Canonical Inflectional Classes

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1. Introduction: Canonical typology

Inflectional classes are a basic notion in morphology, though occasionally their existence is challenged. In trying to get a new perspective on complex phenomena, like inflectional classes, we may take a 'canonical' approach. This means that we extrapolate from what there is to what there might be, in order to define the theoretical space. Within that scheme of theoretical possibilities we can situate the real instances we find. An effect of this approach is to separate out coincidental overlaps in the examples that exist; we may then start to ask which characteristics *happen* to be the way they are and which *have* to be the way they are (Corbett 2007). This approach has proved helpful in tackling a range of topics, particularly in syntax (for instance: Comrie 2003, Evans 2003, Polinsky 2003, Corbett 2006) and in morphology (Baerman *et al.* 2005: 27-35; Spencer 2005; Stump 2005; Corbett 2008a; Thornton 2008, and others).[1]

On one level we know what an inflectional class is. For example: 'An *inflectional class* is a set of lexemes whose members each select the same set of inflectional realizations.' (Aronoff 1994: 64). From the other perspective: 'The lexical entry for the noun must therefore bear some sort of flag to assure that it will manifest the appropriate set of inflections. This flag is the inflectional class.' (Aronoff 1994: 65). In this sense, inflectional class is equivalent to 'morphological feature', as for instance in Corbett & Baerman (2006). Yet on close examination the notion bears further clarification. Our aim therefore will be to specify canonical inflectional classes, through a fully convincing ideal. Given that canonical ideal we can see how close the real examples come to it. As we investigate a phenomenon as specific as inflectional class, we may introduce principles and criteria which follow from more general principles which should eventually be stated at a higher level of description. At this stage it is worth discussing them for the light they shed on the particular phenomenon under discussion, and on its less canonical instances. As Wurzel points out, in a relevant quote (1989: 63): 'The constitution of inflectional classes is based on the uniformity and distinctiveness of paradigms, just as every classification is based on the common and distinct properties of the elements to be classified.'

2. Canonical inflection

In canonical inflection we find a unique mapping from form to function, and from function to form. It does not matter at this stage whether such a system exists: the point is that we can define it, we can recognize it if we find it, and it gives us a measure of canonicity according to which we can calibrate the instances of inflectional morphology which we find. The ideas are presented in Corbett (2005, 2007, forthcoming) and so are introduced briefly here.

[1] For a current bibliography of work in Canonical Typology see:
http://www.surrey.ac.uk/LIS/SMG/CanonicalTypology/

We assume that we have analysed the system and have established the features and their values. In a canonical system these should 'multiply out', to give a paradigm in which all possible cells exist. Thus if a language has three cases and three numbers in its nominal system, the paradigm of a noun should have nine cells. (This is equivalent to Spencer's 'exhaustivity' 2003: 252.) Moreover, a canonical paradigm should be 'consistent', according to the following criteria:

(1)   Canonical inflection

	comparison across *cells* of a lexeme (level one comparison)	comparison across *lexemes* (level two comparison)
1. composition/structure (morphotactics)	same	same
2. lexical material (≈shape of stem)	same	different
3. inflectional material (≈shape of inflection)	different	same
outcome (≈shape of inflected word)	different	different

This schema implies two levels of comparison:

level one: we start from the abstract paradigm gained by multiplying out the features and their values. We then examine any one lexeme fitted within this paradigm. The centre column of (1) compares cell with cell, within a single paradigm. We take in turn the criteria in the left column:
1. we look at the *composition and structure* of the cells; suppose the first consists of a stem and a prefix: for this lexeme to have a canonical paradigm, every other cell must be the 'same' in this regard. Finding a suffix, or a clitic, or any different means of exponence would reveal non-canonicity.
2. in terms of the *lexical material* in the cell, we require absolute identity (the stem should remain the same).
3. on the other hand, the *inflectional material* 'should' be different in every cell.

The outcome for such a lexeme (bottom row) is that every cell in its paradigm will realize the morphosyntactic specification in a way distinct from that of every other cell.

level two: this involves comparing lexemes with lexemes within the given language (right column). We use the same criteria as before:
1. a canonical system requires that the composition and structure of each cell be the same, comparing across lexemes.
2. we require that the lexical information be different (since these are different lexemes).
3. in the canonical situation, the inflectional material is identical. That is, if our first lexeme marks dative plural in *-z-i*, so does every other.

The outcome is that every cell of every lexeme is distinct. Such a system of canonical inflection would make perfect sense in functional terms. There is absolute differentiation within the morphology, while using minimal material.

Of course, we find substantial divergences from this idealization. Its value is as a standard from which we can calibrate the phenomena we find. We look at the deviations from canonicity first internally, comparing the cells of a single lexeme, then externally, comparing across lexemes. A general pattern is that where we actually find 'same' in place of canonical 'different' this will give a non-functional outcome. If we find 'different' in place of canonical 'same' this will lead to increased complexity and/or redundancy.

Working through the different deviations gives us an overall classification of the phenomena of inflectional morphology. We will take just a couple of illustrative instances. Starting with phenomena that can be defined within the lexeme, recall that in the canonical situation, lexical meaning (and only that) is conveyed by lexical material, the stem; grammatical meaning, and only that, is conveyed by the inflection. Thus the stem is inert, and all the differentiation in the paradigm is due to the inflectional material. Contrary to this canonical situation, we find all sorts of alternations of stem, from the predictable, through the less regular, right up to full **suppletion**, which marks a boundary of non-canonicity (Corbett 2007). Or consider the inflectional material, which in the canonical situation should be different in each cell of a single paradigm. However, we often find instances of identity, that is, **syncretism**.

We now move on to deviations which are to be defined in terms of comparisons across lexemes. In the canonical situation, the composition and structure of a lexeme's paradigm will be constant when we compare across the class. For example, if we find that nouns in a given language distinguish singular and plural, in the canonical situation this would mean that *all* nouns distinguish singular and plural, and in the same way (for instance, by inflectional means in all instances). One deviation from this canonical situation is **overdifferentiation** (Bloomfield 1933: 223-224). Lexemes which are overdifferentiated stand out from the rest of the group in that they have an additional cell in their paradigm, say a dual, in a language where most nouns have only singular and plural. And finally, in the canonical situation, inflectional material is the same across lexemes. We can specify that the first singular past tense passive has a particular form just once in the grammar. We find, however, that in many languages this simple, functionally justifiable situation is not found. Besides specifying first singular past tense passive, it is also necessary to indicate which class the verb belongs to. This deviation from the canonical situation defines **inflectional classes**, our topic.

3. Canonical inflectional classes

Inflectional classes represent a deviation from the canonical point just defined. We now repeat the process and ask what a canonical instance of such a deviation would be. We begin with the example in (2).

(2)   An example (a carefully selected segment of two actual paradigms)

I	II
zakon	žena
zakone	ženo
zakona	žene

This language has at least two inflectional classes, as illustrated.[2] We should ask what criteria would convince us that we do need to propose inflectional classes in such situations.

There are nine criteria, grouped under two main principles:

PRINCIPLE I (distinctiveness):   *Canonical inflectional classes are fully comparable and are distinguished as clearly as is possible.*

The principle is intended to ensure that we are comparing like with like (canonical inflectional classes are fully comparable) in that the classes are equivalent in their functions; and yet they are distinct in their form. We make this explicit through the following four criteria.

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[2] For the curious, the real, more complex, paradigms are taken from Serbo-Croat (or Central South Slavonic), see Corbett & Browne (2009).

Criterion 1:   In the canonical situation, forms differ as consistently as possible *across* inflectional classes, cell by cell.

note: the larger the paradigm the more obvious the effect

weakening: the existence of shared or default forms for some cells gives reduced canonicity

This is the obvious key criterion. In (2), the realization for the item on the left differs consistently in every cell from that on the right. If the paradigm were larger, that would increase the effect. Conversely, if there were additional cells, but with similar realizations (as say with the oblique plurals of Russian nouns, Corbett & Fraser 1993), that would reduce the canonicity of the inflectional classes.

While criterion 1 is concerned with forms being different, this is not sufficient. They must also be realizations of the same specifications:

Criterion 2:   Canonical inflectional classes realize the same morphosyntactic or morphosemantic distinctions (they are of the same structure).

weakenings: paradigms may be reduced for semantic reasons or may be overdifferentiated. In the more canonical situation, such weakenings extend across the classes.[3]

In the canonical situation, the inflectional classes and all their members have identical paradigm shapes. It is common, however, for there to be some items with a reduced paradigm. For instance, some nouns may not have the number distinctions available to others. The nouns involved are typically some lower segment of the Animacy Hierarchy (Corbett 2000: 54-88). In the more canonical situation, this restriction affects the different inflectional classes equally; that is, it is an orthogonal factor, not something bound up with a particular class. Conversely, some items have 'too many' forms, they are overdifferentiated. Within its case inventory, Russian has a locative case, which occurs only together with one of a small number of prepositions, for instance, *v žurnale* 'in the magazine'. It is indisputably a case value: for many nouns in the singular the locative has a distinct form, and for all inflecting nouns the locative is distinct in the plural. And then just a small number of nouns have an additional, 'second' locative, a distinction which the vast majority of nouns do not make.[4] For some nouns (in locative contexts) the second locative is obligatory: it has to be *v sadú* 'in the garden' (and not **v sade*). For some nouns the second locative is only optional. The number of nouns involved is declining. This is a non-canonical situation. Of the four main inflectional classes of Russian, these overdifferentiated nouns are found in just two (see Brown 2007, Corbett 2008a, and references there).

We now turn to the specifics of the forms involved in canonical inflectional classes.

Criterion 3:   *Within* a canonical inflectional class each member behaves identically.

note: this implies that there are no stem differences, alternants or other subclasses.

The notion that the members of a class should be uniform in their behaviour is true of any analysis into classes, within linguistics and beyond. It is worth including as a criterion here, because of the interest of the non-canonical instances which it highlights.

These include:[5]

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[3] Compare Stump & Hippisley (2008) on Shughni.

[4] From a slightly different perspective, this situation is non-canonical from the point of the morphosyntactic features involved. Of the criteria for canonical morphosyntactic features, the fourth states that: 'Canonical features and their values are distinguished consistently across lexemes within relevant parts of speech.' (Corbett 2008b).

[5] Fully regular phonological alternations, affecting the stem, the inflection, or both, seems innocent enough, and are omitted here. But suppose for instance that particular consonants palatalize before a front vowel. This can lead to non-uniformity since within an inflectional class there is now a (fully predictable) difference between members with stems ending in a particular consonant and all others.

1. fully regular morphophonological alternation
2. lexically specified morphophonological alternation
3. regular stem or inflectional alternation
4. lexically specified stem or inflectional alternation

We give examples of the fourth type:

(3)   Some Russian nouns showing stem alternations

type	singular	plural	gloss
augment in the singular	tatar**in**	tatar-y	Tatar
augment in the plural	brat	brat´**j**-a	brother
augment in both	xozja**in**	xozja**ev**-a	landlord
consonant alternation[6]	sose[**d**]	sose[**dʸ**]-i	neighbour

These phenomena can also be discussed in terms of canonicity, and they represent successively less canonical inflectional morphology (the end point of lexically specified stem alternation being suppletion). For current concerns, the point is that each can make the inflectional class less uniform in terms of its membership. Thus effects on the stem are the more relevant here. If they are restricted to one inflectional class, then it might be argued that there is no diminution of the distinction between that class and others. If they are distributed over classes, the situation rapidly becomes complex.

> *Criterion 4:*   *Within* a canonical inflectional class each paradigm cell is of equal status.
> *note:*   this implies that there will be no paradigm-structure conditions (Wurzel 1984: 118, discussed in Carstairs-McCarthy 1991, 1998: 332-334, 2000),[7] or their equivalent.

In the canonical situation, where all forms are distinct between classes, the form for each cell predicts all the others within a class; this matches Finkel & Stump's (2008) notion of maximal transparency.

The possible weakenings of this criterion can include implications about stem effects (those listed for the discussion of Criterion 3); in terms of Criterion 4, however, implications relating to inflections are the more significant (for numerous examples of these see Baerman *et al.* 2005, Corbett 2005, Baerman 2009, Blevins 2009). The point of criterion 4 is that implications between cells reduce the differences between classes, since apparent differences are actually inter-connected and so the number of genuine differences between classes is reduced.

A *consequence* of Principle I (that is, all of Criteria 1-4) is that canonical inflectional classes would have (in Stump's 2006 terms):

(i)   identical content paradigms;
(ii)   completely distinct form paradigms.

We have now reviewed the four criteria which specify the requirement of Principle I; all are concerned with the formal properties of canonical inflectional classes. We now turn to the issue of the membership of canonical inflectional classes.

PRINCIPLE II (independence):   *The distribution of lexical items over canonical inflectional classes is synchronically unmotivated.*

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[6] This item shows an unpredictable alternation of consonant (non-palatalized ~ palatalized). The *d* in the plural *sosedi* 'neighbours' is palatalized. The *d* of the nominative singular is devoiced by regular phonological rule; in the oblique cases we find the irregular opposition just in palatalization.

[7] For further ideas on relations between cells see Carstairs-McCarthy (1994) and Halle & Marantz (2008) on 'blur'.

Canonical inflectional classes are morphology-internal, not motivated from outside. (If there were outside motivation, this might allow an analysis in terms of sub-categories, each with a single type of inflection, and hence no need for inflectional classes.) Principle II can also be broken down into its contributing criteria.

Criterion 5: The larger the number of members of an inflectional class (up to an equal 'share' of the available items) the more canonical that class.

weakenings: (i) if a class had a small number of members, this could allow listing of the forms for each item.

(ii) a small number of items showing combinations of forms from other classes can be treated as heteroclites.

It is evident that having sufficient membership is important for a canonical inflectional class. If the membership were very small, then it is not necessarily clear that there is any need to postulate a class (rather then having fully specified exceptional items). A more interesting weakening is that which occurs when particular lexical items can be listed as belonging to a particular class but taking particular forms from another. One such instance of heteroclisis is illustrated in (4):

(4)   Example of heteroclisis in Russian

	slovar´ 'dictionary'	kost´ 'bone'	put´ 'road, way'
NOMINATIVE	slovar´	kost´	put´
ACCUSATIVE	slovar´	kost´	put´
GENITIVE	slovarja	kosti	puti
DATIVE	slovarju	kosti	puti
INSTRUMENTAL	slovarem	kost´ju	**putem**
LOCATIVE	slovare	kosti	puti

Here the noun *put´* 'road, way' belongs to the same inflectional class as *kost´* 'bone', except for the instrumental singular which, in the standard language at least, it 'borrows' from the inflectional class to which *slovar´* 'dictionary' belongs. For more on heteroclisis see Noyer (2005) and Stump (2006).

The remaining criteria illustrate the ways in which motivation might theoretically occur. Their interest is both in showing the types of motivation which are found (hence making particular inflectional classes less canonical) and in suggesting theoretical possibilities which appear not to occur.

Criterion 6: In the canonical situation, the distribution of lexical items over inflectional classes is not phonologically motivated.

If the phonological form of the item gave a full prediction of its morphology, there would be no requirement to postulate inflectional classes. There are numerous instances of a relation between phonology and inflectional class. For instance, in Guugu Yimidhirr, as discussed by Dixon (1980: 393-396), verbs fall into five inflectional classes: in two the members have monosyllabic roots, and in three they are disyllabic. There is no unique prediction from the number of syllables to the inflectional class, and so inflectional classes cannot be dispensed with here.[8]

Criterion 7: In the canonical situation, the distribution of lexical items over inflectional classes is not syntactically motivated.

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[8] Since it is the morphological class which is to be predicted it is the phonology of the 'remainder' which is the potential source for prediction, most naturally the phonology of the stem.

This criterion makes it non-canonical, say, for verbs which govern the dative to fall into a particular inflectional class. Similarly, it would not be canonical for verbs which take a preceding object to be in one inflectional class and the remainder in another. Note that such instances do not fall foul of the principle of morphology-free syntax (Zwicky 1996), since the syntax does not make reference to a morphological feature, rather the morphological feature would be motivated by the syntactic behaviour. We do find instances where the distribution of verbs over inflectional classes is related to transitivity: see Dixon's discussion of Yidiny (1980: 382-383), where in two inflectional classes over 80% of the members are transitive, while in the third the figures is 44%. Here there is a relation between transitivity and inflectional class, making the classes slightly less canonical, but there is no clear prediction from syntactic behaviour to inflectional class.

> *Criterion 8:*   In the canonical situation, the distribution of lexical items over inflectional classes is not motivated by Part of Speech.

At first sight canonicity may seem an impossible ideal here, since the Part of Speech can determine the features and hence the paradigm shape of the inflectional classes. While Criterion 8 is one that likely to be met rarely, we do find instances of inflectional classes extending over different parts of speech. For instance, we find primarily adjectival paradigms being available to nouns in Russian (as in (5)):[9]

(5)   A Russian inflection class available for different parts of speech

	komnata 'room'	stolovaja 'dining room'	staraja 'old' (F SG)
NOMINATIVE	komnata	stolovaja	staraja
ACCUSATIVE	komnatu	stolovuju	staruju
GENITIVE	komnaty	stolovoj	staroj
DATIVE	komnate	stolovoj	staroj
INSTRUMENTAL	komnatoj	stolovoj	staroj
LOCATIVE	komnate	stolovoj	staroj

The point is that syntactic nouns like *stolovaja* 'dining room' belong to the same inflectional class as a regular adjective (though taking only a part of the paradigm).

Of course, Part of Speech distinctions are a difficult analytical problem. The 'danger' for inflectional classes is that they would match a subcategorization within the Part of Speech: for instance if stative verbs had distinct syntactic properties and distinct inflection. Hence in the canonical situation the members of inflectional classes cannot be determined by Part of Speech categorization or subcategorization.

Our final type of inward motivation is covered in Criterion 9:

> *Criterion 9:*   In the canonical situation, the distribution of lexical items over inflectional classes is not motivated by pragmatics (including information structure).

Such motivation would be clearly non-canonical, and it may well be that there are no examples. It might seem relevant at first sight, given examples like the choice of full and reduced agreement in Somali (Saeed 1993, Corbett 2006: 203-204), but in Somali focus is a condition on the choice of inflection, and lexical items have both types of inflection. Thus we are dealing with another dimension to the inflectional paradigm, and not a partition of the lexical items.

Before leaving motivation, we should consider 'outward' motivation. We have seen that canonical inflectional classes do not allow 'inward' prediction. However, they may permit 'outward' prediction that is, information which is predictable from inflectional class specification. One could even argue that their status is made more secure by outward prediction, provided the outward prediction is unique and

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[9] Compare Spencer (2005: 50) where this situation is treated as a type of mismatch.

is demonstrably uni-directional. Canonical inflectional classes allow the prediction of two types of other information:

> (i) lexical information;
> (ii) derivational potential.

We illustrate these in turn. An instance of the prediction of lexical information from inflectional class is gender in various languages. This situation can hold once the more significant semantic assignments rules are allowed for; prediction from inflectional class operates for the semantic residue (see Corbett 1991: 34-50) for several examples. Thus in Russian, nouns denoting males are of masculine gender, those denoting females are feminine. And for the semantic residue, we find this situation:

(6)   Prediction of gender in Russian

inflectional classes	I	II	III	IV
genders	masculine	feminine		neuter

Given the number of genders and the number of inflectional classes (see Corbett 1991: 34-43 and references there for justification), the direction of the prediction is clear.

The prediction of derivational potential can be illustrated using data akin to the last. The form of the possessive adjective in some Slavonic languages is predictable from the inflectional class of the noun (and not from its gender). Consider these patterns (data and sources in Corbett 1987: 325-326):

(7)   Motivation for the possessive adjective in Slavonic

Inflectional class	I	II	II
Gender	M	M	F
Russian (original system)	Ivan 'Ivan' > Ivan**ov**	papa 'daddy' > pap**in**	mama 'mummy' > mam**in**
Upper Sorbian (innovative system)	Jan 'Jan' > Jan**owy**	starosta 'headman' > starost**owy**	sotra 'sister' > sotř**iny**

We see that in languages like Russian, the form of the possessive adjective is predictable from a noun's inflectional class and not from its gender. This is clear from the middle column, for nouns like *papa* 'daddy', which belong to inflection class II. This class contains mainly feminine nouns; thus the inflectional class and the gender do not overlap as they normally do, and we see which is the predictor. Several Slavonic languages (Upper Sorbian: Belorussian, Slovenian, Czech, Slovak, and Lower Sorbian) have moved away from this original situation and now form the possessive adjective according to gender (clear again from the middle column). For these the inflectional class is no longer an adequate predictor.

4. Canonical and actual instances

In some investigations within Canonical Typology we find instances that are very close to canonical. We might expect that for inflectional classes the situation would be rather different. We might assume that in this instance the canonical point is rather distant from the real examples we find. Of the more familiar examples of inflectional classes, most of those which are closest to canonical are found in the more conservative Indo-European languages. These languages are a good habitat for inflectional classes, and it is not accidental that examples with minor deviations from canonicity offered above have also been taken from Indo-European languages. Having canonical inflectional classes means that a language has parallel and distinct systems for carrying out the same function. This situation seems unlikely, in the pure form. Even if it arises, we would expect processes of analogical change to reduce the canonicity of the system. Hence the expectation that we would not find canonical

inflectional classes. And yet it appears that we do. Consider these data from Burmeso, a language of the Mamberamo River area of Western New Guinea, from Donohue (2001). Burmeso was previously considered an isolate, but Ross (2005) suggests an affiliation on the basis of the pronouns. Among several interesting characteristics, Burmeso shows two classifications of nouns, forming what has been defined as a 'combined gender system' (Corbett 1991: 184-188). We consider just the first classification, which involves six gender values.[10] Evidence for the classification comes from object agreement on the verb (Donohue 2001: 99):

(8) da   timar   g-ihi-maru
     1SG   bat.SG   II.SG-see-TODAY'S.PAST
     'I saw a bat.'

(9) da   timnarid   s-ihi-maru
     1SG   bat.PL   II.PL-see-TODAY'S.PAST
     'I saw some bats.'

(10) da   kwehia   g-ihi-maru
     1SG   frog.SG   III.SG -see-TODAY'S.PAST
     'I saw a frog.'

(11) da   kwehorudo j-ihi-maru
     1SG   frog.PL   III.PL-see- TODAY'S.PAST
     'I saw some frogs.'

Here we see clear evidence to distinguish gender II from III, and Donohue provides a full set of examples, to demonstrate the existence of six gender values.[11] In (12), the outline criteria according to which nouns are assigned to the genders are given under 'assignment'.

(12)   Verbal inflectional classes in Burmeso (Donohue 2001: 100, 102)

	assignment	inflectional class 1		inflectional class 2	
		e.g. *-ihi-* 'see'		e.g. *-akwa-* 'bite'	
		SG	PL	SG	PL
I	male	*j-*	*s-*	*b-*	*t-*
II	female, animate	*g-*	*s-*	*n-*	*t-*
III	miscellaneous	*g-*	*j-*	*n-*	*b-*
IV	mass nouns	*j-*	*j-*	*b-*	*b-*
V	banana, sago tree	*j-*	*g-*	*b-*	*n-*
VI	arrows, coconuts	*g-*	*g-*	*n-*	*n-*

The important point for us is the different forms of *-ihi-* 'see', in examples (8)-(11), which distinguish gender and number. They utilize a small inventory in drawing a good number of distinctions. In addition to verbs like *-ihi-* 'see', there is another set like *-akwa-* 'bite', also given in (12). These have exactly the same paradigm shape, but the phonological realizations are entirely different (there are some syncretisms but even these are identical across the classes). Burmeso thus has two inflectional classes of verbs, and they come close to being canonical. In terms of membership in the classes, Donohue (2001: 101) states explicitly: '… there are no obvious semantic correlations for verbs which take the different sets of prefixes, and both sets of verbs are of approximately equal size.'

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[10] Donohue calls these 'noun classes', reserving 'gender' for the partly cross-cutting distinctions marked on adjectives

[11] At least gender V is 'inquorate' in that it has only two members (Donohue 2001: 102) and its agreements are a combination of agreement from other genders; the two nouns could therefore be marked as lexical exceptions.

From the evidence Donohue provides it appears that the inflectional classes of Burmeso verbs are remarkably close to being canonical.

5. Conclusion

Canonical typology offers us a clearer picture of what there is, within the space of possibilities of what there might be. And indeed, investigating the criteria which point to the canonical instances of inflectional classes has brought clarity to that notion. We find many instances of inflectional classes which are far from being canonical, and that does not surprise us: there are numerous ways in which they can be non-canonical, some of which appear much more likely than the canonical situation. And yet we do find a situation close to canonical too, in Burmeso, which shows that the large theoretical space we established is a more realistic typology than seemed probable when we began the research.

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