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Comparing causal-noncausal alternation in three West-African families in contact: Atlantic, Mel and Mande

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Introduction

The causal-noncausal alternation is defined here as a *semantic* distinction built on the presence/absence of a *causer* in a pair of verbs referring to the same core event or state-of-affairs, such as *kill/die*, *break* (tr.)/*break* (intr.), *raise/rise* or *frighten/fear* in English. Although this semantic opposition is often correlated with an opposition between transitive and intransitive constructions (e.g. *break* (tr.)/*break* (intr.), *kill/die*) or between processes and states (e.g. *frighten/be afraid*, *dry/be dry*), these syntactic and aspectual oppositions are not defining properties of the causal-noncausal alternation, they rather appear as realizations of this alternation, depending on the various verb types or Aktionsarten involved in the causal-noncausal pairing. In a typological perspective, several studies point that the coding of causal-noncausal alternation shows an interesting crosslinguistic variation. Depending on the semantic subtypes of causal-noncausal pairs, the crosslinguistic variation for coding this alternation is more or less important. On the one hand, there is a general tendency of languages to code this alternation by deriving (morphologically or syntactically) the causal verb form out of the noncausal one by means of causative markers (e.g. *laugh/make laugh*), that is using a transitivization strategy, as evidenced by Nichols *et al.* (2004). On the other hand, Haspelmath (1993) has shown that the cross-linguistic variation in the coding of causal-noncausal pairs is particularly important for a specific subtype of verb pairs, referred to as ‘inchoative/causative’ pairs and defined as follows: The ‘inchoative’ (noncausal) member of the pair “generally refers to a change of state (more rarely a going-on), excludes a causing agent and presents the situation as occurring spontaneously” (*ibid.* p.90), as in *The stick broke* (inchoative) vs. *The girl broke the stick* (causative). For this type of pairs (such as ‘break’ intr./tr., ‘melt’ intr./tr., ‘open’ tr./intr.), the direction of formal derivation (i.e. causative, decausative or non-directed alternations using labiality, equipollence or suppletion) is not predictable and languages differ considerably in their preferences for coding this alternation.

In order to account for crosslinguistic diversity in the coding of causal-noncausal verb pairs, various factors can be called into play, such as genetic affiliation, typology (Nichols *et al.* 2004), frequency (Haspelmath *et al.* 2014) or contact (Bickel 2015). As a contribution of African linguistics to the debate, this article investigates the coding of causal-noncausal alternation in three families of languages spoken in West Africa. Atlantic, Mande and Mel languages belong to the same Niger-Congo phylum¹ but display quite different typological

¹ The belonging of Mande to the Niger-Congo phylum is presently questioned by some authors (Dimmendaal 2008, 2011, Creissels 2017) and remains an outstanding issue (Vydrin 2016).

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profiles and have long lasting historical contacts in Senegal and the surrounding areas. These features make them good candidates for (i) evaluating the correlation between typological profile and “valence orientation” that is the overall tendency of a language to treat members of causal-noncausal verb alternations in a particular way (Nichols *et al.* 2004), (ii) tackling contact-induced changes in valence orientation.

The five possible strategies for the coding of causal-noncausal pairs are actually attested in the three families, as illustrated in the three tables below, namely:

- the *suppletive* strategy (abbreviated here as $nC \neq C$) whereby the causal-noncausal pair is made of two different lexemes;
- the *labile* strategy ($nC = C$) whereby the same verb is used with a causal or noncausal meaning without formal change;
- the *causative* or transitivization strategy ($nC > C$) whereby the causal verb is formed through a causative derivation² of the noncausal verb;
- the *decausative* or detransitivization strategy ($nC < C$) whereby the noncausal verb is formed through a decausative derivation of the causal verb;
- the *equipollent* strategy ($nC \sim C$) whereby the causal-noncausal pair is made of two different forms of a same verb, both displaying the same degree of morphological complexity. Alternation can be achieved through derivational, inflectional or phonological marking.

Table 1. Examples of the five coding strategies in Atlantic family

<i>Jóola Kwaatay</i> (Coly 2010)				
suppletive	$nC \neq C$	<i>ketu</i>	<i>yoolu</i>	die / kill
labile	$nC = C$	<i>liiken</i>	<i>liiken</i>	learn / teach
causative	$nC > C$	<i>lab</i>	<i>lab-n</i>	boil / boil
decausative	$nC < C$	<i>welej-o</i>	<i>welej</i>	break / break
equipollent	$nC \sim C$	<i>siin-o</i>	<i>siin-an</i>	be straight / make straight

Table 2. Examples of the five strategies in Mel family

<i>Landuma</i> (Rogers & Bryant 2012)				
suppletive	$nC \neq C$	<i>nənk</i>	<i>mənk</i>	see / show
labile	$nC = C$	<i>pəc</i>	<i>pəc</i>	cook / cook
causative	$nC > C$	<i>wos</i>	<i>wos-əs</i>	dry / make dry
decausative	$nC < C$	<i>wəkəc-ɔ</i>	<i>wəkəc</i>	break / break
equipollent	$nC \sim C$	<i>funp.ɔ</i> ³	<i>funp-əs</i>	fall / drop

Table 3. Examples of the five strategies in Mande family

<i>Bobo</i> (Bris & Prost 1981)				
suppletive	$nC \neq C$	<i>siri</i>	<i>yε</i>	die / kill
labile	$nC = C$	<i>yɔ</i>	<i>yɔ</i>	break / break
causative	$nC > C$	<i>tanga</i>	<i>tanga-be</i>	sit / seat
decausative	$nC < C$	—	—	(not found in data)

² Periphrastic causatives are not studied here.

³ Hyphen (-) indicates a derivational morpheme, dot (.) indicates a morpheme analyzable as an inflectional ending or as a frozen suffix.

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equipollent	nC ~ C	<i>kibe</i>	<i>kɔba</i>	open / open
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However, considering their respective typological profiles, distinct strategies are expected to be favored in the different families. Labile strategy is expected to be favored in Mande languages which are rather isolating languages with a limited set of derivational suffixes (Williamson & Blench 2000: 21) and regularly labile verbs, as exemplified in (1). For instance, in Mano, four verbs out of five (actually 66 out of 297) are labile in Khachaturyan’s study (2014).

Mandinka (Mande) (Creissels & Bassène 2013)

- (1) *dádaa*
‘to repair’ ~ ‘to be repaired’

In contrast, directed (i.e. causative and decausative strategies, as exemplified in (2)) or, more largely, derivational strategies (consisting of causativization, decausativization and equipollence) are expected to be favored in Atlantic where large inventories of verbal extensions are widespread (Williamson & Blench, 2000: 22). In accordance with this rich and productive inventories of verbal affixes illustrated in example (2), equipollence is mostly coded by a double derivation in these languages (as exemplified in Table 1 above). Therefore a grouping of all these strategies⁴ together (including equipollence), may be more relevant for Atlantic than the usual distinction between directed (causative and decausative) vs. non-directed strategies (labile and equipollent strategy).

Wolof (Atlantic)

- | | |
|------------------------------|--------------------------------|
| (2) noncausal > causal | causal > noncausal |
| <i>réer</i> ‘to be lost’ | <i>sakk</i> ‘seal’ |
| → <i>réer-al</i> ‘to lose’ | → <i>sakk-u</i> ‘to be sealed’ |
| be_lost-CAUS1 ⁵ | seal-MID |
| <i>génn</i> ‘go out’ | |
| → <i>génn-e</i> ‘take out’ | |
| go_out-CAUS2 | |
| <i>jooy</i> ‘cry’ | |
| → <i>jooy-loo</i> ‘make cry’ | |
| cry-CAUS3 | |

As for Mel, this small family is too poorly documented for defining a typological profile. However, considering that these languages were classified as a sub-group of Atlantic family until recently⁶, some affinity between the two families can be assumed so that we hypothesize for Mel a coding profile closer to that of Atlantic.

⁴ This unusual grouping of equipollence with directed strategies is also supported by Plank and Aditi's position (2015: 1) arguing that “phonological alternations [equipollent, here], on their own or attendant upon conjugation class switches between intransitives and transitives, can be as directed as derivations are which are implemented through adding segmental markers”.

⁵ List of abbreviations: ACT *active*, CAUS *causative*, MID *middle*, INF *infinitive*, PASS *passive*. Number after CAUS *causative* indicates that language has several causative derivations, the number refers to a specific one.

⁶ The classification of the Mel languages into a distinct family has been recently confirmed by Pozdniakov and Segerer (to appear), after a first suggestion by Dalby (1965).

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Temne (Mel)

(3)	noncausal > causal		causal > noncausal
	<i>shel</i>	laugh	<i>mãnk</i>
	<i>shel-əs</i>	make laugh	<i>mãnk-əne</i>
	laugh-CAUS		hide-MID
			hide (tr.)
			hide (intr.)

In order to check these predictions and to identify contact-induced changes, we have documented the three families by retrieving and analyzing the same eighteen verb-pair meanings from the *RefLex* lexical database (Seegerer & Flavier 2011). The list of eighteen verb pairs proposed by Nichols *et al.* was used here to ensure continuity and built on the previous works. As can be seen in Appendix 1, this list designed for targeted investigations includes proxies (e.g. cry/laugh) and does not distinguish between states and processes (e.g. be/become angry as noncausal member of pair 07) nor between durative and inceptive processes (e.g. burn/catch fire for pair 11). These data were also complemented and substantiated by available grammars, and by some inquiries of specialists of individual languages when needed and possible.

This article is structured as follows. Section 1 presents the language sample, its limitations and the problems encountered for collecting data. Section 2 is dedicated to the study of the correlation between typological profile and valence orientation across the three families. The coding profiles of the different families emerging from our quantitative study are here confronted with our hypotheses. While these first results confirm the predictions about Atlantic (2.1), they provide contradictory results for Mande. This leads us to consider a possible bias due to the list of verbs and to check again the coding profiles using a restricted list of verbs. The results obtained with this new list concerning the favored strategies in the three families are then presented (2.2), along with two additional results (2.3 and 2.4.) which were unexpected according to general predictions. Using optimized patterns of distribution of the coding strategies used in each family, the last section (3) tackles the issue of contact-induced changes in valence orientation by sorting out the possible causes for the deviation of individual languages from the family standards. This methodology is applied to Mel (3.2.), to the Mande sample (3.3.), and finally to Atlantic family on which this study focuses (3.4). Eventually, a possible genetic distribution of deviation according subgroups is investigated for this last family.

1. The language sample: limitations and problems

As a first step, the whole Atlantic family has been investigated in the database. Since a preliminary study had revealed a greater diversity among Atlantic languages than inside the Mande family, we decided to focus our study on Atlantic languages and restrict the Mande sample to languages in contact with Atlantic. All the languages of the small Mel family were also investigated because they are in contact with the two other families (see Map 1). For Mande, we have added to the six languages in contact with Atlantic and Mel, two other languages with no contact, for balancing somehow a possible effect of contact in the coding profile emerging from our study of Mande. However, after retrieving all the data from the database, several languages have been discarded for this study because they were too poorly documented.

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Map 1- Map of the languages of Senegal and the surrounding areas (Pozdniakov, Segerer, & Vydrine 2008)



In spite of the extraordinary coverage of *ReFLex*⁷ and our personal effort for substantiating these data with additional documentation on the various languages, the list of 18 verb pairs could not be fully completed for the majority of the languages in the sample. This is due to missing information in *ReFLex* (which is a lexical database using uneven sources, from short lists of words to full dictionaries), to data collection through a *lexical* database and not through elicitation, and ultimately to the insufficient documentation of African languages (many languages are still poorly documented). Consequently when a derived form was not found in the dictionaries used for building this lexical database (or in the descriptions used additionally for this study), it does not mean that it does not exist in the language (lexicographers have various strategies about including or not suffixal forms in their dictionaries or lexicons). Moreover, for Mel and Atlantic, some items had to be removed from our sample of verb pairs because, according to our documentation, the causal member or even sometimes the two members of a pair have a periphrastic coding. These problematic pairs are: 01 ‘laugh’ and 04 ‘eat’ in Atlantic, 03 ‘sit’ in Mel, and most frequently 07 ‘be/become angry’ in the two families. Accordingly, they are missing for several languages, not because they are not documented but because the causal periphrastic coding is excluded from our study. This situation has generated gaps in our samples and also a possible bias in favor of the verb pairs universally coded by suppletion. This data shortage results in an unbalanced coverage of the verb pairs across individual languages with risks of bias in the comparison. We have figured out various solutions to counterbalance these possible bias (see 2.1 and 3.1.). Still our results on the families’ coding profiles about valence orientation should be interpreted with caution due this uneven sampling. However, a complementary analysis (Tang, Voisin & Robert in preparation), based on permutations with bootstrap samples of the data and randomly selected subset of variables shows that the available information is sufficient to capture the regularities of verb pairs in the three different language families.

⁷ *ReFLex* (*Reference Lexicon of the Languages of Africa*), is an online lexical database devoted to the languages of Africa. It covers presently 789 languages with over one million words, retrieved from referenced and accessible sources, and provides additional tools, mainly dedicated to phonological and lexical reconstruction.

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2. Correlations between typological profile and valence orientation

In order to study the correlation between typological profile and valence orientation across the three families, the coding profiles of the different families have been defined by calculating the average of the various strategies used for coding the 18 causal-noncausal verb pairs in each set of languages. Considering the gaps in the data, the total for each strategy is calculated here on the basis of the number of pairs found in individual languages ($X/18$). Therefore the total of percentages is below hundred. These results are then confronted with our predictions about the favored strategies according to typological profiles.

2.1. The favored strategies across families: first results

For Atlantic, directed or, more largely, derivational strategies (*i.e.* directed strategies plus equipollent strategy) were expected to be favored according to the typological profile of these languages. The quantitative study of the coding strategies for the 18 verb pairs in the 36 Atlantic languages confirms our prediction. As shown in Table 4, derivational strategies are by far the most common strategies used inside the family, be they directed (making use of causative or decausative affixes) or not (using equipollent strategy).

Table 4. Average values for directed and derivational strategies vs. others in Atlantic (% of pairs found)

	ATLANTIC		
< & >	41,34	51,43	derivational strategies
~	10,09		
=	8,61	24,38	non-derivational strategies
≠	15,77		

In contrast, labiality was expected to be the favored strategy for the rather isolating Mande languages. However, this hypothesis is not confirmed here. As visible from Table 5, in our sample, Mande languages display a more prominent use of causativization (>), labiality (=) being only the second (important) one, also much more frequent in Mande than in Atlantic and Mel. Noticeably, with the list of verb pairs that was used, transitivization (causativization in our terms) is the preferred strategy in the three families, confirming here the general trend evidenced by Nichols *et al.* (2004).

Table 5. Average values for each of the five possible strategies in the three families (% of pairs found)

	ATLANTIC	MANDE (sample)	MEL
>	29,34	36,81	20,83
<	12,00	8,89	17,59
~	10,09	0,93	11,11
=	8,61	31,25	7,54
≠	15,77	12,15	20,63

It is worth noting that Mel has a coding profile closer to that of Atlantic. This is not surprising considering the previous classification of Mel languages as a sub-branch of Atlantic. As shown in Table 6, the various strategies display the same ranking in both families. However in Mel the scores for causativization (>) and suppletivism (≠) are almost equal (see Table 5).

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Table 6. Ranking of the five strategies in Atlantic and Mel

Ranking	1	2	3	4	5
ATLANTIC	>	≠	<	~	=
MEL	>	≠	<	~	=

2.2. New results with a controlled list of verb pairs

Contrary to our predictions based on typological profiles, labiality is not the favored strategy for Mande in our results, causativization is the preferred one. These contradictory results for Mande lead us to consider a possible bias in favor of causativization in the list of verbs we used for this study, resulting in an overrepresentation of causativization strategy. In their study on causal/noncausal verb alternations, elaborating on the general preference of languages for transitivization strategy, as pointed out above, Haspelmath *et al.* (2014) indicate that, crosslinguistically, causative strategy is almost always used for agentive and atelic core-events.

“In general when the core-event is itself agentive (i.e. when one participant is a volitional agent) and atelic, languages (virtually) never use anticausative, equipollent or labile coding.” (Haspelmath *et al.* 2014: 591).

Indeed, verbs virtually 01 to 09 in our list are prototypically used with an animate subject (as explicitly indicated by Nichols *et al.* 2004⁸), so they are often agentive, and also atelic. Thus, causative derivation might be overrepresented in our results because of this first half of verbs. On the other hand, verbs 10 to 18 in this list correspond almost perfectly to the noncausal verb types for which the cross-linguistic variation in the coding of causal-noncausal pairs is particularly important according to Haspelmath (1993) and Creissels (in this volume), that is for “monovalent verbs referring to a process (not a state) typically undergone by concrete inanimate entities, and easily conceived as occurring without the involvement of a clearly identified external instigator” in Creissels’ (*ibid.*) terms. Therefore, the study of these verbs is crucial to characterize the *preference* of individual languages for one of the possible strategies. For these two reasons, we have taken out verbs 01 to 09 from the list and calculated the average of the five strategies for verbs 10 to 18 in the three families. Henceforth, following Nichols *et al.* (2004), for brevity we will refer to the two sets of verbs in the list, as ‘animate’ and ‘inanimate’. It should be kept in mind, though, that in our corpus all the ‘inanimate verbs’ do not strictly correspond to the verb type described by Haspelmath *et al.* (2014) and Creissels (in this volume): Some are states and not processes (e.g. ‘be straight’ as a proxy of ‘become straight’), since the original list did not distinguish between stative and dynamic processes (see Appendix 1).

As visible from Table 7, with this restricted list of verb pairs controlling (in)animacy, the coding profile of Mande confirms our predictions based on typological profile: labiality is the favored strategy. These new results also confirm the bias for causativization in the original list combining all verb types.

⁸ “Pairs 1-9 have varying degrees of agency and volition on the part of an animate S/O; 10-18 have varying degrees of independence, resistance to force, etc. on the part of an inanimate S/O. Henceforth for brevity we will refer to the two sets of verbs as ANIMATE VERBS and INANIMATE VERBS respectively » (Nichols *et al.* 2004: 155-6).

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Table 7. Average of the 5 possible strategies for the verb pairs 10 to 18 (% of pairs found)

	ATLANTIC	MANDE	MEL
>	30,98	33,33	29,63
<	21,74	13,89	42,59
~	15,74	0,00	11,11
=	15,36	44,44	19,44
≠	12,87	5,56	11,11

Interestingly, when using the ‘inanimate’ verb list, the increase of lability in Mande parallels an increase of decausativization for Atlantic (from 12 to 21,74 %) and Mel (from 17,59 to 42,59 %), decausativization becoming even the favored strategy in Mel. This is in accordance with the general preference of Atlantic and Mel for directed strategies but the preference of Mel for decausative coding reaches here an outstanding proportion. For this family, four languages were removed from the sample because of data shortage (less than four verb pairs were found) when retrieving only verb pairs 10 to 18. Consequently, the new scores presented are calculated on the only three well documented languages for these verb pairs: Sherbro, Kisi and Landuma. Eventually, a remarkable point stands out for Atlantic when using this controlled list of verb pairs, which are crucial to characterize the preferences of languages: the coding profile of this family appears here to be more evenly distributed among the various strategies compared to Mel and especially to Mande, directed strategies (> and <) standing ahead and all other ranking tightly together with no really low scores.

The comparative results with this controlled list, restricted to ‘inanimate verbs’, show that verb types are conditioning factors for the coding of valence alternations. As a selection of verbs displaying the greatest crosslinguistic variability for this coding, this restricted list is crucial to characterize the preference of individual languages. However, in the next parts of this study, we keep using the larger list as more appropriate for a cross-family comparison, in as far as it covers a greater and more representative sample of the various verb types used in languages.

2.3. Additional results: surprising scores for equipollent and suppletive strategies

In addition to the results confirming the correlations between typological profiles and favored strategies as we hypothesized, we found two unexpected results according to general assumptions.

2.3.1. Equipollent strategy: a surprisingly significant score in Atlantic and Mel

The equipollent strategy has received less attention in the typological studies on causal-noncausal alternation. In these studies, the focus is generally on the crosslinguistic prominence of the causative strategy over others. The typological trends of languages for coding this alternation show some exceptions on this point but in these counterexamples the equipollence is never the privileged strategy, even when augmented by the suppletivism measure, as proposed by some authors considering the supposedly rare use of these two strategies (see footnote 12). In Table 8, extracted from Haspelmath *et al.* (2014), the equipollent strategy is merged with suppletion. The scores show that the causative strategy is indeed the preferred strategy of a majority of languages (four out of seven), the three diverging languages (Romanian, Russian and English) favoring either the decausative or the labile strategy, but none equipollent one. Due to the fusion of equipollent and suppletive strategies in this table, it is

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difficult to have a good preview of the proportion of verb pairs using only equipollent strategy, but the rates in this sample of languages already confirm its low use.

Table 8. Different coding type trends in the seven languages (Haspelmath et al. 2014: 591)

	Causatives	Anticausatives	Equipollents	Labiles	% of causatives
Turkish	12	7	1	0	63
Japanese	8	7	4	1	53
Maltese	9	9	1	1	50
Swahili	6	8	7	0	43
Russian	1	13	6	0	7
Romanian	0	20	0	0	0
English	0	0	2	18	0

By comparison, in our study, the score of use of equipollent strategy is remarkable both in Atlantic (10,09 % with the ‘inanimate’ verbs in Table 5, reaching 15,74 with the restricted list in Table 7) and Mel (11,11 % in all cases), in particular when compared to Mande (0,93 and 0,00). Two converging structural factors may explain these unexpected scores. Equipollent strategy consists of various subtypes. In a first subtype, the causal-noncausal alternation corresponds to voice oppositions encoded in the verbal inflection either through inflectional voices system or through conjugation classes. These two inflectional variants are recorded for a few languages in our survey. In Pulaar and Ful of Massina for instance, the verb system is organized around voice oppositions in the form of active, middle and passive inflections as illustrated in (4). In these languages, verbal inflections display steady markers for the different voices, and there is no decausative morpheme. So, there is no alternative derivational means for equipollent coding than the inflectional voice system.

Ful of Massina (Atlantic) (Breedveld 1995: 151)

(4)	<i>ɔudd-ude</i>	<i>ɔudd-aade</i>	<i>ɔudd-ɛede</i>
	open-INF.ACT	open-INF.MID	open-INF.PASS
	‘to open something’	‘to be open(-able) (of something)’	‘to be opened (by someone)’

In Balant (and probably in Landuma⁹, Mel family), the inflectional system takes the form of verb class changes (or conjugations classes), as illustrated in (5) below. Balant has three conjugation classes, visible through a set of final vowels¹⁰. These classes are regularly correlated with transitivity properties of the verb. Indeed, Class B consists almost exclusively of intransitive verbs, and a large number of them are paired with transitive verbs in the Class A. Thereby, in some cases, Class A and Class B display an alternation based on the active/mediopassive opposition.

Balant (Atlantic) (Creissels & Biaye 2016: 246)

(5)	Class A (causal)	Class B (non-causal)
	<i>baŋ</i> ‘tell, say’	<i>baŋ.ɛ</i> ‘close oneself up’

⁹ In Kirk Rogers’ work in progress on Landuma verbal system (generously shared with us by the author), we have interpreted a problematic verb final vowel *a* as a detransitivizing suffix undergoing freezing under certain conditions.

¹⁰ For more details, see Creissels et al. (2016: 142–6).

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<i>bɛɛnθ</i>	‘sharpen’	<i>bɛɛnθ.ɛ</i>	‘be sharp(ened)’
<i>bɔŋ</i>	‘injure’	<i>bɔŋ.ɛ</i>	‘be injured, injure oneself’
<i>bɔn</i>	‘increase’	<i>bɔn.ɛ</i>	‘grow’
<i>dag</i>	‘braid s.one’s hair’	<i>dag.ɛ</i>	‘braid oneself, be braided’
<i>das</i>	‘cut’	<i>das.ɛ</i>	‘cut oneself, be cut’
<i>fur</i>	‘dig (out)’	<i>fur.ɛ</i>	‘be dug (out)’
<i>fɔr</i>	‘peel’	<i>fɔr.ɛ</i>	‘be peeled’

The Balant system differs from the voice system of Ful on several points. Firstly, in Balant there is no strict repartition of voices in each conjugation class. The causal-noncausal alternation can also be delivered by a Class C and B opposition, as in *jet.i* (‘straighten’, Class C) vs. *jet.ɛ* (‘be straight’, Class B); or by a Class C and A opposition, as in *mɔñ.I* (‘to wet’ (tr.), Class C) vs. *mɔñ* (‘to wet’ (intr.), Class A). Secondly, the alternation is not exclusively conveyed by the conjugation classes: For some verbs, the causal-noncausal alternation cannot be produced by this sole means, a decausative suffix needs to be associated to the Class B, as in *wubt-ul.ɛ* ‘to open’ (intr., Class B with the middle suffix *-ul*) vs. *wubut* ‘to open’ (tr., underived Class A). Note that in this last case, due to the presence of a middle suffix, the verb pair has been counted in the decausative coding in our study. In the two variants of inflectional coding illustrated by Ful and Balant, the use of equipollent strategy is induced by the verbal system, being incorporated in the verbal inflection, and structurally obligatory (a verb form is always inflected in one of the voices) or favored in the Balant mixed system (a verb form always belong to a conjugation class, requiring or not an additional suffix for the causal-non causal pairing).

The second structural feature explaining the high score recorded for equipollent strategy pertains to the typological profile of Atlantic family, which can be extrapolated to Mel. As indicated before, most Atlantic languages display a large set of productive verbal extensions. Consequently, this structural profile is expected to favor the second subtype of equipollence coded by “double derivation”. In *most languages* in our sample, the equipollence is actually coded by a suffix on each member (of the pair) of the causal-noncausal alternation. The two voice markers can be clearly analyzed as causative and decausative suffixes, either because the (underived) verbal root is also attested (6), or because, in spite of the absence of an identifiable verb root, the morphology of the affixes remains transparent. In example (7), in the absence of a root **lak* in Jóola Keeraak, it is impossible to give a meaning to the verb stem but the suffixes *-o* and *-en* are clearly the middle and causative markers of the language, found elsewhere in causal-noncausal alternations such as *kɔlli* / *kɔlli-en* ‘be afraid/frighten’ and *ɔɔh-ɔ/ɔɔh* ‘hide (oneself) / hide (something or someone)’.

Wolof (Atlantic)

(6)	<i>daan</i>	<i>daan-u</i>	<i>daan-e</i>	/ <i>daan-al</i>
	win	win-MID	win-CAUS1	/ win-CAUS2
	‘overcome / win’	‘fall’	‘drop’	

Jóola Keeraak (Atlantic)

(7)	<i>*lak</i>	<i>lak-o</i>	<i>lak-en</i>
	–	‘sit’	‘seat’

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This correlation is confirmed by the coding profile of Swahili in Haspelmath *et al.*'s (*ibid.*) sample presented in Table 8. Swahili (another African language belonging also to the Niger-Congo phylum but to the Bantu family) displays the highest score for equipollence. It is also the only language displaying more or less the same rates of causatives and anti/decausatives as Mel and Atlantic languages do with the 'inanimate' list in our study, as illustrated in Table 9. For equipollence, the lower average shown here by Mel and Atlantic languages compared to Swahili can be explained by the presence of some verb pairs using labile strategy in our sample. The higher score for equipollence in Atlantic against Mel languages can be explained by a lesser usage of anti/decausative strategy due to the verbal inflections in Pulaar, Ful and Balant (Atlantic) described above. As Atlantic and Mel, Bantu languages are also known to have large inventories of productive verbal affixes, so the coding rates for this language confirm the correlation between typological profile and valence orientation evidenced by Atlantic and Mel, and the importance of equipollent strategy in this type of languages.

Table 9. Comparative scores for Swahili (Bantu) in Haspelmath *et al.* (2014) and for Mel and Atlantic families¹¹ in this study (verb pairs 10 to 18)

	Causatives	Anti/decausatives	Equipollents	Labiles
Swahili	30%	40%	35%	0%
Mel family	30%	42%	22%	19%
Atlantic family	31%	22%	29%	15%

2.3.2. Suppletion: a surprisingly significant score in the three families

According both to general assumptions¹² and to our predictions for the three families based on their typological profiles, we hypothesized that suppletive lexicalization should be rare in both Atlantic and Mande languages for opposite reasons. In Atlantic (and maybe Mel) because of the numerous derivational suffixes and the resulting preference for derivational strategies, in Mande because of the overall lability. However, this is not the case, suppletion is actually not negligible in all families, in particular in Atlantic languages where it is the second favored strategy with 15.77%, and even more in Mel where suppletivism (20.63%) almost equal causativization (20.83), the most preferred strategy, as visible in Table 10 based on the full list of verb pairs.

¹¹ In this table, suppletive and equipollent strategies are fused as to match with the procedure used in Haspelmath *et al.* (2014).

¹² "A fifth type, suppletion (e.g. *die/kill*, *learn/teach*) could be added but is quite rare. Where it occurs, we subsume it under the equipollent type" (Haspelmath *et al.* 2014: 591).

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Table 10. Average values for each strategy in the three families for verb pairs 1 to 18 (% of pairs found)

	ATLANTIC	MANDE (sample)	MEL
>	29,34	36,81	20,83
<	12,00	8,89	17,59
~	10,09	0,93	11,11
=	8,61	31,25	7,54
≠	15,77 (2 ^d)	12,15 (3 rd)	20,63 (2 ^d)

Two factors may explain these scores. The first one pertains to the corpus. Among the eighteen pairs, two involve verbs referring to *frequent activities* which are known to favor suppletivism, namely 02 *die/kill* and 06 *see/show*. As shown by the scores for these two pairs in the next table, the languages of the three families do follow this universal tendency. Note that in Mande, the relatively lower score of suppletive strategy is counterbalanced by the use of lability again.

Table 11. Percentages of languages (per family) using suppletion for verb pairs 02 and 06

	02 die / kill		06 see / show	
ATLANTIC	nC ≠ C	97%	nC ≠ C	90%
MANDE	nC ≠ C	63%	nC ≠ C	87%
	nC = C	38%		
MEL	nC ≠ C	100%	nC ≠ C	100%

The second factor could be a bias due to our *incomplete data* and unbalanced sampling. For the languages for which we found only few pairs (because the causal member could not be found in the dictionaries), the pairs using suppletive coding were overrepresented because lexical causal verbs were always (by definition) in the dictionary whereas derived causatives are not always given in the lexical database (see section 1). However, in order to overcome possible biases due to incomplete data, the patterns of distribution of the five coding strategies have been recalculated based on a selection of the best documented languages, as presented next in section 3.1. Suppletion remains significant in all families with this optimized sample, as visible in Table 12 below, and is still the second favored (individual) strategy in Atlantic with an even higher score (raising from 15,77 to 17,31%). Thus our results contradict the general assumptions according to which suppletion is rarely used for causal-noncausal alternation. Considering that our language sample for the Mande family (which extends much further to the East) is mainly made of languages spoken in the contact area under study, this surprisingly strong representation of suppletion can be interpreted as an areal peculiarity of the region where Atlantic and Mel languages are spoken, that is the area extending from Senegal in the North to Sierra Leone in the South (see Map 1). Further investigations are needed for defining the full extension of this feature. This areal hypothesis is supported by the diverging results reported in Creissels' study (in this volume) based on a sample of a languages covering the whole Sub-Saharan Africa: At this larger scale, suppletive strategy show the standard low scores.

To conclude this section, our first hypothesis has been confirmed by this study on the distribution of coding strategies across these three families: The families' typological profiles correlate with valence orientation and can be used to predict the strategies favored by languages

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for coding causal-noncausal alternation. In the next section the family coding-patterns are used for identifying possible contact-induced changes in individual languages.

3. Sorting out contact-induced phenomena from families features

In order to identify contact-induced phenomena in causal-noncausal orientation, we have defined the following method. To prevent possible bias due to data shortage, the standard patterns of distribution of the five strategies for each family are first optimized by discarding too poorly documented languages when possible. These optimized patterns are then used to measure the deviation of individual languages from family pattern, using standard-deviation. Finally, we analyze the possible causes of deviation and argue whether the observed deviations can be attributed (i) to language specific features, (ii) to internal change or, eventually, after checking geographical contacts, (iii) to contact-induced changes. Moreover, for Atlantic languages, the deviations of individual languages against family-standard will be used to investigate the variability inside Atlantic family and a possible genetic distribution of deviation according subgroups.

3.1. Optimizing family patterns

The optimized family standards are calculated on the base of the eighteen verb pairs (Nichols *et al.* 2004), in accordance with the initial conditions laid down for this study. In order to balance the average number of documented pairs, for Atlantic ten languages with less than 9 pairs documented were removed (reducing the sample from 36 to 26 languages). For Mande, none was removed because in our small sample, the eight language are all well documented. For Mel, again none was removed, this time because taking out the four languages with poor data would have made our sample (7) too small. Thus, Table 12 differs from Table 5 (original family standards in section 2) only for Atlantic.

Table 12. Standard patterns of distribution of the 5 strategies based on optimized samples of languages (% of pairs found))

	ATLANTIC ≥ 9 pairs	MANDE unchanged	MEL unchanged
>	33,33	36,81	20,83
<	12,33	8,89	17,59
~	11,28	0,93	11,11
=	8,64	31,25	7,54
≠	17,31	12,15	20,63

Table 12 gives a good overview of the distribution and ranking of the strategies inside the families and allows cross-families comparison. In the next sections devoted to the study of deviations inside families, standard patterns by *numbers of verb pairs* (rather than by percentages) will be added for facilitating the comparison with individual languages.

3.2. Mel

As visible from Table 12. , the standard pattern of the Mel family shows an overall preference for derivational strategies (equipollence being included here because for the reasons presented

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in section 2.3.1.) but does not exhibit any really prominent strategy, suppletion being slightly ahead, closely followed by causative and next by decausative strategy. However with the selective list of ‘inanimate’ verbs (pairs 10 to 18), known to be good indicators of individual languages’ preferences, decausative strategy comes first (see Table 7 above). Deviations recorded inside Mel family are presented in Table 13.

Table 13. Deviations in Mel family (by numbers of verb pairs per strategy)

	>	<	~	=	≠	number of documented verb pairs (out of 18)
Standard pattern for 1 to 18	4	3	1	1	3	12
<i>Standard deviation +/-</i>	1/5	1/5	0/2	0/3	2/5	
Sherbro	6	4,5 ¹³		1,5	4	16
Kisi	3	4		4	5	16
Kim	1,5	1		1	3,5	7
Mani	2	2		1	3	8
Temne	5	1,5		1	2,5	10
Baga Sitem				1	6	7
Landuma	5	6	4	0 ¹⁴	3	18

In the deviation tables, the dark and grey boxes correspond to deviations. Dark boxes indicate values higher than the standard-deviation and grey boxes lesser values. In Mel, four languages display significant deviations from the standard pattern, Sherbro, Kisi, Baga Sitem and Landuma. All of them are positive¹⁵ (black boxes), indicating a greater use of these strategies in the languages.

- (i) A higher use of causative strategy can be observed in *Sherbro*. Since this language has some contacts with Mande languages (on the eastern edge of the Sherbro area), this deviation from Mel standard could be attributed to contact with the Mande family which shows a stronger preference for causativation than Mel (36,81 vs. 20,83 in Table 12.). Another hypothesis would be to consider this to be a *language specific* feature of Sherbro, maybe witnessing a former standard of the Mel family with a more drastic preference for directed strategies than the current one, as it will be also argued next about Landuma (iv). It is worth noting that, in our sample, these two languages show the highest rates of directed strategies inside Mel family, with 11 pairs out of 18 for Landuma and 10,5 out of 16 for Sherbro.
- (ii) *Kisi* displays a surprisingly important usage of labile strategy compared to the standard pattern (4 verb pairs against one pair in the standard pattern, and among these pairs, 3 belong to the critical list restricted to ‘inanimate verbs’). Considering the geographical contacts with Mande (Kisi is surrounded by Mande languages) and

¹³ When two possible strategies were found for the same verb pair, a score of 0,5 has been assigned to each of them.

¹⁴ A zero indicates that the strategy is not used in the language when all verb pairs have been documented.

¹⁵ The greater use of one strategy is not balanced here by a lesser use of another one. In general when deviations do not balance, it can be due either to small negative deviations (below standard deviation) scattered across different strategies, or to the high number of documented pairs for this language, exceeding the standard average of pairs.

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- the clear preference for lability in Mande (31,25 % vs. 7,54 % in Mel), a contact-induced change is very plausible here, with a convergence of Kisi towards Mande.
- (iii) *Baga Sitem* displays a much higher usage of suppletive strategy than standard (6 verb pairs against 3, half of them belonging to the restricted list). This distribution is all the more noteworthy considering that only seven pairs out of eighteen have been found for this language. As noted before (in 2.3.2.), the unusually high use of suppletion for coding valence alternation seems to be an areal feature of the languages under study. Accordingly, this specific configuration of Baga Sitem may be attributed either to a bias due to the use of a single dictionary, which could not be supplemented by additional documentation, when collecting data (*cf.* section 1) or to a *specific feature* of this language pushing further the unusually high use of suppletion evidenced for the languages spoken in this area. This specificity could be due, for instance, to borrowings or to a propensity of the language for polysemy and semantic shifts generating suppletive pairs.
- (iv) Lastly, two positive deviations can be observed for *Landuma*. The first one pertains to the decausative strategy. Although Landuma is surrounded by five Atlantic languages, this deviation cannot be analyzed as a contact-induced change because the proportion of use of decausative strategy is lower in Atlantic (12,33 %) than in Mel (17,59%). A more plausible explanation would be that a greater usage of directed strategies was the original standard for Mel, other Mel languages having undergone changes and Landuma being more conservative on this point. Concerning the second deviation, Table 13 indicates that Landuma is the sole Mel language making use of equipollence, and so to a remarkable extent. This important deviation may be attributed either to a specific evolution of Landuma (more information is needed for this interpretation) or to contact with Atlantic languages, for which the use of equipollent strategy is attested not only in the standard pattern (11,28 %) but also across most of the languages as visible in Table 17 below, contrasting with the null score recorded for Mande languages (Table 14). Note that among the numerous Atlantic languages in contact with Landuma (namely Pulaar, Biafada, Nalu, Baga Mboteni and Baga Fore), Pulaar is the vehicular language of the area (Guinea-Conakry). So, considering the specific usage of equipollent alternation made by this language, as discussed in section 2.3.1., the higher usage of equipollence in Mel may be induced by the contact with this language playing a very influential role in the area.

3.3. Mande

First, it should be stressed that the standard pattern proposed here cannot be seen as the standard of the whole Mande family, since it is built on a convenience sample of eight languages and we do not know to which extent this sample can be representative of the seventy or so recorded languages for the family¹⁶. This convenience sample was made of the six languages in contact with Atlantic and Mel and two other languages with no contact (Bobo and Bambara) that were added for balancing somehow a possible effect of contact in the emerging coding profile. For this investigation on possible contact-induced changes in valence orientation, the measure of

¹⁶ A positive sign about the representativeness of our small sample can be seen in Creissels' indication (in this volume) about his own sample: This author indicates that the five Mande languages studied in his sample, which are all included in ours except one (Mano), "seem to be representative of the diversity across Mande languages" for his study, more focused, though, on 'inanimate verbs'.

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deviation is logically applied only to the formers. As visible from Table 12, this (selective) family pattern pairs exhibits a contrasted profile for Mande with two prominent strategies, causativization (36,81 %) and lability (31,25 %) and two strategies with a very low or quasi nul rate of use: decausativization (8,89 %) and equipollence (0,93). Based on the critical list of ‘inanimate’ verbs (Table 8), lability becomes clearly the favored strategy (44,44 % in Table 7). As can be seen from Table 14, four languages in contact with Mel or Atlantic show significant deviations.

Table 14. Deviations in the Mande family (by numbers of verb pairs per strategy).

	>	<	~	=	≠	Number of documented verb pairs (out of 18)
Standard pattern for 1 to 18	6	1	0	5	2	12
<i>Standard deviation +/-</i>	10/3	2/0	0/0	8/3	4/1	
Maninka	4			7	1	12
Mandinka	10	0	0	7	1	18
Kakabe	6,5			8,5	1	16
Soso	10	2		2	1	15
Soninke of Bakel	10,5	2	0	3,5	2	18
Soninke of Kingi	1	3		5	3	12

- (i) For *Kakabe*, a significantly increased usage of lability can be observed. Since lability is the favored strategy in Mande according both to our results for the critical list of ‘inanimate verbs’ and to other studies (e.g. Katchaturyan 2014 and Creissels in *this volume*), we conclude that *Kakabe* is most likely closer to the general Mande standard, or displays a language specific evolution towards an increased use of this strategy.
- (ii) Instead, *Soso* shows a negative gap for lability. It is worth noting that this negative deviation remains significant with the critical restricted list, as visible in Table 15 below. This may be interpreted as a contact-induced phenomenon considering both the geographical contacts of this language with Atlantic and Mel languages, and the substantially lower use of labile strategy in these two families favoring directed strategies. The increase of causative and decausative strategies in *Soso*, virtually above standard deviation, lends some support to this view. Another possible explanation would lay in the under-representation of the critical ‘inanimate verbs’ in our sample (only 6 out of 9 vs. 9 out of 9 for ‘animate verbs’), as visible in Table 15 and Table 16.

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Table 15. Deviations in the Mande family for verb pairs 10 to 18 ('inanimate')

	>	<	~	=	≠	Number of documented verb pairs (out of 9)
Standard pattern (10 to 18)	3	1	0	4	0	8
<i>Standard deviation +/-</i>	4/1	2/0	0/0	5/2	1/0	
Maninka	2			3		5
Mandinka	4	0	0	5	0	9
Kakabe	2,5			5,5		8
Soso	4	1		1		6
Soninke of Bakel	4	2	0	3	0	9
Soninke of Kingi	0	2		4	1	7

- (iii) Conversely, the positive deviation for causativization in *Soninke of Bakel*, for which all the 18 pairs have been documented, may reflect the bias for causativization introduced in the Mande profile by the 'animate verbs', as discussed in section 2.2. The comparison between Table 16 and Table 15 supports this view: While most languages show a high score for causativization with 'animate verbs', Soninke of Bakel being slightly above standard deviation, with inanimate verbs (known to reflect more significantly the individual languages' preferences), the scores are lower and none language exceeds standard deviation, including Soninke of Bakel.

Table 16. Deviations in the Mande family for verb pairs 1 to 9 ('animate')

	>	<	~	=	≠	Number of documented verb pairs (out of 9)
Standard pattern (1 to 9)	4	0	0	2	2	8
<i>Standard deviation +/-</i>	6/2	1/0	0/0	3/0	3/1	
Maninka	2			4	1	7
Mandinka	6	0	0	2	1	9
Kakabe	4			3	1	8
Soso	6	1	0	1	1	9
Soninke of Bakel	6,5	0	0	0,5	2	9
Soninke of Kingi	1	1		1	2	5

- (iv) Lastly, in Table 14 *Soninke of Kingi* displays a lesser use of causative strategy compared to standard but a higher use of decausative strategy. The negative gap for causativization may be due to the unbalanced data for this language. In contrast to the other languages from the sample, most of the verb pairs found for Soninke of Kingi belong to the 'inanimate list', and most of the missing ones to the 'animate list'. Since the 'animate verbs' favor the causative strategy, the lack of several such pairs would be an explanation for the negative gap concerning causative strategy in Soninke of Kingi¹⁷. Conversely, considering the high proportion of inanimate verbs in the sample (known to be good indicators for the preferences of individual languages), the higher use of decausative strategy may be viewed as a contact-induced change due to contact with Atlantic languages which display a higher rate

¹⁷ For the record, all the missing verb pairs in Soninke of Kingi do have a causative coding in Soninke of Bakel.

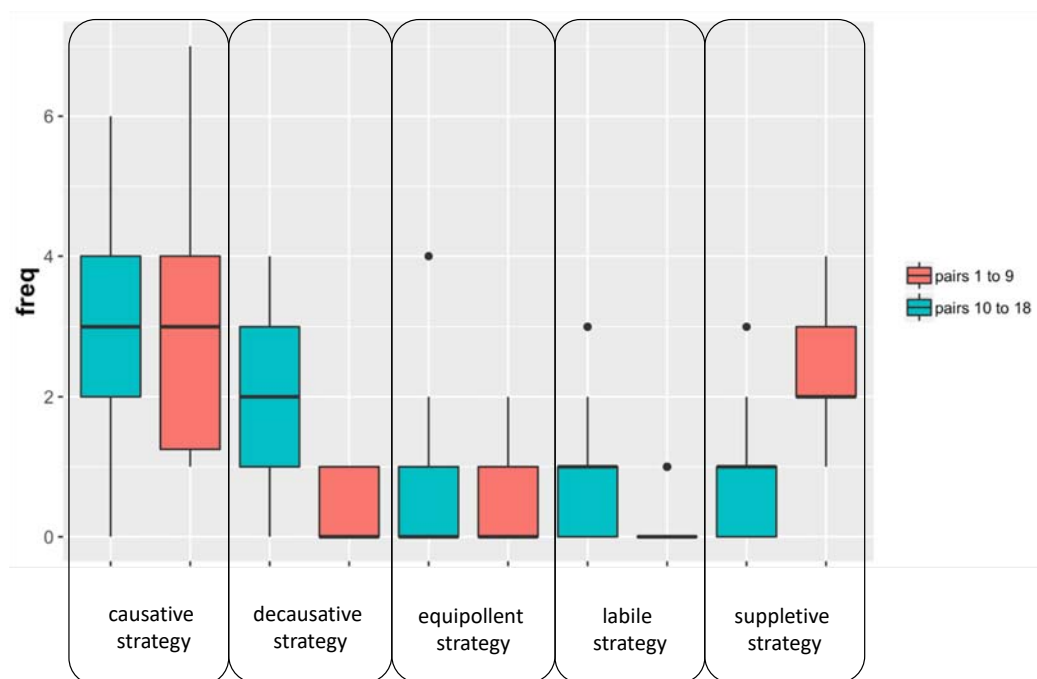
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of use of decausativization than Mande. However given that data are unbalanced, these analyses are rather speculative.

3.4. Atlantic

Based on the full list of verb pairs and the optimized sample of (26) languages, the standard pattern for Atlantic languages in Table 12 indicates an overall preference for derivational strategies (including equipollence among them) and exhibits one prominent strategy, causativization (33,33 %). When using the crucial list of ‘inanimate verbs’ for the original standard (Table 7), the coding profile of this family appeared to be quite evenly distributed among the various strategies, oriented strategies (> and <) standing ahead and all other ranking tightly together with no really low scores. A comparison between the scores in the two lists of verb, ‘animate’ vs. ‘inanimate’ verbs allows us to refine the picture.

Figure 1: Overview of the causal-noncausal coding in the two lists of verb for Atlantic family (average number of pairs used per strategy in optimized sample)



This figure makes it possible both to compare the various uses of each strategy in the two lists and to visualize the deviations in each case: The size of the boxes shows the spread of scores around the average (indicated by the bolded horizontal line crossing the boxes). A first remark can be drawn from this figure. Causativization strategy shows the same highest use with the two sets of verbs. However, the standard pattern for the list restricted to ‘inanimate verbs’ (blue boxes) displays *two* prominent strategies, causative and decausative. Note that the small difference between the two prominent strategies for this ‘inanimate’ list (with an average of 2 pairs for decausative against 3 for causative) is offset by a larger standard-deviation for causative in the animate list: While showing a same average of 3 pairs in the two lists, the use of causative strategy displays a greater variability in the ‘animate’ list (in red) than with the ‘inanimate’ one, as visible from the larger box below average. The three remaining strategies show lower scores in the two lists but differences are visible in some cases. The use of equipollence is strictly equivalent in both cases (same scores and same deviation). The use of

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labile strategy is quasi null¹⁸ with the animate list. Concerning the greater use of suppletion in the ‘animate’ list, two remarks can be made. The first one pertains to the role of the two pairs favoring suppletion, *die/kill* and *see/show*, as explained in section 2.3.2. These two verbs do belong to the ‘animate’ list, and all Atlantic languages but one (Bijogo) use suppletion for coding *die/kill* and most of them for *see/show* (23 out of 26). Furthermore, Figure 1 shows that the higher use of suppletion in ‘animate’ list is counterbalanced by a lower use of decausativization and lability. Altogether, this new point of view on the data confirms the focused conclusion in section 2, namely that the favored strategies in Atlantic are the directed ones (causative and decausative).

Coming to deviations of individual languages, a striking point is readily visible in Table 17: A great number of Atlantic languages display small deviations from the family standard, pointing to a *strong internal variation*. For convenience, the languages are ordered in this table according to the internal organization of Atlantic family, as presented in Figure 2 below (section 3.3.2).

Table 17. Deviations in Atlantic family (by numbers of verb pairs per strategy)

	>	<	~	=	≠	Number of documented verb pairs (out of 18)
standard pattern for 1 to 18	6	2	1	1	3	14
<i>standard deviation +/-</i>	4/8	1/3	0/3	0/2	2/4	
Wolof	9	4	1	2	2	18
Nyun Guñaamolo	8	4	1,5	0,5	3	17
Nyun Gubëcher	4	4	1		3	12
Nyun Gujaher	5	2	2		2	11
konyagi	3	3		2	4	12
Bedik	6	1		1	3	11
Basari	5	2		1	1	9
Pajaade	5	1		1	3	10
Sereer	9,5	3	1	2,5	2	18
Pulaar (Ful of Futa Toro)	8	0	3	2	5	18
Ful of Massina	7		2		3	12
Laalaa	9	4	0	1	4	18
Palor	2	1	1		5	9
Saafi	4	2			4	10
Nalu	6	2		1	6	15
Balant Kəntohe	6	2			1	9
Balant Ganja	4	3	6	2	2	17
Jóola Keeraak	4	3	2	4	2	16
Jóola Fóoñi	5,5	3,5		1	5	15
Jóola Banjal	5	2	4	2	3	16
Jóola Kasa	9		2	1	2	14
Jóola Kwaatay	2	1	3	1	4	11
Jóola Karon	4	4	2		4	14
Manjaku of Bassarel	10	1		1	1	13
Pepel	9	2		1	3	15
Bijogo Kagbaaga	7	1	1	3	3	15

¹⁸ The points in the figure represent deviating scores recorded only for one or a very few languages.

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A first overview of this table shows an interesting distribution of deviance among strategies. Labiality shows only a few positive deviations and so against a very low average of use, confirming the low use of labiality as a distinctive feature of this family. Two strategies display a strong variation with many languages both below and above standard deviation, namely causative and suppletive strategies. While quite high most of the time, the scores for causativization vary significantly across languages compared to the standard average, 6 language standing above standard deviation and 3 below. For decausativization, the pattern is different: 6 languages are above standard deviation and only one (Pulaar) is below, and so for structural reasons (as it will be explained in 3.3.1.). It is also worth noting that, despite the missing data, this strategy is recorded in almost all languages. Thereof, beyond a variable partition across languages, the use of decausative strategy seems to be a stable feature of this family and, combined with high scores for causativization, confirms the preference for directed strategies in Atlantic.

In order to account for these numerous scattered deviations and identify possible contact-induced phenomena, our study proceeds as follows, due to the large number of languages. We first sort out the languages for which the deviation from standard can be attributed to language-specific features (3.4.1), then we investigate the possible distribution of deviance along genetic sub-groups of the family (3.4.2), before tackling contact-induced phenomena and sorting these out from the various factors accounting for the deviances (3.4.3).

3.4.1. Deviance due to language-specific features

The types of deviance attested for Pulaar and Balant Ganja can be accounted for by specific structural features of these languages, as mentioned previously (2.3.1.). For Pulaar¹⁹, the absence of use of decausative strategy (0/2) is, in all probability, induced by the voice oppositions grammaticalized in the verb system (with active, middle and passive voices) in this language, The middle (or decausative) meaning being conveyed by the middle voice in the verb system, there is no middle decausative suffix in this language. When the base-verb is a causal one, the causal-noncausal alternation is always coded by an opposition between the active and the middle inflectional form of the same verb, that is say by an equipollent strategy. For this very reason, a decausative coding is structurally impossible. Thereof, the inflectional voice system both favors equipollence (*cf.* the high score for Pulaar with 3 pairs *vs.* 1 in the standard) and precludes decausativization (nul score). The Balant Ganja case is slightly different. While keeping a decausative suffix, this language has developed conjugation classes occasionally involving causal-noncausal alternation. This double system does not exclude the decausative coding but favors equipollence, as attested by the positive deviation for equipollence in Balant Ganja (6 pairs against 1 in the average standard).

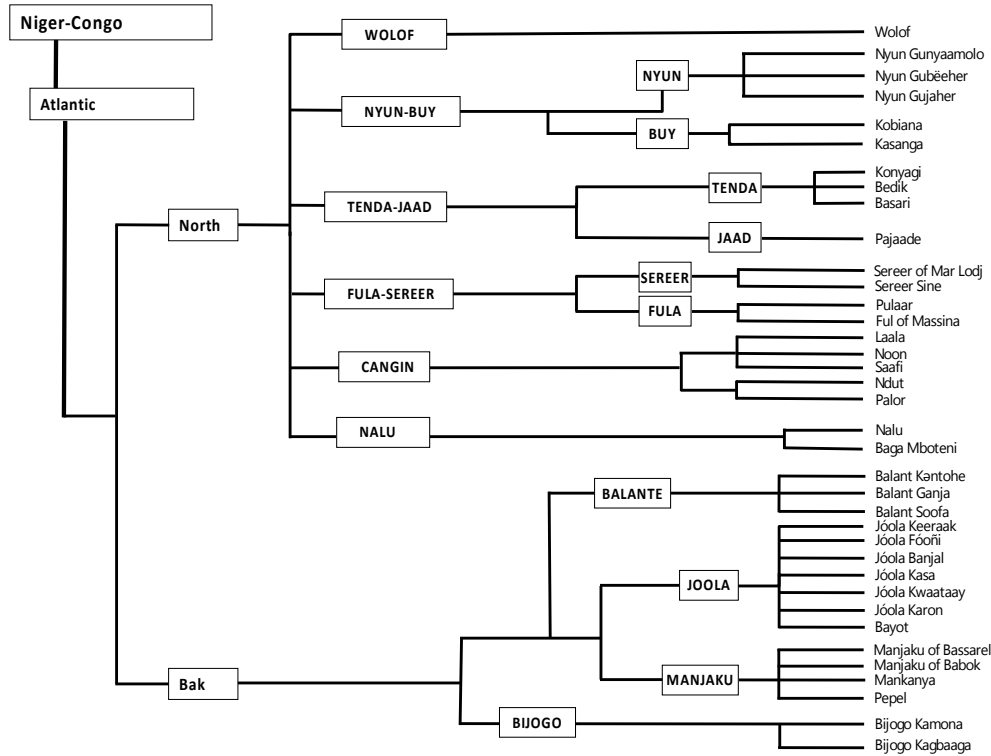
3.4.2. Study of deviance of individual languages along genetic subgroups

As can be seen from Figure 2, the Atlantic family is organized in two main branches, North and Bak. These two branches are in turn subdivided into various levels (up to three) of subgroupings. On a phylogenetic point of view, this splitted internal organization points to an important historical depth for this family, which could play a role in the strong internal variation and rather distributed profile of this family concerning valence orientation.

¹⁹ Ful of Massina should appear in the list since this language has the same voice system as Pulaar and show the same absence of decausative strategy. However due to incomplete data, this null score does show off in the table.

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Figure 2. The Atlantic family – The (affiliation of) Atlantic languages of the sample – adapted from Pozdniakov and Segerer (to appear)



In order to investigate the possible role of group features in the internal variation of Atlantic for coding causal-noncausal pairs, we have studied the deviations along the North and Bak groups, that is, the deviations recorded in Table 17 have been reorganized according to the affiliation of individual languages in Table 18. As visible from this table, higher usages and lesser usages of the various strategies are recorded for languages belonging to the two branches: For each type of deviation both North and Bak columns are filled in with at least one language. Therefore, deviations of individual languages cannot be explained by a mere opposition between North and Bak branches. In Table 18, Balant and Pulaar are given in brackets because their deviating usage has been previously explained by specific structural features (3.3.1).

Table 18. Deviations according to North vs. Bak branches

	Usage	NORTH languages	BAK languages
>	Higher	Wolof, Sereer, Laalaa	Jóola Kasa, Manjaku of Bassarel, Pepel
	Lesser	Konyagi, Palor	Jóola Kwaatay
<	Higher	Wolof, Nyun Gunyaamolo, Nyun Gubêcher, Laalaa	Jóola Fóoñi, Jóola Karon
	Lesser	(Pulaar)	
~	Higher	(Balant Ganja)	Jóola Banjal
=	Higher	Sereer	Jóola Keeraak, Bijogo Kagbaaga
≠	Higher	Pulaar, Palor, Nalu	Jóola Fóoñi
	Lesser	Basari	Balante Kəntohe, Manjaku Bassarel

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Going further into significant details, for causative strategy both higher and lesser usages of the strategy are recorded in the two language groups pointing to a remarkable variation inside the family for this coding strategy.

Table 19. Deviations for causative coding according to North vs. Bak branches in the whole list

Average of causative coding for verbs 1 to 18			6/18
Higher usage of causative coding: - 6 languages out of 26 - equal partition between North and Bak	NORTH	Wolof	9
		Sereer	9,5
		Laalaa	9
Lesser usage of causative coding: - 3 languages on 26 - approximate equal partition between North and Bak	BAK	Jóola Kasa	9
		Manjaku of Bassarel	10
		Pepel	9
Lesser usage of causative coding: - 3 languages on 26 - approximate equal partition between North and Bak	NORTH	Konyagi	3
	BAK	Palor	2
		Jóola Kwaatay	2

This variation can be considered to be more specific to the Bak branch since with the restricted list of ‘inanimate verbs’, the deviation is more persistent for this group as visible in Table 20.

Table 20. Deviations for causative coding according to North vs. Bak branches in the restricted list (verbs 10 to 18)

Average of causative coding for 10 to 18			3/9
Higher usage of causative coding: - 3 languages out of 26 - Only in the Bak branch	NORTH	<i>none</i>	
	BAK	Jóola Fóoñi	4,5
		Jóola Kasa Manjaku of Bassarel	5 6
Lesser usage of causative coding: - 1 languages out of 26 - Only in the Bak branch	NORTH	<i>none</i>	
	BAK	Balant Ganja	0

If the nine ‘animate’ verbs can account for the higher uses of causative strategy in the whole list (Table 19), they cannot account for deviations attested in the Table 20 using the restricted list. A crossed comparison with the deviations for decausative strategy sheds light on this issue. As visible from Table 21, when taking out Pulaar, for which the negative deviation has been explained by a structural feature precluding decausative coding, only positive deviations are recorded for decausative strategy, indicating again that Atlantic languages favor this strategy. This deviations pertains mostly to languages belonging to North group (4 against 2 in Bak group) when using the whole list (Table 21), and are restricted to one language, belonging again to North group, when using the critical list of inanimate verbs (Table 22). Altogether, the crossed comparison between the deviations for causative and decausative strategies suggests that the extensive use of the causativization in Atlantic is mainly due to the Bak languages, North languages displaying a more balanced usage the two directed strategies.

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Table 21. Deviations for decausative coding according to North vs. Bak branches in the whole list

Average of decausative coding for 1 to 18			2/18
Higher usage of decausative - 6 languages on 26 - More frequent in North branch	NORTH	Wolof	4
		Nyun Guñaamolo	4
		Nyun Gubëeher	4
		Laala	4
	BAK	Jóola Fóoñi	3,5
		Jóola Karon	4
Lesser usage of decausative (Pulaar is explained by specific structural features)	NORTH	<i>none</i>	0
	BAK		

Table 22. Deviations for decausative coding according to North vs. Bak branches in the restricted list 10 to 18

Average of decausative coding for 10 to 18			2/9
Higher usage of decausative	NORTH	Nyun Guñaamolo	3,5
	BAK	<i>none</i>	
Lesser usage of decausative Pulaar is explained by specific-languages features	NORTH	<i>none</i>	
	BAK		

For equipollence and labile strategy, only few languages (belonging again to each group) deviates from standard, none displaying a lesser usage of lability than standard average in both groups. Lastly, for suppletion, the variation is comparable to that of causative strategy: deviating usages are attested in both groups and with both negative and positive deviations.

3.4.3. Tackling contact-induced phenomena inside the genetic delineations

So, from a global perspective, the internal variation of Atlantic family in the coding of causal-noncausal alternation does not follow the genetic split between North and Bak groups. However, a more detailed observation including the use of several restricted lists of verb pairs shows that the variation in the Atlantic languages is probably due to deviations in the Bak branch, and probably more specifically to the Manjaku-Jóola subbranch, as evidenced by the various Bak languages showing a positive deviation for causative strategy in Table 19 or Table 20). Furthermore, deviations have been shown to always involve a Jóola language and, most of the time, *only* Jóola languages (Table 21). The specific features of the Jóola group need to be further investigated on this issue but we hypothesize here a very likely role of contact. According to our general knowledge on these languages, Jóola languages (Atlantic-Bak) have clearly undergone various influences from the surrounding Nyun languages (Atlantic-North) and also from Mande languages. This specific situation of Jóola languages may explain the current diversity inside the Bak group for valence orientation. The same hypothesis can be put forward for Manjaku group but a detailed study of the area where they are spoken is needed here. The languages of this group are more scattered and the more influential languages may differ in each case, depending on the zone. By contrast, in North group none conclusion is possible in affiliation terms: the deviations do not follow subgroupings. Wolof is an isolate, classified as a subgroup on its own. In the Fula-Sereer subgroup, Sereer is not at the same stage of evolution as Pulaar, since the merging of voice markers into the verbal system is not as completed in Sereer²⁰ it is in Pulaar. In an interesting way, the coding profile of Sereer for

²⁰ In Sereer, the merging between TAM and voices only concerns passive voice at this time, the middle (decausative) marker is still clearly identifiable as a specific morpheme most of time. Hence the different scores for the decausativization recorded for these two closely related languages.

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valence alternation is closer to that of Wolof than to that of Pulaar at this point in time, but we can expect Sereer to end up with the same deviations as Pulaar. Concerning Cangin languages, in Table 18, Laalaa shows deviances that are not encountered in other languages of this subgroup within the limits of our sample. A better documentation of Cangin languages is clearly needed for definitive conclusions: Noon and Ndut have been discarded because of data shortage. However, our survey already shows significant differences between Palor on the one hand and Laalaa and Saafi on the other hand, which confirm the internal classification of Cangin group in two subgroups (Palor-Ndut *vs.* Laalaa-Saafi-Noon) and points to possible subgroup features for valence orientation. Note that the increase of suppletism in Palor (5/3) can be related to the erosion of the morphology already described for the noun class system in this language (Diagne 2015). The need for a better documentation holds true for most of the Atlantic subgroups: too many Atlantic languages had to be discarded or ignored because they were too poorly documented. Nevertheless, this study of valence orientation has already singled out specific subgroups for remarkable divergences inside the family.

Conclusion

These investigations on Atlantic, Mel and Mande families were conceived as a case study for evaluating the correlation between typological profiles and valence orientation in different families, and for identifying possible contact-induced changes. A specific methodology was designed for this, combining family standards-patterns and measure of deviation focused on the contact area. Various interesting results have emerged from this study. First, the typological profiles of the families have proved to predict their valence orientation. However, due to the general trend toward causativization, the favored strategies of families are better defined in combination, in order to bring out their distinctive coding patterns. In this perspective, Atlantic and Mel share a preference for directed strategies, and Mande combines a strong propensity for lability with a prevalence of causative coding. Nevertheless, lability is confirmed as the favored strategy of this family for the ‘inanimate verbs’ which are known to be good indicators of individual languages’ preferences.

As for contacts, several cases have been identified inside Mel and Mande sample thanks to the standard patterns. Deviations from standard pattern can be plausibly attributed to contact-induced changes for Kisi (shaped by Mande), and possibly for Sherbro (shaped again by Mande) and Landuma (shaped by Atlantic), in the Mel family. Contacts with Atlantic languages have probably shaped the deviations recorded in our Mande sample, namely the increased use of decausative strategy deviations recorded for Soninke of Kingi (which might be expandable to other varieties of Soninke), and the shortfall of lability, also favored by additional contacts with Mel, recorded for Soso. Contact-induced phenomena were more difficult to identify inside Atlantic family due to the strong internal variation recorded for this family for the coding of causal-noncausal alternation. This internal variation doubtlessly reflects the historical depth of the family (around 8 000 years *vs.* 5 000 for Mande). So, individual languages have undergone more changes through time, leading to more drastic (internal) divergences than in more recent families, as evidenced by the very splitted internal organization of the family. In addition, a structural characteristic of Niger Congo phylum assuredly contributes to increase the variability for coding valence alternation in this Atlantic family specifically favoring derivational strategies. The current knowledge on Niger-Congo suggests that verbal derivation is an old

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system - this system has been reconstructed for proto-Niger Congo²¹ (Meeussen 1967, Voeltz 1977) - undergoing constant renewal. So, unlike other languages, which develop their verbal morphology mostly through the grammaticalization of lexical items, Niger-Congo languages (and especially Atlantic ones) also constantly renew a former system of affixes through the reanalysis of freezing suffixes into stacking suffixes (Hyman 2011) or into verbal inflections, as evidenced here by Pulaar and Ful for inflectional voices, or for Balant (and maybe in Landuma) for conjugation classes. Due to the developing of this structural feature through time, the internal variation of Atlantic family for valence orientation does not follow the genetic split between North and Bak branches, and not even the subgroups delineations, as evidenced by the numerous and scattered deviations recorded for this family. This diachronic evolution of verb systems and its historical depth also resulted in contact-induced changes shaped not only by contacts with Mel and Mande families but also but by contacts inside diverging subgroups of Atlantic: An in-depth analysis of deviations has revealed that the variation inside this family is mainly due to the Jóola languages and Jóola languages (Atlantic-Bak) have clearly undergone various influences from Mande languages but also from the surrounding Nyun languages (Atlantic-North).

Finally, this contrastive study of valence orientation has brought several additional results. First, the study has revealed that structural features (such as inflectional voices or conjugation classes) may favor or preclude specific coding strategies (namely equipollence and decausativization). This point opens up new avenue for typological studies. Focusing primarily on the distribution of directed *vs.* non-directed strategies and on the general preference for causativization, most typological studies on valence alternation relegates equipollence and suppletion into a kind of opaque trash can for rarely used strategies. However in this study, the various subtypes covered by equipollence in typological studies have been shown to play distinctive roles when it comes to predict preferences for coding causal-noncausal alternation according to typological profiles. For this reason, equipollent strategy appeared to be usefully included (along with causativization and decausativization) into a new cluster of *derivational strategies*, for some languages. In addition, despite data shortage, the study of deviations has confirmed some internal subdivisions inside Atlantic family, such as the subdivision of Cangin group in two clusters. Moreover, the surprizingly large use of suppletion was shown to be an areal feature. Further investigations are needed about its full extension but this areal feature already points to Senegal and the surrounding countries as an interesting region for studying contact and areal linguistics. The cross-family comparison also allowed us to propose new hypotheses for possible evolution of the families in the past or in the future. For Mel family, the Sherbro and Landuma profiles convergingly suggest a former standard pattern for this family with an even more drastic preference for directed strategies than the current one, and various ongoing evolutions inside the family. In contrast, inside Atlantic family, an evolution toward an increased use of equipollent strategy can be predicted for Seereer, considering the ongoing restructuration of its verbal system converging with the Pulaar and Ful system. This evolution may create a specific coding pattern for the Fula-Seereer subgroup. As for Mande, the prominent use of causativization, outpacing lability in our sample when using the complete list of verbs, may be induced by contact with Atlantic and Mel or reflects a possible evolution of Mande but this needs to be confirmed by a study on the whole family. Several arguments suggest that lability should be a more prevalent strategy in the general standard-pattern of

²¹ Verbal derivation still has to be reconstructed for proto-Atlantic, for a first attempt at reconstructing causative suffix in Atlantic, see Voisin (to appear).

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Mande. Eventually, the comparative investigations on controlled verb lists required for our analyses have confirmed that (in)animacy is a conditioning factor in the coding of causal-noncausal verb pairs. For instance, in Mande, several deviations from standard pattern appeared to be plausibly due to unbalanced documentation between ‘animate’ and ‘inanimate’ verbs. These results highlight the key role played by the types of verbs selected when studying valence orientation, and suggest a more systematic and more refined control of Aktionsarten and verb semantic subtypes in the next studies on valence orientation.

This outcome stems from the assumption that the respective typological profiles of the families may account for the preferences of the families in coding causal-noncausal alternation. The family trends were refined by an in-depth observation of the structural features of both families and individual languages, and the family standards-patterns have been used to sort out contact-induced changes inside families. Altogether, through the analysis of divergence and convergence both within and between families, this in-depth case study focusing on a micro-area in western Africa has brought a specific contribution and a new methodology, opening new avenues for a general account of crosslinguistic diversity in the coding of causal-noncausal alternation.

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Appendix 1. The 18 pairs of verbs sought in the survey, and their proxies (Nichols *et al.*, 2004: 186)

	<i>Non-causative</i>	<i>Causative</i>	<i>Proxies</i>
1	laugh	make laugh, amuse, strike as funny	cry
2	die	kill	
3	sit	seat, have sit, make sit	lie down; go to bed, put to bed
4	eat	feed, give food	drink, give to drink
5	learn, know	teach	understand, find out, grasp
6	see	show	
7	be/become angry	anger, make angry	annoy(ed)
8	fear, be afraid	frighten, scare	
9	hide, go into hiding	hide, conceal, put into hiding	
10	(come to) boil	(bring to) boil	cook
11	burn, catch fire	burn, set fire	be aflame; char
12	break	break	split, shatter, smash
13	open	open	close
14	dry	make dry	wet, clean; black, white
15	be/become straight	straighten, make straight	crooked, long, round, flat
16	hang	hang (up)	lean (incline), extend, project, protrude
17	turn over	turn over	turn, turn around, rotate, revolve, roll; shake, tremble, vibrate
18	fall	drop, let fall	fall down, fall over, etc.; sink

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Appendix 2. The language samples

(In Atlantic * indicates the poorly documented languages that were removed from the original sample for calculating the optimized standard patterns; In Mel # indicates languages that are discarded because of data shortage in the deviation study)

ATLANTIC (36)		
Wolof	Ful of Massina	Jóola Fóoñi
* Kasanga	Laalaa	Jóola Banjal
* Kobiana	* Noon	Jóola Kasa
Nyun Guñaamolo	* Ndut	Jóola Kwaatay
Nyun Gubëeher	Palor	Jóola Karon
Nyun Gujaher	Saafi	* Bayot
Konyagi	Nalu	Manjaku of Bassarel
Bedik	* Baga Mboteni	* Manjaku Babok
Basari	Balant Kəntohe	* Mankanya
Pajaade	Balant Ganja	Pepel
Sereer	* Balant Sofa	Bijogo Kagbaaga
Pulaar (Ful of Futa Toro)	Jóola Keeraak	* Bijogo Kamona

MANDE (8)	MEL (7)
Bobo	Sherbro
Bambara	Kisi
Maninka	# Kim
Mandinka	# Mani
Kakabe	# Temne
Soso	Baga sitem
Soninke of Bakel	Landuma
Soninke of Kingi	

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