Ri-investigating inverse number in Dagaare*

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1 Introduction

Dagaare (Niger-Congo, Mabia/Gur; glottocode: sout2789) exhibits an interesting pattern of number marking whereby particular suffixal markers appear in the singular for one set of nouns, but in the plural for another set of nouns. This phenomenon is referred to as 'inverse number marking' (e.g., Corbett 2000:159), and is found in various languages around the world, including, for example, Kiowa (Kiowa-Tanoan; Watkins 1984). See Corbett (2000:159–166) for an overview.

Examples of inverse number marking from Dagaare are given in Table 1. We see that for the stems *bì* 'child' and *dò* 'warthog/bush pig', the suffix *-ri* appears on the plural form, but for the stems *kù* 'tortoise' and *kómbí* 'tomato', *-ri* appears on the singular form.[1]

Table 1: Dagaare inverse number examples

Stem	Stem gloss	Singular	Plural
bì	'child'	bíé	bíí-**rí**
dò	'warthog'	dùó	dò-**rí**
kù	'tortoise'	kù-**rí**	kùé
kómbí	'tomato'	kómbí-**rí**	kómbíé

* Hotze has always been a champion for students. His contribution to both the undergraduate and graduate programs at UBC has been consistent and massive. We therefore think this paper is a fitting tribute to his indefatigable work in this regard as it is a contribution of one former student, one visiting student, and one current student — oh, and it also drags one struggling phonologist into the scary domain of semantics... Thanks to Ryan Bochnak for very helpful comments on a draft of the paper. This paper was supported by a SSHRC Insight grant to Pulleyblank.

[1] The non-*rí* forms often have additional material, such as the final [é] in the singular of 'child' and the plural of 'tortoise' and 'tomato'. Whether this additional material constitutes a morpheme or is a result of epenthesis is a matter we do not address here, since our focus is the *-ri* suffix. Grimm's work assumes, following Anttila and Bodomo (2009), that these final vowels are epenthetic; Angsongna (2023) presents evidence against this assumption, suggesting that the vowel is a morpheme.

Grimm (2010, 2012a,b, 2018, 2021) proposes that the singular and plural uses of the same formatives can be explained by reference to 'individuation'. The core of his proposal is that with nouns that are inherently singular and countable, *-ri* indicates multiple individuals, i.e., plurality. In nouns that are inherently plural and noncountable, *-ri* again indicates individuation, referring now to a (singular) component.

In this paper we test the individuation hypothesis against a database of Dagaare nouns. For each noun marked with *-ri* in either the singular or the plural, we independently evaluated whether the semantics suggests inherent individuation or not. We then investigated how the suffixal marking lines up with the semantics. At issue is whether the lexical semantics of nouns directly determines the choice of suffixes, or whether morphological encoding of suffix choice is necessary, with such encoding only correlating imperfectly with the lexical semantics. Our results support the latter conclusion.

2 A few notes on *-ri*

Before turning to our predictions and testing, it is appropriate to delineate the details of what we refer to as the suffix '-ri'. This suffix appears in a variety of surface forms. Consider the examples in (1) which illustrate, drawing on instances of plural *-ri.*

(1) Variation in the surface forms of *-ri*

a.	-rì	gbàg-rì	'agama lizard-PL'
b.	-rí	láá-rí	'bowl-PL'
c.	-rì	zú-rì	'head-PL'
d.	-rí	kóg-rí	'chair-PL'
e.	-nì	jɛ́n-nì	'sense-PL'
f.	-ní	lɔ́n-ní	'frog-PL'
g.	-nì	lón-nì	'hourglass.drum-PL'
h.	-ní	gòn-ní	'silk.cotton-PL'

Three properties of the *-ri* suffix are predictable from the root. The tongue root value, [i] vs. [ɪ], is determined by root-controlled harmony. The tone, L vs. H, is determined by the root. The initial consonant is by default [r] but appears as [n] when the root contains a nasal consonant. See Anttila and Bodomo (2009) and Angsongna (2023) for details. We consider all eight surface realisations to be instances of the suffix *-ri*.

In addition, we might ask why singular and plural *-ri* are not simply two homophonous suffixes. In brief, there are two arguments against the

multi-suffix possibility. First, this hypothesis would lead one to expect the possibility of some nouns being marked for both singular and plural with *-ri.* We know of no instances where that happens. Second, there is an interesting idiosyncrasy illustrated by *-ri,* whether singular or plural. Nominal roots exhibit a complex pattern of length alternations. Some roots are consistently short, some are consistently long, and others alternate between short and long. For example, the root *gbó* 'heart' is consistently short: [gbô] 'heart-SG', [gbó-rì] 'heart-PL'; the root *nú* 'hand' alternates between short and long: [nû] 'hand-SG', [núú-rì] 'hand-PL'; the root *wɔ́ɔ́* 'elephant' is consistently long: [wɔ́ɔ̀] 'elephant-SG', [wɔ́ɔ́-rì] 'elephant-PL'. Whether marking singular or plural, *-ri* consistently selects the long form of a root if there is one.

Overall, our assumptions about *-ri* being a single morpheme are consistent with those made by Grimm (2012a, 2021).

3 Predictions

Previous literature on inverse number marking often suggests that there is a semantic basis for the division into two sets of nouns (those for which the inverse marker indicates plural, and those for which it indicates singular). Corbett (2000:162) notes that there is a "notion of an inverse marker which indicates the less expected number." Corbett also observes (2000:161) that "the two main classes of noun in Kiowa, one with the inverse marker for plural and the other with inverse marking for singular, conform broadly with the Animacy Hierarchy, since the first contains all the animates."

Grimm (2021:454) argues that "the inverse number system in Dagaare reflects principled lexical semantic categorization", although he considers that the system no longer applies to newly created or imported nouns, and he also notes that that "there is a certain amount of conventionalization, historical residue and fuzzy boundaries in the Dagaare system" (2021:455).

Grimm offers two generalizations about the semantic underpinning of the Dagaare inverse number system: frequency and individuation. Frequency refers to the claim that "when a noun designates an entity which is likely to appear singly, *-ri* encodes the plural, while when a noun designates an entity which is likely to appear in multiples, *-ri* encodes the singular" (2021:453). This proposal is in line with Corbett's idea about the "less expected" form being the overtly marked one. Individuation refers to the distinction between referents which are conceived of as

individuals and those that are conceived of as "a collection of entities or an amorphous mass" (Grimm 2021:457).

Grimm (2021:451;457; see also Grimm 2018) argues that Dagaare divides its nouns into four individuation categories. In increasing degrees of individuation, these denote liquids and substances, granular aggregates, collective aggregates, and individuals. The first two of these categories are claimed not to appear with *-ri.* The collective aggregate nouns are termed "basic plural" and take *-ri* in the singular, and the individual nouns are termed "basic singular" and take *-ri* in the plural. Grimm (2012a) also outlines a set of more specific predictions, quoted in (2).

(2) Grimm's (2012a:83) predictions for *-ri*-marking

i. Nouns for higher-level (more salient) animals are more likely to be unmarked in the singular than nouns for insects (animacy)
ii. Nouns for trees should be unmarked in the singular in comparison to nouns for vegetation (distinguishability)
iii. Nouns for tools should be more likely to be unmarked in the singular than the converse (one canonically interacts with them individually)
iv. Nouns for body parts which inherently come in pairs or groups should be more likely to be unmarked in the plural than not, while nouns for body parts which inherently come in single units should be more likely to be unmarked in the singular than not

In our study we set out to test these predictions, using a database of forms described in the next section.

4 Methodology

The data used in this paper are from the central variety of Dagaare spoken in Sombo in the Nadowli-Kaleo district, Ghana. The data were collected in Ghana from twenty-three (23) native speakers in the months of March and April 2018. It involved the elicitation of wordlists, phrases, and sentences and was based on the SIL Comparative African Wordlist (Snider & Roberts 2004). Short stories, songs, and descriptions of local events/culture also formed part of the database. This was supplemented by data from prior literature and data from one of the authors, Alexander Angsongna, who is a native speaker of the above variety of central

Dagaare; the supplemental data served to fill in gaps where a singular or a plural appeared in our data collected in Ghana, but not both. The elicitation was done with a Shure WH30XLR cardioid condenser (a headset microphone) and Rode NGT2 supercardioid condenser (a shotgun microphone) at the sampling rate of 48 kHz and bit depth of 16 bits. The microphones were attached to a Zoom Q8 camera.

The steps towards arriving at the results in this paper involved a number of stages. We started with a total database of seventeen thousand three hundred and fifty-nine (17,359) entries. These entries included duplications, verbs, nouns, adjectives, particles such as tense, negation, and focus particles. Since our focus is on nouns, the next step was to separate the nouns from the rest of the database. We did this using Microsoft Excel.

This stage resulted in a total of four thousand one hundred and seventy-two (4,172) nouns. With this number, we took some further steps. We removed all compound nouns (except for cases where the second member of the compound did not appear independently in the database). We eliminated derived nouns which resulted from nominalization and reduplication. Incorrect entries were also removed. Where stems, including loan words, did not have a clear marker of number or where the alternative was not in the database, we were able in certain instances to edit the entry to include the missing singular or plural form; in other cases, the entry was removed. In terms of number morphology, zero suffixes had not been systematically glossed; so, we added glosses where relevant. Moreover, if a tonal or segmental error was noticed while checking an entry, it was corrected, though we did not systematically try finding such errors for all entries. We also edited cases where glossing was unusual.

After completion of the above steps, we arrived at a total of four hundred and thirty-one (431) simple nouns.[2] The nouns were grouped based on shared roots and we ensured that identical words were adjacent to each other. Out of the 431 nouns, some had both singular and plural forms; some had only singular forms and some had only plural forms. Data gaps were flagged and filled in by Alexander Angsongna.

Our main research objective involves determining whether a noun root is intrinsically individuated or not (or identifiable by some semantic criterion — see Grimm 2010, 2012a, 2018) and whether that determines

[2] By 'simple noun', we refer to a noun root + number suffix combination. That is, all simple nouns are two-morpheme sequences (root+suffix, though the suffix can in some cases be ∅).

the choice of number affixes. So, with regards to semantic assessment, two spreadsheet files were created with the 431 nouns: one with information about the affix choice and the other with information about roots. Each of the authors semantically coded the roots independently, and without consulting the file that contained the affix choice information. We then met to compile the individual assessments into a group consensus. Assessments included mass vs. count, individuated vs. grouped, perceivable components vs. no perceivable components; we also did an assessment into semantic categories — human, body parts, animal, food, insect, event, etc. Based on our combined assessments, we were able to decide on semantic descriptions and categories for each noun. See Section 5 for detailed semantic descriptions and classification of nouns. When semantic coding was complete, we combined the data with our classification of roots to test the correlations of semantics with morphological singular-plural choice. We report here on affix choice for the 222 nouns in our database that used *-ri* in either the singular or the plural.

5 Results

We present our results here by first expressing the precise prediction being tested and then giving the counts from our database. We classified nouns according to three properties: (i) count vs. mass; (ii) if count, then individual vs. group; (iii) if mass, then perceivable components vs. no perceivable components. This corresponds to Grimm's four individuation categories as laid out in Table 2.

Table 2: Individuation categories

Grimm's categories	Count vs. mass	Individual vs. group	Perceiv. vs. no perceiv.
Liquids; substances	mass		no perceivable components
Granular aggregates	mass		perceivable components
Collective aggregates	count	group	
Individuals	count	individual	

Our predictions based on these individuation categories are laid out below.

First, regarding (i) liquids and substances and (ii) granular aggregates, we may distinguish strong and weak predictions. The strong prediction is that there should be no use of *-ri* as a suffix for these two classes of nouns. In Table 3, we present our results. The number of cases involving *-ri* for each of the four individuation classes is compared with the total number of examples in that class.

Table 3: Occurrence of *-ri* in the four individuation classes, based on 449 nouns

	Number of *-ri*	Total number in class
Liquids; substances	21	49
Granular aggregates	3	15
Collective aggregates	48	101
Individuals	150	284

As shown in Table 3, there are examples of *-ri* in both the liquids and substances class and the granular aggregates class, inconsistent with the strong prediction. While there are only a few examples of *-ri* with granular aggregates, over 40% of the liquid and substances class is marked by *-ri*.

The weak prediction for these two classes is that if *-ri* is found for nouns of these types, then it should mark the singular, not the plural. Our results are given in Table 4.

Table 4: Occurrence of *ri*-singular and *ri*-plural in mass nouns, based on 24 nouns with *-ri*

	Prediction	*ri*-singular	*ri*-plural
Liquids; substances	ri-SG > ri-PL	11	10
Granular aggregates	ri-SG > ri-PL	2	1

As seen, even the weak prediction is not met. The number of nouns using *-ri* in the singular in the two mass noun classes is comparable to the number of nouns using *-ri* in the plural.

Regarding count nouns, *-ri* is expected to occur with both collective aggregates and individuals. As seen in Table 3, this is indeed the case: approximately half of both count classes have number marking with *-ri*. The more important prediction for these classes — the core of the inverse

numbering pattern — is that *-ri* should specifically occur with singulars in the collective aggregate class and with plurals in the individuals class. Our results are given in Table 5.

Table 5: Occurrence of *ri*-singular and *ri*-plural in count nouns, based on 198 nouns with *-ri*

	Prediction	*ri*-singular	*ri*-plural
Collective aggregates	ri-SG > ri-PL	23	25
Individuals	ri-SG < ri-PL	45	105

Our results are not consistent with the individuation prediction. The number of instances of *-ri* in singular collective aggregates is comparable to the number in the plural. For the individuals class, the predicted asymmetry holds as a weak tendency, but roughly a third of this class occurs with *-ri* in the singular, against expectation.

Consider next the predictions for nouns of particular semantic types. In terms of animals and plants, it is predicted that for higher-level animals, the default interpretation would be singular, so *-ri* is more likely to occur in the plural, while for lower-level animals such as insects, the default would be plural, so *-ri* is more likely to occur in the singular. In the class of 'animals', we included mammals and reptiles; fish and birds were not included in our counts as we were unsure how to control for interpretations involving schooling or flocking. In a similar vein, trees are more likely to have a default singular interpretation and therefore take *-ri* in the plural while less distinguished vegetation is more likely to have a default plural interpretation and therefore take *-ri* in the singular (Grimm 2021:452).

Table 6: Occurrence of *ri*-singular and *ri*-plural in animals and plants

	Prediction	*ri*-singular	*ri*-plural
Animals	ri-SG < ri-PL	5	23
Insects	ri-SG > ri-PL	3	8
Trees	ri-SG < ri-PL	0	6
Vegetation	ri-SG > ri-PL	3	5

Our results are consistent with the predictions when *ri*-singulars are predicted to be fewer in number than *ri*-plurals, and inconsistent with the predictions when a greater number of singular forms are expected. The

overall tendency is simply for *ri*-plurals to outnumber *ri*-singulars in these semantic classes.

For tools, the default is expected to be singular; hence the prediction for *-ri* is that it should occur in the plural.

Table 7: Occurrence of *ri*-singular and *ri*-plural in tools

	prediction	*ri*-singular	*ri*-plural
Tools	ri-SG < ri-PL	10	17

The prediction is confirmed as a tendency only, with over a third of tools that are marked for *-ri* taking *-ri* in the singular.

Finally, we considered the use of *-ri* in nouns denoting body parts. As sketched in (2), it is predicted that body parts that are grouped would have a default plural interpretation (hence *-ri* in the singular) while body parts that are not grouped would have a default singular interpretation (hence *-ri* in the plural) (Grimm 2021:453). The results are given in Table 8.

Table 8: Occurrence of *ri*-singular and *ri*-plural in body parts

	Prediction	*ri*-singular	*ri*-plural
Paired/grouped body parts	ri-SG > ri-PL	14	6
Unpaired/ungrouped body parts	ri-SG < ri-PL	14	15

As seen, individual body parts are quite evenly distributed between *ri*-singular and *ri*-plural — inconsistent with the prediction. Paired/grouped body parts are consistent with the prediction as a tendency, though we find six examples of 'default' singular.

6 Discussion

6.1 Semantics of *-ri*

We have shown so far that *-ri* is a single morpheme, which sometimes conveys singularity and sometimes plurality, and as seen in our results section, which of these meanings *-ri* conveys is not predictable from the semantics of the noun to which it attaches. It is a non-trivial challenge to find a unified semantic denotation for *-ri* that achieves the apparently

opposite results of sometimes conveying singularity and sometimes plurality.

Grimm (2012a) considers two proposals for the semantic analysis of *-ri.* The first analysis, which he adopts (see also Grimm 2021), assumes an *exclusive* interpretation of the plural, according to which plural denotations exclude singular atoms (e.g., Link 1983). Thus, an exclusive plural noun 'children' would refer only to pluralities of children, and give rise to falsity when applied to a single child. The function of *-ri* is then to select the complement set of the denotation of the noun: *-ri* added to a basic singular produces a plural noun that denotes only sums, while *-ri* added to a basic plural produces a singular noun that denotes only atoms.

The second analysis, which Grimm considers but then rejects, assumes an *inclusive* interpretation of *-ri* plurals, according to which these plural denotations include both sums and atoms (e.g., Krifka 1989). The contribution of *-ri* under this analysis is to produce closure under join, which means that a *-ri*-noun, regardless of whether *-ri* combines with a basic singular or a basic plural, will always denote the entire semi-lattice (covering both sums and atoms). The fact that basic singulars + *-ri* denote pluralities is achieved by pragmatic blocking. The same explanation can also account for why basic plurals + *-ri* denote singularities, under the assumption that the basic plural nouns have exclusive plural denotations, which are then made into inclusive plurals (containing atoms) by *-ri* (Grimm 2012a:96).

It seems to us that neither of these two analyses quite works. The exclusive plural analysis fails because the facts do not support an exclusive interpretation for *-ri*-plurals. This is illustrated in (3) to (4). The exclusive plural analysis predicts that answer B' in (3) will be felicitous, since the plural form *bíírí* denotes only non-atomic sums and, therefore, if B has one child, it will be appropriate to deny that they have *bíírí*. This prediction does not fit the judgments of Alexander Angsongna.[3]

(3)	A:	fɔ̀	táá	ná[4]	bìì-**rì**
		2SG	have	FOC	child-**RI**
		'Do you have children?'			

[3] Grimm twice alludes to the fact that inclusive plural tests yield parallel results in Dagaare to in English (which has inclusive plurals) (2012a:96–97); he nevertheless opts for the opposite analysis. The only data he provides to test the inclusivity of plurals do not include *-ri*, hence is not a relevant example (2012a:97).

[4] Note that the focus particle as indicated here has another variant referred to as *lá* in other varieties of Central Dagaare especially the Jirapa dialect. It also has clitic forms as *-ŋ, -e/-ɛ.*

B: Mḿḿ, Ǹ táá ná bì-jénì
yes 1SG have FOC child-one
'Yes, I have one child.'

B':# Ààjí, Ǹ táá ná bì-jénì
no 1SG have FOC child-one
'No, I have one child.'

Example (4) makes a similar point. The negation of a *-ri*-plural negates both sums and atoms, not merely sums, as shown by the fact that C's utterance conveys that C has not even one child.

(4) *Context: C has one child. C tells D:*

M̀ bá táà bíí-**rí**
1SG NEG have child-**RI**
'I don't have children.'

On the other hand, the inclusive plural analysis relies on the assumption that the simple basic-plural nouns have exclusive plural denotations, as noted above. These are then converted to inclusive plural denotations by *-ri,* and pragmatic blocking by the exclusive-plural bare noun results in a singular denotation for the *-ri* form. As noted by Grimm, however, this also does not fit the facts for simple plural nouns. This is illustrated in (5).

(5) Q: fʊ̀ táá ná kòmbì-è
2SG have FOC tomato-PL[5]
'Do you have tomatoes?'

A: ḿḿ, Ǹ táá ná kómbì-yénì
yes 1SG have FOC tomato-one[6]
'Yes, I have one tomato.'

[5] Concerning glossing, we have glossed [kòmbì-è] as 'tomato-PL' here, in line with an analysis of -è as a morpheme; if -è is an epenthetic vowel then the glossing would be more appropriately 'tomato.PL'. See discussion of what is at stake in Section 6.2.

[6] As pointed out by Ryan Bochnak, the semantic function of *yénì* in this example raises interesting questions. If 'tomato' is plural-denoting by default, then what exactly is the effect of adding *yénì* 'one'? This and other questions concerning number in Dagaare go beyond our examination of *-ri* in this paper and require future research.

While we do not have a worked-out formal solution to this problem at the current time, the desired effect of *-ri,* based on the data in (3) to (5), is clear: when *-ri* applies to a simple singular denotation that includes only atoms, it *adds sums* to result in an inclusive plural denotation. When *-ri* applies to a simple plural denotation that is inclusive (containing both atoms and sums), it *removes the sums* to result in a singular denotation. Crucially, whether a simple noun will denote singularities or pluralities is *not* predictable from whether the noun refers to items that are typically found in groups or singularities in the real world. That is, we assume that it must be lexically specified for each simple noun whether it is inherently singular or inherently plural.

6.2 Lexical encoding of number

As discussed above (in Section 6.1), under Grimm's analysis the suffix *-ri* does not itself denote the singular or plural, but instead denotes negation of the lexical denotation of the base. Nouns may be lexically singular (e.g., *bì* 'child') or plural (e.g., *kù* 'tortoise'). For Grimm, lexical number-marking is systematically determined by the degree of individuation: more individuated nouns are predicted to be lexically singular.

Rejecting the inverse-marker analysis: If we reject entirely the analysis of *-ri* as an inverse marker, then there must be two distinct but homophonous morphemes *-ri*$_{[PL]}$ and *-ri*$_{[SG]}$, explaining how the "same" morpheme can mark either the singular or plural depending on the noun base that it attaches to. The choice of *-ri*$_{[PL]}$ or *-ri*$_{[SG]}$ is an idiosyncratic property of a given noun (within one of the noun classes that surfaces with a *-ri* suffix), and is presumably encoded in its lexical entry. However, the uniform morphophonological behaviour of the *-ri* suffix(es), as discussed in Section 2, strongly suggests that *-ri* is indeed a single morpheme, and this generalisation is lost if we postulate multiple homophonous *-ri* suffixes.

Rejecting the individuation analysis: However, it may be possible to reject Grimm's analysis of noun individuation in Dagaare while retaining the insight that *-ri* is an inverse marker. Suppose that nouns are arbitrarily specified in the lexicon as either [singular] (denoting atoms) or [plural] (denoting atoms + pluralities), rather than basic number being determined by a putative scale of individuation. Since *-ri* is an inverse marker and denotes the negation of the lexical base, we derive the observed pattern of number marking.

In general, however, analysing *-ri* as an inverse marker leaves behind the uneasy residue of the additional *-V* that appears in the "unmarked" forms of many nouns. As mentioned in footnote 2, whether or not *-V* is an epenthetic segment or a morpheme is unclear. While Grimm follows Anttila and Bodomo (2009) in assuming that its presence is phonologically conditioned and thus predictable, Angsongna (2023) raises problems for the epenthesis account. Future research is needed to determine the optimal analysis of this marker. If *-V* can be shown definitively to *not* just be an epenthetic segment, then the inverse-marker analysis must also provide an account for *-V*.

6.3 Borrowings

Grimm (2021:454) states that inverse number is not observed in loan vocabulary. Particularly since we have argued above that inverse number is not (fully) predictable even in native vocabulary, this would certainly not be surprising. Nevertheless, consider borrowed items such as those in (6) and (7). The forms in (6) appear to be phonologically special, as noted in Grimm (2021), since the *-ri* observed in the singular could be the Dagaare interpretation of the phonological form of the English.

(6) Singular marked by *-ri*

Singular	Plural	Source	Gloss
lɔ́ɔ́-rì	lɔ́è	English	'lorry'
sákì-rì	sákìè	English	'bicycle'
hántʃí-rì	hántʃíè	English	'handkerchief'

The forms in (7), which do not show such a phonologically motivated effect, might be interpreted as showing a general tendency to use *-ri* to mark plural in loan words. It is noteworthy, however, that all the nouns here can be seen as designating entities that are likely to occur singly, which would lead us to expect by the inverse number hypothesis that *-ri* should encode plural.

(7) Plural marked by *-ri*

Singular	Plural	Source	Gloss
bìrítʃì	bìrítʃì-rí	English	'brick'
wátʃì	wàtʃì-rí	English	'watch'
dɔ́kítà	dɔ́kítà-rí	English	'doctor'
kɔ́pɔ̀	kɔ́pɔ̀-rí	English	'cup'

móŋgò	móŋgò-rí	English	‘mango’
bìlédì	bìlédì-rí	English	‘blade’
ásíbítì	ásíbítì-rí	English	‘hospital’
nɛ́ɛ́sì	nɛ́ɛ́sì-rí	English	‘nurse’
pèríkó/pòríkó	pèríkó-rí	Akan/Portuguese	‘pig’
kòdú	kòdú-rí	Akan	‘banana’
pòlísì	pòlísì-rí	English	‘police’
sùkúù/sàkúù	sùkúú-rì/sàkúú-rì	English	‘school’
kànɪ́ɛ̀	kànɪ́ɪ́-rì	Akan	‘lantern’
gɔ́ɔ́tà	gɔ́ɔ́tà-rí	English	‘gutter’
táájà	táájà-rí	English	‘tyre’
bókítì	bókítì-rí	English	‘bucket’
sódʒá	sódʒà-rí	English	‘soldier’
ʧɛ́nsì	ʧɛ́nsìì-rí	English	‘sheet’

We leave an investigation of the productivity of *ri*-singular vs. *ri*-plural for future investigation.

6.4 Comparative Mabia

Aside from central Dagaare, the morpheme *-ri* has a number-marking function in three other dialects of Dagaare/Dagara, namely Lobr, Wiile, and Birifor (Mwinlaaru 2023). A similar singular–plural alternation or inverse marking strategy involving *-ri* is found in these three dialects. Also, as in Dagaare/Dagara, a *-ri* morpheme is employed as a number marker in other Mabia/Gur languages. Some of these languages, e.g. Buli (Schwarz 2005, 2012; Akanlig-Pare 2005), Konni (Cahill 1999), and Moore (Delplanque 1995), employ *-ri* primarily as a singular, but Dagbani (Wilson 1972; Olawsky 1999), another Mabia/Gur language, employs *-ri* as a plural marker. A few other Mabia/Gur languages (e.g., Gurene – Dakubu 1996; Nsoh 2002) have no *-ri* for number marking.

On phonological grounds, it appears that *-ri* is not the original number marker in Mabia/Gur languages. One piece of evidence can be deduced from the distributional features of /r/. The approximant /r/ rarely occurs as a word-initial element in Mabia/Gur languages. In word-medial position, where /r/ is found frequently, /r/ occurs as an allophonic variant of a different sound. Dagaare has several allomorphs of the *-ri* suffix (Angsongna 2023). It thus appears that there was an original morpheme (not *-ri*) in Dagaare and other dialects of Dagara that has etymologically been replaced by [-ri]. In Buli, [ri] and [di] are singular-marking variants in nouns like [bìisírí]~[bìisídí] ‘breast’, [nísírí]~[nísídí] ‘hand’, and

[nùènsírí]~ [nùènsídí] 'footwear'. The Buli pronominal system provides good evidence for [di] being the original form of the morpheme. For example, in accordance with the agreement pattern of Buli, morphemes that mark number also function as independent pronouns. All nouns that have [-ri] or [-di] as a singular suffix in Buli select [di] as their independent pronoun; [ri] never occurs as a pronoun. There are also Mabia languages that have [-di] but no [-ri] as a number marker, so we would assume that not every Mabia language has developed a [-ri] variant.

As seen above, most of the Mabia languages about which we have discussion take *-ri* as a marker of singular. This suggests that the proto-language had *-ri* as a singular morpheme.[7] If this is correct, then we would expect the innovation in Dagaare to be the use of *-ri* as a plural marker. Taken together with the individuation hypothesis concerning the semantics of *-ri*, we would expect that plural cases involving *-ri* would be more semantically coherent than singular cases involving *-ri*. This follows since the cases in the proto-language with *-ri* as a singular would not be expected to show individuation distinctions: *-ri* simply marks singular. As *-ri* shifted to encoding plurality on certain nouns, if the individuation hypothesis is correct, then we would expect a change only in count nouns where the default meaning is individuals. That is, liquids/substances, granular aggregates, and collective aggregates would be expected to continue using *-ri* in the singular since there would be no pressure for change.

This is easy to test. There are 81 nouns that show *-ri* in the singular and 141 nouns that show *-ri* in the plural. The breakdown in terms of the four individuation categories we have been considering is shown in Table 9.

While the effect is not absolute, we see that count/individual cases where *-ri* appears in the plural constitute 74% of all *ri*-plural forms while only 56% of all *ri*-singular forms. Overall, the *ri*-singular nouns are indeed more semantically diverse than are the *ri*-plural forms.

[7] This hypothesis leaves unexplained the Dagbani pattern where *-ri* is a marker of plural only.

Table 9: Dagaare individuation in *ri*-singular and *ri*-plural

	Nouns taking ri-SG	Percentage	Nouns taking ri-PL	Percentage
Liquids; substances	11	14%	10	7%
Granular aggregates	2	2%	1	1%
Collective aggregates	23	28%	25	18%
Individuals	45	56%	105	74%

7 Conclusion

In this study, we tested semantic individuation as a means of determining the use of *-ri* in Dagaare as a singular or plural marker. Using a database of forms collected from multiple speakers, we coded nouns for individuation categories and assessed these categories for observed use of singular and plural *-ri*. While we did not find consistent enough use of semantic individuation to directly predict observed suffix choice, we did find certain indications that Dagaare has been innovating in the direction of including *-ri* as a plural marker, and doing so preferentially for nouns denoting countable individuals.

We leave numerous questions for future investigation. Notably, we have not developed a formal treatment of the semantics of *-ri* suffixation. In addition, we have not considered how to integrate the properties of *-ri* into a larger treatment of number in Dagaare generally. In particular, we have not addressed the morphology and semantics of the epenthetic/lexically specified vowel 'suffix' that is paired with *-ri,* and we have not considered the suffixes that account for the roughly 50% of the lexicon that marks number in other ways.

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