Chapter 3

From macroparameters to microparameters: A Bantu case study

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Crosslinguistic variation in the Bantu languages provides evidence for a more fine-grained model of parameter setting, ranging from macro- via meso- and micro- to nano-parametric variation, as proposed by Biberauer & Roberts (2015a). The various sizes of parametric variation in Bantu are discussed for word order, verb movement, ditransitive symmetry, locatives, and φ indexing in the clause. Taking a Minimalist featural perspective, the resulting emergent parameter settings and hierarchies are motivated by third-factor principles. The paper furthermore shows how macrovariation does not equal macroparametric variation.

1 Parametric variation

In a Minimalist approach to syntactic variation, the variation is often assumed to be located in the lexicon, since the items in the lexicon need to be learned anyway, be they of a lexical or functional nature. This basis of parametric variation is captured in the Borer–Chomsky conjecture (Baker 2008: 3, cf. Borer 1984; Chomsky 1995), building on the lexical parameterization hypothesis (Manzini & Wexler 1987) and the functional parameterization hypothesis (Fukui 1995):

(1) All parameters of variation are attributable to differences in the features of particular items (e.g. the functional heads) in the lexicon.

This entails that parameter settings involve, first, the selection of which formal features are present in the grammar of a language, and second, where in the language these features manifest themselves. This creates natural dependency

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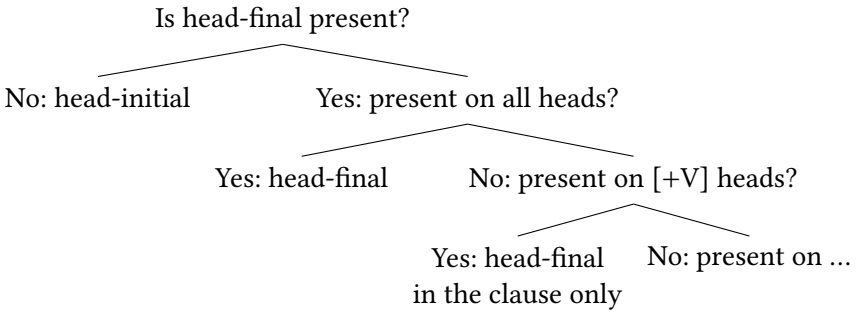
relations, which can be captured in parameter hierarchies – the backbone of the ReCoS project as proposed by Ian Roberts (see Roberts & Holmberg 2010; Roberts 2012 and much work in collaboration with other members of the project). An example is the hierarchy for word order (Roberts 2012), assuming that the default is for languages to be head-initial (Kayne 1994) and that head-finality is triggered by a feature moving the complement to the specifier of the head containing the feature (see further in §2.1):

(2) Word order parameter hierarchy (Roberts 2012):



There are two main conceptual motivations for exploring this hierarchical model of parameterisation. First, organising parameters in a dependency relation – rather than postulating independent parameters – drastically reduces the number of possible combinations of parameter settings, i.e. the number of possible grammars, as shown by Roberts & Holmberg (2010), Sheehan (2014), and Biberauer et al. (2014).

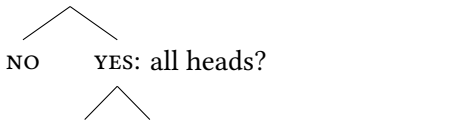
Second, the parameter hierarchy can serve to model a path of acquisition that is shaped by general learning biases (a component of the "third factor" in language design, Chomsky 2005). Biberauer & Roberts (2015a; 2017) suggest that two general learning biases combine to form a "minimax search algorithm":

(3) Biberauer & Roberts (2015a: 300)
   a. feature economy (FE)
      Postulate as few features as possible to account for the input.
   b. input generalisation (IG)
      If a functional head sets a parameter to value v_i then there is a preference for all functional heads to set this parameter to value v_i (a.k.a. "maximise available features")

By FE, the first parameter is always whether a feature is present/grammaticalised in a language at all (cf. Gianollo et al. 2008). If there is no evidence for the

presence of the feature, this first question will not even be asked. If there is evidence, a formal feature is posited, and by IG the feature is taken to be present on all heads. Only if there is counterevidence in the primary linguistic data (PLD) for this omnipresence will an acquirer postulate new categories and ask more specific questions about the distribution of the feature, i.e. on which subset of heads the feature is present. We thus derive a "none-all-some" order of implicational parameters and of parameter acquisition, as represented in (4). Parameters in this system are thus an emergent property of the grammar; see Biberauer & Roberts (2015a; 2016), Biberauer (2017a,b; 2018) , and Roberts (2019) for a full explanation of this emergent parameter setting.

(4) F present?



This NONE > ALL > SOME acquisition creates a hierarchy that we can think of as ever more specified (i.e. featurally rich) parameters. In "size" terms, Biberauer & Roberts (2015a; 2016) propose the following taxonomy of parameters:

(5) Types of parameters
For a given value v_i of a parametrically variant feature F:
   a. Macroparameters: all heads of the relevant type, e.g. all probes, all phase heads, share v_i;
   b. Mesoparameters: all heads of a given natural class, e.g. [+V] or a core functional category, share v_i;
   c. Microparameters: a small, lexically definable subclass of functional heads (e.g. modal auxiliaries, subject clitics) share v_i;
   d. Nanoparameters: one or more individual lexical items is/are specified for v_i.

These parameter settings are said to have consequences for typology, acquisition, and diachrony. True macroparameters sit at the top of the hierarchy, determined by the complete absence or omnipresence of a feature. Typologically, the subsequent parameter settings have longer and more complex featural descriptions (since the descriptions are essentially aggregates of prior parameter settings), indicative of increasingly more marked grammatical systems. In terms

of acquisition, the higher parameters need to be set before lower parameters can be, which means that the further down the hierarchy a parameter is, the further it is expected to be along a learning path.

A conceptual motivation for the various sizes of parametric variation has thus been presented in the work by Biberauer and Roberts, but there remains a need for empirical evidence for these size differences. Biberauer & Roberts (2012; 2016) and Ledgeway (2013) form a good start, and the first goal of the current paper is to show that the different sizes of parametric variation are empirically verifiable in the Bantu languages, allowing a clearer insight into the nature of cross-Bantu variation, and a finer-grained discussion of how languages differ parametrically.

A second goal of the current paper is to show how parameter setting sizes need to be distinguished from geographical and genealogical "sizes" of variation. This is an important distinction that is not always made explicit: there is a difference between *sizes of variation* and *sizes of parameter settings*. The terms "macrovariation" and "microvariation" are standardly used when referring to comparative differences in a respectively larger or smaller geographical area, or at a respectively higher or lower level of genealogical relations. For example, one might talk about macrovariation between Algonquian vs. Sinitic languages (e.g. for polysynthetic vs. analytic morphology), or microvariation among northern Italian dialects. Given the relative robustness and stability of higher parameters with respect to lower parameters, we expect the variation in parameter size to go together with this geographical and genealogical variation. Logically speaking, however, the two are distinct. For example, if the presence of the feature uCase is one of the parameters, then it can be set as a macroparameter: either DPs need to be licensed or they do not.[1] Diercks (2012) shows that some Bantu languages do not show evidence for the presence of uCase, essentially setting the first parameter in this potential hierarchy to "no": uCase features are not present. In contrast, I show that at least the Bantu languages Makhuwa and Matengo do show evidence for the presence of abstract Case (van der Wal 2015), which again appears to be set as a macroparameter for the whole language. This means that we find both macroparametric settings ("no" and "all") in different Bantu languages. Although this is a variation in macroparametric settings, it would not typically be described as macrovariation, since it concerns variation within a subfamily.

[1]Halpert (2012; 2016) and Carstens & Mletshe (2015) suggest that even if uCase is absent on T (no evidence for nominative/subject case), there might still be a requirement for nominals in the lower domain to be licensed. Halpert claims that bare nominals can be Case licensed either inherently if they have an augment (K) or by a clause head while in the vP domain; Carstens & Mletshe propose semantic Case licensing by a low Focus head along with a value for [Focus]. This suggests a micro setting for the Case parameter in these languages.

With this background and these aims, the rest of the paper illustrates the various sizes of parametric variation across Bantu. §2 exemplifies each parameter size (from macro to nano) from different domains: word order, verb movement, symmetry in double objects, and locatives. §3 focuses on one domain, φ feature indexing, and attempts to establish a parameter hierarchy, capturing the variation as found in the Bantu languages, and exploring the nature of parameter hierarchies in the process.

2 One size does not fit all: Bantu illustrations of parameter sizes

2.1 Macro setting: Word order parameter

Under the assumption that head-initiality is the basic parameter setting (Kayne 1994), head-finality can be seen as the presence of a movement feature triggering "roll-up" movement. This feature can then be present on no heads, all heads, or a subset of heads, as already referred to above. The Bantu languages are almost all straightforwardly head-initial in all domains: initial complementisers, aux-V order, V-O order, prepositions, and N-possessor order, as illustrated in (5).

(6) Swahili (G42, Lydia Gilbert, p.c.)[2]
A-li-ni-ambia kwamba a-ta-enda ku-nunua mkate bila
1SM-PST-1SG.OM-tell COMP 1SM-FUT-go INF-buy 3.bread without
mfuko w-a wazazi.
3.bag 3-CONN 2.parents
'S/he told me that s/he would go to buy bread without her parents' bag.'

In a parameter hierarchy for word order as in (2) above, the Bantu languages overall are in the initial state: no head-final features. In acquisition this means that the parameter is left as unspecified, since there is no evidence whatsoever in the PLD that would trigger an acquirer to even consider the presence and spread of the feature.

In this case, a macro-setting for the word order parameter happens to also be associated with macro-variation, in the sense that there is not much variation *within* the Bantu language family but only on a macro-level of comparing language families.

[2]Bantu languages are classified with a letter (region) and number (language), according to Maho's (2009) update of the original classification by Guthrie (1948).

However, there are tiny patches of head-finality to be found here and there. Two examples are O-V order in Tunen, and final question particles in languages like Rangi[3] and Zulu. While these languages are otherwise head-initial, they show head-finality in some restricted areas of the grammar.

Tunen is one of very few Bantu languages in which the direct object typically precedes the verb (7a). Only when the object is (contrastively) focused will it follow the verb, and in addition be marked with a contrastive particle *á* (7b).

(7) Tunen (A44, Mous 1997: 126)

a. Àná mònɛ índì.
3SG.PST money give
'S/he gave money.'

b. Àná índì á mònɛ.
3SG.PST give PTCL money
'S/he gave MONEY.'

Final particles form another example: while complementisers typically precede the clause they embed, question particles in Zulu and Rangi are clearly clause-final, evidencing a high interrogative-related projection (cf. Buell 2005; 2011).

(8) Zulu (S42, Buell 2005: 69)

a. U-Sipho u-ya-yi-thanda lo-mculo.
AUG-1.Sipho 1SM-DJ-9OM-love 3.DEM-3.song
'Sipho likes this song.'

b. U-Sipho u-ya-yi-thanda lo-mculo na?
AUG-1.Sipho 1SM-DJ-9OM-love 3.DEM-3.song Q
'Does Sipho like this song?'

[3]Rangi (like some surrounding languages) is famous for its main clause V-aux order in two future tenses (Gibson 2016), which is an instance of head-finality too. However, the fact that the object still follows the auxiliary argues against roll-up movement, and thus against an analysis as involving the same feature. Furthermore, the strict adjacency required between the infinitival verb and the auxiliary, as well as the fact that clauses with a filled C-domain (relative, cleft, wh, focus) require aux-V order, argues in favour of V-aux as a derived by phrasal movement of only the infinitive to the specifier of the aux, rather than a full comp-to-spec movement.

(9) Rangi (F33, Gibson 2012: 51)

a. Ma-saare y-áányu mwi-ter-iwre ~~uu~~?
6-words 6-your 2PL.SM.PST-listen-PFV.PASS Q
'Were your words listened to?'

b. N~~i~~ w-ar~~i~~ w-óó-sáák-a úry-a w~~uu~~?
COP 14-stiff.porridge 2SG.SM-PROG-want-FV eat-FV Q
'Is it stiff porridge that you want to eat?'

While the typical Bantu acquirer generally does not pay any attention to the word order parameter and happily leaves the "no" setting intact, the illustrated phenomena provide potential input to the Rangi or Tunen acquirer that the "no" setting is not quite right. It is also clear that not all heads are head-final (skip macro), and that the verbal domain is not head-final in its entirety either (skip meso), which means that the head-final feature is at most only present on a subclass of heads, i.e. a micro-setting. Specifically for Tunen, it seems to only be present on V,[4] and in Rangi and Zulu only on a head in the high discourse domain of the clause.

2.2 Meso setting: Clausal head movement

Another point where Bantu languages do not seem to vary internally is the template of verbal morphology and the structural position of the verb stem. Bantu verbs consist of a root with inflectional prefixes and (mostly optional) derivational suffixes, ordered as in the simplified template in Figure 3.1.[5]

NEG	subject	NEG	TAM	object	**root**	APPL, PASS, CAUS, etc.	final suffix	post-final

Figure 3.1: Slots in the Bantu verb

[4] This is likely a subset of V that c-selects for a DP object, as for example CP complements still follow the verb.

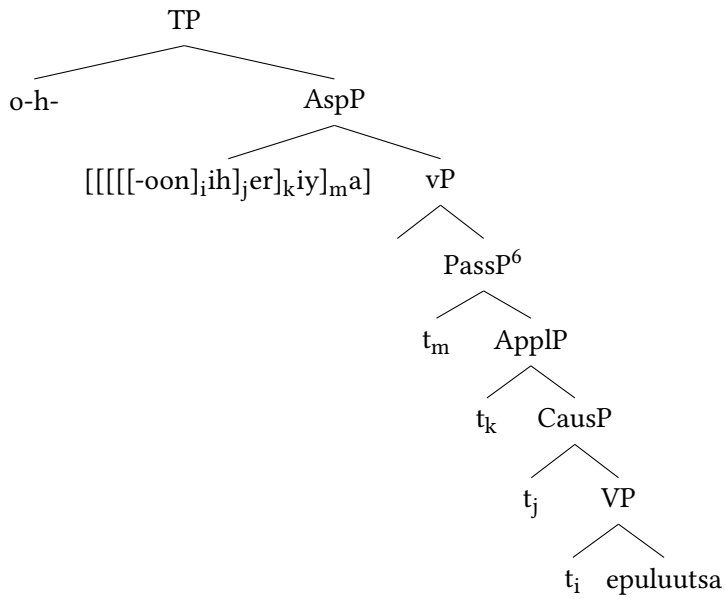
[5] Some Bantu languages also use tense, aspect, mood (TAM) inflections suffixes. An anonymous reviewer points out that TAM marking in Chimwiini is prefixal in general, with the exception of the past tense, which is a suffix. Whether this exception is due to a syntactic nano-parameter or a different morphological specification remains a question for further research.

This verbal morphology provides clear clues as to its underlying syntax. The most attractive structural analysis of this verbal structure is, following Myers (1990), Julien (2002), Kinyalolo (2003), Carstens (2005) and Buell (2005), and drawing on the explanation in van der Wal (2009), that the verb starts out as a root and incorporates the derivational and inflectional *suf*fixes by head movement in the lower part of the clause. It then terminates in a position lower than T. The inflectional *pre*fixes on the verb represent functional heads spelled out in their base positions. The (derived) verb stem and prefixes form one word by phonological merger. See Julien (2002) for the more elaborate argumentation.

To illustrate and argue for this derivation, consider first the Makhuwa example in (10) and the proposed derivation in (11). The verb stem *-oon-* 'to see', head-moves to CausP and incorporates the causative morpheme to its left: *-oon-ih-*. This combined head moves on to ApplP, incorporating a further suffix to its left: *-oon-ih-er-*. The next step adds the passive morpheme to form *-oon-ih-er-iy-* and this complex moves once more to add the final suffix, which has been posited in an aspectual projection just above vP. Crucially, these are all suffixes, and they surface in reversed order of structural hierarchy (Baker's 1988 mirror principle).

(10) Makhuwa (P31, van der Wal 2009: 168–169)
nlópwáná o-h-oón-íh-er-íy-á epuluútsá
1.man 1SM-PFV.DJ-see-CAUS-APPL-PASS-FV 9.blouse
'the man was shown the blouse'

(11)



One might expect the verb to move even higher (v-to-T-to-C), but there is no reason to assume that a moved head will first incorporate morphemes to its right (the derivational extensions and final inflectional suffix) and then to its left (the agreement and TAM markers). Therefore, the fact that inflectional morphemes surface as prefixes strongly suggests that these are not incorporated into the verb in the same way as the derivational suffixes, and thus that the verb has not head-moved further in the inflectional domain. The prefixes do form one phonological unit with the verb stem, but are posited as individual heads that attach to the rest of the verb by phonological merger only.

Another argument for this analysis is found in the order of the prefixes. If the inflectional prefixes were also the result of head movement, like the suffixes, they are expected to surface in the opposite order. This is indeed what we find in French, where there is independent evidence that the verb moves to T: the inflectional morphemes appear in the reverse order of the Makhuwa inflectional prefixes (12), and they appear as suffixes on the verb in (13).

(12) Makhuwa (P31, van der Wal 2009: 169)
kha-mw-aa-tsúwéla
NEG-2PL.SM-IPFV-know
'you didn't know'

(13) French
nous aim-er-i-ons
1PL.PRON love-IRR-PST-1SG
'we would love'

The verbal morphology thus provides evidence for head movement of the verb in the lower part of the clause to a position just outside of vP, with the prefixes spelled out in their individual positions in the inflectional domain above vP/AspP. Assuming with Roberts (2010) that head movement is triggered by features on heads (and a subset relation of the features of the goal with respect to its probe), then in featural terms, Bantu verbal movement can be accounted for by the distribution of this feature in the lower part of the clause only. More precisely: only the heads in the lower phase trigger head movement, but not the higher phase: a mesoparametric setting (see also Ledgeway 2013 and Schifano 2015 for a parametric account of variation in height of verb movement in Romance).

Coming back to the distinction between macrovariation and macroparametric variation, notice that the vast majority of the language family displays this

[6]The passive morpheme can also reside in a higher VoiceP; for the current point it does not make a difference.

"halfway" head movement. This is an invariant "macro" fact about Bantu *crosslinguistic* (non-)variation that nevertheless clearly is at a meso-level of *parametric* variation, illustrating again that these notions should be kept apart.

2.3 Micro setting: (A)symmetrical double objects

Ditransitives in Bantu languages show crosslinguistic variation as well as language-internal variation in the behaviour of the two internal arguments. Bresnan & Moshi (1990) divided Bantu languages into two classes – symmetrical and asymmetrical – based on the behaviour of objects in ditransitives: languages are taken to be symmetrical if both objects of a ditransitive verb behave alike with respect to object marking and passivisation (see Ngonyani 1996; Buell 2005 for further tests). In Zulu, for example, either object can be object-marked on the verb (14), making this a "symmetrical" language.[7]

(14) Zulu (S42, Adams 2010: 11)

a. U-mama u-nik-e aba-ntwana in-cwadi.
1a-mama 1SM-give-PFV 2-children 9-book
'Mama gave the children a book.'

b. U-mama u-**ba**-nik-e in-cwadi (aba-ntwana).
1a-mama 1SM-**2OM**-give-PFV 9-book 2-children
'Mama gave them a book (the children).'

c. U-mama u-**yi**-nik-e aba-ntwana (in-cwadi).
1a-mama 1SM-**9OM**-give-PFV 2-children 9-book
'Mama gave the children it (a book).'

Conversely, in asymmetrical languages only the highest object (benefactive, recipient) can be object-marked; object-marking the lower object (theme) is ungrammatical.

(15) Swahili (G42)

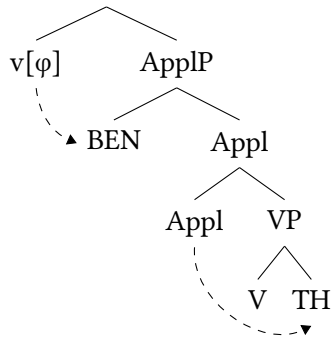
a. A-li-**m**-pa kitabu.
'She gave him a book.'

[7] One should, however, be careful in characterising a whole language as one type, since it has become more and more evident that languages are usually only partly symmetrical (Schadeberg 1995; Rugemalira 1991; Thwala 2006; Ngonyani 1996; Ngonyani & Githinji 2006; Riedel 2009; Baker 1988; Alsina & Mchombo 1993; Simango 1995; Zeller & Ngoboka 2006; Jerro 2015; van der Wal 2017, etc.).

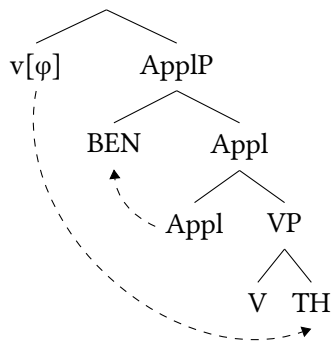
b. * A-li-**ki**-pa Juma.
'She gave it to Juma.'

Following Haddican & Holmberg (2012; 2015), I propose in van der Wal (2017) that symmetry in Bantu languages derives from the ability of lower functional heads like the Applicative to (Case) license an argument either in its complement or in its specifier, as in (16) and (17).

(16) v agrees with BEN (and can spell out as Benefactive object marker)



(17) v agrees with TH (and can spell out as Theme object marker)



In asymmetrical languages, Appl always licenses the theme and (16) is the only possible derivation, whereas in symmetrical languages Appl is flexible in licensing either argument (and either derivation in (16) and (17) is possible). The features involved in flexible licensing are discussed in van der Wal (2017), but for the current discussion it suffices to take this licensing flexibility to account for the difference between asymmetrical and symmetrical languages.

However, within these "symmetrical" languages, there is variation in which low functional heads are flexible. That is, lexical ditransitives, applicative verbs and causative verbs differ in symmetry, across and within languages. For example, in Otjiherero the lexical ditransitive (not shown) and applied verb (18) behave symmetrically for object marking, but causatives are asymmetrical, only allowing object marking of the causee and not the theme (19).

(18) Otjiherero (R30, Marten & Kula 2012: 247)
Applicative

a. Má-vé **vè** tjáng-ér-é òm-bàpírà.
PRS-2SM 2OM write-APPL-FV 9-letter
'They are writing them a letter.'

b. Má-vá **ì** tjáng-ér-é òvà-nâtjé.
PRS-2SM 9OM write-APPL-FV 2-children
'They are writing the children it.'

(19) Otjiherero (R30, Jekura Kavari, personal communication)
Causative

a. Ma-ve **ve** tjang-is-a om-bapira.
PRS-2SM 2OM write-CAUS-FV 9-letter
'They make them write a letter.'

b. * Ma-ve **i** tjang-is-a ova-natje.
PRS-2SM 9OM write-CAUS-FV 2-children
'They make the children write it.'

This means that flexibility is present only in a subset of functional heads in the lower phase, i.e. a microparameter, and within that subset we can distinguish even further microparameterisation, for example only applicative but not causative in Otjiherero. Moreover, there appears to be an implicational relation as to which types of ditransitives show symmetrical object behaviour (van der Wal 2017), shown in Table 3.1.

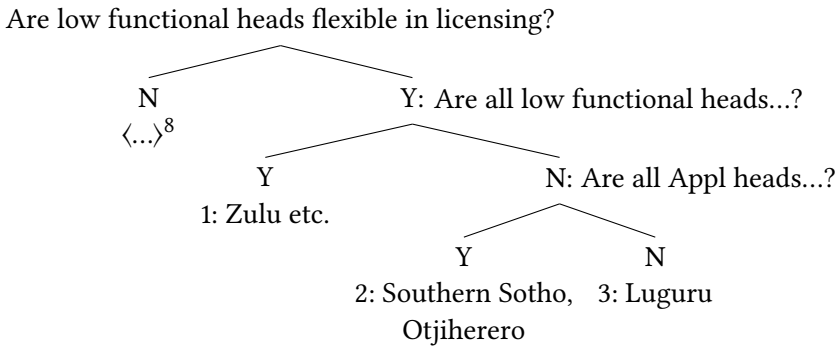
How can this relation be accounted for? Following Pylkkänen (2008), I take the lexical ditransitive to involve a low applicative head (LApplP) under V. Applicative verbs contain a high applicative head (HApplP) between V and v, and Causative verbs have a causative head (CausP) above HApplP, either between V and v or above a second little v (see further Pylkkänen 2008 on different heights of causatives). The pattern in Table 3.1 can then be understood as an implicational relation between low argument-introducing heads, such that if a relatively higher head is flexible (= shows symmetrical object behaviour), lower heads do so too.

Table 3.1: Implicational relation in ditransitive symmetry

CAUS	APPL	DITRANS	Languages
✓	✓	✓	Zulu, Shona, Lubukusu, Kîîtharaka, Kimeru
✗	✓	✓	Otjiherero, Southern Sotho
✗	✗	✓	Luguru
✗	✗	✗	Swahili etc. (asymmetrical)

For our parameters, this means that within the microparametric subset of heads (namely, Case licensing functional heads in the lower phase of the clause), the none-all-some pattern introduced above re-appears:

(20) Parameter hierarchy for (a)symmetry in ditransitive alignment (adapted from van der Wal 2017)



This falls out naturally if we acknowledge that the creation of a subset type results from specifying an additional formal feature. Following the same logic, the basic questions inspired by FE and IG apply to these features too: the feature is only postulated if there is evidence (is it present → yes: create subset), it is then assumed to be present in the whole subset (*all* heads within the subset), and only if there is further evidence that it is not present for all heads in the subset is a further subset created (defined by another feature). The scope of the parameter settings is thus growing smaller and smaller the further down the hierarchy a parameter is, but the mechanism stays the same. The microparameter for object symmetry illustrated here applies only to the object domain and can therefore be considered relatively small – indeed, it is microparametric variation — which in this case also equals a geographical and genealogical size of microvariation.

[8]This is a theoretical possibility, representing flexible licensing that is sensitive to other factors.

2.4 Nano setting: Locatives

Coming to the smallest size of parametric variation, it is important to note that nanoparameters should be distinguished from what Biberauer & Roberts (2015b: 9) call "parametric fossils". Syntactic parameters, however limited their scope might be, still have effects in the syntax rather than just affecting the morphology (as is the case for example in irregular past tenses that have no syntactic effect). Such a nano-parametric syntactic parameter setting can be found in Tswana locatives.

The Bantu noun classes include a number of locative classes, most commonly the classes traditionally numbered 16–17–18 and sometimes 23 (Meeussen 1967). In Chichewa, for example, the class 18 prefix *mu-* derives a locative DP (with meaning "inside") from a noun in a non-locative class, as shown in (21).[9] The DP status can be seen in the locative's ability to control subject agreement and object agreement on the verb. However, not all languages retain locatives as a part of the noun class system, as there is variation in the categorial status of locatives. In some southern Bantu languages locative DPs have undergone the "great locative shift" (Marten 2010), reanalysing the locative prefix as a preposition. Locatives are thus PPs in these languages, as illustrated for Zulu in (22).

(21) Chichewa (N31, Bresnan 1991: 58; Ron Simango, p.c.)

a. Ndí-ma-**ku**-kóndá ku San José.
1SG.SM-PRS.HAB-17OM-love 17 San Jose
'I like (it) (in) San José.'

b. Mu-nyumba **mu**-na-yera.
18-9.house 18SM-PST-white
'Inside the house is clean.'
[$_{DP}$ [$_{nP}$ mu [$_{NP}$ nyumba]]

(22) Zulu (S42, Buell 2007)
Ku-lezi zindlu ku-hlala abantu abakhubazekile.
17-10.these 10.houses EXPL-stay 2.people 2.handicapped
'In these houses live handicapped people.'
[$_{PP}$ ku [$_{DP}$ lezi [$_{NP}$ zindlu]

[9] Carstens (1997) analyses locative DPs as null locative nouns taking a KP complement, of which K agrees with the locative and spells out as the locative prefix. The reanalysis to a PP then concerns the loss of null locative nouns, leaving the KP/PP. Regardless of the precise analysis of locatives (locatives as a nominal derivation by means of nP being another possibility – see Fuchs & van der Wal 2019), the process of change from DP to PP and the relics in this area illustrate a nanoparametric setting.

Riedel & Marten (2012) show that there is a continuum for Bantu locatives, ranging from a fully operative three-way (or more) distinction between the different locative noun classes, on nouns as well as agreement markers, to a completely reanalysed PP-based locative system and a reduced verbal agreement paradigm (Demuth & Mmusi 1997; Creissels 2011). Towards the latter end of this spectrum is Setswana, where locative noun classes have been lost, leaving behind some "relics". Only some prepositions show class 16 or 18 morphology (23a), and only two nouns are inherently in locative classes (23b,c).

(23) Tswana (S31, Creissels 2011)
  a. class 18 *mo-rago ga* 'behind'
  b. class 17 *go-lo* 'place'
  c. class 16 *fe-lo* 'place'

Crucially, *golo* and *felo* are not just lexicalised locatives that are otherwise adjusted to fit a system without any formally locative arguments, but they still trigger true class 17 locative agreement on the verb, according to Creissels (2011). This is important because it means that there still is a syntactic parameter to be set, rather than the variation being "fossilised" and purely lexical.

The fact that this syntactic property is restricted to only two lexical items makes it of a nano-parametric size. This is a fragile but interesting stage of a parameter – unless the lexical items are highly frequent, there is little chance that acquirers of the language will have enough input to be able to pick it up. This means that either the property will spread through the language and remain part of the system, or that it disappears, essentially catapulting the language right to the top of the relevant hierarchy, back to the "none" setting (cf. Biberauer & Roberts 2016). The Tswana locatives seem to be on their way out, as Creissels (2011: 36) notes that "Tswana speakers tend to regularize the situation by using *lefelo* (class 5, plural *mafelo*) instead of *felo* [class 16, JW]". This effectively reanalyses the noun class of the last remaining inherently locative nouns, leading to the loss of the productive noun class.

In summary, I have presented evidence for more fine-grained parametric distinctions ranging from macro- to nano-parameters from various domains of Bantu syntax. One of the challenges in the ReCoS research programme is to see how the different sizes of variation all link up in one hierarchy, which is the topic of the next section on φ feature indexation.

3 Variation in the distribution of φ features

Bantu languages tend to be head-marking in the clause, often displaying subject and object marking, as well as complementiser agreement, but again there is cross-Bantu variation. A closer look at this parametric variation in φ feature indexation turns out to be interesting, both from an empirical and a conceptual point of view. An attempt at establishing one parameter hierarchy for uφ features is shown to be problematic, but problematic in an insightful way.

3.1 Where we see uφ features

In the current framework, φ feature indexation is taken to be a reflection of an Agree relation between a Probe and a Goal (Chomsky 2000; 2001). In Probe–Goal agreement, a head with an uninterpretable feature (uF), called the Probe, searches its c-command domain for valuation by the closest constituent with a matching interpretable feature (iF), the Goal. I assume that subject marking on the verb indicates the presence of a full uφ feature specification on T, and that object marking is due to uφ on little v. I take a hybrid approach to object marking as Agree with a defective goal (Roberts 2010; Iorio 2014; van der Wal 2015), which entails that all object marking, be it pronominal (non-doubling) or grammatical (doubling), involves a φ probe. The presence of uφ features on a higher head like C results in agreeing complementisers or separate relative markers on the verb (Carstens 2003; Henderson 2011, among others). Finally, I propose that the presence of uφ features on lower functional heads such as Appl and Caus results in multiple object markers, illustrated in the example in (24) and structure in (25).[10] The sets of φ features on the heads in the lower part of the clause are "gathered" by head movement of the verb through the lower part of the derivation (see §2.2 above). As φ features differ from the derivational heads themselves, they are spelled out as prefixes on the verb (unlike the applicative, causative, passive, etc., which appear as suffixes).

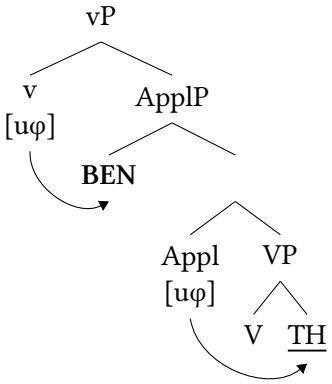
(24) Luganda (JE15, Sseikiryango 2006: 67, 72)

a. Maama a-wa-dde **taata** ssente.
1.mother 1SM-give-PFV 1.father 10.money
'Mother has given father money.'

[10] I leave to one side how the Kinande "linkers" (Baker & Collins 2006; Schneider-Zioga 2015) fit into this model – it might be that there is a separate LinkerP head that has uφ features (as Baker & Collins 2006 propose).

b. Maama a-zi-**mu**-wa-dde.
1.mother 1SM-10OM-1OM-give-PFV
'Mother has given him it.'

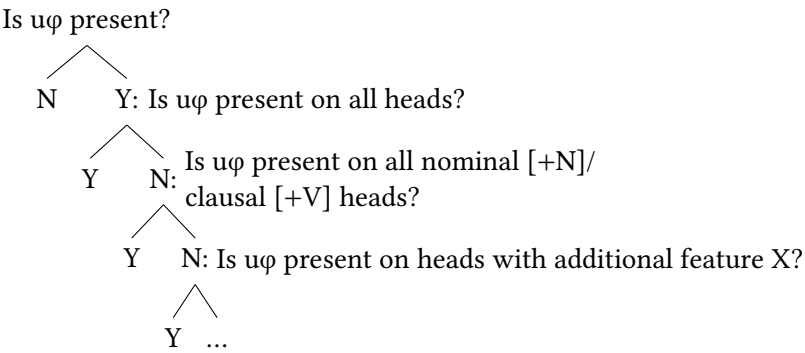
(25)



3.2 First attempt at a hierarchy

In setting the uφ parameters of a language, what needs to be established is whether the language makes use of uφ probes at all, and if so, on which heads these features are present. One can thus imagine a parameter hierarchy as in (26), following the now-familiar none–all–some sequence.

(26) Possible uφ feature hierarchy 1 (cf. Roberts & Holmberg 2010; Roberts 2012; 2014)



The first parameter asks whether uninterpretable φ features are present at all in the language. If the answer is "no", this could describe radical pro-drop languages (Saito 2007, Roberts 2010; 2012; 2014; 2019), which do not show any cross-indexing and where this question will thus not even come up for the language

acquirer (sticking to FE). In contrast, verbal inflection in all Bantu languages shows at least some indexing, which means that it needs to be established how pervasive this feature is in each language.

By IG, the next parameter sets whether *all* probes have uφ. There is a question as to which heads are included in "all probes"; concretely, should both the nominal and verbal domain be considered? This is not the case for the null subject hierarchy for φ features as proposed by Roberts & Holmberg (2010), where only the clausal domain is considered. The acquisition logic of none-all-some, however, requires that the first "all" setting concerns undifferentiated categories (see Biberauer 2011; 2018, Bazalgette 2015, and Biberauer & Roberts 2017 on emergent parameters), which means that the whole domain – which is eventually split into nominal and verbal – should be considered at this macro stage. Setting this parameter to "yes" should result in agreement not just on C, T, v, and Appl but also P, D, Num, and Poss. While some Bantu languages may come close to the presence of uφ features throughout the language,[11] I do not know of any Bantu language showing φ agreement on prepositions,[12] so we need to inspect subtypes.

One step further down the hierarchy we ask whether uφ is present on a subset of heads, specifically all heads in the nominal or verbal domain. Since it may be the case that there is a relevant subset in *both* domains, we can see this as a split in a third dimension where parameters are set for the nominal domain [+N] separately from the verbal domain [+V], depending on the input. Focussing on the clausal domain for the current discussion, once the [+V] subset is identified, by IG it is assumed that all heads in the subset, i.e. all functional heads in the extended verbal projection, have uφ.

An example of a language where uφ features are generalised to occur on all (clausal) heads is Ciluba. Ciluba displays multiple object marking (i.e. uφ on v and Appl, in the system as introduced above), as well as subject marking (φ on T) and agreeing relative complementisers (φ on C). Object and subject marking are illustrated in (27); and (28) shows separate subject marking on the verb and relative agreement on the auxiliary.

(27) Ciluba Kasai (L31, Cocchi 2000: 87)
Mukaji **u-tshi-mu**-sumb-il-a.
1.woman 1SM-7OM-1OM-buy-APPL-FV
'The woman buys it (fruit) for him (the boy).'

[11] There is a question as to whether agreement and concord involve the same operation – see for example Giusti (2008) for discussion claiming that they are not.

[12] I take the Bantu connective *-a* 'of' to not be a true preposition (van de Velde 2013).

(28) Ciluba Kasai (L31, de Kind & Bostoen 2012: 104)

a. maamù **u**-di ba-àna **bà**-ambul-il-a mikàndà…
1.mother 1RM-be 2-child 2SM-carry-APPL-FV 4-book
'mother, for whom the children are carrying the books…'

b. mi-kàndà **ì**-dì ba-àna **bà**-ambul-il-a maamù…
4-book 4RM-be 2-children 2SM-carry-APPL-FV 1.mother
'the books which the children are carrying for mother…'

If not all heads in the clause have uφ, further parameterisation consists of establishing the next relevant subset where uφ is present. For the Bantu clausal domain, the next largest subset appears to be the argument-licensing heads: T, v, and Appl/Caus. Sticking with a standard view of Case licensing, this would come down to heads that have Case in a featural specification.[13] In Kinyarwanda, the verb famously displays multiple object marking (29) as well as subject marking, but not complementiser or relative agreement for φ features: the relative clause in (30) is formed by a high tone. This means that uφ is present on v and Appl, as well as T, but not on C. Kinyarwanda thus sets the parameter "Is uφ present on all argument-licensing heads?" to "yes", entailing that there is no uφ on C, since otherwise the language would have already been done setting its parameters at the previous question, i.e. all clausal heads have uφ.

(29) Kinyarwanda (JD61, Beaudoin-Lietz et al. 2004: 183)
Umugoré **a**-ra-na-ha-**ki-zi-ba-ku-n**-someesheesherereza.
1.woman 1SM-DJ-also-16OM-7OM-10OM-2OM-2SG.OM-1SG.OM-read.CAUS.CAUS.APPL.APPL
'The woman is also making us read it (book, cl. 7) with them (glasses, cl. 10) to you for me there (at the house, cl. 16).'

(30) Kinyarwanda (JD61, Zeller & Ngoboka 2014: 11)

a. U-mu-kózi a-bar-a i-bi-tabo.
AUG-1-worker 1SM-count-FV AUG-8-book
'The worker counts books.'

b. i-bi-tabo u-mu-kózi a-bar-á
AUG-8-books AUG-1-worker 1SM-count-FV
'the books that the worker counts'

[13] However, see the discussion on Case in §1 as well as Diercks (2012) and van der Wal (2015). Even if abstract as we know it does not play a role which is as influential in many European languages, there is still reason to believe that a nominal licensing constraint is at play universally, as we show in Sheehan & van der Wal (2016; 2018).

For all languages setting this parameter to "no", a further subset will be found, forming the next parameter. Within the argument-licensing heads, the next question is whether uφ is present on heads in the higher phase (i.e. v and T but not Appl). If the setting is "yes", the language has subject marking and only a single object marker, as illustrated for Makhuwa. Makhuwa shows extremely regular subject marking as well as object marking (all and only objects in classes 1 and 2 are marked, van der Wal 2009), but is restricted to one object marker (31), which means φ on T and v, but not on Appl.

(31) Makhuwa (P31)
Xaviéré **o**-nú-**ḿ**-váhá anelá Lusiána.
1.Xavier 1SM-PFV.PRS-1OM-give 1.ring 1.Lusiana
'Xavier gave Lusiana a ring.'

Makhuwa equally does not show agreement on C: complementisers never agree, and the relative construction in Makhuwa does not have a relative complementiser or relative agreement. Instead, it is best analysed as a nomino-verbal participial construction which does not have an agreeing C head (van der Wal 2010).[14]

(32) Makhuwa (P31, van der Wal 2010: 210)
Ki-m-phéélá ekanetá tsi-ki-vah-aly-ááwé (Alí).
1SG-SM-PRS.CJ-want 10.pens 10-1SG.OM-give-PFV.REL-POSS.1 1.Ali
'I want the pens that he (Ali) gave me.'

If the parameter setting is "no" for the presence of uφ features in the higher phase, then the language only has uφ on one head. This turns out to always be the highest in the subset left: uφ on T, i.e. only subject marking (see §3.3 below on the implicational relation for uφ on clausal heads). Basaa illustrates this parameter setting: it has a subject marker, which is written separately but is obligatory even in the presence of a full DP subject (33).

(33) Basaa (A43, Hyman 2003: 277)
Liwándá jêm **lí** m ꜜɓéná jɛ bíjɛk í ꜜndáp.
friend my SM PRS do-often eat food in house
'My friend often eats food in the house.'

[14] What seems to be a subject marker or relative marker on the relative verb in Makhuwa (*e-* and *tsi-* in the examples) is a pronominal head (PtcpP) coreferring to the referent indicated by the head noun, e.g. both refer to a class 9 shirt and therefore are both in class 9. There is no regular subject marking, but the subject can be pronominalised on the verb as a possessive (*-aawe*), showing that the relative clause is not a full clause but lacks higher heads in the extended verbal projection. See van der Wal (2010) for details.

Objects, however, are not marked on the verb, and when the object is pronominalised it simply appears as an independent pronoun following the verb (34b).

(34) Basaa (A43, Hyman 2003: 278)

a. A bí nuŋúl lítám.
SM P2 sell fruit
'He sold a fruit.'

b. A bí nuŋúl jɔ.
'He sold it.'

Finally, relative clauses in Basaa can be marked with a demonstrative (*nu* in (35a) and *hi* in (35b), but Jenks et al. (2017) argue that this is not a C head.

(35) Basaa (A43, Jenks et al. 2017: 19, 20)

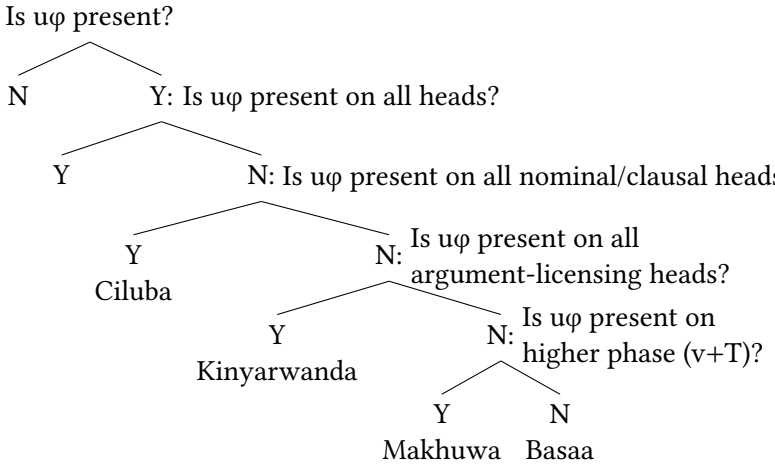
a. í-mut (nú) a bí ˩jɛ bíjɛk
AUG-1.person 1.REL/DEM 1.SM P2 eat 8.food
'the person that ate the food'

b. hínuní (hí) liwándá lí bí ˩tɛhɛ
AUG.19.bird 19.REL/DEM 5.friend 5SM P2 see
'the bird that the friend saw'

If Jenks et al. (2017) are correct in their analysis of the relative construction, then Basaa can be taken to illustrate a language in which only T has uφ features, whereas C, v and Appl do not.

The parameter hierarchy for Bantu languages discussed so far would thus come out as follows:

(36) Possible uφ feature hierarchy 2 (to be adjusted)



3.3 (In)dependent parameters

If this parameter hierarchy represents the typological picture, then it holds an implicational prediction such that if a language has uφ on one head in the following scale, it will have uφ on all the heads to its right (as noted for subject and object agreement by Moravcsik 1974, cf. Givón 1976; Bobaljik 2008):

(37) C > Appl > v > T
comp/rel agr > multiple OM > OM > SM

Considering the sequence of heads in the verbal extended projection, it is clear that C is not in the expected position on this implicational hierarchy. And there are more indications that C is not quite in place in this hierarchy. For one thing, the evidence for the absence of uφ features on C in Makhuwa and Basaa is very much dependent on the theoretical analysis of relative clauses, which makes the argument for the absence of uφ on C in these languages less strong. Moreover, there is clear evidence from other Bantu languages that φ agreement on C must be independent of uφ on the argument-licensing heads. This is illustrated by Bembe, which shows the typical Bantu subject and object marking (40b, uφ on T and v), but does not allow more than one object marker (40c, no uφ on Appl). Non-subject relative clauses in Bembe can display a relative marker in addition to a pronominal subject marker (40), indicating that T and C both have their own set of uφ features.

(38) Bembe (D54, Iorio 2014: 103)

a. Twa-h-ile batu bokyo.
1PL.SM-give-PST 2.people 14.money
'We gave people money.'

b. Twa-bo-h-ile batu.
1PL.SM-14OM-give-PST 2.people
'We gave it to people.'

c. * Twa-bo-ba-h-ile / *Twa-ba-bo-h-ile
1PL.SM-14OM-2OM-give-PST 1PL.SM-2OM-14OM-give-PST
intended: 'We gave them it.'

(39) Bembe (D54, Iorio 2014: 152)

a. Baana ba-twa-mon-ilé ba-b-ile babembe.
2.children 2RM-1PL.SM-see-PST 2SM-COP-PST 2.Bembe
'The children whom we saw were Bembe.'

b. bilewa bi-ba-koch-ilé
8.food 8RM-2SM-buy-PST
'the food that they bought'

This cross-linguistic situation, as illustrated in Table 3.2, suggests that the presence of uφ features on C does not form part of the implicational hierarchy that holds between the argument-licensing heads T, v and Appl, which in turn suggests that uφ on C is a parameter that is independent of the parameter hierarchy for uφ features. See also Biberauer (2017a) and references cited therein on how C behaves differently from lower heads in the domain of word order as well.

Table 3.2: Implicational relation in uφ features

C	T	v	Appl	Example language
✓	✓	✓	✓	Ciluba
	✓	✓	✓	Kinyarwanda
	✓	✓		Makhuwa
	✓			Basaa
✓	✓	✓		Bembe

However, the implicational hierarchy *does* appear to hold for the argument-licensing heads: if a language has uφ on Appl (multiple object marking) then it has uφ on v (single object marking), and if a language has uφ on v (object marking) then it has uφ on T (subject marking):

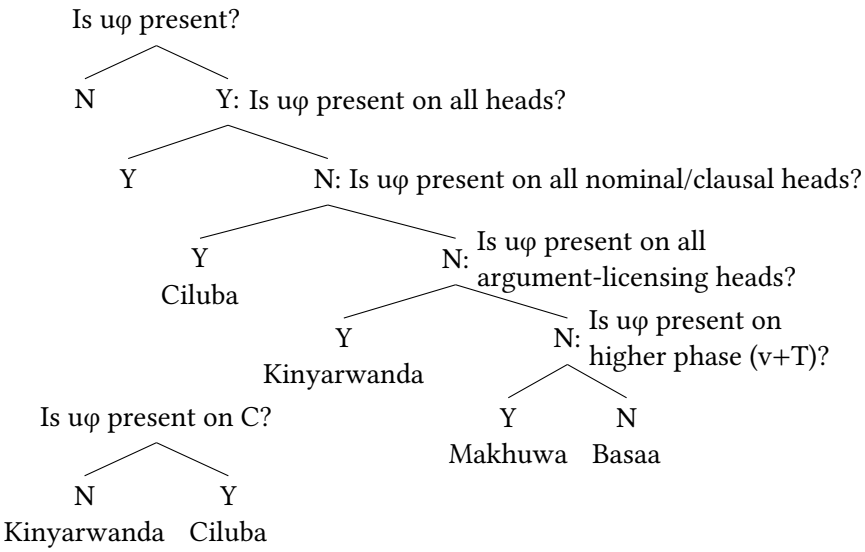
(40) Appl > v > T
multiple OM > OM > SM

It is known that v's Case-assigning capacity can be dependent on T's (Marantz 1991; Baker 2015), and it is clear from the data surveyed here that the same holds for head-marking agreement (see Roberts 2014 on the same conclusion for Romance; and see, among others, Bobaljik 2008; Bárány 2015 for discussion on implicational relations between heads in the domains of Case and agreement). Additionally, based on the data surveyed for Bantu languages, this implicational relation can be extended to the lower functional heads such as Appl. The fact that these implications hold indicates that argument-licensing heads are a natural class, with a strong relation to φ feature agreement.

This suggests a revision of the parameter hierarchy that brings out the interdependence of argument-licensing heads, keeping C apart. In fact, it suggests

that variation in the presence of uφ features on C is a parameter that is not actually part of this hierarchy, since hierarchies are only attractive for modelling *dependent* parameters (as argued in the original ReCoS research proposal, see also Roberts & Holmberg 2010 and Sheehan 2014). The separate parameters can then can be modelled as in (41), representing only the dependent parameters in a macro-to-micro hierarchy:

(41) Dependent and independent uφ feature parameters



3.4 Further subsets

Potential nanoparametric variation can also be attested in this domain, as exemplified by Luguru and Nyakyusa. These languages do display object marking, but only for some predicates. To illustrate with one example: in Luguru the verb *-bona* 'to see' requires an object marker and cannot be grammatically used without it, as shown for animate and inanimate objects in (42) and (43). The semantically similar verb *-lola* 'to see/look at', on the other hand, does not have this requirement and occurs without object marker (44).

(42) Luguru (G35, Marten & Ramadhani 2001: 264–265)

a. Ni-w-on-a iwana.
1SG.SM.TNS-2OM-see-FV 2.children
'I saw the children.'

b. * Ni-on-a iwana.
1SG.SM.TNS-see-FV 2.children
intended: 'I saw the children.'

(43) Luguru (G35, Marten & Ramadhani 2001: 264–265)

a. Wa-ch-on-a ichitabu.
2SM.TNS-7OM-see-FV 7.book
'They saw the book.'

b. * Wa-on-a ichitabu.
2SM.TNS-see-FV 7.book
int. 'They saw the book.'

(44) Luguru (G35, Marten & Ramadhani 2001: 264–265)
No-bam-aa ku-lola iwanu.
1SG.SM.TNS-want-FV 15-look.at 2.people
'I want to look at people.'

Marten & Ramadhani (2001) claim that this variation in predicates that do or do not require/allow object marking is not due to transitivity or the choice of object but individual predicates. Nevertheless, it seems that it can be modeled as variation in v's selection of a predicate taking an argument instead of an adjunct, i.e. microvariation. This would fit the difference between 'see X' (argument) and 'look at X' (non-argument). What is particularly suggestive in this case is the fact that the presence of an object marker can influence the interpretation of a predicate in Luguru. Marten and Ramadhani illustrate this with the predicate *-pfika,* which is usually interpreted as 'find, meet' when used with an object marker (45a), but as 'arrive' when there is no object marker (45b).

(45) Luguru (G35, Marten & Ramadhani 2001: 265–266)

a. Wanzehe wa-pfi-pfika ipfitabu.
2.elders 2SM.TNS-8OM-find 8.books
'The elders found books.'

b. Wa-pfika ukaye kwake.
2SM-find house POSS
'They have arrived at / been to his home.'

c. ? Wanzehe wa-pfika ipfitabu.
2.elders 2SM-find 8.books
'The elders arrived at the books'
intended: 'The elders found books.'

Such a microparametric account seems less likely for Nyakyusa (M31), which has similar restrictions on object marking (Lusekelo 2012). Here too, the presence of uφ on v is not set for *all* v heads, and transitive predicates are in one of three groups according to their object marking abilities/possibilities (Amani Lusekelo 2012 and p.c.):

- impossible ('cook', 'weave'),
- obligatory ('see', 'love/like'),
- optional ('smear', 'hold/touch', 'take');

The first type of predicate never shows object marking and thus never projects a v with uφ features. In the second and third type of predicate uφ features must/can be present on v. It is unclear, however, how type 1 can be distinguished (featurally) from the other two types, or, in other words, how type 1 forms a natural subset. object marking in Nyakyusa therefore appears to be an instance of nanoparametric variation: individual predicates have/do not have uφ features on v.

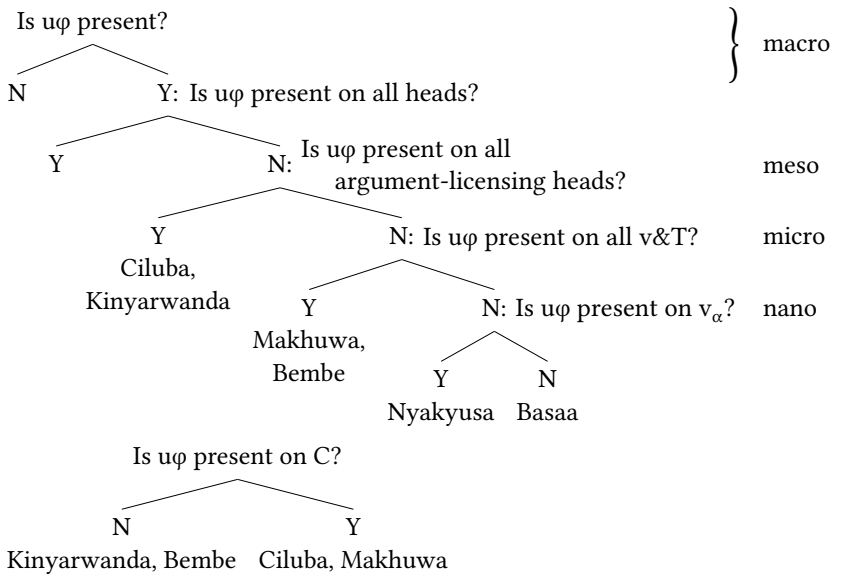
What underlies the distinction between the second and third type is equally unclear; alternatives suggested by anonymous reviewers include a potential semantic difference for psych vs. touch/motion verbs, and a phonological factor where the initial consonant of the verb stem or syllable structure might play a role in requiring object marking. However, at the moment this is only speculative and has to await further research on Nyakyusa object marking.

Even if the exact size of the parameter setting or the precise features involved are as yet unknown, it is clear that these languages distinguish different predicates, that is, different subtypes of little v, when it comes to the distribution of uφ features.[15] We thus need a further specification of subsets, arriving at the nano-level where certain predicates have a positive setting for the presence of φ features on v, indicated as v_{α} in the adjusted hierarchy in (46).[16]

[15]Note that Sheehan (2014; 2017) proposes quite extensive subhierarchies for little v with respect to ergative alignment, but starting from a different logic underlying the shape of the parameter hierarchy.

[16]An alternative way of organising the hierarchy to make the typological implication fall out would be the following sequence of parameters (see also Bárány 2015): Is uφ present? > Is uφ present on T? > Is uφ present on v? > Is uφ present on Appl? Note, though, that this cannot capture the acquisitional path, and hence loses the motivation in the general cognitive principles of FE and IG.

(46)



This exploration of the hierarchy for uφ parameters has thus brought to light that what is thought to be the same phenomenon in the first instance might actually not be part of the same parameter hierarchy – concretely, the parameter for φ features on C was shown to be set independently of the other heads in the clause. The data also revealed an interesting implicational relation for φ features on argument-licensing heads, which can be captured in a parameter hierarchy that considers smaller and smaller subsets representing Bantu-internal parametric variation from the meso to the nano level.

4 Conclusions

The different sizes of variation as proposed by Biberauer & Roberts (2015a), ranging from macro to nano, fit the morphosyntactic variation in the Bantu languages better than a simple "macro" or "micro". Importantly, this perspective encourages us to look seriously at syntactic variation from a featural perspective. The featural perspective is attractive with the Minimalist programme in mind, locating parametric variation in the features (on functional heads) in the lexicon. With the outlined parameter-setting algorithm motivated by third-factor principles (Biberauer 2017a,b; Biberauer & Roberts 2017) we have a promising model accounting for crosslinguistic variation.

Bantu-internal variation shows that all parameter types are actually attested, and individual languages vary as to the "grain" of their settings: what is micro

in one system could be nano in another, etc. This is predicted in the current approach: the "same" phenomenon surfaces in different sizes in different systems (cf. Biberauer & Roberts 2016; Ledgeway 2013).

The Bantu variation also illustrates that the setting of a parameter to a certain size does not necessarily correspond to geographical or genealogical macrovariation or microvariation. Whether languages or language families differ markedly from each other or not (macrovariation) or are more similar but show variable properties (microvariation) tends to go hand in hand with the size of the parameter setting (because of diachronic stability), but there is no one-to-one relation: a language can have a macro setting on a certain parameter hierarchy where the rest of the family has smaller settings, and the variation between otherwise similar languages can still be characterised as microvariation – as is the case for Bantu.

The crosslinguistic variation as seen in this paper thus stems from 1. whether a feature is present in a language at all; 2. on which (subset of) heads the feature is present; 3. the combination/interaction of different parameter settings. The current state of research focuses primarily on the first and second determinants, which necessarily precede the third aspect. Future research will hopefully shine light on the interaction of the various parameters and parameter hierarchies, especially since the "some" options in any hierarchy are formed by the interaction with features that potentially are part of their own separate hierarchy. This, however, requires further conceptual and empirical investigation.

Abbreviations

1	first person	EXPL	expletive
2	second person	FE	feature economy
3	third person	FUT	future
APPL	applicative	FV	final vowel
AUG	augment	HAB	habitual aspect
BEN	benefactive argument	IG	input generalisation
CAUS	causative	INF	infinitive
CJ	conjoint verb form	IPFV	imperfective
COMP	complementizer	IRR	irrealis
CONN	connective	NEG	negation
COP	copula	OM	object marker
DEM	demonstrative	P2	general past tense
DJ	disjoint verb form	PASS	passive

PFV	perfective
PL	plural
PLD	primary linguistic data
POSS	possessive
PROG	progressive
PRON	pronoun
PRS	present
PST	past
PTCL	particle
Q	question particle
REL	relative
RM	relative marker
SG	singular
SM	subject marker
TAM	tense, aspect, mood
TH	theme argument
TNS	tense

Numbers refer to noun classes, or to persons when followed by SG or PL. High tones are marked by an acute accent, low tones are unmarked or marked by a grave accent.

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