A case for a binary feature underlying clusivity: the possibility of ABA

Katya Pertsova[1] (iD)

Abstract

This paper reevaluates claims about the status of inclusive pronouns and introduces a new database of pronominal morphology. There are conflicting views about inclusive person: on the traditional view inclusive person is a subcategory of first person, but there are disagreements about whether it realizes a privative feature or a binary one; on other views inclusive is its own separate category.

In this paper, I use evidence from patterns of syncretism, suppletion, and morphological relatedness to reevaluate claims about inclusives with a new pronominal database of 270 genetically and geographically diverse languages. I find support for the traditional view that inclusive is a type of first person. However, my findings go against recent approaches to morphological features based on privative contrasts that create containment relationships and predict the so-called *ABA-constraint (Bobaljik, 2012; Caha, 2009; Moskal, 2018). I show several examples of ABA patterns in the data and no stark asymmetry between frequencies of inclusives derived from exclusives compared to the reverse situation. Both of these facts support the view that clusivity is due to a binary featural contrast. I propose a feature hierarchy that incorporates such a binary contrast and captures a number of facts about pronominal paradigms that go beyond patterns of clusivity.

1 Introduction

It is well known that some languages in non-singular contexts have a distinction between inclusive 1st person, a category that includes a speaker and addressee(s) among possibly others, vs. exclusive 1st person, a category that includes only the speaker, but not addressee. Although the inclusive category is traditionally considered to be a type of 1st person (see Sect. 2.2), several linguists suggest instead that it should be

✉ K. Pertsova
pertsova@unc.edu

1   University of North Carolina at Chapel Hill, Chapel Hill, USA

viewed as an independent category, not a subtype of 1st or 2nd person (this view is presented in Sect. 2.1). Also for some languages (most notably in Algonquian family) it has been suggested that inclusives are a type of second person. Most evidence for these views comes from typological observations about the patterns of syncretism, suppletion, morphological relatedness, and the range of available distinctions which together can suggest systematic patterns in the conceptual structure of the category *person*. Understanding this underlying structure has implications for establishing potentially universal cognitive constraints on morphological categories, and for understanding factors that predict the range of variation in realization of these categories. In this paper, I reevaluate previous claims about inclusives using a new pronominal database, Pronom, introduced in Sect. 4.

Based on patterns of morphological relatedness, I find support for the traditional view that inclusive person is a type of first person. However, my findings go against a unary theory of person features according to which exclusive person is featurally subsumed or contained by inclusive non-singular person and is, therefore, less marked. In particular, a type of patterning of 1st person pronouns that has previously been claimed to be impossible (an ABA-type pattern) together with evidence that in some languages exclusive is a more marked category than inclusive suggest a binary-feature approach to the category of clusivity.

This result contributes to the conversation on the universal inventory of morphosyntactic features and how the choice of feature-types (e.g., binary vs. privative, or both) affect the range of predicted patterns. Privative features that create containment relationships have been hypothesized in some recent accounts as a general property of grammatical architecture that favors minimalism because among other things they explain several observed cases of the *ABA-constraint (Bobaljik, 2012; Bobaljik & Sauerland, 2018; Caha, 2009; Smith et al., 2019). However, this paper argues that, at least in the domain of clusivity, the privative feature approach does not hold under scrutiny.

1.1 Background

To introduce the issues discussed here, consider a few examples of pronominal paradigms and what they can tell us about the underlying structure of the person category.

Table 1 shows pronominal paradigms in three languages. In Orig (Niger-Kongo, Sudan, ras)[1] and Ida'an (Malayo-Polynesian, Malaysia, dbj) there are no obvious morphological relationships among any of the pronominal forms, but in contrast to Orig, Ida'an has an extra distinction in its paradigm, differentiating between what is usually called 1st person inclusive plural, indicating reference to groups that minimally include both a speaker and a listener, and exclusive plural, used to refer to groups that include a speaker but not a listener. Tzeltal (Mayan, Mexico, tzh) is like Ida'an in that it has a clusivity distinction in the plural, but is different from both Orig and Ida'an in that it displays some degree of morphological relatedness between singular and plural forms: plural is marked by the suffix *-tik*, except in 2nd

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[1] When a language from the database is introduced, it will be followed by its genetic classification, region, and the ISO code.

Table 1 Examples of pronominal paradigms

Verbal Subject Agreement Prefixes in Orig (Schadeberg & Elias, 1979)

	sg	pl
me	j-	n-
you	w-	ŋ-
other	Ø	t-

Ida'an free personal pronouns (Goudswaard, 2005)			Petalcingo Tzeltal pronouns (Shklovsky, 2005)		
	sg	pl		sg	pl
me	aku	–		xoʔ-on	–
me+other(s)		kəmmi			xoʔ-on-(r)jo-tik
me+you(+others)		kito			xoʔ-o-tik
you	ikow	uju		xaʔ-at	xaʔ-eç
other	rumo	(m)iro		xaʔ	xaʔ-tik

person (this suffix also marks plurality on nouns). Additionally, we observe that all pronouns whose reference includes a speaker (these will be referred to as 1st person pronouns) share a substring in common, -o(n)-, which triggers vowel harmony on the stem xoʔ/xaʔ.[2]

Thus, while looking at the Ida'an paradigm, we do not see any reasons for grouping inclusive person with any other person as a natural class, Tzeltal data suggest that inclusive plural forms a natural class with other first person pronouns since all of them are marked by the same morpheme, -o(n). This language also suggests that exclusives are more marked than inclusives because they appear to be morphologically more complex and possibly derived from inclusives. If inclusive indeed is a type of first person, then the difference between Ida'an and Orig could be explained as neutralization of an inclusive/exclusive contrast in Orig, leading to a generic first person which subsumes both "me+others" and "me+you+others" interpretations that are typically associated with 1st person plural. Such considerations about morphological relatedness, natural classes, and markedness across many unrelated languages are at our disposal when we try to reconstruct the conceptual structure of person as a grammatical category. Many alternative analyses of this category have emerged over the years (Ackema & Neeleman, 2013; Harbour, 2016; Harley & Ritter, 2002; Nevins, 2007; Noyer, 1992; Silverstein, 1976, and others), with no current consensus but with common themes and points of agreement. One still open question is how the category of clusivity should be analyzed within the category of person.

In this paper, I will consider three alternative views on clusivity. According to the first view, inclusive is a distinct category that is just as (un)related to 1st person as it is to 2nd person. On a second view, the distinction between inclusive and exclusive is accounted for via a unary feature whose presence signals inclusive meaning. Thus,

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[2]Shklovsky analyzes these pronouns as consisting of a stem xoʔ/xaʔand does not break up the remaining strings further. The Proto-Mayan first person plural absolutive suffix was -oʔŋ, and first person plural demonstrative pronoun was *haʔo-ʔŋ, Proto-Mayan had no clusivity (Mora-Marin, p.c.). In Petalcingo Tzeltal the 1st person absolutive plural shows up as -on (exclusive) and -o (inclusive) (Shklovsky, 2005). And -*on* now also marks 1st singular absolutive and shows up in the 1sg pronoun as can be seen in Table 1. These facts support a hypothesis that there was a reanalysis of the plural absolutive suffix as a 1st person marker Thus, I am assuming that -on and -o are allomorphs and can be isolated as a separate morpheme.

Table 2 Possible patterns of relatedness for 1sg, 1excl.pl, and 1incl.pl. Cells that have different shading are not morphologically related

1sg	1sg	1sg	1sg	1sg
1excl.pl	1excl.pl	1excl.pl	1excl.pl	1excl.pl
1incl.pl	1incl.pl	1incl.pl	1incl.pl	1incl.pl
ABC	AAB	ABB	ABA	AAA

exclusives are featurally "contained" by inclusives and, therefore, the two categories form a natural class with the inclusive category being more structurally marked. On a third view, the clusivity distinction is derived via a binary feature contrast, with no prediction about the universal markedness of these two categories. Another logical possibility which I will consider in less detail because it has been discussed and rejected elsewhere is the view that inclusive is a subcategory of second person (see discussion in Sect. 2.2.4).

1.2 Patterns of morphological relatedness

To contrast the predictions of the three theories, let us first consider all possible ways in which the categories in question can be morphologically related to each other. If a language has a singular-plural distinction and an inclusive-exclusive distinction, then there are typically three categories involving speakers: 1sg (me), inclusive non-sg (me+you(s)(+other(s))), and exclusive non-sg (me+other(s)). There are five ways to partition a set with three members, so five possible ways of mapping the phonological exponents to these three categories. These mappings are summarized in Table 2. Each phonologically distinct cell is shaded a different color (letters A, B, C used in the label under the figure mark distinct exponents). These labels follow Bobaljik (2012)'s notation for patterns of suppletion which will be explained in the next section.

In some languages with the inclusive/exclusive distinction the number contrast is between minimal vs. augmented number rather than between singular vs. plural. These languages distinguish between minimal inclusives (me and you) vs. non-minimal inclusives (me and you(s) and possibly others), with minimal inclusives sometimes patterning with morphologically singular forms (Nichols, 2005). For these paradigms there are four categories involving the speaker (me, me+you, me+you+other(s), me+other(s)), and 15 possible partitions among them. I will not list all 15 here, but some of them will be exemplified later on (e.g., see Table 5). For paradigms with more numbers (e.g., dual, trial) the number of possible partition patterns is even larger.[3] In the sections below I will give examples of such patterns when evaluating the three theories of interest.

2 Theories of inclusive person

The most restrictive view of clusivity is the view according to which inclusive is a separate category distinct from both 1st and 2nd person. It is restrictive in the sense

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[3]In general we know from mathematics that for a set of size n there are B_n ways to partition it, where B is a Bell number (Bell, 1938)).

that it predicts no systematic syncretisms or morphological relatedness between inclusive and other forms in the paradigm. That is, referring to Table 2, it predicts only patterns of type ABC and AAB. This is the view that I will describe first.

A more traditional view is that the distinction between inclusive and exclusive persons in non-singular creates a finer partition of the more general category, first person, which can be defined as a category that includes a speaker in its reference set. On this view languages without a clusivity distinction have a generic 1pl category (e.g., *we* in English) with the meaning "speaker and others", subsuming both the inclusive and the exclusive readings. I will consider two versions of this view, one in which the clusivity distinction is conceived of as resulting from a privative feature for the inclusive category and one in which this distinction is due to a binary contrast. These versions are not notational variants of each other – as we will see, they make different empirical predictions about possible patterns of morphological relatedness and markedness discussed in the next few sections.

2.1 Inclusive as a separate category

Some typologists believe that inclusive is not a type of first person, but is a distinct category all together despite semantic relatedness to first and second person (Cysouw, 2005; Daniel, 2005b; Plank, 1985). This view is supported by findings that inclusive is apparently rarely morphologically related to first person singular.

For example, Cysouw (2005) considered patterns of full pronominal syncretism involving exclusive or inclusive and concluded that while exclusive is often syncretic with 1sg, inclusive is not. Likewise, inclusive is also rarely fully syncretic with 2nd person. His investigation was based on an *ad hoc* sample from a private database described in Cysouw (2003) with additional languages that satisfied the following criteria: inclusive or exclusive was fully syncretic with another form in a paradigm. The resulting sample, intended to be as encompassing as possible, contained only one language in which inclusive was fully syncretic with 1sg, Binandere, a Goilalan language of New Guinea. On the other hand, there were many examples of exclusive being fully syncretic with 1sg. Based on these findings, Cysouw concluded that inclusive is not a type of first or second person.

A similar pattern of results is reported in Daniel (2005b). Daniel considered patterns of partial identity in addition to full syncretism, focusing in particular on cases in which plural forms could be seen as derived via productive morphology from the singular. He used data from a genetically and geographically balanced set, a subset from the World Atlas of Language Structures (WALS) (Dryer & Haspelmath, 2013), and found that most of the time 1sg, inclusive non-sg, and exclusive non-sg are completely distinct from each other (this was true in more than 80 languages in a sample of "not quite one hundred"). In some cases exclusive was related to 1sg, and in only three cases inclusive was related to exclusive or to 1sg.

Daniel's focus was to explain a well-known asymmetry between 1st person and 2nd person plural pronouns – while the reference of 1st generic plural can be described as "me and others," the reference of 2nd person plural is not "you and others," but "you and others, but not me." Daniel derives this asymmetry and the fact that inclusives are rarely related to 1sg by assuming that plurals of pronouns have a similar

structure to associative plurals with the meaning "group that includes X" where X is the *focal referent*. He further assumes the Locutor Hierarchy *speaker > addressee > non-locutor* (Plank, 1985; Zwicky, 1977) which controls the choice of the focal referent. For example, if a group includes both a speaker and an addressee, the hierarchy dictates that the speaker be privileged as the focal referent, classifying such a group as a first person (resulting in a generic "we"). If the group includes an addressee and others, the hierarchy above privileges the addressee (since the speaker is not present), making it a second person. Thus, the fact that second person plural cannot refer to a set that includes a speaker falls out from the fact that speakers are privileged over addressees as focal referents. That is, any group including a speaker is automatically a 1st person. In languages that make a clusivity distinction, Daniel assumes that the hierarchy is somewhat different: *speaker = addressee > non-locutor*. In these languages, speakers and addressees are on an equal footing, so when both are present as part of a group, neither one is privileged and both are selected as focal referents, creating an inclusive person.[4] On Daniel's view 1sg and 1excl.pl are straightforwardly morphologically related as both are first persons by virtue of having speaker as the focal referent. Inclusive, on the other hand, is a distinct category that has a different focal referent and, therefore, is not a subtype of 1st person.

Overall, Daniel's analysis of person differs from the feature-based analyses we will consider next and predicts that syncretism and patterns in which inclusive person(s) are morphologically related to other 1st person categories should be rare. The pronominal grammar for a specific language is defined by a specific Locutor Hierarchy and the rules for focal reference choice (e.g., pronouns *I* and *we* in English have *speaker* as the focal referent, and hence form a natural class as 1st person). It is important to note that for Daniel generic first person (English *we*) does not constitute an example of neutralization of the inclusive/exclusive distinction. This pattern is simply a result of a language using a Locutor Hierarchy in which speakers are privileged over addressees, rather than being on the same footing with them. Daniel also considers the logical possibility of addressees being privileged over speakers leading to a third type of language in which inclusives and 2nd person form a single category. I will discuss this possibility later in Sect. 2.2.4.

2.2 The containment hypothesis: clusivity as a privative contrast

A more common view is that inclusive is a subtype of 1st person, and a prominent version of this view is the hypothesis that inclusive is a more marked elaboration on exclusive. Namely, it is conceptually and formally more complex than exclusive 1st person. Conceptually it requires that the referents of a group in addition to a speaker include an addressee. Formally, this is often implemented with unary conjunctive

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[4]Note that featural accounts of person can also encode similar assumptions. For example, Harley and Ritter (2002) also assume that languages with a clusivity distinction differ from languages without this distinction in that they have no one privileged default feature under the *Participant* node, while for languages like English without the clusivity distinction, the default Participant feature is *Speaker*. However, Harley and Ritter do not explicitly discuss how activation of *Addressee* in their hierarchy precludes activation of *Speaker* in languages without incusives. See a modification of their account proposed by McGinnis (2005) that addresses this issue.

Table 3 Privative/unary person features (following Moskal, 2018)

Person	Featural representation
1st inclusive	[AUTHOR, ADDRESSEE]
1st exclusive	[AUTHOR]
2nd person	[ADDRESSEE]
3rd person	[] (unspecified)

(1). 1sg   (2). 1excl plural   (3.) 1incl plural
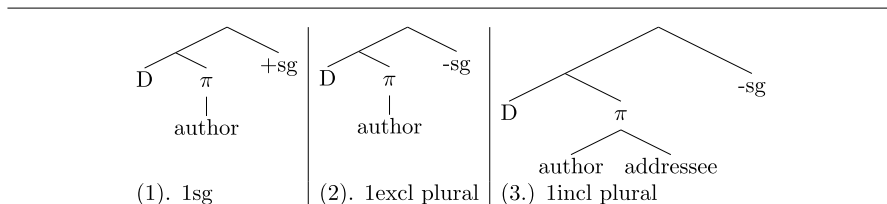
Fig. 1 Syntactic trees for 1sg, 1excl, and 1incl. following Moskal (2018)

features, such as ADDRESSEE which is added to the [AUTHOR] feature of 1st person exclusive (other notations for 1st person include features like SPEAKER, ME, EGO, etc.). The result is that exclusives are contained by (or are featurally a subset of) inclusives. This view is exemplified in proposals such as Béjar (2003), Harley and Ritter (2002), Moskal (2018) (among others).

In particular, Moskal (2018) argues for a feature system shown in Table 3 (which is a privative version of binary features in Bobaljik (2008)). Her argument is based on typological impossibility of certain patterns predicted by privative features. According to this system, the feature set for 1st exclusive person, [AUTHOR], is a proper subset of the feature set for inclusive person [AUTHOR; ADDRESSEE]. She assumes that plurality is marked via a binary feature [±sg], with [+sg] being morphologically less marked. Thus, in terms of markedness we have the following hierarchy: 1sg << excl.pl << incl.pl, with inclusive plural being the most complex, marked category. Note that Moskal also allows for the possibility of a privative feature PARTICIPANT (for 1st and 2nd persons), but she does not include it since it makes no difference for her further analysis. Moskal assumes the framework of Distributed Morphology (DM) (Halle & Marantz, 1994) which has dedicated functional projections in syntactic representations for specific morphological features (see syntactic trees in Fig. 1 that represent the three first person DPs). The category D stands for the pronominal stem.

In DM, lexical items are inserted into the syntactic trees following the Subset Principle. That is, the more specific items matching the maximum number of features in the syntactic representation are inserted first, blocking the more general ones. This principle leads to very specific predictions about what patterns of morphological relatedness are possible. These predictions have been investigated by Bobaljik (2012) with respect to similar containment relationships in adjectives (*adjective << comparative << superlative*), and by Smith et al. (2019) with respect to categories of number and case in pronouns. In terms of the proposed containment relationship for clusivity, the Subset Principle predicts that if the lexicon has a single lexical entry,

Table 4 AAB. Evenki free personal pronouns (1st and 2nd person) (Chao, 2009)

	SG	PLURAL	Exponent Rules	
1exc.	**b**-i	**b**-ʉ	b-	[AUTHOR]
1incl.	–	miti	miti	[AUTHOR, ADDRESSEE, −SG]
2nd	ʃ-i	ʃ-ʉ	-i	[+SG]
			-ʉ	[−SG]
			ʃ-	[ADDRESSEE]

such as A:[AUTHOR], this entry will be inserted into every single tree in Fig. 1. The result will be a pattern that Bobaljik (ibid.) calls AAA in which all three categories are morphologically related. I will assume that AAA can refer to either full syncretism of the three pronouns, or partial similarity among them due to a shared or weakly suppletive morpheme. A visual representation of the AAA pattern appears as the last example of morphological relatedness in Table 2.

If there are two competing lexical entries, a more general one and a more specific one, then two other patterns are possible, ABB and AAB. ABB can arise when there are two lexical entries, such as A specified as [AUTHOR] and B specified as [AUTHOR −SG]. According to the Subset Principle, B will be inserted into the non-singular exclusive and inclusive contexts (the second and third tree in Fig. 1), while A will fill in the rest of the paradigm. AAB can result from lexical entries A:[AUTHOR] and B:[AUTHOR, ADDRESSEE, −SG]. For an example of an AAB pronominal paradigm consider Evenki (Tungusic, East Siberia, evn) personal pronouns in Table 4 with corresponding DM-style exponent rules. No other pattern of relatedness can naturally arise given the assumption of unary features and the Subset Principle. In particular, a pattern like ABA can only come about as a result of accidental homophony. The reason is this: to derive ABA in this system, B would have to be specified as [AUTHOR −SG] so it can be inserted into 1excl.pl context, and A could only be specified as [AUTHOR] if it is to be compatible with both 1sg and 1incl.pl. But then B would be wrongly inserted into the inclusive context because it matches more features with the inclusive.

2.2.1 Predictions of the containment theory for paradigms with sg-pl number

Predictions of the containment theory for paradigms in which there are only three categories involving speakers are then as follows: all patterns of relatedness in Table 2 are predicted to be possible except for ABA, repeated below.

(1)   ABA pattern – impossible under the containment hypothesis

1sg
1excl.pl
1incl.pl

Moskal (ibid.) examined the pattern of root suppletion for 1sg, 1excl, and 1incl pronouns in a large set of languages from Norval Smith's database of free personal pronouns (Smith, 2011) and found support for the predictions above: namely, all of the patterns that are predicted to be possible according to the containment hypothesis

Table 5 Impossible patterns of relatedness for 1st person categories under the containment hypotheses for languages with minimal inclusives

1min.excl	1aug.excl
1min.incl	1aug.incl

a.

1min.excl	1aug.excl
1min.incl	1aug.incl

b.

1min.excl	1aug.excl
1min.incl	1aug.incl

c.

1min.excl	1aug.excl
1min.incl.	1aug.incl

d.

1min.excl	1aug.excl
1min.incl	1aug.incl

e.

were well-attested, while there was only one example of an impossible ABA pattern, and even this example was judged to be problematic for other reasons (discussed later). Her paradigm counts are given below; note that a single paradigm sometimes contributed to counts of more than one pattern.

(2)   **Counts of paradigms exhibiting each pattern in Moskal (2018)**
       ABC   68
       AAA   53
       ABB   34
       AAB   34
       ABA   1

2.2.2 Predictions of the containment theory for paradigms with min-aug number

With respect to paradigms with minimal inclusives, this theory makes specific predictions as well. In particular, the paradigms in Table 5 are all predicted to be unnatural under the containment hypothesis. The first paradigm (a) in this table is an example of an excusive-or (XOR) pattern which would occur when minimal inclusive shares structure with non-minimal exclusive and the reverse – minimal exclusive shares structure with non-minimal inclusives. These types of patterns have been sometimes referred to as "polarity effects" or "morphological reversals" and at least in the literature on syncretism are found to be quite rare in general (Baerman, 2007; Lahne, 2007; Wunderlich, 2012). The other patterns are all similar to the ABA in that one of the exclusive forms is unique (unrelated to other forms), while the inclusive form of the same number is related to an exclusive form of the opposite number. In cases (b) and (c) exclusive plural stands out as unique and in cases (d) and (e) the same is true about exclusive singular. These cases are problematic for the containment theory given that it provides no way to refer to an exclusive category without making it compatible with an inclusive context (since exclusives are contained by inclusives). For example, let us consider case (e). The exponent associated with the darkly shaded cells in the paradigm has to be underspecified for ADDRESSEE because it occurs in both exclusive and inclusive contexts and for MINIMAL because it occurs in both minimal and augmented contexts. Thus, it can only be specified as [AUTHOR]. One might think that 1min.excl morpheme should be specified as [AUTHOR +MIN], but then it will be wrongly predicted to be inserted into 1min.incl context. If we assume that 1min.excl exponent is specified just for [AUTHOR], then we will have two identically specified exponents, with no principled way of choosing which should be inserted in what context.

Table 6 Some impossible patterns of relatedness for 1st person categories under the containment hypotheses for languages with sg/du/pl numbers

1sg.excl	1du.excl	1pl.excl	1sg.excl	1du.excl	1pl.excl	1sg.excl	1du.excl	1pl.excl
–	1du.incl.	1pl.incl	–	1du.incl.	1pl.incl	–	1du.incl.	1pl.incl

Of course, these paradigms can always be described by positing separate lexical entries for the cells which are shaded the same color. However, this amounts to conceding that such patterns cannot naturally arise given the containment assumptions and are, therefore, expected to be parochial.

2.2.3 Predictions of the containment theory for paradigms with sg-pl-du-(trial) number

One can also work out the predictions of the containment theory for languages with multiple non-singular numbers such as dual, trial, paucal, plural. Regardless of how one chooses to analyze multiple number systems, at a minimum the ABA-type patterns will still be ruled out. Such patterns will include paradigms in which all or some inclusive forms across different numbers are related to 1sg, while at least some exclusive forms are not. A couple of examples (not an exhaustive list) appear in Table 6.

2.2.4 Predictions of the containment theory for patterns involving 2nd person

Given the privative feature system in Table 3, there is an additional containment relationship which was not discussed in Moskal (2018), the one involving inclusive and 2nd person. This relationship is fully symmetrical to the one that holds among the traditionally 1st person plural categories in that inclusive fully contains the 2nd person. Therefore, one would predict the second containment hierarchy $2sg << 2pl << incl.pl$, and another set of possible or natural relatedness patterns. In particular, patterns of type AAA where all 2nd persons and the inclusive plural share a morpheme in common should be possible. Same would be true for patterns of type AAB, where only 2sg and 2pl share a morpheme, and patterns of type ABB where inclusive plural and 2nd person plural share structure to the exclusion of 2sg. This feature system would rule out cases of type ABA where 2sg would share structure with inclusive plural to the exclusion of 2pl. Another prediction of this containment hierarchy is that inclusives could be derived from 2pl forms. This specific set of predictions has not been previously evaluated to my knowledge, although the relationship between inclusive and 2nd person has been a topic of many discussions (see Déchaine (1999), McGinnis (2005), Noyer (1992), Siewierska (2004), Zwicky (1977), among others). There are several proposals about ways to formally capture this relationship which I will briefly comment on below.

Harley and Ritter (2002), who also rely on privative features of AUTHOR and ADDRESSEE (with the difference that both of them are dependents of another feature PARTICIPANT) use the fact that 2nd person and inclusive share the ADDRESSEE feature in common to explain cases in which inclusive person patterns with 2nd person. However, they point out that this happens relatively rarely because the 1st person is less marked (in their system it is the default specification of the participant node) and,

therefore, more salient and more likely to be grouped with inclusive compared to 2nd person. Harley and Ritter's proposed feature geometry for person is shown below in (3).

(3)   Harley and Ritter's features for person. Underlining represents default features.

RE
|
PARTICIPANT

AUTHOR   ADDRESSEE
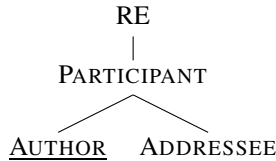
This explanation is similar in spirit to the relative prominence of 1st over 2nd person in Zwicky's locutor hierarchy.

Daniel (2005b) considers the scenario when the locutor hierarchy is reordered as *addressee > speaker > non-locutor* as has been proposed for several languages based on person-agreement preferences, e.g., (Filimonova, 2002; Macaulay, 2009; Siewierska, 2004). Such reordering predicts a language with a focal referent addressee, that is, the category that comprises any set including an addressee (i.e., inclusives and 2nd persnos) vs. sets including speakers but not addressees (exclusive 1st person) vs. non-locutors (3rd persons). McGinnis (2005) argues that the grouping of inclusive with 2nd person into a single category is also in fact predicted by Harley and Ritter (2002)'s geometry (contrary to their intent) given that ADDRESSEE is the primary non-default specification of the participant node. That is, activation of the addressee feature should semantically correspond to picking out *any set that contains addressees* including the inclusive. She argues that this is a wrong prediction because even in languages with 2nd person-inclusive syncretisms, the distinction between the two categories is never fully conflated – 2nd person and inclusive share some structure in common but are not fully identical.

For example in Algonquian languages which are famous for the apparent prominence of addresees over speakers, inclusives are typically constructed by combining a 2nd person prefix and 1st person plural marker. In other words, inclusives simultaneously share structure with 2nd and 1st persons. For this reason, Cysouw (2005) considers these examples to be similar to the so-called "compound inclusives" which are derived by transparently combining 1st and 2nd person pronouns and correspond to an English equivalent of "you and me" or "you and us." One apparent counterexample to combined 2nd person inclusives are Itonama pronouns which show fully identical forms for inclusive and 2nd person, but McGinnis (ibid.) gives examples showing that these two persons are still distinguished from each other in other parts of the grammar. So, the main takeaway point is that the relationship between 2nd person and inclusive is observed in several languages, but the two categories are never conflated. This stands in stark contrast to the fact that inclusive reference is conflated with 1st person exclusive reference (resulting in the generic *we*) in about two thirds of the world's languages (Cysouw, 2013).

To sum up, the possibility of inclusives forming a natural class with 2nd person is predicted by several theories, including the containment theory above. In fact, according to the features assumed in Table 3 and assuming that no other consideration

constrains syncretism in this case, inclusives are predicted to be just as related to 2nd person as they are to 1st person. However, given the observation that no language conflates inclusives with 2nd person, the containment relationship such as 2sg $<<$ 2pl $<<$ incl.pl is unlikely, or must be further constrained. Nevertheless, any feature system we assume must be able to account for cases of syncretism between inclusive and 2nd person.
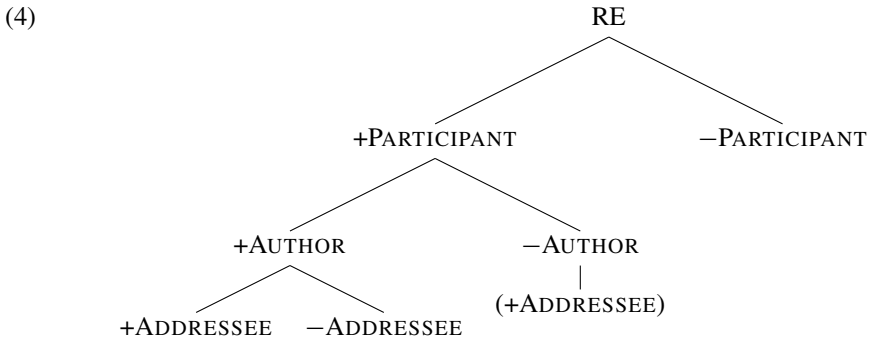
2.2.5 Predictions of the containment theory for markedness of inclusive vs. exclusive

Finally, the containment theory with privative person features also predicts that if inclusive and exclusive forms are morphologically related (as in the ABB and AAA patterns), the most likely derivational relationship should be exclusive serving as the base for inclusive and not the reverse. Since inclusive person only differs from exclusive 1st person by having an additional feature [ADDRESSEE], then it is logical that a morpheme encoding this feature could be added to an exclusive form to derive the inclusive one. Moskal acknowledges that this prediction about directionality of the derivational relationship between exclusive and inclusive and about their relative markedness is violated since cases of the reverse pattern (derived exclusives) are attested – see for example the Tzeltal paradigm in Table 1. She suggests that overt coding of contrasts does not track "structural markedness" (that is, markedness due to containment), and attempts to offer an alternative analysis of one language with apparent derived exclusives, Limbu, within the containment theory. However, as will be shown in Sect. 6.2 her analysis has several problems and does not scale up to other languages like Tzeltal.

2.3 Clusivity as a binary contrast

The other version of the traditional view on which inclusive is a type of 1st person assumes a binary clusivity contrast. The most frequently proposed binary feature to distinguish between inclusive and exclusive is ±ADDRESSEE: thus, groups including speakers are further subdivided into those that exclude or include addressees. For example, this type of analysis can be found in Noyer (1992), Silverstein (1976) and more recently in Little (2018) who specifically argues for the binary addressee feature on the grounds that it allows us to account for derived exclusives in several Mayan languages. A somewhat different binary feature approach that uses non-conjunctive and non-commutative features (i.e., the order in which the features are applied matters) is offered in Harbour (2016) and discussed at more length in Sect. 6.1. What all of these approaches have in common is that they allow for exclusive person to be the more specific category in some scenarios, which then predicts both the existence of ABA-type patterns and cases in which exclusives are derived from inclusives.

For concreteness, let us consider the following instantiation of a binary feature approach.

(4)

```
                                    RE
                        _____/ _____
                       /                         \
                 +PARTICIPANT                 −PARTICIPANT
              _____/ _____
             /               \
        +AUTHOR            −AUTHOR
       ___/ \___              |
      /         \        (+ADDRESSEE)
+ADDRESSEE  −ADDRESSEE
```

According to this feature geometry, PARTICIPANT (in discourse) is the main dependent of the Referential Expression (RE) node following Harley and Ritter (2002). This creates a well-documented contrast between locutors (1st and 2nd person) and non-locutors (3rd person). Languages that further distinguish between 1st and 2nd person, have an additional feature AUTHOR which logically depends on +PARTICIPANT since non-participants cannot be speakers. This can be seen from the fact that the −PARTICIPANT node is non-branching. In languages that do not have a clusivity distinction, 1st person corresponds to [+PARTICIPANT +AUTHOR] and 2nd person to [+PARTICIPANT −AUTHOR]. Languages that have a clusivity distinction have an additional feature ADDRESSEE, that depends on AUTHOR and distinguishes between 1st inclusive and 1st exclusive within the 1st persons. Within the 2nd persons, this feature makes no additional distinctions: the [+PARTICIPANT, −AUTHOR, +ADDRESSEE] is the same as 2nd person in languages without clusivity, and [+PARTICIPANT, −AUTHOR, −ADDRESSEE] would pick out an empty set, so it's not a possible person. The full list of possible categories that follow from the above geometry is given below together with the referent sets indicating possible combinations of the assumed primitives *me, you, other(s)*.

(5)   Featural representations for personal categories under the feature hierarchy in (4)

Person	Featural representation	Referent set
1st and 2nd	[+PARTICIPANT]	me, me+you(s), you(s), you(s)+other(s) me+other(s), me+you(s)+other(s)
3rd	[−PARTICIPANT]	other(s)
1st (generic)	[+PARTICIPANT +AUTHOR]	me, me+you(s), me+other(s), me+you(s)+other(s)
1st incl	[+PARTICIPANT, +AUTHOR, +ADDRESSEE]	me+you(s), me+you(s)+other(s)
1st excl	[+PARTICIPANT, +AUTHOR, −ADDRESEE]	me, me+other(s)
2nd	[+PARTICIPANT, −AUTHOR, (+ADDRESSEE)]	you(s), you(s)+other(s)

Although, the +ADDRESSEE feature in 2nd person of languages with clusivity appears to be redundant, it actually is necessary to describe patterns in which inclusive

Table 7 Pemón free personal pronouns (1st and 2nd person) (Cesáreo de Armellada & Olza, 1999)

	SG	PL
1excl.	**ju**-re	ina
1incl.		**ju**-re-nokon
2nd	ama-re	ama-re-nokon

simultaneously patterns with 1st exclusive and with 2nd person as will be shown later. The three features assumed here also predict which specific patterns of full conflation (non-distinction of categories) are possible. When a language only has the PARTICIPANT feature active, it can distinguish between 1st/2nd person vs. 3rd person. When a language has both PARTICIPANT and AUTHOR active, it can distinguish three persons: 1st, 2nd, and 3rd. And finally, when an ADDRESSEE is also active, a language can distinguish 4 persons: 1st inclusive, 1st exclusive, 2nd, and 3rd. Note that no conflation is predicted between inclusive and 2nd person, as well as between 2nd and 3rd persons, or 1st and 3rd persons. I will come back to the discussion of these predictions and compare this feature system to the proposal made in Harbour (2016) in Sect. 6.3.

2.3.1 Predictions of the binary addressee feature for patterns of morphological relatedness

The binary clusivity contrast is the least restrictive approach in the sense that it predicts the widest range of possible patterns of morphological relatedness. In particular, all patterns in Table 2 are predicted to be possible including the ABA pattern. Below I illustrate how this approach can capture an ABA-type pattern. An example of a language with an ABA pronominal paradigm is Pemón (Cariban, Venezuela, aoc) presented in Table 7. This language comes from the Cariban family which also includes Macushí discussed as an example of a potential ABA pattern in both Moskal (2018) and Daniel (2005b).

Pemón has the same morpheme in 1sg and 1pl.incl, and a distinct non-compositional exclusive plural pronoun. A set of lexical entries for Pemón that uses a feature system in (4) and DM-style assumptions for lexical insertion is given below. I assume that the exclusive plural is a portmanteaux morpheme that is either created via morphological merger or, alternatively, the Subset Principle which regulates lexical insertion is allowed to operate over spans of multiple nodes.

(6) Lexical entries for Pemòn using the feature system in (5)
>   *re*   D (pron. stem)
>   *ina*   [D +PARTICIPANT, +AUTHOR, −ADDRESSEE, −SG]
>   *ju-*   [+PARTICIPANT, +AUTHOR]
>   *ama-*   [+PARTICIPANT, −AUTHOR]
>   *-nokon*   [−SG]

So, here ABA results from the fact that a general first person morpheme *ju-* is blocked in the exclusive context by a more specific 1st person exclusive portmanteau morpheme which is specified as [−addressee] (not a possible option if ADDRESSEE is privative).

Table 8 Maung free personal pronouns, Nom. case, 1st and 2nd person (Capell, 1971)

	SG	PL
1exc.	ŋa-b-i	ŋar-i
1incl.		ŋar-wur-i
2nd	nu-j-i	nu-wur-i

For languages with minimal vs. augmented contrast, this theory is also not very restrictive. For example, all patterns in Table 5 are possible to describe with a binary clusivity feature except for the XOR pattern (paradigm a). Similarly, ABA-type patterns for languages with multiple numbers (like those in Table 6) are predicted to be possible.

However, it is worth noting that even on this account 1st singular and inclusive plural do not form a natural class and an ABA pattern is, thus, more complex compared to AAB, ABB, or AAA. More specifically, all three patterns AAB, ABB, and AAA can be described with underspecification of features alone given the proposed binary features, while ABA requires both underspecification and blocking (e.g., assumption of the Subset Principle). Pattern AAB (1sg=1excl.pl) involves underspecification of the number feature. Pattern ABB (1excl.pl=1incl.pl) involves underspecification of the addressee feature, and finally pattern AAA involves underspecification of both addressee and number features. On the other hand, ABA would require underspecification of both addressee and number features and a more specific exclusive morpheme blocking the insertion of A in the exclusive context. As shown in Pertsova (2011), syncretism patterns that require both underspecification and blocking are more typologically rare compared to those that require underspecification alone. She derives this fact from a learning bias for one-to-one mappings between exponents and feature sets. If this learning bias and the binary feature approach presented here are on the right track, ABA would be harder to learn and, as a result, less common than other patterns, although not impossible.

2.3.2 Predictions of the binary addressee feature for 2nd person

Given the particular feature system with a binary clusivity contrast assumed here, we do not predict inclusive person and 2nd person to be conflated. Conflation only arises as a result of non-active daughter nodes in the hierarchy (see discussion at the end of Sect. 2.3). However, syncretism between these two categories would be easy to account for given that they share the features [+PARTICIPANT, +ADDRESSEE]. For example, consider free personal pronouns from Maung (Iwaidjic, Australia, mph) in Table 8 in which inclusive shares a morpheme with 2nd person and at the same time shares a different morpheme with 1st exclusive.

In Maung -*wur* can be analyzed as a plural marker realizing the features [+ADDRESSEE, −SG] or [−SG] in the context of [+addressee]. This explains why it occurs in both inclusive and 2nd person; while ŋar- can be said to realize the 1st person features [+PARTICIPANT, +AUTHOR], explaining why it occurs in both 1excl and 1incl (and possibly in 1sg as an allomorph ŋa-). Finally, *nu*- would realize the features [+PARTICIPANT −AUTHOR], restricting it to 2nd person only. This paradigm

shows how [+addressee] feature, which appears redundant in 2nd person, neverthe-
less is useful for capturing paradigms in which inclusive simultaneously patterns with
1st person and 2nd person.

2.3.3 Predictions of the binary addressee feature for the markedness of inclusive vs. exclusive person

Another notable difference between the binary and unary feature approaches to clu-
sivity is that the unary approach predicts that inclusive can be derived from exclusive
(via addition of the ADDRESSEE feature), but not the reverse. On the other hand, on
the binary feature approach, either the inclusive or the exclusive can serve as a deriva-
tional base for the other category. As a consequence, either can appear as a substring
of the other. The two categories are formally equally marked because they involve
the same number of features as can be seen in (5).

I have already discussed the view that inclusive is the more marked category which
follows from the containment hypothesis, particularly from the assumption that the
denotation of 1st person inclusive is the superset of the denotation of 1st person exclu-
sive. However, there are equally compelling arguments for the reverse claim, namely
that exclusive is a more marked category. As pointed out in Cormier (2005), if a lan-
guage has a dedicated exclusive category, it will also have an inclusive category (this
is Universal 1484 in the Universals Archive (Plank & Filimonova, 2000)), while the
reverse is not the case – a language may have a special inclusive category without
an exclusive category. Following Greenberg-type implicational markedness relations
"if a language has (a more marked category) X, it also has a (less marked category)
Y", we would conclude that exclusive is more marked than inclusive. Additionally,
Cormier (ibid.) citing Jacobsen (1980) notes that if an inclusive/exclusive distinction
is lost, "it is the inclusive form that remains to take over the combined first-person
plural reference." And since it is generally more typical for a less marked form to
serve as the base for paradigm leveling or neutralization (Bonet, 1991; Bybee, 2010),
this again suggests that exclusive is more marked than inclusive.

Given a binary feature of clusivity, it could ultimately be a parametric language-
choice which of the two categories is more or less marked. Namely one of the feature
values of ADDRESSEE could be considered more marked than the other, leading to an
asymmetry. To test which of the two scenarios is more likely, one could compare the
frequency with which inclusives are derived from exclusives to the reverse situation.
This will be done in Sect. 5.7 based on the language sample introduced in this paper.

In the remainder of this section, I show how the binary feature approach can ac-
count for both types of cases, exclusives derived from inclusives and the reverse. An
example of the former case was already shown in Tzeltal (repeated in Table 9 for
convenience). In this language inclusive is a substring of exclusive, but both forms
share an exponent with 1sg.

An analysis of Tzeltal that relies on the feature system in (4) is presented below.
Note that this analysis is similar to the analysis of ABA patterns because it assumes
a general 1st person morpheme (underspecified for ADDRESSEE) and a more specific
exclusive plural morpheme.

Table 9 Petalcingo Tzeltal personal pronouns

	sg	pl
1excl.	xoʔ-on	xoʔ-on-(r)jo-tik
1incl.		xoʔ-o-tik
2nd	xaʔ-at	xaʔ-ex
3rd	xaʔ	xaʔ-tik

Table 10 Temiar free personal pronouns (1st and 2nd person) (Means, 1998)

	SG	DU	PLURAL		Exponent rules for dual pronouns
1exc.	jəjʔ	ar	ejʔ	ar	[+PARTICIPANT, +AUTHOR, −SG, +MIN]
1incl.	–	j-ar	kanəʔ	j-	[+ADDRESSEE]/__[−SG,+MIN,+AUTHOR]
2nd	ha:	ɲɔb	ɲɔb	ɲɔb	[+PARTICIPANT, −AUTHOR, +ADDRESSEE, −SG]

(7)   Lexical entries for 1st and 2nd person forms of Petalcingo Tzeltal using the feature system in (4)

xaʔ/xoʔ	D (pronom. stem)
o/on	[+PARTICIPANT, +AUTHOR]
(r)jo	[−ADDRESSEE]/__[+PARTICIPANT, −SG]
tik	[−SG]
at	[+PARTICIPANT, −AUTHOR, +SG]
ex	[+PARTICIPANT, −AUTHOR, −SG]

For an example of the opposite case in which inclusive is more complex and is derived from exclusive, consider the paradigm of free personal pronouns in Temiar (Austroasiatic, Malasia, tea). An analysis of this language's dual pronouns with the binary addressee feature appears in Table 10. I will assume that the dual corresponds to the feature set [−sg, +min]. In this language the morphological relationship between inclusive and exclusive plural forms is not clear, but in the dual forms across all paradigms, free pronouns and verbal subject agreement prefixes in all tenses, a prefix *j-* is added to the exclusive form to derive the inclusive (e.g., exclusive subject agreement prefix is *-a* and the inclusive counterpart is *-j-a*). As a reminder, the containment theory can only account for languages like Temiar, but not for languages like Tzeltal. Moskal (2018) attempts to explain one language similar to Tzeltal, Limbu, within the assumptions of nested unary features. An interested reader can find a review of her account and an argument against it in Sect. 6.2.

2.4 Interim summary

To summarize so far, there are at least three different views on the status of inclusive person which make different empirical predictions. The focal referent theory predicts any patterns of relatedness between inclusive and other 1st persons to be rare, including any derivational relationship between inclusive and exclusive. The containment hypothesis predicts only patterns of type ABA to be rare and it also predicts that inclusives should be most naturally and commonly derived from exclusives rather than

the reverse. Finally, the binary-feature approach predicts the widest range of possible patterns, and the possibility of both inclusive or exclusive serving as the derivational base for the other category.

From the discussion so far, the evidence for these theories is mixed: on the one hand, the binary feature account seems preferable on the grounds that it does not predict conflation between inclusive and 2nd person, and given that it can easily account for the attested cases of derived exclusives. On other other hand, this account also predicts the possibility of ABA patterns which are claimed to be (nearly) unattested. With respect to other patterns of relatedness, there is also no agreement: for example, Moskal's analysis of Smith's database of free personal pronouns (see counts in (2)) suggests that AAA and ABB are common, while Daniel's WALS data mentioned in Sect. 2.1 suggests otherwise.

Below I will first speculate about the reasons for these disagreements. Then, I will use another dataset to evaluate predictions of all three theories. I will begin by considering relative frequencies of ABA-type patterns among 1st person pronouns and the cases in which inclusive is a substring of exclusive. If we find that both of these patterns occur more frequently than expected, this would rule out the focal-referent and the containment theories. If, instead, these cases are unattested or exceedingly rare, this would rule out the binary-feature theory and we can focus on the relative frequencies of AAA and ABB in order to decide between the focal-referent and the containment theory.

3 Contradictory findings in the previous typological studies

Before introducing the dataset used to evaluate the three theories in question, let me comment on possible sources of differences in the findings of Moskal and Daniel, and discuss some methodological issues related to this project. Recall that Daniel's typological survey found that around 80% of all pronominal paradigm types follow the ABC pattern, when 1sg, 1incl, and 1excl are completely unrelated to each other. On the other hand, Moskal using a different sample found that most paradigms displayed some morphological relatedness of type AAA, AAB, or ABB. I hypothesize that this difference is due for the most part to the methodological choices of what to count as morphological relatedness. In particular, Moskal counted a pattern to be an example of AAA when all three pronouns in question had the same stem (either in the whole paradigm, or in a subparadigm). This was done because she was interested in documenting possible patterns of stem-suppletion. A closer look at Smith's database and the list of languages in the appendix of Moskal (2018) attributed to each paradigm type, also reveals that Moskal treated nearly any phonological overlap among the three forms of interest as morphological relatedness.

An example that illustrates both points above comes from Tukang Besi (Malayo-Polynesian, Indonesia) in Table 11 which was classified as AAA in Moskal. While all first person forms in this paradigm share the segments i and k, these segments are not contiguous in 1sg and also appear in 2nd person pronouns. It is possible that there is a common shared pronominal stem for participants (1st and 2nd person), but if we isolate this stem out, we see that the remaining strings of 1sg, 1incl, and

Table 11 Tukang Besi, North (as represented in Smith (2011))

	SG	PL
1excl.	iaku	ikami
1incl.		ikita
2nd	iko'o	ikomiu
3rd	ia	amai

1excl forms are all distinct. Under the assumption that these remaining strings are the only possible candidates for morphemes encoding differences among participants in discourse, for our purposes this paradigm is better classified as an example of ABC. Daniel's data is not publicly accessible, so we cannot tell what methodological assumptions he was making, but it is likely that there were significant differences in the two researchers' approaches, particularly given that Daniel's main focus was on cases of relatedness which exemplified derivations from a common stem via addition of number morphology.

Another difference between the two studies was that Smith's data is not genetically or geographically balanced, unlike the WALS sample. The advantage of using a non-balanced sample is that it includes more languages, but the disadvantage is that it could possibly lead to overestimating frequency of a particular pattern if it occurs in many related languages. The Pronom database I will use is based on a sample of languages that is genetically and geographically balanced, so in that sense it will be more similar to the WALS data.

4 Pronom

In this section I describe the Pronom dataset used to evaluate the three theories of interest, how it was compiled, and also what methods of morphological analysis were used in coding pronominal paradigms.

4.1 Introducing Pronom

Pronom is a publicly available database of pronominal paradigms from a genetically and geographically balanced sample of languages. It includes free pronouns as well as bound verbal and nominal agreement morphology such as possessive morphology on nouns, verbal agreement affixes, and pronominal clitics. Thus, the primary data in this database are paradigms, not languages. The database was compiled by the author and the author's students from original sources such as grammars, dictionaries, and grammatical sketches. The database can be downloaded as a spreadsheet from the Carolina Digital Repository (cdr.lib.unc.edu, https://doi.org/10.17615/h78a-9w72).

At the time of this writing Pronom includes 698 paradigms from 270 genetically and geographically diverse languages. The database was intended to be a representative unbiased sample from the languages of the world. We used the following sampling procedure: we assigned languages and genera from the list of 2,679 languages in the World Atlas of Language Structures to six geographical areas identified in Dryer (1989). We then picked forty random genera for each region (the smallest number of

genera in any region) and 2 random languages from each genus. This would have resulted in 80 languages per geographical area, however, we had to reduce that number to 64 due to the fact that some genera only had one language in them and other genera only had a few languages which were close dialects of each other. Thus, we ended up with $64 * 6 = 384$ languages. To date, 270 languages have been documented with roughly same number of languages from each of the 6 regions.

It should be noted that since the data was collected by many different people who read linguistic descriptions and grammars, it necessarily contains a lot of noise. The grammars themselves are known to contain inaccuracies and are written at different levels of generality and explicitness. This noise would only be amplified by the second layer of human processing – interpreting grammatical descriptions and coding them.

4.2 Methodological assumptions

In making decisions for how to classify a morphological paradigm into one of the possible types I adopt the following assumptions. Two or more cells in a paradigm will be considered as related if *all and only* these cells share common phonological material, ruling out cases when the shared material could be due to expression of features other than person (e.g., number, gender, stem) or cases in which the cells in question are only a subset of the larger set of related cells. Additionally, the following conditions hold:

(8)   Conditions for morphological relatedness

     a. The shared phonological material may be due to full syncretism between considered cells, but not complete conflation (i.e., non-distinction of two categories in the language as a whole), or

     b. The shared phonological material is due to a shared morpheme or morphemes, identified in the grammar source (factoring out allomorphic variation), or

     c. The shared phonological material is identified to result from shared morphological structure according to the morphological analysis of the paradigm by the author (more on that below).

Determining whether two forms share a morpheme requires identifying morpheme boundaries and making decisions about whether possibly lexicalized forms can be decomposed, which is notoriously difficult. There is inevitably a subjective component to the process of morphological analysis, but the general principles usually require a high degree of semantic compositionality and transparency, as well as consistent phonological correspondences. Consider the following two examples which illustrate some of the principles I followed. In the paradigm of free personal pronouns from Ju|'hoan (Kxa, Southern Afrika, ktz) in Table 12, the inclusive appears to be marked by a morpheme *m-* which can be isolated because all inclusive pronouns begin with this sound and removing *m-* in each case leaves strings that can be analyzed as dual and plural morphemes. Thus, a fully compositional analysis of non-singular forms is possible. One might observe that the 1sg. form *mí* also begins with the segment *m-*, but removing this segment from 1sg does not leave a string that

Table 12 Ju|'hoan personal pronouns (Dickens, 2005)

	SG	DU	PL
1exc.	mí	é-tsa	é-!a
1incl.		m-tsá	m-!a
2nd	á	i-tsá	í-!a
3rd	ha	sá	sí-!a

Table 13 Kwazá personal pronouns (van der Voort, 2004)

	SG	PL
1exc.	si	tsi-ʔtsɛ
1incl.		tʃaʔna
2nd	ʃji	ʃji-ʔtsɛ
3rd	ĩ	ĩ

can be clearly identified as a singular morpheme. In fact, all singular forms appear to be non-decomposable. (Note, that if we isolate *m-* as a separate morpheme in 1sg, this would make this paradigm an example of an ABA pattern).

As another illustration, consider the free personal pronoun paradigm of Kwazá (unclassified, Brazil, xwa) in Table 13. I assume that *ʔtsɛ* is a plural morpheme because it occurs in two out of three plural contexts in which one expects it to occur (third person often patterns differently from 1st and 2nd persons). Additionally, removing *ʔtsɛ* from 1excl and 2nd plural forms, leaves strings that also occur in 1excl and 2nd person singular as one would expect. It is possible that *tsi* is either an allomorph of *si* or has the structure *t-si* with the formative *t* which appears as a prefix in 1st plural contexts (since it is also present in the inclusive form). However, in absence of further data it is not possible to decide between these two possibilities. In such cases, preference was given to a non-compositional analysis. I should note that evidence across different paradigms within the same language was also taken into account during morphological analysis.

Of course, a common worry about any morphological analysis of such frequent lexical items like pronouns is whether we can be sure that speakers are sensitive to the underlying morphological structure. Although this is a legitimate worry, the fact that we can find such structure indicates that at least at some point in the history of the language it was "alive" for the speakers. Additionally, we know from overregularization errors in children's speech (e.g., English children producing possessive pronouns like "mines" instead of "mine"), that the frequency of a form does not guarantee that it is wholly memorized and not affected by grammatical structure.

5 Evaluating the status of inclusives in Pronom

As noted before, even patterns that are predicted to be impossible according to a particular theory can still occur due to accidental reasons – two forms may be homophonous or share some phonological structure by chance, not due to their morphosemantic similarity. Therefore, it would be good to know what the expected frequen-

Table 14 Number of languages in which 2nd and/or 3rd person sg and non-sg show a morphological relationship

2nd person	23
3rd person	31
both 2nd and 3rd person	12
neither	26

cies of different patterns are to begin with, or how to distinguish between rare events and accidental events.

To answer this question a good place to start is to consider how often we expect to see singular and non-singular forms to be morphologically related in pronominal paradigms at all. This will give us an idea of how often 1st person forms might be morphologically related. The most common type of relationship we expect to find is the one in which the plural forms are derived from the singular ones via productive plural morphology. According to Daniel (2005a), in slightly more than half of the languages from the sample of 259 WALS languages ($n = 138$), plurality cannot be factored out from the independent personal pronouns or is simply not marked. Thus, in more than half of the languages singular and plural forms are not morphologically related via number morphology. In the sample of languages in Pronom, looking only at those languages that have a clusivity distinction and more than one number ($n = 92$), roughly 72% show some morphological relatedness between singular and non-singular forms in 2nd or 3rd person, or both. The exact breakdown appears in Table 14. If first person patterned similarly to second person, then about 37% of languages would have some kind of relationship between singular and non-singular 1st person forms, and, thus, about 63% would not and would be classified either as ABC or ABB.

The expected frequency of other types would of course depend on the theoretical assumptions about the underlying conceptual organization of the person category. For example, both focal referent and containment theories rule out patterns like ABA. Therefore, if one of these theories is on the right track we would expect ABA to be very rare, only possible through chance. Moreover, even on the least restrictive binary-addressee theory discussed in Sect. 2.3, there are good reasons to think that ABA should be more rare than the other three patterns given that ABA cannot be described with feature underspecification alone. However, at the same time it should be more frequent than the truly accidental patterns of relatedness. To gauge the frequency of accidental patterns, we can focus on cases in which 1st exclusive or inclusive share structure with 3rd person (something that none of the three theories we considered here predict).

With respect to the relative markedness of inclusive vs. exclusive and the direction of the derivational relationship between them, both are expected to be roughly equally frequent on the binary feature approach, while according to the containment theory the pattern when inclusives are more marked than exclusives are expected to be significantly more common. According to the focal referent theory, both cases are expected to be rare since inclusive is not straightforwardly related to the 1st person exclusive (singular or non-singular).

Type	Num. of languages
no number	3
minimal-augmented	15
singular vs. non-sg.	77

Table 15 Breakdown of languages with clusivity in Pronom based on the type of plural marking

1 excl.	-ha/-xa
1 incl.	-sa
2	-ma
3	-pa

Table 16 Aymara possessive pronominal affixes (Hardman et al., 1988)

5.1 The general distribution of languages in Pronom with respect to number marking

The general profile of languages with clusivity in the Pronom is as follows: out of 270 languages, 96 (roughly 35%) mark clusivity in some way. One of them, Tariana, does not have an inclusive/exclusive distinction in 1st person pronouns, but has a set of impersonal pronouns that can also be used to convey inclusive meaning. The remaining languages are broken down into three types in Table 15 based on how they mark number.

Note that languages with no plural marking cannot have an ABA type pattern, but there's a logical possibility for morphological relatedness between inclusive and exclusive pronouns. Languages with minimal-augmented number will be considered separately from languages with sg-pl and sg-du-pl number marking since the predictions for ABA-type patterns differ for these two types of languages.

5.2 Paradigms with no number

In three languages with clusivity, Chrau (crw), Aymara (aym), and Mixtec (mig), and in one paradigm of the language Kokota (kkk) there are no morphological number distinctions in pronouns, restricting the number of possible pronouns to four: 1st person exclusive, inclusive, 2nd person, and 3rd person. Such paradigms do not allow us to evaluate relatedness between singular and plural 1st person forms, but they could show evidence of relatedness between inclusive and exclusive pronouns in opposition to 2nd person pronouns, or relatedness between inclusive and 2nd person in opposition to 1st. However, in all four cases the four pronouns are distinct from each other. An example from Aymara (Aymaran, Bolivia, aym) possessive pronouns is given in Table 16.

5.3 Minimal-augmented paradigms

Fifteen languages in the sample have paradigms with so-called minimal vs. augmented number alignment. Minimal-augmented paradigms have at least four categories that involve the speaker: exclusive and inclusive forms in both minimal and augmented number. Some of these languages also have a unit-augmented number

Table 17 Impossible patterns of relatedness for 1st person categories under the containment hypotheses for languages with minimal inclusives

1min.excl	**1aug.excl**
1min.incl	1aug.incl

a.

1min.excl	1aug.excl
1min.incl	**1aug.incl**

b.

1min.excl	1aug.excl
1min.incl	**1aug.incl**

c.

1min.excl	**1aug.excl**
1min.incl	**1aug.incl**

d.

1min.excl	**1aug.excl**
1min.incl	1aug.incl

e.

(where minimal sets are augmented by one) leading to a three-way distinction in number analogous to the sg-du-pl systems.

Recall that according to the focal referent theory, the only natural morphological relations would be those that hold between different inclusive pronouns across number categories (ditto for the exclusive pronouns).[5] A wider range of patterns is predicted to be natural according to the containment theory. The unnatural or problematic patterns for this theory were summarized in Table 5 repeated below in Table 17. According to the binary feature theory, only the XOR pattern (example (a) in Table 17) is unnatural; that is, cannot be described without assuming at least one case of accidental homophony.

Within the fifteen languages with minimal-augmented number, we find many examples of the patterns in Table 17. For instance, the paradigm of verbal prefixes in Table 18 from Bininj-Gun Wok (gup), a Gunwinyguan language of Australia, exemplifies case (d) in Table 17. An a-theoretic description of this pattern is that all first person forms involve the prefix (ŋ)ar- except for the 1st exclusive minimal which is realized as (ŋ)a-. This generalization cannot be easily expressed in the containment theory given that the "exception" (1st exclusive minimal) would have to be structurally more marked or specific to block the more general (ŋ)ar-, but it is in fact the least marked cell in the paradigm if we assume privative features. If (ŋ)a- is a result of some phonological adjustment (e.g, r-deletion), one would still have the same problem since there would be no way to correctly pick out the context in which this adjustment happens with unary features. If we assume that this pattern results from suffixing -r to 1st minimal exclusive, then we have a problem of capturing all cells with (ŋ)ar- as a natural class. The only way out would be to posit homophony. For example, we could assume two different suffixes, -r expressing ADDRESSEE in the context of AUTHOR and -r expressing [−MIN].

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[5]As a side note, Daniel (2005b) considers existence of languages with minimal inclusives as evidence for inclusives as a separate category, distinct from first and second person, supporting the focal referent theory. His reasoning is as follows: if inclusives are different from first and second person in that they require the presence of two rather than one discourse participants, the speaker and the hearer, it makes sense that the semantic operation of taking a minimal set would yield a different result when applying to inclusives (producing sets of size 2), than when applying to first or second person (producing sets of size 1). However, one could object that it would still be possible for inclusives to be morphologically related to 1st person (and not 2nd person) or vice versa. We could detect such a relationship if, for example, there were systematic syncretisms between inclusives and exclusives (whether minimal or not), or between inclusives and second person.

Table 18 Bininj Gun-Wok verbal agreement prefixes for transitive verbs with 3rd person object (1st and 2nd person) (Evans, 2003)

	MIN	UNIT AUG	AUG
1exc.	(ŋ)a-ban-	**(ŋ)ar**-ban	**(ŋ)ar**-ban-
1incl.	**(ŋ)ar**-ban-	**(ŋ)ar**-ban-	**(ŋ)ar**-ban- /gar-ban-
2nd	ji-ban	ŋur-ban-/gur-ban-	ŋur-ban-/gur-ban-

Table 19 Nunggubuyu 1st and 2nd person masc. free personal pronouns (Heath, 1984)

	MIN	UNIT AUG	AUG
1exc.	**ŋa**-ja	ni-ŋi	nu-ru
1incl.	na-ga-wa	**ŋa**-gu-ŋi	**ŋa**-gu-ru
2nd	na-gaŋ	nu-gu-ŋi	nu-gu-ru

Table 20 Panare free personal pronouns (1st and 2nd person) (Payne, 2013)

	MIN	AUG
1exc.	**ju**	ana
1incl.	**ju**-to	**ju**-ta-kon
2nd	amən	amən-ton

An example of case (c) in Table 17 comes from the paradigm of free personal pronouns in another Gunwinyguan language, Nunggubuyu (nuy) shown in Table 19. Note that the minimal inclusive in this language behaves differently from other pronouns as it includes a nominal dual marker *wa* which otherwise does not appear in pronouns (Heath, 1984). The *ga/gaŋ* marks minimal number, and *gu* – augmented (these morphemes also appear in 3rd person, not shown here). The formative *ŋa*- occurs in 1st exclusive minimal and all non-minimal inclusive forms creating a pattern similar to ABA.

Panare (Cariban, Venezuela, pbh) is an example of pattern (b) in Table 17. In this language minimal and non-minimal inclusive forms pattern with 1sg, while the non-minimal exclusive has a different suppletive stem (see Table 20). This language is related to Pemón discussed earlier and Macushí, which appeared in both Moskal (2018) and Daniel (2005b) as a potential example of ABA. The pattern found in Panare is pervasive throughout the whole Cariban language family. Moskal speculates that the exclusive pronoun in Cariban is not a true pronoun because it does not have affixal variants and does not control plural agreement on verbs. Based on this, she does not include it in her counts of ABA. However, at least in Panare the exclusive does have an affixal variant – a possessive prefix on nouns. While there might be something special about exclusive pronouns in Cariban, it is not clear that we should discount them as irrelevant for the purposes of this typological survey. Even if historically the pronoun *ana* was not at some point part of the pronominal system, prima facie the synchronic pattern appears to be a clear example of ABA.

The Malayo-Polenesian language spoken in the Philippines, Maranao (mrw), is an example of pattern (e) in Table 17. A paradigm of verbal subject agreement affixes from this language is shown in Table 21 (the same pattern is seen in free personal pronouns). Here affix *-no* appears to be the augmented marker, and the morpheme *ta*

Table 21 Maranao free personal pronouns (1st and 2nd person) (McKaughan & Macaraya, 1967)

	MIN	AUG
1exc.	(a)ko	**ta**-no
1incl.	**ta**	kami
2nd	ka	ka-no

Table 22 Ngandi verbal agreement prefixes for transitive verbs with 3rd person sg. masc. ni-class human object (1st and 2nd person) (Heath, 1978)

	MIN	AUG
1exc.	**ŋa**-nu-	ŋa-ru-
1incl.	ŋa-nu-	**ŋa**-ru-
2nd	ɲa-nu-	ɲa-ru-

occupies a set of cells that do not form a natural class and cannot be described with unary features for clusivity.

Two other languages, Ngandi (Gunwinyguan, Australia, nid) and Mangarrayi (Mangarrayi-Maran, Australia, mpc), show an XOR-type pattern (case (a) in Table 17). Mangarrayi was counted in Moskal (2018) as the single example of ABA in Smith's data with the caveat that this example would present problems for any theory. A paradigm from Ngandi that demonstrates this pattern is given in Table 22. In this language, in all paradigms (bound suffixes and free forms) minimal inclusive shares initial segments with non-minimal exclusive and vice versa, minimal exclusive shares segments with non-minimal inclusive. This is remarked on as a systematic pattern in the grammar by Heath (1978).

To summarize, in four out of fifteen languages with minimal-augmented number there are paradigms that are predicted to be unnatural under both the focal referent and the containment theory. Two additional cases are examples of an XOR pattern that are predicted to be unnatural according to all theories. It should be noted that four out of six cases discussed here come from related Australian languages (where minimal-augmented distinction is common). So it is possible that regional and genetic factors are involved in the relative prevalence of ABA-like patterns within the minimal-augmented number system. If we count all Australian cases as a single example, we still have 3 problematic cases in 15 languages from three different regions and language families: Cariban in South America, Malayo-Polenesian in South East Asia, and Gunwinyguan in Australia.

5.4 Singular-plural languages

We now turn to the languages with singular vs. plural alignment that typically have only three types of first person: singular, inclusive non-singular, and exclusive non-singular. The non-singular forms can be further subdivided based on whether a language also has dual and trial/paucal distinction. There are 77 languages of this type contributing multiple paradigms to the sample. Overwhelming majority of these paradigms are of type ABC where 1sg, 1incl, and 1excl are all distinct or not obviously related, supporting Daniel's findings. However, there are still some non-negligible number of patterns ABB, AAB, AAA, and ABA. I will first discuss the ABA patterns which are of particular interest to us.

Table 23 Puquina free personal pronouns (Aguiló, 2000)

	SG	PLURAL
1exc.	**ni**	seŋ
1incl.	–	**ni**-tʃ
2nd	pi	pi-tʃ
3rd	tʃu,hi	tʃu-tʃ

Table 24 Motuna Free Personal Pronouns Stems (Onishi, 2012)

	SG	PL
1exc.	**n**-i	noni
1incl.		**n**-ee
2nd	r-o	r-ee

Recall that ABA arises when inclusive non-singular person is related to 1sg, but neither is related to exclusive non-singular. The first example of ABA comes from Pemón (aoc), already shown in Table 7 in Sect. 2.3, another Cariban language like Panare discussed earlier. Unlike Panare this language has a singular-plural number system, but the inclusive still patterns with 1sg while exclusive is distinct.

The next apparent example of ABA comes from the extinct language of the Incas, Puquina (puq). This case is questionable given that one of the sources, La Grasserie (1894), does not mention inclusive pronouns at all. However, Aguiló (2000) reports the pronominal paradigm for Puquina shown in Table 23, which is clearly an ABA pattern.

Another example comes from Worrorra (Worrorran, Australia, unp). In this language the 1sg ŋa shows up in all inclusive, but not in exclusive persons, similar to Nunggubuyu, Ngandi, and Mangarrayi discussed in Sect. 5.3. The author of the grammar, Clendon (2014) remarks on this pattern as follows: "Notice . . . that the first person singular exclusive shape begins with a velar nasal, making it similar in this respect to the first person inclusive series" (p. 156). Given that this is another Australian language, one might consider this pattern to be a repetition of what we have already seen in the previous section.

The next example in Table 24 comes from a Papuan language of Solomon Islands, Motuna (siw)[6]. In Motuna the inclusive pronoun *n-ee* is a regularly derived plural form of 1sg, while exclusive plural is not obviously compositional. The fact that inclusive, rather than exclusive is morphologically related to 1sg is also clearly seen from the Motuna paradigm of agreement suffixes in intransitive verbs in Table 25. In this paradigm, inclusive plural shares structure with 1sg and all 1st dual forms, while exclusive plural stands out as different. It is not clear how the exclusive plural *moru* should be decomposed, so I leave it unanalyzed.

It might also be worth noting that in Vietnamese there's something that resembles an ABA pattern, although given the intertwined nature of the politeness and

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[6]This pronoun is also used as 1st plural pronoun in a related Pouko dialect which has no clusivity distinction (Onishi, 2012), confirming the observation that when the clusivity contrast is collapsed, it is the inclusive form that takes over to become the general 1st person pronoun.

	SG	DUAL	PL
1exc.	**m-u**	**m-u**-ti	moru
1incl.		**m-u**-ti	**m-u**-ru
2nd	r-u	r-u-ti	r-u-ru

Table 25 Motuna subject agreement suffixes on intransitive verbs (Onishi, 2012)

clusivity in this language, it is less clear how to analyze it. More specifically Vietnamese has a number of 1st person forms indicating different levels of politeness, and one of these forms that is used for 1sg neutral reference, also has the inclusive meaning "me+you," and when pluralized, it is interpreted as a plural inclusive meaning "me+you(s)+other(s)" (Thompson, 1987). The plural exclusives are derived from non-neutral 1st person pronouns (either the polite or the familiar). In any case, this is an example where one of the 1sg forms is realized by the same morpheme as 1st inclusive (dual or plural).[7]

Taking together examples presented in this and the previous section, we can say that the ABA-type pattern is not impossible as claimed before. It is certainly not common, but it does crop up in a few different families and regions of the world. It seems to be more common in the languages of Australia, but it also occurs in some languages of South America (in the Cariban family, and possibly in Puquina), in Papua-NewGuinea (Motuna), and in Polenesia (Maranao).

5.5 Other patterns

In this section we compare the frequencies of ABA to the frequencies of other patterns. The AAA pattern, which I have defined as relatedness across all and only first persons, is predicted to occur via underspecification of both number and addressee features whether they are conceived of as unary or binary. I found 9 examples of cases in which all first person pronouns (in languages with either min-aug or sg-pl alignment) shared a morpheme. Most of these languages come from North America. An example appears in Table 26 from Heiltsuk (hei), a Wakashan language of British Columbia. In this language, all first person object agreement prefixes have the same initial morpheme, with exclusive and inclusive additionally sharing a further substring in common, making this also an instance of an ABB pattern. Another example comes from a Mayan language spoken in Mexico, Tojolabal (toj, see Table 27), which has a distinct 1st person pronominal prefix *ke* shared by all 1st person forms attached to the demonstrative stem *ʔ(e)n*. Overall, AAA does not seem to be very common.

The most common pattern of relatedness found in 19 languages is AAB (1sg = 1excl.non-sg) followed by ABB (1excl.non-sg = 1incl.non-sg) found in 16 languages. An example of AAB was given earlier in this paper (see the paradigm of

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[7]Ultimately, this language appears to have multiple conceptually-different categories of 1st person: something like "me, the servant" (for polite reference), "me, the superior" (for familiar reference), and a more neutral category that may be analyzed as inclusive by default, but which can also refer to the speaker alone in the singular neutral context such as in a soliloquy. There's one more "intimate" pronoun that can refer either to a speaker or a listener (and frequently to a spouse), and in the plural this pronoun also has inclusive reference. This pronoun may be analyzed as realizing the features [+author +addressee], but when restricted to the singular, only one or the other of these features is realized, and hence the pronoun can refer either to a speaker or to a listener.

Table 26 Heiltsuk object agreement prefixes, 1st and 2nd person (Rath, 1981)

	SG	PL
1exc.	**-entl**/**-entl**a	**-entl**-ent^hk^w
1incl.		**-entl**-ents^h
2nd	-utl/-utla	-utl/-utla

Table 27 Tojolabal free personal pronouns (Furbee-Losee, 1976)

	SG	PL
1exc.	**ke**-ʔn-a	**ke**-ʔen-tik-on
1incl.		**ke**-ʔen-tik
2nd	we-ʔn-i	we-ʔen-leʃ
3rd	je-ʔn-i	je-ʔen-leʃ

Table 28 AAB. Sumu free personal pronouns (Norwood, 1997)

	SG	PLURAL
1exc.	**jaŋ**	**jaŋ**-na
1incl.	–	ma-**jaŋ**
2nd	man	man-na
3rd	witiŋ	witiŋ-na

Evenki in Table 4), and another example appears in Table 28 showing personal pronouns in Sumu (Misumalpan, Nicaragua and Honduras, yan). In this language 1sg morpheme actually shows up in both inclusive and exclusive forms, but in inclusive it is used in conjunction with 2nd person morpheme (a common pattern sometimes referred to as "compound inclusives"), while in exclusive it is used in conjunction with a plural morpheme which is what one expects in a typical AAB pattern.

As for ABB, several examples have already appeared in this paper such as Heiltsuk (Table 26), Temiar (Table 10), and Maung (Table 8). Another representative example of ABB is given below from Toaripi (Trans-New Guinea, Papua New Guinea, tqo) in Table 29. Here the distinction between inclusive and exclusive is neutralized in the dual. This paradigm can be described by positing a single 1st person non-singular morpheme *la* (I'm assuming that *e-* is the plural stem) and a more specific inclusive plural morpheme, peculiarly consisting of a long string of vowels. Within the focal referent theory this example could only be explained if one assumes different locutor scales acting in dual vs. plural number, with speaker being privileged over addressee in dual but not in plural.

Another notorious example of an ABB language is Gooniyandi (Bunuban, Australia, gni) which was also discussed in Daniel (2005b). This language makes an unusual distinction between inclusive plural ("me and you and other(s)") and another category which subsumes "me and you" and "me and other(s), but not you." Thus, this second category appears to conflate inclusive dual with exclusive dual/plural. As McGregor (1990) notes, the relevant distinction here might be excluding someone (either the 2nd person or 3rd person). Something similar happens in Miskito, for which Heath (1927) reports that the typically exclusive pronoun can occasionally be

Table 29 Toaripi free personal pronouns, 1st and 2nd person (Brown, 1968)

	SG	DU	PL
1exc.	a-ra-va	**e-la**-ka	**e-la**-va
1incl.		**e-la**-ka	iauoa
2nd	a-va	e-u-ka	e-va
3rd	a-re-va	e-re-u-ka	e-re-va

Table 30 Summary of languages with different patterns of relatedness in Pronom

1. **AAA**:	Pengo, Tojolabal, Tlapanek, Amuzgo, Tübatulabal, Nambikuara, Heiltsuk, Hani, Yanyuwa
2. **AAB**:	Cubeo, Evenki, Miskito, Inanwatan, Nivkh, Ngankikurungkurr, Vietnamese, Somali, Malagasi, Nambikuara, Cayuvava, Sumu, Akha, Nivkh, Bininj Gun-Wok, Semelai, Nação Kiriri, Mixe, Kwazá(?)[a]
3. **ABB**:	Temiar, Gooniyandi(?), Maung, Orokolo, Toaripi, Gayo, Puquina, Heiltsuk, Nisenan, Ika, Tlapanec, Pemon, Motuna, Wari', Tiwi, Bininj Gun-Wok, Bilua
4. **ABA**:	Worrorra, Puquina(?), Pemon, Motuna, Ngandi, Mangarrayi, Nunggubuyu, Panare

[a]The paradigm of Kwazá can be seen in Table 13. This language can be counted as AAB if we analyze the 1excl.pl form as containing the 1sg *si*

used with an inclusive meaning ("me and you, but no others"). If McGregor is correct, Gooniyandi is not a real example of ABB since it does not have the same category of exclusive/inclusive as the other languages (exclusive means something different – excluding some other person, not just 2nd person).

To summarize, ABB is slightly less common than AAB. Some examples of this pattern are due to the neutralization of the exclusive/inclusive distinction in one of the non-singular numbers. Table 30 presents the overall summary of the patterns we have considered listing languages that have at least one paradigm exhibiting this pattern. Minimal-augmented languages are included in this table as well.[8] Majority of the paradigms, as was expected, had fully unrelated 1st person forms (i.e., the pattern ABC).

5.6 Relationships of inclusive/exclusive to non-first persons

In addition to relatedness among first person pronominal forms, there are a few other patterns of interest. In particular, as was discussed in Sect. 2.2.4, there are reasons to expect that inclusives may also be related to 2nd person. There were no languages in Pronom in which inclusive was conflated with 2nd person. However, there were 10 languages in which inclusive was syncretic or morphologically related to 2nd person in some paradigm. Most of these cases can be described with either privative or binary person features, but at least one case presents a problem for the privative feature system and containment.

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[8]Within minimal-augmented languages, there were no paradigms in which all first persons shared a morpheme in common (which would be similar to an AAA-type pattern), there were a few languages with an AAB-type pattern (i.e., those in which 1st minimal exclusive and 1st augmented exclusive shared structure), a few languages with the ABB pattern (i.e., those in which the augmented inclusive and exclusive shared structure), and those with an ABA-type pattern which were discussed in Sect. 5.3.

Table 31 Inanwatan free personal pronouns, 1st and 2nd person oblique case (de Vries, 2004)

	SG	PL
1exc.	n-á-ga	n-í-ga
1incl.		í-ga
2nd	á-ga	í-ga

Table 32 Warembori object agreement, short forms (Donohue, 1999)

	SG	PL
1exc.	-e(o)	-m(o)
1incl.		-k(o)
2nd	-a(o)	-m(o)
3rd	-i(o)	-t(o)

In particular, in free personal pronouns in Inanwatan (Inanwatan, Indonesia, szp) in Table 31 we see syncretism between inclusive and 2nd person plural, but at the same time exclusive appears as the most marked person. Crucially, the pronoun *íga* that is used for 2nd person and inclusive plural also appears as a substring in 1pl.excl. This suggests that it realizes the features of plural participants, while exclusive has an additional 1st person exclusive prefix *n-*. The Inanwatan pattern cannot be straight-forwardly described with privative features because there is no way to ensure that the prefix *n-* be restricted to the exclusive context given that the features of exclusive person are contained by inclusive. On the other hand, on the binary feature approach, one would simply assume that the prefix *n-* is associated with a set of features that include [−ADDRESSEE] which is incompatible with the inclusive.

Interestingly, there were also 7 languages in which 1pl exclusive shared structure with 2nd person. This type of pattern is unexpected under the focal referent theory or the containment theory, but is in fact consistent with the binary feature approach because a pattern like this can result from a general morpheme for plural participants being overridden by a more specific morpheme in the 1pl.incl context. For example, consider the syncretism between 1pl.excl and 2nd person in Warembori (Malayo-Polynesian, Papua New Guinea, wsa) object agreement short affixes in Table 32.

This paradigm can be accounted for by positing an exponent *-m(o)* specified as [+PARTICIPANT, −SG] and a more specific inclusive plural *-k(o)* specified as [+PARTICIPANT, +AUTHOR, +ADDRESEE, −SG].

Finally, we turn to patterns that are not predicted to be attested under any theories considered here: namely, those in which one of the 1st person non-singular forms (either exclusive or inclusive) shares structure with 3rd person. I was able to find only two examples of such cases. In Worrorra, mentioned earlier, exclusive plural nominal agreement prefix is identical to 3rd person plural prefix. The other example is more complex and it comes from Mun (Hmong-Mien, Vietnam, mji) which is described to have 3rd person inclusive and exclusive forms. The so-called inclusive 3rd person is used for reference that includes some other person as in "they and John went to the store", while the exclusive is used for simple non-conjunctive reference (Shintani, 1990). The Mun paradigm is shown in Table 33. Both 3rd inclusive and exclusive contain the 1excl pronoun *ʔbu:(13)*. The third person exclusive actually looks like a

Table 33 Mun free personal pronouns. Numbers mark tone. (Shintani, 1990)

	SG	PL
1exc.	zja:(13)	ʔba(33)n
1incl.	–	ʔbu:(13)
2nd	mi:(33)	njow(33)
3rd	na(33)n	ta(33)ʔbu:(13) – incl.
		na(33)nʔbu:(13) – excl.

Table 34 Orokolo free personal pronouns (Brown et al., 1986)

	SG	du	PL
1exc.	a-ra	e-la-lila	e-la
1incl.		e-la-lila	e-la-vi:la
2nd	a	e-ari-la/e-ari/e-ali	e
3rd	a-re	e-re-aei-la/e-re-ari/e-re-ali	e-re

compound between 3sg and 1incl.pl. Overall, we see that the relationship between 1st person plural and 3rd person plural is rare, as one would expect, particularly more rare than the ABA pattern.

5.7 Findings regarding the markedness of inclusive vs. exclusive

Recall that according to the containment theory inclusives can be morphologically derived from exclusives, while the reverse is unnatural. No such asymmetry is expected given a binary addressee feature. In this section, I examine cases in which either inclusive is a substring of exclusive or the reverse. First, there are cases in which inclusive and exclusive differ by just one additional morpheme that can be interpreted as a type of exclusivisor or inclusivisor. Secondly, there are cases in which the substring relationship holds, but inclusive additionally shares structure with 2nd person.

Focusing on the first type of cases, there were three examples in Pronom that could be construed as inclusives derived from exclusives. The first example appears in a South-East Asian language Temiar, discussed earlier (see Table 10). In this language in multiple paradigms inclusive duals systematically differ from exclusive duals by having a prefix *j-* which can be analyzed as an inclusivisor realizing the addressee feature. The second example is Orokolo (Trans-New Guinea, Papua New Guinea, oro) in Table 34, related to Toaripi (cf. Table 29). Like in Toaripi, clusivity distinction is neutralized in the dual paradigm, but in the plural, inclusive has one extra morpheme compared to exclusive. The final example comes from the Chapacuran language of South-America, Wari' (cf. Table 35). In this language the exclusive pronoun is /war/ and the inclusive pronoun is /wariʔ/, which incidentally serves as the name of the language (literally, "us"). Thus, it is possible that -*iʔ* or *i* is something like an inclusivisor.

Looking for the reverse cases, we find two examples of inclusives that are a substring of exclusives. The first case was shown in Tojolabal (Table 27), a Mayan language similar to Tzeltal analyzed in Sect. 2.3.1. In this language, the morpheme *on*

Table 35 Wari' free personal pronouns (1st and 2nd person) (Everett, 1996)

	MIN	AUG
1exc.	wa-taʔ	wa-r
1incl.	–	wa-r-iʔ
2nd	wum	wa-huʔ

Table 36 Tübatulabal verbal subject agreement clitics (Voegelin, 1935)

	SG	DU	PL
1exc.	**-gi**	-**gi**-la-ʔan	–
1incl.		-**gi**-la	-**gi**-lu:ts
2nd	-bi		-bumu
3rd	Ø/dʒa		-da

Table 37 Tübatulabal verbal subject agreement clitics with min-aug alignment

	MIN	AUG
1exc.	-gi	**-gi-la**-ʔan
1incl.	**-gi-la**	-gi-lu:ts
2nd	-bi	-bumu
3rd	Ø/dʒa	-da

can be synchronically viewed as an exclusivisor (a [−ADDRESEE] morheme). A similar pattern is discussed in Little (2018) with respect to Ch'ol. The second language in Pronom with this pattern is an extinct Uto-Aztecan language Tübatulabal (tub, Table 36) which was also counted as an example of AAA. This language is unusual in that it completely lacks a category of plural exclusive, while having a distinction between inclusive-exclusive in dual with a caveat that dual is only distinguished in first person reminiscent of minimal-augmented systems (but the grammar does not specify if the listed exclusive dual form is used in plural contexts as well). Note that in this language exclusive dual appears to be derived from the inclusive dual via the morpheme *ʔan* (with *-la* being the dual marker).

If this language is instead analyzed as a minimal-augmented language (see the recasted paradigm in Table 37), then it would present an example of an ABA-type pattern, namely it would correspond to the case (e) in the table of problematic paradigms in Table 17. So, whether this language is analyzed as having a sg-pl or min-aug number, it is problematic for the containment theory.

In addition to these cases, there are three more cases in which either inclusive or exclusive are a substring of the other, but one of them also shares a morpheme with 2pl. All of them have already been discussed. The first case is Inanwatan (see Table 31) discussed in the previous section. In this language inclusive (which is syncretic with 2nd person) is a substring of the exclusive. The opposite of this happens in two Australian languages, Maung and Nunggubuyu (see Tables 8 and 19). In both languages exclusive is a substring of inclusive, but the extra-morpheme that differentiates inclusive from exclusive also occurs in 2nd person and can be analyzed as a plural marker subcategorized for the [+addressee] context.

So, in total there are 5 cases in Pronom in which exclusives are a substring of inclusives and appear to be less marked and 3 cases of the reverse pattern. These numbers are rather small and lean in the direction of supporting exclusives as a less marked category, but this is hardly a clear asymmetry that one expects to see under the containment theory. Both patterns are attested and both are rather rare.

5.8 Summary of findings

To summarize, we have set out to explore the relative frequencies of ABA-type patterns and cases in which inclusive was a less marked category subsumed by exclusive. In the genetically and geographically balanced database, we found several languages with an ABA-type of patterning among the categories of 1st person. Additionally, there were a few cases when inclusive is a less marked category and a substring of exclusive. Neither of these two scenarios is particularly frequent, but their frequency is roughly comparable to the frequency of other patterns which are less controversial. For instance, ABA is only slightly less frequent than AAA and is more frequent than clear cases of accidental patterns when 1excl or 1incl share a morpheme with 3rd person. Derived inclusives are almost as (in)frequent as derived exclusives in this sample, and both are seen in diverse language families. These findings go against the predictions of the focal-referent theory and the containment theory. Instead, they support a theory according to which a binary feature governs the distinction between inclusive and exclusive.

6 Further discussion of the binary-addressee approach

The binary addressee approach outlined in Sect. 2.3 allows us to distinguish between inclusives and exclusives as subcategories of 1st person, allows to pick out either one of them as the "background" elsewhere case (leading to a possibility of ABA-patterns and derived exclusives), and allows to account for cases when inclusives (or even exclusives) share structure with 2nd person without predicting conflation between the two. Overall, this approach is most explanatory by covering the widest range of attested patterns. It is beyond the scope of this paper to choose or decide on a particular version of the binary feature approach to clusivity, but I will briefly compare the feature hierarchy discussed here to another alternative proposed by Harbour (2016).

6.1 Harbour's proposal 2016

Harbour (2016) proposes a feature theory of person that uses two binary features, *author* (for speaker) and *participant* (for 1st and 2nd person). These two features are independent in the sense that all combinations of their values are possible, but the order in which the features combine makes a difference because the features instantiate functions with more complex semantics than the more familiar conjunctive semantics of typical morphological features. I refer the reader to the original source for an overview of the specifics and formal details of the proposal. Table 38 summarizes featural representations for person categories in languages with the inclusive/exclusive distinction. Informally, one can think of exclusives as a category that

Table 38 Peson features for languages with clusivity in Harbour (2016)

1st excl.	[+AUTHOR, −PART]
1st incl.	[+AUTHOR, +PART]
2nd	[−AUTHOR, +PART]
3rd	[−AUTHOR, −PART]

Table 39 Limbu personal pronouns, first and second persons

	SG	DU	PL
1exc.	aŋ-ga	an-chi-ge	an-i-ge
1incl.	-	an-chi	an-i
2nd	khɛn-ɛʔ	khɛn-chi	khɛn-i

is derived by first removing all participants from all sets of logically possible persons and then adding the speakers to each of the resulting sets (this creates sets which necessarily contain a speaker and optionally others). The corresponding function is $(+author(-part(\pi)))$, where π is a set of all possible person denotations. In featural representation this function is represented as [+AUTHOR −PART]. On the other hand, inclusives are derived by first adding participants to each set in π and then redundantly adding the speakers to the same sets, resulting in the function $(+author(+part(\pi)))$, corresponding to [+AUTHOR, +PART]. Thus, the difference between inclusives and exclusives lies in the binary feature ±PART. Because we have a binary feature distinguishing inclusives and exclusives, this approach derives a very similar set of facts about inclusives as the binary addressee feature approach. In particular, it predicts the possibility of an ABA-type of pattern when a general [+AUTHOR] morpheme is overriden in the exclusive context by the more specific [+AUTHOR, +PART, +AUTOMIC] (Harbour uses [+AUTOMIC] for singular).

In addition to ABA patterns, this theory can also easily explain the existence of derived or more marked exclusives. As an illustration of this I will discuss Harbour's analysis of Limbu, yet another language in which exclusive is derived from inclusive. The Limbu paradigm is shown in Table 39.

On Harbour's account of this paradigm, *an* (and the allomorph *aŋ-* before velars) realizes the 1st person feature [+author], and *-ge* realizes the feature [−PART]. Thus, an exclusive form *an-i-ge* (1pl.excl) is derived by combining morphemes realizing the features [+AUTHOR], [−PART], and [−AUTOMIC]. One might expect *-ge* to also occur in 1sg.excl, and Harbour (following van Driem, 1987) speculates that the suffix *-ga* which appears in 1sg, may be an allomorph of *-ge*. A potential problem for this account is the fact that for Harbour 3rd person shares a feature with 1st inclusive, namely [−PART] (see Table 38). Therefore, one might also expect *-ge* to show up in 3rd person. To avoid this problem Harbour offers two possibilities: first, one can assume that *-ge* realizes the [−PART] feature only in the context of [+AUTHOR], and secondly, one can assume that 3rd person is not specified for [±PART] feature (e.g,. this feature is deleted via some operation like impovershment).

Let us compare this account of Limbu to the one that assumes the feature hierarchy in Sect. 2.3. I will leave out the number morphemes, the dual *-chi* and the plural *-i* (the suffix *-ɛʔ* in 2sg may be an animacy marker as it also occurs in 3sg. animate).

(9)   Lexical entries for Limbu person morphemes under the binary-addressee feature account

an/aŋ   [+PART, +AUTHOR]
-ge/-ga   [−ADDRESSEE]
khɛn   [+PART, −AUTHOR, +ADDRESSEE]

Note that this account is similar to Harbour's, but it is simpler because it does not require restricting *-ge* to 1st person given that no features are shared between 1st and 3rd persons to begin with. In the next subsection, I consider an alternative account of the same paradigm proposed in Moskal (2018) using unary features for speaker and addressee.

6.2 Limbu within the containment theory

Paradigms like Limbu discussed in the previous section (as well as other languages mentioned earlier in which inclusives are a substring of exclusives) present a challenge for the containment theory. Moskal (2018) tried to address this challenge by reanalizing Limbu to make the analysis consistent with the assumptions of the containment theory. Here I consider the plausibility of such an alternative and whether is scales up beyond Limbu.

Recall that the main problem with languages like Limbu for the containment theory is the fact that exclusive appears to have an extra-morpheme compared to inclusive, but featurally exclusive is less marked or simpler than inclusive. To get around this, Moskal proposes that the apparent exclusive morpheme is in fact the 1st person morpheme (*-ge* in Limbu), and the reason it does not show up in inclusive is because there's an invisible (null) inclusive morpheme which is by assumption of the containment theory more specific, and hence is inserted first. This account raises a question of what to do with the morpheme *an*, i.e., the morpheme that appears in all 1st person contexts. Moskal proposes that we should think of *an* as a pronominal stem restricted to 1st person instead. The full analysis (again ignoring the number morphemes) is shown below.

(10)   Lexical entries for Limbu person morphemes proposed in Moskal (2018)

an/aŋ   D /__[AUTHOR]
-ge/-ga   [AUTHOR]
-Ø   [AUTHOR, ADDRESSEE]
khɛn   [ADDRESSEE]

Compared to an account in (9), Moskal's account has an extra morpheme (which is invisible, so hard to verify), and a contextual restriction for a person-specific stem in a language where otherwise there are no reasons to posit pronominal stems. Moreover, this type of approach will not work for other similar languages like Tzeltal in Table 9. The reason for this is that in Tzeltal, there is already a pronominal stem to which person and number morphemes are attached. So, one cannot take the first person morpheme (*on* in Tzeltal) and make it into another stem restricted to 1st person.

Overall, Moskal's approach fails to convincingly reconcile the existence of languages like Limbu or Tzeltal with the containment theory.

6.3 Differences between the binary-addressee and Harbour's approaches

One of the main takeaway points of this paper is that inclusive is a subcategory of first person and we need a binary rather than a unary feature to distinguish between inclusives and exclusives. As we have seen there are several theories that allow us to do that. It would take a lot of additional evidence and considerations to argue for one of these theories over the other, which is beyond the scope of this paper. However, I will briefly point out a few points of disagreement between the feature-geometric approach introduced in Sect. 2.3 and Harbour's non-geometric and non-conjunctive approach.

The main differences between Harbour's proposal and the one presented in Sect. 2.3 go beyond the predictions about the patterning of inclusive person. In particular the two proposals differ in what subsets of persons form natural classes due to feature sharing. First, as has already been highlighted in the discussion of Limbu above, Harbour's proposal assumes that 1st exclusive and 3rd person share a feature in common. Relatedly, 1excl, 1incl, and 2nd person do not share a feature in common on Harbour's account. On both of these points the feature-geometric approach in Sect. 2.3 makes the opposite predictions. Thirdly, on Harbour's proposal 2nd and 3rd person share a feature in common and, moreover, can be completely collapsed into a single category (as explained below), while this is not predicted on the binary addressee account. I will briefly consider these differences in turn.

First, given the assumed features on Harbour's view one can imagine a pronominal paradigm that involves composite persons of the following sort: 1st person inclusive and exclusive share a morpheme x in common which realizes the feature [+AUTHOR], second and third person have a morpheme y in common which realizes the feature [−AUTHOR], 1st exclusive and 3rd person share a morpheme w in common which realizes [−PART], and finally 1st person inclusive and 2nd person share a morpheme z in common which realizes the feature [+PART]. Overall, the paradigm will look as follows:

(11) A hypothetical paradigm predicted to be possible on Harbour's account
      1st excl.   xw
      1st incl.   xz
      2nd   yz
      3rd   yw

Paradigms that instantiate a subset of the relations in the hypothetical case above are attested. For instance, we have seen examples of languages whose paradigms simultaneously show the 1excl-1incl and 1incl-2nd person relatedness (cf. Maung in Table 8). Note that such cases are predicted by both theories. However, in the sample of languages considered here there were no cases in which 2nd person simultaneously patterned with 3rd person (as [−AUTHOR]) and 1st inclusive (as [−PART]), and only one case in which 1st exclusive shared structure with 3rd person. Harbour (ibid.), however, does not consider what he calls "incomplete attestation" as a problem for his theory because "other forces (both I-linguistic and E-linguistic, in the sense of Chomsky 1986) may make some of these [patterns] rare to vanishing" (p. 122).

The second difference is that the 1excl, 1incl, and 2nd person do not form a natural class on Harbour's account while they do on the feature-geometric account by virtue of sharing the feature [+participant]. That is, 1st person (exclusive and inclusive) and 2nd person all refer to groups that contain participants in discourse. The common morphological patterning of 1st and 2nd person, regardless of whether a language makes a further distinction between inclusives and exclusives, is pervasive and amply documented. Harbour discusses this problem under the heading of *nonfeaturally natural classes*, and suggests that cases in which 1st excl, 1 incl, and 2nd person pattern together can be captured instead via complete feature underspecification with 3rd person being the more specific morpheme.

Finally, on Harbour's theory 2nd and 3rd person form a natural class by virtue of sharing the feature [−AUTHOR], that is, both involve subtraction of speakers from their corresponding denotation sets. Moreover, these two persons can be conflated in languages in which [±AUTHOR] is the only active feature, leading to the opposition between speakers on the one hand vs. hearers and 3rd persons on the other. Such languages instantiate the "author bipartition" in Harbour's terminology, but the evidence for this pattern comes almost exclusively from the domain of spatial deictics (e.g., "here, near the speaker" vs. "there, away from the speaker"), a domain which according to Harbour is governed by the same set of features as personal pronouns. However, within the pronominal systems existence of author bipartitions is questionable. Habour cites two potential examples: Damin, which was a ceremonial ritual language of the aboriginal Lardil and Yangkaal people of Nothern Australia. Crucially, as Harbour notes mastery of this language "was facilitated by its spartan vocabulary," which could explain the unusual restriction to two pronouns. The second potential case is Morwap (also known as Elseng), a poorly documented Papuan language with the two sources cited by Harbour, Laycock (1977) and Burung (2000), expressing some uncertainty or disagreement about the pronominal system. The related Border languages all have a distinction between 2nd and 3rd person. While complete conflation between 2nd and 3rd person within non-deictic pronouns remains doubtful, syncretism between these two persons is quite common (Baerman et al., 2005). Such cases of syncretism can be easily captured using the same strategy that Harbour proposes for *nonfeaturally natural classes*, namely using complete underspecification of all person features, with full specification for the 1st person exponents.

On a more meta-theoretical note, Harbour rejects any feature-geometric approach on the grounds that feature-dependencies and the order of these dependencies amount to stipulation rather than an explanation. However, this is not necessarily the case. Some dependencies are purely logical following from the semantics of the features themselves (i.e., the dependency of AUTHOR on PARTICIPANT), and other dependencies or order relations may be explained based on other cognitive grounds, e.g., the same I-linguistic and E-linguistic forces that he allows to explain certain unattested patterns. For instance, the fact that AUTHOR rather than ADDRESSEE is the primary dependent of PARTICIPANT can be explained through the general privileged status of speakers over listeners proposed in many other accounts of person and often connected to the egocentricity bias (Filimonova, 2002).

7 Conclusion

To conclude, a typological investigation of a wide range of pronominal patterns has revealed that certain possibilities that were claimed to be extremely rare or unattested before, in fact exist with non-negligible frequencies. These patterns include the so-called ABA pattern in clusivity, in which 1sg is related to 1st inclusive (but not 1st exclusive), and cases in which inclusive is a substring of the exclusive. First, both of these facts support the more traditional view that inclusive is a type of 1st persons and, therefore, go against the focal referent theory, or at least against the claim that inclusive is morphologically unrelated to 1st person. Second, these facts support the view that the feature responsible for the clusivity contrast must be binary, not unary. There are several possibilities for what that binary feature is and one concrete proposal appears in Sect. 2.3. In addition to capturing facts about clusivity, this proposal makes a number of other correct predictions: it allows for a relationship between inclusive and 2nd person without predicting conflation between the two. It can account for a variety of other syncretism patterns via complete feature underspecification, but it rules out conflation between 2nd and 3rd person for which there's no strong evidence in the domain of pronouns, and conflation between 3rd person and one (or both) of 1st persons.

Declarations

Competing Interests The authors have no competing interests to declare that are relevant to the content of this article.

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