Chameleon Probes in Mordvin

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Abstract
In this paper I discuss argument encoding on transitive verbs in Mordvin (Uralic). There are hierarchy effects in that agreement can obtain with both arguments of a transitive verb, depending on their grammatical function and feature values. Béjar (2003) develops an elegant system which derives these hierarchy effects. However, this system is unable to capture the distribution of person markers in one part of the paradigm. I claim that this pattern can indeed be derived and is even expected to occur with a minor and independently motivated change in Béjar's analysis. I propose that – rather than remaining unchecked – an X-probe searching for a feature X on a goal can be valued by feature Y after the X-probe has been heavily impoverished such that it is underspecified for the value it probes for (X or Y).

1. Argument Encoding in Mordvin

Mordvin is a Uralic language that splits into two dialects, Erza and Moksha (cf. Raun 1988 for a comparative description). The following argumentation is based on Erza data, but the generalizations are also valid for Moksha. In Mordvin, a transitive verb can agree with its subject and object in person (1st, 2nd, 3rd) and number (singular, plural1 This agreement pattern only

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1 . Mordvin is the most complex of the Uralic languages in the sense that a verb can agree in number *and person* with its object in the definite conjugation. In all other Uralic languages with a definite conjugation either only number agreement obtains with the object (in Khanty, Mansi, Nenets, Enets,

arises if the verb is in perfective aspect and takes a definite object (called definite conjugation); in any other context the verb can only agree with the subject (called indefinite conjugation). The subject of this paper is argument encoding in the past and non-past definite conjugation. The order of suffixes on the verbal stem is as follows:

(1) ***Verbal template***
stem – mood suffix – tense suffix – person/number suffixes

The surface forms of the verbal suffixes including the tense marker (set in bold) are given in (2) and (3), cf. Collinder 1957; Abondolo 1982; Raun 1988; Zaicz 1988.[2]

(2) ***Definite non-past paradigm***

Subj\Obj	**1sg**	**2sg**	**3sg**	**1pl**	**2pl**	**3pl**
1sg	---	**ta**n	**s**a	---	**ta**diz	**s**yn^{j}
2sg	**sa**mak	---	**sa**k	**sa**miz^{j}	---	**s**yt^{j}
3sg	**sa**mam	**ta**nzat	**s**y	**sa**miz^{j}	**ta**diz^{j}	**s**yn^{j}z^{j}e
1pl	---	**ta**diz^{j}	**s**yn^{j}ek	---	**ta**diz^{j}	**s**yn^{j}ek
2pl	**sa**miz^{j}	---	**s**yŋk	**sa**miz^{j}	---	**s**yŋk
3pl	**sa**miz^{j}	**ta**diz^{j}	**s**yz^{j}	**sa**miz^{j}	**ta**diz^{j}	**s**yz

(3) ***Definite past paradigm***

Subj\Obj	**1sg**	**2sg**	**3sg**	**1pl**	**2pl**	**3pl**
1sg	---	**i**tin	**i**ja	---	**i**d^{j}iz	**i**n^{j}
2sg	**i**mik	---	**i**k	**i**miz^{j}	---	**i**t^{j}
3sg	**i**mim	**i**n^{j}z^{j}it^{j}	**i**z^{j}e	**i**miz^{j}	**i**d^{j}iz^{j}	**i**n^{j}z^{j}e
1pl	---	**i**diz^{j}	**i**n^{j}ek	---	**i**d^{j}iz^{j}	**i**n^{j}ek
2pl	**i**miz^{j}	---	**i**ŋk	**i**miz^{j}	---	**i**ŋk
3pl	**i**miz^{j}	**i**diz^{j}	**i**z^{j}	**i**miz^{j}	**i**d^{j}iz^{j}	**i**z^{j}

Nganasan) or the pure presence vs. absence of a definite object is marked without indicating any phi-features of the object (in Selkup, Mator, Kamas).

2 . The superscript *j* indicates palatalization of the preceding consonant. The vowel which follows the tense marker and the following consonant cluster of the person /number suffix is analysed as an epenthetic vowel by Abondolo (1982) because its occurrence and form is predictable: [a] in the non-past and [i] in the past paradigm. Hence, the vowel does not express any features of the arguments and will therefore be ignored in what follows.

Examples of Mordvin sentences with a verb in the definite conjugation are provided below (Zaicz 1988: 197, Abondolo 1982: 14, 15):

(4) ***Mordvin***

a. kunda- tan
catch- 1sg>2sg
I catch you. *(definite non-past)*

b. van- $ɣt^{j}in^{j}$
look- past.1sg>2sg
I saw you. *(definite past)*

c. van- samam
look- non-past.3sg>1sg
S/he saw me. *(definite past)*

Based on similarities to markers of the nominal inflection, Abondolo (1982) and Georgi (2010) argue that the verbal suffixes can be segmented into smaller markers which either encode only subject or object features. In this way transparadigmatic syncretism between nominal and verbal forms can be resolved. The resulting paradigms with underlying forms are shown in (5) and (6).[3]

(5) ***Segmented definite non-past paradigm***

Subj\Obj	**1sg**	**2sg**	**3sg**	**1pl**	**2pl**	**3pl**
1sg	---	t -n 2 -1	a 1	---	t -iz 2 -pl	iz -n pl -1
2sg	m -k 1 -2	---	k 2	m -iz 1 -pl	---	iz -t pl -2
3sg	m -m 1 -1	nze - t 3 -2	i 3	m -iz 1 -pl	t -iz 2 -pl	iz -nze pl -3
1pl	---	t -iz 2 -pl	iz -nek pl -1	---	t -iz 2 -pl	iz -nek pl -1
2pl	m -iz 1 -pl	---	iz -nk pl -2	m -iz 1 -pl	---	iz -nk pl -2
3pl	m -iz 1 -pl	t -iz 2 -pl	iz -Ø pl -3	m -iz 1 -pl	t -iz 2 -pl	iz -Ø pl -3

3 . Arguments for segmentation and a detailed discussion of phonological processes which apply to the underlying forms can be found in Abondodlo 1982, Zaicz 1988, Raun 1988, and Georgi 2010.

(6) ***Segmented definite past paradigm***

Subj\Obj	**1sg**	**2sg**	**3sg**	**1pl**	**2pl**	**3pl**
1sg	---	t -n 2 -1	a 1	---	t -iz 2 -pl	iz -n pl -1
2sg	m -k 1 -2	---	k 2	m -iz 1 -pl	---	iz -t pl -2
3sg	m -m 1 -1	nze - t 3 -2	ze 3	m -iz 1 -pl	t -iz 2 -pl	iz -nze pl -3
1pl	---	t -iz 2 -pl	iz -nek pl -1	---	t -iz 2 -pl	iz -nek pl -1
2pl	m -iz 1 -pl	---	iz -nk pl -2	m -iz 1 -pl	---	iz -nk pl -2
3pl	m -iz 1 -pl	t -iz 2 -pl	iz -Ø pl -3	m -iz 1 -pl	t -iz 2 -pl	iz -Ø pl -3

2. Generalizations on Marker Distribution

Béjar (2003) bases her analysis of Mordvin verbal agreement on the segmented forms proposed by Abondolo 1988. She states the following generalizations about the distribution of person and number markers in the definite paradigms, which hold apart from the shaded cells:

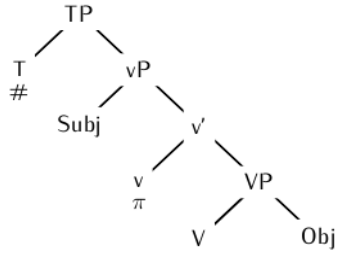
(7) ***Hierarchy effects in Mordvin (Béjar 2003: 168)***

a. The verb agrees with a local person object. Subject person is cross-referenced only if the object is 3rd person.

b. The verb agrees with the subject in number (only plural). Object number (plural) is cross-referenced only if the subject is singular (singular is invisible for Agree; it is argued to be complete absence of number features by Béjar).

Béjar implements the preferences of the probes for agreement with either subject or object by postulating a separate person (π) and number (#) probe. The former is located on v, the latter on T, see the tree in (8).

(8) ***Distribution of probes in the structure***



Each probe agrees first with the closest goal in its c-command domain (the subject for # and the object for π) and expands its search domain to the coargument if the closest goal does not provide the features the probe searches for, which are local person for π and plural for #, respectively. In general, the unmarked values of a feature (3rd person and singular) are not visible for the agreement system when agreement obtains with the preferred argument. But whereas the unmarked person value (3rd person) becomes a possible target for agreement when it obtains with the non-preferred coargument (the subject, see e.g. the form for 3sg > 3pl), the unmarked number value "singular" remains invisible even for agreement with the non-preferred object. Béjar (2003) argues that singular is complete absence of any number features in Mordvin and is thus always invisible for agreement, in contrast to 3rd person.[4] Hence, only a single person and a single number probe are needed to derive the distribution of agreement markers in Mordvin.

However, this analysis cannot explain why double person agreement obtains in the shaded cells of the definite paradigms. This should be impossible if there is only a single person probe in the structure. Béjar (2003: 171)'s comment is as follows: "Finally, what can be said about the irregularities in the shaded forms of (24)? Here, I would argue, the syntax of agreement has nothing to say about the actual form of these irregularities [...]"

4 . Her arguments are that i) there is never an overt exponent for singular (but for 3rd person, cf. the paradigms above), and ii) that a singular argument is not an intervener for agreement between a higher number probe and a structurallylower argument (in contrast to other languages where an argument with an unmarked value does act as an intervener in such a scenario and thus must have some features).

I take Béjar's analysis of verbal agreement in Mordvin to be generally valid and I show that there is a way to reconcile it with the alleged irregularities.[5] On this purpose, I propose another and at first sight more trivial generalization about the Mordvin paradigms above:

(9) ***Two-marker-generalization***
There are always two markers in a suffix string
(apart from the combination sg subject > 3rd sg object which I will come back to.)

Usually, these two markers are a person and a number marker. Note that the generalization also holds in the argy cells, the only difference is that there are two person instead of a person and a number marker. The absence of a number marker is expected, because the number probe is not able to see the value singular in Mordvin (which was argued to be complete absence of number features), but double person marking is unexpected with a single person probe. Note that the generalization in (9) is not a stipulation; it follows from the fact that there are two probes in the structure, π and #, which have to be checked and valued if the derivation is to converge (cf. Chomsky 2000). The number probe searching for plural cannot be checked if both arguments are singular and could thus remain unchecked. Béjar assumes that the number probe is checked by default valuation in this context in order to avoid the crash of the derivation, but this cannot explain the occurrence of a second person marker. Instead, I propose that - descriptively spoken - the number probe turns into a person probe. I call such a probe a *chameleon probe* because it accommodates itself to the syntactic context, being able to search for number or person values. In this way, the "number" probe can be checked and valued, saving the derivation from its crash. One could also propose another solution which is closer to Béjar's analysis: The number probe is indeed deactivated by default valuation, the valuation of the person probe leads to a single person exponent. However, the output would violate the Two-marker-generalization. Hence, a repair strategy could apply in order to fulfill the generalization. One way to implement this is to say that the present person marker is simply copied in the phonological component. However, this cannot be true, because the two person markers in the shaded cells are not

5 . Differnt accounts of the marker distribution in Mordvin which do not rely on segmented markers are developed by Aranovich (2007) and Nevins (2010).

(always) identical. A di□erent repair mechanism is the insertion of a second person probe. Such an approach is less preferable for two reasons: First, the insertion of an additional probe violates Inclusiveness (Chomsky 1995) and secondly, it would have to stipulate the Two-marker-generalization as a language specific requirement on definite verbal paradigms which is a high ranked constraint and can thus trigger repair strategies. Hence, the approach would miss the fact that the generalization in (9) follows automatically from the number of probes in the structure. Because the alternative analyses have serious short-comings, I pursue the approach with a *chameleon probe*.

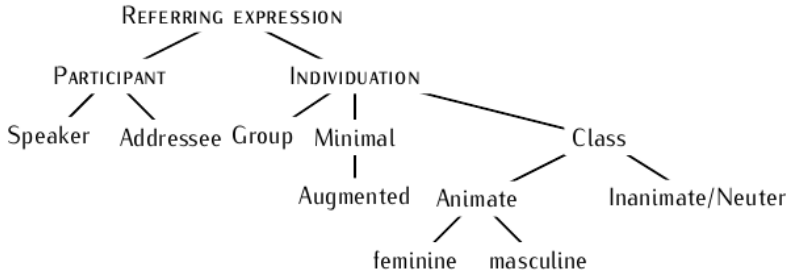
To sum up, double person marking in the shaded cells obtains because the regular person probe is valued by person features and the former number probe is valued by person features, too, if both arguments are singular (if one was plural # could be valued with a number value).

3. Béjar's analysis

I claim that the "metamorphosis" of the number probe does not have to be stipulated but it can be derived with a straightforward expansion of Béjar's (2003) analysis. Therefore, I first present more details of her analysis.

An important question is how the probes can be checked by certain values but not by others. Béjar argues that person and number values are complex objects which are bundles of more abstract privative feature values. She bases her decomposition on the feature geometry motivated by Harley and Ritter (2002), which is shown in (10).

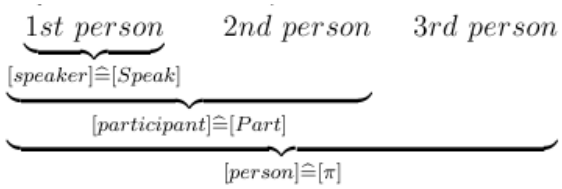
(10) ***Harley & Ritter (2002)***



They claim that there are implicational relations between nodes: A node on a level L_i implies the presence of the node on a higher level L_{i+n}. In a

language like Mordvin with three person and two number values only the nodes *Referring expression*, Participant, Speaker, *Individuation*, and *Group* are active. *Participant* encodes speech-act participants (local persons), *Speaker* the speaker; *Individuation* encodes number in general, *Group* encodes plurality. Hence, Béjar's decomposition looks like in (12) and (13), based on the decomposition in (11). Note that she includes an additional feature π that Harley & Ritter (2002) do not propose and which encodes person in general. If only π is active, this encodes third person (the reasons for which she introduces π are of no importance for the present discussion).

(11) ***Béjar's feature decomposition based on Harley & Ritter (2002)***



(12) ***Encoding of person values***

1st: $\begin{bmatrix}[\pi]\\[Part]\\[Speak]\end{bmatrix}$ 2nd: $\begin{bmatrix}[\pi]\\[Part]\end{bmatrix}$ 3rd: $[[\pi]]$

(13) ***Encoding of number values***

Sg: [ ] Pl: $\begin{bmatrix}[Indiv]\\[Group]\end{bmatrix}$

The probes are also bundles of privative features: The number probe # looks for plural arguments and the person probe π searches for local person, hence, they are represented as in (14).

(14) ***Person and number probe in Mordvin (Béjar 2003: 168)***

π: $\begin{bmatrix}[\pi]\\[Part]\end{bmatrix}$ #: $\begin{bmatrix}[Indiv]\\[Group]\end{bmatrix}$

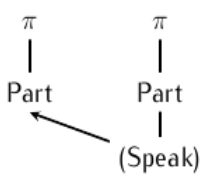
Béjar assumes that a probe targets the closest accessible goal in its c-command domain. The probe is checked and valued if the following condition holds: The goal must have a superset of the features of the probe, including identity of features. If the closest goal fulfills this condition and valuation can take place, Béjar speaks of "first cycle Agree". If valuation fails with the closest goal, the probe extends its search domain to the second argument and is valued afterwards, which is called "second cycle Agree". A probe must c-command its goal for Agree. The number probe # c-commands the subject and the object. person probe Hence, if a second cycle of probing is necessary because the closest goal does not fulfill the superset condition on valuation, then the number probe # can stay on T from where it c-commands the object, too, cf. (8). The person probe π, however, does not c-command the subject with which it is to agree if valuation on the first cycle with the closest argument, the object, fails. In this case, one option discussed by Béjar, is that π is raised to T from where it c-command the subject. I will adopt this strategy in what follows. But apart from extending its search domain, a probe which cannot be valued at the first cycle has to be impoverished: The bottommost feature in the matrix is deleted before the second probing starts. This is necessary because otherwise valuation of π by a third person subject on the second cycle would still be impossible, the goal still does not have a superset of the features of the probe. Empirically, however, this agreement does take place. Deleting the bottommost feature in the probe's matrix facilitates valuation because the superset condition on agreement can be met more easily on the second cycle.

The derivations proceed as follows: If π probes and the object is local person, π can be valued, cf. (15). If the object is third person it does not have a superset of the probe's features and cannot value π. The probe is then raised to T and its feature [Participant] is deleted. π can then be valued with any subject person value, even with third person, cf. (16). The number probe searches for plural on the subject and is valued if the subject is indeed plural, cf. (17). If it is singular (absence of features), #'s feature [Group] is deleted and it looks for number on the object. If the object is plural it values # on the second cycle cf. (18a-c); but if it is singular, too, # can still not be valued and Béjar assumes default valuation, cf. (18d-e).

Illustration of Béjar's system (valuation is indicated by an arrow)

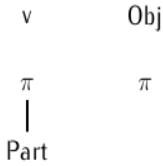
(15) *π: first-cycle valuation by the object*

Person agr., 1st cycle value (local person object):



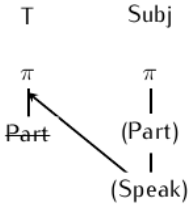
(16) *π: second-cycle valuation by the subject*

a. *Person agr., no 1st cycle value (3rd person object)*:



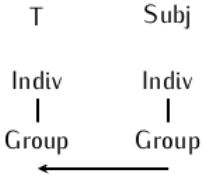
b. π raises to T, [Part] is deleted

c. *Person agr., 2nd cycle value (1st/2nd/3rd person subject)*:



(17) *#: first-cycle valuation by the subject*

Number agr., 1st cycle value (plural subject):

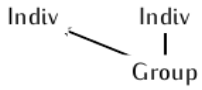


(18) *#: second-cycle valuation by the object*

a. *Number agr., no 1st cycle value (singular subject)*:

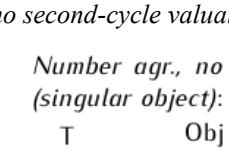
b. [Group] is deleted

c. *Number agr., 2nd cycle value (plural object)*:



#: no second-cycle valuation by the object; default valuation

d. *Number agr., no 2nd cycle value (singular object)*:



e. Bejar: default valuation, no number exponent, occurrence of a second person marker unexplained

4. Extended System: Chameleon Probes

My suggestion is that person valuation of the number probe is enabled when we follow the feature geometry by Harley and Ritter (2002) more closely. Note that Béjar (2003) by and large adopts their geometry, but she does not include the root node R(eferrring Expression) in her feature bundles. This root node is however active in Harley and Ritter's system, i.e. some combination of features are represented by the presence of the node R alone (Harley and Ritter 2002: 13). I thus include this node in the feature matrices such that the bundles look like in (19) and (20). The probes in Mordvin which look for local person and plural, respectively, have the form in (21).

(19) ***Encoding of person values***

1st: $\begin{bmatrix} [R] \\ [\pi] \\ [Part] \\ [Speak] \end{bmatrix}$ 2nd: $\begin{bmatrix} [R] \\ [\pi] \\ [Part] \end{bmatrix}$ 3rd: $\begin{bmatrix} [R] \\ [\pi] \end{bmatrix}$

(20) ***Encoding of number values***

Sg: [ ] Pl: $\begin{bmatrix} [R] \\ [Indiv] \\ [Group] \end{bmatrix}$

(21) ***Person and number probe in Mordvin***

π: $\begin{bmatrix} [R] \\ [\pi] \\ [Part] \end{bmatrix}$ #: $\begin{bmatrix} [R] \\ [Indiv] \\ [Group] \end{bmatrix}$

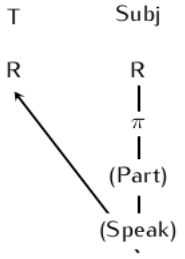
The remaining assumptions of Béjar (2003) are adopted without changes. For the valuation of the person probe the additional feature [R] has no consequences. The derivations are exactly as in (15) and (16), except for the presence of [R] on top of the goals and the probe. π is valued at the latest at the second cycle. For the number probe, nothing changes if one of the arguments is plural. If the subject is plural, valuation obtains at the first cycle, if it is singular, the probe is impoverished to [R [Indiv]] and it looks for plural on the object (see (17) and (18a-c)). But if the object is singular, too, and # can still not be valued, we expect it to be impoverished for a second time in Béjar's system. As a result, the number probe consists only of the node [R], [Indiv] and [Group] having been deleted. Crucially, the probe is still active at this point, because the additional node [R] is present and the probe can start a new search. As the privative feature [R] is also a part of every person feature bundle, the probe can be checked and valued with any person value because the person feature bundle on a goal consists at least of [R [π]] and therefore fulfills the superset condition on valuation. This valuation at the "third cycle" is illustrated in (22).

(22) ***Impoverished # valued by person features (third-cycle Agree)***

a. *Number agr., no 2nd cycle valu (singular object)*:

b. second probe impoverishment: [Indiv] is deleted

c. *Person agr., 3rd cycle value of #:*



The number probe does not find a suitable goal at the first cycle, [Group] is deleted and it starts to search for number on the object. The object is singular and hence does not provide features for valuation of #. As a consequence, probe impoverishment applies for a second time and deletes [Indiv] such that the probe only consists of [R]. Thus, it is underspecified for the exact feature it searches for (person or number) and can be valued by both. As both arguments are singular and do not provide a value, the impoverished probe is valued by person features. This gives the impression that a number probe is valued by person, although the number probe is not a number probe anymore but an underspecified probe.

To sum up this section, I have proposed that the valuation of a number probe by person is possible because person and number form a natural class with respect to the privative feature [R] which has been suggested for independent reasons in Harley and Ritter (2002) anyway. The heavily impoverished probe # loses its feature [Indiv] which characterizes it as a number probe and it can then be valued by person. Note that there is no real transformation into a person probe, the effect obtains by the impoverishment which Béjar (2003) needed anyway to allow for the valuation of a person probe by a third person goal at the second cycle. Double person marking in the shaded cells arises because of the regular person probe and the "number probe" which is valued by person features because it does not find a plural argument.

5. Predictions on Exponence

What is the search domain for 3rd cycle Agree? Is it identical to the first or the second cycle search domain of the "number" probe? Looking at the exponents in the shaded cells, one can see that the additional person marker cross-references the person of the subject. It can be concluded that the probe on T always targets the closest accessible goal as long as there are features by which it can potentially be valued. Hence, it is the person features of the subject which are targeted by the former number probe on T at the third cycle of Agree. The only exception to this generalization in the shaded cells is the combination 3sg subject > 1sg object. Here the person of object is expressed twice although present account predicts that the rightmost person marker should cross-reference the person value of the subject (object markers are closer to the stem then subject markers in Mordvin). I do not have an explanation for why the heavily impoverished probe on T seems to skip the subject when it probes for the third time, but the important point is that there is double person marking which should be impossible in Béjar's system but which is expected in my extended system.

Another point that needs to be discussed is allomorphy of person exponents. As can be seen in the paradigms in (5) and (6) above, plural is always realized by the marker /iz/, regardless of whether the value is provided by subject or object. For person features, there are different exponents for first and second cycle values. First person is expressed by /m/ when the object valued the person probe and /n/ when the subject valued the person probe; the same holds for second person: /t/ is 2nd person object, /k/ 2nd person subject; third person morphology /nze/ and /nz/ is necessarily second cycle morphology (there is no valuation by third person on the first cycle). One way proposed by Béjar (2003) to distinguish these exponents in a realizational morphology is to use category information as context restriction. If the person probe is valued by the object (first cycle) it is located on v, if it is valued by the subject it has been raised to T (second cycle). The different vocabulary items can thus be represented as in (23):

(23) ***First person morphology in Mordvin***
a. /m/ ⟺ [1] /v ***b***. /n/⟺ [1] /T

The prediction is that the "number probe" which is valued by person when both arguments are singular is realized by second cycle person morphology. The reason is that the number probe starts out on T and is not moved because it c-commands both arguments of the verb. If it is valued by person

features it is indistinguishable for the morphological component from second cycle valuation of the regular person probe which is raised from v to T. This prediction is born out: The exponents for person of the subject in the shaded cells are /n/, /k/, /nze/, all of which are second cycle morphemes. The only exception is again the combination 3sg subject > 1sg object. First of all there is a second object person marker as was already discussed above. But apart from this, the exponent for the 1st person of the object (valued on the *chameleon probe*) should be the second cycle morpheme /n/, but it is the first cycle morpheme /m/. However, in the Moksha dialect of Mordvin, we find indeed the expected form /m-n/ (surface form -*saman* in the non-past) (Raun 1988: 106).

The last issue I want to address is the alleged violation of the two-marker-generalization in the combination sg subject > 3sg object. There is only a single person exponent, although two person markers are expected under my analysis because both arguments are singular. But note that in these contexts a situation arises which does not occur elsewhere: there are two person values on the head T, once by valuation of the regular person probe at the second cycle and once by the chameleon probe (because both arguments are singular). I suggest that there is a constraint which rules out identical feature values on the same head and that one of the feature bundles is deleted before vocabulary insertion. Such an effect is also observed by Nevins and Sandalo (2010) in Kadiwéu and Georgian. They argue that "two instances of [+participant] within the same T domain is banned by dissimilatory 'OCP' of two identical marked morphosyntactic feature values within the same domain" (Nevins and Sandalo 2010: 11). They propose that the more marked of these values is then deleted. I adopt their proposal for Mordvin, the only difference is that the two person values on T are identical, such that none of the values is more marked than the other; hence, it does not matter which one is deleted in order to fulfill the constraint.

6. Conclusion

In this paper I have provided an analysis of verbal inflection in Mordvin. Based on the analysis by Béjar (2003), I have shown that the double person marking pattern which is unexpected under her analysis with a single person and a single number probe can be derived with an independently motivated and straightforward extension of the structure of feature bundles. Including the feature [R] into these bundles, as proposed in the feature geometry by

Harley and Ritter (2002), allows us to form a natural class between person and number. If the number probe is successively impoverished such that it only contains [R], which can only happen if both arguments of a transitive verb are singular, it can be valued by person features. In this way, double person marking obtains although the structure initially contains only a single person probe and a number probe. I called the number probe which is valued by person a *chameleon probe*, indicating -descriptively spoken- that the probe can adapt the features it searches for to the syntactic context. In order to achieve this, no new mechanisms had to be assumed that have not also been part of Béjar's analysis. In general, I proposed a further repair strategy which may apply in order to avoid the crash of a derivation containing unvalued probes: probe impoverishment with the consequence that a probe is valued by features it originally did not search for.

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