plural distinction, the wholesale addition of imperfective forms for both singular and plural subject, as in Table 26.

NOUN	VERB (PROXIMAL REALIS FORMS)
isté:pek ‘his/her louse’	imaslé:pek ‘s/he delouses.PFV’
isté:pexk ‘his/her lice’	imaslé:pexk-im ‘s/he delouses.IPFV’
isté:pex-ox ‘their lice’	imaslé:pex-ox ‘they delouse’

TABLE 25. Possessed nouns and derived verbs—addition of SG IPFV suffix *-tim*.

NOUN	VERB (PROXIMAL REALIS FORMS)
ipná:ił ‘her skirt’	imipná:ił ‘she wears skirt.PFV’
—	imipná:ił-im ‘she wears skirt(s).IPFV’
ipná::x ‘their skirts’	imipná::x ‘they wear skirt(s).PFV’
—	imipná::x-am ‘they wear skirt(s).IPFV’

TABLE 26. Possessed nouns and derived verbs—addition of dedicated IPFV forms.

The suffix *-tim* is noteworthy because it is not related to any nominal number markers, and it appears to be a purely verbal suffix; the nouns it does appear on are transparently deverbal, as with *pnaiʔáʔp-tim* ‘bag-SG’ (S. Marlett, p.c.). The only other verbal suffix that is not related to nominal number markers is *-ot*, realized as *-t* postvocally. It is found in two contexts. First, it is found in the singular perfective of verbs derived from nouns whose singular ends in a post-tonic vowel, for example, *itasi* ‘(his/her) name’ → *-itasi-t* ‘have a name (SG PFV)’. Second, deverbal verbs (typically causatives), derived using the multipurpose prefix realized as *a-*, *ak-*, *k-*, *ako-*, and *aʔ-* (see §4.1), may add *-ot* as well in the singular imperfective (see Marlett 1981:106). An apparent variant of this occurs in some verbs where instead of suffixed *-ot*, <to> is inserted before a stem-final /ʔ/, as in Table 27. This suffix is not attested with nominal number marking.

	SG PFV	SG IPFV	PL PFV	PL IPFV	
BASE	-iʔi:met	-iʔi:me-tim	-iʔi:m-tox	-iʔi:m-toʔka	‘marry’
DERIVED	-aʔ-i:met-ot	-aʔ-i:me-tim	-aʔ-i:m-tox	-aʔ-i:m-toʔka	‘give permission to marry’
BASE	-ke:kʷʔ	-ké:koʔ-im	-ké:koʔ-ox	-ké:koʔ-ox	‘hear’
DERIVED	-a-ké:ko<to>ʔ	-a-ké:koʔ-im	-a-ké:koʔ-am	-a-ké:koʔ-am	‘make hear’

TABLE 27. Suffix *-ot* in deverbal derived verbs.

Thus, with the exception of *-tim* and *-ot*, the verbal suffixes are in effect nominal number markers. Recognizing this is the key to understanding how the system is constructed.

5.1. MORPHOLOGICAL AND MORPHOSYNTACTIC HIERARCHIES. The reader will probably have noticed that many of the longer suffixes appear to be composed of shorter ones (Marlett 1981:96), and that this morphological agglutination of suffixes corresponds to a morphosyntactic agglutination of plurality. This is most clearly illustrated by the possessed noun paradigms, some examples of which are shown in Table 28. Where plurality of the noun alone is meant, it has just a simple suffix. When plurality of the possessor is indicated—which in these cases also implies plurality of noun, and hence multiple plurality—the noun has a compound suffix.

SG POSSESSUM	PL POSSESSUM	SG/PL POSSESSUM	
SG POSSESSOR	SG POSSESSOR	PL POSSESSOR	
janópx	janópx-k	janópx-k-ox	‘fist, hand’
islá:x	islá:ifi-ʔ	islá:ifi-ʔ-ka	‘shoulder’
itá:ka	itá:k-t	itá:ka-t-x	‘side of face’

TABLE 28. Morphological and morphosyntactic agglutination (examples from Table 23).

This means that we can construe some suffixes as being inherently ‘more plural’ than others, so that even if we cannot assign them a specific morphosyntactic value, their RELATIVE values are indicated, along some hierarchy of plurality. In the case of verbs we must then establish what that hierarchy is. The morphological parallelism between verbs and possessed nouns and verbs outlined in the preceding section suggests that we can equate subject number with possessor number, and aspect with possessum number. The two ends of the hierarchy are then clear enough: singular perfective has no plurality, while plural imperfective has double plurality. In the case of the two other values a purely mechanical computation leaves their relationship undetermined, since each bears only one instance of plurality, nor does an informal paraphrase yield a better answer: is an act performed by a single subject multiple times more or less plural than an act performed by multiple subjects a single time? We do not currently have the means to

perform a principled semantic investigation of this question across the lexicon, but the morphological facts outlined in the remainder of this section make it clear that the singular imperfective lies closer to the singular perfective, while the plural perfective lies closer to the plural imperfective, yielding the hierarchy singular perfective – singular imperfective – plural perfective – plural imperfective. If we interpret this as reflecting increasing plurality, then paradigmatic configurations such as seen in Table 20 (repeated below as Table 29) can be explained as follows. If we assume a morphophonologically regular rule of /x/ → /ʎ/ before /k/ within suffixes (consider the various suffix configurations illustrated in Table 16), the suffix *-toʎka* is composed of the two plural suffixes *-tox* and *-ka*, and always expresses greater plurality than *-tox* alone, whatever the actual values in the paradigm.

LESS PLURAL ← → MORE PLURAL					paradigmatic distribution of <i>tox/toʎka</i>
SG PFV	SG IPFV	PL PFV	PL IPFV		
-atáskar	-atásikar	-atáskar-ox	-atáskar-ox	'make tortillas'	tox tox
-monxk	-mónax-ox	-mónx-ox	-mónx-ox	'go in zigzag'	tox tox
-a:fp	-á:fi:p-ox	-ató:fi:p-ox	-ató:fi:p-oʎka	'unfasten'	tox tox toʎka
-mi:ʔ	-mi:ʔ	-mi:ʔ-tox	-mi:ʔ-toʎka	'be scarce'	tox tox toʎka
-aksípχ-a	-aksípχ-ox	-aksípχ-oʎka	-aksípχ-oʎka	'glue'	tox toʎka toʎka
-iχpχ-ax	-iχpχ-oʎka	-iχípχ-oʎka	-iχípχ-oʎka	'be soft'	toʎka toʎka toʎka

TABLE 29. Relative plurality of related suffixes (repeated from Table 20).

It should be borne in mind, however, that the apparent compositionality of many of the suffixes, though of possible diachronic significance, does not necessarily have any bearing on the synchronic composition of paradigms, which may well consist of suffixes that bear no demonstrable morphotactic relationship to each other. But even so, hierarchical relationships obtain between otherwise unrelated suffixes, as illustrated by the distribution of *-tox* and *-kam* in Table 30.

LESS PLURAL ← → MORE PLURAL					paradigmatic distribution of <i>tox/kam</i>
SG PFV	SG IPFV	PL PFV	PL IPFV		
-písak-im	-písaxk-im	-písax-ox	-písat-kam	'sharpen'	tox kam
-á:ix-am	-á:i:x-ox	-á:ix-ox	-á:i:t-kam	'wrap oneself around'	tox tox kam
-á:i:x-am	-á:i:x-ox	-á:i:t-kam	-á:i:t-kam	'roll up'	tox kam kam

TABLE 30. Relative plurality of unrelated suffixes.

Because of the freedom with which the suffixes combine within paradigms, they are implicated in multiple hierarchical relationships, which can be represented as links in a larger chain. Consider the plural subject forms in Table 31. Although each suffix can appear in either of these two cells, their distribution appears to be constrained along the hierarchy *tam – tox – xam*, such that a greater degree of morphosyntactic plurality must be expressed by a suffix of equal or greater plurality. For example, in this fragment, if *-tox* is used for the plural perfective, the plural imperfective cannot be *-tam*, while if the plural perfective is *-xam*, the plural imperfective must also be *-xam*.

PL PFV	PL IPFV	
-ató:-tam	-a:tó:-tam	'help hold'
-oá:la-tam	-oá:la-tox	'lap up'
-ʔá:-tam	-ʔá:-xam	'be'
-á:ko-tox	-á:ko-xam	'give directions'
-jái-tox	-jái-tox	'be face to face'
-á:ma-xam	-á:ma-xam	'percolate'

TABLE 31. Evidence for a hierarchy of suffixes *tam – tox – xam*.

The paradigmatic cooccurrence restrictions in Table 31 are graphically represented in Table 32, where the y-axis represents the occurrence of a suffix in a ‘lower’ morphosyntactic position (in this case, perfective), and the x-axis represents its occurrence in a ‘higher’ position (in this case, imperfective). The numbers indicate the number of lexemes in which a given paradigmatic order of suffixes occurs. Cooccurrence of the same suffix in both positions is assumed to be unrestricted and is indicated by the shaded cells.

		HIGHER (IPFV)				PL PFV	PL IPFV	
		tam	tox	xam				
LOWER (PFV)	tam		1	1	thus:	tam	tam	<i>lexeme 1</i>
	tox			1		tam	tox	<i>lexeme 2</i>
	xam					tam	xam	<i>lexeme 3</i>
				tox		tox	<i>lexeme 4</i>	
				tox		xam	<i>lexeme 5</i>	
				xam		xam	<i>lexeme 6</i>	

TABLE 32. Paradigmatic cooccurrence restrictions from Table 31 (syncretism between adjacent cells is unconstrained).

Table 33 shows how this kind of hierarchy scales up both to the paradigm as a whole (all four cells) and to the corpus as a whole (all 952 lexemes). The suffixes are arranged in an order of increasing plurality along the scale SG PFV – SG IPFV – PL PFV – PL IPFV; note that suffixes with just a single occurrence in the corpus have been omitted. The vast majority of data points fall to one side of the diagonal: 4,292 out of 4,453, or 96%. (As indicated in the preceding paragraph, the cooccurrence of the same suffix in adjacent positions in the paradigm is not overtly registered.) This means that this single hierarchy effectively describes the paradigmatic distribution of suffixes throughout the corpus. Even without ascribing an explicit morphosyntactic value to any of the suffixes, we can equate this morphological hierarchy with a scale of plurality.

As for the 4% (161) of instances that do not conform to the hierarchy, nearly all of these (148, or 92%) involve the suffixes zero or *-tim*. That is, the presence or absence of zero or *-tim* in the paradigm of a verb is relatively independent of the other suffixes in its paradigm. Two possible explanations can be offered here. In the first case, this may be evidence that zero is not really a suffix (hardly a controversial suggestion) and so does not participate in the suffixal hierarchy. As for *-tim*, this may have an exceptional status among the suffixes, being the one truly productive one, which can be more or less freely employed in any paradigm. Evidence for this is its frequency, which dwarfs that of all the other overt suffixes (see Table 16), and also the fact that it is productively employed in denominal verb derivation, where it functions as an add-on to a previously existing paradigm (see Tables 25 and 26).

I should caution that the morphological hierarchy in Table 33 is almost surely over-articulated and could probably be consolidated by clustering mutually exclusive suffixes into a single class. I have been able to do so with the terminal points in the hierarchy, but so far lack sufficient evidence to determine clusters in between.

6. OTHER MORPHOLOGICAL EXPONENTS. As already indicated in the preceding sections, subject number and aspect inflection have other exponents besides the suffixes that are the main focus of this study. Their scope in the lexicon is smaller than that of suffixation, but still substantial. Most of these are also found as number markers in nouns, summarized in Table 34: stem-final alternations, and the two types of vowel alternation, namely syncope and ablaut.

		om, in,															tkam, koŋka, tkox, taŋka,					TOTAL							
	ZERO	ot	am	i	ix	tim	t	at	to	ta	koŋ	x	tax	tx	k	ka	xox	ŋ	tkam	koŋka	tkox	taŋka	totka						
ZERO		6	26	7	1	682	42	6	37	68	20	67	93	10	110	29	8	39	85	267	112	207	23	74	47	2	251	2,319	
ot	5		3			12	2		1	3	1	1	1		1	1	1	3	13			1					15	56	
om, in, am	5			3		2			1	3	1	1	1									2				1	5	27	
i	2				1	6			1	1									1	5			3			2	4	24	
ix						1												1	1			2						5	
tim	91			3	2		33	3	35	33	12	50	63	8	76	6	8	27	66	193	59	192	14	45	44	4	227	1,294	
t	3					19					1	1	1	3			2		11	11	1	11	1	1	6		25	86	
at													1						3								7	4	
to																			5			19					12	36	
ta	1					11							11	1	5	1	1	5	8	32	3	18	1	1	1	1	23	121	
koŋ																											18	26	
x															2		1		4			1	2	3	5	4	1	5	
tax						2													2	1							31	49	
tx																											1	3	103
k	3					4										3	5	3	47	26	5	3			1		3	1	22
ka						1													1	1	15	3			1		2	3	
xox																											1	1	2
ŋ																			30	3							2	35	
tkam																				1							2	3	
koŋka																													
tkox																													
kox																													
tam																													
kam																													
ŋam																													
xam																													
tix																													
tkam, koŋka, tkox, taŋka, totka																													

TABLE 33. Hierarchy of suffixes along the morphosyntactic continuum SG prfv – SG prfv – PL prfv – PL prfv. Figures indicate the number of lexemes in which a suffix in the y-axis occurs in a paradigm where the suffix in the x-axis is used for a morphosyntactic value that is ‘higher’ along the morphosyntactic hierarchy.

VERBS (SUBJECT NUMBER)			NOUNS		
	SG PFV	PL PFV	SG	PL	
STEM-FINAL	-ke:tk	-ke:txk	ka:tk	ka:txk	‘grasshopper’
	-áftox	-áfoŋ	χé:kox	χé:kʷ	‘wolf’
	-mé:som	-mé:sotʃ	ʔá:onom	ʔá:onatʃ	‘hat’
	-áfin	-áfix-a	komitin	komitix-a	‘desert ironwood’
	-χá:in	-χá:if-ox	koton	kotoʃ-ax	‘blouse’
	-tapʃχ	-tápkax-k	itíʃχ	itikax-k	‘penis’
	-te:pχ	-té:pʃax-k	je:pχ	jé:pʃax-k	‘its arm, wing’
	-ké::χ	-ké::taχ	jákaχ	jáktaχ	‘its dorsal fin’
	-aʔisiŋ	-aʔiʃiŋ	ipχási	ipχáʃ	‘its meat’
SYNCOPE	-aʔá:pŋ	-aʔá:poŋ-ox	ipŋ	ípaŋ-ox	‘tongue’
	-pítot	-pítŋ-ox	jámot	jámŋ-ox	‘its stomach (fish)’
ABLAUT	-pá:isχ	-pá::sχ-ax	iná:iŋ	iná::x	‘skin, hide’

TABLE 34. Nonsuffixal number marking in verbs and nouns.

The stem-final consonant alternations are of the most interest here, because they appear to follow the same hierarchical organization as the suffixes. This is perhaps not surprising, given that the dividing line between suffixes and stem-final consonants is not always clear. For this reason we look at them in some detail in §6.1.

The other exponent types do not appear to follow this hierarchical organization when looked at over the full four-cell paradigm, so they are surveyed only briefly. The vowel alternations (§6.2) assume a morphologically arbitrary 'morphomic' pattern. There is also a purely verbal marker, namely the infix *to:/ko* (§6.3), which is a straightforward exponent of subject number and has little or no interaction with aspectual distinctions.

6.1. STEM-FINAL ALTERNATIONS. The stem-final alternations at least show elements of a hierarchical organization similar to what is found with the suffixes. This is perhaps not surprising, given the rather fluid distinction between the two types of exponent. Because the stem-final alternations generally distinguish just two forms, we can construe them as representing a simple singular ~ plural opposition, with variation in the precise cut-off point between the two. There are two predominant patterns, seen in Table 35: (i) something we can call a general singular vs. plural opposition, in which the singular perfective is opposed to all of the other values, each of which has some element of plurality to it, and (ii) singular subject vs. plural subject. To a large measure individual alternations go along with a particular pattern. Thus /x/ ~ /ʎ/ and /k/ ~ /xk/ are associated with the first type, while /n/ ~ /ŋ/ and /t/ ~ /ʎ/ are associated with the latter.

	SG PFV	SG IPFV	PL PFV	PL IPFV	
general SG ~ PL	-ʔánaχ	-ʔánaŋ-im	-ʔánaŋ-k	-ʔánaŋ-kox	'gossip'
	-aʔipak-ot	-aʔipaxk-im	-aʔipax-ox ^a	-aʔipaxk-am	'cause to turn back to'
SG SBJ ~ PL SBJ	-χá:in	-χá:in-im	-χá:if-ox	-χá:if-otka	'gather'
	-aʔémot-ot	-aʔémot-im	-aʔémŋ-ox	-aʔémŋ-otka	'subtract'

TABLE 35. Major paradigmatic patterns of stem-final alternations.

^a Recall that stem-final /xk/ is regularly realized as /x/ before underlying *to*-initial suffixes.

There may, however, be some vacillation between these two patterns, above all in two contexts. First, the alternation /x/ ~ /ʎ/ adheres to the SG SBJ ~ PL SBJ pattern with some lexemes (Table 36).

	SG PFV	SG IPFV	PL PFV	PL IPFV	
general SG ~ PL	-ʔánaχ	-ʔánaŋ-im	-ʔánaŋ-k	-ʔánaŋ-kox	'gossip'
SG SBJ ~ PL SBJ	-ítaχ	-ítaχ-im	-ítaŋ-k	-ítaŋ-kox	'burn'

TABLE 36. Varying patterns of the stem-final alternation /x/ ~ /ʎ/.

Second, the pattern displayed by alternations of the /χ/ ~ /Caχ/ type are sensitive to the presence or absence of a singular imperfective suffix (usually *-tim*). If there is no suffix, the singular imperfective patterns with the other ‘plural’ forms and terminates in /Caχ/. If suffixed, the stem patterns with the singular perfective. This is particularly apparent if we look at variant forms as recorded in Moser and Marlett’s (2010) dictionary, as in Table 37.

	SG PFV	SG IPFV	PL PFV	PL IPFV	
VARIANT 1	-ápoχ	-áp<ta>χ	-áp<ta>x-k	-áp<ta>χ-lka	‘grab’
VARIANT 2	-ápoχ	-ápoχ-im	-áp<ta>x-k	-áp<ta>χ-lka	

TABLE 37. Varying patterns of the stem-final alternation /χ/ ~ /Caχ/.

In sum, the stem-final alternations represent a more restricted version of the hierarchical relationships seen with suffixes, because only a two-way distinction is involved. In just a very few lexemes do we see additional morphological distinctions that, interestingly, appear to extend the hierarchy. For example, in Table 38, the verb ‘surround’ shows a stem-final alternation between /n/ (singular subject) and /x/ (plural subject), while the verb ‘tingle’ adds to this a further alternation between /x/ and /t/.

SG PFV	SG IPFV	PL PFV	PL IPFV	
-áfin	-?áfin-im	-?áfix-a	-?áfix-a	‘surround’
-imátmi ^a	-imátin-im	-imátix-a	-imát-t-ołka	‘tingle’

TABLE 38. Stem alternation within plural subject forms.

^a After a final /Cn/ cluster an epenthetic /i/ is added.

This alternation *WITHIN* the plural subject forms mirrors one of the most common singular ~ plural stem-final alternations (see Table 35), suggesting that we might also see these alternations in terms of relative plurality, as with the suffixes. Such examples are quite rare though.

6.2. VOWEL ALTERNATIONS. Although vowel alternations (syncope, ablaut) are a feature of the verbal paradigm shared with nominal number marking, the way they are distributed in the paradigm cannot readily be described in terms of the monotonic concatenation of plurality, as I have suggested for suffixation and stem-final alternations.

Syncope involves the deletion of a post-tonic short vowel; in case the vowel is /o/ and is adjacent to a velar consonant, the deleted vowel leaves a trace in labialization (see §3.4). Although these circumstances might suggest it is a phonologically conditioned process, there is nothing in its synchronic distribution that supports this; for example, within a paradigm syncope may be observed between a pair of unsuffixed forms and between a pair of suffixed forms, and may be associated with both the addition and the removal of a suffix. The possibilities are summarized in Table 39. This shows that syncope is a morphological operation and not a phonological effect.

-ápot	(SG PFV)	-ápt	(PL PFV)	‘exchange’
-mí:pt-ox	(PL PFV)	-mí:pał-ox	(PL IPFV)	‘be bad’
-a?á:pł	(SG PFV)	-a?á:poł-ox	(PL PFV)	‘chill (tr.)’
-pitoł	(SG PFV)	-pítł-ox	(PL PFV)	‘have gas’

TABLE 39. Lack of relationship between syncope and suffixation.

Table 40 shows the paradigmatic patterns of syncope. Were this to follow the same regularities displayed by stem-final alternations, we would expect to see the paradigms divided into segments: a ‘singular’ zone to the left and a ‘plural’ zone to the right. However, only half of the items shown here conform to this template.

	SG PFV	SG IPFV	PL PFV	PL IPFV	# of lexemes
a.	Ø	V	Ø	Ø	122
b.	Ø	V	V	V	86
c.	V	V	Ø	Ø	82
d.	Ø	V	Ø	V	63
e.	Ø	Ø	V	V	22
f.	Ø	Ø	Ø	V	16
g.	V	V	Ø	V	14
h.	V	Ø	Ø	Ø	5
i.	Ø	Ø	V	Ø	3
j.	V	Ø	Ø	V	3
k.	Ø	V	V	Ø	2
l.	V	Ø	V	Ø	2
m.	V	Ø	V	V	1

TABLE 40. Patterns of vowel syncope.

Some generalizations can be made, but they are more connected with the behavior of imperfective forms. First, syncope in the imperfective usually presupposes syncope in the corresponding perfective. With singular subjects, of the fifty-two lexemes with syncope in the imperfective, forty-one have syncope in the perfective as well. With plural subjects, of the 216 lexemes with syncope in the imperfective, 209 have syncope in the perfective as well. Second, syncope in the imperfective is roughly four times more common with plural subjects than with singular subjects, as the preceding figures indicate. Aside from these generalizations the patterns of syncope appear to be randomly distributed, so that there is no evidence for a morphosyntactically coherent role for syncope.

Ablaut, or vowel-quality alternations, typically involves long vowels and diphthongs and affects only a small portion of the lexicon (around ninety lexemes). The patterns of alternation more or less match those found with vowel syncope, as summarized in Table 41, where alternation patterns found with syncope have been abstracted out. This suggests that both syncope and ablaut might be seen as instantiations of a single system of vowel alternations.

ABLAUT					SYNCOPE (ABSTRACT PATTERNS)				
SG PFV	SG IPFV	PL PFV	PL IPFV	# of lexemes	SG PFV	SG IPFV	PL PFV	PL IPFV	# of lexemes
A	A	B	B	33	A	A	B	B	104
A	B	B	B	21	A	B	B	B	91
A	B	A	B	13	A	B	A	B	65
A	B	A	A	13	A	B	A	A	123
A	A	A	B	4	A	A	A	B	16
					A	A	B	A	17
					A	B	B	A	5

TABLE 41. Patterns of ablaut compared to patterns of syncope.

Overall, I have not been able to find in the vowel alternations evidence of the hierarchical organization that governs suffixation and stem-final alternations. At best, we can say that they are morphologically stipulated.

6.3. INFIXATION. Infixation is found with seventy-two verbs, with two allomorphs, <to:-> and <ko:->; see Table 42. The former is the default and occurs postvocally, while the latter occurs when the infix follows a consonant, a situation that arises when a stem-internal vowel /i(:)/ is deleted, which regularly occurs under infixation. The infix has no parallel in the nominal system and is used exclusively to mark plural subjects; in

a dozen verbs it is used in just one aspect, for some verbs the perfective, and for others the imperfective.

	SG PFV	PL PFV	
AFTER V	-matsx	-ma<tó:>tisx-ox	'tell lies'
AFTER V (stem-initial /i/ retained)	-ik	-i<tó:>k	'plant'
AFTER C (stem-internal /i/ deleted)	-jip	-ʃ<kó:>p-ʒam	'kiss'

TABLE 42. Plural infix allomorphy.

In its relative morphosyntactic straightforwardness and the phonological predictability of its allomorphy, infixation resembles the verbal prefix system described in §3.3. It differs, though, in that the use of the infix itself is lexically stipulated, so that in spite of its paradigm-internal regularity it nonetheless adds complexity to the lexicon.

6.4. SUMMARY. Like the suffixes described in §5, the major nonsuffixal exponents of subject number and aspect correspond morphologically to nominal number markers. The system of stem-final alternations is close to that of the suffixes: they can be understood as marking the verbal equivalent of singular vs. plural, with the precise morphosyntactic cut-off point between these values depending both on the particular alternation and on the lexeme itself. The vowel alternations, although they also parallel nominal number marking, have a different paradigmatic distribution and follow a large number of different patterns that appear to be lexically specified. Infixation marking subject plurality is a uniquely verbal formative type and plays a much smaller role in the language.

At the descriptive level, at least, these additional layers of exponence add complexity to the inflectional system, because they must be independently specified—either singly, as in the examples shown in Table 34, or in combination, as in Table 43, which shows a verb that displays a stem-final alternation (/t/ ~ /t̥/), syncope, ablaut (/i/ ~ /e/), and infixation.

	'cross'	STEM-FINAL	SYNCOPE, ABLAUT	INFIXATION
SG PFV	-ikt-im	t	∅	—
SG IPFV	-ikit-i	t	i	—
PL PFV	-i<tó:>k̥t̥	t̥	∅	to:
PL IPFV	-i<tó:>ket̥-am	t̥	e	to:

TABLE 43. Varieties of inflectional operations.

Most of the lexicon employs one or more of these nonsuffixal exponents (only 22% of the corpus—215 lexemes—is inflected by suffixation alone). As shown in Table 14, factoring in these additional exponents increases the number of inflection classes and raises the conditional entropy (though not dramatically).

7. DISCUSSION AND CONCLUSION. The suffix paradigms of Seri verbs show a degree of complexity that sets them apart from most other attested inflectional systems, as measured by the unpredictability of the forms. Two sources of this complexity stand out. The first is the wealth of allomorphs and the freedom with which allomorphs in one paradigmatic cell can combine with those of another cell. Much the same can also be said about the relationship between suffixation and the other inflectional subsystems—stem-final alternations, vowel alternations, and infixation—which are by and large independent variables. Such cross-classification is, to a greater or lesser extent, a property of nearly every inflectional class system, and Seri stands out more in degree than in kind.

It is rather the second source of complexity that is particularly noteworthy. Under the analysis offered here, it reflects a type of paradigmatic organization that is typologically

unusual and has not to the best of our knowledge received a detailed description, let alone a formal analysis within any of the theoretical models currently in circulation. The Seri verbal suffixes, along with the allied system of stem-final alternations, occupy a particular typological middle ground between morphosyntactic motivation and morphological autonomy. The morphological paradigm runs in parallel to the morphosyntactic paradigm, in that both mark—I have argued—the aggregation of plurality, morphologically identical to nominal number marking in the vast majority of cases. In this sense the morphosyntactic paradigm has a clear morphosyntactic motivation. But these morphological markers do not have fixed relationship to any particular morphosyntactic value, and so represent an autonomous system, in the sense that the rules governing their distribution in the paradigm must be stated separately from the morphosyntactic values they instantiate. The morphosyntactic and morphological systems run in parallel, but the two are not consistently calibrated.

As argued toward the end of §1, inflectional morphology can be understood to relate to morphosyntactic functions in two ways: either morphological formatives directly encode morphosyntactic values that they express, or they are pure elements of form generated by an autonomous morphological system, which are then exploited for the expression of morphosyntactic contrasts. Though this contrast could be portrayed as reflecting fundamentally different conceptions of the role of morphology in the architecture of grammar, for the present discussion it is more important that it reflects different typological possibilities. Both are easily illustrated by elements of the Seri verbal system. Consider first the intransitive subject prefixes in Table 44. Each prefix realizes a clearly defined morphosyntactic function, which is the same for all verbs.

1SG INTR	→	?p-
1PL	→	?a-
2SG	→	m-
2PL	→	ma-
3	→	∅

TABLE 44. Intransitive subject prefixes: direct mapping from morphosyntax to morphology.

Vowel alternations, such as the representative patterns of vowel syncope given in Table 45, are another story. In this case there is a clear morphological pattern—the opposition between the presence and absence of a post-tonic short vowel—that cannot be derived directly from the relationship between the morphosyntactic values. Table 46 shows how this might be represented. Morphological and morphosyntactic paradigms are completely independent from each other. The two are linked by stipulated association lines (see Stump 2006), which themselves vary from class to class.

SG PFV	SG IPFV	PL PFV	PL IPFV		PATTERN OF SYNCOPE			
-apókx	-apókɪ-k	-apókɪ-kox	-apókɪ-kam	'pry off'	∅	∅	∅	V
-akókam-ot	-akókam-am	-akókɪm-oŋka	-akókam-oŋka	'help put'	V	V	∅	V
-apáinɪx	-apáinɪ-k	-pá:inaɪ-kox	-pá:inaɪ-oŋka	'roll (tr.)'	∅	∅	V	V
-ifáʔʃɣ	-ifáʔaʃɣ-im	-ifáʔʃɣ-ox	-ifáʔʃɣ-oŋka	'sob'	∅	V	∅	∅

TABLE 45. Different patterns of syncope.

Neither effectively captures the behavior of the Seri verbal suffixes. As has been amply demonstrated in the preceding sections, most of the suffixes are not tied to a specific value, so there is no obvious justification for anchoring any particular suffix to any particular cell in the morphosyntactic paradigm. Even if we were to assume instead that the suffixes realize some underspecified value or set of values (licensing their use in

				MORPHOLOGY				
Ø	Ø	Ø	V	MORPHOSYNTAX	SG PFV	SG IPFV	PL PFV	PL IPFV
				MORPHOLOGY				
V	V	Ø	V	MORPHOSYNTAX	SG PFV	SG IPFV	PL PFV	PL IPFV
				MORPHOLOGY				
Ø	Ø	V	V	MORPHOSYNTAX	SG PFV	SG IPFV	PL PFV	PL IPFV
				MORPHOLOGY				
Ø	V	Ø	Ø	MORPHOSYNTAX	SG PFV	SG IPFV	PL PFV	PL IPFV

TABLE 46. Autonomous morphology: stipulated linkage between morphosyntax and morphology.

multiple cells of the paradigm), we then run into the problem that all of the suffixes have variable distribution (see e.g. Table 20), and there is no satisfying way of resolving how multiple underspecified formatives assume the paradigmatic configuration that they do.⁹ Treating the suffixes as direct exponents of the morphosyntactic values does not therefore seem like a very promising approach.

If instead we view the morphological paradigm as a purely morphological object, we solve all those problems in one fell swoop, because we are free to stipulate the morphological paradigm independent of morphosyntax. This makes perfect sense where the logic of the morphological paradigm is unrelated to the morphosyntactic values it realizes, as with the vowel syncope patterns just described. The problem with the Seri verbal suffixes is that the morphological paradigm is NOT unrelated to the morphosyntactic paradigm. As argued in §5.1, the suffixes follow a strict hierarchy within the paradigm, which comparison to the nominal system reveals to be one of relative plurality. The morphosyntactic paradigm also reflects plurality—both of events and of arguments—and this can hardly be a coincidence. The two systems are marching to similar if not identical tunes, but are out of step with each other.

For a concrete illustration, consider the partial paradigms in Table 47, which are analyzed in Table 48. Suffixes and morphosyntactic values are arrayed along their parallel hierarchies, with the links between them indicated by lines.

PL PFV	PL IPFV	
-a:tó:-tam	-a:tó:-tam	'help hold'
-oá:la-tam	-oá:la-tox	'lap up'
-ʔá:-tam	-ʔá:-xam	'be'
-á::ko-tox	-á::ko-xam	'give directions'
-jái-tox	-jái-tox	'be face to face'
-á:ma-xam	-á:ma-xam	'percolate'

TABLE 47. Evidence for a hierarchy of suffixes *tam* – *tox* – *xam* (taken from Table 31).

In the first instance any given link is arbitrarily stipulated. But once we have two or more suffixes in the paradigm of a lexeme, the hierarchy constrains the stipulation:

⁹ Equally, if we were to treat their distribution as resulting from something like rules of referral, so that the suffix is extended beyond its core range in certain contexts (as in the example of the Russian genitive-accusative alluded to in §1), the lack of a fixed anchor point is a fatal problem.

PL PFV	PL IPFV		LESS PLURAL	MORE PLURAL
		MORPHOLOGY	tam	tox xam
tam	tam	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
tam	tox	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
tam	xam	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
tox	xam	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
tox	tox	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
xam	xam	MORPHOSYNTAX	PL PFV	PL IPFV

TABLE 48. Linkage between morphological and morphosyntactic hierarchies, using suffix paradigms extracted from Table 47.

the lines that link morphology to morphosyntax cannot cross. This enforces the parallelism between the two hierarchies, by preventing the sorts of illicit paradigms shown in Table 49.

PL PFV	PL IPFV		LESS PLURAL	MORE PLURAL
		MORPHOLOGY	tam	tox xam
tox	tam	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
xam	tam	MORPHOSYNTAX	PL PFV	PL IPFV
		MORPHOLOGY	tam	tox xam
xam	tox	MORPHOSYNTAX	PL PFV	PL IPFV

TABLE 49. Illicit paradigm linkage: lines cross.

Thus one of the most important lessons we can gain from studying the Seri suffixal paradigms is that there is a middle ground between the conceptual extremes of morphosyntactically motivated and morphologically autonomous morphology, which in this case underlies the entire system of verb suffixation. The morphological paradigm is transparently organized along the same principles as the morphosyntactic paradigm, but it appears that the precise calibration between the two in any given instance must be arbitrarily stipulated. If this analysis is correct, it raises some important questions for morphological typology and theory. What motivates the linkage that we see in Table 48? Arbitrary stipulation, though it lacks a transparent morphosyntactic motivation, does not just come out of nowhere. How then does the diffuse notion of relative plurality become mapped onto concrete values in individual lexical paradigms? Is there

something in the lexical or situational semantics that has caused the suffix *-tox* to settle on the singular imperfective in *-á:ix-ox* ‘roll up’, on the plural perfective in *-á:ko-tox*, and on the plural imperfective in *-oá:la-tox*? Equally, the facts analyzed here represent a challenge for morphological theory: how can we insightfully and economically represent the dual nature, motivated and arbitrary, of the morphological paradigm? What other already familiar inflectional systems could be seen in this light, and would that lead us to modify our conception of how morphology serves to realize morphosyntactic functions? Of course, further work, in particular on the semantics of verbal aspect in Seri, might compel us to reduce the degree of morphological arbitrariness that has been proposed here. But the patterns described here are sufficiently robust to demand our attention and expand our overall typology of the sorts of inflectional systems that people have come to construct.

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Surrey Morphology Group [I1]
 School of English and Languages
 University of Surrey
 Guildford, Surrey GU2 7XH, United Kingdom
 [m.baerman@surrey.ac.uk]

[Received 31 October 2014;
 revision invited 4 May 2015;
 revision received 23 July 2015;
 accepted 31 December 2015]