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Aspects of Linguistic Variation

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Aspects of Linguistic Variation

Edited by
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Studies in honor of Johan van der Auwera
On the occasion of his retirement

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Tanja Mortelmans, Daniël Van Olmen, Frank Brisard

Introduction

The present volume contains a selection of contributions that were written on the occasion of Johan van der Auwera's retirement. Its focus is on the study of linguistic variation, an area on which Johan has had considerable influence. It brings together papers dealing not only with cross-linguistic and diachronic variation but also with intra-linguistic and inter-speaker variation. The phenomena that are examined range from negation and tense-aspect-modality over connectives and the lexicon to definite articles and comparative concepts in well- and lesser-known languages. This collection can thus be said to reflect Johan van der Auwera's very broad linguistic interests and to contribute to our understanding of variation in general.

Johan van der Auwera graduated in Germanic Philology (Dutch and English) and Philosophy in 1975 at the University of Antwerp. In the same year, he got a doctoral scholarship to study at the University of California in Berkeley, where he stayed for two years. He then returned to finish his dissertation (on the philosophy of language: *Regaining speculative grammar – Speech acts, logic and focus*) at the University of Antwerp (1980), with Louis Goossens (professor of English Linguistics) as his supervisor. After finishing his dissertation, he spent a few months as a guest lecturer at the University of Cologne and was then awarded a two-year Postdoctoral Fellowship of the Belgian National Science Foundation, which he took up at the University of Antwerp (UIA). From 1983 until 1984, he was a Lecturer in Business English at the University of Antwerp (UFSIA), before returning to research abroad: in 1984–1985, he worked as an Alexander von Humboldt Fellow at the University of Hannover (1984–1985) and the Max Planck Institute for Psycholinguistics in Nijmegen (1985).

In 1985, at the age of only 32, he obtained a tenured position as a Fellow of the Belgian National Science Foundation at the University of Antwerp, where he

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was affiliated with the Department of Germanic Philology. In 1990, he finished his habilitation dissertation simply entitled *Coming to terms*, which addressed aspects of the structure of the noun phrase. At the time, Johan was mainly expected to conduct research. His teaching load at the University of Antwerp (UIA) was thus restricted. Still, the courses taught from 1985 onward already reflect the width of his research interests on the one hand and their development over the years on the other: Johan taught an *Introduction to semantics* for more than ten years, he acquainted students with the structure of Yiddish (1988–1997) and introduced them to *Non-Indo-European linguistics* (1985–1989) and the *Syntax of the relative clause* (1986–1987). His course on *Semantics and logic* disappeared from the curriculum after three years (1985–1988) whereas a new course on *Typology and universals* was introduced in 1993. Johan was to teach it until the very end of his academic career.

In 1997, Johan was appointed Professor of English Linguistics at the University of Antwerp, where he became a Full Professor in 2003. In the last two decades of his university career, he taught courses on (various aspects of) English grammar, varieties of English and English creoles, the development of English, negation and linguistic typology, both in the bachelor's and in the master's program. The list of his visiting professorships is long: Johan was a visiting professor at the CNRS (Paris), Princeton University, the University of Gothenburg, Kyoto University and Chulalonkorn University (Bangkok). In 2006, he was awarded the prestigious Francqui Chair (by the Belgian Francqui Foundation), for which he gave a number of lectures on typology. He taught master and doctoral classes on various aspects of typology at the Complutense University of Madrid (2008), the University of Palermo (2009), the Université Libre de Bruxelles (2015) and the University of Roma III (2015).

In the very beginning of his career in linguistics, Johan published on classic topics within semantics and pragmatics, addressing presuppositions, conversational implicatures and indirect speech acts, to name but a few of the terms that occur in the titles of his earliest publications. In fact, his very first publication (van der Auwera 1975), which appeared as the second issue in the series *Antwerp Papers in Linguistics*, deals with semantic and pragmatic presupposition. It was the topic of his licentiate's dissertation, also supervised by Louis Goossens. His earlier publications also include work on conditionals, complementizers, relative clauses and modality, some of which reveal a rather strong logical orientation.

However, in an interview with Jolanta Šinkūnienė (2016: 295), Johan admits to having been "disappointed with this logical approach to language" at a particular stage in his career.[1] It is "a change of pathway" that has allegedly saved him and this change was his interest in typology, an area of linguistics which at that time (i.e., in the early nineties) was not yet prominent in Europe. An important catalyst of typological studies in Europe was the EUROTYP-project, a large-scale research project funded by the European Science Foundation (1990–1995) which aimed at examining the range of typological variation found in the languages of Europe. Johan participated in this project, working mainly on adverbials. About ten years later, he was also one of the 55 authors of *The world atlas of language structures* (Haspelmath et al. 2005), (co)-authoring seven chapters on the expression of modality and moods. We can safely say that Johan is one of the leading typologists in Europe and perhaps even beyond.

His many publications (six monographs, over 200 scholarly articles, 23 books or special journal issues as editor) testify to his extremely broad linguistic interests: they deal with conditionals, concessives, mood(s), modal expressions, tense, negation, aspect, indefinites, impersonals, periphrastic *do*, prefixes, adverb(ial)s, similatives, relative clauses, the structure of the noun phrase, (de)grammaticalization, the status of constructions, semantic maps and so much more. In fact, it seems almost impossible to find a topic within the broad domain of the semantics of grammar on which Johan has not worked and published. The field he has had most impact on is probably (or should we use another marker here: undoubtedly?) that of modality. The article he wrote with Vladimir Plungian on *Modality's semantic map* (van der Auwera and Plungian 1998) is one of the classic and most cited articles in the field, with no less than 986 citations on Google Scholar (on March 21, 2018).

When one looks at Johan's impressive list of publications, a number of things strike one's eye – and they reveal something about his person(ality) as well. First, we should mention the fact that he has not only published in English and Dutch but also in French, German, Croatian, Russian and Chinese. This is in line with his huge language expertise: he speaks at least five languages fluently (Dutch, English, French, Swedish and German), has a more than average knowledge of many other Germanic and Romance languages, reads Russian and has notions of Thai and Mandarin. Second, many publications are the result of collaborations

1 A nice example of this change of heart can be found in the title which he gave to a volume in honor of Louis Goossens: *English as a human language* (van der Auwera, Durieux and Lejeune 1998) – an implicit reference/reply to the influential work by Richard Montague: *English as a formal language*.

with other linguists from all over the world. Throughout the years, Johan has built up an enormous international network and has been using it in an extremely generous way to connect linguists with each other. Third, Johan does not seem to have followed a particular publication strategy. Instead, we find a wide array of publication types, from articles in highly acclaimed peer-reviewed international journals (e.g., *Language*) to contributions to more local book volumes and journals.

His academic record is not limited to his publications, of course. His list of conference papers is impressive. It starts with a presentation on *Presupposition and existence* given at the University of Louisville in 1976. Over 200 other papers were to follow, which Johan presented – in his somewhat idiosyncratic but always enthusiastic manner – either alone or (which is considerably more often the case) together with other, often young researchers. To illustrate Johan's professional zeal and boundless energy, consider the nine papers that he gave in 2004, mostly together with other researchers, on a multitude of topics: negative indefinites in Flemish (April, Berkeley, USA), nominalization in Tucanoan (May, Santa Barbara, USA), the ancestors of the verb *need* (May, Verona, Italy), interrogative pro-verbs (August, Nancy, France), English modal verbs (September, Pau, France), modal polyfunctionality in Standard Average European (September, Antwerp, Belgium), imperatives in Slavonic (September, Leuven, Belgium), deverbal nouns as questions (October, Lille, France) and Slavic verbs and adverbs of epistemic possibility (November, Regensburg, Germany).

Another important aspect of Johan's academic activities concerns his professional guidance of younger linguists. Between 2002 and 2016, he supervised ten PhD dissertations, which again cover a broad range of topics: from Bultinck's (2002) dissertation on the meaning of English cardinals from a Gricean perspective over modality in Chinese and English (Li 2003), the diachrony of *need* (Taeymans 2006), tense, aspect and mood markers in Turkish (Temürcü 2007), interrogative pronominals (Idiatov 2007), imperatives (Schalley 2008; Van Olmen 2011), tense and aspect (De Wit 2014) and indefinites (Van Alsenoy 2014) to negation (Vossen 2016).

Apart from the obvious quality and quantity of the research he conducted, Johan also excelled in the number of services he has lent the academic community. At the University of Antwerp, Johan co-founded the Centre for Grammar, Cognition and Typology in 1999, which he directed until 2014 and which was also the home of many international guests. Moreover, Johan was the chair or a member of expert committees for national and international research councils such as the European Research Council (2006–2013), the European Science Foundation (2005–2010), the Belgian Research Councils (Flemish 2000–2009, French 2010–

2015) and the French, Swedish, Danish and Norwegian Research Councils, as well as various national research assessment committees. Not least remarkably, since 2005, Johan has been Editor-in-Chief of the prestigious journal *Linguistics*.

Another important chapter in Johan's professional biography is his work for the Societas Linguistica Europaea. He was elected President of the SLE in 2004. Seeing how the organization worked, Johan quickly realized there was room for improvement. More specifically, he saw the SLE's potential to grow from a Central European old boys network into a genuine European forum for linguistics. The SLE benefited immensely from Johan's excellent international contacts and his good relations with many publishers. In 2005, he proposed Teresa Fanego as the new Editor-in-Chief of *Folia Linguistica*. This was the start of a process of modernization of the SLE, which meant making the organizing more attractive to different generations. Together with people like Christian Lehmann and Anna Siewierska, Johan prepared real change. In the following years, this new dynamism was consolidated with the organization of regular board meetings and the appointment of a conference manager (a role first fulfilled by Bert Cornillie, who had worked at the University of Antwerp for some years). As a consequence of all this, the SLE has evolved into a vibrant linguistic organization with many members, whose yearly conferences are widely attended. The decisions taken under Johan's leadership have greatly contributed to this success.

It is evident from a look at his prosperous career that the hope which Johan expressed in the final words of his first publication has been more than fulfilled: "Notwithstanding restrictions we hope that we have not been beating dead horses and would be pleased if we have stuck out our neck on a few central issues." (van der Auwera 1975: 69). We hope that the present volume testifies to Johan's example and offers some new insights into issues central to one of his long-standing interests, i.e., linguistic variation – in the widest sense of the term. It includes contributions from some of Johan's collaborators that have come closest to his own interests (at one point or another) and whom he evidently respects for their work.

Dagmar Divjak looks at complementation, which has repeatedly come up in Johan's list of publications too (e.g., van der Auwera 1990; Ammann and van der Auwera 2004), and examines to what extent a theoretical analysis of Polish complementing constructions reflects either individual speakers' or the speech community's knowledge. In tribute to Johan's extensive work on areal linguistics (e.g., van der Auwera 1998a, 2011), Volker Gast and Maria Koptjevskaja-Tamm make innovative use of lexical databases to study areality as a factor in lexical typology. Martin Haspelmath develops his notion of comparative concepts and

elaborates on the differences with descriptive linguistic categories, thus addressing issues raised by van der Auwera and Sahoo (2015) among others. Dmitry Idiatov's paper is the second one that takes an areal point of view. It focuses on clause-final negation in Africa and builds on much of Johan's recent research (e.g., Devos and van der Auwera 2013; van der Auwera and Van Alsenoy 2016). Ekkehard König looks at the languages of Europe – a perspective also taken in, for instance, van der Auwera (1998b) and Gast and van der Auwera (2011) – and describes the formal and functional variation of their definite articles.

Pierre Larrivée and Adeline Patard explore the diachronic implications of semantic maps, the theory of which is a recurrent theme in Johan's research (e.g., van der Auwera 2008). They also deal with two phenomena that are of centreal interest in his career: modality and negative indefinites (e.g., van der Auwera 2017). Jacques Moeschler's paper can be said to honor especially Johan's earlier work on theoretical pragmatics and the logic of language (e.g., van der Auwera 1985, 1997) and answers the question whether logical connectives are truth-functional. Vladimir Plungian shares his interest in verbal categories with Johan (e.g., van der Auwera and Plungian 1998; Plungian and van der Auwera 2006). His contribution to the present volume concentrates on verb paradigms in Eastern Armenian and in particular on hidden semantic distinctions close to (ir)realis and (im)perfectivity. Jean-Christophe Verstraete contributes to the literature on epistemic modality (e.g., van der Auwera and Ammann 2005; Vittrant and van der Auwera 2010) by identifying an unknown pattern of epistemic marking in the Native Australian languages of Cape York Peninsula and explaining its origins. Jacqueline Visconti, finally, examines the development of the Italian connective *anzi* 'on the contrary' and, more specifically, its procedural meanings, an area of semantics that also features prominently in Johan's work (e.g., van der Auwera 1993; van der Auwera and Coussé 2016).

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Dagmar Divjak

Binding scale dynamics

Fact or fiction?

Abstract: This paper contributes to current debates in linguistic theory and methodology by focusing on discreteness versus continuity in linguistic description as well as on the importance of structure versus use for understanding mental representations of language phenomena. It does so through a case study on the Polish [finite verb + infinitive] construction, henceforth [Vfin Vinf]. Within a Cognitive Linguistic framework, Divjak (2007) proposed a structurally underpinned Binding Scale encompassing eight levels of looser to tighter integration, with verbs expressing modality, intention, attempt, result and phase representing the most integrated type of [Vfin Vinf] constructions. Cognitive Linguistics aims to give a usage-based account of the complex system that language is, grounded in general cognitive principles. But at which level of abstraction should we pitch the linguistic description of a system such as the [Vfin Vinf] system to find such motivating principles at work? In this paper, I assess the distance between usage and structure by investigating whether the proposed Binding Scale can be reliably distinguished in judgments of usage events through statistical unsupervised learning. By experimenting with the type of abstraction that needs to be imposed on acceptability ratings to arrive at a meaningful classification, conclusions can be drawn about the social or mental nature of this structure.

Keywords: structure, use, discreteness, continuity, cluster analysis, Polish, Binding Scale, complementation

1 The structure versus usage debate

During most of the 20th century, the classical Saussurean distinction between Langue and Parole dominated mainstream linguistic theory. Generativists took

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the distinction between Langue and Parole on board, accepting there to be structural facts and usage facts that are in principle independent of each other and can be described in complete isolation from each other. Once performance errors are declared irrelevant to competence, it suffices to describe facts about structure or competence, to the neglect of use or performance. As an added bonus, allowing linguists to study an idealized version of language greatly simplified linguistic analysis.

Cognitive and functional approaches have been challenging this view for the past four decades, stressing the usage-based nature of structure. Within the functional-cognitive camp, this has led to a focus on usage facts to the extent that now structure is largely ignored. A radical usage-based approach would seem to do away with the notion of system altogether, indeed (Geeraerts 2010: 258). Yet, "accounts of language usage, language acquisition and language change are impossible without an assumption about what it is that is being used, acquired, or subjected to change. And more moderate functionalists and cognitive functionalists recognize both structural facts and usage facts as genuine facts central to the understanding of language" (Boye and Engberg-Pedersen 2010: vii).

Much cognitive and functional writing does not concern itself with characterizing the precise relationship between usage and structure. Usage is observable, but where is the structure? Geeraerts (2010: 237) suggests "a dialectal relationship between Structure and Use: individual usage events are realizations of an existing systemic structure, but at the same time, it is only through the individual usage events that changes might be introduced into the structure". Boye and Harder (2007: 572) agree that "language is indeed based on actual, attested usage, but that it rises above attested instances in providing the speaker not only with actual usage tokens but also with a structured potential that is distilled out of previous usage".

Structure plays no doubt a role in linguistic description and theorizing but the question that I want to pose here is whether speakers distil and store structure out of use. And if they do, how similar is the structure stored by speakers to the structure proposed by linguists?

2 The role of abstraction in linguistic description and representation

On a methodological level, the discussion about the relationship between structure and usage resurfaces as the ongoing debate about the choice for continuity

or discreteness in linguistic analysis (for a first book-length treatment, see Fuchs and Victorri 1994). In the following two sections, I will discuss the role of abstraction in linguistic description (Section 2.1) and in linguistic representation (Section 2.2).

2.1 The role of abstraction in linguistic description

Separating Langue from Parole and declaring the former to be the object of linguistic study allowed Saussureans to focus on the "neat and tidy" side of linguistics and to describe language structure independently of language use in terms of clean paradigmatic and syntagmatic relations. This discrete frame of description marginalized phenomena falling outside the realm of such an approach, a trend that was further supported by the Chomskyan focus on syntax and preference for algebraic formalizations.

Nevertheless, there have always been dissidents, denouncing the reductionism inherent in discrete models. The past few decades have witnessed a surge in explicitly continuous models, both for analysis and for representation, couched in functionally oriented frameworks. Langacker (2006) remarks that all (linguistic) models are metaphorical, and all metaphors are potentially misleading. Although, generally speaking, formalists tend towards metaphors involving discreteness while functionalists favor those based on continuity, even functionalist metaphors based on continuity such as the network model have been (rightly) criticized for being too discrete. The network model, for example, remains too discrete in the identification of sub-meanings and fails to capture the continuous dispersal of phenomena (Janda 2009: 111).

What is it that is discrete or continuous? Is continuity or discreteness a property of a (certain type of) phenomenon (see Fuchs and Victorri 1994 for semantic phenomena) or merely a characterization of the model capturing the phenomenon? The choice for continuity or discreteness comes into play in all domains of linguistic analysis (as well as outside of linguistics) and at multiple levels. Whether something is discrete or continuous is subject to construal (Langacker 2006: 114): a linguistic phenomenon is typically so complex that both discrete and continuous descriptions are appropriate, for different aspects of it. Thus, even if a phenomenon is gradual in nature, we could well gain insights from thinking about it in discrete terms, and vice versa.

Langacker (2006: 114–126) discusses a variety of ways in which phenomena can be viewed discretely or continuously. On the one hand, there are the *discretization techniques* of, first, all-or-nothing responses to gradient input and, second, zooming in to yield a higher resolution and see more detail. Discreteness can be

imposed through all-or-nothing responses to gradient input since the placement of the boundary is arbitrary and implies discontinuity where there is none. Another critical factor for discreteness is specificity, i.e., whether a phenomenon is viewed in coarse-grained or fine-grained detail. Something that appears continuous can be rendered discrete by "zooming in" to examine it at a higher resolution, where differences between individual items become visible.

On the other hand, there are *continuity-imposing measures* such as schematization and summation. Schematization ensures that two experiences become equivalent at a certain level, so that comparing them registers identity rather than disparity and thus facilitates recognition: if we apprehended everything in full, fine-grained detail, we could not build up a coherent view of the world, since every experience would be unique. Summation too yields continuous properties. Grammaticality judgments, for example, are intrinsically continuous, with deviance being the cumulative result of multiple factors. It is only when the sum of these individual factors passes a certain threshold that a clear-cut judgment of ill-formedness emerges. But any particular cut-off point is arbitrary, since the judgments are gradient. At the same time, the continuity is derivative rather than primitive, since it represents the cumulative result of numerous individual assessments.

2.2 The role of abstraction in linguistic representation

The problem of continuity versus discreteness also poses itself on a representational level. What kind of linguistic information is encoded? Structure or usage? Rules or facts? Or is the former derived from the latter?

Since rules are not "given" in the input, if they "exist", they must be inferred from input. If we see syntactic knowledge in terms of rules, we must postulate either a rich body of innate linguistic knowledge or a sophisticated grammar induction device. There are problems with both the generativist approach, postulating a Universal Grammar, as well as with the emergentist approach, searching for a powerful grammar induction device.

Recently, proposals have been put forward that favour storage of facts, i.e., minimally different, partially overlapping exemplars. Researchers disagree as to what then happens to these exemplars. Do exemplars remain stored in clouds that (have a prototype structure? and) are efficiently searched when activated (cf. Bybee 2013) or do such rote-learned formulas form templates that gradually develop into distinct low-level schemas? In low-level schemas, none of the slots is tied to specific lexical items, as a result of storage-efficient data compression in

long-term memory (Dąbrowska 2000). Unlike the abstract rules of formal linguistics, usage-based schemas are derived from actual expressions and have the same structure as their instantiations. According to Langacker (1991: 133 and elsewhere), the function of higher level schemas in the linguistic system is primarily an organizational one.

Human beings purportedly excel at observing patterns in the speech stream (Saffran, Aslin and Newport 1996; Gomez and Gerken 1999) and abstract distributionally defined categories from input. But does pattern detection (need to) yield anything like a linguist's grammar? Distributional analysis has also proven relevant in the context of computational modeling. Redington and Chater (1997, 1998) show that distributional analysis yields relevant patterns at low and high levels of abstraction. Yet, they point out that the study of distributional information and semantics from a psychological perspective is in its infancy (Redington and Chater 1998: 183). Although the cognitive system is sensitive to features of the input, determining empirically whether infants actually exploit particular sources of distributional information to build their grammatical knowledge from the ground up remains an open question. This raises the issue of cognitive reality for results of distributional linguistic analysis.

The following survey-based study on Binding Scale dynamics in Polish is a case in point. It explores what level of granularity is ideal for describing the Binding Scale. What kind of picture emerges at a lower level of abstraction, with more detail about variation? Data for this study stems from a large survey of verbs that combine with an infinitive in Polish. Before presenting details on the measuring instrument (Section 3.1) and the data collection (Section 3.2), I will briefly introduce the [Vfin Vinf] phenomenon and its relevance to the issues outlined in Sections 1 and 2.

3 The Vfin Vinf system: diagnostics and data

Polish has more than 20,000 verbs but very few take an infinitive. Culling verbs that combine with an infinitive from the 100,000-word corpus-based dictionary *Inny Słownik* (Bańko 2000) yielded 95 such verbs (a list is provided in Appendix 1). Descriptions of the [Vfin Vinf] system are few and far between and this comes as no surprise. The [Vfin Vinf] construction is exceptional within any verbal system: usually, one verb is enough to form a full-fledged clause or sentence, as in the example *I came across a problem*. Such events are called simplex events. Sometimes, more than one verb will be used in one clause or sentence, as in *I decided to solve the problem*, with the finite verb *decided* and the infinitive *[to]*

solve. Although less than 1% of all verbs combine with an infinitive, some of the members of this category are highly frequent, such as modals or auxiliary verbs. Moreover, not all [Vfin Vinf]s are created equal: a distributional analysis shows that different finite verbs entertain links of different strength with their infinitives (Divjak 2007). In Sections 3.1.1 to 3.1.3, I will describe the set of three diagnostic tests that make it possible to differentiate between the different degrees of integration between the two verbs in a [Vfin Vinf] construction.

3.1 Diagnostic tests

The three diagnostic tests, initially proposed in Divjak (2007) (to which I refer for details and references), reveal the degree to which the two verbs or events are structurally integrated. They measure the cognitive status of the infinitive clause and the degree of integration between finite verb and infinitive by referring to the functions verbs typically fulfil. Verbs express events that have participants and this is captured in their argument structure. This observation forms the basis for the thing-test in Section 3.1.1 and for the *that*-test in Section 3.1.2. Events also take place at a certain moment in time (and space), which forms the verbs' temporal event structure. This is exploited in the time-test in Section 3.1.3.

3.1.1 The thing-test

The first diagnostic, the "thing"-test, reveals the conceptual status of the infinitive seen from the point of view of the finite verb. Very briefly, in Cognitive Grammar, nouns and verbs instantiate diverging kinds of predication (Langacker 1987: Ch. 4, 5, 6): verbs represent relational predications whereas nouns represent non-relational predications. Furthermore, nouns and verbs differ in terms of the type of entities they designate and the sort of scanning required to capture the entities they depict. Nouns are symbolic structures whose semantic poles profile things, i.e., scenes that are conceived as being unrelated to time and are scanned summarily, as a whole. Verbs profile processes or series of component states distributed through a continuous span of conceived time and are scanned sequentially, frame by frame. Infinitives are intermediary between nouns and verbs as they profile atemporal relations. Therefore, the conceptualization type typical of the (finite) verb can be determined by tracking whether the verb combines with both things and relations or only with one of them.

The question thus becomes: does a specific finite verb need an infinitive or can it do with a noun? In (1) and (2), this question is explored with pro-structures,

i.e., pro-nouns to refer to things and a pro-verb to refer to actions. If the pro-verb *do something* subsumes under the pro-nominal question *something* for a particular (lemma of a given) verb, then the verb referred to by *do something* is in essence conceptualized as a thing, despite its relational appearance as a verb.

(1) *He planned to travel to Warsaw.*
what?
to do what?

(2) *He had to travel to Warsaw.*
**what?*
to do what?

The verb *plan* from (1) expresses a process, i.e., it is a relational entity, and combines with infinitives, i.e., entities that, just like processes, have their own relational profile, albeit an atemporal relational profile. Yet, the question *what (does he plan) to do?* is not strictly necessary. One could also ask *what (does he plan)?* and receive as response *to travel to Warsaw*. At a more abstract, non-lexicalized level, the action expressed by the infinitive is thus reified, i.e., conceptualized as a thing. In other words, the thing-test shows that verbs like *plan* do not need another relational profile as offered by the infinitive: the infinitive can be the answer to a pro-nominal question. Thus, conceptually, *plan* treats the infinitive as any other non-relational entity it combines with. One could say that a verb like *plan* evokes conceptualization of the conceived scene expressed by the infinitive like any non-relational thing in that position, more precisely, like a direct object. The infinitival relation is thereby presented as a thing, i.e., as an entity that is scanned as a unitary whole and is made conceptually subordinate to the process expressed by *plan*.

The situation is quite different with a finite verb like *have* in (2), which exemplifies the second scenario. The infinitive that follows this verb cannot be captured by the pro-noun *what*, belonging to the argument structure of the finite verb. The question *what (did he have) to do?* remains required to obtain *to travel to Warsaw* as answer. This indicates that, with certain verbs, the infinitival relational profile cannot be backgrounded or made conceptually subordinate to that of the finite verb. The finite verb necessarily evokes the idea of another verbal relation, albeit an atemporal relation.

3.1.2 The *that*-test

Apart from differences in the "cognitive status" of the infinitive, [Vfin Vinf] patterns also differ in how "close" the second verb needs to be to the finite verb. Closeness can be judged spatially (i.e., within sentence boundaries) as well as temporally and sheds light on the strength and independence of the (finite) verb and the event it expresses.

Closeness within sentence boundaries can be determined by rephrasing the infinitive clause as a *that*-clause. Some verbs that combine with an infinitive are restricted to the [Vfin Vinf] pattern while other verbs can link to the second verb using a *that*-construction, without causing the finite verb to change its meaning. The verb *promise* can introduce *that*-complement clauses and can use these complement constructions to express the infinitival content alternatively: (3a) can be (partially) paraphrased using the pattern of (3b). Unlike *promise*, *try* does not occur with a *that*-complement clause at all, as illustrated in (4a) and (4b).

(3) a. *She promised to tell him the truth.*
b. *that she would tell him the truth.*

(4) a. *She tried to tell him the truth.*
b. **that she would tell him the truth.*

Complementation has been described in terms of conceptual subordination and dependence (Langacker 1991: 440–442). Viewing the subordinate clause as a main clause participant implies conceptual distancing that encourages summary scanning of the component states if not their reification. In other words, construing the second verb's content as a full-fledged complement clause equals imposing a nominal construal on the second verb and the elements that depend on it and detaching that structure conceptually from the finite verb. Compare here Wierzbicka's (1988: 132–141) and Givón's (2001: Ch. 12) analysis of *that*-complementation in English.

Verbs that do not allow *that*-complementation and are instead restricted to combinations with infinitives share morphological and syntactic information and strict co-reference rules apply. Such verbs depend to a higher degree on the infinitive than those finite verbs that combine with an infinitive as well as with a full-fledged complement clause. Although the latter constructions also consist of two events, both events exist to a certain extent independently of one another and the infinitive event can be made subordinate to the finite verb event.

3.1.3 The time-test

The (im)possibility of modifying both verbs in a [Vfin Vinf] structure with conflicting time adverbials or adverbial expressions of time shows how the different verbs that combine with an infinitive deal with the co-temporality requirement. This provides a second measure for the degree of integration between the finite verb and the infinitive, a measure that is moreover independent of the verb's argument structure and conceptual subordination of one event to the other.

The verb *ask* could be used in a construction that locates the finite verb and the infinitive in two different and not necessarily tightly sequential moments in time. The verb *manage* demands overlap in or tight sequentiality of time. This requirement is illustrated in (5) and (6).

(5) a. *He asked her to buy a ticket.*
b. *Yesterday he asked her to buy a ticket tomorrow.*

(6) a. *He managed to buy a ticket.*
b. **Yesterday he managed to buy a ticket tomorrow*

Temporal distancing does not imply conceptual subordination. Inserting conflicting temporal specifications is a way to measure the degree of distance or integration between the two verbs in [Vfin Vinf] structures, independent from their argument structure. The occurrence of temporal distance between two events merely entails their conceptual distance. The two events take place at two different moments in time. They are construed as distinct (though related) events (Wierzbicka 1975: 497–499; Lakoff and Johnson 1980: 131; Langacker 1991: 299 fn. 11).

3.2 A theoretically supported Binding Scale

The grammaticality of using each of the verbs that combines with an infinitive in each of the three diagnostic tests can be used to build a Binding Scale, a scale of looser to tighter integration between two events (see Divjak 2007 for details). A binary approach (acceptable versus unacceptable) allows for eight logically possible combinations or degrees of integration, as shown in Table 1. Plusses indicate a positive test score for a test, minuses a negative one.

Tab. 1: Binding scale

1	2	3	4	5	6	7	8
+ thing + that + time	+ thing - that + time	+ thing + that - time	+ thing - that - time	- thing + that + time	- thing - that + time	- thing + that - time	- thing - that - time
main verbs							auxiliary verbs

The eight different logically possible combinations of properties correlate with eight different degrees of integration between the two verbs in the [Vfin Vinf] construction. The categories were ordered according to the thing-test, followed by the time-test and, finally, by the *that*-test. The *that*-test was considered the linking diagnostic because it overlaps partially with the thing-test in that it tests for the object status of the infinitive structure and partly with the time-test in that it tests for separability.

[Vfin Vinf] combinations on the left-hand side of Table 1 score positively on all three diagnostic tests. They show the loosest type of bond and are considered multiple, independent events. [Vfin Vinf] combinations on the right-hand side of Table 1 score negatively on all three diagnostic tests. These exemplify the tightest type of bond and qualify as complex, integrated events. The finite verbs of the former combinations are considered standard main verbs while the finite verbs in the latter combinations are considered auxiliary verbs, in the most general sense of the word. Once the argument structures of each of the verbs is taken into account, several semantically coherent subgroups emerge within each category, as I demonstrated for Russian (Divjak 2007), which boasts about 300 verbs that combine with an infinitive.

In order to construct a Binding Scale for Polish, data needs to be collected on how each of the 95 Polish verbs that combines with an infinitive responds to each of the three diagnostic tests. This can be done by relying on one's intuitions or on the intuitions of a number of native speakers. In section 3.3, I will briefly discuss the way in which the acceptability of each of the 95 verbs in each of the three diagnostic tests was assessed by relying on a large sample of native speakers. In Section 4, I move on to finding semantically coherent groups in the data using cluster analysis.

3.3 Data

The vast majority of linguistic theories rest on a peculiar type of data: acceptability or grammaticality ratings. Ratings of usage events are proxies: if we accept that the system constrains the possibilities, the constructions that are licensed by the system should be judged more acceptable than the constructions that are not licensed. And more acceptable constructions should be used more frequently than constructions that are not licensed. Traditionally, these ratings were obtained through introspection by the analyst, an approach that is problematic in many (if not most) respects. Linguists have addressed (part of) the issue by eliciting ratings from larger numbers of native speakers.

Data on which to construct the Binding Scale for Polish were gathered in a large elicitation survey, following Cowart (1997), in which native speakers of Polish rated the acceptability of the 95 Polish verbs that combine with an infinitive in each of the three diagnostic tests that together reveal the degree of verb integration between the verbs in the [Vfin Vinf] structure (see Section 3.1).

Trigger sentences were constructed for each verb*test combination, i.e., all 95 verbs were used in the three test-constructions, resulting in 285 test sentences. To avoid lexical effects, three different examples were constructed per verb*construction combination. All sentences were adaptations of authentic sentences extracted from the Polish National Corpus (non-literary texts) that were comparable in complexity and length. 285 participants saw fifteen randomly selected verb*construction combinations in which fifteen different verbs were used and each of the three test-constructions was presented five times.

The trigger sentences were hidden among 30 filler sentences that are comparable in complexity and length and likewise exhibited grammaticality levels ranging from -2 to +2, as judged by native speakers. Both triggers and fillers were randomly assigned to blocks (to avoid order effects) that each contained one example of each construction type (three triggers) and one example of each mistake level (five fillers). These eight sentences were randomized within blocks, i.e., they were pseudo-randomized to ensure no questionnaire started with a trigger and triggers never followed each other. For an example, see Appendix 2.

Surveys of one page and a half were filled out in class by undergraduate students of English or German in Poland. Participants were asked to "tell me how Polish this sentence sounds" and their answers were recorded on a five-point Likert scale (-2 to +2 and ?). On this scale, they were told, -2 stands for unnatural Polish, i.e., a sentence that sounds strange and may even be difficult to understand. The middle value, 0, signaled "OK" Polish or sentences a native speaker could produce, although they are not perfect (this accommodates the strong pre-

scriptive tradition concerning the regulation and teaching of Polish to which participants would have been exposed). Finally, +2 was reserved for natural Polish sentences that are fully normal and understandable. Participants were ensured there were no right or wrong answers.

4 Finding groups in the data

Structure is an abstraction over usage data, yet very little is known about the amount of variation that is discarded in traditional linguistic analyses. In this section, I will use exploratory statistical techniques to detect natural groupings in the data and compare those to the eight degrees of integration that together make up the Binding Scale presented in Section 3.2.

The acceptability ratings were subjected to cluster analysis, an unsupervised learning technique that detects structure in data (see Baayen 2008; Johnson 2008; Gries 2009; Divjak and Fieller 2014; Levshina 2015). Cluster analysis is an exploratory data analysis technique, encompassing a number of different algorithms and methods for sorting different objects into groups. It requires the analyst to make choices about dissimilarity measures and grouping algorithms. Yet, in contrast to many other statistical methods, there seem to be fewer diagnostics informing of the weaknesses of any classification solution proposed. Therefore, "look[ing] for cluster groupings that agree with existing or expected structures" and "pick[ing] the one solution you like best" are not frivolous comments in the context of cluster analysis (Divjak and Fieller 2014: 430). Here, I will try a number of different dissimilarity measures and grouping algorithms to see whether any one combination can identify clusters that correspond to the eight degrees of integration from the Binding Scale discussed in Section 3.2.

The nature of the Likert scale used to collect grammaticality judgments poses a challenge in this respect. Whether the Likert scale is an ordinal or an interval scale is the subject of much debate. Although Likert himself assumed that the scale has interval qualities, as it was originally intended as a summated scale (after the questionnaire is completed, item responses are summed to create a score for a group of items), some consider a Likert scale to be ordinal in nature. Hence, treating the data as interval, or even ratio, is doubtful: summing ordinal data will not make it interval data, it will only make it summated ordinal data. The problem is compounded if only five levels of (dis)agreement are used, since respondents will not perceive all pairs of adjacent levels as equidistant. It has been objected, however, that, if the wording of response levels implies symmetry of response levels around a middle category, measurements would fall between ordinal and

interval level. To treat such data as ordinal could mean ignoring information it may contain. Furthermore, accompanying the item-to-be-rated with a visual analog scale where equal spacing of response levels is clearly indicated has been said to increase the likelihood that respondents construe the points as equidistant. Although both requirements were met in the questionnaires used, I remain doubtful as to whether the data could be considered anything but ordinal.

Since few clustering techniques deal with ordinal data, several work-arounds are explored, i.e., clustering summated responses (Section 4.1) and clustering summated proportions of responses (Section 4.2). Although the assumption that speakers have had less exposure to constructions they consider bad and are less likely to use such constructions themselves underlies both types of data summaries, there is a qualitative difference between these two approaches. Similarity in summated proportions of respondents assigning a particular score are slightly more precise in that they keep variation in the data, while similarities between summated responses may gloss over the very different combinations of judgments they are made up of. For example, a summed score of 10 might be the result of five respondents assigning the test construction a marginally unacceptable score or from two respondents considering the construction perfect and three others considering the construction unacceptable.

4.1 Cluster analysis on summated responses

For a first series of analyses, the fifteen ratings per verb*construction combination were summed up. Responses to several Likert questions can be summed, provided that all questions use the same Likert scale and that the scale is a defendable approximation to an interval scale, in which case they may be treated as interval data measuring a latent variable.

The data was then taken through hierarchical agglomerative cluster analysis, using agnes() from the package cluster in R, with Euclidean as the distance measure and Ward's as the amalgamation algorithm. Euclidean measures the distance between items "as the crow flies" and Ward's is known to yield small groups. The combination of both has proven to work well for linguistic data. The results are presented in the dendrogram in Figure 1. The dendrogram is read bottom up, with lower clusters representing items that are very similar and hence end up being clustered first. These lower-level clusters are then in turn grouped to form higher-level clusters and this process is repeated until all clusters are united in one overarching cluster.

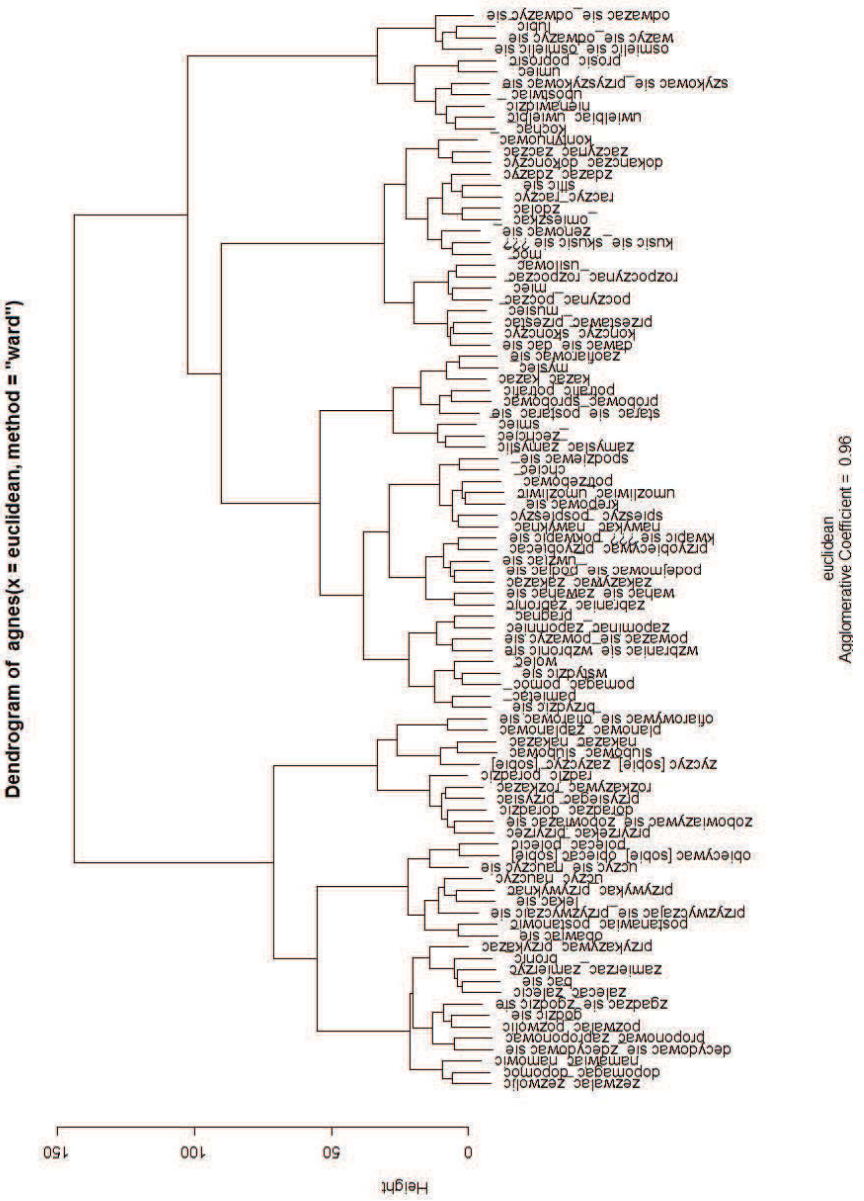


Fig. 1: Dendrogram of HAC cluster analysis on summated data with Euclidean as distance measure and Ward's as amalgamation algorithm

The agglomerative coefficient (AC), indicated at the bottom of the plot, is a measure of the clustering structure of the dataset that ranges from 0 to 1. An AC close to 1 indicates that a very clear structuring has been found whereas an AC close to 0 indicates that the algorithm has not found a natural structure. Do bear in mind that this measure is sensitive to sample size, i.e., the value goes up as the number of observations grows. In the present analysis, the AC for the dendogram is very high (0.96) and this supports the presence of natural varieties (despite the indicator's sensitivity to the sample size).

Given the large number of clusters distinguished, a non-hierarchical cluster analysis was carried out to find the optimal clustering. This was done with pam() from the package cluster in R, using the same Euclidean distance measure. Silhouette plots were used to compare clustering solutions. These plots are read from left to right, and each silhouette represents one cluster.

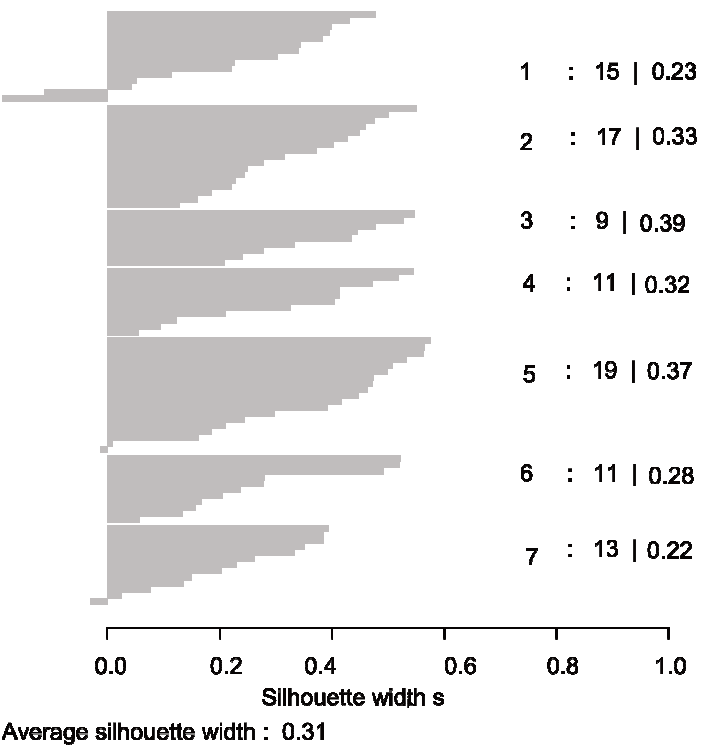


Fig. 2: Average silhouette width for seven-cluster solution

The more the silhouette shape resembles a rectangle, the higher the similarity of the elements in the cluster. The similarity is also expressed quantitatively by means of a silhouette value, which measures the degree of confidence in the clustering assignment of an observation. Well-clustered observations that are very distant from neighbouring clusters have values near 1, while poorly clustered observations that are probably assigned to the wrong cluster have values near -1. The average silhouette width is the average of the silhouette widths for all objects in the whole dataset and indicates the goodness of the overall clustering. Comparing average widths across clusterings reveals the best cluster solution. The optimal clustering solution for the data appeared to contain seven clusters, which is shown in the silhouette plot in Figure 2. Yet, each of the clusters has a relatively low silhouette width (ranging from 0.22 to 0.39) and the Average Silhouette Width for the optimal seven-cluster solution remains as low as 0.31, indicating that the proposed clustering may not be sensible.

This conclusion is confirmed by looking at the contents of each cluster. For each of the seven clusters a medoid is identified. A medoid is the most centrally located point in the given data set, representative of a data set in the sense that its average dissimilarity to all the objects in the cluster is minimal. The medoids are listed in Table 2. As mentioned in Section 3.2, the verbs in a cluster are expected to resemble each other semantically. The medoids do not show a strong semantic resemblance to the other verbs that are part of the same cluster, unfortunately. Table 3 contains details on one of the clusters listed in Table 2, i.e., the one for which the medoid is *bać się* 'be afraid of, fear' (the complete contents of each of the seven clusters is listed in Appendix 3). Apart from one verb, *(za)wahać się* 'hesitate, waver', all other verbs express rather the opposite of fear. There is some semantic cohesion between other verbs that are part of this cluster, however.

Tab. 2: Medoids for a non-hierarchical cluster analysis requesting 7 clusters

Cluster	Medoid	Translation
1	*bać się_*	'be afraid of, fear'
2	*śpieszyć _pośpieszyć*	'hurry, be in a hurry'
3	*zobowiązywać się_zobowiązać się*	'bind, pledge oneself'
4	*uwielbiać_uwielbić*	'adore, worship'
5	*kończyć_skończyć*	'end, finish, conclude, close'
6	*uczyć_nauczyć*	'teach, instruct'
7	*potrafić_potrafić*	'know how to, manage'

Tab. 3: Contents of one cluster resulting from non-hierarchical cluster analysis requesting seven clusters

Verb	Translation
decydować się_zdecydować się	'determine, decide'
pozwalać_pozwolić	'allow, permit, let'
zgadzać sie_zgodzić sie	'agree, concur, consent'
proponować_zaproponować	'offer, propose'
*bać sie_*	'be afraid of, fear'
*godzić sie_*	'agree, consent'
zalecać_zalecić	'recommend, commend'
przykazywać_przykazać	'order, command'
*bronić_*	'defend, guard, vindicate, assert'
namawiać_namówić	'induce, persuade'
zamierzać_zamierzyć	'intend, mean, be going to'
zezwalać_zezwolić	'allow, permit, let'
dopomagać_dopomóc	'help, aid, assist'
wahać się_zawahać się	'hesitate, waver'
zakazywać_zakazać	'forbid, prohibit'

The shape of the clusters in Figure 2 and the low average silhouette width confirm that there is no clear structure. Instead, many verbs are close to verbs from other clusters. The fact that the structure found may be artificial would explain why the overarching semantics of individual clusters is difficult to capture.

4.2 Clustering summated proportions of responses

Instead of summing all judgments provided for one sentence, we could also summarize the data by proportions of respondents who assign a particular score. Summarizing by proportions of responses was done in two different ways, using the original five-point scale and a condensed three-point scale.[1]

1 Due to the instructions accompanying the rating scale, i.e., the fact that the middle point was conceived as 0 to capture the judgment "could be heard", creating a binary solution would require second-guessing respondents' intentions for assigning a 0 as it could mean "could be heard but I consider it unacceptable" or "could be heard and I consider it acceptable".

4.2.1 Using a five-point rating scale

In a first analysis, proportions of responses were calculated using the original five-point ratings scale. Eight analyses were run, with both Euclidean and Manhattan distance in combination with complete, single, average linkage and Ward's amalgamation algorithms. Because both distance measures yielded virtually identical results, I will only present one set here.

The highest agglomerative coefficient was achieved by the Manhattan/Ward combination (0.87), followed by Manhattan/Complete (0.72), Manhattan/Average (0.54) and Manhattan/Single (0.29). To assess the replicability of the clustering, in the absence of an independent test-sample, p-values for all clusters contained in the clustering of the original data were calculated using the R package pvclust. For each cluster in hierarchical clustering, p-values are calculated via multiscale bootstrap resampling, a computer-based way of simulating similar datasets. Pvclust provides two types of p-values: the AU (Approximately Unbiased) p-value (on the left, normally in red) and BP (Bootstrap Probability) value (on the right, normally in green). The AU p-value, which is computed by multiscale bootstrap resampling, is a better approximation to unbiased p-value than the BP value computed by normal bootstrap resampling. Clusters that are highly supported by the data will have large p-values.

The two clusterings with the clearest structure as per the Agglomerative Coefficient do not yield any high-level replicable clusters. Based on 100 replications, the Manhattan/Ward combination yields nine clusters, each containing between two and six verbs, with AU values above 95. The likelihood that these clusters would not be found in another dataset is thus rejected at significance level 0.05. These clusters appear in (red) rectangles in Figure 3. All clusters are lower-level groupings; no higher-level clusters are likely to be found in other datasets, as the zeroes indicate. Of the lower-level groupings, only the six-verb cluster (second from the right) is semantically coherent, containing verbs like 'promise' or 'advise'. Manhattan/Complete yields a similar picture: eight replicable clusters with between two and four verbs each.

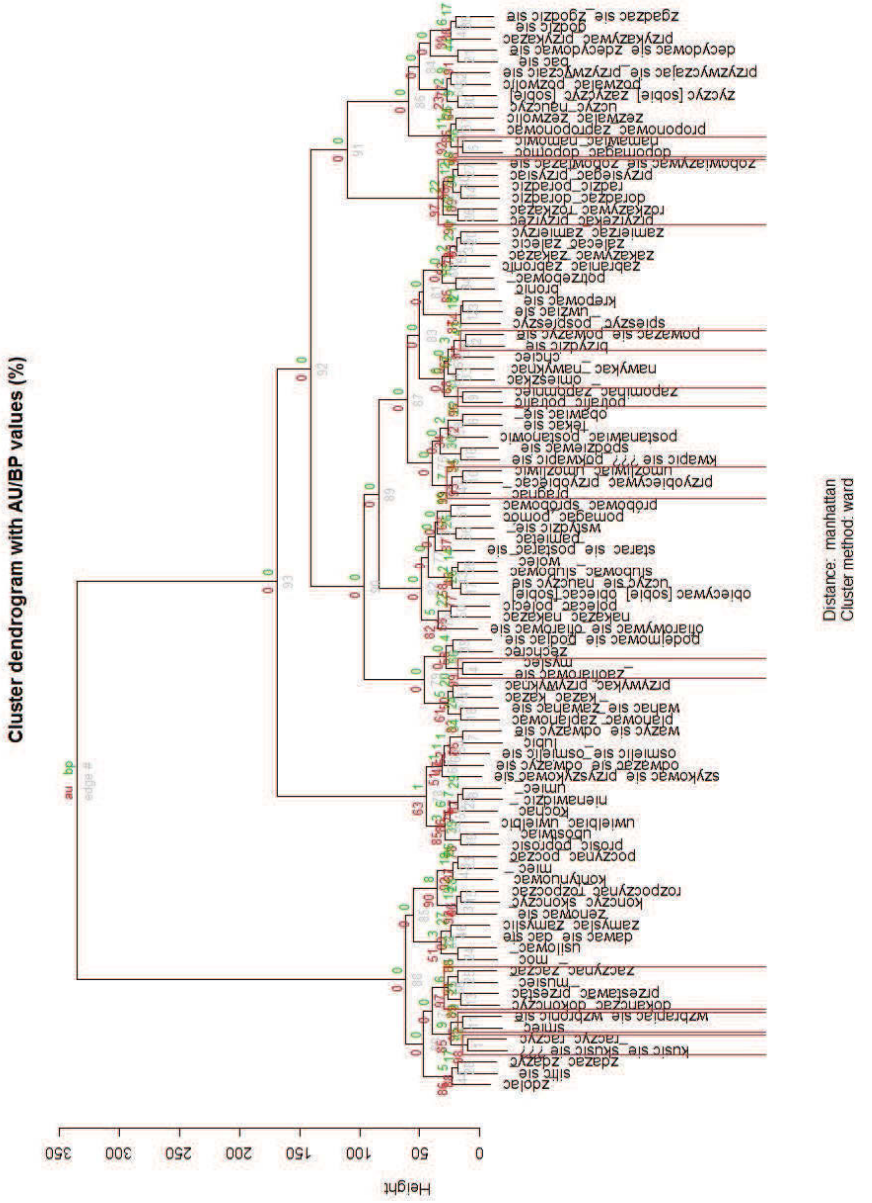


Fig. 3: Dendrogram of HAC with Manhattan/Ward and p-values on five-point scale

In other words, working with five levels of acceptability results in many low-level clusters. It is unclear from the data, however, what would motivate these clusters. If linguists would like to prefer low-level generalizations over high-level ones, some form of similarity between the verbs in one cluster would be expected. Dąbrowska (2008), for example, found that speakers prefer low-level generalizations over clusters of phonologically similar forms or clusters of words sharing the same derivational affix to more global generalizations. The clusters do, however, not contain verbs resembling each other from a semantic point of view and there is no phonological or morphological similarity either. It is rare to find a cluster containing infinitives ending in the same suffix, having a reflexive pronoun or exhibiting the same morphological aspectual alternation pattern.

4.2.2 Using a three-point rating scale

Clusters containing only two to four verbs contribute little to our understanding of the category of [Vfin Vinf] verbs as a whole. Therefore, in a next step, the five scoring options were reduced to three, by collapsing the scores -2 and -1 as well as 1 and 2. The same eight analyses as described in Section 4.2.1 were run, four with the Euclidean distance measure and four with Manhattan. For both sets, the agglomerative coefficients are the same depending on the amalgamation strategy used. Ward's does best, while Single linkage performs most poorly.

Of the clusterings run with the Euclidean distance measure, Ward-based clusterings achieve an agglomerative coefficient over 0.90 (both Euclidean/Ward and Manhattan/Ward get 0.93) while Complete-based clusterings receive an agglomerative coefficient over 0.80 (Manhattan/Complete gets 0.83 and Euclidean/Complete gets 0.82). Manhattan/Average gets 0.69 and Euclidean/Average 0.68 while Euclidean/Single gets 0.41 and Manhattan/Single 0.39.

These analyses were followed up with pvclust, to determine which clusters could be expected to replicate. Using pvclust with 1000 repetitions to assess the uncertainty in the Euclidean/Ward hierarchical cluster analysis, the two overarching groups that are amalgamated last both receive AU (approximately unbiased) p-values of 99. In other words, the hypothesis that these clusters do not exist is rejected at significance level 0.01.

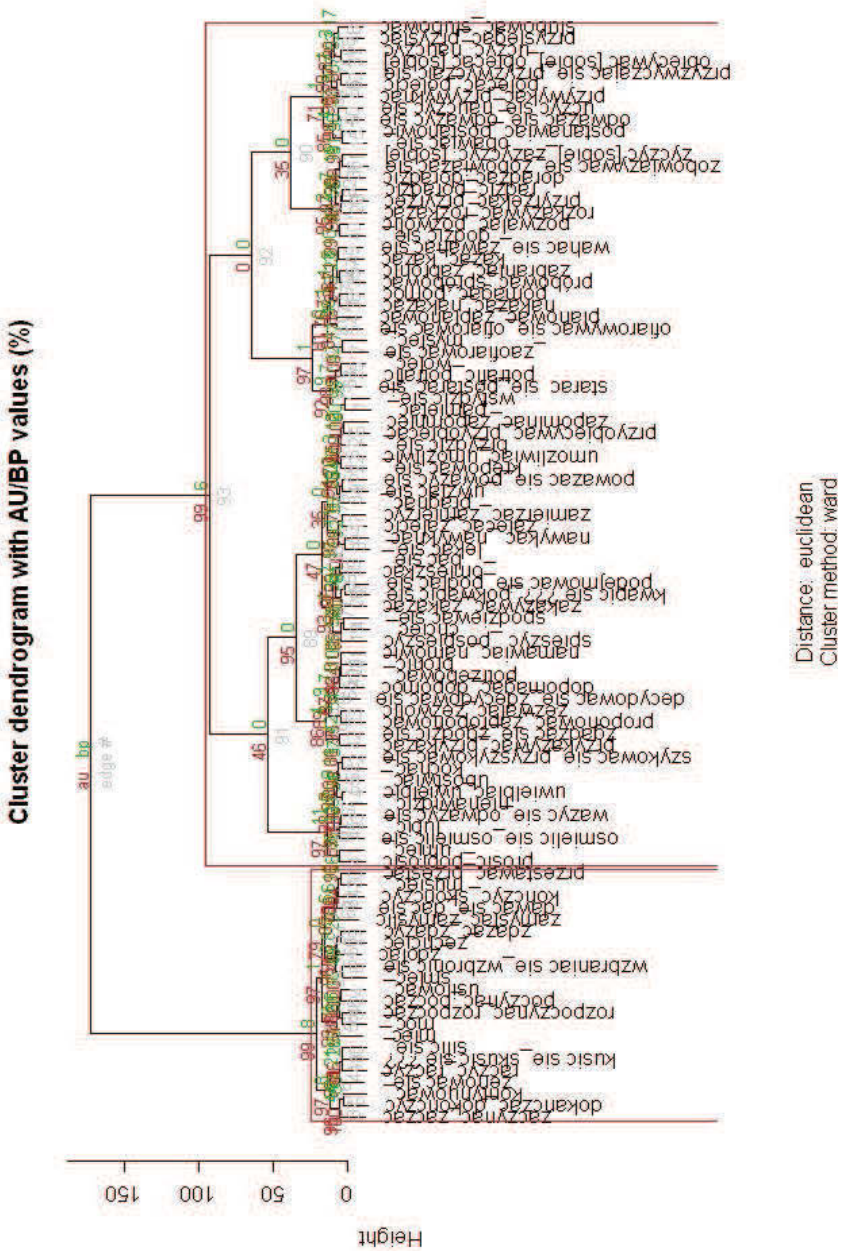


Fig. 4: Dendrogram of HAC with Manhattan/Ward and p-values on three-point scale

The highlighted clusters in Figure 4, one on the left-hand side containing 22 verbs and the other one containing all remaining verbs, do not only seem to exist because of sampling error but may be stably observed if we increase the number of observations. The second-best clustering (running on Euclidean/Complete, not pictured here) suggests different clusters would replicate. The same high-level cluster of 22 verbs emerges but it is complemented by a medium-level seven-verb cluster expressing attitudes such as 'like' or 'detest', as well as by fifteen low-level clusters containing between two and four verbs each. These smaller clusters remain semantically unmotivated.

The two clusters in Figure 4 that are amalgamated last are of most interest from the point of view of the Binding Scale introduced in Section 3.2. It is also important that the leftmost cluster falls out of the second-best clustering as well. The two high-level clusters correspond to what I earlier called main verbs and auxiliary verbs respectively. The leftmost cluster contains the so-called auxiliary verbs whereas the rightmost cluster contains all the other verbs. In other words, auxiliary verbs behave differently enough from all other verbs to be rated in such a way by naïve speakers that they are picked up by a clustering program. The verbs listed in Table 4 qualify as auxiliary verbs. This diverse group of so-called auxiliary verbs is consistent with the results for English (Givón 2001: 54–58) and Russian (Divjak 2007), where semantic clusters of verbs expressing modality, intention, attempt, result and phase are attested within the category of auxiliary verbs. Comparable findings have been reported for non-Indo-European language systems, which may use verbal affixes, modifiers to a verb (including both adverbs and modal verbs) and non-inflecting particles within a clause to express similar concepts (Dixon 1996: 178).

Tab. 4: Replicating cluster of verbs with Manhattan/Ward on three-point scale

Verb	Translation	Classification
_zdołać	'be able'	result
_zechcieć	'become willing'	volition
dawać się_dać się	'be possible, allow itself'	modality
dokańczać_dokończyć	'finish up, conclude'	phase
kończyć_skończyć	'end, finish, conclude, close'	phase
*kontynuować_*	'continue'	phase
kusić się_skusić się	'seek to obtain, attempt'	attempt
*mieć_*	'have to'	modality
*móc_*	'can, be able'	modality

Verb	Translation	Classification
*musieć_*	'be obliged to, have to'	modality
poczynać_począć	'begin, originate'	phase
przestawać_przestac	'cease, stop, discontinue'	phase
raczyć_raczyć	'deign, condescend'	result
rozpoczynać_rozpoczać	'begin, start, commence'	phase
*silić się_*	'make efforts, exert oneself'	attempt
*smieć_*	'dare, venture'	NA
*usiłować_*	'make efforts, endeavor, attempt'	attempt
wzbraniać sie_wzbronić sie	'forbid'	NA
zaczynać_zacząć	'begin, start, commence'	phase
zamyślać_zamyślić	'design'	volition
zdążać_zdążyć	'manage to do on time'	result
*żenować się_*	'feel embarrassed'	NA

5 Is there a system in the variation?

It has been claimed that language is a social fact, an observable regularity in language use realized by a specific community. But it is also a cognitive fact because the members of the community have an internal representation of the existing regularities that allows them to realize the same system in their own use of the language (Geeraerts 2010: 237–238). In the case of the [Vfin Vinf] constructions discussed in this paper, would the proposed Binding Scale fall out of a social interpretation of acceptability ratings for the diagnostics that motivate the system? And how much of any Binding Scale would speakers need to have internalized to yield judgments that would seem to support the abstract system?

The one clear result that emerged from a series of cluster analyses supports a bifurcation of [Vfin Vinf] constructions into those built on a finite verb that is a main verb and those built on a finite verb that is an auxiliary verb. Small low-level classes exist but it is unlikely that there would be any widely shared local prototypes given that those lower-level classes did not exhibit any phonological, morphological or semantic coherence, which would be required to elevate the verb*construction combination from lexical idiosyncrasy to lower-level schema. Individual local prototypes may, however, have guided the ratings for individual

respondents and any divergence between these local prototypes may have further increased the variability in the data. The cline of eight different degrees of integration between the events expressed by means of a [Vfin Vinf] construction could not be reconstructed from acceptability ratings, when submitted to a (standard) statistical technique designed to find groups in data.

The observed two-way classification fell out from data summarized as the proportion of respondents who assigned a score on a three-point scale, i.e., it is a social construct and the result of summation and schematization. Summing the number of individuals who assigned a particular rating registered tendencies within the group of respondents. The scales had to tip for a (more) clear-cut judgment of ill-formedness to emerge. This process was facilitated by schematization: reducing the five-point scale to a three-point scale ensured that two experiences had a better chance of becoming equivalent, so that comparing them registered identity rather than disparity, thereby facilitating categorization.

The Binding Scale, like any other linguistic classification, abstracts away from variation to reveal the skeleton of a system that, if built on well-motivated diagnostic principles, should apply to a number of languages. For this study, usage data was used to populate the cells. A sufficient number of speakers of Polish recognized the syntactic limitations on auxiliary verbs for them to emerge as a category at the social level. The sample of speakers that I polled appears to have a strong aversion towards using auxiliary verbs in any other constructions than [Vfin Vinf]. At the same time, speakers diverged in their assessment of the extent to which the three diagnostic constructions are felicitous for main verbs. Because of the variation in their judgments, no crisply delineated categories of main verbs arise at the participants' group (i.e., social) level. This may mean that the finer details of the classification are not mentally real for any speakers, or maybe only for a small subgroup.

In this case, the Binding Scale could be partly reconstructed on the basis of acceptability data on the diagnostics but only if that data is summarized so as to reveal its social basis. The cluster analyses suggest that the Binding Scale captured conventionalization in society, not entrenchment in the mind. Language is very likely a complex adaptive system (Beckner et al. 2009) in which knowledge of the system's individual parts does not imply understanding of the system. The local agents or speakers know their task but the teleology of the system remains out of their grasp – if there is a goal to the overarching system at all. Knowledge is socially distributed: while each speaker individually knows part(s) of the system, no one speaker knows them all. By putting this distributed knowledge together, a picture of a socially supported system emerges, that in its entirety is unlikely mentally real for any one agent.

These findings limit what usage-based linguists, working within a cognitive framework, can expect from theoretical models that are not built on usage data from a large number of speakers but on binary acceptability judgments from an individual. Even if a proposed account is theoretically justified and each diagnostic has a plausible cognitive explanation, the overarching model may well lack psychological reality for other speakers of the language.

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Appendix 1: List of verbs that combine with an infinitive

	Verb (imperfective_perfective aspect)	Translation
1	*zezwalać_zezwolić*	'allow, permit, let'
2	*brzydzić się_*	'abhor, loathe, have an aversion'
3	*przyrzekać_przyrzec*	'promise'

	Verb (imperfective_perfective aspect)	Translation
4	*kochać_*	'love'
5	*wzbraniać się_wzbronić się*	'forbid'
6	*ośmielić się_ośmielić się*	'venture, dare'
7	*zamyślać_zamyślić*	'design'
8	*obawiać się_*	'fear, be afraid, be anxious'
9	*umieć_*	'know how, be able'
10	*starać się_postarać się*	'endeavor, make efforts, take pain, try'
11	*decydować się_zdecydować się*	'determine, decide'
12	*dawać się_dać się*	'let, allow'
13	*pozwalać_pozwolić*	'allow, permit, let'
14	*przyzwyczajać się_przyzwyczaić się*	'become accustomed, get used'
15	*poczynać_począć*	'begin, originate'
16	*zabraniać_zabronić*	'forbid, prohibit, interdict'
17	*życzyć [sobie]_zażyczyć [sobie]*	'wish, desire'
18	*kazać_kazać*	'bid, order, let'
19	*proponować_zaproponować*	'offer, propose'
20	*zakazywać_zakazać*	'forbid, prohibit'
21	*móc_*	'can, be able'
22	*poważać się_poważyć się*	'dare'
23	*nawykać _nawyknąć*	'become accustomed'
24	*pomagać_pomóc*	'help, aid, assist'
25	*przysięgać_przysiąc*	'swear'
26	*próbować_spróbować*	'try, test, attempt'
27	*radzić_poradzić*	'advise'
28	*dokańczać_dokończyć*	'finish up, conclude'
29	*ślubować_ślubować*	'vow, make a vow'
30	*uczyć się_nauczyć się*	'learn'
31	*śpieszyć _pośpieszyć*	'hurry, be in a hurry'
32	*ubóstwiać_*	'idolize, adore'
33	*woleć_*	'prefer'
34	*kończyć_skończyć*	'end, finish, conclude, close'
35	*_zechcieć*	'become willing'
36	*godzić się_*	'agree, consent'
37	*nienawidzić_*	'hate, detest'
38	*pamiętać_*	'remember, keep in mind'
39	*obiecywać [sobie]_obiecać [sobie]*	'promise'

	Verb (imperfective_perfective aspect)	Translation
40	*_omieszkać*	'fail'
41	*planować_zaplanować*	'plan'
42	*mieć_*	'have to'
43	*zobowiązywać się_zobowiązać się*	'bind, pledge oneself'
44	*_uwziąć się*	'set one's mind, become crazy'
45	*śmieć_*	'dare, venture'
46	*dopomagać_dopomóc*	'help, aid, assist'
47	*rozpoczynać_rozpocząć*	'begin, start, commence'
48	*wstydzić się_*	'be ashamed'
49	*zgadzać się_zgodzić się*	'agree'
50	*kusić się_skusić się*	'seek to obtain, attempt'
51	*zalecać_zalecić*	'recommend, commend'
52	*zapominać_zapomnieć*	'forget'
53	*krępować się_*	'be embarrassed, feel uneasy'
54	*potrzebować_*	'need, want, be in need of'
55	*bronić_*	'defend, guard, vindicate, assert'
56	*raczyć_raczyć*	'deign, condescend'
57	*silić się_*	'make efforts, exert oneself'
58	*nakazać_nakazać*	'order, command'
59	*zaczynać_zacząć*	'begin, start, commence'
60	*bać się_*	'be afraid of, fear'
61	*postanawiać_postanowić*	'resolve, determine, make up one's mind'
62	*potrafić_potrafić*	'know how to do, manage'
63	*uwielbiać_uwielbić*	'adore, worship'
64	*musieć_*	'be obliged to, have to'
65	*odważać się_odważyć się*	'dare, venture'
66	*usiłować_*	'make efforts, endeavor, attempt'
67	*ważyć się_odważyć się*	'dare, venture'
68	*doradzać_doradzić*	'advise'
69	*pragnąć_*	'desire'
70	*zdążać_zdążyć*	'manage to do (on time)'
71	*prosić_poprosić*	'ask, beg, request'
72	*chcieć_*	'want, be willing, intend, desire, wish'
73	*przyobiecywać_przyobiecać*	'promise'
74	*polecać_polecić*	'recommend'
75	*_zdołać*	'be able'

	Verb (imperfective_perfective aspect)	Translation
76	*myśleć_*	'think, mean'
77	*zamierzać_zamierzyć*	'intend, mean, be going'
78	*wahać się_zawahać się*	'hesitate, weaver'
79	*umożliwiać_umożliwić*	'enable, make possible'
80	*lękać się_*	'fear, be anxious'
81	*kwapić się_pokwapić się*	'be eager'
82	*ofiarowywać się_ofiarować się*	'offer (oneself)'
83	*spodziewać się_*	'hope, expect'
84	*uczyć_nauczyć*	'teach, instruct'
85	*podejmować się_podjąć się*	'undertake'
86	*kontynuować_*	'continue'
87	*lubić_*	'like, love'
88	*przestawać_przestać*	'cease, stop, discontinue'
89	*szykować się_przyszykować się*	'prepare (oneself)'
90	*przykazywać_przykazać*	'order, command'
91	*_zaofiarować się*	'offer (oneself)'
92	*namawiać_namówić*	'induce, persuade'
93	*rozkazywać_rozkazać*	'order, command'
94	*przywykać_przywyknąć*	'get accustomed to'
95	*żenować się_*	'feel embarrassed'

Appendix 2: Example questionnaire

Trigger sentences for each of the verbs in each of the three constructions were composed. To ensure naturalness as much as possible, the sentences were adapted from authentic sentences from the non-literary text sections from the PNC. The raw material for the sentences was extracted from the test version of the PNC (66 million words). Raw sentences were taken from written periodicals. If no examples were found, both dictionaries and (near-)native speakers were consulted. The sentences were then altered to contain the test constructions. To ensure comparability, every trigger item consisted of two sentences that formed a whole and could stand alone, i.e., were not context dependent. All sentences are declarative statements. Positive sentences were used unless there was a clear counter indication that the verb favored negative contexts. Sentence subjects are

male/female third person singular/plural. Finite verbs are past and perfective (if possible). Infinitives are proportional to 'do something'.

The following is an example of one block. The capital letters A, B and C refer to the diagnostic tests (the thing-, that- and time-tests respectively). Small letters a, b and c refer to the lexical set, while numbers identify the verb. The capital letter F indicates filler sentences.

- Ac42 *Mieszkańcy Kołobrzegu mieli jeść, spać i oglądać telewizję w blokach poza centrum. Mieli to, aż nie naprawili przewodu gazowego w centrum.*
  'The inhabitants of K had to eat, sleep and watch TV in apartment buildings outside the center. They had this, until they fixed the gas pipes in the center.' [example of an infelicitous thing- test]
- F8 *FBI prowadziło operację specjalną. Prowadzono operację w tak głębokiej tajemnicy, że w pewnym momencie nawet sam prezydent nie był do końca poinformowany.*
- F11 *Demokracja to dla wielu ludzi rzecz oczywista o której nie myślą. Nie wiedzą co to jest żyć w dyktaturze.*
- Ba23 *Jest w złym humorze, bo nawykł urlop spędzać w Kalifornii. Jak człowiek już nawykł, żeby spędzać urlop w słonecznym miejscu, to polskich deszczowych lat nie uwielbia.*
  'He is in a bad mood, because he is used to spending his holidays in California. Once you are used to spending your holidays in a sunny place, you no longer love Polish rainy years.' [example of a felicitous that-test]
- F1 *Berlin był miastem podzielonym murem. W 1989 roku ludzie z obu stron zaczęli rozwalać mur.*
- F17 *Sztucer to broń myśliwska na grubego zwierza. Zawsze brał właśnie sztucer kiedy chodził na polowania.*
- Cc92 *Po wyborach był całkiem rozczarowany. On był jednym z tych, którzy podczas kampanii wyborczej namówili członków zespołu w dzień wyborów wesprzeć Kerry'ego do Białego Domu.*
  'The elections had left him completely disappointed. He was one of those who during the election campaign had talked members of the team into supporting Kerry into the White House on election day.' [example of a felicitous time-test]
- F25 *Zgodnie z prawem księcia chronił królewski immunitet. Tylko królowa mogła go zdecydować o ukaraniu go jak normalnego obywatel*

Appendix 3: Contents of each of the seven clusters supported by K-means analysis on summated responses

Verb in cluster 1	Translation
decydować się_zdecydować się	'determine, decide'
pozwalać_pozwolić	'allow, permit, let'
zgadzać się_zgodzić się [2]	
proponować_zaproponować	'offer, propose'
*bać się_*	'be afraid of, fear'
*godzić się_*	'agree, consent'
zalecać_zalecić	'recommend, commend'
przykazywać_przykazać	'order, command'
*bronić_*	'defend, guard, vindicate, assert'
namawiać_namówić	'induce, persuade'
zamierzać_zamierzyć	'intend, mean, be going to'
zezwalać_zezwolić	'allow, permit, let'
dopomagać_dopomóc	'help, aid, assist'
wahać się_zawahać się	'hesitate, weaver'
zakazywać_zakazać	'forbid, prohibit'

Verb in cluster 2	Translation
spieszyć_pospieszyć	'hurry, be in a hurry'
umożliwiać_umożliwić	'emable, make possible'
krępować się _	'be embarrassed, feel uneasy'
spodziewać się _	'hope, expect'
*pragnąć_*	'desire'
*potrzebować_*	'need, want, be in need of'
nawykać_nawyknąć	'become accustomed'
_uwziąć się	'set one's mind, become crazy'
*chcieć_*	'want, be willing, intend, desire, wish'
kwapić się _pokwapić się	'be eager'

2 Translations are missing if they were not included in Polish-English dictionaries.

Verb in cluster 2	Translation
_omieszkać	‘fail’
przyobiecywać_przyobiecać	‘promise’
podejmować _podjąć się	‘undertake’
wzbraniać _wzbronić się	‘forbid’
zapominać_zapomnieć	‘forget’
brzydzić się _	‘abhor, loathe, have an aversion’
_zdołać	‘be able’
zobowiązywać _zobowiązać się	‘bind, pledge oneself’
radzić_poradzić	‘advise’
przyrzekać_przyrzec	‘promise’

Verb in cluster 3	Translation
doradzać_doradzić	‘advise’
rozkazywać_rozkazać	‘order, command’
planować_zaplanować	‘plan’
życzyć[sobie]_zazyczyć[sobie]	‘wish, desire’
ofiarowywać_ofiarować	
przysięgać_przysiąć	‘swear’

Verb in cluster 4	Translation
uwielbiać_uwielbić	‘adore, worship’
*ubóstwiać_*	‘idolize, adore’
*kochać_*	‘love’
ważyć _odważyć się	‘dare, venture’
szykować _przyszykować się	
*lubić_*	‘like, love’
*nienawidzić_*	‘hate, detest’
ośmielić _ośmielić się	‘venture, dare’
*umieć_*	‘know how, be able’
odważać _odważyć się	‘dare, venture’
prosić_poprosić	‘as, beg, request’

Verb in cluster 5	Translation
kończyć_skończyć	‘end, finish, conclude, close’
przestawać_przestać	‘cease, stop, discontinue’
poczynać_począć	‘begin, originate’
dawać _dać się	
*mieć_*	
*musieć_*	‘be obliged to, have to’
*usiłować_*	‘make efforts, endeavor, attempt’
kusić _skusić się	‘seek to obtain, attempt’
rozpoczynać_rozpocząć	‘let, allow’
*kontynuować_*	‘have to’
*móc_*	‘can, be able’
dokańczać_dokończyć	‘finish up, conclude’
zdążać_zdążyć	‘manage to do on time’
zaczynać_zacząć	‘begin, start, commence’
zamyślać_zamyślić	‘design’
żenować się _	‘feel embarrassed’
raczyć_raczyć	‘deign, condescend’
silić się _,	‘make efforts, exert oneself’
*smieć_*	‘dare, venture’

Verb in cluster 6	Translation
obiecywać[sobie]_obiecać[sobie]	‘promise’
uczyć_nauczyć	‘teach, instruct’
polecać_polecić	‘recommend’
*lękać się_*	‘fear, be anxious’
uczyć _nauczyć się	‘learn’
przywykac_przywyknąć	‘get accustomed to’
postanawiac_postanowic	‘resolve, determine, make up one’s mind’
ślubować_ślubować	‘vow, make a vow’
nakazać_nakazać	‘order, command’
obawiać się _	‘fear, be afraid, be anxious’
przyzwyczajać _przyzwyczaić się	‘become accustomed, get used to’

Verb in cluster 7	Translation
starać_postarać się	‘endeavor, make efforts, take pain, try’
próbować_spróbować	‘try, test, attempt’
kazać_kazać	‘bid, order, let’
*myśleć_*	‘think, mean’
potrafić_potrafić	‘know how to, manage’
_zaofiarować się	
pomagać_pomóć	‘help, aid, assist’
wstydzić się _	‘be ashamed’
*woleć_*	‘prefer’
*pamietać_*	‘remember, keep in mind’
_zechcieć	‘become willing’
zabraniać_zabronić	‘forbid, prohibit, interdict’
poważać_poważyć się	

Volker Gast, Maria Koptjevskaja-Tamm

The areal factor in lexical typology

Some evidence from lexical databases

Abstract: Our study aims to explore how much information about areal patterns of colexification we can gain from lexical databases such as CLICS and ASJP. We adopt a bottom-up (rather than hypothesis-driven) approach, identifying areal patterns in three steps: (i) determine spatial autocorrelations in the data, (ii) identify clusters as candidates for convergence areas and (iii) test the clusters resulting from the second step controlling for genealogical relatedness. Moreover, we identify a (genealogical) diversity index for each cluster. This approach yields promising results, which we regard as a proof of concept, but we also point out some drawbacks of the use of major lexical databases.

Keywords: areality, colexification, lexical database, lexical typology

1 Introduction

1.1 Lexical typology and areal linguistics

The lexicon is arguably one of the most difficult domains for cross-linguistic and typological generalizations. It is much more loosely structured than, for instance, sound or tense systems and its structure is hardly reflected in linguistic form. Attempts at identifying principles of lexical organization, for example, with sense relations in the structuralist tradition or through prototypes and family resemblances therefore mostly rely on diagnostic tests and intuitions, even in the analysis of individual languages (e.g., Lipka 1992; Cruse 1986; Kleiber 1990; Geeraerts 2010). Comparing the lexicons of different languages obviously poses an even greater challenge and some would say that such comparison is not even possible,

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as word meanings are only defined relative to the systems they form part of (cf. Evans 2011: §1.3 for some discussion). Despite such difficulties, some non-trivial generalizations have been formulated about the organization of lexicons. Most of the insights concern individual domains of meaning, such as color terms (Berlin and Kay 1969 and follow-up work), verbs of motion (Talmy 1985 and follow-up work), kinship terms (e.g., Nerlove and Romney 1967; Dahl and Koptjevskaja-Tamm 2001), body parts (e.g., Majid, Enfield and Van Staden 2006; Brown 2013a, 2013b), perception (e.g., Viberg 1984; Evans and Wilkins 2000; Vanhove 2008a), temperature terms (Koptjevskaja-Tamm 2015) and verbs of aqua-motion (Koptjevskaja-Tamm, Divjak and Rakhilina 2010), to name just a selection of the domains that have figured prominently in this branch of typology. The findings of lexical-typological studies often take the form of "holistic characterizations" (e.g., "language x is a satellite-framed language" in terms of Talmy 1985) or implicational relations (e.g., "if a language has three basic color terms, one of them is 'red'"; Berlin and Kay's 1969 stage II).

Broader generalizations about possible systems of lexical domains have often been represented using the semantic map methodology, particularly in the domain of function words such as indefinites (e.g., Haspelmath 1997; van der Auwera and Van Alsenoy 2011) and impersonal pronouns (e.g., van der Auwera, Gast and Vanderbiesen 2012; Gast and van der Auwera 2013) but also in other, "more lexical" domains (cf. Koptjevskaja-Tamm, Rakhilina and Vanhove 2015 for an overview of implicational and probabilistic semantic maps in lexical typology; Rakhilina and Reznikova 2016 on the use of semantic maps in the frame-based approach to lexical typology). Semantic maps can be regarded as networks (technically, graphs; cf. Gast and van der Auwera 2013) representing patterns of multifunctionality manifested by semantically/functionally "comparable" linguistic expressions (e.g., morphemes, words, constructions) of particular languages, where the main guiding principle is the "contiguity/connectivity requirement". More specifically, functions (uses, meanings, contexts) that are often associated with one and the same linguistic expression, represented as "nodes" (or "vertices") in the graph, are connected by "edges" or they cover a contiguous region on a semantic map.

While semantic maps may be used to represent the range of meanings associated with any kind of linguistic expression, the term "colexification", coined by François (2008) and since then widely adopted, specifically targets the expression of two (supposedly different) concepts with one word. Its major advantage is that it is non-committal with respect to why two concepts are expressed with the same linguistic element. Polysemy is certainly the most interesting case in cross-linguistic studies but colexification may also emerge for other reasons,

such as the reanalysis of scope relations (cf. the case of impersonal pronouns discussed in Gast and van der Auwera 2013). Colexification is also less rigorous when it comes to the contiguity/connectivity requirement insofar as linking elements on semantic maps may sometimes be lost in historical developments, leaving us with two words that do not cover a contiguous space on the map but are nevertheless colexified (cf. van der Auwera and Temürcü 2006; van der Auwera and Van Alsenoy 2013).

The concept of colexification can therefore be fruitfully used for the purposes of areal linguistics and areal typology (e.g., Urban 2012; Koptjevskaja-Tamm and Liljegren 2017). As is well-known, languages do not only borrow "matter" (e.g., loan words), but also "patterns" (Matras and Sakel 2004). A particularly common type of pattern transfer has been called "polysemy copying" (Heine and Kuteva 2003, 2005) or "distributional assimilation" (Gast and van der Auwera 2012): As a result of "interlingual identification", linguistic elements from contact languages may assimilate their distributions. The results of such transfer can further be expected to be reflected in areal patterns of distribution. In fact, some colexification patterns are cross-linguistically frequent, such as the colexification of 'finger' and 'toe'. Others show a genetically and/or areally restricted distribution, such as the colexification of 'eat' and 'drink' in many Papuan and Australian languages (Aikhenvald 2009), as well as in some other languages of the world (for further examples, see Vanhove 2008b; Urban 2012; Juvonen and Koptjevskaja-Tamm 2016). Still others are very local or even language-specific, such as 'beef' expressed as 'big meat' in some of the languages of Hindukush – the mountainous region comprising northern Pakistan, northeastern Afghanistan and the northern-most part of Indian Kashmir (Koptjevskaja-Tamm and Liljegren 2017). It has been shown, even before the notion of colexification came into use, that there are clear areal patterns in, for example, the distribution of languages distinguishing specific color terms (cf. Kay and Maffi 2013a, 2013b) and the body parts 'arm', 'finger' and 'hand' (cf. Brown 2013 a, 2013b). There is therefore a challenge to both identify such areal patterns and to provide explanations for them.

A systematic cross-linguistic study of colexification patterns needs a lot of data. Most of the relevant investigations have been based on retrieving dictionary data and/or elicitation, both of which are very time-consuming, which explains why this research has so far been relatively restricted; it would require developing new and more efficient methods of data collection. For instance, the range of data for the comparative study of lexical-semantic patterns can be broadened by relying on parallel texts. This approach, pursued by Östling (2016), among others, represents a highly promising direction for future research, specifically when the range of texts and registers can be broadened. At present, most studies using

"massively parallel corpora" (Cysouw and Wälchli 2007) rely on the Bible and, consequently, on a rather specific (written) register, which introduces a certain bias in terms of both the topics covered and the vocabulary used. For instance, the richness of kinship terminology found in some parts of the world is obviously not retrievable from Bible texts. Still, parallel texts clearly provide a useful resource for the cross-linguistic study of lexical semantics that should be explored further.

The recent development of typological resources with a global coverage of data has made the study of a broader range of colexification patterns possible. For example, the *Database of cross-linguistic colexification*s (CLICS version 1.0; see List et al. 2014) provides an interface for the visualization and graphical inspection of colexification patterns in a sample of 221 languages. Such databases, and their potential (as well as limitations), constitute the main topic of this contribution. In addition to the CLICS database, which has been designed specifically for the study of colexification, we will use data from another lexical database for comparison, the database of the *Automated similarity judgment programme* (ASJP; see Wichmann, Holman and Brown 2016).

1.2 Main questions addressed in this study

The main question addressed in this contribution can be formulated as follows: what can we learn from cross-linguistic lexical databases such as CLICS and ASJP to gain a better understanding of global patterns of lexical organization and their areal distributions? As outlined in Koptjevskaja-Tamm and Liljegren (2017), at least the following groups of lexico-semantic phenomena may serve as indicators of areality:

- lexico-semantic parallels – shared colexification patterns and/or shared lexico-constructional patterns/calques, such as the colexification of 'fruit' and 'child', or 'fruit' being expressed as 'child of tree' across many West African languages, both cases involving a semantic association between 'child' and 'fruit';
- shared formulaic expressions, such as the farewell expressions *au revoir* (French), *auf Wiedersehen* (German), *på återseende* (Swedish), *do svidanija* (Russian) and *näkemiin* (Finnish), which follow the same model across a number of European languages;
- area-specific lexicalizations and a shared or similar-looking internal organization of certain semantic domains, such as a highly specialized vocabulary describing dairy practices and dairy products across the languages of the

Greater Hindukush or the different areally defined patterns in the systems of phasal adverbials 'still', 'no longer', 'not yet' and 'already' in European languages (see van der Auwera 1998a).

Since the existing cross-linguistic lexical databases such as CLICS and ASJP are restricted in their data coverage, our main question will specifically target shared colexification patterns. In other words, we want to determine what information we can gain about colexifications from the databases. "Gaining information from" the databases basically comprises two complementary aspects: we can test existing claims and hypotheses about colexification patterns and we can explore new patterns that have not been identified so far. In this study, we pursue the latter approach.

We would like to make it clear from the outset that our approach is entirely unprejudiced. Neither of us was involved in either project (CLICS or ASJP) and we are using the data in a way in which anyone else could use them as well. The study has an exploratory character and a certain methodological focus. The discussion will therefore contain some critical remarks, which are not intended to call into question the merits of open-access resources like CLICS and ASJP, or the value of large-scale databases in general. Moreover, it should be borne in mind that we are using the data from these databases in ways that were not intended or anticipated by the creators. Any kind of limitation pointed out is thus not to be seen as criticism of the databases.

Following some remarks on the data and methodology in Section 2, we present some rather general observations about the scope and limits of the databases in Section 3. In Section 4, we present a bottom-up approach to the identification of areal colexification patterns, as well as some results obtained in this way. Section 5 contains some conclusions.

2 Remarks on the data and methodology

2.1 Lexical databases used in the study

CLICS is an online database of colexifications (called "synchronic lexical associations" on the homepage)[1] with data from 221 language varieties of the world. It draws on four types of (digital) resources (see Mayer et al. 2014):

1 http://clics.lingpy.org/main.php (accessed 1 June 2017).

- the *Intercontinental dictionary series* (IDS; Key and Comrie 2015), which emerged from a long-term project that started in the 1980s and implied the compilation of word lists (by experts) for the expression of 1,310 concepts in 233 languages – for CLICS, a reduced set of (cleaned-up) data from 178 languages was used;
- the *World loan word database* (WOLD; Haspelmath and Tadmor 2009), which contains a large amount of vocabulary (1,000–2,000 items) from 41 languages, compiled by experts – data from 33 of the languages were included in CLICS;
- the online dictionary LOGOS, from which the authors extracted data for four languages not represented in IDS or WOLD;
- the Språkbanken research unit at the University of Gothenburg provides ten word lists of South Asian and Himalayan languages,[2] six of which were used for CLICS.

The database has been specifically developed for extracting information on colexifications across languages. As its creators explain, "[i]t is designed to serve as a data source for work in lexical typology, diachronic semantics, and research in cognitive science that focuses on natural language semantics from the viewpoint of cross-linguistic diversity. Furthermore, CLICS can be used as a helpful tool to assess the plausibility of semantic connections between possible cognates in the establishment of genetic relations between languages" (CLICS website).[3]

Information on colexifications can be extracted in various ways. Using the query interface, it is possible to find out whether two specific concepts are linked in the language varieties in CLICS and to determine how many links to different concepts are reported for a specific concept. Users can also browse the concept networks that have been extracted from the data by the database creators and download parts of the data for large-scale quantitative investigations, which is what was done for the purposes of this study.

Given the heterogeneity of sources, there are no consistent, language-independent definitions of the concepts represented in the database.[4] As far as areal

2 https://spraakbanken.gu.se/eng/research/digital-areal-linguistics/word-lists (accessed 11 April 2017).

3 http://clics.lingpy.org/main.php (accessed 11 April 2017).

4 We will leave the discussion of labelling and (the absence of) definitions for the entries in the different lexical databases for a future occasion.

coverage is concerned, the authors make the following disclaimer (see CLICS website):[5]

> Coverage of the world's languages in both IDS and WOLD is biased towards certain regions of the world. In the case of IDS, South American languages and languages of the Caucasus are overrepresented. In the case of WOLD, languages of Europe figure particularly prominently. Since it is possible and even expectable that certain polysemies in the lexicon are frequent or even restricted to certain areas of the world, we advise researchers interested in cross-linguistic diversity to take appropriate measures to rule out unwarranted generalizations due to areal effects.

The database of ASJP was created for the purposes of comparative historical linguistics, as a means for evaluating the similarity of words from different languages with the same meaning and, ultimately, for classifying languages computationally on the basis of the observed lexical similarities. It grew out of a collaboration of "25 professional linguists and other interested parties working as volunteer transcribers and/or extending aid to the project in other ways" (Wikipedia).[6] The database (version 17, April 2017) provides information on the expression of mainly 40 concepts from the (100-item) Swadesh list in 4,664 languages and was collected with guidelines administered to the contributors.[7] As the ASJP data is based on the Swadesh list, there is, as far as we can tell, no language-independent definition of the concepts. The English words thus function as a *tertium comparationis*. Given the sheer quantity of languages represented in the data, there is, inevitably, a certain amount of heterogeneity in it but it should be borne in mind that the project was coordinated by specialists (especially Cecil H. Brown, Søren Wichmann and Eric W. Holman) and the database continues to be curated.

2.2 Extracting and processing the data

As both CLICS and ASJP associate concepts with words, we can (automatically) identify colexifications through a simple comparison of words and their associated meanings. For the CLICS data, we used the file "links.csv" from the "official" download link.[8] It contains 32,536 links (colexification types), each of them for a

5 http://clics.lingpy.org/faq.php#data1 (accessed 4 April, 2017).

6 https://en.wikipedia.org/wiki/Automated_Similarity_Judgment_Program#The_ASJP_Consortium (accessed 4 April 2017).

7 http://asjp.clld.org/static/Guidelines.pdf (accessed 1 June 2017).

8 http://clics.lingpy.org/download.php (accessed 1 June 2017).

certain number of languages. Altogether, it provides information about 91,673 instances of colexification in 221 languages.

The file with the ASJP data[9] contains 7,221 word lists. Nearly all consist of a 40-item subset of the 100-item Swadesh list found to constitute the diachronically most stable items (Holman et al. 2008). Most of these 40-item lists are incomplete. In addition, there are a little over 300 full 100-item lists (also generally not complete), most of which hark back to the beginning of the project, as described in Brown et al. (2008), before the selection of stable items was made. Often, more than one word is listed for a given concept. We mainly made use of the data from the 40-item lists because of the scarcity of data for the 60 items not on that list (words for 'feather' and 'bark' constitute exceptions, see Section 4).

As we wanted to keep things comparable and consistent, specifically with respect to geographical data, we mapped all the varieties to Glottolog codes. This led to some loss of information. The 7,221 word lists of the ASJP file were associated with 4,675 ISO 639-3 codes. We lumped the data from different word lists with the same ISO 639-3 code. This may have led to a certain loss of accuracy in the data, as we may have mixed data from distinct language varieties. Some data was also lost because some mappings from ISO 639-3 codes to Glottolog codes were missing. In this way, we obtained information about 690 colexification types in 4,554 languages. The CLICS data was reduced for the same reason, leaving us with 4,064 colexification types from 196 languages.

In order to identify the areal distribution of colexification patterns, we also need negative evidence, i.e., information about the absence of a colexification pattern. As CLICS focuses specifically on colexification, not differentiation, this information is not *per se* included in the database. We can, however, retrieve a certain amount of negative evidence from the data, as the colexification patterns associate pairs of concepts with sets of forms. The ASJP data provides information about specific form-meaning pairings. Whenever we had information about the form encoding a given concept and when the two forms corresponding to the members of a colexification pair were different, we assumed that the pair of concepts in question was differentiated in the given language.

After adding cases of differentiation to our data, our (enriched) ASJP database contained 2,060,856 data points (a subset of the 4,554 languages multiplied by 690 colexification patterns) and the CLICS-database contained 92,805 data points (a subset of the 196 languages x 4,064 colexification patterns).[10] Each data

9 The file "dataset.tab" from http://asjp.clld.org/download (accessed 1 June 2017).

10 The data frames can be downloaded at http://www.uni-jena.de/~mu65qev/data in csv-files (accessed 4 April 2018).

point is a quadruple of two concepts, a (Glottolog) language code and a value of "t" (true/colexified) or "f" (false/differentiated): <'arm', 'hand', russ1263, t>, for instance, says that 'arm' and 'hand' are colexified in Russian. The Glottolog code can, moreover, be mapped to geographical and genealogical information.

As far as the types of concepts represented in the databases are concerned, the ASJP data covers a certain range of nominal concepts from the domains of body parts (e.g., 'eye', 'ear', 'nose'), animals and plants (e.g., 'louse', 'dog', 'fish') and nature (e.g., 'sun', 'star', 'water'), as well as 'person' and 'name'. The database furthermore contains data on five verbs (i.e., 'drink', 'die', 'see', 'hear' and 'come'), two adjectives (i.e., 'new' and 'full'), the numerals 'one' and 'two' and the pronouns 'I', 'we' and 'you'. As pointed out above, we have also made use of some of the other material in the data, which covers a few additional basic concepts such as 'feather', 'hair' and 'bark'. CLICS contains an overall much more varied set of concepts, including a high number of kinship terms, some of them highly specific (see the examples discussed in Section 4.5).

3 What the databases can(not) do for us

Our data indicates, for pairs of concepts, whether they are colexified or differentiated in a given language or variety. This is obviously a simplification. For example, many languages may have different words for 'day' and 'night' and still use 'day' as a cover term. If two languages are shown to colexify a given concept, this does not necessarily mean that they do not have different words for the individual concepts as well. 'Arm' and 'hand' provide a well-known problem in this respect, as many languages (e.g., Slavic ones) have a cover term for both body parts while also having more specific terms for each part. For example, Russian *ruka* covers both the arm and the hand but there is a more specific word for 'hand' as well, i.e., *kist'*, which is used much more rarely and only in specific contexts. There is thus both colexification and differentiation. We assume that the data in the databases, by and large, represent the "preferred" patterns of colexification or differentiation in the languages in question but it should be clear that the distinction between the two cases is an idealization (note that this does not only apply to the data used for this study but also to *World atlas of language structures* maps like those of Brown 2013a, 2013b).

Moreover, we should bear in mind that colexification is a very general term, as pointed out above, and that, unlike in the semantic map methodology, it does not necessarily indicate immediate or exclusive relatedness of two concepts. This

point can be illustrated with patterns that emerged from an inspection of extremely rare cases of colexification. For instance, the colexification pair <'daughter-in-law (of a woman)', 'father-in-law (of a man)'>, found in only two languages, seems quite remarkable. Closer inspection of the data shows, however, that both cases of this type – one from WOLD, one from the IDS – are instances of extremely general kinship terms, rather than unusual cases of polysemy. Swahili (swah1253) *mkwe*, for example, roughly means 'in-law' and is thus not only used for the two concepts mentioned above but also for many other in-law relationships. Similarly, Polci (polc1243) *kwam* is used for all types of in-law relations holding between contiguous generations, according to the information given in the IDS. What this shows is that we should always look at broader patterns of multifunctionality before jumping to conclusions about pairwise meaning associations, specifically when we explore the data in a bottom-up fashion as intended in the present study.

Finally, we will briefly address the questions of areal/lexical typology for which neither of the two databases can give us any information (and for which neither of them was made). CLICS and ASJP do not allow us to extract any information on shared lexico-constructional patterns or formulaic expressions. They only associate linguistic forms with concepts, so we can only identify pairs of concepts that are expressed by exactly identical linguistic forms, with the linguistic forms (lexemes) not being further analyzed. This identity of lexemes in synchrony corresponds to François's (2008: 171) notion of "strict colexification". Colexification and semantic associations can, however, be understood more broadly – both diachronically, as two concepts being expressed by the same lexeme at different periods in its history, and panchronically, as linked to each other by derivation, composition or other constructions. To give one example: while 'eye' and 'eyelid' in Khasi (khas1269) and in Kumyk (kumy1244) are expressed by the same form (*ñiuhmat* in Khasi, *köz* in Kumyk), there are plenty of languages, including English, where 'eyelid' is expressed by a compound involving 'eye'. Such cases of "loose colexification" (François 2008: 171), involving various kinds of semantic shifts are, arguably, much more difficult to represent and identify in databases. A laudable attempt to systematize cross-linguistically recurrent patterns of loose colexification is represented in the *Catalogue of semantic shifts in the languages of the world* at the Institute of Linguistics of the Russian Academy of Sciences in Moscow. It is a database that currently contains more than 3,000 semantic shifts found in 319 languages (see Zalizniak 2008; Zalizniak et al. 2012) but the organization of the database does not make it possible at present to draw any (statistical) conclusions on the distribution of these patterns across the languages of the world. In this paper, we will therefore only use data from CLICS and

ASJP, restricting ourselves to cases where the databases associate two different concepts with exactly the same lexeme.

4 Areal clusters of colexification patterns

One of our intentions in using the data from CLICS and ASJP was to detect new patterns and generate new hypotheses about areal clusters of colexification patterns in a bottom-up approach. Our starting point is a map like the one in Figure 1, which shows the distribution of languages colexifying and differentiating 'feather' and 'hair' (see also Urban 2012 for this pattern) in the ASJP data. A black square stands for colexification, a red/empty circle for differentiation. Note that we are using this example because the relative small number of data points allows us to illustrate the method more easily. The noun 'feather' is contained in the Swadesh list but it is not among the 40 core items used for ASJP, so the number of data points is relatively small, and certain regions are heavily underrepresented (e.g., Africa). The full dataset of the (40-item) ASJP project has worldwide coverage (see the remarks made in Section 2.2).

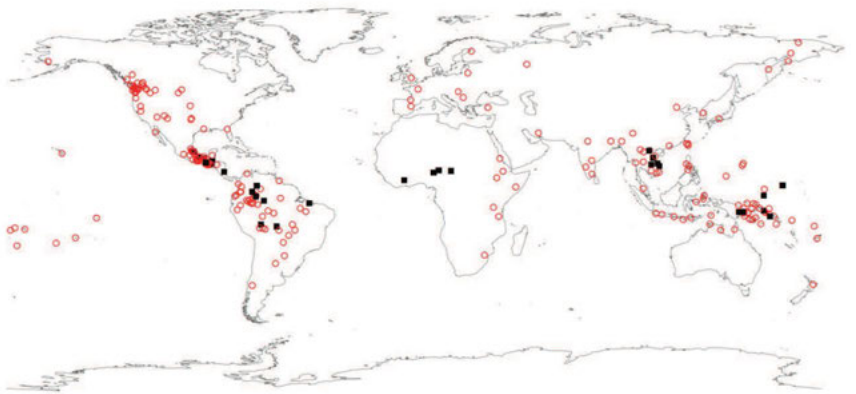


Fig. 1: Colexification (black squares) versus differentiation (red/empty circles) of 'feather' and 'hair' in the ASJP data

In order to identify areal clusters of colexifications, we proceeded in three steps:

– identification of areally biased colexification patterns;

– identification of areal clusters in the biased patterns as candidates for "cluster areas", i.e., areas that are characterized by a given colexification pattern;
– testing the cluster areas controlling for genealogical relatedness.

4.1 Identifying areally biased colexification patterns

In order to identify areally biased colexification patterns, we used the Join Count statistic (Cliff and Ord 1981), which is commonly applied to test for spatial autocorrelations in binary data.[11] Assume that there is a grid of, say, eight by eight cells and all of the cells are either black or white. If black and white cells are distributed over that grid as on a chessboard, no cell has a (horizontal or vertical) neighbor of the same color – there are no (same color) "joins" at all. In this case, there is a "negative autocorrelation". If, by contrast, all the black cells are on the left side of the grid and all the white cells on the right side, there are many joins between cells of the same color – to be precise, 52 black-black joins and 52 white-white joins, as against eight black-white joins (in the middle of the board). In this case, there is a positive spatial autocorrelation. The Join Count statistic compares the observed number of same-color joins to the number expected on the basis of a random distribution of colors. It is defined as the observed frequency minus the expected frequency of identical joins, divided by the standard deviation of the expected frequency. The statistic indicates a direction of the correlation (positive or negative) and we can calculate a p-value for it (i.e., a value that indicates the probability of finding the distribution in question under the hypothesis that the colors are distributed randomly).

In order to apply the Join Count test to linguistic data,[12] we have to transform our data points into a grid or network of "neighbors". This implies that we have to decide what languages count as neighbors. As we are dealing with questions of language contact, "being a neighbor" should mean "potentially being in contact with each other". Obviously, it is hard to generalize over distances making language contact (im)possible, as this varies with the local habitat (e.g., sea versus mountains). Moreover, the distance has to be adapted to the density of data points, i.e., we need larger distances for sparser data. We experimented with dis-

11 Note that spatial autocorrelation is a common problem in many natural sciences such as biology and geography. As in linguistic typology, data points are often influenced by neighboring data points.

12 We used the function 'joincount()' from the R package spdep (see Bivand, Hauke and Kossowski 2013; Bivand and Piras 2015).

tances between 500 km and 2,000 km and – comparing the results with the clustering applied at the second stage – found that a neighbor distance of 2,500 km was a reasonable choice for the CLICS data and a distance of 1,000 km for the ASJP data. On the basis of these distances, the maps were transformed into networks of neighbors, as illustrated in Figure 2 for Mesoamerica.[13] Note that only those languages are shown for which we have information on colexification or differentiation for the pair <'feather', 'hair'>.

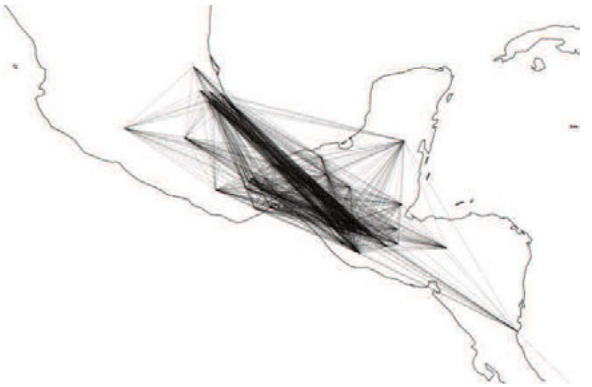


Fig. 2: Neighbor network for languages of Mesoamerica and Central America

4.2 Identifying clusters

For those colexification patterns which showed an areal bias (positive autocorrelation) according to the Join Count test (at a p-value < 0.05), we determined clusters using hierarchical cluster analysis on the basis of a (geographical) distance matrix.[14] We distinguished three types of clusters, defined on the basis of their (maximal) distance to a neighboring cluster, i.e., "micro-clusters" (2,000 km), "meso-clusters" (4,000 km) and "macro-clusters" (6,000 km).

13 For the identification of neighbors, we used the function 'dnearneigh()' of the spdep package for R (Bivand, Hauke and Kossowski 2013, Bivand and Piras 2015).

14 As we are dealing with geographical data, we used the function 'distm()' from the 'geosphere'-package for R (Hijmans 2016), rather than the native 'dist()'-function of R. By default, the function uses the Haversine Great Circle method (fun=distHaversine). For the cluster analysis, we used the native 'hclust()'-function of R, with the linkage method 'complete' (for "round" clusters).

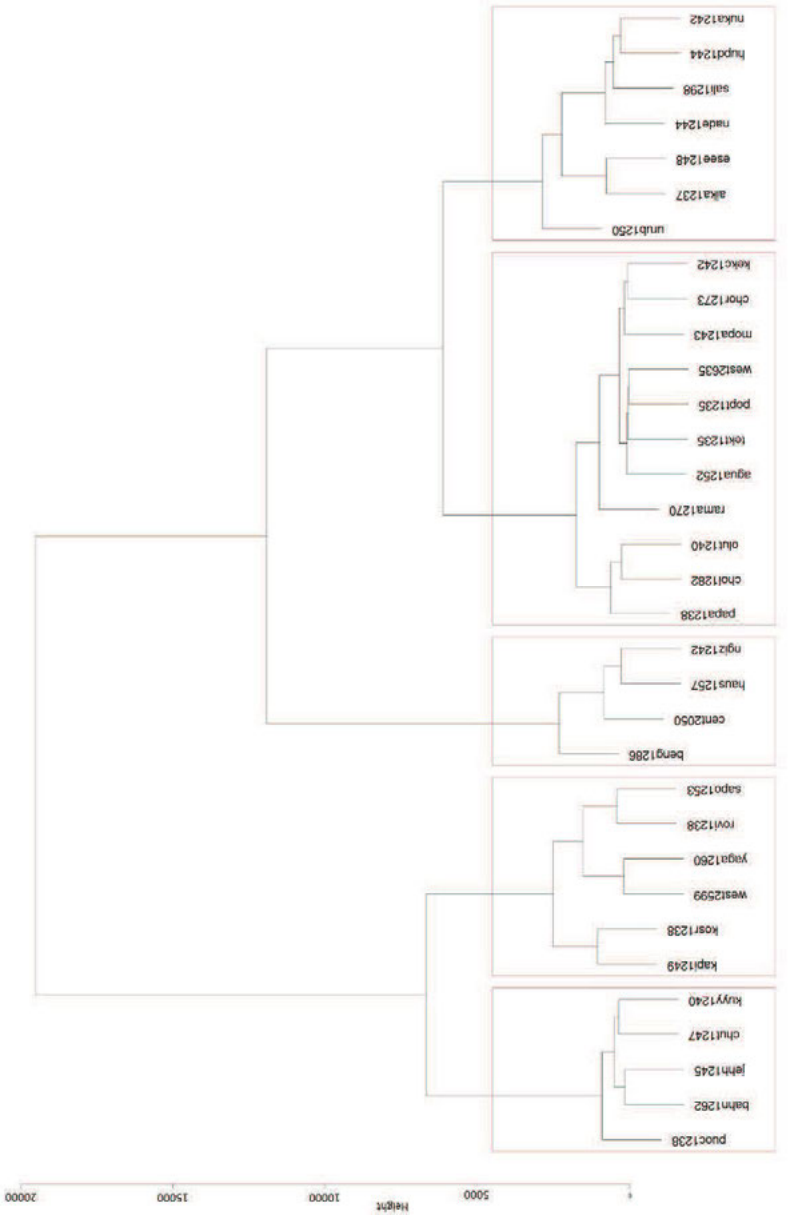


Fig. 3: Dendrogram for the colexification pair <'feather', 'hair'> (meso-clusters)

The results of such cluster analyses are commonly represented in the form of dendrograms, as shown in Figure 3. The dendrogram shows the grouping of the languages exhibiting colexification of 'feather' and 'hair', represented by their Glottolog codes at the bottom, into meso-clusters. The y-axis of the diagram ("height") indicates distances between nodes. The splits between groups of languages in Figure 3 are based on the maximum distances between pairs of elements from sisters in the tree. As the figure shows, the clustering of the relevant languages into meso-clusters, the cut-off distance is (by definition) 4,000 km. The (red) boxes at the bottom illustrate the clusters emerging from this cut-off point (the upper edge of any box is located at that "height", i.e., the distance). Note that the critical distances are upper boundaries, so different cut-off points may deliver the same clusters. The largest distance between pairs of elements from a cluster is thus 2,000 km, 4,000 km or 6,000km, depending on the type of cluster.[15] The geographical locations of the five clusters emerging from Figure 3 are shown in Figure 4. The dotted circles are positioned around the geographical center of a cluster[16] and their radius corresponds to the largest distance of any one cluster language to the center. The areas indicated by the circles enclosing a cluster will be referred to as the "cluster area" in each case. Each cluster area has a numerical identifier for the purpose of data processing and textual reference. The cluster areas determined on this basis will serve as hypotheses for linguistic contact areas characterized by the relevant colexification patterns (potentially among other features, of course).

15 We also applied model-based clustering, where the cut-off points between clusters are determined on the basis of specific diagnostics of the relevant models, such as the Bayesian Information Criterion, as in the function 'mclust()' of the R package mclust (Fraley and Raftery 2002; Fraley et al. 2012). This approach yielded highly heterogeneous results in terms of scaling, however, so comparability of clusters was compromised.

16 The centers and radiuses were calculated by mapping the geographical coordinates to a Cartesian coordinate system, determining the relevant data and mapping them back to geographical coordinates.

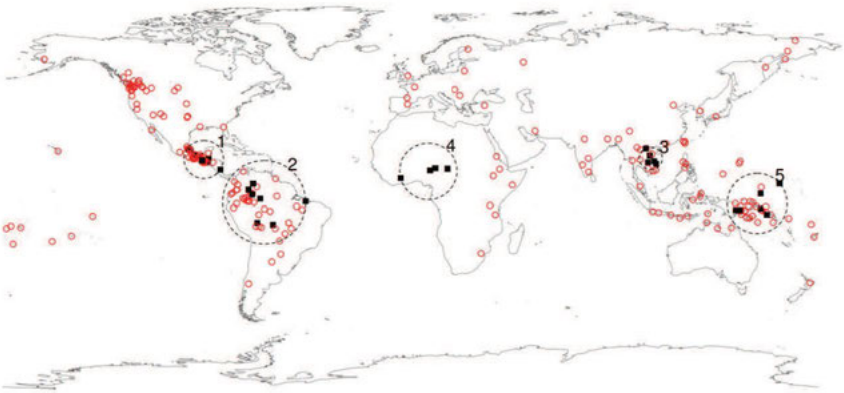


Fig. 4: Hypothesized meso-clusters for the colexification pattern <'feather', 'hair'>

4.3 Testing and analyzing clusters

Obviously, a (hypothesized) cluster area may have emerged for reasons that are independent of the geographical location of the languages concerned, in particular, as it may just reflect the genealogical relatedness of neighboring languages with inherited colexification patterns. Given that we are most interested in clusters that are areally conditioned (i.e., clusters that emerged through language contact or some other geographical factor), we determined the influence of the independent variable "membership of a language *L* to a given cluster area" on the dependent variable "presence of a colexification pattern in *L*", controlling for genealogical relationships. We fitted (for each colexification pattern and cluster size, i.e., micro, meso and macro) a mixed effects model, treating the (highest-level) language family as a random effect.[17] The data was pre-filtered and we only ran regression analyses for colexification patterns with at least 20 TRUE cases for

17 We used Bayesian logistic regression as implemented in the function 'MCMCGlmm()' of the MCMCGlmm-package for R (Hadfield 2010), with weakly informative prior assumptions (Gelman et al. 2008). The main reason for this choice was the structure of the data, with many systematic cases of complete separation. We compared the results from Bayesian regression with frequentist (mixed-effects) methods and inspected the results for "sanity", using binned residual plots (Gelman and Su 2016). So-called Gelman priors assume a Cauchy distribution with center 0 and scale 2.5. The MCMCglmm package offers a function 'gelman.priors()', which we used for this purpose. The number of iterations was set to 130,000, with 30,000 burnin iterations and a thinning interval of 10.

the ASJP data and 15 TRUE cases for the CLICS data. In each model, we included only data points from families such that one member of the family either exhibited the colexification pattern in question or was a member of one of the (hypothesized) cluster areas. The (Bayesian) regression model identifies a posterior mean-value for each cluster area ("pm", a rough indicator of effect size) and a p-value ("p.pm") showing the probability that the posterior mean is not higher than zero (and that membership to the cluster area thus has no effect). In the following discussion, we will mainly focus on the p-value. For the <'feather', 'hair'>-pattern, the analysis delivered the values shown in Table 1.

Tab. 1: Results of regression analysis for <'feather', 'hair'> (meso-clusters)

Colexification	Cluster	Long	Lat	Radius	pm	p.pm
<feather, hair>	1	-91.2	16.0	937	1.19	0.16
<feather, hair>	2	-64.5	-2.8	2,043	0.89	0.27
<feather, hair>	3	106.2	16.5	544	2.75	< 0.01
<feather, hair>	4	8.0	10.7	1,380	4.29	< 0.001
<feather, hair>	5	153.2	-3.3	1,470	1.54	0.054

To provide a somewhat better idea of the internal make-up of clusters, Figure 5 shows cluster areas 1[18] and 2 in more detail.

18 The prevalence of the <'feather', 'hair'> colexification in Mesoamerica has been noted earlier, among others by Smith-Stark (1994), who tests but also discards its applicability as a Mesoamerican areal trait ("lexical calque").

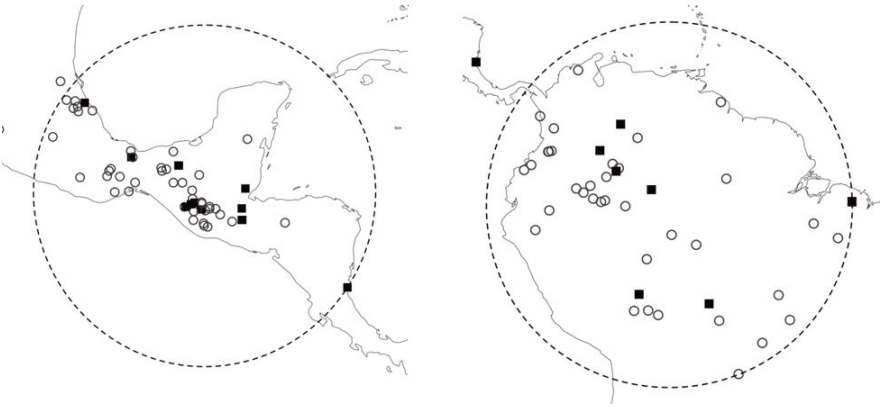


Fig. 5: Cluster areas 1 and 2 for the colexification pair <'feather', 'hair'>

Membership to a cluster area may be a significant predictor even when the cluster is genealogically entirely homogeneous if there is a high number of non-cluster-members from the same family which do not exhibit the colexification pattern in question. The regression analysis only excludes that a cluster primarily contains languages from families whose members tend to exhibit the pattern independently of membership to the cluster. We therefore determined an indicator of the genealogical diversity within each cluster as well. We used Shannon's diversity index (Simpson 1949) for this purpose, with a correction factor for small sample sizes.[19] We determined this index only for those languages of a cluster area that showed the colexification pattern in question. In the <'feather', 'hair'> clusters in Figure 4, we find different degrees of homogeneity, as Table 2 shows.

Tab. 2: Diversity indices for <'feather', 'hair'> (meso-clusters) (ASJP)

Cluster area	Diversity index
1	1.01
2	1.38
3	0
4	0.77
5	0.44

19 With the R DiversitySampler package's 'Hs()'-function (Lau 2012), with the option "corr=T".

As Table 2 shows, cluster area 3 in Southeast Asia is totally homogeneous and it actually provides a nice illustration that significant clusters need not be genealogically diverse. All languages showing the colexification pattern in question are Austroasiatic.[20] Given that, at the same time, all Austroasiatic languages showing the colexification in question are members of this cluster, membership to this cluster correlates positively with the colexification pattern in question. The ratio of languages to families is one, however, and the diversity index is therefore zero. By contrast, cluster area 2 (in South America) is the most heterogeneous one, as the six languages showing colexification of 'feather' and 'hair' belong to six different families.[21] Cluster area 5 (in Melanesia) exhibits a relatively low degree of diversity (six languages from two families). This is illustrated in Figure 6, where families are identified with their Glottolog codes.[22] (It should, of course, be borne in mind that the density of data points is very low for this colexification pair, particularly in Melanesia, and that the data is only used for illustrative purposes at this point.)

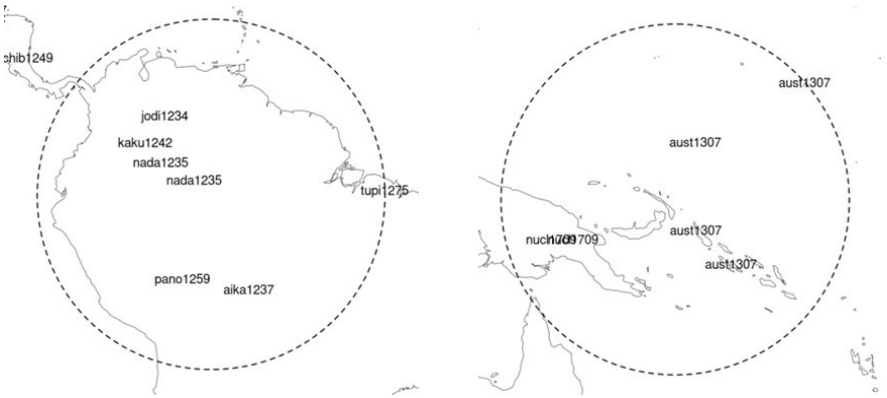


Fig. 6: Cluster areas 2 and 5 for <'feather', 'hair'>

20 Note that the degree of genealogical diversity of a cluster should ideally be measured not relative to top-level families but to lower-level branches. The Austroasiatic languages in cluster 4 actually belong to four different branches of that family: Bahnar (bahn1262) and Jeh (jehh1245): Bahnaric, Kuy (kuyy1240): Katuric, Ksingmul (puoc1238): Khmuic, Chut (chut1247): Vietic.

21 Viz., Jodi-Saliban (jodi1234), Kakua-Nukak (kaku1242), Nadahup (nada1235), Tupian (tupi1275), Pano-Tacanan (pano1259) and Aikanã (aika1237).

22 Viz., Austronesian (aust1307) and Nuclear Trans New Guinea (nucl1709).

On the basis of the procedure described above, we can now identify clusters in a bottom-up fashion, generating some statistics that will allow us to estimate how interesting they are from the point of view of lexical typology and in an areal perspective. Obviously, the best evidence for contact-induced clusters is provided by examples with a high degree of distinctiveness (which means that many languages in the cluster exhibit the colexification in question and few non-cluster languages have it) and a high degree of genealogical diversity. We will now take a closer look at the clusters delivered by the data from ASJP and CLICS (Sections 4.4 and 4.5).

4.4 Clusters emerging from the ASJP data

The procedure described in Sections 4.1 to 4.3 brought to light 23 colexification patterns showing a significant positive spatial autocorrelation and 120 cluster areas that turned out to be significant predictors for a given colexification in the ASJP data, controlling for genealogical relatedness. The 23 colexification pairs are shown in (1), the 36 meso-clusters in Figure 7.

(1) <‘I’, ‘fish’>; <‘I’, ‘we’>; <‘I’, ‘you’>; <‘bark’, ‘skin’>; <‘blood’, ‘die’>; <‘bone’, ‘die’>; <‘come’, ‘dog’>; <‘die’, ‘eye’>; <‘drink’, ‘water’>; <‘ear’, ‘hear’>; <‘ear’, ‘leaf’>; <‘ear’, ‘name’>; <‘eye’, ‘name’>; <‘feather’, ‘hair’>; <‘fire’, ‘tree’>; <‘horn’, ‘knee’>; <‘horn’, ‘tooth’>; <‘liver’, ‘two’>; <‘louse’, ‘we’>; <‘man’, ‘person’>‘, ‘<‘mountain’, ‘stone’>; <‘name’, ‘tooth’>; <‘see’, ‘we’>



Fig. 7: All meso-clusters of the ASJP data

We can now apply further filters in order to identify the most interesting cases of association between a colexification pattern and a cluster area. We can use the diversity index for that purpose. Table 3 shows the top ten of the clusters, ordered by the diversity index (all cluster areas are significant predictors at a 0.05 level, according to the regression model).[23] It also indicates (in this order) the position and radius of each cluster, the numbers of languages and families, the diversity index, the posterior mean and the p-value for the latter value. A list of all significant cluster areas is provided online.[24] The ten clusters in Table 3 correspond to four colexification patterns: <'fire', 'tree'>, <'mountain', 'stone'>, <'ear', 'leaf'> and <'bark', 'skin'>. We will now take a closer look at each of these patterns.

Tab. 3: Top ten clusters emerging from the ASJP data

Colexification	Size	No	Long	Lat	Radius	No lng	No fam	Div	pm	p.pm
<fire, tree>	meso	1	142.9	-7.8	2557	53	16	2.3	2.87	< 0.001
<mountain, stone>	macro	1	16.5	6.9	4,320	69	16	2.3	2.90	< 0.001
<ear, leaf>	macro	1	29.8	7.8	3,876	39	14	2.2	2.98	< 0.001
<ear, leaf>	meso	1	30.1	8.6	2,670	38	13	2.1	3.24	< 0.001
<bark, skin>	macro	1	-65.3	-7.2	2,466	14	11	1.9	1.86	0.033
<ear, leaf>	micro	2	35.0	4.9	921	30	10	1.9	3.04	< 0.001
<mountain, stone>	meso	2	133.1	-19.0	1,967	27	10	1.9	1.15	0.027
<mountain, stone>	meso	4	-64.8	-8.4	1,533	9	8	1.6	1.42	0.030
<fire, tree>	micro	6	130.6	-12.1	822	8	7	1.5	1.76	0.019
<mountain, stone>	meso	3	5.9	11.1	1,808	45	7	1.5	1.92	< 0.001

23 Note that, in some cases, the same cluster areas were identified for different cluster sizes (e.g., meso and macro), as the cut-off points for clusters are maximal distances. In such cases, we obviously regarded the cluster as being of the smallest category.

24 See http://www.uni-jena.de/~mu65qev/data/colex-tables/ASJP-clusters.htm (accessed 4 April 2018).

4.4.1 <'Fire', 'tree'>

<'Fire', 'tree'> is a well-known colexification pattern, also noted by Urban (2012) and Östling (2016) and comprehensively discussed by Schapper, San Roque and Hendery (2016). We will therefore restrict ourselves to presenting our data. As has been shown by Schapper, San Roque and Hendery (2016), colexification (either strict or loose) of 'fire' and 'tree' is well-attested in the Sahul area comprising the languages of Australia, New Guinea and surrounding islands, though not to the extent that this had been suggested in earlier research. In fact, Schapper, San Roque and Hendery (2016) argue that it is much more common for the Sahul languages to colexify 'fire' with 'firewood', to the exclusion of 'tree'. However, since 'firewood' is not in the Swadesh list, this pattern cannot be extracted from the ASJP data. As we will see in Section 4.5, some relevant information can be obtained from the CLICS data, however. The ASJP data is shown in Figure 8 (in the following, only cluster areas that are significant predictors for the colexification pattern in question are indicated).

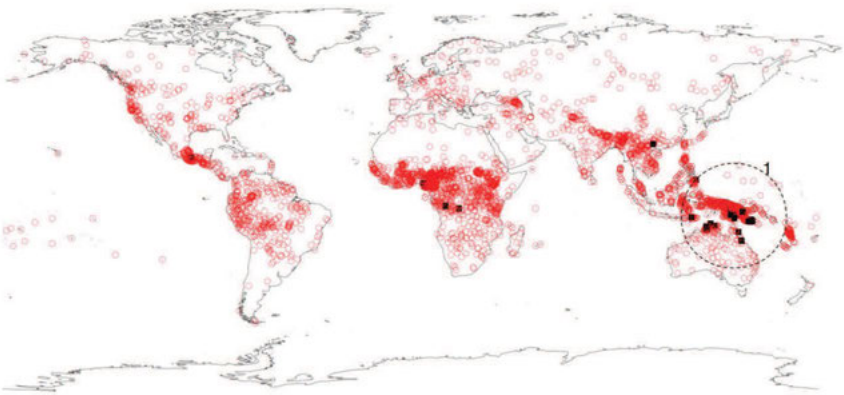


Fig. 8: Significant meso-cluster for <'fire', 'tree'> in the ASJP data

4.4.2 <'Mountain', 'stone'>

The colexification of 'mountain' and 'stone' has been discussed by Östling (2016) and is pervasive in the data used by Urban (2012). As Urban (2012) points out, Buck (1949: §1.22) already noticed a certain affinity between the meanings 'mountain' and 'rock' in Indo-European (e.g., Goth *hallus* 'rock', Old Norse *hallr* 'large

stone' or 'sloping' as an adjective, probably related to Latin *collis* 'hill' and Lithuanian *kalnas* 'mountain'). Sometimes, such instances of colexification are probably mediated by a word for 'cliff' (e.g., Old High German *felis* 'rock', Old Norse *fjall* 'mountain', Irish *all* 'rock, cliff').

The macro-cluster shown in the second row of Table 3 covers the whole continent of Africa. As Figure 9 shows, it is particularly prominent in two parts of Africa, i.e., a central area that can perhaps, roughly, be negatively defined as a "non-Afroasiatic" and "non-Bantu" belt[25] and the Kalahari Basin in the south (cf. Güldemann 2010). The whole continent of Australia constitutes a particularly clear case of a cluster. It is, however, genealogically less diverse than the cluster in Africa (the diversity index is 1.9 in Australia versus 2.3 in Africa; note that the Australian cluster is listed as a meso-cluster in Table 3). A relatively weak cluster was identified in South America.

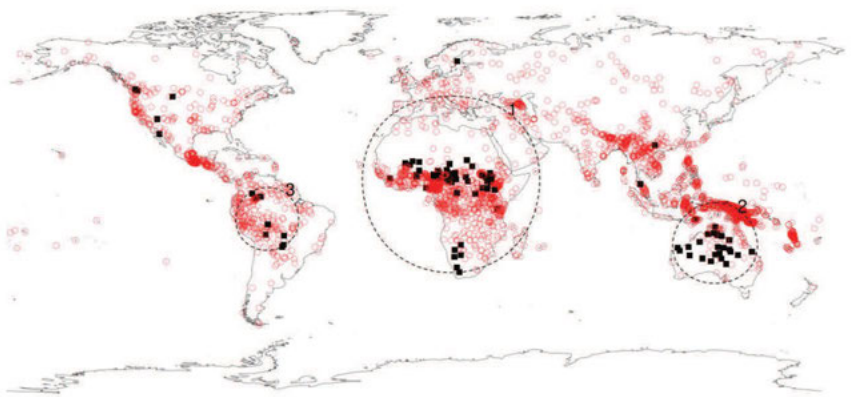


Fig. 9: Significant macro-clusters for <'mountain', 'stone'> in the ASJP data

It seems plausible to assume that the colexification of 'mountain' and 'rock' may be rooted, to a certain extent, in the physical environment of the speakers, at least in Australia, with rocky environments and/or arid regions. A common alternative colexification partner of 'mountain' is 'forest', specifically in regions with a rich vegetation (e.g., [Mexican] Spanish *selva*, originally 'forest' from Latin *silva*, is often used for 'rain forest' as well as 'montane forest'; see Urban 2012). The African cluster cannot, of course, be explained in this way. Tom Güldemann (p.c.)

25 We owe this observation to Tom Güldemann.

has hypothesized that the colexification of 'mountain' and 'stone' shown in Figure 9 may represent a pattern that was widespread before the expansion of Afroasiatic and Bantu languages – a 'remnant areal pattern' between the zones covered by the two major families, as it were. We would obviously need other types of evidence (especially historical) to test this hypothesis. In any case, the "belt" of black squares in Figure 9 does not seem to correspond to an area that we could define positively – for instance, in terms of geographical characteristics or patterns of language contact.

4.4.3 <'Ear', 'leaf'>

<'Ear', 'leaf'> is a particularly common pattern in Eastern Africa, most of the languages being located in Güldemann's (forthc.) "Nilotic-Surmic spread zone". As Table 3 and Figure 10 show, there is a highly distinctive (meso-)cluster in this area, with 39 languages from 14 families. Our method has also identified some weaker and much smaller clusters in other parts of the world, i.e., in the Americas and in Australia, but they are far less diverse than the African cluster and it is questionable whether clusters with two members (as in Australia) should be taken into consideration at all (we included them because even two-member clusters may have resulted from language contact).

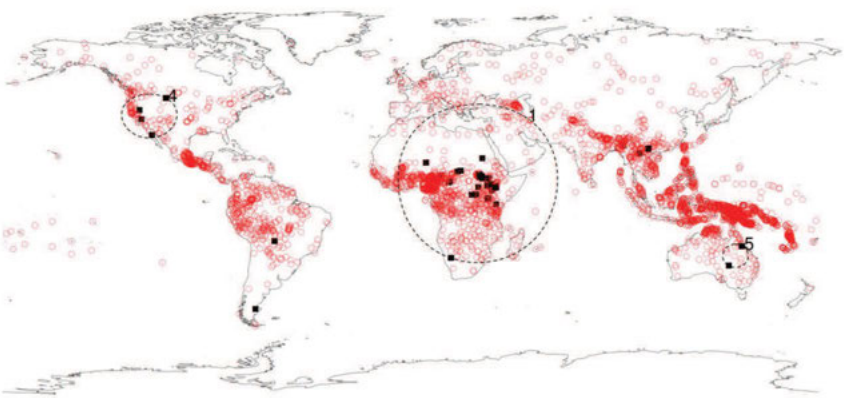


Fig. 10: Significant meso-clusters <'ear', 'leaf'> in the ASJP data

Given the density of languages in the Nilotic-Surmic spread zone, it is hard to plot the specific languages or language families of the <'ear', 'leaf'> cluster in this area. Figure 11 shows the Glottolog codes of the families: Afro-Asiatic (afro1255), Atlantic-Congo (atla1278), Central Sudanic (cent2225), Dizoid (dizo1235), Ta-Ne-Omotic (gong1255), Heibanic (heib1242), Khoe-Kwadi (khoe1240), Lafota (lafo1243), Maban (maba1274), Blue Nile Mao (maoo1243), Nilotic (nilo1247), Nubian (nubi1251), Songhay (song1307) and Surmic (surm1244).

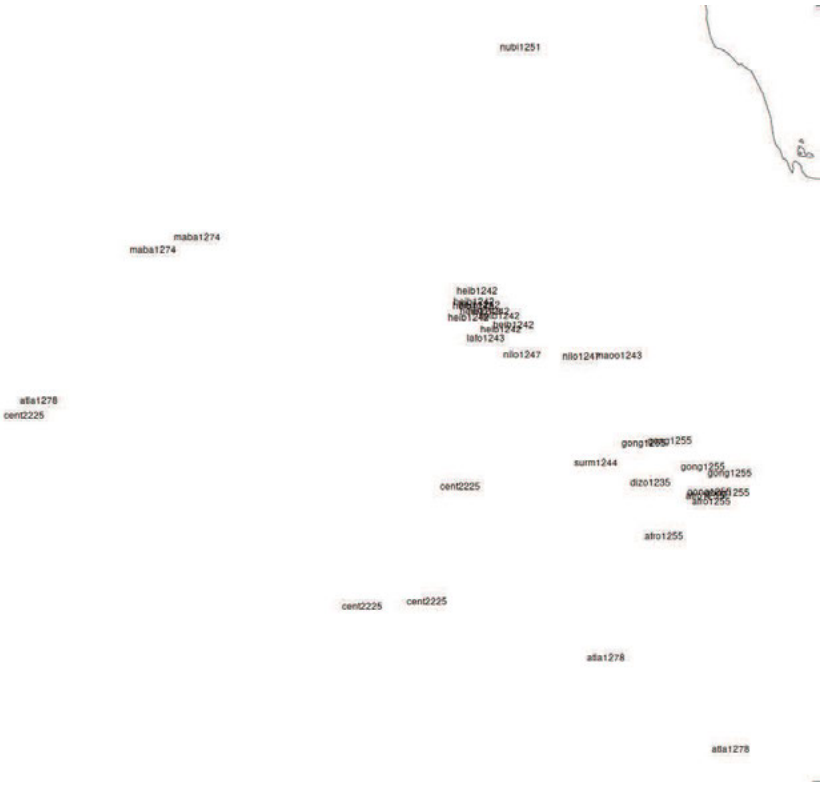


Fig. 11: Macro-cluster <'ear', 'leaf'> in Eastern Africa in the ASJP data – language families

As we are not specialists of African languages, we cannot interpret the facts from Eastern Africa any further. Specifically, it would be interesting to know what other meanings are involved in this pattern. Moreover, it would be intriguing to see if there is any connection between the physical environment and this colexification pattern (e.g., insofar as there are plants with ear-like leafs). While this

may seem a bit far-fetched, a cursory glance at materials available to us in fact points in that direction. According to Hellenthal (2010: 493), in Sheko (shek1245) (which is not in our data, but its relative Dizin [dizi1235] is), *haay* means both 'ear' and 'leaf of ensete or yam' ("ensete" is also known as "Ethiopian banana") but there are other words for other types of leaves. What ensete and yam leaves have in common is that they are relatively large in comparison to their "hosts" and prominently stick out laterally (while still being curled up, the "top leaf" of an ensete is described with a different word in Sheko, i.e., *mùkmūrì*). This conjecture gets some support from the fact that the pattern is also found in the desert regions of Mexico and the Southern United States, where the agave (americana) and similar plants are widespread. We leave it to specialists, however, to explain the particularly strong (areal) association of 'ear' and 'leaf' in this part of the world.[26]

4.4.4 <'Bark', 'skin'>

Before we consider the colexification of 'bark' and 'skin' that emerged from our analysis, it should be pointed out that 'bark' is not in the 40-item word list actually used for ASJP (while being in the 100-item Swadesh list). The number of data points is therefore considerably lower than for most other pairs (cf. the case of 'feather' and 'hair' discussed in Sections 4.1 to 4.3). The two significant macrocluster areas are shown in Figure 12. The cluster in South America is the "strongest" one.

What is remarkable about cluster area 1 is the genealogical heterogeneity of the languages exhibiting colexification of 'bark' and 'skin'. As Table 3 shows, the cluster comprises fourteen languages from eleven families (note that some of the languages listed in the following are also mentioned by Urban 2012): Abipon (abip1241) is Guaicuruan; Masaká (aika1237) is Aikanã; Apinayé (apin1244) is Nuclear-Macro-Je; Bororo (boro1282) is Bororoan; Cha'palaa (chac1249), Tsafiki (colo1256) and Guambiano (guam1248) are Barbacoan; Hixkaryána (hixk1239) is Cariban; Hupdë (hupd1244) is Nadahup; Minica Huitoto (mini1256) is Huitotoan;

26 Guillaume Segerer (p.c.) has pointed out to us that one interesting aspect of the <'ear', 'leaf'> colexification pattern is that, with a few exceptions, it seems to be absent from Niger-Congo. In his data, it is attested in Sheko (shek1245), the Omotic languages of Wolaytta (wola1242), Gofa (gofa1235), Dorze (dorz1235), Dawro (dawr1236), Haro (kach1284), Basketo (bask1236) [Ta-Ne-Omotic] and Dime (dime1235) [South Omotic], and the Central Sudanic languages of Proto-SBB, Modo (modo1248), Bongo (bong1285), Mangbetu (mang1394), Avokaya (avok1242), Kaliko (kali1312), Logo (logo1259), Lugbara (lugb1240) and Ma'di (madi1260).

Páez (paez1247) is Páez; Paraguayan Guaraní (para1311) and Parakanã (para1312) are Tupian; and Tacana (taca1256) is Pano-Tacanan.

Figure 12 shows that there is also a cluster in Melanesia where 'bark' and 'skin' are colexified. It comprises seven languages from two families (Austronesian and South Bougainville) and is therefore not as distinctive as the cluster in South America. Remember, however, that the number of data points is very small for this part of the world, as 'bark' is not included in the 40-item ASJP list.

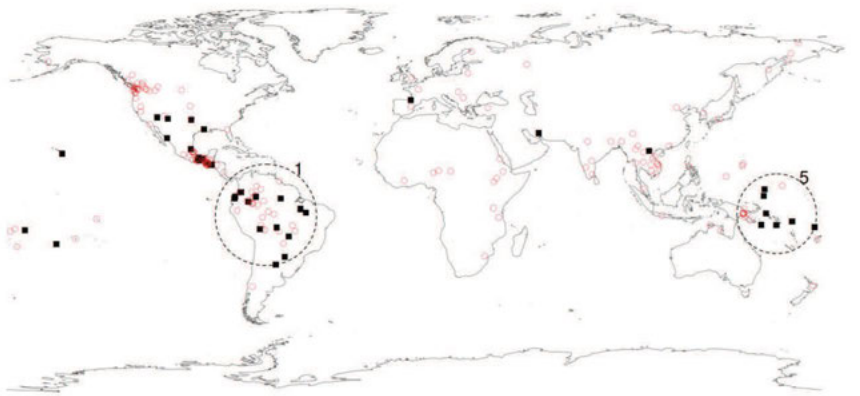


Fig. 12: Macro-clusters for <'bark', 'skin'> in the ASJP data

The colexification of 'bark' and 'skin' has also been discussed, but actually discarded, as a potential lexical trait of Mesoamerican languages (cf. Smith-Stark 1994). As Figure 12 shows, there is no significant cluster in this area, according to the ASJP data. This actually confirms Smith-Stark's (1994) observation that 'bark' and 'skin' are not characteristic of that area, as they are also colexified in neighboring, non-Mesoamerican languages.[27] However, our data suggests that, even within the cluster, the degree of colexification is limited. Figure 13 shows the hypothesized cluster area, identified by the hierarchical clustering process, and the languages with and without colexification of 'bark' and 'skin'.

27 For ways of quantifying membership to the Mesoamerican linguistic area, see van der Auwera (1998b) and Gast (2007).

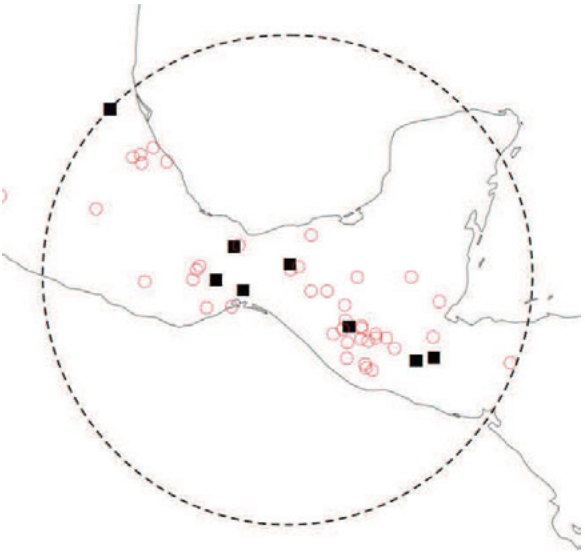


Fig. 13: Colexification of 'bark' and 'skin' in Mesoamerica in the ASJP data

While Figure 13 suggests that colexification of 'bark' and 'skin' is actually much less widespread in Mesoamerica than we may have thought, it seems to us that what we find here in many cases is "loose colexification". For example, in the Mixe-Zoquean language Copainalá Zoque (copa1236), *naca* means 'skin' and *ku'yu-naca* 'bark' or, literally, 'tree-skin' (Harrison, Harrison and García H. 1981: 280, 355). This example thus shows, once again, that a separate treatment of loose colexification will be beneficial to detect a broader range of colexification patterns.

4.5 Clusters emerging from the CLICS-data

Before we start to explore the data in a bottom-up way, it seems worthwhile to see if we can get any information from CLICS that would allow for a comparison with the ASJP data. As pointed out in Section 2.1, the types of concepts covered in CLICS are very different from those in ASJP and there is little overlap. One pair of elements, however, can be reasonably compared: CLICS provides information about 'fire' and 'firewood', which, in a way, complements the information on 'fire' and 'tree' discussed in Section 4.4.1. Interestingly, the <'fire', 'tree'> pattern is not found in CLICS at all. As can be seen in Figure 14 (showing hypothesized

cluster areas), the data is very sparse, however, and it is not surprising that the clusters – even though the colexification pattern shows a spatial autocorrelation according to the Join Count test – did not pass the significance test in the regression analysis.

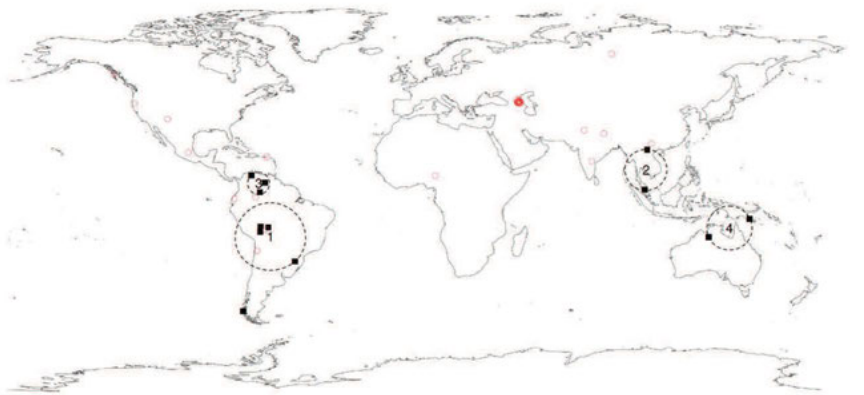


Fig. 14: Hypothesized cluster areas for <'fire', 'firewood'> in the CLICS data

While the <'fire', 'firewood'> clusters in Southeast Asia and Australia/New Guinea are in accordance with the ASJP data on the colexification of 'tree' and 'fire', shown in Figure 8, it is perhaps surprising that the CLICS data shows some relevant data points in South America, as this part of the world does not exhibit a single instance of colexification of 'fire' and 'tree' in the ASJP data. CLICS lists the following languages for this pattern: Qawasqar (qawa1238), Araona (arao1248), Wayuu (wayu1243), Kaingang (kain1272), E'ñapa Woromaipu (also known as Panare, enap1235) and Yavitero (yavi1244). To be sure, 'firewood' and 'tree' are different things but it still seems surprising that, according to the combined ASJP and CLICS data, not a single South American language seems to colexify both 'fire' and 'firewood' and 'firewood' and 'tree' – a pattern that is attested in 10% of the Sahul sample in Schapper, San Roque and Hendery (2016). As we are not familiar with any of the South American languages involved, we have no further comments to make at this point.

We can now turn to a data-driven inspection of the clusters emerging from the CLICS data. Our method identified 36 colexification patterns with a significant spatial autocorrelation and 37 cluster areas that were significant predictors for a given colexification (at a 0.05 level). There are twelve micro-clusters, thirteen

meso-clusters and twelve macro-clusters. The colexification patterns are listed in (2) and the thirteen significant meso-clusters are shown in Figure 15. Given the areal bias of the data, it comes as no surprise that most of the clusters are located in South America and Eurasia.

(2) <‘air’, ‘weather’>; <‘beak’, ‘mouth’>; <‘believe’, ‘think’>; <‘body’, ‘flesh’>; <‘brother’, ‘sister’>; <‘buy’, ‘take’>; <‘catch (ball) ‘, ‘take’>; <‘count’, ‘measure’>; <‘count’, ‘think (be of the opinion)’>; <‘country’, ‘earth (ground, soil)’>; <‘daughter in law (of a woman)’, ‘mother in law (of a woman)’>; <‘daughter’, ‘son’>; <‘dig’, ‘drop (verb)’>; <‘dye’, ‘paint (noun)’>; <‘earth (ground, soil)’, ‘world’>; <‘father in law (of a man)’, ‘son in law (of a man)’>; <‘female (adjective)’, ‘woman’>; <‘female’, ‘woman’>; <‘furs’, ‘skin (hide)’>; <‘get (obtain)’, ‘take’>; <‘grandson’, ‘nephew’>; <‘grass’, ‘pasture’>; <‘grass’, ‘plant’>; <‘green’, ‘green (unripe)’>; <‘hold’, ‘keep (retain)’>; <‘hold’, ‘seize (grasp)’>; <‘hold’, ‘take’>; <‘language’, ‘voice’>; <‘leg’, ‘thigh’>; <‘male (adjective)’, ‘man (vs. woman)’>; <‘male’, ‘man (vs. woman)’>; <‘nephew’, ‘niece’>; <‘offspring (son or daughter)’, ‘son’>; <‘post (pole)’, ‘tree’>; <‘release (let go)’, ‘send’>; <‘time’, ‘weather’>



Fig. 15: All meso-clusters emerging from the CLICS data

Some of the clusters emerging from the data are not terribly interesting. For instance, there are many cases of adjectives and nouns being colexified, such as ‘woman’ and ‘female’, which is a matter of morphosyntax rather than the lexicon.

The top ten of the remaining significant clusters are shown in Table 4 (the data for all clusters with a p-value lower than 0.1 is provided online).[28]

Tab. 4: Significant lexical clusters from the CLICS data

Colexification	Size	No	Long	Lat	Radius	No lg	No fam	Div	pm	p.pm
<count, measure>	macro	1	-68.0	-6.1	2,578	18	15	2.2	3.1	0.010
<catch (ball), take>	meso	1	-67.4	-8.6	2,181	16	13	2.1	1.85	0.048
<count, measure>	meso	1	-70.8	1.2	1,237	12	11	1.9	2.74	0.026
<hold, take>	macro	1	-62.0	-30.9	2,754	9	8	1.6	2.17	0.034
<count, measure>	micro	1	-75.4	-1.8	643	7	7	1.5	3.07	0.025
<air, weather>	macro	1	44.5	41.3	3,603	22	5	1.2	2.73	0.042
<get (obtain), take>	macro	1	48.3	46.3	3,088	24	5	1.2	2.38	0.039
<hold (seize), grasp>	micro	2	46.7	41.1	1,484	24	4	1.0	3.60	0.004
<count (think) be of the opinion>	meso	1	46.2	41.9	1,557	18	4	1.0	2.98	0.011
<hold (seize), grasp>	meso	2	46.7	41.1	1,484	24	4	1.0	3.93	0.004

Table 4 can be split into two major groups of clusters, those from South America (the first five) and those from Eurasia (the last five). The five South American clusters comprise three colexification types: <'count', 'measure'> (micro, meso and macro), <'catch (ball)', 'take'> and <'hold', 'take'>. The most prominent pair is clearly <'count', 'measure'>. The macro-cluster listed at the top of Table 4 is shown in Figure 16. As the data in the table shows, it is extremely diverse genealogically speaking, and is found in fifteen languages from eighteen families.

28 See http://www.uni-jena.de/~mu65qev/data/colex-tables/CLICS-clusters.htm (accessed 5 April 2018).

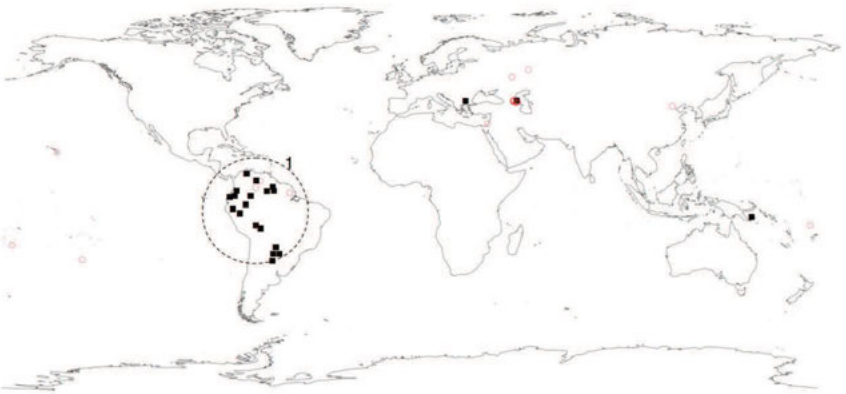


Fig. 16: Macro-clusters for <'count', 'measure'> in the CLICS data

The following clusters are all located in Eurasia: <'air', 'weather'> (macro), <'get (obtain)', 'take'> (macro), < 'hold', 'seize (grasp)'> (micro and meso) and <'count', 'think (be of the opinion)'> (meso and macro). The "strongest" macro-cluster for <'air', 'weather'> is shown in Figure 17. As the map shows, this colexification is divided rather categorically between South America and Eurasia.



Fig. 17: Macro-clusters for <'air', 'weather'> in the CLICS data

Further inspection of the data reveals some more interesting patterns, which we do not have the space to discuss at this point. We will therefore restrict ourselves to some comments on one group of clusters discussed above. It is interesting to see that CLICS brings to light a number of verbal patterns. The lexical typology of verbal meanings is particularly difficult, because comparability is even harder to establish in this domain than it is for nominal meanings, and elicitation represents an additional challenge. We have to reckon with elicitation artefacts, for instance, stemming from the language used during the interviews or the language in which the concepts are coded. For example, the fact that colexification of 'count' and 'think (be of the opinion)' (see Table 4) is widespread in Eurasia may be related to the fact that the concepts are colexified in Russian as well. *Schitat'* is actually listed as an elicitation form for both concepts in the IDS data (though, for 'think', an alternative form is given, i.e., *dumat'*). But then, it is possible that Russian is just another language colexifying these concepts, perhaps under areal influence (note that the elicitation languages of the IDS data are not listed in CLICS). A more comprehensive study of such questions obviously requires more data from other parts of the world.

5 Conclusions

The aim of this study has been of an exploratory nature. We intended to determine how much information about areal patterns of colexification we can gain from lexical databases such as CLICS and ASJP. We chose a bottom-up (rather than hypothesis-driven) approach, identifying areal patterns in three steps: (i) determine spatial autocorrelations in the data, (ii) identify clusters as candidates for convergence areas and (iii) test the clusters resulting from the second step controlling for genealogical relatedness. Moreover, we identified a (genealogical) diversity index for each cluster. For the ASJP data, we identified clusters associated with four colexification pairs in this way: <'fire', 'tree'>, <'mountain', 'stone'>, <'ear', 'leaf'> and <'bark', 'skin'>. One of these patterns has figured prominently in recent research carried out by specialists, i.e., <'fire', 'tree'> (see Schapper, San Roque and Hendery 2016). Two of the colexification types have been discussed before, though not in very much detail, i.e., <'mountain', 'stone'> and <'bark', 'skin'> (see Urban 2012). The colexification of 'ear' and 'leaf', which seems to be prominent in Eastern Africa, has not been noted in the lexical-typological literature, as far as we are aware (we are, of course, not familiar with the whole range of specialized literature). We regard these results as a proof of concept, in the sense that our bottom-up approach has yielded promising results.

Inspection of the other patterns emerging from the ASJP data shows a number of further interesting pairs, some of which may inspire more detailed research, such as <'ear', 'name'>, <'horn', 'tooth'> and <'horn', 'knee'> (see the more comprehensive cluster lists in our online data repository, cf. footnote 25).

The CLICS data shows a heavily biased areal distribution but it can be used to identify some differences between South America and Eurasia. Once interesting pairs of concepts have been identified, other regions of the world could be investigated more thoroughly. What makes the CLICS data particularly interesting is the inclusion of a broad range of concepts, including verbal ones. Given the relative scarcity of data and given the rather strict selection criteria that we applied (e.g., a 0.05 level of significance), we only identified a relatively small number of clusters. Still, some of these clusters are potentially interesting from an areal point of view. Moreover, closer inspection of the data in the online repository (where all clusters with a p-value < 0.1 are listed, cf. footnote 29), again, brings to light some further relevant patterns, such as clusters for various kinship terms (e.g., <'daughter', 'son'>, <'brother', 'sister'>, <'grandson', 'nephew'>) and body parts (e.g., <'leg', 'thigh'>), as well as for the particularly interesting case of <'language', 'voice'>. The conceptualization of 'language' seems to vary greatly across the regions of the world, including metonymies such as 'tongue', 'voice' and 'word' (see Radden 2004). The ways in which the (rather abstract) concept 'language' is encoded deserves a typological study of its own. Here as well, inspiration for follow-up research was found in the data.

We have also pointed out some drawbacks of the use of major lexical databases. First, the data has been collected from various sources, which means that they are not based on consistent definitions, and most of the primary data was probably elicited through English (or some other major language, such as Russian), so that the elicitation stimulus functioned as a *tertium comparationis*. This implies the danger of elicitation artefacts of various types. As we saw in Section 4.5, some languages of Eurasia, including Russian, colexify 'count' and 'think (be of the opinion)'. It is possible that this is a genuine areal pattern but we cannot rule out that at least some data points were influenced by the (probably Russian) elicitation word. Note that the problems concerning the status of verbal meanings in cross-linguistic comparison are, of course, of a more general nature. Elicitation of verbal concepts represents a well-known problem for language documentation and linguistic typology, for at least two reasons. First, it is hard to know *a priori* what verbal concepts a language encodes, specifically when dealing with cultural practices that most of us are unfamiliar with (such as hunting). Second, actions are mostly harder to describe or paraphrase than nominal concepts. Multimodal (or even behavioral) elicitation techniques are therefore required (e.g.,

videos). Elicitation is thus "expensive" and it is likely that, in general, lexicons from little described languages exhibit a "nominal bias" for this reason. It is therefore a great asset that CLICS contains a considerable number of verbal concepts – most of them originating from the IDS data – even though the data, obviously, has to be handled with care.

Having started the experiment of detecting areal colexification patterns bottom-up in an entirely unprejudiced way, our conclusion is predominantly positive. Even in our small-scale exploratory study we have identified various topics that deserve closer investigation. In spite of the inevitable noise in data gathered on a large scale and in collaborative efforts, we hope to have shown that lexical databases represent a valuable tool for typological research, even when used for purposes that they were not originally intended for.

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Martin Haspelmath

How comparative concepts and descriptive linguistic categories are different

Abstract: This paper reasserts the fundamental conceptual distinction between language-particular categories of individual languages, defined within particular systems, and comparative concepts at the cross-linguistic level, defined in substantive terms. The paper argues that comparative concepts are also widely used in other sciences and that they are always distinct from social categories, of which linguistic categories are special instances. Some linguists (especially in the generative tradition) assume that linguistic categories are natural kinds (like biological species or chemical elements) and thus need not be defined but can be recognized by their symptoms, which may be different in different languages. I also note that category-like comparative concepts are sometimes very similar to categories and that different languages may sometimes be described in a unitary commensurable mode, thus blurring (but not questioning) the distinction. Finally, I note that cross-linguistic claims must be interpreted as being about the phenomena of languages, not about the incommensurable systems of languages.

Keywords: comparative concept, descriptive linguistic category, social category, natural kind, type-token relation, (non-)portable term, (in)commensurability

1 Introduction

To make lasting progress in linguistics, we need cumulative research results and replicability of each other's claims. Cumulativity and replicability are not much emphasized by linguists and one of the reasons why these seem difficult to achieve is that, often, we cannot even agree what we mean by our technical terms. Typically, this is because we do not distinguish clearly enough between descriptive categories of individual languages and comparative concepts for cross-linguistic studies. We routinely use the same terms for both (e.g., ergative,

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relative clause, optative mood) but I have argued that we cannot equate the two kinds of concepts in the general case (Haspelmath 2010).

The first published critique of my 2010 proposal was van der Auwera and Sahoo (2015) but, in the meantime, several further articles discussing this methodological distinction have appeared (especially the papers collected by Plank 2016 and Lehmann 2016). I will use the opportunity of this paper to address a number of different points that have come up in the discussion of the issues over the last few years.

Overall, I have few disagreements with those linguists that work in a broadly Boasian and/or Greenbergian tradition. But it is clear that some of my claims *seem* controversial, so I hope that this paper will clarify a few issues. (I do have real disagreements with linguists who simply assume a close match between categories of particular languages and innate cross-linguistic categories; see Sections 6 and 7.)

In this paper, I provide further justification for the claim in (1) but, in addition, I put special emphasis on the observation in (2) that the general category presumption is wrong for linguistics.

(1) Ontological difference
Comparative concepts are a different kind of entity than descriptive categories (cf. Section 5).

(2) General category fallacy
We do not learn anything about particular languages merely by observing that category A in language 1 is similar to category B in language 2 or by putting both into the same general category C (cf. Section 6).

For example, by saying that the Spanish-specific construction *estar* V-*ndo* 'be V-ing' is an instance of the general category "progressive", we do not learn anything that goes beyond what we need to know for a description of this construction anyway. Thus, general categories do not by themselves advance our knowledge, although there are, of course, many ways in which information about some other language or knowledge of cross-linguistic patterns can help describers to identify all the properties of a language-particular construction.[1]

1 And, of course, in comparative contexts, statements such as "*estar* V-*ndo* is a progressive construction" are very useful. Linguists make comparative statements all the time but the point here is that they are different in nature from language-particular statements.

This is worth emphasizing because there is a constant temptation to think that subsuming a language-particular descriptive category under a general category does add information. We experience the usefulness of the general category presumption every day: when a young woman introduces a young man as her boyfriend, I can make certain further inferences concerning their behavior, which are usually very helpful for further interaction; and when I am told that a certain kind of infusion is real tea (made from *Camellia sinensis*), I have different expectations concerning its effects than if it is a herbal tea made of chamomile. It is important to understand why the general category presumption is a fallacy in comparative linguistics.

Briefly, the answer is that the cross-linguistic comparative concepts (like progressive) are not natural kinds or pre-established categories that exist independently of the comparison. Different languages represent historical accidents and (unless they influenced each other via language contact or derive from a common ancestor) the categories of one language have no causal connection to the categories of another language. By contrast, the categories "boyfriend" and "*Camellia sinensis*" do exist independently of particular circumstances. And if someone becomes a boyfriend or if a new tea plant grows, this is causally connected to the independently existing category.

I will elaborate on this point later on but, first, I discuss a number of different kinds of comparative concepts (Section 2). Subsequent sections will address a range of additional issues that have come up in the literature on comparative concepts and descriptive categories.

2 Kinds of comparative concepts

Comparative concepts can be divided into two main types: *category-like* comparative concepts and *etic* comparative concepts. With the latter type, there is no danger of confusing them with pre-established categories.

Category-like comparative concepts are the most difficult to deal with but also the most familiar type of comparative concept. Some examples of category-like comparative concepts are given in Table 1, listed together with chapters from the *World atlas of language structures* (WALS) that make use of them.

Tab. 1: Some category-like comparative concepts

Category-like comparative concept	WALS chapter
lateral consonant	Maddieson (2005a)
syllable	Maddieson (2005b)
reduplication	Rubino (2005)
subject, object, verb	Dryer (2005)
independent personal pronoun	Siewierska (2005)
adnominal demonstrative	Diessel (2005)
future tense	Dahl and Velupillai (2005)
applicative construction	Polinsky (2005)
epistemic possibility	van der Auwera and Ammann (2005)

All these terms were originally used for the description of some particular language and were extended to comparative use only later (they could therefore be called "descriptive-derived terms"). Some of them are phonetically based (e.g., lateral consonant) or semantically based (e.g., epistemic possibility). But most category-like comparative concepts which are familiar from typology are *hybrid* comparative concepts (Croft 2016: 3), i.e., they include both semantic-functional aspects and formal aspects in their definition. For example, a future tense form is a verb form which includes a marker that indicates future time reference of the situation denoted by the verb. Crucially, the form must include a grammatical marker, i.e., a formally defined entitity,[2] and this marker must occur on a particular class of roots (namely verb roots). In Haspelmath (2009: §6) and Haspelmath (2010: §5), I listed and defined a dozen category-like comparative concepts, which are all of this hybrid type. In these earlier papers, I focused on this subtype of comparative concepts, because these are the concepts that are often confused with descriptive categories.

Another type of category-like comparative concept is known by terms that are not derived from grammars of particular languages. For the typology of argument coding, the role types S, A, P, T and R, along with the notion of alignment, have proven very useful (Haspelmath 2011a) and, for the typology of subordina-

2 A grammatical marker can be defined as a simple bound form (i.e., a form that cannot occur in isolation) but occurs in close association to a major class root (or in second position of the clause) and expresses an abstract meaning which may correspond to nothing in a translation to another language.

tion, Cristofaro (2003) makes extensive use of the notions of balanced subordination and deranked subordination. These concepts have been important in typology but they are not normally used in descriptions and are therefore not easily confused with descriptive categories. Similarly, the general concepts of locus (head-marking and dependent-marking; Nichols 1992) and branching direction (Dryer 1992) have been important in typology but need not play any role in particular languages. The notions of adpossessive construction (Haspelmath 2017) and existential construction (Creissels 2013) have also proven very useful, though many grammatical descriptions make no use of these notions. They are still category-like but less so than the descriptive-derived terms in Table 1. What is typical of these concepts is that they are defined more narrowly than the corresponding language-particular categories. For example, an adpossessive (i.e., an adnominal possessive) construction is defined as a construction that expresses kinship relations, part-whole relations and/or ownership relations (cf. Koptjevskaja-Tamm 2003) but, in individual languages, such constructions normally express other relations as well (e.g., *my chair* 'the chair I am sitting on', *your school* 'the school that you are attending').[3]

In addition to category-like comparative concepts, typologists also work with etic comparative concepts, which are kinds of pronunciations in phonetic typology and meanings or functions in grammatical typology, often of a type that would not be expected to be the meaning or function of a single form. In semantic map studies, for example (e.g., Haspelmath 2003; van der Auwera and Temürcü 2006), the nodes on the map are meanings or functions (or uses) that are employed by the typologist to express generalizations across languages, as illustrated by Figure 1.

3 Thus, I disagree with Lander and Arkadiev's (2016: 404) statement that "if comparative concepts are not felt to be relevant for the grammars of different languages, they are usually not viable". On the contrary, many comparative concepts (e.g., all the etic ones) are not usable for language description and, conversely, some of the well-known category-like concepts that are not viable as comparative concepts (see example [8] in Section 8) work well in individual languages.

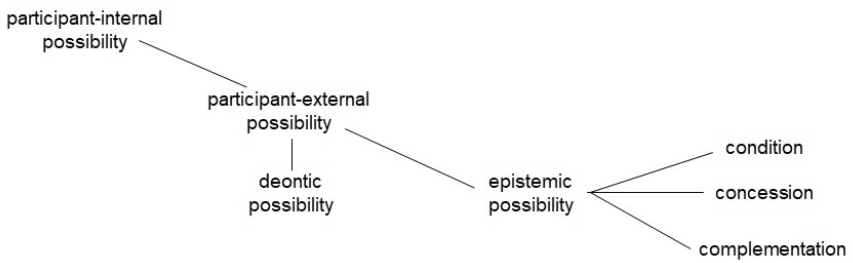


Fig. 1: Modality's semantic map (van der Auwera and Plungian 1998: 91)

Even though semantic map studies do not always make this fully clear, the meanings or functions (or uses) are not intended to correspond to any categories of languages. Categories of languages can be mapped onto semantic maps but there is no claim that the categories must be polysemous and that the meanings or uses on the map are somehow significant outside of the comparison.

When the semantic-functional nodes on semantic maps are not abstract concepts as in Figure 1 but reflect concrete utterances, it is immediately clear that they are not linguistic categories but merely components of a comparative methodology. Examples of such token-based comparative concepts are visual stimuli, as employed in much recent research on semantic typology (e.g., Majid et al. 2007 on cutting and breaking events: Evans et al. 2011 on reciprocals), as well as translation contexts, as employed by questionnaire-based studies (e.g., van der Auwera 1998a) and in parallel text typology (e.g., Wälchli and Cysouw 2012; Dahl 2014). Comparative concepts of the type considered in this paragraph are also called "etic grids" (Levinson et al. 2003: 487), using a term originating in anthropology.[4] The functions or uses of classical semantic maps of the type in Figure 1 have not been called "etic" but I would argue that their status is not any different. As Croft (2016: 3) notes, the newer token-based methods "provide a denser distribution of comparative concepts in particular regions of conceptual space" and the existing cross-linguistic studies have shown that "linguistic categorization is even more variable than we believed".

What all comparative concepts share is that they are defined in substantive terms, i.e., making reference to aspects of form or meaning that are independent of the structures of particular languages. This allows them to be applied to all

4 The terms "etic" and "emic" from American anthropology (going back to Kenneth Pike) broadly correspond to the Hjelmslevian (European structuralist) terms "substance-based" and "structure-based" (cf. Boye and Harder 2013).

languages in the same way, using the same criteria for all languages. This point will become important in Section 7.

Different kinds of comparative concepts relate to language-particular phenomena in somewhat different ways. Token-based comparative concepts must be matched by tokens of language use and category-like comparative concepts (like those in Table 1) are generally matched by categories of language systems. Category-like comparative concepts are particularly easy to confuse with descriptive categories because we talk about "a language having X" in both cases. As a language-particular statement, for instance, we say that "German has a Future tense construction, formed with the auxiliary *werden*" and, likewise, we say from a typological perspective that "German has a periphrastic future tense construction". These two ways of expression sound almost identical but they are actually quite different. From a comparative perspective, German could have a periphrastic future tense construction that is at the same time an epistemic mood construction. But German's Future tense construction cannot be anything else at the same time – it is just a single language-particular construction, identified by language-particular criteria.

3 Natural kinds, social categories and observer-made concepts

Describing a new language is somewhat like discovering a new island that has not been visited by an explorer before. The language contains a large number of previously unseen elements of language structure: more concrete ones such as sounds and words and more abstract ones such as classes of sounds, meanings and sound-meaning combinations at multiple levels of organization. These can be compared to landscape features of the newly discovered island and to the plant and animal species inhabiting the island. The explorer will try to bring home pictures of the island's mountains and streams, as well as behavioral descriptions and specimens of the plants and animals, and, in modern times, she will also make videos that tell others about the new discoveries. Likewise, the descriptive linguist will make sound recordings of the language and bring home a dictionary and a grammar containing many new "linguistic species".

When multiple islands are compared by comparative geographers and biogeographers, they must find a way of relating all the unique parts and life forms of the islands to each other. Now crucially, this is done differently for plants, animals and minerals than for mountains and streams.

Plant and animal species elements and kinds of minerals are *natural kinds*, i.e., they are categories which "have properties that seem to be independent of our minds" (Dahl 2016: 428). For example, the red fox (*Vulpes vulpes*) is a category of animals that form a group regardless of any observers. To talk about them, we need detailed descriptions and agreement on a label but not a definition. If we know enough about red foxes, we can easily recognize them in California or China after having first described the species in Europe (or vice versa). The same is true for trees such as the sycamore (*Acer pseudoplatanus*), found in Spain, Belgium and Romania, and for elements and minerals such as gold or quartz.[5] (Philosophers seem to regard chemical elements as the best exemplars of natural kinds but, for present purposes, biological species can also be included.)

Mountains and streams, by contrast, are not categories of nature. They are *concepts created by observers* and we must learn what they mean from other people. If they are to be applied in science, they must be defined rigorously and delimited from similar phenomena (e.g., mountains versus hills, streams versus rivers). They are comparative concepts of physical geography. Such delimitations are often somewhat arbitrary, so terminological uniformity among scholars may require decisions by nomenclature bodies (a well-known example is the International Astronomical Union's 2006 decision to define the comparative concept of a planet in such a way that Pluto is no longer considered a planet).

When exploring a new island, researchers may find completely new plants and animals (endemic to the island) but they will not find completely new landscape forms to which existing terms (like "mountain" or "stream") are inapplicable. Geographers may feel unhappy with conventional terminology and may propose new ways of cutting up the continuum found in nature (just as astronomers changed their minds about planets). But such changes in observer-made concepts will not be triggered by any single discovery, the way a single new animal species requires a new name.

But what about human cultures? Suppose the explorers encounter a new human population, with different kinship patterns, poetic forms and house-building styles than they are familiar with. How will these be categorized? On the one

5 Another sort of natural kind is represented by diseases such as tuberculosis, which can occur in different places at different times and which can be cured in the same way, regardless of cultural conventions (cf. Haspelmath 2015 on the analogy between linguistic categories and diseases). Such diseases are generally caused by a single pathogen. (Of course, there are also disease names that comprise rather heterogeneous conditions and these are then better seen as comparative concepts, such as the "common cold".)

hand, comparative culture scientists work with observer-made concepts. For example, when Botero et al. (2014: 16784) find that "beliefs in moralizing high gods are more likely in politically complex societies that recognize rights to movable property", they use the observer-made concepts "moralizing high god" and "politically complex society", which have a status very much like that of "mountain" or "planet". These are thus comparative concepts, not natural kinds.

On the other hand, human cultures and societies also have specific categories that are neither natural kinds (in the sense that they recur across continents, independently of individual cultures) nor observer-made concepts but that are recognized by every member of the society. For example, Western societies have the categories "boyfriend" (a quasi-kinship concept), "poetry slam" (a poetic form) and "office tower" (a house-building style). These are not universal and did not exist in Western societies as recently as 150 years ago but, nowadays, they are well-recognized parts of Western culture. I call such categories *social categories*. What they share with natural kinds is that they are pre-established and there is a causal connection between their members and the category. It is not only observers of the Hong Kong skyline that put the buildings in the category "office tower" – these buildings were created with precisely this category in mind. Similarly, when a man becomes a woman's boyfriend, he knows in advance what social behavior this category implies.

Moving to language, many readers will readily agree that comparative concepts used in language typology are observer-made in the same sense as "mountain" or "politically complex society". But what about the descriptive categories that authors of grammars of individual languages set up for their descriptions? Are they not more like the unique plant and animal species that explorers used to find on newly discovered islands? And what about individual words or morphemes, such as the word *bahi* 'book' in Odia (an Indic language of India)? Here, I will argue that language-particular categories are social categories, not natural kinds or observer-made concepts (see Section 6). But before we get there, I will discuss the main challenges of language description and comparison (Section 4) and why there is no type-token relation between comparative concepts and descriptive categories (Section 5).

4 The challenges of description and comparison

Linguists often talk about "theoretical approaches" and "linguistic analysis" but I do not find these notions sufficiently clear. It seems to me that all non-applied

linguistics is theoretical and that analysis is the same as description (Section 4.1). Deeper questions often require comparison of languages (Section 4.2).

4.1 Description

Science begins with charting the territory and cataloguing the phenomena, as a prerequisite for comparing the data to answer deeper questions. A basic difference between the two is that charting should be exhaustive while asking and answering deeper questions is an endless enterprise.

In practice, it may be difficult to describe a language fully but this is a task that can in principle be completed. We do have very comprehensive dictionaries of quite a few languages and the complexity of grammars is not limitless either. Thus, one goal of linguistics is to describe all languages in such a way that every regularity is captured or, in other words, to chart the territory exhaustively. This is quite different from the comparison of languages, which is necessarily partial, as further discussed in Section 4.2.

In addition to listing the words of a language, our descriptions need to make reference to categories (with names such as syllable, construction, inflection class, noun phrase and clause) because language use is productive and speakers can create and understand completely novel complex expressions. These categories must strike a balance between elegance and comprehensibility. The more abstract the description, the less easy it will be to understand it, because it will presuppose understanding many abstract intermediate concepts.[6] Thus, there is no such thing as *the* best description[7] but description can be more or less comprehensive and ideally, it would be exhaustive. Van der Auwera and Sahoo (2015: 2) are right when they observe that not only comparative concepts but also descriptive categories are "made by linguists" but the difference is that linguistic categories must exist for productive language use to be possible, independently of linguists. Different speakers may use different categories, just as different linguists may prefer different categories, but categories of some kind must exist. (In

6 For example, Müller (2004) says that the Russian nominal inflectional suffix *-o* can be characterized by the features {[+N],[+α,+β],[-obl]}. This is an elegant description because it requires only four features. But it is very hard to understand because readers need to have an explanation of the highly abstract features and their values first.

7 It is often said that descriptions should be cognitively realistic (reaching "descriptive adequacy" in Chomsky's parlance) but it has never been made plausible that any existing descriptions even approach this goal, so it is unclear to me how seriously it can be taken.

contrast, comparative concepts do not exist in the absence of comparative linguists.)

It is also sometimes said that descriptions should be "typologically informed" (e.g., Himmelmann 2016) but it is unclear what exactly this means, beyond the imperative to avoid idiosyncratic terminology.[8] What is clear, however, is that one cannot describe a language well by filling in a questionnaire or checklist. The grammars based on the Comrie and Smith (1977) questionnaire are often hard to understand because they do not give the authors the opportunity to introduce the basic categories that are crucial for understanding the grammatical patterns of the language. It is true that the checklist structure ensures comprehensiveness and comparability but it does not ensure or even allow good descriptions.

4.2 Comparison

Unlike description of languages, comparison is not a goal in itself. It always serves some other goal, such as learning about human language in general or answering questions about the historical origin and development of languages. Comparison must be based on comparable phenomena, i.e., phenomena that are identified by the same criteria in all languages (sometimes called *tertia comparationis*). It is not sufficient if the phenomena happen to have the same label in different languages. This is the same in other disciplines, such as geography. We can compare streets, bridges and subway lines across cities on the basis of their universally applicable formal and functional properties and probably also main streets and side streets, as well as one-way streets and city highways. But it makes no sense to compare streets called "Willy-Brandt-Straße" across German cities (unless one's focus is on the history of street naming, of course). Thus, we can compare gender systems or causatives across languages only if we have a universally applicable definition of the comparative concepts of gender and causatives. One of the most interesting results of comparison is implicational universals of the type pioneered by Greenberg (1963). In order to formulate testable universals

8 Van der Auwera and Sahoo (2015: 139) say that each language should "be described in its own terms, but that does not mean that one should start from 'categorial' or 'conceptual' scratch each time one sets out to describe a new language". But since each language has its own sets of conventions and linguistic categories are defined within the language system (as will be seen in Section 5), strictly speaking, one has to start from scratch, although, in practice, substantive characterizations of categories will often serve as a good starting point for further detailed work (see Section 8).

which can be replicated and can serve as the basis for a cumulative research agenda, it is particularly important that the comparative concepts have clear boundaries. Canonical definitions are useful in that they allow us to see how various phenomena relate to each other conceptually (cf. Brown, Chumakina and Corbett 2013) but they do not allow us to test universal (or other quantitative) claims, because they do not have clear boundaries.[9]

Unlike description, comparison cannot and need not be exhaustive. There are many things that can usefully be compared across languages but each language also has highly idiosyncratic features that cannot be readily compared. Examples from grammar are stranded prepositions in English, strong and weak adjectives in German, liaison in French and A-not-A questions in Chinese. Linguists tend to study more general phenomena and they rarely wonder about idiosyncrasies of lexical items and idiomatic multi-word expressions, of which every language has many thousands. All these can (and ultimately must) be described but they can hardly be compared across languages. This is not a problem, because there may not be anything special to learn about such historically accidental phenomena anyway, beyond their exhaustive description.

5 Why there is no type-token relation between comparative concepts and descriptive categories

According to Lehmann (2016) and Moravcsik (2016), comparative concepts can simply be seen as types of which descriptive categories are tokens: "Comparative concepts are taxonomically superordinate to descriptive categories." (Moravcsik 2016: 422).

In some simple cases, this may seem to be the case. Thus, Moravcsik would say that English personal pronouns and Hungarian personal pronouns are tokens of the general category "personal pronoun" and Lehmann (2016: §2.3) says that the Ancient Greek dual is a hyponym of the general ("interlingual") category "dual". And in these particular cases, no big problems would arise.

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9 The same is true of prototypical concepts (cf. Lehmann 2016: §2.2.2) or "vague" comparative concepts (Lander and Arkadiev 2016: §3). With Dryer (2016: 317), I tend to think that the temptation to set up concepts with non-clear boundaries in typology arises from the failure to distinguish between comparative concepts and language-particular categories.

However, more generally, this is not the case, because descriptive categories are defined in a very different way from comparative concepts: "Language-specific categories are classes of words, morphemes, or larger grammatical units that are defined distributionally, that is, by their occurrence in roles in constructions of the language." (Croft 2016: 7).[10] Comparative concepts, by contrast, are defined in a way that is independent of distributions within particular systems. This is a crucial point that is often overlooked.

For example, Moravcsik (2016: 420) says that one could ask whether the categories of the Latin case system (Nominative, Accusative, etc.) hold for Warlpiri and that it is an empirical question whether the two are commensurable or not. And van der Auwera and Sahoo (2015: 3) say that three categories A, B, C from three different languages could simply be compared by checking whether they share the features a, b, c, d, and so on. But this approach cannot work, because categories are defined within particular systems, which are different across languages. It makes no sense to ask whether Warlpiri has a Latin Accusative because the Latin Accusative is defined with respect to constructions of Latin. And when van der Auwera and Sahoo (2015) compare demonstratives of a special type in English, Dutch and Odia (*such*, *zulk* and *emiti/semiti*), they do not do so with respect to the defining features of these items but with respect to other comparative concepts which actually play no role in defining these items.[11]

That comparative concepts are different kinds of entities than descriptive categories is clearest in the case of etic comparative concepts, especially token-based concepts like visual stimuli and translation contexts. But category-like comparative concepts are not different in principle. The category-like comparative concept "dative" (Haspelmath 2009: §6.1) is defined in the familiar substantive way based on universally applicable semantic and formal features[12] but the meaning of the English preposition *to* is defined with respect to the structural network of constructional meanings in English. Many authors attribute a general "goal" meaning to it and claim that a sentence such as *Mary gave the money to John* uses the Caused-motion construction and thus has a slightly different meaning than *Mary gave John the money*, which uses the Ditransitive construction (e.g., Goldberg 1992). From a comparative perspective, one can thus say that English *to*

10 To this, I would add that phonemes and other phonological categories, as well as language-specific meanings, have the same status.

11 In fact, there is no need to define English *such*, other than by its pronunciation, as van der Auwera and Sahoo (2015: §3.7) note themselves.

12 A dative marker is a marker on a nominal that codes the recipient role if this is coded differently from the theme role (Haspelmath 2009: §6.1).

matches the "dative" concept but one cannot say that it is a token of a general (cross-linguistic) dative category or that it "instantiates" the general category.[13]

That the difference is important can best be seen by controversial cases, such as the notion of subject, which has been widely discussed (also in Dryer's seminal 1997 article). From a comparative perspective, it seems best to use the term "subject" as the conjunction of the S argument (the single argument of a verb like 'fall') and the A argument (the agent argument of a verb like 'kill', cf. Dixon 1994: 124) because, in this way, we can ensure the biggest overlap with the existing literature. However, in particular languages, definitions of syntactic roles are necessarily rather different. They do not make any reference to S, A and P but rather to constructions such as case-marking, person indexing and passivization. In Latin and German, for example, one could say that a Subject is a nominal argument that is in the Nominative case and controls Verb Agreement. Subjects can have various kinds of semantic roles (going far beyond physical action verbs like 'kill', which are the basis of the definition of A and P, as well as transitive clauses; Haspelmath 2011a), but these do not define the category. The category is defined by case and agreement.

The situation in English is different, because case is impoverished and various syntactic patterns are quite salient. For example, Subject-to-Object Raising not only allows patterns such as (3), but also patterns like (4), where the existential particle *there* is raised.

(3) a. The dog *is in the house*.
b. *I believe* the dog *to be in the house*.

(4) a. There *are two unicorns in the garden*.
b. *I believe there to be two unicorns in the garden*.

This is commonly taken to be a criterion for Subjecthood in English, for good reasons. If we do not use the label "Subject" for *the dog* and *there* in (3) and (4), we need to find some other label and none comes readily to mind. But this also

13 Dahl (2016: 429) objects to my earlier arguments against a type-token relation, observing correctly that the mere fact that a category in a language has more properties than the comparative concept does not mean that there can be no type-token relationship (see also Lehmann 2016: §2.3). In Haspelmath (2010), I did not sufficiently emphasize that categories are defined distributionally within a given language while comparative concepts are defined not distributionally but by their substantive properties.

means that agreement is no longer relevant to the definition of Subject in English, because the verb *are* in (4a) does not agree with *there*. In Icelandic, which has much richer case marking, not even case is thought to be relevant for the definition of Subject.

This well-known example nicely illustrates that, in different languages, different criteria are used to identify categories that are rather similar semantically (because, of course, the Latin, English and Icelandic Subject categories are semantically similar and differ only in atypical cases). But since the categories are not defined by their meanings, their nature is different and they are incommensurable.

In such cases of incommensurable definitions, it is nonsensical to use the term "subject" as a general term and to ask, for example, whether the Subject is the controller of reflexivization in both Latin and Icelandic. There is no Subject concept that would work as a descriptive category in diverse languages.

Thus, I maintain the view that comparative concepts and descriptive categories are not the same kinds of things. But even more important is the point that we do not learn anything about language 1 by observing that its category A is similar to category B in language 2 or by putting both into the same general category C: the general category presumption does not work in cross-linguistic studies. This is discussed next.

6 Linguistic categories are not natural kinds but social categories

When I realize that the Spanish noun *nariz* 'nose' belongs to the Feminine gender, this gives me additional knowledge about this noun: I can predict that it will occur with the indefinite article form *una* (not *un*). And when you are told that the Russian verb *kupit'* 'buy' is in the Perfective aspect, you can predict that its Non-Past form will have future time reference (*ja kuplju* 'I will buy'). Thus, language-particular categories help predict the behavior of linguistic forms. In this regard, they are like natural kinds or (other) social categories. As we saw in Sections 1 and 3, when told that something can be subsumed under a natural kind or a social category, we learn more: when told that a drink is made of *Camellia sinensis*, we can predict its health effects and, when told that a man is a woman's boyfriend, we can predict their behavior. Similarly, once we realize that an animal is a red fox (*Vulpes vulpes*), we can predict much about it and, if an investor is told that a

developer wants to build an office tower, they have clear expectations. Both natural kinds (like tea, red fox and sycamore) and social categories (like boyfriend, office tower and epic poem) are categories that exist in advance, independently of the categorization. Realizing that something is subsumed under a natural kind or social category is a finding that gives us additional information and we can establish a causal link between the phenomena and the categories.

In this respect, natural kinds and social categories are crucially different from comparative concepts such as "mountain", "planet" or "moralizing high god". If a geographer calls a landscape form on a newly discovered island a mountain, this does not add any information and it does not establish a causal link. And the classification by a category-like concept such as mountain may be regarded as too crude by other observers, to be replaced by more fine-grained comparative concepts such as precise contour lines on topographic maps (just as rough classifications into alignment patterns based on S, A and P can be replaced by more fine-grained comparative concepts based on micro-roles; e.g., Hartmann, Haspelmath and Cysouw 2014). Similarly, comparative concepts in economy such as "developing country" and "industrialized country" are very crude and are usually replaced by more fine-grained measurements.

But are categories of particular languages natural kinds or social categories? This depends on whether one sees language systems as biological entities or as conventional systems.

In generative grammar, it is common practice to emphasize the biological foundations of language and it is often assumed that highly specific aspects of language are part of its biology, including not only architectural properties of the system but also substantive features ("substantive universals").[14] In this approach, linguistic categories are thus regarded as natural kinds, which means that the same categories are used in different languages, just as different languages use the same architectural design for their rules. In other words, categories are thought to be cross-linguistic categories (or universally available categories; Newmeyer 2007). This means that there is no need to define linguistic categories, just as there is no need to define natural kinds such as red fox, gold or tuberculosis (Zwicky 1985: 284–286). Natural kinds can be recognized by various symptoms, which need not be necessary and jointly sufficient, unlike definitional criteria (cf. Haspelmath 2015).

14 "Substantive universals … concern the vocabulary for the description of language; formal universals involve rather the character of the rules that appear in grammars and the ways in which they can be interconnected" (Chomsky 1965: 29).

I regard the generative vision as perfectly coherent[15] but it has not been confirmed by research on grammatical patterns over the last century. We have not come up with a fixed list of categories (analogous to the periodic table of elements in chemistry; cf. Baker 2001) that we encounter again and again with exactly the same properties.

In practice, when we describe a new language and find a phenomenon that is similar to a previously encountered phenomenon from some other language, this is far from the end of our study: we still need to look at the whole range of its properties. For example, when we discover a construction that has some properties of a passive construction, we cannot simply say that it belongs to the natural kind "passive" and leave it at that. We need to investigate it in detail, until we have found all its properties in all contexts (e.g., Noonan 1994 on two different passives in Irish; Broadwell and Duncan 2002 on two passives in Kaqchikel). In the end, it does not matter what we call the newly found category – we should probably call it "Passive" for pedagogical reasons but, by attaching that label to the category, we have not learned anything that is not part of our primary description. Thus, I do not see any reason to hope that we will ever find a fixed list of possible categories and it remains a remote possibility at best.[16]

Languages have a strong biological basis but they vary widely across communities, i.e., they are systems of social conventions, like social hierarchies, religions, laws, currencies and kinship systems. All of these consist of social categories. In general, social categories are definable only within particular systems. Thus, the religious category "angel" can be defined only within a monotheistic religion of the Judeo-Christian-Islamic type; the kinship-like category "boyfriend" can be defined only within a modern Western society; the currency Euro's validity depends on the existence of European Union institutions; and so on. All social categories need to be described fully within their frame of reference and we do not learn anything new by linking them to a comparative concept. For example, if a religious scholar encounters an angel-like being in a newly studied faith, they cannot simply assume that it has all the properties of angels in Christianity or Islam. And if a Western comparative legal scholar encounters a divorce

15 Dryer (2016: 314) sees it in the same way: "The position that there are crosslinguistic categories is, under such a view [i.e., of innate linguistic knowledge], at least coherent … this is the only coherent way in which there might be cross-linguistic categories."

16 PHOIBLE (Moran, McCloy and Wright 2014) contains segment inventories of 1,672 languages and it makes use of 2,160 comparative concepts for segment types. If more languages are added, no doubt more and more segment types would have to be included. Many segment types recur across languages but there is no reason to think that there is a biological limit on segment types. The same is apparently true of other types of categories.

law in a non-Western society, they cannot simply assume that it has all the properties of Western divorce laws (which are, of course, somewhat variable themselves).

The three kinds of scientific concepts that I have discussed here and how they relate to concepts in other disciplines are summarized in Table 2.

Tab. 2: Social categories, natural kinds and comparative concepts

Discipline	**Social category**	**Natural kind**	**Comparative concept**
	Independently existing category		**Observer-made concept**
	Culture-specific	**Universally applicable**	
linguistics	Spanish Feminine noun, Russian Perfective verb		ergative alignment, epistemic possibility
religious studies	Christian angel, Jewish Rabbi		moralizing high god
chemistry		gold, quartz	catalyst
medicine		tuberculosis	respiratory disease
biology		*Camellia sinensis*, *Vulpes vulpes*	predator, wing
astronomy			planet
geography	office tower		mountain, stream
sociology	boyfriend		father, mother, ego

Thus, linguistic categories are not independently existing natural kinds and there is no way around a complete description of phenomena of individual languages. The question then arises what the status of category assignment controversies (Haspelmath 2007) is, i.e., for instance, why we would want to know whether Chamorro words with meanings like 'big' are "Class II words" (words with weak pronoun subjects; Topping 1973) or whether they are "adjectives" (Chung 2012). Both descriptions are possible, though the first one would seem to be more straightforward (as it makes reference to a highly salient feature whereas the second description builds on two fairly marginal phenomena). So why would one insist that a description in terms of adjectives is possible and desirable (as Chung 2012 does)? The only reason, it seems, is that it would confirm the hypothesis that all languages have nouns, verbs and adjectives as innate categories, i.e., that these are natural kinds. But this hypothesis seems to be based primarily on English and the alternative hypothesis that all languages are like Chamorro in having Class I and Class II words would also be confirmed by many (and maybe

all) languages (Haspelmath 2012).[17] And if Chung's (2012) deeper study of Chamorro had indeed made a discovery of broader significance, we would expect that other properties of the relevant Chamorro words would come to light due to their identification as adjectives. But this is not the case: the properties of Chamorro adjectives are specific properties of Chamorro, not general properties of adjectives in all languages. Calling them adjectives does not teach us anything further about Chamorro (or about human language) and thinking that it does means succumbing to the general category fallacy in (2).

7 Different criteria for different languages

Unfortunately, the general category fallacy is still widespread in linguistics. When there is a prominent grammatical term, linguists often assume that it stands for a general category that exists independently of the term and of particular languages. Since languages differ in the criteria that can be used, linguists resort to different criteria for different languages. It is often implicitly assumed that this is an acceptable strategy and, sometimes, it is also stated explicitly, as in (5).

(5) a. adjective

Dixon (2004: 9): "All languages have a distinguishable adjective class … [which] differs from noun and verb classes in varying ways in different languages, which can make it a more difficult class to recognize."

b. word

Spencer (2006: 129): "There may be clear criteria for wordhood in individual languages, but we have no clear-cut set of criteria that can be applied to the totality of the world's languages."

c. monoclausal pattern

Butt (2010: 57): "Whether a given structure is monoclausal or not can only be determined on the basis of language-dependent tests. That is to say, tests for monoclausality may vary across languages, depending on the internal structure and organisation of the language in question."

17 Of course, such a hypothesis could only be formulated after turning Class I and Class II into comparative concepts (or by assuming that they are innate categories of UG), just as the Latin-specific category Adjective has been turned into a comparative concept.

d. noun phrase versus prepositional phrase

Baker (2015: 13): "[To distinguish NPs and PPs, we should] hope that one can find some fine-grained syntactic properties which distinguish the two kinds … : a process of clefting, perhaps, or quantifier floating – the sorts of syntactic phenomena known to apply to NPs but not to PPs in some languages."

However, using different criteria (or "tests", "properties" or "diagnostics") for different languages makes sense only if we have good reason to think that the phenomenon exists as a universal category (or natural kind) in the first place. In generative linguistics, the presupposition that part of our grammatical knowledge is innate makes it at least a coherent enterprise to look for such universal categories but, if there are no good initial reasons to think that categories like "word" or "prepositional phrase" are universal (other than that they have been used in the grammatical tradition of the last few decades and centuries), it is not a promising enterprise. Croft (2009, 2010) has called this approach "methodological opportunism". Another term that I have used informally is "diagnostic-fishing".

It seems to me that diagnostic-fishing is one of the biggest obstacles to rigorous cross-linguistic comparison and to the sort of replicable and cumulative science of language structures that I mentioned at the beginning of this paper. It is for this reason that I regard the distinction between language-specific descriptive categories and rigorously defined comparative concepts as fundamental for the progress of typological linguistics.

8 Portable terms for category-like comparative concepts

Some category-like comparative concepts seem very similar to corresponding descriptive categories. For example, the Italian Future tense and the Swahili Future tense are similar to each other (in the sense that their language-particular descriptions would involve very similar basic notions) and one could say not only that they correspond to the comparative concept "future tense" of Dahl and Velupillai (2005) but even that "the Italian Future tense is a future tense", i.e., that there is a type-token relationship here or an instantiation relationship. And for languages which have two such categories, like English, one could say that "both the *will* Future and the *gonna* Future instantiate the future tense". Thus, for these

concepts, it is possible to see the comparative concepts as categories or classes. The comparative concept "future tense" would then be the class (or category) of all tense forms in different languages that fulfill the definition.

Terms for comparative concepts of this kind are called "portable" by Beck (2016) and there are quite a few of them, such as those in (6).

(6) personal pronoun, second person, demonstrative, polar question, accusative, instrumental, comitative, future tense, past tense, dual, plural, cardinal numeral, conditional clause, bilabial, velar, fricative, nasal stop

I do not agree with Beck (2016: 395) that these are language-particular terms which "are comparative concepts"[18] but, clearly, these terms are widely used for category-like comparative concepts which do not differ greatly in their definition from the corresponding descriptive categories. In many or most circumstances, it does not matter much for these concepts whether they are defined substantively like comparative concepts or distributionally like language-particular categories. It seems that those linguists who deny or ignore the importance of the distinction between comparative concepts and descriptive categories mostly have this subset of comparative concepts in mind.

However, even here, it is often necessary to distinguish between descriptive categories and comparative concepts when one considers the phenomena in greater detail. For example, the German polite pronoun *Sie* 'you' is semantically a second person pronoun but, within the grammar of German, it is a Third Person form that triggers Third Person indexing on the verb, (e.g., *-en* in *Sie kommen* 'you are coming'). The English polite question *would you please open the door?* is a Polar Question within in the grammar of English (as can be seen from its word order and intonation pattern) but, functionally, as a speech act, it is not a question but a request. The Finnish Present tense is normally used in future contexts where English requires a special future tense form (Dahl and Velupillai 2005) but it would still be strange to say that "the Finnish Present tense instantiates the future tense".[19]

18 But perhaps Beck (2016) means this statement as a description of the historical process, in which case I agree. Clearly, these terms originated as descriptions of language-particular categories which were transferred to other similar languages without much confusion arising (as noted in Section 2). The resulting comparative concepts are different (see below) but the difference is not striking and may not be noticed much in practice.

19 Lehmann (2016: §2.1) says that grammatical category concepts can be multiple hyponyms of other grammatical category concepts but it seems that this is possible only when these are on

How does one distinguish between portable and non-portable category labels? I do not know any simple answer to this question. Most grammatical category terms from the Greco-Latin tradition have been used for other languages but not all of them have given rise to general concepts that can be defined in the same way (using substantive concepts) for all languages. Some concepts that do not seem to work for all languages are listed in (7).

(7) a. aorist, supine, gerund, middle voice, ablative absolute
b. word, clitic, adposition, compound, incorporation, morphology
c. inflection, derivation
d. finite, converb

The terms in (7a) belong to the more exotic aspects of the classical languages and only "middle voice" has been used in a typological context, as far as I am aware (but while Kemmer [1993] cites many similarities in different languages, she does not provide a definition of middle voice with clear boundaries). The unsolved problems with "word" and "clitic" as comparative concepts are discussed in Haspelmath (2011b, 2015) and they carry over to other concepts defined in terms of "word", such as adposition, compound and morphology. Sharp boundaries between inflection and derivation are often assumed (e.g., when gender is defined in terms of a lexeme concept, which is itself defined in terms of the inflection concept) but they do not seem to be definable in a cross-linguistically applicable way (cf. Plank 1994). Finally, finiteness is not a useful concept cross-linguistically, because it combines both person marking and tense marking, which need not be absent or present together (cf. Cristofaro 2007).[20]

different levels (as with his example of adverbial clauses, which instantiate both "subordinate clause" and "adverbial modifier"). It hardly seems felicitous to say that the Finnish Present tense is both a present tense and a future tense or that the Turkish Dative case is both a dative case and an allative case. For this reason, I have used the verbs "correspond to" and "match" for the relation between descriptive categories and comparative concepts rather than "be" or "instantiate".

20 The term "converb" is defined in terms of the finiteness concept in Haspelmath (1995) and thus inherits its unsolved problems (see also van der Auwera 1998b on the definition of "converb").

9 Commensurable description of different languages

Moravcsik (2016: 421) asks whether descriptive categories are different for all languages, even closely related languages such as French and Italian. And what about dialects or historical stages of a language? "Are relative clauses of Standard Modern English categorically different from those of the African-American Vernacular and also from those of Middle English?" (Moravcsik 2016: 421). And Dahl (2016: 430) asks a similar question: "If we accept that a category varies within one language, why can't it do so across languages?"

The answer is that it depends on how we view and describe these languages, as different systems or as variants of a single system. Especially for closely related languages, describing them as variants of a single system makes good sense for practical purposes. This is what Gil (2016) calls the "unitary commensurable mode" of description. Adopting this mode means that the same categories are used and variation is described in an ad hoc way. Thus, for example, we could describe German and Modern English relativizers in the same way, as Relative Pronouns, regardless of their synchronic status within the system. We would then say that Modern English *that* is a relative pronoun (cf. van der Auwera 1985), like the German relative pronouns, and that it just happens to be case-invariant and identical to the complementizer *that*.[21]

One could extend the unitary commensurable mode to languages even further away and this is, of course, what has traditionally been done, for instance, when linguists have said that the accusative in Swahili is expressed by word order or the vocative in English is identical to the nominative. Such descriptions are now universally thought to be cumbersome and ethnocentric and linguists agree that they do not do justice to the languages whose structure is not Latin-like. But such judgements are always somewhat subjective and I do not know how to achieve greater objectiveness in language description. As I noted in Section 4.1, description must primarily be comprehensive and it must include categories

21 Another situation where two categories may be known by the same label is when they are cognate but not particularly similar anymore. For example, the Modern German Subjunctive mood has almost no functional overlap with the English Subjunctive (as in *I insist that he come*) but both are known by this name because they derive from the same Proto-Germanic form. The term "subjunctive" is not used as a comparative concept here but as a label for a cognate set, like "the **tūn* word", a possible label for the cognate set comprising both English *town* and German *Zaun* 'fence', which derive from Proto-Germanic **tūn*. Cognate sets are united by common origin, not by any common features.

which strike a balance between elegance and comprehensibility. Uncontroversially, using the same categories for all languages leads to hopelessly inelegant descriptions,[22] so the issue of incommensurability arises whenever different language-specific categories are set up by researchers. Since the well-known European languages English, Spanish, French, German and so on are very similar in their structure, incommensurability does not raise its head very often and many linguists blissfully ignore it.

But when it does arise, as with the question whether Serbo-Croatian adnominal demonstratives are adjectives or determiners (cf. Bošković 2009), one needs to be aware that terms like "adjective" and "determiner" are either defined language-internally (in which case Bošković's question is a terminological question) or as comparative concepts (in which case Serbo-Croatian adnominal demonstratives would normally be treated as determiners, not as adjectives, because the latter are defined semantically, with respect to properties such as age, dimension, value and color).

10 Universal claims pertain not to language structures, but to language phenomena

Dahl (2016: 432) notes that "generalizations presuppose the possibility of making statements about individual cases". Thus, corresponding to the universal in (8a), there must be a true language-particular statement as in (8b) and similar statements for all languages that have question-word movement.

(8) a. Question-word movement is always to the left. (Haspelmath 2010: 671)
b. In Swedish, question-word movement is to the left.

Dahl (2016: 432) correctly observes that "if typological generalizations do not involve language-specific categories, these statements should also be free from such categories". This may sound paradoxical, because (8b) would seem to be a statement about Swedish grammar and the rules of Swedish grammar are supposed to be stated in terms of language-particular descriptive categories.

22 More precisely, this is uncontroversial outside of generative linguistics. In generative linguistics, not even the goal of comprehensive description (Section 4.1) seems to be shared, let alone the goal of readily comprehensible description.

The paradox is resolved by noting that (8b) is a correct factual statement about the Swedish language but is not a rule of the Swedish language. The corresponding Swedish rule says that Question Words are moved to the Prefield Position (i.e., the position preceding the Finite Verb) and this rule is, of course, formulated in structural terms that presuppose other descriptive categories of Swedish.[23] The relationship between the Swedish rule and the factual statement in (8b) is that the rule makes it straightforwardly clear that the factual statement is true, i.e., there is a matching or correspondence relationship (but, of course, not an instantiation relationship).

Very similarly, the universal in (9a) entails a statement such as (9b).

(9) a. In almost all languages, the subject normally precedes the object when both are nominals. (Greenberg 1963, Universal 1)

b. In Mandarin Chinese, the subject normally precedes the object.

LaPolla (2016: §2) objects to the claim that Chinese is an SVO language – which is a more specific claim than (9b) but otherwise very similar – because he has shown in earlier work that Chinese does not have any subject or object category. LaPolla (2016: 370) thinks that "labeling [Chinese as an SVO language] implies that these categories either determine word order or are determined by it" (cf. LaPolla and Poa 2006). But again, this is not so. (9b) is a correct factual statement about Mandarin Chinese (assuming that "subject" means S/A, and "object" means P) and it is not a rule of Mandarin grammar.[24] LaPolla (2016: 370) may be right that "most people who see a description of Chinese as SVO will in fact assume that the label was given to the language because those categories are significant for determining word order in the language". But if they do, they have not understood the difference between describing a language and classifying a language from a comparative perspective. These two are different enterprises – not completely unrelated, because both are based on the phenomena of the language, but also not identical.

23 A generativist might try to formulate both the universal in (8b) and the Swedish rule in terms of a cross-linguistic category (a natural kind, part of innate linguistic knowledge) such as "specifier of C position". Such a view has indeed been popular (and may still be held by many) but there are very few cross-linguistic phenomena that support it. In the great majority of cases, question words are simply fronted, without any evidence for a C position (cf. Dryer 2005).

24 Confusingly, LaPolla (2016) uses the expression "the facts of the language" in the sense in which I use "rules of the language" (this strange terminology may be motivated by his rejection of structuralism and the competence/performance distinction).

The notion of "factual statement" may be a bit surprising to some readers, because it seems not to have played an important role in typology so far. But I would argue that, implicitly, it has long been there. As part of their grammar-mining activities, typologists have generally considered the entire description of a language, not merely the part where the author describes a particular category. In many cases, considering the frequency of occurrence of a particular form or function is part of this. For example, Dobrushina, van der Auwera and Goussev (2005) say that they regard an inflectional form with subjunctive functions as an optative if "the expression of the wish is the main function", which is presumably decided by frequency of use. Similarly, Dryer (2005) distinguishes between dominant order and lack of dominant order on the basis of frequency of use.

Thus, what we compare across languages is not the grammars (which are incommensurable) but the languages at the level at which we encounter them, namely in the way speakers use them. This is true not only for word order but also for cross-linguistic variation in semantic categorization. Studies based on etic comparative concepts such as translation questionnaires, visual stimuli and parallel texts lead to groupings of comparative concepts into larger clusters and to semantic maps as seen in Figure 1. These etic concepts typically reflect uses to which the categories can be put, not different meanings, and they would not play a role in their semantic description.

This is again similar to what is practiced in related disciplines: When anthropologists compare kinship terms, when political scientists compare political systems and when economists compare economic activities, they must make reference to what happens on the ground rather than to the incommensurable categories of the diverse cultures.[25] For linguistics, the relative independence of typology from description was already noted in Haspelmath (2004).

11 Conclusion

I conclude that there is a fundamental distinction between language-particular categories of languages (which descriptive linguists must describe by descriptive categories of their descriptions) and comparative concepts (which comparative

25 These disciplines can make mistakes as well, of course. For example, comparative economists can make the mistake of equating economic activities with legally recorded activities expressed in money values, ignoring subsistence and "shadow" economies of various sorts. Such a failure may lead to a very distorted view of economic patterns.

linguists may use to compare languages). Language-particular categories are defined system-internally, by other language-particular categories, but comparative concepts are defined substantively, by other comparative concepts. The distinction between system-internal categories and comparative concepts is found in the same way in other disciplines dealing with social and cultural systems and has been well-known in anthropology by the labels "emic" (for system-internal categories) and "etic" (for comparative concepts). I have also compared linguistic categories with natural kinds, as familiar from biology and chemistry, and I have argued that they are not natural kinds, because they do not recur across languages with identical properties. Thus, it is not licit to use different criteria or symptoms for the identification of the same categories across languages.

The widespread confusion between language-particular categories and category-like comparative concepts seems to derive from the fact that, for a significant part of the categories ("portable categories"), a characterization in substantive terms gets us fairly far (e.g., characterizing nouns in terms of things, persons and places). As a result, carrying over terms from one language to another language based on substantive similarities is often possible, sometimes without any serious difficulties. But it is universally recognized that, ultimately, linguistic categories must be defined in structural terms (with respect to other constructions of the language), so the distinction does not disappear.

Finally, I noted that, on the present view of comparative linguistics, what we compare is not language systems (which are incommensurable) but "the phenomena of languages".

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Dmitry Idiatov

An areal typology of clause-final negation in Africa

Language dynamics in space and time

Abstract: Clause-final negation markers (CFNMs), although typologically rare, can be found in a very wide range of languages of Northern Sub-Saharan Africa. Based on a sample of 618 African languages, this paper provides an analysis of spatio-temporal language dynamics in Sub-Saharan Africa with respect to the feature CFNM. I argue that it is important to consider together both the languages that have the feature under investigation and the languages that do not have it. Furthermore, in order to better capture the diversity of the languages that have CFNMs, I increase the degree of granularity of my data by taking into account two parameters, viz., obligatoriness of CFNMs and possible restrictions on the freedom to use CFNMs in different constructions. For spatial analysis and visualization, I use the methods of spatial interpolation and generalized additive modeling. Both methods converge on the need to distinguish two focal areas of the feature CFNM. The first one, the Central Focal Area, is the most prominent of the two and spans the east of West Africa and parts of Central Africa. The second one, the Western Focal Area, is less prominent and is restricted to West Africa. The two focal areas are separated by a major discontinuity around Ghana, Togo and Benin. In order to better calibrate the results of the spatial analysis and to identify the historical core of the Central Focal Area, I call onto other types of data available. Finally, I address the distribution of optional and/or restricted CFNMs in Africa, with a particular focus on the spread of CFNMs among Bantu languages to the south of the Central Focal Area, primarily in the Congo River corridor and the north of the Democratic Republic of Congo.

Keywords: African languages, areal typology, clause-final negation, historical linguistics, language contact, morphology, spatial analysis, syntax

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1 Introduction

In recent years, a number of studies, such as Beyer (2009), Dryer (2009) and Devos and van der Auwera (2013), have drawn attention to some typologically striking properties of negation marking in languages of different parts of Africa. Dryer (2009) focuses on "neutral negation", i.e., obligatory and productive (general) negation marking patterns in declarative verbal main clauses expressed by negation markers that are words, in languages with SVO order in Africa. He demonstrates that SVO languages in "an area in central Africa [stretching] from Nigeria across to the Central African Republic and down into the northern Democratic Republic of Congo", as illustrated in Figure 1,[1] significantly differ from SVO languages elsewhere in the world in that "the negative [word] follows the verb [instead of preceding it], typically occurring at the end of the clause, in SVONeg order" (Dryer 2009: 307). Dryer (2009) also points out that double negation marking is widespread in this region.

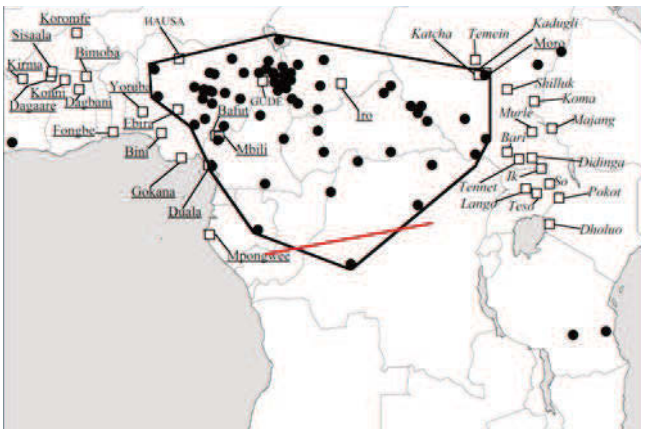


Fig. 1: VO&VNeg languages in Africa, with their core area delineated (Dryer 2009: 323)

Beyer (2009), in the same volume on negation patterns in West African languages (Cyffer, Ebermann and Ziegelmeyer 2009) as Dryer (2009), focuses specifically on

1 The (red) line cutting off the southern-most point on the map has been added by me, as it must be a mistake. This point is labeled as Ngbaka (Ubangian) on other maps in Dryer (2009) but it has to be some Bantu language. Yet, no Bantu language from this area is mentioned in the paper.

double negation marking for "sentential negation" in a large group of West African languages centered on the Volta River basin, as illustrated in Figure 2. In most cases, the second of the two negation markers also happens to be clause-final.

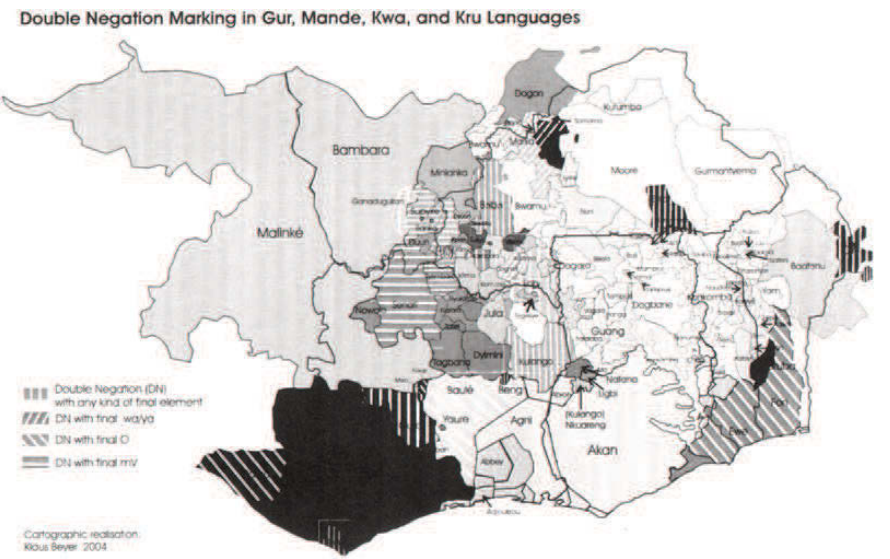


Fig. 2: Double negation marking in West African languages centered on the Volta River basin (Beyer 2009: 222)

Devos and van der Auwera (2013) is an in-depth study of multiple negation exponence in Bantu languages, a large group of languages spoken in a vast area from Cameroon and Kenia in the north all the way down to the South African Republic. They survey cases of multiple negation in Bantu languages, which is usually double but some exuberant examples of triple and quadruple negation marking are also attested. They also investigate recurrent sources for post-verbal negation markers. Many of these post-verbal negation markers happen to be also clause-final, as illustrated in Figure 3.[2]

2 In the Bantuist tradition, the term "post-final" used in Figure 3 refers to the position immediately following the verb.

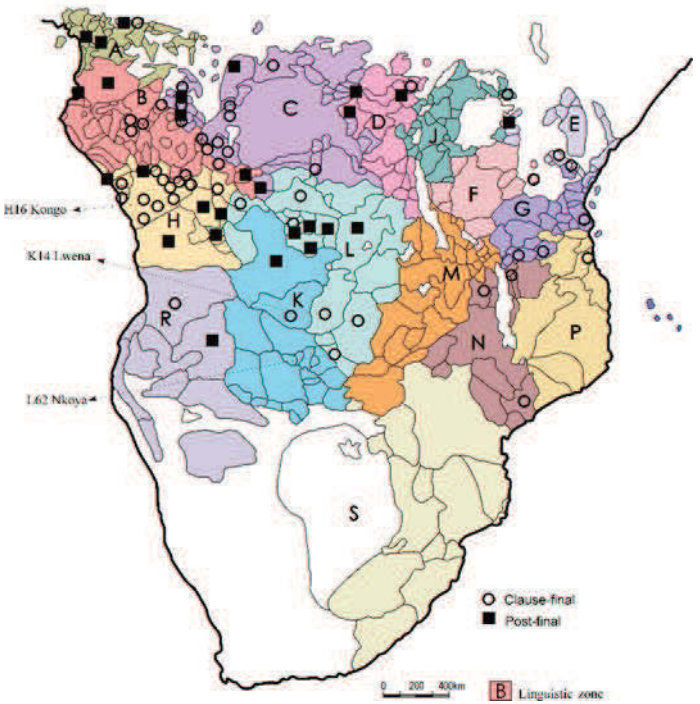


Fig. 3: Bantu double negation (Devos and van der Auwera 2013: 215)

As these studies make clear, clause-final negation markers (CFNMs), although typologically rare, can be found in a very wide range of languages of Sub-Saharan Africa. Based on a sample of 618 African languages, I demonstrate in this paper that the spatial distribution of languages with CFNMs forms a clear areal pattern within Sub-Saharan Africa. At the same time, the spatial distribution of 462 languages with post-verbal negation markers of any kind does not form any distinctive areal pattern, as it is virtually identical to the spatial distribution of all the languages of the sample as a whole. The two distributions overlaid with their spatial intensity plots are shown in Figure 4 and Figure 5 respectively.[3] I am not able to plot the spatial distribution of multiple negation exponence on the scale of the

3 All the plots and calculations for this paper have been produced with the software *R* (R Core Team 2015). The plots of spatial intensity and spatial interpolation have been produced with the package spatstat (Baddeley and Turner 2005).

continent at this point but I expect it to have a much less pronounced spatial structure than that of CFNMs.

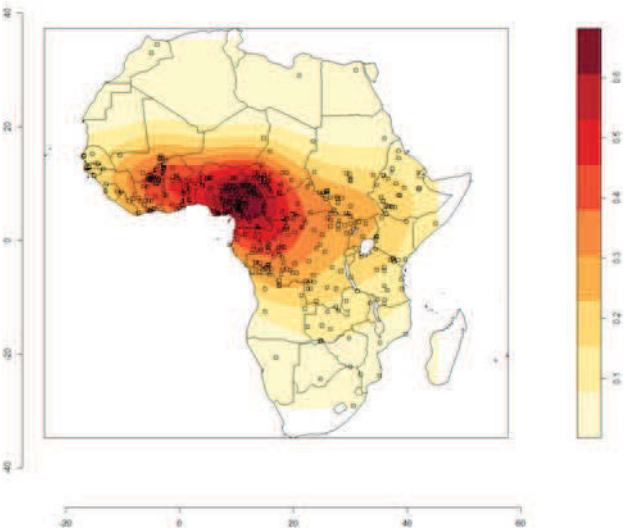


Fig. 4: Geographic distribution of the 462 languages of the sample with post-verbal negation markers and a plot of their spatial intensity

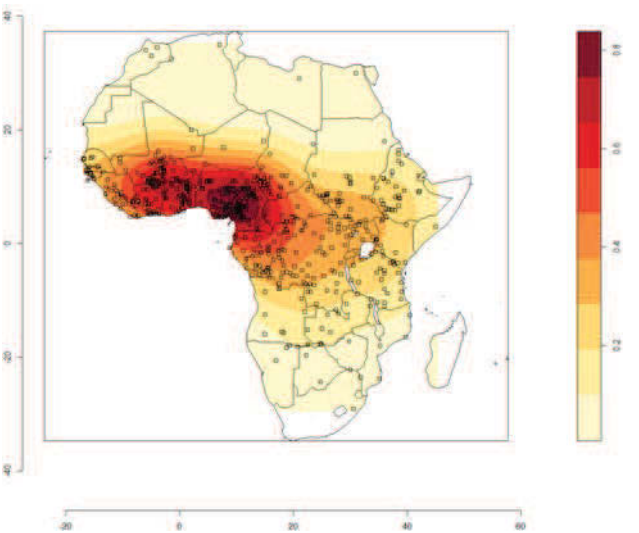


Fig. 5: Geographic distribution of the 618 sample languages and a plot of their spatial intensity

Beside forming a clear areal pattern within Sub-Saharan Africa, on a worldwide scale CFNMs are also typologically much more unusual than post-verbal negation markers and multiple negation exponence. Furthermore, as I argued elsewhere (Idiatov 2012a), CFNMs in Sub-Saharan Africa tend to be characterized by a number of peculiarities in their morphosyntax and diachronic development that set them apart from similar markers elsewhere in the world and offer important clues as to an explanation of their observed areal distribution. Of course, some of these differences are more a matter of degree, yet some do seem to be more fundamental. For instance, CFNMs in African languages are often associated with the presence of multiple negation exponence within a clause, most commonly double but sometimes also triple and occasionally quadruple. CFNMs in Africa often happen to be morphosyntactically deficient as compared to more canonical grammatical markers in being optional or lacking in some types of clauses as conditioned by the TAM value of the predicate of the clause, the subordination status of the clause, the associated information structural and speech act type values or the discourse type that the clause belongs to (cf. Idiatov 2015). Diachronically, CFNMs in the area tend to be rather unstable and appear to be relatively easily borrowable (cf. Idiatov 2012b; 2015), unlike negators in other parts of the world but more like discourse markers, focus particles and phasal adverbs (cf. Matras 2009).

All this makes CFNMs in Sub-Saharan Africa a particularly interesting morphosyntactic feature to explore from the perspective of language dynamics in space and time. This paper provides such a spatio-temporal analysis of the feature CFNM in African languages. For reasons of space, I do not elaborate in the rest of paper on the explanation of why many negation markers are clause-final in Sub-Saharan Africa and why such negation markers are so common in particularly this region. I treat these issues in more detail elsewhere (Idiatov 2012a; in prep.). So here is just the gist of the explanation, which goes as follows. The clause-final position of the negation markers is explained by their origin in other clause-final markers. The fact that CFNMs are so common in this region is related to another typological feature of many of the relevant languages, viz., a grammatical category of clause-final markers whose core function is the expression of intersubjective meanings. Combined with the fact that negation is exactly one of those situations, propitious for the use of intersubjective markers, where the speaker's assertive authority is at stake, frequency effects account naturally for the tendency to conventionalize clause-final negation markers.

The paper is organized as follows. I begin by discussing in Section 22 various aspects of the definition of CFNMs adopted for this typology. This definition is rather inclusive because, as I explain in Section 2.1, my goal is to capture the most

of the synchronic diversity to achieve a better explanatory adequacy. However, for the reasons explained in Section 2.2, I leave negation constructions with nominal predicates out. Since I consider both obligatory and optional CFNMs, in Section 2.3, I address some of the issues that the distinction between the two may present. In Section 2.4, I elaborate on the meaning of the term "clause-final" within this typology. Related to the latter point is the issue of relevance of the relative order of object and verb for a typology of CFNMs. As I explain in Section 2.5, this order is not relevant in the typology presented here, unlike for example in the typology of post-verbal negation markers by Dryer (2009), which is confined to languages with VO order. I briefly present my sample in Section 3. I also provide maps of the 618 languages of the sample as a whole and of the languages with and without CFNMs. The simple binary division into languages that have and languages that do not have CFNMs hides important diversity among the languages with CFNMs. As I discuss in Section 4, in order to better capture this diversity and thus get a better idea of the possible historical and spatial dynamics behind the observed pattern, I increase the degree of granularity of my data by taking into account two parameters, viz., obligatoriness of CFNMs and possible restrictions on the freedom to use CFNMs in different constructions. Section 5 provides a discussion of the spatial and temporal dynamics reflected in the observed areal typological patterns of CFNMs in Africa. I first discuss in Section 5.1 the results and potential pitfalls of two methods of spatial analysis and visualization of the distribution of the values of the feature CFNM in Africa, viz., spatial interpolation and generalized additive modeling (GAM). Both methods converge on the need to distinguish two focal areas of the feature CFNM. The first one, the Central Focal Area (CFA), is the most prominent of the two and spans the east of West Africa and parts of Central Africa, largely coinciding with Dryer's (2009) core area of VO&VNeg languages reproduced in Figure 1. The second one, the Western Focal Area (WFA), is less prominent and is restricted to West Africa. The two focal areas are separated by a major discontinuity around Ghana, Togo and Benin. In Section 5.2, I call onto other types of data to better calibrate the results of the spatial analysis produced in Section 5.1 and to identify the historical core of the CFA. Finally, Section 5.3 addresses the distribution of optional and/or restricted CFNMs in Africa, with a particular focus on the spread of CFNMs among Bantu languages to the south of the CFA, primarily in the Congo River corridor and the north of the Democratic Republic of Congo.

2 What kind of CFNMs are we looking at?

2.1 An inclusive definition: synchronic diversity as a window on language change

Morphosyntactic properties of negation constructions differ across languages. Similarly, the marking of negation may vary within a given language from one predicative construction to another. There are many different parameters along which the variation occurs. Depending on our goals and means, we can cut up this variation space in different ways. The definition that I adopt here is rather inclusive since my goal is to capture the most of the diversity. The rationale behind this is that synchronic diversity directly reflects the gradual nature of language change and thus offers us a window on the historical processes that brought about the current situation. Thus, one of the most common mechanisms known to be involved in the evolution of negation constructions, the so-called Jespersen cycle (cf. van der Auwera 2009, 2010 for a general overview; Devos and van der Auwera 2013 on Bantu languages), proceeds through a number of stages with most intermediate stages characterized by variation in the marking of negation within a given construction. Typically, related languages do not proceed on this path in exactly the same manner. Both the synchronic variation within one language and the synchronic diversity of negation patterns within a group of related languages offer an invaluable source of information on the earlier stages of the respective languages and on the processes underlying the change in negation constructions.

For the purposes of the present study, I consider as CFNMs the elements that may be used in the right periphery of negative verbal predications with clause scope negation but that do not appear in the corresponding positive predications and whose position is determined with respect to the clause as a whole. A CFNM may be the sole marker of negation in the clause or just one of the exponents of negation marking distributed within the clause. That is, my typology is not confined to double negation-marking, like the typology of Beyer (2009). A CFNM may be a dedicated negation marker or may also encode other meanings, such as tense, aspect, mood and emphasis (in this respect, see also Section 2.3). For the purposes of my typology, the degree of morphological bounding of CFNMs is not relevant either. That is, they may be words (similarly to the negation markers in Dryer's 2009 typology), clitics, (supra)segmental affixes or non-linear morphological operations. Similarly, my typology takes into consideration negation of all types of verbal clauses and is not restricted to the negation of declarative verbal main clauses, such as the "standard negation" typology of Miestamo (2008) or

the "neutral clausal negatives" typology of Dryer (2009). Negation of nominal predicates is beyond the scope of my typology for the reasons laid out in Section 2.2. As discussed in Section 2.3, I consider both obligatory and optional CFNMs. The meaning of the description "clause-final" in CFNM is explained in more detail in Section 2.4. Section 2.5 further elaborates on the clause finality of negation markers from the perspective of different relative orders of object and verb.

2.2 Beyond the scope of the typology: negation of nominal predicates

I am not concerned here with negation constructions with nominal predicates. The reason is not that I do not deem them relevant. Clearly, it is important to equally take into account negation strategies used with nominal predicates if one wants to achieve a comprehensive diachronic account of clausal negation constructions with verbal predicates. Thus, as pointed out by Croft (1991), negative existential markers may come to be extended to negative verbal predications within the so-called "negative-existential cycle". However, from the perspective of an areal typology of CFNMs, negation constructions with nominal predicates tend to present rather different types of analytic problems. For instance, in the case of negative existential constructions (as distinguished from locative-presentative ones; cf. Veselinova 2013) that use a dedicated negation marker without any distinct existential marker, the question of whether the position of this marker is determined with respect to the clause as a whole or the nominal predicate may be simply irrelevant. For equational and identification constructions, it may not always be obvious which nominal should be considered the predicate (cf. Bisang and Sonaiya 2000 on Yoruba constructions of the structure X 'BE' Y, where X and Y are nominals). In view of these complications, another reason why I decided not to include negation of nominal predicates in the areal typology of CFNMs here is that it is my strong impression that their inclusion would not affect significantly the areal pattern established solely on the basis of constructions with verbal predicates. Thus, I found only a few languages described with CFNMs only in negation constructions with nominal predicates but not in the ones with verbal predicates, such as Ngangela [nba] (Bantu K12; Maniacky 2003), which has an optional CFNM *ko* only with nominal predicates as illustrated in (1) versus (2), and Beiya [kmy] (Adamawa, Samba Duru; Littig and Kleinewillinghöfer 2012), which has a CFNM *ʔwá* only with nominal predicates as illustrated in (3) versus (4) (for both languages, the sources provide only examples of identificational constructions). Although I do not consider these languages as having CFNM for the purposes of the typology presented here, their addition would not disrupt the

general areal pattern established on the basis of negation constructions with verbal predicates only.

(1) Ngangela[4]

a. Kací	*impweevó*	ko
NEG.COP	woman	NEG
b. Kaci	*ímpweevo*	
NEG.COP	woman	
c. kéci-ko	*ímpweevo*	
NEG.COP-NEG	woman	

'It is not a woman.'
(Maniacky 2003: 192)

(2) ko-*tw-a-mween*-e *ðiŋgóómbe*
NEG-1PL-PRF-see.PRF-NEG cows
'We have not seen the cows.'
(Maniacky 2003: 140)

(3) Beiya
yɔ́ɔ́ *yēn* *kúsén* ʔwə
COP thing bush NEG
'It is not a wild animal.'
(Littig and Kleinewillinghöfer 2012: 6)

(4) *Miǹ* *túúrə́* *Fə̀lé*
1SG come\NEG PROP
'I do not come to Poli.'
(Littig and Kleinewillinghöfer 2012: 6)

4 The following abbreviations will be used here: 1,2,3 first, second and third person; COP copula; DAT dative; DEF definite; DEM demonstrative; EMPH emphatic; FUT future; INDF indefinite; IPFV imperfective; LOG logophoric; NEG negation; NONHUM non-human; OBJ object; PFV perfective; PL plural; POSS possessive; PQ polar question; PRF perfect; PROG progressive; PROP proper name; PST past; QUO quotative; REFL reflexive; REL relative; SBJ subject; SBJV subjunctive; SG singular; STAT stative.

2.3 The issue of optionality

I consider both obligatory and optional CFNMs. Obligatory CFNMs may be obligatory throughout negation constructions or be confined to a subset of those. Optional elements of negation constructions are taken into consideration in so far as their addition does not change the propositional meaning of the negative predication or the constraints on their use are conditioned primarily by structural properties of their environment rather than their meaning (cf. Idiatov 2015 on the CFNM *wāā* in the Mande language Dzuun [dnn]). Admittedly, it is not always possible to make a clear-cut distinction along these lines precisely because language change is gradual. One of the frequent cases like this is represented by elements that are said to be optionally added to "emphasize" negation and are sometimes provided with translations such as 'at all'. As a rule of thumb, I presume that if the author of a grammatical description deems it necessary to state that a negation construction may contain a given optional element, this element is frequent enough in this construction for its original referential meaning to be sufficiently backgrounded.

A different type of situation that is often conceived as involving optionality is when a default negation marker can be replaced by a negation marker that does change the propositional meaning of the negative predication and, for that reason, neither marker can be said to be obligatory as such, yet the presence of at least some such marker in the construction is required for the construction to be negative. In other words, it is the particular way of expressing negation within a negation construction that is obligatory but not the specific negation markers. French provides a good example of such a situation as a consequence of an ongoing Jespersen cycle type evolution and loss of negative concord (cf. van der Auwera and Van Alsenoy 2016). In colloquial French, the older preverbal negation marker *ne* is usually omitted and only the newer negation marker *pas* is used immediately following the verb, as in(5). The default negation marker *pas* can be replaced by a number of more specific markers, such as *jamais* '(n)ever', as in (6), or *nulle part* 'nowhere', as in (7), and, although the latter elements do change the propositional meaning of the predication, at least some such element must be used in this constructional slot for the predication to remain negative. The alternative English translations of (6) and (7) using *never* and *nowhere* respectively are closer to the French original and have similar origins as well (cf. Ingham 2013).

(5) French
Elle (ne) *va* pas.
She NEG goes NEG
'She doesn't go.'

(6) *Elle* (ne) *va* jamais.
She NEG goes never
'She doesn't ever go.' or 'She never goes.'

(7) *Elle* (ne) *va* *nulle part*
She NEG goes nowhere
'She doesn't go anywhere.' or 'She goes nowhere.'

A somewhat more complicated example is provided by the Mande language Dzuun [dnn], as discussed by Idiatov (2015). Thus, Dzuun has a default CFNM *wāā*, as in (8), which may be omitted under certain conditions. In addition, Dzuun has a number of CFNMs that are semantically narrower than the default CFNM *wāā*, such as *dɛ̄* 'anymore, no more' and *kūrāā* '(n)ever; (not) at all'. These specific CFNMs usually stand alone, as in (9), replacing *wāā* just like *jamais* or *nulle part* replace *pas* in the French examples (6) and (7). However, occasionally, they can also be followed by *wāā*, as in (10), or they can co-occur with each other when the negative meaning needs to be further specified, as in (11). Finally, some of the forms that function as specific CFNM markers can also occur in positive constructions, as illustrated with *dɛ̄* in (12), where it functions as an emphatic marker. In this respect, consider French *jamais*, which can also be used in positive constructions, such as *si jamais* 'if ever' and *pour jamais* 'forever'.

(8) Dzuun
À náà *wù* *è* *tsí* wāā
3SG NEG.PST good 3SG.SBJV save NEG
'It was not good that he be saved.'
(Solomiac 2007: 270)

(9) *Wó* *dɔ̀n* *náà,* *wó* nā *bómà* *jàá* dɛ̄
2SG enter come.IPFV 2SG NEG exit see.IPFV anymore
'You enter, but you do not find the exit anymore.'
(Solomiac 2007: 254)

(10) *Tà* *bwèy,* *bɔ́ɔ́* *rèè* náà *n'á* *rē* *yè* *ē*
DEM moment Elder PL NEG.PST COP-3SG at 3PL.SBJV REFL
sɛ́rɛ́ kúráá wāā
pray at.all NEG
'At that time, the elders did not want to pray at all.'
(Solomiac 2007: 256, 578)

(11) *À* náà *fyā* *fyɛ̄* dɛ̄ kūrāā
3SG NEG.PST fabric white anymore at.all
'[When the chicken wanted to come with the white fabric,] it was not a white fabric anymore.'
(Solomiac 2007: 539)

(12) *À* *cī,* *á!* *cī* *mún* *dzūnwɛ̄ínsíá* *mún* *sàn* *fìrìū* dɛ̄
3SG QUO ah! QUO 1SG friend.DEF 1SG foot cheat.PFV EMPH
'He said: "Ah! My friend has really cheated me."'
(Solomiac 2007: 483)

As illustrated on the example of Dzuun, a marker need not be a dedicated negation marker (be intrinsically negative in its meaning) to be considered a CFNM.

2.4 The meaning of being clause-final

The description "clause-final" in CFNM refers to the canonical position of the negation marker on the extreme right periphery of a clause. A given negation marker need not be in the absolute clause-final position in every possible construction to count as a CFNM. What is relevant is that, in the clause where the verbal predicate is accompanied by two or more simple nominal arguments and one simple adjunct modifying the predicate, such as a simple place or time adverbial, the position of the negation marker is determined with respect to the clause as a whole and not with respect to the verbal predicate, its nominal arguments or its modifier. In a given language, the position of the CFNM with respect to other right periphery markers and verbal predicate modifiers may be fixed or depend on a range of factors, such as their scope, meaning, morphosyntactic structure and length. Again, as in the discussion of optionality of CFNMs, a clear-cut distinction along these lines may not be always possible because change is gradual (although, more often, the difficulty is caused by the lack of relevant examples in the sources).

A good example of possible complexities involved in the syntax of CFNMs is provided by three Eastern Mande languages of the Boko-Busa cluster, Boko [bqc], Busa [bqp] and Bokobaru [bus], whose CFNMs have the form *=o* (Boko) and *=ro* (Busa and Bokobaru). Like all Mande languages, the languages of the Boko-Busa

cluster have a strict SOVX constituent order in transitive constructions[5] and SVX in intransitive constructions, where X stands for "oblique", which is any constituent (an argument or an adjunct) other than S and O (cf. Creissels 2005). The canonical position of the negation marker *=(r)o* is clause-final, as illustrated in (13). However, other right periphery elements with clausal scope, such as the polar question marker *=à*, follow the CFNM *=(r)o*, as illustrated in (14). Furthermore, "sentence level adverbial phrases and clauses may follow the negative marker" (Jones 1998: 299), as illustrated in (15), which can be compared to (14). The tendency for adverbials to follow the negation marker *=(r)o* is more general in Busa and Bokobaru while, in Boko, it is especially longer adverbials that are affected. Finally, the negation marker *=(r)o* can be followed by the second coordinate in the alternative coordination construction, as in (16). This may be analyzed as a result of ellipsis, as is done by Jones (1998: 298). Alternatively, it may be seen as extraposition of a constituent to the right periphery because heavy constituents, such as the ones involving coordination, are dispreferred in argument positions (subject, object, postpositional phrase). This would not actually be uncommon in Mande and it would also parallel the tendency to place longer adverbials after the CFNM *=(r)o*.

(13) Boko

'í	ī	*gbɛ́̃*	*pī-ɔ*	*kã*	*lá*	*álɛ́*
fluid	NEG.PFV	person	that-PL	intoxicate	as	2PL.PROG
'e	*wà*=o					
see	like=NEG					

'Drink has not intoxicated those people as you are thinking.'
(Jones 1998: 301)

(14)

'àsí	*álɛ́*	*ma*	*nàáí*	*kɛ*	*'e*	*tìa*=o=*à?*
so	2PL.PROG	1SG.POSS	trust	make	until	now=NEG=PQ

'So you are still not trusting me?' (lit. 'So you are not making my trust until now.')
(Jones 1998: 299)

5 Unlike most other Mande languages, the languages of the Boko-Busa cluster also allow null objects with anaphoric reading but only when the referent is non-human and only in non-perfective constructions, as well as perfective constructions with nominal subjects or a third person plural pronominal subject (Jones 1998: 212–213).

(15) *aa* *mɛ̀* *wa* *ʼĩ* *mi*=o *ʼe* *gɔɔ* *pɔ́*
3PL.PFV say.PFV 3PL.LOG.FUT water drink=NEG until time REL
wà *aà* *dɛ̀*
3.INDF.PFV 3SG.OBJ kill.PFV
'They said they would not drink until the time when he was killed.'
(Jones 1998: 299)

(16) *má* *ʼésé* *vĩ*=o *ge* *màsé*
1SG.STAT sorghum have=NEG or maize
'I don't have any sorghum or maize.'
(Jones 1998: 299)

The canonical position of the negation marker *=(r)o* in Boko-Busa is clause-final and this is how it is classified within this typology. At the same time, the observed synchronic variation in its placement is indicative of an ongoing diachronic process of the negation marker being attracted to the immediately post-verbal slot.[6]

2.5 CFNMs and the relative order of object and verb

Unlike in the typology of post-verbal negation markers by Dryer (2009), which is confined to languages with VO order, the relative order of object and verb is not relevant in the typology of CFNMs presented here. The object can either precede the verb as in the Dzuun and Boko-Busa examples above or follow it, as in the Gbaya Kara [gya] (Gbaya-Manza-Ngbaka) example in (17).

6 The attraction of the negation marker in Boko-Busa from its original clause-final slot toward the immediately post-verbal one is likely to have been triggered by substrate influence of Baatonum, a Gur language spoken immediately to the southwest of Boko-Busa. In Baatonum, negation markers are mostly preverbal, except in the negative perfective construction, where the preverbal negation marker is complemented by a verbal suffix (Winkelmann and Miehe 2009: 181–182). In Mande, the placement of negation markers varies but CFNMs are never attracted to the immediately post-verbal position, as it is not the position associated with polarity marking in Mande languages. Furthermore, there are sufficient reasons to assume that a substantial part of the current Boko-Busa populations shifted to Boko-Busa from Baatonum at some point in the past. For instance, Jones (1998: 5) points out the clear relation between the Boko-Busa terms for the non-royal Boko-Busa people ('peasants', 'vassals', 'slaves') and the Boko-Busa designations of the Baatonum.

(17) Gbaya Kara

ʔám	*gbɛ́*	*sàdì*	*hã́*	*kóò*	*kɔ́m*	*ɲɔ́ŋ*	ná
1SG	kill\IPFV	animal	so.that	wife	POSS.1SG	eat\IPFV	NEG

'I did not kill game to feed my wife.' (lit. 'so that my wife eats')
(Roulon-Doko 2012 : 5)

What is relevant for my typology is that the position of the negation marker on the right periphery is determined with respect to the clause as a whole. Constructions with VO order and constructions with OV order may present different types of analytic problems for determining whether the negation marker is clause-final in this sense or not.

As pointed out by Dryer (2009: 319), in those (Sub-Saharan) African languages with VO order where the negation marker follows the object it "predominantly" also follows "any adverbs or adjunct phrases". In other words, it is typically a CFNM. In this respect, Sub-Saharan African languages differ from languages with VO order and the negation marker following the object elsewhere in the world, such as German, the language cited by Dryer (2009) as an example. A rare example of a language from Sub-Saharan Africa similar to German is Jur Mödö [bxe] (Bongo-Bagirmi; Andersen 1981; Persson and Persson 1991), spoken in South Sudan on the periphery of the core CFNM area (cf. Figure 8, 10 or 11). Jur Mödö uses SVX order in intransitive constructions and SVOX order in transitive constructions. The slot immediately at the end of the verb phrase, viz., after V in intransitive construction and after O in transitive construction or, framed differently, immediately before the X slot, appears to be reserved in Jur Mödö for at least two grammatical markers, one of which is the negation marker *dé*, as illustrated in (18) and (19), and the other one is the resultative or perfect marker *dɛ́ní* (called "perfective" by Andersen 1981 or "completive" by Persson and Persson 1991, as illustrated in (20).[7]

7 Contrary to Dryer's (2009: 320) statement that the negation marker "can be freely positioned among adverbial or adjunct elements", Andersen (1981) and Persson and Persson (1991) only specify that the negation marker is a type of "adverb" which should "occur in the adjunct [position], separated from the verb by the object" (Persson and Persson 1991: 15). Yet, in all the examples found in these sources, the negation marker is always the first of the "adverbs" or "adjuncts", immediately following the verb or, if present, the object.

(18) Jur Mödö
m-ʊ́dɔ̌ *ndɔ̀bɔ̀* dé *kpɛ̀* *tí=ì*
1SG-do work NEG again with=2SG
'I won't work with you again.'
(Andersen 1981: 59)

(19) *mɔ̀rɔ́* *ílábá* dé *rɔ̀* *kɔ̀bì*
spear fall NEG at buffalo
'The spear did not hit the buffalo.'
(Andersen 1981: 80)

(20) *kìrábà* *ɔ̀pɛ̀* *kʊ́mʊ́* dɛ́ní *dì* *mì* *màlìbìwù*
jackal release hare PRF from in snare
'Jackal released Hare from the snare.'
(Persson and Persson 1991: 15)

Beside the typical situation in African VO languages, where the clause-final status of a negation marker is relatively straightforward, we also find a number of VO languages on the periphery of the core CFNM area (cf. Figure 10 or 11), where a negation marker gravitates towards the end of the clause but it is not obvious whether its canonical position should be characterized as clause-final or not. One of the clearest examples of such a language is Nzadi [no code] (Bantu B865; Crane, Hyman and Tukumu 2011), whose description provides a detailed overview of the syntax of the post-verbal negation marker. In Nzadi, the negation is marked in two positions in the clause with the first marker occurring before the verb "in the auxiliary" (the form of this negation marker depends on the TAM values) and the second marker, *bɔ*, occurring after the verb "towards the end of the clause" and taking scope "over any of the elements" of the clause (Crane, Hyman and Tukumu 2011: 169, 173). (21) schematizes the possible positions of *bɔ* in various clause structures.

(21) Nzadi: the possible positions of the post-verbal negation marker *bɔ* (Crane, Hyman and Tukumu 2011: 171)[8]

S-V-*bɔ*	*S-*bɔ*-V	**bɔ*-S-V
S-V-O-*bɔ*	?S-V-*bɔ*-O	
S-V-IO-DO-*bɔ*	S-V-IO-*bɔ*-DO	*?S-V-*bɔ*-IO-DO
S-V-DO-Obl-*bɔ*	?S-V-DO-*bɔ*-Obl	*?S-V-*bɔ*-DO-Obl
S-V-DO-Obl_{ben}-*bɔ*	S-V-DO-*bɔ*-Obl_{ben}	*S-V-*bɔ*-DO-Obl_{ben}
S-V-X-*bɔ*	S-V-*bɔ*-X	

For the purposes of my typology, negation markers similar to Nzadi *bɔ* are classified as optionally clause-final. From a diachronic perspective, such indeterminacy suggests an ongoing syntactic change whereby a negation marker that, by virtue of its etymology, has originally evolved in a certain slot in the clause structure is being attracted to a different slot in the clause structure, presumably because this slot is associated with the expression of certain types of meanings.[9]

8 The asterisk <*> marks ungrammatical options. Elsewhere in the source, the examples of *bɔ* placement options marked with the combination <*?> are also characterized as "ungrammatical", so it remains unclear what difference between <*> and <*?> was intended by the authors in this table. The question mark <?> marks options that are characterized as "strongly dispreferred" or "at least marginally acceptable". *S-V-IO-DO* stands for ditransitive "double object constructions", where the indirect object is unmarked. *S-V-DO-Obl* stands for ditransitive "indirect object constructions", where the indirect object, referred to as oblique, is introduced by the locative preposition *kó*. I added to the original table the row with the benefactive oblique (Obl_{ben}) marked by *sám ʻé N* (lit. 'reason of N'), because it differs from the obliques introduced by the preposition *kó* in that "the preferred ordering may place *bɔ* before the benefactive", although without any "strong preference either way" (Crane, Hyman and Tukumu 2011: 170). Finally, "*X* can be a non-object complement, or any adjunct, and may co-occur with direct and indirect objects [including obliques], with *bɔ* placement restricted with regard to objects as in other cases" (Crane, Hyman and Tukumu 2011: 171).

9 The original position of the Nzadi marker *bɔ* is probably after the indirect object, either the unmarked one or the one introduced by the preposition *kó* or, in the absence of such an indirect object, after the direct object or, when no object is present, after the verb. That is, it is now being attracted to the clause-final position, arguably because of its default clausal scope and its intermediary function as attenuator of the assertive strength of the negative predication as a whole. Its original placement can be explained by its likely etymology as a possessive pronoun, which used to be coreferential with the subject and functioned as a kind of attenuator, something like 'as for X_i [S_i does not P]', which can be roughly compared to some uses of emphatic pronouns in French, as in *Pierre ne sait pas, lui* 'Pierre does not know (while others might know)' (lit. 'Peter does not know, him'). Given the shape of *bɔ*, it is most likely the third person plural form that has become generalized. As described by Devos and van der Auwera (2013), possessive pronouns are not uncommon as a source of secondary negation markers in the Bantu languages of the area.

African languages with OV order and a post-verbal negation marker can be subdivided into two groups for the purposes of my typology. In the first group, the verb is normally followed by some constituents (arguments or adjuncts) other than the object. Most such languages seem to behave like the Mande languages Dzuun and Boko presented in Sections 2.3 and 2.4 in that the post-verbal negation marker also follows other post-verbal constituents and thus can be characterized as clause-final. Most such languages are in fact Mande. In the second group, the clause is basically verb-final so that, in principle, the question of whether the post-verbal negation marker is oriented toward the clause as a whole or just the verb is not particularly meaningful. However, where some diachronic evidence is available, it is usually clear that the post-verbal negation marker is oriented toward the verb and not the clause as it often originates in a main verb reanalyzed as an auxiliary (cf. van Gelderen 2008: 232–233; Lucas 2009 on Afro-Asiatic languages). Therefore, by default, the post-verbal negation markers in such languages are not characterized as clause-final for the purposes of my typology. This situation is common among the Afro-Asiatic languages of northern and eastern Africa (Cushitic, Omotic, Semitic), as illustrated in (22) from Dhasaanac [dsh] (Cushitic; Tosco 2001), in some Nilo-Saharan groups in Chad and Sudan (such as Saharan, Fur and Nubian) and in Dogon and Ijoid languages in western Africa, as illustrated in (23) from Jamsay [djm] (Dogon; Heath 2008).

(22) Dhasaanac

yáa	*ʔúm*	ma	*ká*	*šuggun*-iŋ
1SG.SBJ	children	NEG	here	bring.IPFV-NEG

'I am not going to bring the children here.'
(Tosco 2001: 299)

(23) Jamsay

ɔ́ɣɔ́rɔ́	*kɔ̀-rú*	*yɔ̀wɔ̀*-l-*á*
quickly	NONHUM-DAT	accept-PFV.NEG-3PL.SBJ

'They did not readily accept it [= plow].'
(Heath 2008: 368)

3 The data

The data for this study come from individual grammatical descriptions complemented by a number of existing typological surveys of negation patterns in Af-

rica, such as Dryer's (2009) survey of post-verbal negation markers in the VO languages of Central Africa, Devos and van der Auwera's (2013) study of multiple negation marking in Bantu languages[10] and Beyer's (2009) study of double negation marking in the languages of the area centered around the Volta River basin in western Africa. I tried to cross-check the information coming from typological surveys in grammatical descriptions whenever possible.

My sample consists of 618 languages, of which 256 languages appear to use some kind of CFNM while 328 languages clearly lack a CFNM and, for 34 languages, the information available was not sufficient for an informed decision. For most purposes, I combined the latter two groups as languages without CFNMs (362 languages). The geographic distribution of the 618 languages of my sample is presented in Figure 5 in Section 1. Figure 5 also represents this distribution as spatial intensity, that is, the degree of concentration of languages taken as points in space. The most important concentration of languages is found in the area around the border between Cameroon and Nigeria. Another area of high concentration of languages stretches from Togo into the southwest of Burkina Faso. Figure 6 shows the geographic distribution and the spatial intensity of the 256 languages that have CFNMs and Figure 7 of the 362 languages that do not have CFNMs. The overall pattern of distribution of languages with CFNMs in Figure 6 resembles the pattern of distribution in the sample as a whole in Figure 5. The pattern in Figure 6 is, however, more spatially circumscribed in almost all directions. It is basically restricted to northern Sub-Saharan Africa. Its focal area, although equally situated in the area around the border between Cameroon and Nigeria, has a relatively northern position and its westward extension towards southwestern Burkina Faso is somewhat less pronounced and has a more clearly latitudinal east-west orientation (as opposed to a more southeast-northwest orientation in Figure 5).

10 I am grateful to Maud Devos and Johan van der Auwera for providing me with the source database they created for that survey.

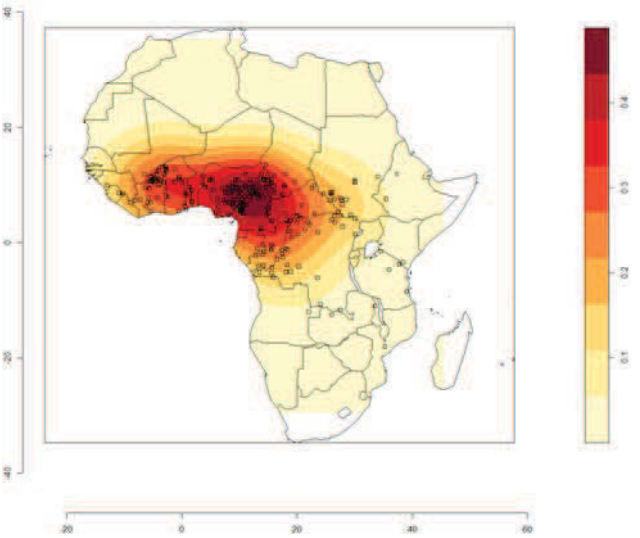


Fig. 6: Geographic distribution of the 256 languages with CFNMs and their spatial intensity

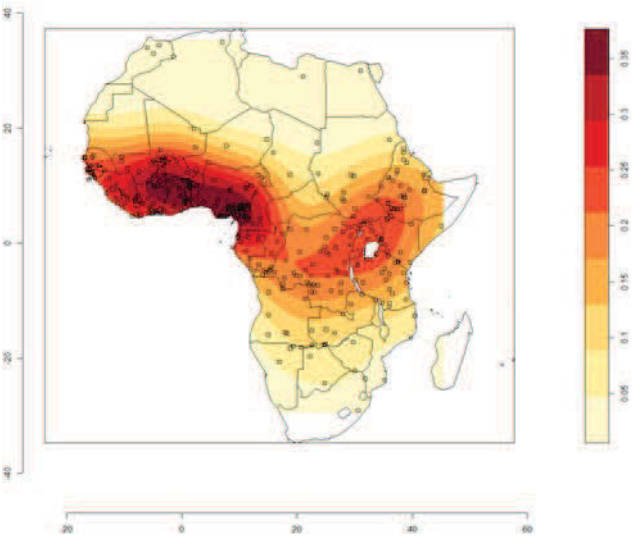


Fig. 7: Geographic distribution of the 362 languages without CFNMs and their spatial intensity

The pattern of distribution of languages without CFNMs in Figure 7 is quite different, especially in its eastern part. To begin with, the distribution in Figure 7 is

much more spread out. Importantly, it is characterized by a clear depression in Central Africa where the pattern has a U-shaped curve. This depression in the pattern in Figure 7 is created by the presence of a relatively homogenous cluster of languages with CFNMs in that area, whose importance may not be obvious from Figure 6. The depression (and the cluster of languages with CFNMs that creates it) is northeast-southwest oriented and extends from the Central African Republic along the Congo River, corresponding on the map to the border between Congo and the Democratic Republic of Congo. This depression makes the pattern go southward in Cameroon, parallel to the coast towards the lower reaches of the Congo River, where it then turns eastward and finally turns back around central Democratic Republic of Congo in a northeast direction toward Ethiopia. It is interesting to compare the West African focal area of Figure 7with that of Figure 6. The focal area in Figure 7 is both wider and more pronounced, stretching in a southeast-northwest orientation similar to what we find in the sample as a whole in Figure 5. Similarly to the focal area in Figure 6, the eastern end of the focal area in Figure 7 is situated around the border between Cameroon and Nigeria but it has a clearly more southern position, spanning southeastern Nigeria and southern Cameroon.

4 Increasing the granularity in the data: obligatoriness and constructional freedom

The patterns of geographic distribution of the languages of the sample presented in Figure 5 (Section 1) and Figures 6 and 7 in Section 3 are basically point patterns. As such, they show us the overall extent of the languages with and without CFNMs and highlight the regions of high and low concentration of the two types of languages. This is valuable information for a first approach to the phenomenon. However, this binary representation hides important diversity among the languages with CFNMs. In order to better capture this diversity and thus get a better idea of the possible historical and spatial dynamics that brought about the current situation, we need to increase the degree of granularity of our data. Following the discussion of the different issues involved in delimiting CFNMs in Section 2, I will use two parameters. The first one is obligatoriness of CNFMs, that is, whether CFNMs are obligatory or optional, and the second one are possible restrictions on the freedom to use CFNMs in different constructions. The two ranking options of these parameters and the pseudo-numerical values assigned to

them are summarized in Table 1.[11] The last column provides the numbers of languages of each type. CFNMs that are obligatory and free from constructional restrictions are ranked highest, as 4, in both ranking options, while CFNMs that are both constructionally restricted and optional are ranked lowest, as 1.

Tab. 1: Constructional restrictions and optionality: two ranking options

Constructional freedom highest	Constructional freedom	Obligatoriness	Obligatoriness highest	Number of languages
0	no CFNMs		0	328
0.5	unclear		0.5	34
1	restricted	optional	1	7
2	unrestricted	optional	2	22
3	restricted	obligatory	3	31
4	unrestricted	obligatory	4	196

In principle, either of the two parameters could be ranked first. It so happens that, for this particular distribution of languages with CFNMs, which is highly skewed to one side, both options produce very similar results. Nevertheless, I have a principled preference for ranking obligatoriness highest because I conceive obligatoriness as the defining property of grammatical meanings (see Idiatov 2008 for a detailed discussion). Lack of constructional restrictions on the use of a grammatical marker is a property of canonical grammatical markers (in the sense of canonical typology; cf. Brown, Chumakina and Corbett 2013. Therefore, CFNMs that are both obligatory and free of constructional restrictions are canonical grammatical markers whereas other types of CFNMs fall short of such status.

An important point to be mentioned with respect to the classification in Table 1 is that it classifies languages, not CFNMs. If a language has several CFNMs that

11 The values are pseudo-numerical in the sense that their numeric values are basically arbitrary and are just intended to reflect the relative order of the different combinations of the parameters. In fact, whether we use these numeric values or just an ordered list of factors does not matter that much. The two methods give very similar results in terms of spatial analysis, for instance, when we visualize them using spatial interpolation (see Section 5.1). However, I prefer to use the pseudo-numeric values because they allow to better capture the relative status of languages that do not have CFNMs as opposed to the different types of languages that have or may have CFNMs. See also Section 5.1 for an alternative coding scheme for pseudo-numeric values applied in generalized additive modeling.

differ with the respect to the two parameters, I choose the CFNM that ranks highest, as the closest to being a canonical grammatical marker, to represent the language as a whole. Admittedly, this way, some of the diversity fails to be properly reflected in the typology but I do not see very well how I can incorporate this information. Furthermore, I also have the impression that adding it would not have significant effects on the overall results.

5 Areal typology of CFNM in Sub-Saharan Africa

In this section, I first discuss the results and potential pitfalls of two methods of spatial analysis and visualization of the distribution of the values of the feature CFNM in Sub-Saharan Africa, as well as some geographic correlations that emerge from this analysis (Section 5.1). In particular, I apply spatial interpolation (using two different types of smoothing, kernel smoothing and inverse-distance weighted smoothing) and generalized additive modeling (GAM). The different methods used converge on the same spatial pattern of the feature CFNM. They confirm the existence, the position and the overall shape of two focal areas, the Central Focal Area (CFA) spanning the east of West Africa and parts of Central Africa and the Western Focal Area (WFA) restricted to West Africa. The two areas are separated by a major discontinuity around Ghana, Togo and Benin. Of the two focal areas, the CFA can be called the primary focal area, given its prominence, and the WFA a secondary focal area. In Section 5.2, I address the issue of the historical core of the CFA. In particular, I argue that, despite the apparent prominence of an area in southern Chad and the Central African Republic within the CFA, it cannot represent its historical core and that it is much more likely that the primary historical core of the CFA is situated immediately to the northwest of the Central African Republic along the Benue River corridor going from southern Chad through northern Cameroon into central Nigeria. At the same time, as discussed in Section 5.3, this area in southern Chad and the Central African Republic prominent within the CFA must have served as the source for the spread of the feature CFNM among Bantu languages further south in the Congo River corridor and the north of the Democratic Republic of Congo. Section 5.3 further offers a discussion of the broader issue of the distribution of optional and/or restricted CFNMs in Africa and argues that, as expected, such grammatically non-canonical CFNMs tend to be peripheral areally as well.

5.1 Spatial analysis: spatial interpolation, generalized additive modeling and correlations with geography

The spatial distribution of languages with different kinds of CFNMs (as distinguished in Section 4) and languages without CFNMs can be inspected in a number of ways. The most straightforward option is to visualize the data by means of spatial interpolation, which I perform here using the pseudo-numeric values described in Section 4. We can also use an alternative coding scheme for pseudo-numeric values, as we will do for generalized additive modeling further in this section, or use an ordered list of factors without any noticeable impact on the results. Thus, Figure 8 shows the result of spatial interpolation using kernel smoothing and Figure 9 shows the result of spatial interpolation using inverse-distance weighted smoothing.

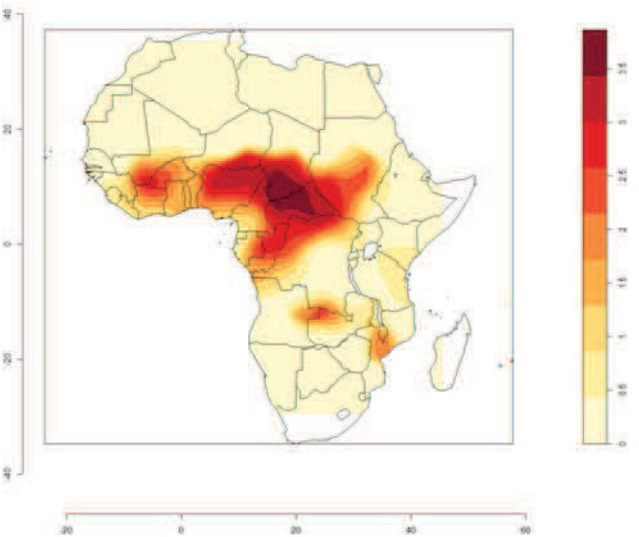


Fig. 8: The spatial interpolation graphic of the different values of the feature CFNM (as described in Section 4) using Gaussian kernel smoothing (the default bandwidth value adjusted by 1.3)

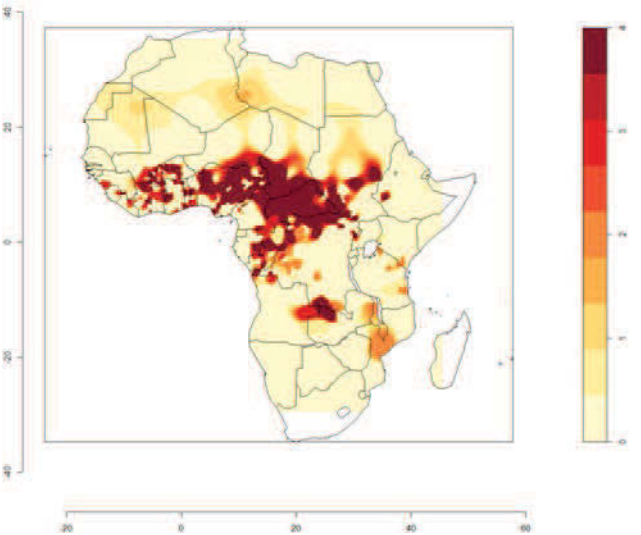


Fig. 9: The spatial interpolation graphic of the different values of the feature CFNM (as described in Section 4) using inverse-distance weighted smoothing (power = 6)

Different spatial interpolation methods produce slightly different visualizations, which may allow to better highlight different aspects of the spatial distribution. Thus, the interpolation using kernel smoothing in Figure 8 is somewhat better in visualizing the overall structure of the spatial distribution of the feature CFNM. It clearly shows a major discontinuity in the distribution of languages with CFNMs in Northern Sub-Saharan Africa (NSSA) around Ghana, Togo and Benin. This discontinuity cuts off a secondary focal CFNM area that is centered on the region where the borders of Burkina Faso, Mali and Ivory Coast come together. For ease of reference, I refer to this secondary CFNM focal area in NSSA as the Western Focal Area (WFA) and to the main CFNM focal area to the east of it as the Central Focal Area (CFA). Both the interpolation using kernel smoothing in Figure 8 and the interpolation using inverse-distance weighted smoothing in Figure 9 show that the CFNM areas in NSSA are largely confined to the hinterland. The location of the three clearest extensions of the CFNM area toward the Gulf of Guinea coast is somewhat better visible in Figure 9. Thus, the first such extension is found around southern Togo and Benin, largely bridging the gap between the CFA and the WFA. The second coastal extension is located in the south of central Nigeria and is formed by the southward spread of the Edoid languages. While the first two coastal extensions are themselves likely to result from relatively recent language spread and/or contact events, the gap between them may be just as well

accidental. Thus, the gap area is occupied by one big language (or a cluster of closely related lects), viz., Yoruba, that must have expanded into the gap area from a more hinterland location in central Nigeria relatively recently and the respective proto-language may have simply happened to lack the CFNM feature by chance or lost it when moving into the area. In this respect, note that CFNMs are found in various related languages spoken just outside of the gap area, such as many Edoid languages or Igala, which belongs to the same lower-level Yoruboid linguistic grouping as Yoruba. The third coastal extension along the Congo River corridor is due to relatively recent language and/or population movements out of Central Africa affecting the Bantu languages in that area (see Section 5.3).

Depending on how the underlying data is distributed in space exactly, spatial interpolation may produce certain visualization artefacts that one should be aware of when analyzing the results. Thus, both methods exaggerate to different extents the prominence of a number of regions, such as the region where the borders of the Democratic Republic of Congo, Angola and Zambia come together, the region in central Mozambique and the region toward the northeast of South Sudan. These exaggerated prominence regions are due to the fact that the sample data points are sparsely distributed in these regions (either because there are simply fewer languages or because the languages were not sampled). To see why this may affect visualization, we can represent data points by peaks whose height corresponds to the numeric value of the types in Table 1. The peaks representing a few isolated examples of CFNM languages in such a region would get very wide slopes when other data points are far. Several low prominence regions in the Sahara in Figure 9 are basically due to the same reason and do not correspond to any real languages, as becomes clear when we compare Figure 9 to Figure 6. That these spurious prominence regions in the Sahara are absent in Figure 8 is just due to the way the sample data points happen to be distributed on the southern fringes of the Sahara and the bandwidth value chosen for kernel smoothing.[12] Finally, care should be exercised when interpreting the region of high prominence (as reflected by its darker shading) within the CFA in southern Chad and the Central African Republic in Figure 8. Although it is tempting to interpret it as the core or hotbed of the CFA, as discussed in Section 5.2, a different interpretation may be more appropriate. In this respect, note that this region of high prominence is absent in Figure 9, which uses a different spatial interpolation method.

12 In this respect, note a number of slight northward spikes in Figure 8, such as the spikes in central Chad and southeastern Niger, which correspond to much clearer spikes in the same places in Figure 9.

Although spatial interpolation is a valuable visualization tool, it does not produce quantifiable results. A statistical tool well-adapted for spatial analysis that can do that is provided by generalized additive models (GAM),[13] for instance, as implemented in the mgcv package for R (Wood 2015). There are different ways to code our response variable, viz., the type of the feature CFNM. One option would be to code it as an ordered categorical variable. The big disadvantage of this option would be that it does not reflect the importance of the divide between the absence and presence of CFNMs in the language and the certain hierarchy between the six values of the feature CFNM of Table 1. For this reason, I will not use this coding. The results it produces are actually largely comparable to the other two options that we are going to consider, although less clear-cut. The latter two options both involve pseudo-numeric values assigned to the six values of the feature CFNM. The first coding scheme simply reuses the numbers from Table 1 (with obligatoriness ranked highest). The other coding scheme uses a scale from 0 to 1, with 0 corresponding to the absence of CFNMs and 1 corresponding to the presence of canonical CFNMs (type 4 in Table 1), which may better capture the hierarchy between the six values of the feature CFNM. The two coding schemes are compared in Table 2.

Tab. 2: Two coding schemes for pseudo-numeric values of the feature CFNM

Constructional freedom	Obligatoriness (ranked highest)	Scheme 1	Scheme 2
no CFNMs		0	0
unclear		0.5	0.5
restricted	optional	1	0.625
unrestricted	optional	2	0.75
restricted	obligatory	3	0.875
unrestricted	obligatory	4	1

13 GAM is an extension of multiple regression that provides flexible tools for modeling complex interactions describing wiggly surfaces. A practical introduction to GAMs for linguists can be found in Baayen (2013), Tamminga, Ahern and Ecay (2016) and Winter and Wieling (2016). Some good examples of use of GAMs in linguistics in relation with spatial analysis are provided by Wieling, Nerbonne and Baayen (2011) and Wieling et al. (2014). Idiatov and Van de Velde (2016, 2018) apply GAM for spatial analysis of lexical frequencies of labial-velar stops in NSSA.

We will consider two GAMs, one using Scheme 1 and one using Scheme 2. Both GAMs estimate the values of the feature CFNM as a function of the combination of longitude and latitude using thin-plate regression splines. The plots in Figure 10 and Figure 11 represent the regression surface of the two GAMs produced using Gaussian distribution as a contour plot with the heat map color scheme. In the heat map color scheme, the lighter the color, the higher the temperature, which, in our case, corresponds to a higher pseudo-numeric value of the feature CFNM. The contour lines are isopleths that mark deviations from the mean in terms of standard deviation.

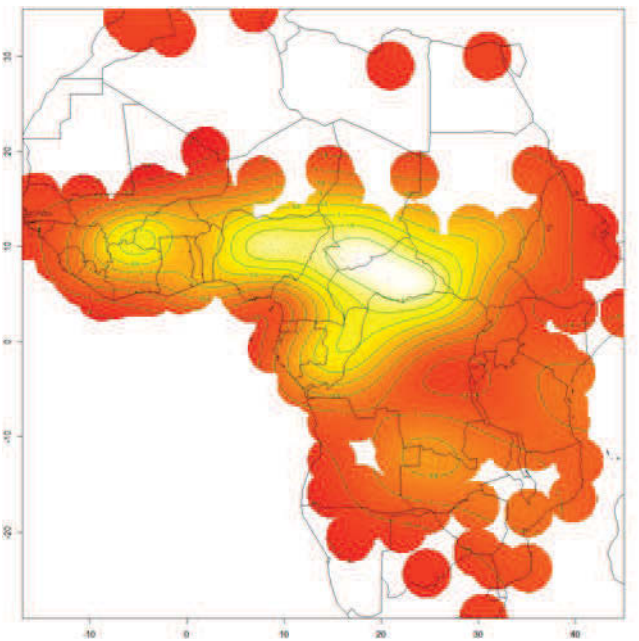


Fig. 10: A contour plot with the heat map color scheme visualizing a GAM produced using Scheme 1 for coding of the feature CFNM (k=13, family = Gaussian, edf = 41.73, p < 2e-16, deviance explained = 43.7%, AIC = 2234)

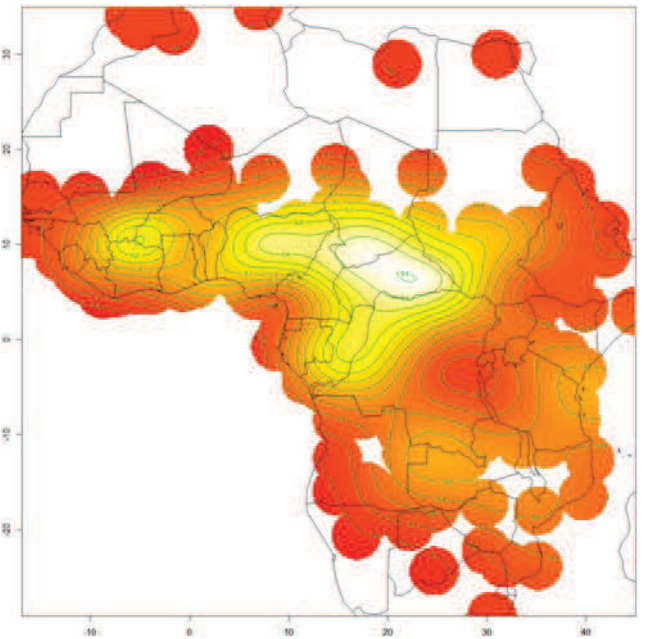


Fig. 11: A contour plot with the heat map color scheme visualizing a GAM produced using Scheme 2 for coding of the feature CFNM (k=13, family = Gaussian, edf = 42.72, p < 2e-16, deviance explained = 42.5%, AIC = 552)

The two GAMs produce very similar results. Basically, they only differ in their Akaike information criterion values (AIC), with the GAM based on Scheme 2 having a much better AIC. However, this does not so much reflect the quality of the respective model as the difference in the coding scheme used, arguably favoring Scheme 2.

The GAM plots in Figure 10 and Figure 11 are very similar to the spatial interpolation plots in Figure 8 and Figure 9, minus the visualization artefacts produced by spatial interpolation and discussed above. The different methods used converge on the same spatial pattern of the feature CFNM. They confirm the existence, the position and the overall shape of two focal areas, the CFA and the WFA, separated by a major discontinuity around Ghana, Togo and Benin.

Of the two focal areas, the CFA can be called the primary focal area, given its prominence, and the WFA a secondary focal area. The overall shape of the two focal areas can be broadly described as the hinterland of the Gulf of Guinea. Starting with the WFA in southern Mali and northern Ivory Coast, the region where the feature CFNM is prominently present extends eastward, primarily following

grasslands and woodland savannahs north of the forest zone, for the most part staying outside of the coastal regions. It is interrupted by only one major discontinuity separating the WFA from the CFA. Geographically, this major discontinuity corresponds rather well to the so-called Dahomey Gap, a southward savannah corridor interrupting the zonal West African rain forest. This may look strange at first, as the WFA and the CFA themselves are in the savannah zone. However, the north-south orientation of this savannah corridor can also be seen as conducive to interrupting the general east-west dynamics of the population and language movements in the western part of NSSA. Thus, I believe that this discontinuity is primarily due to the combined effect of the southward spread of Songhay into the current gap area from the north and the northward spread of the Tano subgroup of Kwa from the coastal regions in the south.

The slight southeastward bent of the CFA in southern Chad toward the Central African Republic follows well the orientation of the relevant ecological zones, topography and hydrography of this part of NSSA, as illustrated in Figure 12 on a relief map of Africa.[14] The CFA further marginally spills over into South Sudan in the east and, much more significantly, into equatorial Central Africa in the southwest along the Congo River corridor (see Section 5.3). The two plausible zones through which the interaction between the CFA and these neighboring areas is likely to have primarily occurred are marked in Figure 12 as A and B respectively, with the difference in the degree of interaction graphically represented by the difference in font style of the two symbols.

14 The eastern borders of Chad and the Central African Republic largely correspond to the divide separating the Lake Chad and Congo River drainage areas to the west from the Nile River drainage area further east. The southwestern border of Chad and the western border of the Central African Republic roughly reflect the divide separating the same Lake Chad and Congo River drainage areas from the drainage areas of the Niger River and some smaller rivers flowing into the Gulf of Guinea. The shape of the divides themselves naturally results from the relief of the area.



Fig. 12: A relief map of Africa: the arrow highlights the correlation between the topography and the southeastward bent in the CFA around southern Chad – A and B mark plausible primary interaction zones between the CFA and the neighboring regions in South Sudan and equatorial Central Africa

5.2 The Central Focal Area: the core issue

In Figure 8, which is a spatial interpolation plot with kernel smoothing, and Figures 10 and 11, which are visualizations of two different GAMs, the CFA is characterized by a region of high prominence in southern Chad and the Central African Republic (as reflected by its darker shading in Figure 8 and lighter colour in Figures 10 and 11). Therefore, it may be tempting to interpret the region in southern Chad and the Central African Republic as the core or hotbed of the CFA, with all the obvious historical implications that such an interpretation would entail. At the same time, this region of high prominence is absent in Figure 9, which uses a different spatial interpolation method, viz., inverse-distance weighted smoothing. Similarly, the same region looks anything but prominent in Figure 6, which shows the distribution of the languages with CFNMs and their spatial intensity. Clearly, care should be exercised when interpreting the relevance of this region

of high prominence within the CFA. In fact, I believe that the prominence of the region in southern Chad and the Central African Republic is epiphenomenal and that this region is not the core of the CFA. A much better candidate for this role is the Benue River corridor going from central Nigeria through northern Cameroon into southern Chad. The apparent prominence of this region within the CFA stems from a combined effect of a number of factors, primarily relevant to its southern part in the Central African Republic. On the one hand, we have the geography of the region, which makes it a kind of cul-de-sac with lots of marshy and seasonally flooded areas. On the other hand, we have the linguistic and population history of the region, which appears to be characterized by strong founder effects.

When looking closer into this part of the CFA, it is first important to note that this region of Central Africa is very homogenous with respect to the feature CFNM with most (if not all) languages having canonical CFNMs (type 4). At the same time, this region of Central Africa is both rather homogenous linguistically and rather sparsely populated. It is sparsely populated both in absolute terms, as becomes obvious from the low density of populated places in this region in Figure 13, and in terms of the languages spoken there. The latter fact is apparent in Figure 5, which shows the distribution of the languages of the sample.

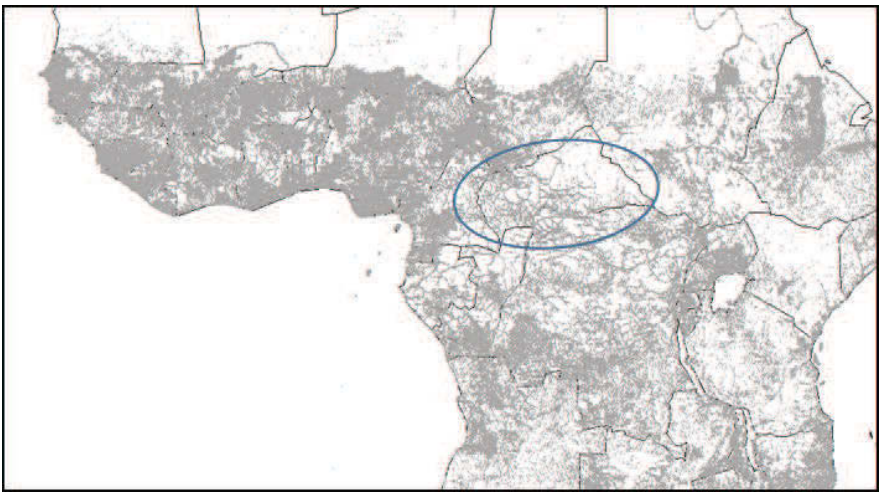


Fig. 13: Populated places in NSSA (based on the data from GeoNames.org) – the oval centered on the Central African Republic roughly indicates the relevant southern part of the CFA

To see how the sparse language density can be relevant for the apparent prominence of the region in question, recall the discussion of some of the possible artefacts of the visualization by means of spatial interpolation in Section 5.1. As for the linguistic homogeneity, this region is occupied by a small number of linguistic groups, all of which are rather shallow, viz., Gbaya-Manza-Ngbaka, Sere-Ngbaka-Mba, Banda, Ngbandi-Mongoba-Kazibati, Zande and Western Sara-Bongo-Bagirmi. All but the last group have traditionally been classified together under the label Ubangian, although more recently Gbaya-Manza-Ngbaka was excluded from this group. Western Sara-Bongo-Bagirmi is a branch of the Sara-Bongo-Bagirmi family, which itself is a subgroup within Central Sudanic. The map in Figure 14 illustrates the location of the first five groups under their older grouping as Ubangian and the map in Figure 15 shows the distribution of the Sara-Bongo-Bagirmi languages as a whole.

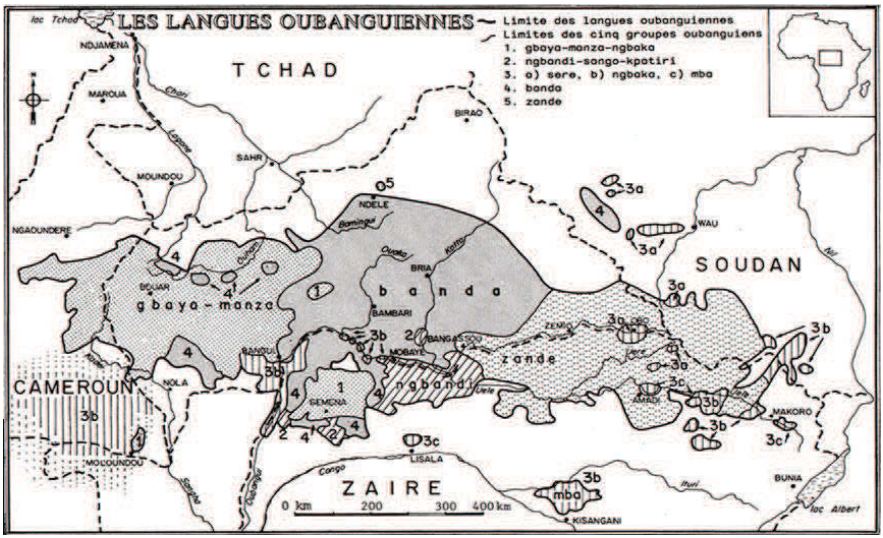


Fig. 14: Ubangian groups (Sere-Ngbaka-Mba, Banda, Ngbandi-Mongoba-Kazibati, Zande) and Gbaya-Manza-Ngbaka (formerly also classified as Ubangian) (Moñino 1988)

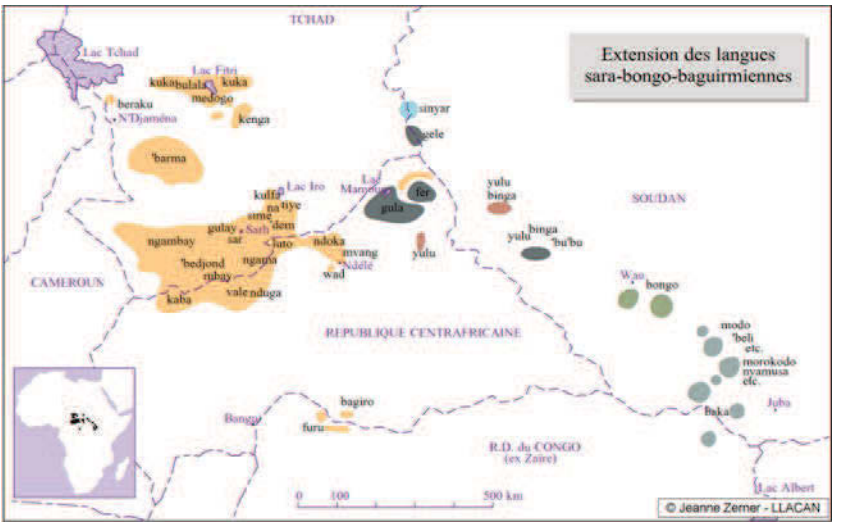


Fig. 15: Sara-Bongo-Bagirmi languages (Boyeldieu 2006) – the Western Sara-Bongo-Bagirmi languages are in pink (or light grey) (e.g., Kaba), dark grey (e.g., Gula or Gele) and brown (or normal grey) (e.g., Yulu)

The degree of internal diversity within all the six groups (Gbaya-Manza-Ngbaka, four Ubangian groups and Western Sara-Bongo-Bagirmi) is also rather low. Some of these groups could have just as well been referred to as languages without much exaggeration. Furthermore, within Ubangian, at least based on lexical similarity (cf. Boyeldieu and Cloarec-Heiss 1986; Moñino 1988:19), Sere-Ngbaka-Mba and Banda can be said to be rather closely related and probably also form one group with Ngbandi-Mongoba-Kazibati, with only Zande left out as not being transparently related to the other three Ubangian groups.

Another important point is that, beside being rather shallow and having a low level of internal diversity, most, if not all, of these groups are very likely to have moved into this region of Central Africa relatively recently and it is only upon their entering this region that most speciation events within these groups have occurred. For instance, Figure 16 shows the reconstructed migration routes of the Sara-Bongo-Bagirmi populations, indicating the Proto Sara-Bongo-Bagirmi homeland in what is now South Sudan just outside of our region in question, the Proto Western Sara-Bongo-Bagirmi diversification node in the northeast of the Central African Republic inside the region in question and an important node of further diversification within Western Sara-Bongo-Bagirmi around the border between Chad and the Central African Republic, viz., the Proto Sara node. Similarly,

as can be seen in Figure 14, both the Sere group of Sere-Ngbaka-Mba and a part of Banda are still spoken in South Sudan approximately in the same area as the Proto Sara-Bongo-Bagirmi homeland in Figure 16. Furthermore, the available evidence suggests that both the remaining part of Banda and the Ngbaka-Mba group of Sere-Ngbaka-Mba have also moved into the region in question from approximately the same area in South Sudan (e.g., Rombi and Thomas 2006: 22 for Ngbaka-Mba; Tisserant 1930: 8–10 for Banda).

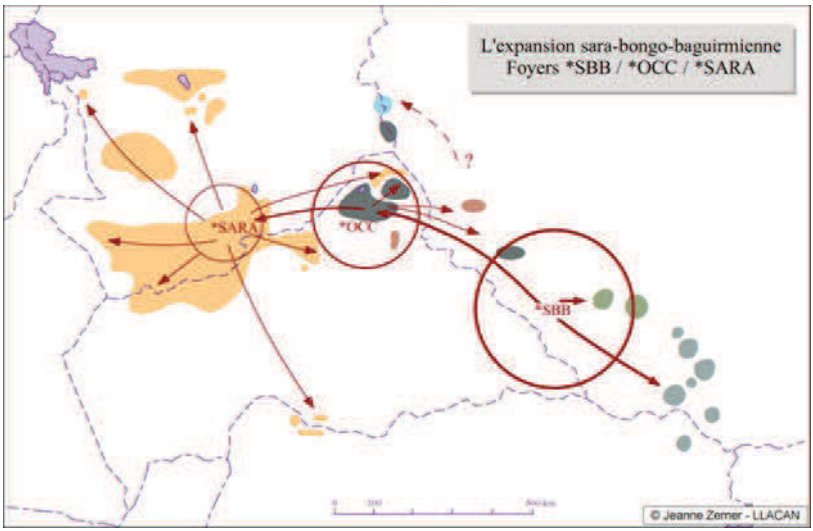


Fig. 16: The reconstructed migration routes of the Sara-Bongo-Bagirmi populations (Boyeldieu 2006) (*SBB is the Proto Sara-Bongo-Bagirmi homeland; *OCC the Proto Western Sara-Bongo-Bagirmi diversification node; *SARA the Proto Sara diversification node, a major subgroup within Western Sara-Bongo-Bagirmi)

Summing up, the region in question appears to have been occupied relatively recently by six shallow and rather homogenous linguistic groups and, of these six groups, at least three are transparently related to one another and may also be more distantly related to yet another group out of these six, which reduces the whole number of the different linguistic groups involved to three. These groups have moved into the region from outside. Moreover, all but one group have most likely migrated out of the same general area in what is now South Sudan, which makes it likely that they had been in close contact with each other even before entering the region in question. The only probable exception is Gbaya-Manza-

Ngbaka, which is more likely to have entered the region from the north somewhere in southern Chad and closer to the majority of the remaining languages of the CFA. These groups have then undergone further diversification upon entering the region. As the proto-language of Gbaya-Manza-Ngbaka is likely to have already had CFNMs, we end with a very high probability that the remaining two (or maximally three) proto-languages coming out of the same area simply happened to have CFNMs from the start or happened to acquire them upon entering the region. In such a situation, it is easy to imagine how the respective region may have easily become as homogenous as it is with respect to the relevant feature due to founder effects. In fact, the languages spoken in the region in question are rather homogenous with respect to a number of features that are otherwise highly unusual typologically,[15] such as the high lexical frequency of labial-velar stops (Idiatov and Van de Velde 2016, 2018), the prominent presence of labial flaps (Olson and Hajek 2003) and the use of possessee-like qualifier constructions (also known as dependency reversal) (Van de Velde 2012, 2013: 233–234).

In view of the arguments presented above, it is extremely unlikely that the prominent presence of canonical CFNMs in this region of Central Africa attests in any way to the hypothesized historical role of this region as a would-be primary core of the CFA. At the same time, as will be discussed in Section 5.3, this region of Central Africa with its prominent presence of CFNMs must have served as the source for the spread of the feature CFNM among Bantu languages further south in the Congo River corridor and the north of the Democratic Republic of Congo. Given the overall orientation of the CFA and its population dynamics as driven by the ecology and geography of the area, it is most likely that the primary historical core of the CFA is situated immediately to the northwest of the Central African Republic along the Benue River corridor going from southern Chad through northern Cameroon into central Nigeria. This is basically the high prominence region on the spatial intensity plot of languages with CFNMs in Africa in Figure 6. The region along the Benue River corridor is densely populated both in terms of people (cf. Figure 13) and languages (cf. Figures 5 and 6). Moreover, the linguistic landscape of this region is highly fragmented and characterized by a lot of deep linguistic diversity, which forms a stark contrast with the Central African Republic areas of the CFA further to the southeast that I have discussed first.

15 This does not mean, of course, that these features need to be restricted to the languages of the region.

5.3 Optional and/or restricted CFNMs: grammatically non-canonical and areally peripheral

From the perspective of language change dynamics, optionality and constructional restrictions of CFNMs are likely to characterize either innovated or disappearing markers, depending on what the direction of change is. Detailed comparative studies would be required to determine the direction with certainty. Yet, given what I know about the languages in question, my strong impression is that such CFNMs are more often innovations than retentions from older stages on their way out.

From an areal typological perspective, languages with optional and constructionally restricted CFNMs, viz., languages with scores 1, 2 and 3 in the column "obligatoriness highest" in Table 1 (which I will refer to as types 1, 2, 3), are expected to be located mostly toward the periphery of the area of languages with CFNMs. This expectation is indeed borne out, as can be seen by comparing the spatial distribution of such languages in Figure 17 with that of all the languages having CFNMs in the sample in Figure 6 (cf. Section 3). Remarkably, languages of types 2 and 3 happen to be in almost complementary spatial distribution, with noticeable overlaps only in the Congo River corridor (cf. Section 3) and in southwestern Cameroon, which are also the same two regions where one finds languages of type 1. Moreover, languages of type 2 are almost all Bantoid and, within that group, they are almost all Narrow Bantu languages whereas the languages of type 3 are much more genetically diverse, which suggests that there is something different about Bantoid and especially Narrow Bantu languages. Typologically, Narrow Bantu languages are indeed known to differ in many respects from the languages in more northern parts of Sub-Saharan Africa, to most of which they are actually related (cf. Clements and Rialland 2008; Güldemann 2008).

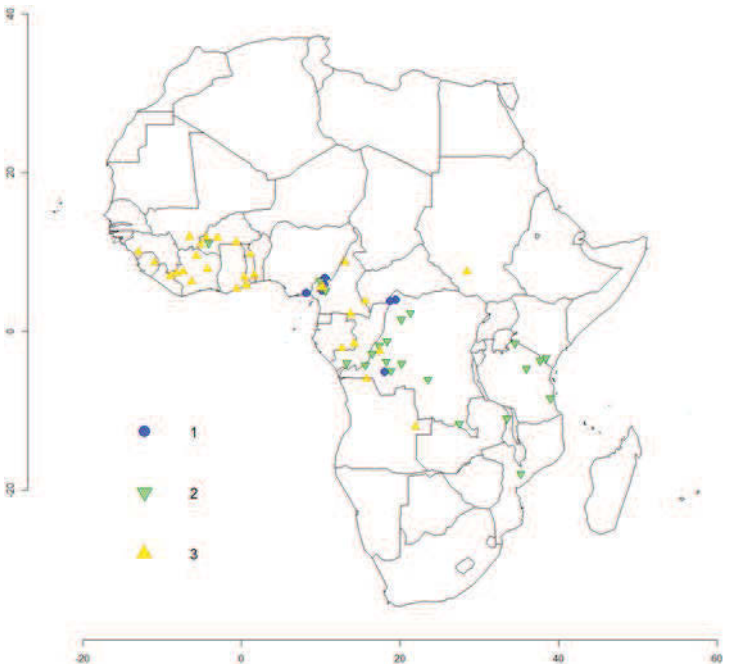


Fig. 17: Languages with optional and constructionally restricted CFNMs (see Table 1 for the meanings of the values 1, 2, 3 in the column "obligatoriness highest")

A possible explanation for the observed distribution of type 2 is that CFNMs in Bantoid and especially Narrow Bantu languages tend to develop through somewhat different pathways than elsewhere, the pathways that are less likely to lead to constructional restrictions but are more likely to result in optional CFNMs, either in the sense that they are clause-final but optional in that position or that they are optionally clause-final. As described by Devos and van der Auwera (2013), "recurrent sources for post-verbal negative markers [including CFNMs] in Bantu languages are locative pronouns, possessive pronouns and negative (answer) particles", which indeed seem to be rarely attested as sources of CFNMs in more northern parts of Sub-Saharan Africa. As mentioned with respect to the negation marker *bɔ* in the Bantu language Nzadi in Section 2.5, which is optionally clause-final, possessive pronouns as a source of post-verbal negation markers are, for instance, unlikely to originate in the clause-final position. To some extent, the same is true for locative pronouns in Bantu. Negative answer particles as a source of post-verbal negation markers, although likely to originate in the clause-final position, are unlikely to be constructionally restricted.

The frequent optionality of CFNMs in Bantu must have much to do with their relatively young age. The relatively recent innovative character of CFNMs in Bantu is confirmed by their restricted distribution within Bantu and important variation in their forms across Bantu, which starkly contrasts with the relative uniformity and almost universal obligatory presence of the older pre-verbal negation markers (cf. Kamba Muzenga 1981; Güldemann 1999; Devos and van der Auwera 2013). Moreover, while the forms of the older pre-verbal negation markers can be reconstructed to Proto Bantu, they cannot be provided with an etymology other than a negation marker (Kamba Muzenga 1981). At the same time, CFNMs cannot be reconstructed to Proto Bantu and, when their etymology can be established, they often originate in elements that are not negation markers. The only noticeable exception are CFNMs originating in negative answer particles.

Another important factor contributing to the frequent optionality of CFNMs in Bantu is that, typically, clause-final markers as such are not a prominent morphosyntactic feature of Bantu languages and, in this respect, they clearly differ from languages of northern Sub-Saharan Africa (cf. Idiatov 2012a). Whereas the prominent presence of clause-final markers in the morphosyntax of languages of northern sub-Saharan Africa would be propitious for the upgrade of innovated CFNMs from optional to obligatory status, such a pull factor is generally lacking in Bantu languages.

Within Bantu, the Congo River corridor is clearly the focal area of the innovation of CFNMs. This is suggested already by the observation in Figure 17 that Bantu languages of type 3 are basically confined to this region and that the concentration of Bantu languages of type 2 is also highest in the same region. The importance of the Congo River corridor becomes even more obvious when we include Bantu languages of type 4, i.e., Bantu languages with obligatory and constructionally unrestricted CFNMs. Thus, as can be seen in Figure 18, Bantu languages with more canonical CFNMs are equally concentrated in the Congo River corridor.

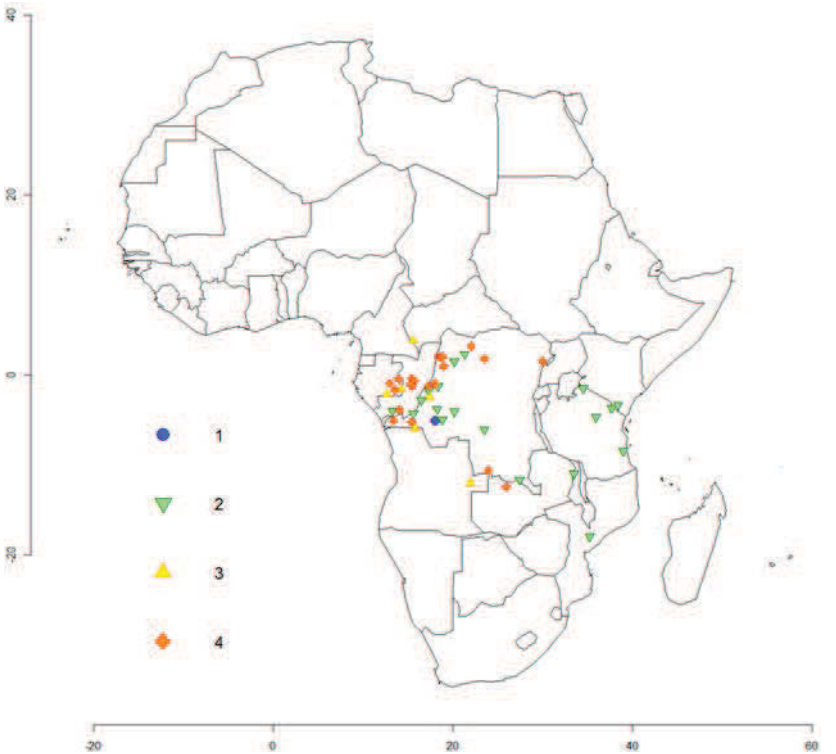


Fig. 18: Bantu languages with CFNMs (see Table 1 for the meanings of the values 1, 2, 3, 4 in the column "obligatoriness highest")

Furthermore, we can observe in Figure 18 two weak stretches of Bantu languages with CFNMs that appear to be linked to the northern and southern ends of the Congo River corridor and both going southeast, one to the north and the other to the south of the Congo River basin. Of these two secondary prominence zones, the southern one is clearly historically an offshoot of the Congo River corridor whereas the northern one must share its origin with the Congo River corridor in the CFA, situated further north in the Central African Republic (cf. Figures 8 and 11 and Section 5.2), as schematically illustrated in Figure 19. Admittedly, we cannot completely rule out the possibility that optional CFNMs in Bantu languages in East Africa have evolved independently.

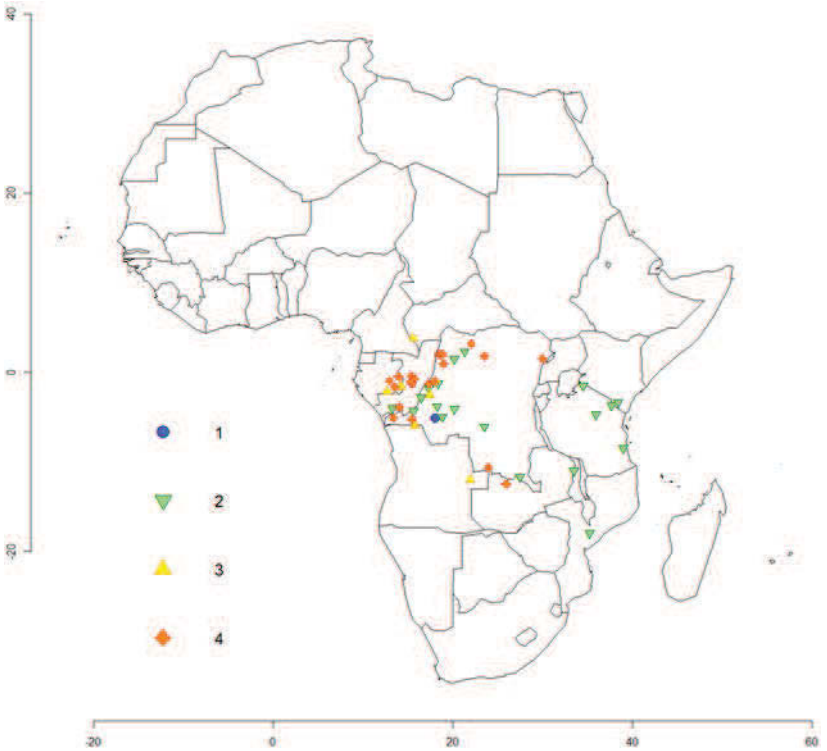


Fig. 19: The suggested direction of spread of the use of CFNMs in Bantu from a major focal area of CFNM use in northern Central Africa into the Congo River corridor and the two secondary prominence zones

The emergence of both the Congo River corridor and the two secondary prominence zones must result from relatively recent population and/or language movements out of Central Africa. They clearly occurred much later than the original Bantu expansion in and around the Congo River basin. In this respect, compare the areal pattern of the distribution of CFNMs in Bantu with the Bantu expansion route reconstructed by Grollemund et al. (2015) and reproduced in Figure 20. The comparison makes it clear that the southwest expansion of the use of CFNMs in the Congo River corridor went in the direction opposite to the original route of Bantu expansion in the northern half of the Congo River basin. The northern secondary prominence zone does not correspond to any original route of Bantu expansion in that area from the northern Democratic Republic of Congo. The southern secondary prominence zone partially corresponds to an original route of Bantu expansion in that area, yet it could not have formed before the emergence

of the Congo River corridor zone and therefore could not have coincided in time with this part of the Bantu expansion route.

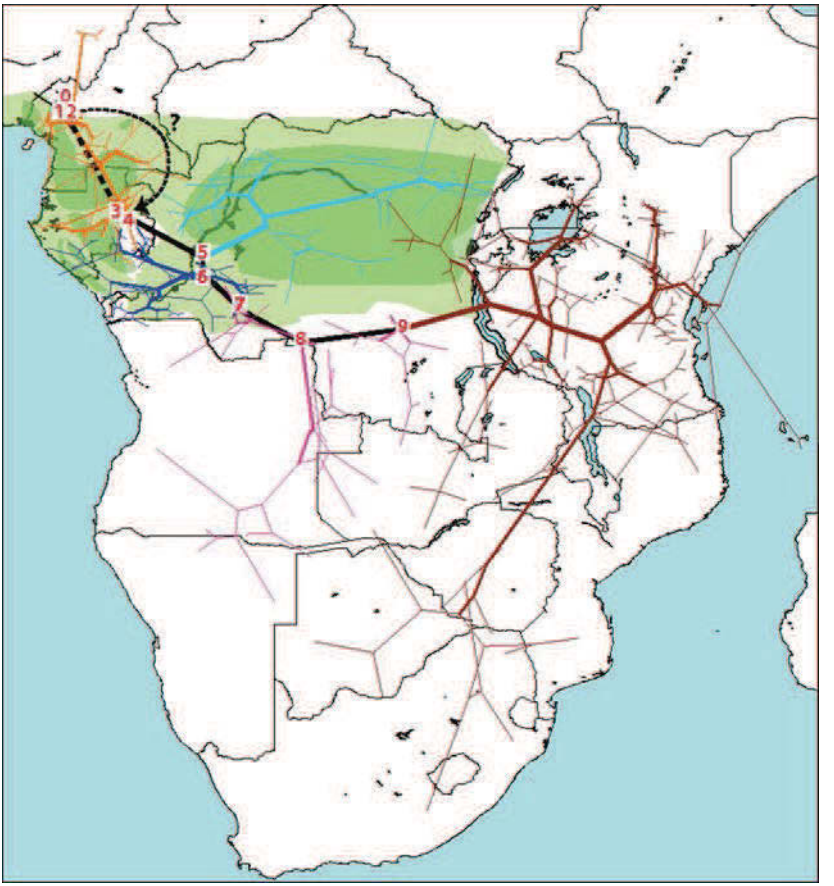


Fig. 20: Bantu migration route reconstructed by Grollemund et al. (2015) on consensus tree by using geographical locations of contemporary languages and connecting ancestral locations by straight lines (the true route will differ) (numbered positions correspond to major diversification nodes on the consensus tree; the curved dashed line indicates the suggested migration route through savannah corridors; lighter (green) shading corresponds to the delimitation of the rainforest at 5,000 BP.; the darker (green) shading corresponds to the delimitation of the rainforest at 2,500 BP)

6 Concluding remarks

The synchronic patterns that we discover are necessarily a product of language change as it evolves in time and space. This paper provides an analysis of spatio-temporal language dynamics in Sub-Saharan Africa with respect to the feature CFNM. It is my strong conviction that the most plausible account of synchronic patterns can only be gleaned by casting your net wide to catch more of the synchronic diversity, rather than by trying to reduce it. Furthermore, when analyzing areal patterns, it is also important to consider together the languages that have the feature under investigation and the languages that do not have it. In terms of spatial analysis, methods such as spatial interpolation and generalized additive modeling (including their mixed extensions) provide particularly valuable research tools.

A question that one is often tempted to ask when doing areal typology is which linguistic group of the ones present in the area where the feature is prominent could have been the primary vector of the feature. Yet, this question can only have a fully meaningful answer if we know that no linguistic groups have disappeared from the scene without traces since the emergence of the feature in the area. Unfortunately, in a region such as Sub-Saharan Africa, we cannot be sure of that. In fact, we can be quite sure of the contrary.[16] Furthermore, the fact that all members of a certain linguistic group carry the feature and are spoken inside the area where the feature is prominently present cannot prove that this linguistic group is the primary vector of the feature.

For instance, Dryer (2009: 346) entertains two possible scenarios with respect to his core area of VO&VNeg languages in Central Africa, which, unsurprisingly, largely coincides with our CFA of the feature CFNM.[17] The first scenario is that the feature VO&VNeg originates in Chadic languages, because the feature is pervasive in Chadic languages and all Chadic languages are spoken inside the relevant

16 For instance, see Kleinewillinghöfer (2001) on Jalaa, an apparent linguistic isolate in north-eastern Nigeria, the area that is particularly relevant for the feature CFNM, which went extinct fairly recently and for which only some lexical data could be collected from rememberer speakers.

17 It is not very surprising because Dryer (2009) restricts his study to negation markers that are words. Although not all post-verbal negation markers that are words are also clause-final, CFNMs are almost always analyzed as words precisely because of their clausal orientation and, therefore, at least canonical CFNMs would always be classified as post-verbal negation markers in Dryer's (2009) typology.

area. Yet, Chadic languages are also typologically quite different from their distant Afro-Asiatic relatives, most of which equally do not carry the relevant feature. In other words, we cannot know whether the feature can be reconstructed to Proto Chadic as independent of the current participation of Chadic languages in the area in question. The second scenario is that the presence of the feature in Chadic is due to a substrate influence from "Nilo-Saharan" and that the substrate influence could have such a pervasive effect on Chadic languages because of the relatively small size of the region populated by speakers of Chadic languages. The Nilo-Saharan group that is both spoken in the same area as Chadic languages and is classified positive for the relevant feature by Dryer (2009: 311) is Western Sara-Bongo-Bagirmi. However, as laid out in Section 5.2, Western Sara-Bongo-Bagirmi languages are one of the recent newcomers in the area. That is, even if there was a substrate influence on Chadic, which is actually quite plausible given the typological differences between Chadic and its Afro-Asiatic relatives, we cannot know what that substrate was, nor can we know whether the pervasive presence of the feature in Chadic can be attributed to this substrate.

The considerations above equally apply to the role of Chadic and other similarly homogenous groups (such as Gbaya-Manza-Ngbaka and Zande) within our CFA of the feature CFNM. While a homogenous distribution of the feature within a given linguistic group (all members of the group carry the feature and are spoken inside the area) does not tell us much on the spatio-temporal dynamics of the feature, a much more informative signal is usually provided by groups that are diverse with respect to the feature, with members both inside and outside the area, especially when it can be complemented by independent information on language and population movements. Thus, in the case of the feature CFNM, various Niger-Congo groups are spoken around the Benue River corridor in the CFA, as well as further to the west in the WFA. At the same time, many Niger-Congo groups are also spoken outside of the CFA and the WFA. We can reasonably hypothesize that the latter Niger-Congo groups have lost the feature CFNM when they moved outside of the area, as when entering the forest zone along the coast of the Gulf of Guinea, for instance, due to some substrate influence (just as, for instance, they developed high lexical frequency of labial-velars in the same coastal regions; cf. Idiatov and Van de Velde 2016, 2018), or when some groups lacking the feature entered the area from outside. For instance, as discussed in Section 5.1, the former type of loss is likely to be the case for the Yoruboid languages in the coastal gap in southwestern Nigeria between two coastal extensions of the CFA while the latter type of loss is likely to be the reason behind the emergence of the major discontinuity separating the WFA from the CFA. At the same time, it is rather unlikely that the feature CFNM should be reconstructed to

higher nodes in the Niger-Congo tree, not even to the Proto Benue-Congo node. A major counterargument to such a deep reconstruction is presented by the general lack of CFNMs in Southern Bantoid languages (with the most noticeable exception of the Bantu languages of the Congo River corridor but, as discussed in Section 5.3, this is clearly a recent development). Within Benue-Congo, their superordinate group, and within Niger-Congo in general, Southern Bantoid languages and especially Bantu languages are generally considered archaic in their typological profile (e.g., Hyman 2011).

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Definite articles and their uses

Diversity and patterns of variation

Abstract: The goal of this paper is to provide the basic outline of a typological study of definite articles, on the basis of both formal and notional criteria, with a focus on European languages. In contrast to earlier contributions to this topic and to recent, more comprehensive typological studies, more attention will be paid to (i) the problems of providing a clear semantic basis for the comparison and (ii) the reconstruction of plausible historical developments, following the leads of Greenberg (1990) and others. In addition to developing a more fine-grained typology of definite articles, the paper will also show that, even in the restricted area of Europe, we find a remarkable diversity in the meaning and use of definite articles.

Keywords: formal and notional criteria for comparison, types of definite articles, diversity of forms and use

1 Introduction

One of the basic assumptions of structuralism (cf. Lazard, 2012), viz., the assumption of the sign as an inseparable union of acoustic image and concept (*signifiant* versus *signifié*), has often been abandoned in linguistics, especially in comparative and typological studies. Only through this change in the theoretical foundations of linguistics has it become possible to base the comparison of languages not only on formal but also on notional criteria and to compare the different ways in which specific meanings are encoded in languages. In the domain under discussion, i.e., definite articles, we can base a comparison on suitable formal criteria and investigate different meanings and uses of comparable forms (e.g., constituents of noun phrases or nouns, preceding or following a noun) or on notional

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criteria like "definiteness" and investigate the different ways of encoding this notion. In further illustration of the second approach, let me briefly mention that the list of formal properties that have been enumerated as markers of definiteness includes the following: word order, sentential stress, adnominal pronouns (Louagie and Verstraete 2015), case, number marking, aspect and topic markers. Both of these approaches and their combination require, however, clear definitions and explications of their basic terms "definite article" and "definiteness".

The goal of this paper is to provide the basic outline of a typological study of definite articles, on the basis of both formal and notional criteria, with a focus on European languages. In contrast to earlier contributions to this topic (Krámský 1972; Nocentini 1996) and to recent, more comprehensive typological studies (Dryer 2005, 2014), more attention will be paid to (i) the problems of providing a clear semantic basis for the comparison and (ii) the reconstruction of plausible historical developments, following the leads of Greenberg (1990), Hawkins (2004) and Heine and Kuteva (2006).

2 Definition, identification, establishing comparability

Definite articles have traditionally been identified and described for modern European languages (Germanic, Romance, Celtic, Basque, Hungarian, Bulgarian) and for Semitic languages. Moreover, emergent articles can be found in the periphery of Europe, i.e., Finnish (Chesterman 1991), Sorbian and Polish (Heine and Kuteva 2006). In fact, definite articles and their contrasts to indefinite ones are often considered to be one of the most characteristic features of Europe as a linguistic area (cf. Haspelmath 2001). The relevant grammatical category was absent, however, in earlier stages of Indo-European languages, with the exception of Classical, post-Homeric Greek. Typological studies have recently shown that something like definite articles is also found elsewhere (in Central Africa, Meso-America and the Pacific).

On the basis of his rich collections of data, Dryer (2005; 2014) has provided a comprehensive description of the diversity found in the forms and uses of definite articles in the world. In one of his contributions to the *World atlas of language structures*, he identifies definite articles cross-linguistically on the basis of the following syntactic criteria: they are free or bound morphemes, constituents of noun/determiner phrases, derived but different from adnominal demonstratives, typically forming an opposition with indefinite articles, and they cannot occur on

their own (i.e., they cannot be heads in the traditional sense of the term) (Dryer 2005: 154). These formal criteria are clearly applicable to the invariant pre-nominal article in English (*the*), to the definite articles in French, which inflect for gender (*le*, *la*) and number (*le*, *les*) and to the definite articles in German, which inflect for gender (*der*, *die*, *das*), number (*die*) and case (*der*, *des*, *dem*, *den* and so on). They also apply to the post-posed articles of Scandinavian (*-en*), Bulgarian (*-ta*, *-to*, *-te*), Romanian (*-ul*, *-a* and so on) and Basque (*-a*, *-ak*).

Dryer's semantic criteria, by contrast, are much more general and less restrictive: definite articles encode "definiteness" and have at least an anaphoric use, i.e., they can have the same referent as an antecedent found in a preceding sentence or text. This definition and the typology it underlies have been criticized as being too broad and too vague and as being therefore applicable to languages which do not meet the criteria generally subsumed under the term "definiteness", such as "uniqueness", "familiarity" and "inclusiveness" (cf. Davis, Gillon and Matthewson 2014). In a more elaborate follow-up article to the brief general sketch required by the *World atlas of language structures* format, Dryer (2014) explains that he wanted to uncover a wider diversity in the use of definite articles than is presented in earlier descriptions and to show that languages with a binary contrast between definite and indefinite articles of the sort found in English are uncommon outside of Europe and the Middle East.

As already mentioned, the main focus of my paper is on European languages. Its goal is to establish more solid semantic foundations for a comparative study of definite articles and to reconstruct the development of these expressions on the basis of available data and plausible processes of semantic change and grammaticalization. The implementation of these goals will be a first step toward a more fine-grained typology of definite articles and ultimately provide a better basis for extending the scope of such a typology to the specific articles of Polynesian languages (cf. Mosel and Hovdhaugen 1992; Moyse-Faurie 1997) and other systems discussed in Dryer (2014). Moreover, it will also be pointed out that, even in the restricted area of Europe, we find a remarkable diversity in the use of definite articles.

The concept "definiteness" that is used in the label for the relevant class of functional expressions is by no means a basic or primitive concept and therefore in need of explication. Using this label in the analysis of articles does not say much more than that an expression of a specific language is translated by the definite article *the* in English. Various attempts to explicate this notion in terms of more elementary ones can be found in philosophical studies (Russell 1905; Frege 1984; Neale 1990), in linguistic studies such as Hawkins (1978) and Abbott (2004) and, more recently, in formal semantic studies such as Elbourne (2010;

2012), Gisborne (2012) and Coppock and Beaver (2015). This is not the place for a detailed discussion of the relevant formalisms. So let me just point out that the more elementary notions used in the relevant explications are the following: "uniqueness", "salience", "existence", "identifiability" and "inclusiveness". Of these elementary notions, "uniqueness" is the most important one. Whenever we use a definite article, as in (1), we presuppose that reference is made to an object or entity that is unique and therefore clearly identifiable in a given context.

(1) a. *Could you pass me* the *salt?*
b. *Let's have a look at* the *church!*
c. The *book I bought yesterday is on the short-list for a prize*.

An additional criterion of salience is important for those cases where several objects meet the description 'church' in (1b) or 'book I bought yesterday' in (1c). In those cases, it has been shown that interlocutors, even at an early age, look for an additional property that distinguishes one entity from the others.[1] Furthermore, in nearly all cases where a unique object is referred to, there is also a presupposition of existence. Nevertheless, it is possible to construct examples where this presupposition is not met, like in (2), where a book has been written by two authors so that there is no "single author" (Coppock and Beaver 2015).

(2) *Houellebecq is not* the *only author of* La vie en rose.

The criterion of inclusiveness or exhaustivity is relevant for plural contexts, where the definite article is quite similar to universal quantifiers like *all*. A request like (3) would generally be meant to include all the cushions outside.

(3) *It is raining. Could you bring in* the *cushions!*

Since plural contexts pose additional problems, we will not consider them any further in what follows. Nor will we consider such quantificational uses as are exemplified by (4), where the definite article is in the scope of and bound by the quantifier *each*.

1 The additional pragmatic criterion of salience does not provide the required solution for counterexamples to the uniqueness requirement like *he is standing at the corner of the intersection* (Coppock and Beaver 2015: 394).The relevant examples have been discussed in a wide variety of studies and, apparently, constitute a limited but systematic set of counterexamples to the uniqueness requirement.

(4) The *mother of each girl was there when their bus left*.

For all of the concepts discussed above, there are precise formal explications in the relevant literature – in some cases, controversial in their details. In summary and without going into the details of a rich literature and complex discussion, we can say that it is the presupposition of uniqueness that is the most important ingredient of the meaning of definite articles. This assumption of uniqueness guarantees that the referent is identifiable for the interlocutor. In the terminology of pragmatics, more specifically in the view of Relevance Theory (Sperber and Wilson 1996), definite articles "come with a guarantee of identifiability".

Given this requirement of uniqueness in a given context, let us now consider the various ways in which a context may identify a unique object. The most important contextual types are described in the following list:

(5) presupposition of uniqueness and identifiability in a certain context:
   a. identification through the situation of speech or universe of discourse (situational use, visibility or general background knowledge)
   b. identification through sufficient description (cataphoric use)
   c. identification by the preceding context (anaphoric use)
   d. identification through appeal to personal memory, partial description (recognitional use, *emploi mémoriel*)
   e. identification by association with an identifiable entity (associative use)

These different ways of contextually identifying the referent of a definite article can be illustrated by the following examples:

(6) a. *Pass me* the *salt*. *Today* the *sun is shining*. The *Pope will come to Paris*.
   b. The *book I bought yesterday is under discussion for the Nobel Prize*.
   c. *Somebody stole my bike yesterday but they have already found* the *thief*.
   d. *You remember* the *restaurant we went to recently*. *That is where I found a wallet*.
   e. *We laid out the picnic*. The *coffee was still warm*.

These are the five context types most frequently distinguished in the literature (cf. Hawkins 1978; Löbner 1985; Himmelmann 1998; De Mulder and Carlier 2011). In (5) and (6), they are listed in the order of their historical development. The most basic way in which a referent might be unique and thus identifiable is its presence in the context of speech, as in (1a) and (6a). A slight extension of this domain of identification then leads to referents that are unique in a universe of discourse:

the Pope, the sun, the government, the weather and so on.[2] We know that there are many suns in the universe but there is only one that is of interest in the context of our weather. A dedicated militant of a political party will simply speak of "the party", whenever she makes reference to her own group and can even give that identification a high scalar value by stressing the definite article (*THE* [ðiː] *party*). In the anaphoric and cataphoric uses of the definite articles, the referents are given in the co-text, in the preceding co-text for anaphoric reference, as in (6c), and in the following co-text for cataphoric reference, as in (6b). Note that definite descriptions, i.e., the identification of a referent through a description of its salient properties, is simply regarded here as an instance of cataphora. The recognitional use (*emploi mémoriel*) requires a search in the memory of interlocutors rather than in the co-text or the non-verbal context. According to Himmelmann (1997), this use of demonstratives has played the decisive role in the development of the definite article. A characteristic feature of this use is the explicit appeal to the hearer to search for the relevant context in his/her memory. Finally, the associative use requires that a referent is identifiable through its association with another one given in a context (cf. Clark and Marshall 1981). There are many relations between entities that provide such a bridge: part-whole, as in (6e), or action-instrument, as in examples like (7).

(7) *Our neighbor was killed.* The *weapon was found two days later.*

3 Origin and historical development

Let us now consider in how far the preceding ordering of relevant contexts for the use of definite articles has historical relevance and squares with the historical evidence provided by relevant data. There is clear historical evidence and general agreement that definite articles – at least in Europe – derive from adnominal demonstratives. This development is a younger phenomenon, only (post-Homeric) Greek and Old Norse had articles among the ancient languages of Europe. Right from the start we must admit, though, that the available historical information is limited and does not enable us to clearly reconstruct and document the

2 One of the reviewers pointed out that absolute unica or entities conceived as such (*church*, *sun*) could appear without articles in older stages of European languages. It is quite plausible to assume that, in those stages, the relevant nouns were used as proper names.

relevant processes of granmaticalization so that we partly have to rely on synchronic evidence.

In his frequently cited paper, Greenberg (1990) distinguished three stages in the development of definite articles from demonstratives, as in Table 1.

Tab. 1: Greenberg's (1990) stages of the development of definite articles

Stage 0	Stage 1	Stage 2	Stage 3
distal demonstratives	definite article	general article	noun marker

In Hawkins (2004) and Heine and Kuteva (2006), this schema is further elaborated to include four stages. In our elaboration of these schemata, we will distinguish five stages, including the use of demonstratives as a separate stage and the development of specific articles in Polynesian languages as a further development, whose details are not very clear, however. The two hierarchies in (8) and (9) roughly characterize the co-evolution of form and meaning in the historical development of definite articles, exclusive of Greenbergs final stage.

(8) demonstratives > strong article > weak article > generic article > specific article

The labels listed and ranked in (8) correspond to the uses in (9).[3]

(9) exophoric > endophoric (anaphoric/cataphoric) > associative > generic/abstract > specific

Let us now take a detailed look at labels and uses, at the relevant historical developments and at individual expressions manifesting a particular use.[4] It is an essential property of demonstratives that they have an exophoric, pointing and contrastive use. They can be used with a pointing gesture and identify entities in

3 What the chains described in (8) or (9) primarily indicate is the development of a new use. Languages differ, however, in whether the use to the left is kept or not in addition to acquiring the new one, i.e., the relevant articles differ in their degree of grammaticalization. In contrast to English, definite articles can still be used exophorically in German and the weak articles of Frisian can still be used for unique entities (cf. Ebert 1970).

4 A more detailed discussion and documentation of the relevant semantic changes, of controversies and relevant data is presented in De Mulder and Carlier (2011).

contrast to others (e.g., *I want THIS book* [gesture] *and not the other*). Demonstratives of all syntactic and semantic types generally have anaphoric and cataphoric uses in addition to the exophoric one but what is maintained in the two endophoric uses of demonstratives is the contrastive element (e.g., *yesterday I bought a book and THIS book I will give to my mother*), which is no longer expressed by definite articles like English *the*.[5] So in the first stages of their development to articles, demonstratives do not only lose their exophoric (gestural) use but also their contrastive meaning. This is exactly the reason why an anaphoric use of an adnominal demonstrative is not a sufficient condition for using the term "definite article" for the relevant expression.

There is good evidence for Romance languages that it is typically the distal demonstrative (Latin *ille*) that gives rise to definite articles (French *le*/*la*/*les*). Given, however, that demonstratives invariably also have an anaphoric use, it should not come as a surprise that some articles seem to be based more clearly and exclusively on this anaphoric use. This is the case not only for those articles derived from Latin *ipse* (*es*, *sa* in Western Catalan and Sardinian) but also for combinations like *ledit* 'said' in Middle French and all combinations of verbs of saying with demonstrative elements (German *der erwähnte*/*besagter* 'said', English *the aforementioned*) or from verbs of saying alone (cf. De Mulder and Carlier 2011). Mention should also be made in this connection that the deictically neutral demonstrative *ce* in French manifests the properties of the first stages in the development of a demonstrative to a definite article, i.e., the anaphoric and the anamnestic (recognitional) use (cf. De Mulder and Carlier 2006).

German and Dutch manifest another interesting, intermediate stage in the development of demonstratives to definite articles: reduced forms of the demonstratives, identical to the definite articles, have an anaphoric pronominal use, in which they contrast with personal pronouns in the choice of the antecedent they relate to. Consider the minimal pairs in German in (10) and (11).

(10) German

a. *Der Hausbesitzer$_i$ informierte den Handwerker, bevor er$_i$ nach Hause ging.*
'The owner of the house informed the workman, before going home.'

b. *Der Hausbesitzer informierte den Handwerker$_j$, bevor der$_j$ nach Hause ging*.
'The owner of the house informed the workman, before he went home.'

5 In contrast to the invariant definite article *the* in English, its German counterparts still have an exophoric use: *ich möchte DAS Buch* 'I would like to have that book'.

(11) a. *Emma liebt ihre$_i$ Tochter und ihre$_i$ Freunde.*
'Emma loves her daughter and her (own) friends.'
b. *Emma$_i$ liebt* [*ihre$_i$ Tochter*]$_j$ *und deren$_j$ Freunde.*
'Emma loves her daughter and her (daughter's) friends.'

These examples show that the relevant reduced demonstratives are used as pronouns rather than adnominally. Moreover, they are used anaphorically like personal pronouns, with which they contrast in (10) and (11). In contrast to the latter, however, they do not pick out the subject as their antecedent but another one, viz., one that the personal pronoun could not relate to without ambiguity, as indicated by the co-indexation and the English translation. What we find here is a change from the nominal exophoric use of demonstratives to an anaphoric one, with the same formal reductions also found in the definite article, accompanied by a loss of the exophoric use only, i.e., without a loss of the contrastive component. This component of contrast now manifests itself in a differential choice, i.e., in the choice of an antecedent different from that made by personal pronouns. The question of how this choice is best described (obviative, non-subject, non-topical antecedent) is a matter of some controversy and will not be pursued any further at this point (for a more detailed discussion, cf. Bosch, Rozario and Zhao 2003; Bosch, Katz and Umbach 2007).

The relevant step in the change from an exophoric to an anaphoric or cataphoric use is the fact that the search for a unique referent is transferred from an external situation to a search in the co-text, either preceding or following. Only if this change is accompanied by a loss of the contrastive meaning can we speak of an emergent article, however. In contrast to the anaphoric use, the cataphoric use provides an identification via a description, i.e., by a relative clause or any other nominal adjunct. In German, there are combinations of articles and distal demonstratives which, through their composite forms, clearly illustrate the transition from demonstrative to definite article in the cataphoric use (*der-jenige* 'he who', *die-jenige* 'she who'). These forms are typically employed in cataphoric contexts, i.e., with a following relative clause (e.g., *diejenigen Studenten, die noch nicht bezahlt haben, möchten dies bitte bald tun* 'the students who have not paid yet are kindly asked to do so immediately'), even though their anaphoric use is also marginally possible.

The next stage in the development of definite articles involves a major step in the availability of a context for identification, from an external, situational or textual context to a more abstract context of association, of memorizing or of general availability in a universe of discourse. It is here that we find the associative and recognitional use (*emploi mémoriel*) of articles, as well as those cases where

the cultural or local context provides a unique referent. The associative use, as in (6e), is often regarded as the crucial step in the development of a definite article, since this use is not available for demonstratives.

In this domain beyond the anaphoric and cataphoric uses of demonstratives and articles, some languages (varieties of Low German, Frisian, Scandinavian and Standard German) draw a distinction between two types of definite articles: a strong one (pragmatic definiteness) and a weak one (semantic definiteness) (cf. Heinrichs 1954; Ebert 1970; Löbner 1985, 2011; De Mulder and Carlier 2011; Schwarz 2013, 2014). On the basis of the available literature, the distinction in the use of these two definite markers can roughly be described as follows: (i) the strong article manifests the situational use, the anaphoric one, including pseudo-anaphors (e.g., *Bill left – the fool had forgotten his money*) and typically also the cataphoric one; (ii) the weak article occurs in associative contexts, in reference to unique entities in the universe of discourse, as well as in generic contexts. In Standard German the regularities are somewhat more complex (cf. Bosch 2013; Schwarz 2013; 2014). A distinction of this kind only shows up in connection with the fusion of definite articles and prepositions, subject to additional phonological constraints (*im*, *am*, *zum*, *vom*, *beim*, *zur*, *ins*, *ans*), which is in contrast to the strong, non-fused form. The latter manifests the anaphoric and cataphoric uses whereas the fused forms typical exhibit the associative use, as well as the use related to unique referents given in the abstract universe of discourse, and also occur in generic sentences. In minimal pairs like (12), the weak article refers to an abstract institution whereas the strong article refers to a specific building, similarly to the use versus non-use of definite articles in English.

(12) a. *Karl geht noch* zur *Schule*.
'Charles still goes to school.'

b. *Karl ging* zu der *Schule hin*.
'Charles went to the school building.'

c. *Karl ist* im *Gefängnis*.
'Charles is (doing time) in prison.'

d. *Karl ist jetzt* in dem *Gefängnis*.
'Charles is now inside the prison.'

e. *Ich möchte* zur *Kirche gehen*.
'I would like to go to church.'

Examples like (12) also show that weak definites in their fused forms have special semantic properties in German, in addition to their contextual restrictions. As pointed out by Bosch (2013), they often involve some semantic enrichment over and above their local information, they lack the existential presupposition typically found in connection with strong definites and the identification of a referent is typically not required or possible. Sentences like (12a) and (12c) identify a location but also express the activity associated with that location. And an utterance like (12e) could meet with a response pointing out that there is no church in the relevant area.

The next step articles typically take in extending their use is the domain of abstract terms and generic sentences. Note that, in contrast to (13) and (14), all preceding examples were episodic sentences. French and Italian are clear examples of languages where generic sentences and expressions denoting abstract terms require the definite article whereas this is only optional in German and unusual in English.[6] In the abstract and generic use, reference is made to kinds and to abstract entities (cf. Behrens 2005).

(13) a. La *solitude est difficile à supporter*. (French)
b. *(*Die*) Einsamkeit ist schwer zu ertragen*. (German)
c. *Loneliness is difficult to live with*.

(14) a. Les *faucons sont des oiseaux de proie*. (French)
b. *(*Die*) Falken sind Raubvögel*. (German)
c. *Falcons are predator birds*.

The final stage, i.e., the one that leads from definite articles as found in Europe to specific articles, is based on highly controversial assumptions and no convincing semantic reconstruction has been proposed so far. An extension in the use of definite articles to merely expressing specificity is assumed in Hawkins (2004: 85) and subsequently adopted in Heine and Kuteva (2006: 103). This assumption is, however, rejected by Himmelmann (1997: 107), who assumes that specific articles evolve directly from demonstratives.

6 One of the reviewers pointed out that, in Spanish and French, generic uses of definite articles were already observable in the very first texts, although they were less frequent. This greater time depth of the generic use offers an explanation for their obligatory nature in current use but throws some doubt on the historical scenario assumed above.

Let us now look at some of the relevant languages and data. Specific articles are found in Polynesian languages and also in a few Melanesian ones (cf. Mosel and Hovdhaugen, 1992; Moyse-Faurie 1997). The relevant articles in Polynesian languages (*le* in Samoan and East Futunan, *te* in Maori and East Uvean), for example, are not only used in contexts which require definite articles in European languages but also for the introduction of a discourse referent and for contexts where an indefinite article would be used in most European languages. The opposition between a specific and a non-specific use of the indefinite article in English, for example, is expressed by the contrast in (15) between specific *le* and non-specific *se* in East Futunan.

(15) East Futunan

a. *E iai* le *Pilitania e fia ʻavaga a malia mo ia*.
'There is an Englishman Malia wants to marry.'

b. *E faka ʻamu a Malia ke ʻavaga mo* se *Pilitania*.
'Mary would like to marry an Englishman.'
(Moyse-Faurie, p.c.)

For such contrasts, the terms "specific" versus "non-specific" articles are indeed appropriate: the article *le* has lost the uniqueness presupposition but has retained the existential implication typically associated with the definite article. So far, we can still speak of semantic loss or erosion. On the other hand, specific articles are also used for emphatic (contrastive) assertion of membership in a class in contrast to another, as in (16) from East Uvean.

(16) East Uvean

Ko te *fafine ia, mole ko* te *tagata*.
'It is a woman, not a man.'
(Moyse-Faurie 2016: 77)

An analysis which sees specific articles as further developments of definite articles as they are found in Europe has to assume that these articles have not only lost their essential property, i.e., the presupposition of uniqueness, but have also re-acquired the contrastive use of demonstratives. Another explanation for the various uses of specific articles could be sought in the conceptualizations they express. We could assume, for example, that classes are conceptualized as individuals in Polynesian languages but further evidence would have to be provided

for that assumption. On the basis of such an assumption, the use illustrated by (16) would express the contrast between two individuals rather than between two members of two classes. It is therefore not clear whether specific articles are really a further development of definite articles. Given that our perspective is primarily a typological one, we will not pursue this question any further.

Analogously to the labels and functions ordered in the two hierarchies in (8) and (9), we can also now rank the relevant semantic changes (extension of contexts) as in Table 2.

Tab. 2: Semantic changes in the development of definite articles

Stage 1	**Stage 2**	**Stage 3**	**Stage 4**	**Stage 5**
exophoric contrastive	anaphoric cataphoric (sufficient description) *employ mémoriel* (loss of contrastive and exophoric use)	abstract context universe of discourse extension of context from co-text to abstract universe of discourse	generic, abstract non-referential non-episodic contexts	specific contrastive loss of uniqueness

So far, nothing has been said about a use found in some languages (Greek, Catalan, Romanian and Albanian; optionally in German and Italian) where definite articles are redundant, viz., their use with proper names (cf. Nocentini 1996). In Modern Greek, definite articles are not only used before proper names of people but also together with place names, with the names for planets, months, holidays and years, with generic and abstract terms and even in combination with adnominal demonstratives. In German and Spanish, the use of articles in combination with some of these names is possible but often involves a slight change of meaning. A pejorative, honorific component or an implicature of familiarity is added. Most of these uses are excluded in English and French.[7] Interestingly enough, the use of definite articles with proper names is excluded in Standard Basque, a language which completely excludes bare nominal phrases in argument positions (Etxebarria 2014). For these and other reasons, it cannot be assumed that the redundant use of definite articles is the result of a further development at the right

7 In French and Italian, place names (towns, cities) can only combine with the definite article if they are followed by a relative clause (e.g., *le Paris que j'avais connu il y a vingt ans* 'the Paris that I knew twenty years ago'), unless the article is an integral part of the name (e.g., *La Hague*).

end of our scale. The development of totally redundant uses of definite articles cannot be analyzed as being part of a wide-spread chain of grammaticalization but must be a lateral development.

4 Syntactic diversity in the use of definite articles

After this brief sketch of semantic differentiations described in terms of grammaticalization let us now look at some of the most striking parameters of variation in the syntax of definite articles. In the available typological surveys (Krámský 1972; Lyons 1999; Dryer 2005), the following parameters of variation are invariably mentioned: availability of articles, one or two types, free form versus affix, interaction with morphological categories and delimitation from demonstratives. More detailed studies on individual phenomena have additionally revealed the insights in Sections 4.1 to 4.4.

4.1 Multiple use of definite articles in nominal phrases

This is found, inter alia, in Albanian, Modern Greek, Yiddish, Romanian, Arabic, Scandinavian and Bavarian (cf. Plank 2003). This multiple occurrence is connected with the normal and special ordering of adjectives, as in (17). In French, superlatives require a double use of the definite article (e.g., *l'étudiant le plus intelligent* 'the smartest student').

(17) Modern Greek
  a. i *kondés fústes*
     'the short skirts'
  b. i *fústes* i *kondés*
     'the short skirts'
  c. i *kondés* i *fústes*
     'the short skirts'
     (Joseph and Philippaki-Warburton 1987: 51)

4.2 Co-occurrence with demonstratives, possessives or both

This is found, inter alia, in languages like the following: Italian, Modern Greek, Hungarian, Chamicuro (Amazonian), Polynesian, Tîrî (Melanesian), Abkhaz and Guarani (cf. Haspelmath 1999). This double marking of definiteness, as in (18), seems to be connected with the time of development of the definite article.

(18) Italian
Ho perduto la *mia giacca*.
'I've lost my jacket.'

4.3 Differential/extended use with respect to semantic context (generic, mass, deixis, proper nouns)

This can be observed in European languages. As already pointed out, languages differ with respect to the extension of their use to certain contexts. From a synchronic perspective, we can rank languages according to the frequency with which definite articles are used, since there are more or less clear subset relations for restrictions on the omission of the definite article (cf. Longobardi 1994, 2001; Dahl 2004; Behrens 2005) – which, for some languages, yields roughly the hierarchy in (19).

(19) Greek > Basque > French, Hungarian > German > English

4.4 Use inside of adpositional phrases

As pointed out by Himmelmann (1998), definite articles are more exceptional in prepositional phrases than in noun phrases. This can clearly be demonstrated for languages like Romanian, Albanian, Tagalog, Bantu and Germanic and for locative or temporal nouns in Polynesian languages. Such tendencies can also be observed in specific constructions in many European languages. Himmelmann (1998) offers a historical explanation for this asymmetry: definite articles develop relatively late and the article-less syntax of prepositional phrases is retained.

Fine-grained comparisons between European languages clearly reveal such asymmetries but the differences tend to be construction-specific and no generalizations are possible even across genealogically related languages. In (20) to (23), a few examples concerning French, German, Italian and English are given.

(20) smell: English = German = Italian ≠ French
  a. *This smells of cow, cat, cabbage, flowers.*
  b. *Das riecht nach Kuh, Katze, Kohl, Blumen.*
  c. *Ça sent* la *vache,* le *chat,* le *chou,* les *fleurs.*

(21) manner of motion: English = French = Italian ≠ German
  a. *go by train/bus/plane/boat/on foot*
  b. *mit* dem *Zug/Auto/Fahrrad/Flugzeug/Schiff reisen/fahren* (versus *zu Fuß gehen*)
  c. *aller à pied/en vélo/en voiture/en avion/en bateau/en avion*

(22) institutions: German = French ≠ English[8]
  a. *go to school/church/work/hospital/prison*
  b. zur *Schule/Kirche/Arbeit/*ins *Krankenhaus/Gefängnis gehen*
  c. *aller á* l'*école/à* l'*église/*au *travail/à* l'*hôpital/en prison*

(23) musical instruments: variation within English
  a. *play* the *piano/guitar/flute/saxophone/trombone* (British English = Italian)
  b. *play piano/guitar/flute/violin* (American English = German)

In cases like the preceding ones, we enter the domain of non-referential uses of definite articles, which may, therefore, often be omitted.

5 Summary and conclusion

Definite articles made their first appearance in European languages around the turn of the first millennium and are thus not a category inherited from Indo-European. What exactly triggered this development of demonstratives is discussed controversially in the relevant literature but it is quite plausible to assume that

8 Detailed corpus studies on variation in the use of the definite article across regional and textual varieties of English can be found in Hundt (2016, 2018). Most of the variation pointed out by her is a matter of "more or less" rather than "either-or".

both their semantic and syntactic properties were involved in their development and grammaticalization. Leiss (2000) argues that it was the loss of aspectual distinctions and case inflection in Early Germanic that led to emergence of definite articles. Quantificational distinctions expressed in some languages by case distinctions (partitive versus accusative) or by verbal prefixes can be transferred to article systems. On the other hand, definite articles can be regarded as a natural extension in the meaning and use of adnominal demonstratives, also found in other subclasses of demonstratives. As far as their syntax is concerned, articles are structure builders, since they occur at the periphery of a noun phrase, either before or, more rarely, after all other modifiers of a noun phrase. In processing sentences, we know that the relevant constituent is a noun phrase, as soon as we meet an article (Hawkins 2004: 76).

It was the main goal of this paper to discuss the diversity in syntax, meaning and use of definite articles across languages, with a specific areal focus on Europe, and, in doing so, complement the typological picture presented in Dryer (2014). It was shown that such comparative studies need to have clear semantic foundations, which can be provided by formal explications of such notions as uniqueness, salience, existence and exhaustiveness, traditionally known to play a role in the semantic analysis of definite articles. On the basis of such a comparative basis, it is possible to reconstruct the historical development of definite articles in its basic outline and to distinguish different types. In addition to manifesting a variety of syntactic differences across languages, definite articles were also shown to differ strikingly in their use.

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Pathways of evolution, contiguity and bridging contexts

Abstract: Semantic maps, to which Johan van der Auwera has brought a major intellectual contribution, are a representation of implicational relations in the typological domain. They have increasingly been used to chart historical evolution. They are arranged as a series of contiguous cells that define pathways of variation and change. The questions raised concern the rationale for the contiguity arrangement. It is demonstrated on the basis of novel diachronic analyses that the cells making up a semantic map should be semantic functions and that the contiguous arrangement of these functions relates to the existence of bridging contexts. Because evolution from one function to the next is made possible by bridging contexts, a specific pathway of function pairs defines the evolution of items that can only proceed between cells that share bridging contexts.

Keywords: language change, bridging contexts, language variation, n-word, counterfactuality

1 Introduction

Johan van der Auwera has significantly contributed to inform the theoretical debate about the conditions of typological and diachronic variation in grammar. His proposals have helped clarify the nature of the implicational relations that capture the extent of possible typological, synchronic and diachronic variation of grammatical items. In this contribution, we focus on diachronic change and propose an answer to the major question of the cause of ordered pathways of implicational relations. Why is there a tendency for (a family of) grammatical expressions to evolve across a series of functions in an orderly way? Why should movement verbs, deictic expressions, perfect tenses and indefinites typically

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evolve into future markers, definite articles, past tenses and negatives respectively in a number of unrelated languages? The proposal that we develop here is that such pathways of evolution exist because contiguous functions share bridging contexts. Bridging contexts enable change from one function to the next and thus explain the order of contiguous functions that shape a pathway of change. While the claim has been made before that bridging contexts play a role for language change (Traugott 2012a and references therein), it has not always been substantiated with detailed empirical mapping. This is what this paper does, by looking at two cross-linguistically well-established cases of change in French. The available quantitative evidence regarding the evolution of negative polarity items (henceforth NPIs) into negative words (n-words) and of perfect or past tenses into modal markers supports the role of bridging contexts as a condition of language change and as a determinant of the order of change from one function to the next.

2 Pathways of evolution, contiguity of functions and bridging contexts

A major type of language variation and change involves expressions that get associated with different functions. This conjunction of functions is not random but tends to be realized following an ordered pathway that constrains possible configurations synchronically and diachronically. Pathways of typological variation have been represented through semantic maps by Haspelmath (1997). Semantic maps are visual representations of implication relationships designed to capture typological generalizations. As an illustration, let us look at the semantic map of indefinites in Figure 1.

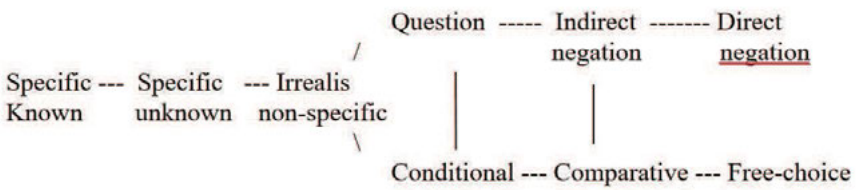


Fig. 1: Haspelmath's (1997: 64) semantic map of indefinites

The map visualizes the implication relationship constrained by the contiguity between the conjoined cells. Thus, synchronically, (families of) indefinite items that

are found in questions can also potentially be found in indirect negation, conditional clauses and *irrealis* environments. They cannot "jump" a cell and be used with direct negation, in comparatives and as a specific unknown, for instance. The contiguity condition similarly constrains diachronic evolution, even though semantic maps were not originally designed for that purpose. An item that expresses *irrealis* is expected to evolve, if it does, by going successively through the various contiguous cells in an orderly way.

The design of such maps contributes to the theoretical and empirical understanding of variation and change by raising at least two questions, regarding the nature of the cells and the condition of contiguity between them.

On the one hand, indeed, why have these particular cells been chosen? One suspects that selection is based on contexts that recur in grammatical descriptive work. Not all relevant contexts are, however, included (lexically inherent negatives, sequences commanded by *before*), and one is left wondering which should and which should not. What is more, as both van der Auwera and Van Alsenoy (2011a) and Larrivée (2011) regret, the content of the cells refers to different levels of analysis. Specific known, specific unknown and *irrealis* are semantic categories; questions, comparatives, conditionals, indirect negation and direct negation are syntactic contexts; and free-choice is both. The unfortunate result is that one use of an item could occur in two cells at the same time: specific unknown *someone* could well occur in a conditional (e.g., *if someone calls, let me know*). And the same context could host items with different interpretations: conditional can happily host specific indefinites, as we have just seen, but also negative polarity items (such as *any* in *if anyone is found on the grounds, security will be annoyed*) and, possibly, free-choice (e.g., *if you hang around with just anyone, you'll get into trouble*). More generally, the interaction between item and context is not considered. To take a fairly obvious case, negation is a licensor for negative polarity (as in the solitary attitude expressed by *I do not hang around with anyone these days*) but it can exert focus on a free-choice item (as in the exclusivity claimed by *I do not hang around with just anyone*). These considerations led van der Auwera and Van Alsenoy (2013: 31) to propose a more functional type of cell, as in Figure 2.

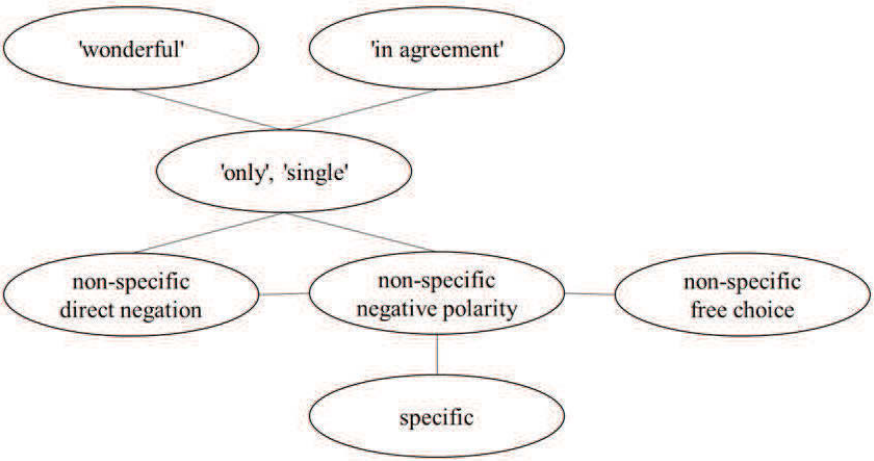


Fig. 2: van der Auwera and Van Alsenoy's (2013: 31) semantic map of *any*

Since both contexts and functions such as specific indefinite, negative polarity and n-word characterize the behavior of (a morphological family of indefinite) items, Larrivée (2011) suggests that it may be wise to map both. The functions would chart the higher-level map, complemented by a set of contexts subordinate to each. While the details of the map design need to be worked out, the idea from both proposals is that a map designed from functions might account more robustly for typological, diachronic and synchronic variation.

On the other hand, the contiguity condition deriving from implicational relationships appears as a desirable constraint on pathways of synchronic and diachronic variation. Haspelmath (1997) points out that this reveals a variation that is more limited than one might expect from a purely Saussurean arbitrary association between a phonological form and a particular meaning. However, particular arrangements might make unsupported predictions. Van der Auwera and Van Alsenoy (2011b: 335) remark that Dutch *niemand* 'no one' can be used in questions and direct negation but not with indirect negation, in contradiction to the contiguity principle. It may thus be that, while the contiguity principle is correct, the particular arrangement of cells may not be. Basing the map primarily on functions rather than contexts may help distinguish between language-specific behavior and general patterns of evolution. However, the question remains as to why contiguity of functions should constrain the evolution of items on a pathway of change. To take a concrete illustration, why do n-words such as *nothing* tend to emerge from negative polarity items such as *anything*, which themselves arise from specific indefinites such as *someone*? Why should items not jump a step and

go directly from specific indefinites to n-words, for instance? Larrivée (2003) tentatively proposes that contiguous functions share the largest number of semantic traits between them but concedes that this is a potentially circular proposal in need of empirical support. The proposal that we put forward and substantiate in this paper is that the cause of the contiguity condition between functions on a pathway of change is the existence of a bridging context that relates them. It is because there is a bridging context between NPIs and n-words that they are regularly related through variation and change. Such relations are not normally found between specific indefinites and n-words since there are no bridging contexts between them. This proposal maintains a ban on jumping over cells which constrains variation in a desirable way while explaining why things are ordered and why they are ordered in the way they are.

The notion of bridging context calls for some clarifications. It can be conceived of as an environment that is compatible with two interpretations of a given expression. Thus, expressions occurring in a bridging context provide input for new generations of speakers to reanalyze them and, as such, bridging contexts are often considered as the condition of language change. Whether the change is necessarily effected by children as the new generation of speakers is a point of some debate (see Diessel 2002 and references therein). For one thing, children do not have the sociolinguistic prestige to force actuation of change. Moreover, it is well-known that language changes during the life of speakers (Diessel 2002). But whether it is children or adults who effect the reanalysis, it seems plausible that language-internal ambiguity plays an important role in grammatical change. The different steps of ambiguity-led change have been discussed by Heine (2002), Diewald (2002) and Traugott (2012a, 2012b). We gloss over the details of the various models and of the putative relations between them to summarize the general points of agreement. It is generally assumed that an item can acquire a new meaning because it occurs in a context that allows both its conventional meaning and the new target meaning. Such contexts are known as bridging contexts because they act as bridges between source and target. A bridging context must be distinguished from a so-called switch context, which is compatible with the target meaning only, exclusive of the source interpretation. An illustration would be the interpretation of the present perfect in *I have bought the car last year*, where the temporal phrase makes it clear that a past reference (the target meaning) is at stake rather than a resultative one (the source meaning) which would require a present reference. In many cases, it is difficult to know whether the target meaning is a conventional property of the item or just a potential reading of it. The final stage of the change is one in which the target meaning is fully conventionalized.

A debate concerns the stage at which the target meaning becomes foregrounded (Heine 2002; Traugott 2012a).

It is striking that, despite the plausible nature of this model and its popularity in typological and diachronic research, little empirical support has been adduced to buttress it, although works by Diewald and a few others come to mind (e.g., Diewald 1999 on German modal verbs; Diewald and Ferrarresi 2008; Giacalone Ramat and Mauri 2009 on the temporal and adversative adverb *tuttavia*). What would prove that a context promotes change from a source to a target meaning? An experimental protocol is proposed by Cournane (2014), which is very interesting but clearly quite elaborate, and it is not clear whether it can be replicated for all changes. A replicable approach is one that examines corpus data with a quantitative method. Traugott (2012b) provides a detailed analysis of future markers developing from the movement expression *be going to*. The compatibility of both readings with a majority of contexts of use for a long period makes the precise bridging context difficult to pin down. This raises the question whether there is always a bridging context for change and whether all changes involve ambiguity between the source and target interpretation. Diewald (1999) claims that opacity of the source meaning is sufficient for change to take place. Traugott and Trousdale (2014) point out that no obvious ambiguous context comes to mind as a candidate for bridging changes in information structure value. The questions of whether all changes involve ambiguity arising from one precise bridging context could be answered confidently once a sufficient body of quantified empirical results has been brought together to characterize changes where ambiguous contexts play a definite role.

In this section, we have proposed that regular language change finds its cause in the occurrence of an expression in an ambiguous context that allows it to be reanalyzed with a new function. The grammatical changes thus mapped should correspond to the contiguous cells of the relevant semantic map, especially if the contents of cells relate to functions. Empirical evidence with respect to the role of bridging contexts in grammatical change is provided by the two following sections.

3 From NPIs to n-words?

In the previous section, we have suggested that the reason why grammatical items evolve from one function to the next in an orderly way is that these functions are related by a bridging context. However, the demonstration that such bridging contexts play a causal role in language change, in the cases where they

can reasonably be expected to play such a role, remains, on the whole, to be provided. This is what this section contributes to by examining critical aspects of the evolution of n-words in medieval French.

There is substantial empirical evidence in a well-documented language like French that items that became n-words like *no one* were NPIs like *anyone* in previous historical periods. This evolution is documented in a number of traditional and recent studies (e.g., Martineau and Déprez 2004; Prévost and Schnedecker 2004; Vanderheyden 2010; Ingham 2011; Kallel and Ingham 2014; Labelle and Espinal 2014). Martineau and Déprez (2004) provide quantitative data showing that the positive indefinite use of *rien*, as in (1), and *aucun*, disappears during the 17th century, that the NPI use, as in (2), varies between 10% and 30% in the medieval period and that a majority of negative uses, as in (3), is found from the 17th century onward.

(1) *Quant la* rien *que ge plus amoie / Voi morte, vie que me vait?*
'When the *thing* that I loved most I see dead what is life worth to me?'
(Foulet 1970: 272)

(2) *Honnis soit ki* rien *lour donra.*
'May he be casted out he who will give them *anything*.'
(Foulet 1970: 275)

(3) *Il (ne) leur donne* rien.
'He gives them *nothing*.'

However, the chronology seems conservative in that, for instance, NPI uses are uncommon in contemporary vernacular French. This may be related to the fact that the data used come from the literary corpus Frantext. Moreover, there is no breakdown of figures per main contexts of use. Based on administrative material presumably closer to the vernacular practice than literary sources, Ingham (2011) and Kallel and Ingham (2014) provide partial quantitative information on some contexts of use of future n-words, more specifically, in conditional clauses. However, this context is chosen because it epitomizes the NPI function of items and is therefore unlikely to be the critical context that makes the change from NPI to n-word possible.

This highlights the issue of which contexts should particularly be paid attention to in the study of change from NPI to n-word. Which context can be considered as a bridging context between NPI and n-word functions? Remember that a bridging context is one which is compatible with both functions of an item, in

which therefore reanalysis can occur. In other words, a bridging context from NPI to n-word should be compatible with both interpretations of an item. Haspelmath (1997: 154) and Breitbarth (2014: 60) propose that comparatives could be the context in question. If so, one would expect comparatives to allow both for an NPI and n-word reading to occur with target expressions. However, the expected ambiguity does not seem to arise. Consider the sequences in (4) to (7) with English NPI and n-words in the equality and superiority comparatives.

(4) *He's as good as anyone.*

(5) *He's better than anyone.*

(6) ?? *He's as good as no one.*

(7) ?? *He's better than no one.*

The NPI reading is available in converging contexts (4) and (5), which contain an NPI. However, with the English n-word in (6) and (7), it is not clear whether an NPI reading is possible: if acceptable, these sentences do not assert that the person in question is better than anyone; they rather deny that they are better at all. So English shows a complementary distribution, where the NPI has an NPI reading and the n-word an n-word reading. The expected ambiguity is not provided by comparative contexts.

There is one context that does provide the expected ambiguity. It is that of a strong NPI, under the direct scope of *without* and sentential negation.[1] Consider (8) and (9).

(8) *He was left without anyone to talk to.*

(9) *He was left without no one to talk to.*

1 Following standard formal definitions, whereas weak NPIs depend on a downward entailing environment where there is an entailment from superset to set (*I didn't eat a single vegetable* entails *I didn't eat kale*). Strong NPIs depend on the more stringently defined anti-additive property such that a negation of conjoined phrases implies the conjunction of two negated sequences (*no kale or spinach was sold* entails *no kale was sold and no spinach was sold*). For more details on this, see, for instance, Krifka (1994).

The NPI reading seems available in both sequences. Although the *without no one* sequence might be frowned upon by prescriptivists, it seems prevalent enough and the attestation in (10) raises no comprehension problem.

(10) *Have you ever ridden a bus or the train feeling bored without no one to talk to and wishing that you were listening to something good?*
(http://www.sampleessaytopics.info/trying-to-sell-an-ipod-essay)

Thus, both NPIs and n-words can occur in strong polarity environments with an NPI reading. How does that fact show that an NPI can be reanalyzed as an n-word? It does so because, in that context, an NPI is indistinguishable from an n-word. An item that occurs in that context can therefore be reanalyzed as an n-word by some speakers. In (11), the item *aucun*, under the command of 'without' and clausal negation, can be analyzed either as a commanded NPI or as a concording n-word.

(11) a. *ledict suppliant a esté et est de bonne vye et renommée et s'est honnorablement gouverné,* sans *jamays avoir esté attainct ne convaincu d'*aucun *villain cas*
'the said supplicant is and has been of good repute and had behaved well, *without* ever having been convicted of any/no *judicial case before*'
b. *dudit suppliant qui n'avoit* jamais *eu* aucune *disputte ne querelle avecq ledit deffunct*
'the said supplicant who never has had any/no dispute with the said dead man'

What is crucial is the inability, in that context, to distinguish whether one is dealing with an NPI or an n-word, making the reanalysis possible.

The question of which context bridges the two readings remains an empirical matter, however. It would be necessary to examine cases of evolution from NPI to n-word to establish whether strong NPI environments indeed play a particular role at the period of change. The expectation is that, if strong NPI contexts allow NPIs to be reinterpreted as n-words, they should be preponderant right before and during the period of change. How preponderance is to be understood is still to be established. This gap is what Kallel and Larrivée (2016) are intending to fill. This study aims to determine what the bridging context is in the evolution from NPI to n-word functions, whether it corresponds to a strong NPI context and whether this context can be demonstrated to play a preponderant role at the time of change. One way to establish such preponderance would be to determine that

there is a significantly higher rate of use of the relevant items in strong NPI contexts before they acquire a majority of n-word uses. In order to answer these questions, the study examines the evolution of contemporary French n-words. French is a well-documented language, with continuous prose material for a variety of genres since the end of the 13th century. This variety of genres allows to focus on material other than literary texts. The reason to do so is the stylistic dimension of literary genres that tends to make the language used more conservative and further removed from the immediate competence of speakers. The evolution of a new series of n-words is further known to be taking place in medieval French. One such evolution is that of *aucun* 'no(ne)', which goes from a specific indefinite equivalent to 'some' to an NPI equivalent to 'any' and, in a final stage, to an n-word equivalent to 'none' by the 17th century. Other n-words have already completed a similar evolution, like *rien* 'nothing' by 1300 or are yet to complete it, like *personne* 'nobody', which starts having n-word uses by 1700. In our study, the behavior of *aucun* was examined in a set of strictly comparable judiciary texts called remission letters. These are letters in which a culprit describes in narrative format the crime he or she has committed and asks for royal pardon against a financial payment. The document is drafted at the local level and received, finalized and archived by the Royal Chancery. This means that the language broadly reflects that of a single geographic region, i.e., Paris. Such letters were produced from the mid-14th century to the 18th century, are plentiful, dated and localized and tend to be edited without the extensive interventions that literary texts may have been subjected to, including normalization of orthography and insertion of punctuation. Groups of remission letters separated by about 50 years have therefore been looked at. The occurrences of *aucun* were extracted and each categorized as to whether it represented a specific indefinite, an NPI in weak or strong context or a pre-verbal or post-verbal n-word. Furthermore, in order to exclude formulaic sequences that might not reflect the immediate competence of speakers, strings including *aucun* that were likely to represent fixed phrases were excluded. The results are presented in Table 1.

Tab. 1: Evolution of functions and contexts for productive uses of *aucun* in remission letters

	Neg		NPI		Specific indefinite	Totals
	Pre-verbal	Post-verbal	Strong	Weak		
1357–1360	0	2	12	26	11	51
1422–1435	3	24	18	6	57	102
1487	2	61	49	11	126	241
1531–1532	2	35	56	3	70	169
1580–1600	0	41	91	24	16	172
1688–1783	1	9	5	1	0	16

The important pieces of information are the emergence of the preponderant n-word function and the proportion of uses in strong NPI contexts. It is not before the latest period that *aucun* most frequently functions as an n-word. That period is represented by only a small number of occurrences: the corpus of later remission letters is smaller due to the destruction of many sources at the time of the Revolution. Nonetheless, this is only a partial concern since it is independently known that *aucun* had gained n-word status by the 17th century. The crucial observation supported by a sufficient number of occurrences is that of the preponderant function at a given period. The strong NPI context represents over 50% of the 172 cases of *aucun* in the late 16th-century period. The use in the bridging context at preponderant rates obtains in the period that immediately precedes the period in which *aucun* has a majority of n-word uses.

These results are important in that they support the bridging context scenario of language change. It supports the view that the strong NPI context plays the role of bridging context between the two contiguous functions of NPI and n-words. The reported investigation shows that the bridging context represents over 50% of occurrences in the period immediately before the change. There is therefore a suggestion that the hypothesized preponderance of bridging contexts immediately before the change is the case and may be represented by a threshold of half the occurrences.

In this section, we have reported on one recent study (Kallel and Larrivée 2016) that provides empirical support for the bridging context scenario of change. The new evidence shows that the use in a bridging context is preponderant just before a change occurs. Of course, more data is needed to confirm this. If confirmed, the results help resolve a mystery about grammatical variation, as underlined by semantic maps, which is why evolution occurs along an orderly pathway

of functions. Change occurs from one function to the next without a jump because pairs of functions are related to one another by specific bridging contexts that do not relate non-adjacent functions. Whether bridging contexts can be demonstrated for other types of change is pursued in the next section.

4 From perfect/past to counterfactuality

Another well-known case of semantic variation exhibited by grammatical items is that of perfect/past markers which may also express modality. Indeed, in many languages, it is the same markers that give a perfect viewpoint on a situation or refer to the past and, in parallel, convey a modal attitude toward the speech content or toward the hearer (hypothesis, counterfactuality, politeness, suggestion and so on). Examples (12) to (15) are a few illustrations from English.

(12) *If I* won *the lottery*, *I* would travel *the world*.

(13) *I wish he* had invited *me to his birthday*.

(14) *I* wanted *to ask you a favor*.

(15) *It's high time we* came *back home*.

This functional variation is well-documented cross-linguistically (e.g., James 1982; Fleischman 1989; Thieroff 1999; Iatridou 2000; Van linden and Verstraete 2008) but barely diagrammed by means of semantic maps (but see Patard 2014 for the modal uses of preterits and imperfects). We would like to argue that the two types of functions are not randomly conjoined across languages but that they are historically connected by bridging contexts allowing for semantic reanalysis. The existence of bridging contexts also attests to the fact that the connection between the two functions follows an orderly pathway from tense/aspect to modality and not the other way round (see also Patard 2014). In the section, we focus on one specific type of such functional variation: perfect or past markers meaning counterfactuality. Bridging contexts between these semantic functions will be evidenced by historical data concerning one verbal tense from French: the so-called *conditionnel passé*.

The *conditionnel passé* is morphologically the perfect version of the conditional tense, which is etymologically an alethic[2] periphrasis conjugated in the imperfect tense (Benveniste 1974; Bourova 2005). Originally, the conditional tense – and therefore its perfect version, the *conditionnel passé* too – expresses two distinct functions (Patard 2017): a future-of-the-past function (in indirect speech) – the situation lies in the future of a past moment (generally expressed by a *verbum dicendi*) – and a hypothetical function – the speaker does not specify whether the situation is true or false ('neither p nor non-p'). Hence, the *conditionnel passé* may express the anteriority of a future-in-the-past situation, as in (16), or of a hypothetical situation, as in (17).

(16) *Je me dis … qu'elle ne pourrait plus rien exiger quand je l'*aurais replacée *au milieu de sa famille.*

'I told myself … that she would not demand anything when I *had put* her within her family.'

(B. Constant, 19th century)

(17) *Si cette clef ne quittait jamais Mlle Stangerson, l'assassin* aurait *donc* attendu *Mlle Stangerson cette nuit-là, dans sa chambre, pour lui voler cette clef.*

'If this key never left Miss Stangerson, then the murderer *would have waited* for Miss Stangerson this very night, in her room, to steal the key.'

(G. Leroux, 20th century)

However, in Modern French, the *conditionnel passé* further conveys counterfactuality: the denoted situation is contrary-to-facts; it cannot be helped anymore ('non-p'). This reading, which has become by far the most frequent in Modern French, is obtained, for instance, in if-sentences, as in (18), or with a modal verb, like deontic *devoir* in (19).

(18) *Si je m'étais obstiné à aller à Rome, j'*aurais perdu *Milan.*

'If I (had?) persisted to go to Rome, I *would have lost* Milan.'

(B. Napoléon, 19th century)

2 According to Bourova and Tasmowski (2007: 28–29), the Latin periphrasis *INF + habere* conveys alethic necessity *lato sensu*, i.e., a logical necessity: the situation is necessarily the case in whatever possible world. Its meaning is close to that of the English construction *be to + INF*.

(18) *J'*aurais dû *fuir, je n'osais pas*.
'I *should have* run away, (but) I did not dare to.'
(G. Bernanos, 20th century)

A closer examination of the synchronic data confirms what van der Auwera and Van Alsenoy (2011b, 2013) and Larrivée (2011) recommend for the mapping of grammatical variation, i.e., that it should primarily rely on functional variation and not on syntactic contexts. Notably, we may observe that the two epistemic interpretations of the *conditionnel passé* (hypotheticality and counterfactuality) share common syntactic contexts: they may both occur in conditional sentences but also in combination with modal verbs. Indeed, the hypothetical reading is also possible with a modal verb, like epistemic *pouvoir* in (20), in contexts where the speaker ignores the reality status of the situation.

(20) *Cet œil n'appartenait pas non plus à Alain Kernoul, comme Hervé* aurait pu *le* croire.
'This eye does not belong either to Alain Kernoul, as Hervé *might have thought*.'
(F. Du Boisgobey, 19th century)

These facts suggest that syntactic contexts are not always relevant to map grammatical variation. If we were to draw the semantic map of the *conditionnel passé*, the distinction between the use in conditional sentences, the use with modal verbs and the use in other contexts would not be discriminative. The map would rather rely on semantic functions: future-of-the-past, hypotheticality and counterfactuality.

The evolution of the *conditionnel passé* further raises the question of diachronic variation: how can a perfect (conditional) tense turn into a counterfactual marker? Was this evolution conditioned by bridging contexts? A quantitative study of a diachronic corpus (Patard, Grabar and De Mulder 2015) allows us to trace the semantic evolution of the *conditionnel passé*, as in Figure 3.[3]

3 The corpus covers the period from the 11th century to the 20th century and is composed of 152 texts (literary for the most part) distributed into ten sub-corpora representing each century. The whole corpus numbers almost 9.8 million words (see Patard, Grabar and De Mulder 2015 for more details).

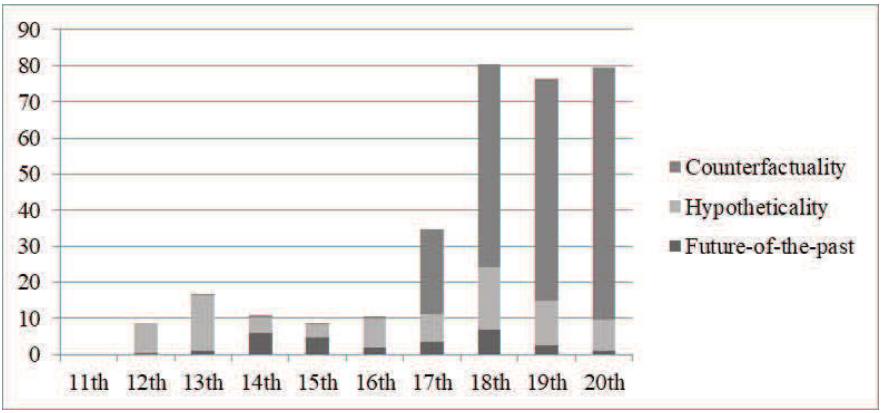


Fig. 3: Evolution of the semantic functions of the *conditionnel passé* (normalized frequency per million words)

The data show that the counterfactual reading was possible in quite an early period, from the 13th century, only one century after the first attestations of the *conditionnel passé*. At that time, the counterfactual reading was extremely rare, though, the main interpretations being those of anterior future-of-the-past and anterior hypothetical marker – see (16) and (17). The counterfactual interpretation only expanded from the 17th century, yielding a sweeping rise in frequency (from around ten occurrences per 100,000 words to more than 75 occurrences per 100,000 words after the 17th century).

We may consider that bridging contexts exist since the 13th century when the hypothetical *conditionnel passé* starts licensing a counterfactual interpretation (even if this is sporadic until the 17th century, as mentioned before).[4] In these bridging contexts, the *conditionnel passé* is a hypothetical marker – it says nothing about the reality status of the hypothesized situation ('neither p nor non-p') – which gives a perfect viewpoint that usually gives rise to an anteriority interpretation – the situation is anterior to another situation given in the context. Counterfactuality may then be expressed by contextual items which specify the epistemic status of the hypothetical situation as being contrary-to-facts ('non-p'). Thus, in earlier texts, we typically find the use of pluperfect subjunctives in the protasis, such as *eust été* in (21).

4 The future-of-the-past *conditionnel passé* found in indirect speech contexts is not concerned by the semantic change.

(21) *Si lui dirent li pluiseurs que, SE il* eust esté *au païs, que cil de l'Escorta n'*auroient fait *ce que il firent*.

'Thus, most of them told him that IF he *had been* in the country, men from Escorta *would* not *have done* what they did.'

(Anonymous, *Chroniques de la Morée*, 14th century)

But, crucially, counterfactuality is the result of a reinterpretation of the *conditionnel passé* that is induced by the context. This reading is brought by two successive inferences: (i) a past entailment and (ii) a counterfactual implicature.

First, the perfect aspect of the *conditionnel passé* entails past when it refers to situations that are anterior to other past situations described in the contexts. For instance, in (21), the state of affairs described by the *conditionnel passé* ('would not have done') is anterior to the past situation denoted by *dirent* 'told'. The perfect aspect of the *conditionnel passé* consequently entails that the hypothesized situation is past. The past entailment will conventionalize from the 17th century and overshadow the perfect aspect in certain contexts one may associate to Heine's (2002) switch contexts, thus following the evolution pathway of perfect forms suggested by Bybee, Perkins and Pagliuca (1994: 105): resultative > anterior > past.

Then, the past interpretation joined together with the hypothetical meaning implicates counterfactuality due to our experience and conception of time. Time is perceived and conceived (at least in Western cultures) as asymmetrical: past is the domain of the irrevocable and the known, as opposed to the future, which is the domain of the possible and the unknown. As a consequence, when a speaker talks about a hypothetical situation that is past, he suggests, by default, that the situation was not the case, because we usually know what happened. In short, making a hypothesis about the past implicates counterfactuality. That is how the *conditionnel passé* allows for the interpretation of the counterfactual meaning that will conventionalize in the 17th century.

To sum up, the bridging contexts of the *conditionnel passé* are contexts where (i) the denoted hypothetical situation is anterior to a past situation, as in (21), and (ii) the speaker knows what happened in the past (this is the case by default). Thus, in the case of the *conditionnel passé*, critical contexts do not correspond to a specific morphosyntactic environment but to a functional type of context, in which anteriority to the past is expressed in a context of known past. This seems to give further confirmation to the fact that a functional mapping of grammatical variation and evolution may be more appropriate. Moreover, it is interesting to note that, a century before the increase of counterfactual contexts, namely in the

16th century, the contexts where the *conditionnel passé* serves to denote past situations have also increased by comparison with the previous period. This is part of the general aorist drift that affects French perfects from Old French following Bybee, Perkins and Pagliuca's (1994) evolution pathway: resultative > anterior > past. This trend is illustrated in Figure 4, adapted from Patard, Grabar and De Mulder et al. (2015).

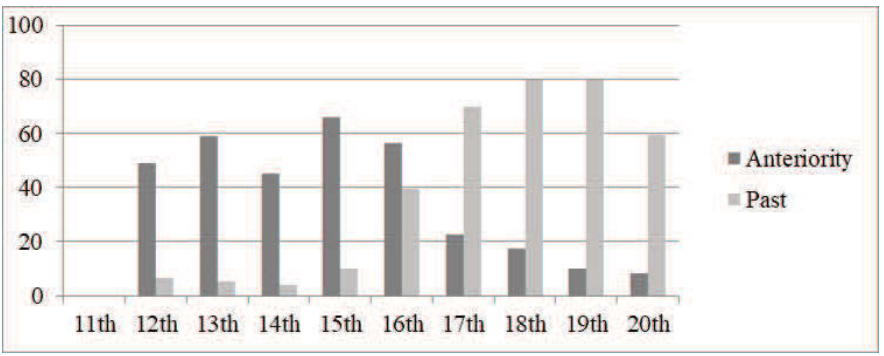


Fig. 4: Evolution of anterior and past interpretations (percentages)[5]

In other words, the *conditional passé* tends more to entail past from the 16th century, thus paving the way for the swiping rise of counterfactual contexts in the following century. Notice, however, that these past contexts do not necessarily correspond to bridging contexts – far from it – since the counterfactual implicature remains very marginal at that time (compare with Figure 3). Indeed, most cases correspond to contexts of ignorance, where the speaker does not know what happened in the past. Hence, the epistemic status of the past hypothetical situation remains indeterminate ('neither p nor non-p'). This is the case for instance in interrogative contexts.[6] So bridging contexts are not only contexts inducing past entailment but also contexts of epistemic ignorance.

5 Anteriority was coded for cases where the denoted situation is anterior to another situation described in the same sentence. Past is coded for cases where the situation precedes the time of utterance. As a consequence, the same token could be coded for both anteriority and past (see Patard, Grabar and De Mulder 2015 for more details).

6 An example is *ce maulvais vent, qui court, t'*auroit *il bien* poulsé *hors de la Court?* (Marot, *L'Adolescence Clémentine*, 16th century) 'this ill wind, which blows, *would* it have indeed pushed you outside the Court?'.

One may finally point out that the bridging contexts we have just described do not exactly follow the mainstream definition according to which both the source meaning and the target meaning are available. In the case of the *conditionnel passé*, bridging contexts are not ambiguous because the hypothetical meaning and the counterfactual meaning cannot be interpreted at the same time: either the reality status of the situation is unspecified ('neither p nor non-p') or it is specified as counterfactual ('non-p') but it cannot be both. This suggests that bridging contexts have more to do with the interpretation of pragmatic inferences than with semantic ambiguity.

To conclude, the inference of counterfactuality in bridging contexts implies that the semantic evolution of the *conditionnel passé* follows a pathway from perfect to past and, ultimately, to counterfactuality. This shows that the conjunction of these functions across languages is not random but that they are historically connected by the conventionalization of pragmatic inferences. The evidence for bridging contexts further involves that the connections between these functions are strictly oriented, from aspect to tense and to modality (and not the other way round).

Furthermore, we may note that the inference of new meaning in bridging contexts is not a sufficient condition for semantic change. It is only during the following stage of switch contexts that the new grammatical interpretation expands and conventionalizes as an effect of its increased frequency. In the case of the *conditionnel passé*, the multiplication of contexts allowing for the counterfactual inference is clearly caused by systemic changes occurring in the same period, namely the decline of the competing subjunctive forms (imperfect and pluperfect subjunctives), the generalization of the non-perfect conditional tense in hypotheticals and the development of the aorist interpretation of perfect forms (see Patard, Grabar and De Mulder 2015 for a detailed analysis). Bridging contexts thus appear to be a necessary condition rather than a causal factor.

5 Conclusion

In this paper, we have revisited the issue of language-internal grammatical change in connection with semantic maps, by examining two diachronic evolutions in French: that of NPIs into n-words and that of the *conditionnel passé* from hypothetical perfect to counterfactual past.

Semantic maps define pathways of evolution by a series of contiguous cells. These cells, we have insisted, represent functions rather than contexts. Moves between contiguous functions thus shape diachronic evolution. This raises the

question why such a contiguity condition should constrain grammatical change in the way it does. We have brought together evidence to support the claim that the contiguity condition is a consequence of the way change occurs. The modality of change is through use in contexts that, at least in some cases, allow ambiguity between two functions. A bridging context allows for items with an established function to acquire a new function. This explains why evolution is mapped by an orderly pattern of functions that are related by bridging contexts. There are no jumps across functions because there are no bridging contexts between non-contiguous functions. Thus, this paper has empirically substantiated the idea that evolution is constrained by bridging contexts. It has also highlighted the role of frequency in grammatical change by showing that, in both cases, the proportion of potentially critical contexts – i.e., strong negative polarity contexts and past contexts – has increased during the period immediately preceding the functional change.

With a view to future work, we note that the identity and role of bridging contexts will vary according to the evolution under consideration. It should be clear from our discussion that, while the evolution of NPIs and the *conditionnel passé* relate to bridging contexts, they do so in a slightly different way. The status of an item as NPI or n-word is ambiguous in bridging contexts (strong negative polarity environments) because an NPI is indistinguishable from an n-word in such contexts. By contrast, the reading of the *conditionnel passé* in bridging contexts (contexts with anteriority to past situations and epistemic ignorance) is not ambiguous but unequivocally counterfactual, the new meaning being crucially inferred from contextual information. In other terms, semantic ambiguity seems crucial in one case while bridging contexts rely more on pragmatic inferences in the other. This raises the issue of the nature and definition of bridging contexts, which seem to vary as to the way they allow for reanalysis – an issue that remains to be explored in future research.

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Jacques Moeschler

On the pragmatics of logical connectives

Are connectives truth-functional?

Abstract: This paper discusses the issue of connectives in natural language, adopting a formalist approach in pragmatics. The outcome is that truth-conditional connectives are limited to conjunction, disjunction and conditional, and that negation, even in its metalinguistic and non-truth-conditional usages, has representational contextual effects, as suppressing a proposition and a presupposition or strengthening a proposition. As regards discourse connectives, they exhibits a strong pragmatic property, that is, they almost all exhibit factivity. Finally, quasi-synonym connectives, as causal ones, do not differ in meaning but in the way their conceptual and procedural meanings are distributed at different layers.

Keywords: conjunction, disjunction, conditional, negation, causal connectives, concessive connectives

1 Introduction

A small subset of connectives in natural language are clear counterparts of logical connectives. As we shall see, this is not tantamount to a question of identity of meaning rather than to a question of lexical entry, since the logical conjunction, disjunction, conditional as well as the operator of negation are linguistically translated in English as *and*, *or*, *if* and *not*.

Even if the relation between logical and linguistic meaning has given rise to a huge literature in semantics and pragmatics (e.g., Allwood, Andersson and Dahl 1977; Gazdar 1979; Mauri 2008; Humberstone 2011; Mauri and van der Auwera 2012), it is not completely clear whether linguistic uses of logical connectives should be connected to their logical meaning, that is, to truth-conditional meaning.

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In a nutshell, there are three principal positions about the relation between logical and linguistic meanings of logical connectives: a formalist account, represented by Gazdar (1979), a non-formalist one, represented by Ducrot (1989), and a Gricean perspective, mainly represented by neo-Gricean pragmatics (Horn 1972, 1984, 1989; Levinson 2000) and post-Gricean pragmatics (Blakemore 1987; Sperber and Wilson 1995; Carston 2002).

In this contribution, I will mainly advocate the formalist approach, even though this position seems to be the first to be abandoned due to the scarcity of its empirical covering. Though I have recently defended the Gricean perspective (Moeschler 2010, 2017a), I would like to formulate a very counterintuitive explanation. The main argument I will develop is that the formalist view is the only one which seems to give rise to some conclusions about semantic universals and general pragmatic principles. I will also point to some drawbacks of the neo- and post-Gricean explanations and will address a more general issue which is connected to the semantics-pragmatics interface (Moeschler forthc.).

In this paper, I will not deal with the non-formalist approaches, even though they address interesting questions from a pragmatic point of view (see Moeschler 2017a for a general comment on these approaches).

2 The classic Gricean approach

Let us start with the classic Gricean account of logical connectives. In the first pages of *Logic and conversation*, Grice (1975: 41, 43) addresses the issue of logical connectives as an introduction to his theory of meaning, claiming that the standard approaches in logic and philosophy of language – the formalist and the non-formalist ones – do not address accurately the relation between logical devices and natural languages:

> It is a commonplace of philosophical logic that there are, or appear to be, divergences in meaning between, on the one hand, at least some of what I shall call the FORMAL devices – $\neg$, $\wedge$, $\vee$, $\supset$, (x), $\exists$(x), $\int$x (when these are given a standard two-valued interpretation) – and, on the other, what are taken to be their analogues or counterparts in natural language – such expressions as *not, and, or, if, all, some* (or *at least one*), *the*. ... I wish, rather, to maintain that the common assumption of the contestants that the divergences do in fact exist is (broadly speaking) a common mistake, and that the mistake arises from an inadequate attention to the nature and importance of the conditions governing conversation.

In a nutshell, the Gricean story works like this: logical connectives have as semantics their logical truth-conditional meaning while their pragmatic uses are

derived by implicature. For instance, the temporal meaning of the conjunction *and* is the result of the respect of the maxim of order ("be orderly"), the exclusive meaning of a disjunction (*or*) is the result of the respect of the first maxim of quantity ("make your contribution as informative as required (for the current purposes of the exchange)"), and the biconditional reading of *if* (conditional perfection) is a by-product of the second maxim of quantity ("do not make your contribution more informative than is required"), the maxim of relevance ("be relevant") and the submaxim of brevity ("be brief"). Examples (1) to (3) are illustrations of these uses.

(1) *He took off his trousers and got into bed.*
Implicature: 'He took off his trousers *and then* got into bed.'

(2) On a menu: *Cheese or dessert.*
Implicature: 'Not cheese and dessert.'

(3) *If you mow the lawn, I owe you 10 euros.*
Implicature: 'If you don't mow the lawn, I don't owe you 10 euros.'

Let us examine these three connectives.

2.1 *And*-pragmatic meaning: implicature or explicature?

The implicature type of solution meets with a lot of issues, however, the more serious having been addressed by Cohen (1971), Carston (2002) and Wilson and Sperber (2012) (see Blochowiak, Castelain and Moeschler 2015 for an experimental testing of this problem). First, as regards *and*-implicature, the Gricean explanation says nothing about when *and* is interpreted as 'and as a consequence'. In other words, the causal interpretation of *and* cannot be explained by any conversational maxim. So, in this case, (4) should be restricted to the meaning 'and then', and not 'and as a consequence':

(4) *He turned the key and the engine started.*
a. 'He turned the key *and then* the engine started.'
b. 'He turned the key *and as a consequence* the engine started.'

This has led Levinson (2000: 37, 114–115) to propose a different stance, in which the hearer is invited to enrich *and*-interpretation as far as he can, to obtain the

most informative interpretation, via an I-implicature. In that case, the interpretation depends on the I-Principle and the I-heuristics:

> I-Heuristics
> What is expressed simply is stereotypically exemplified.
>
> I-Principle
> Speaker's maxim: the maxim of Minimization; "Say as little as necessary". ...
> Recipient's corollary: The Enrichment Rule. Amplify the informational content of the speaker's utterance, by finding the most specific interpretation.

So, the I-heuristic invites the addressee to go up to the temporal, causal and consequence interpretation, the latter being the most informative one.

However, this explanation has given rise to some crucial issues, mainly because the non-truth-conditional pragmatic interpretation for *and* cannot explain why (5) is not a tautology. In effect, if *P and Q* and *Q and P* are truth-conditionally equivalent and *P and then Q* is an implicature, (5) should give rise, from a semantic point of view, to a non-informative reading and its logical structure (6) should be trivially true (from Wilson and Sperber 2012: 171).

(5) *It's always the same thing at parties: either I get drunk and no-one will talk to me or no-one will take to me and I get drunk.*

(6) *P and Q, or Q and P*

Manifestly, in (5), *P and Q* does not equal truth-conditionally *Q and P*, which has led Wilson and Sperber (2012) to propose that the *and*-enrichment is a process occurring not at the level of implicature but at the level of explicature, that is, the enriched and developed full propositional form. So, the only pragmatic reading of (5) is the result of a pragmatic process, occurring at the level of explicit content, as in (7).

(7) *P and then Q, or Q and then P*

In sum, the *and* case, which seems to be a paradigmatic case, combining both the logical meaning of a conjunction and the non-truth-conditional meaning of a generalized conversational implicature, does not bring any solution to the pragmatic enrichment issue.

The two other cases, *or* and *if*, illustrate similar problems, but with different consequences.

2.2 *Or*-meaning: why implicatures are not enough

The second problematic case is illustrated by the *or*-implicature. In a Gricean framework, *or* triggers an implicature because the speaker has a choice for a stronger alternative, that is, *and*. So, if the speaker cannot assert *P and Q*, he prefers to assert the strongest statement possible which does not flout the first maxim of Quality ("do not say what you believe to be false"). In other words, the use of *or* communicates the speaker's ignorance: he does not know which disjunct is true. This is clearly the case in the Gricean example in (8).

(8) Daughter: *Where is mom?*
Father: *In the bathroom or the kitchen.*

In this case, as the mother cannot be in both places at the same place, the only possible interpretation of *or* is its exclusive meaning, which is a stronger truth-conditional meaning than the logical inclusive disjunction connective. Moreover, as regards its truth-conditional meaning, *and* is the strongest connective, since the conjunction is only true if both conjuncts are true.

Tab. 1: Truth conditions for conjunction ($\wedge$), inclusive ($\vee$) and exclusive disjunction ($\bar{\vee}$)

P	Q	P $\wedge$ Q	P $\vee$ Q	P $\bar{\vee}$ Q
1	1	1	1	0
1	0	0	1	1
0	1	0	1	1
0	0	0	0	0

However, the Gricean explanation does not make explicit the reason why the stronger connective for *or* is *and* and does not explain why the *or*-reading is not inclusive but exclusive. In other words, the explanation via the first Quantity maxim does not explain why this *or*-interpretation is more restricted and excludes the situation in which both disjuncts are true.

It is only in the neo-Gricean framework that this explanation is provided. More specifically, in Horn's (1972) proposal, the relevant notion is that of *semantic scale*: in a semantic scale $<\alpha, \beta>$, where β is a weaker expression than α, that is, α entails β, the assertion of β implicates the negation of α. Gazdar (1979: 59) gives the following definition of a scalar (potential) implicature:

> *Φ* scalar-quantity-implicates that the speaker knows that it is not the case that *Ψ* if and only if there is some sentence *Ψ'*, just like *Ψ*, except that it contains a "weaker" scalar expression, and which is entailed by *Φ* and is either identical to *Φ* or form a part of it.

Now, how is it possible for *or* to implicate its exclusive meaning? Gazdar's (1979) reasoning uses a logical demonstration, based on *or*-implicature. Suppose that the semantic scale is <*and, or*>, as the truth conditions in Table 1 show. Then, the two following entailment (→) and implicature (+>) relations hold, given in (9):

(9) Entailment: *P and Q* → *P or Q*
Implicature: *P or Q* +> *not* (*P and Q*)

Gazdar's (1979: 59)'s simplified demonstration is given in (10).

(10) i. $P \vee Q$
ii. $\neg (P \wedge Q)$ implicature of (i)
iii. $P \bar{\vee} Q$ entailed by (i) and (iii)

Step (iii) must be explained: how can the exclusive meaning of a disjunction be entailed both by the inclusive disjunction and its implicature? Here is the explanation: the *or*-exclusive meaning is the conjunction of *or*-semantics and *or*-scalar implicature. This is made explicit in Table 2.

Tab. 2: Truth conditions for exclusive *or*

P	Q	P ∨ Q	P ∧ Q	¬ (P ∧ Q)	P ∨ Q) ∧ ¬ (P ∧ Q)	P $\bar{\vee}$ Q
1	1	1	1	0	0	0
1	0	1	0	1	1	1
0	1	1	0	1	1	1
0	0	0	0	1	0	0

What is surprising is that the implicature is not enough, since the meaning of ¬*(P ∧ Q)* makes the implicature true when both disjuncts are false. Let us comment on this problem.

Suppose that we must choose between two menus in a French restaurant. Menu 1 costs 30€ and includes *fromage et dessert* 'cheese and dessert'. Menu 2 costs only 25€ and mentions *fromage ou dessert* 'cheese or dessert'. So, the choice

is simple. If you want both, you choose menu 1 and, if you want only one plate after the main course, you choose menu 2. Now you know two things by choosing menu 2: first, you cannot have both – this is the *not* (*P and Q*) implicature meaning – and, second, you can choose one item between cheese and dessert. Suppose now that you want a dessert after having chosen cheese in menu 2. The waiter will politely recall that *fromage ou dessert* does not mean both. If you agree and nevertheless want some dessert, then you should pay extra money for it. This seems perfectly reasonable, from a logical and pragmatic point of view. Now suppose that you want cheese and the waiter is embarrassed because there is no more cheese, only dessert. You can accept this but one constraint is not satisfied: even if the client cannot have both, he can choose one of the two and the restaurant must provide both. Finally, suppose that, after the waiter's negative answer about cheese, he answers again negatively in case you accept a dessert. In that case, you are right in having the impression that a maxim has been flouted. Nevertheless, exactly as in the second case, the strict truth-conditional interpretation makes this situation true of *or*-scalar implicature!

Here is the main issue: what is implicated cannot encompass speaker meaning, since what the restaurateur wants to say (means) by writing on the menu *fromage ou dessert* is that only one item can be chosen, even though he is committed to having both. In any case, the pragmatic meaning of *fromage ou dessert* cannot be compatible with neither cheese nor dessert. But this is what the truth conditions of *not* (*cheese and dessert*) predict.

The solution, as shown in Table 2, comes from conjoining the *or*-inclusive meaning with its implicature. In this case, the situation predicted when both propositions are false is ruled out. So, the correct and exclusive meaning, that is, the *or*-exclusive meaning, is obtained via the *or*-inclusive meaning conjoined with its implicature.

Now, if we recall Grice's definition of conveyed meaning, we encounter the classic definition proposed by neo-Griceans (Horn 2004) of what is *communicated*: what is communicated is the addition of what is *said* and what is *implicated*. What is said here is the *or*-inclusion meaning, what is implicated is the negation of the strong alternative expression in the scale, that is, *and*.

In sum, the *or*-case shows that the meaning of an implicature does not exhaust speaker meaning, which raises the question why we must compute implicatures. The answer is that by doing so, we access speaker's meaning indirectly (see Moeschler 2017b, 2017c for a complete proposal about scalar implicature of quantifiers and speaker meaning).

2.3 *If* and the issue of counterfactuals

The third issue is linked to conditional *if*. Since Geis and Zwicky's (1971) influential paper *On invited inferences*, the pragmatic analysis of conditionals has converged on the biconditional interpretation of ordinary conditionals (see also de Cornulier 1985 for an extensive analysis of French *si*; van der Auwera 1997a, 1997b for a general discussion of conditional "perfection"). In other words, ordinary conditionals lead to the biconditional analysis, whose truth conditions are given in Table 3 and logical property in (11).

Tab. 3: Truth conditions for conditional (→) and biconditional (↔)

P	Q	P → Q	P ↔ Q
1	1	1	1
1	0	0	0
0	1	1	0
0	0	1	1

(11) *if and only if P, then Q* is equivalent to *if P then Q and if Q then P*

$P \leftrightarrow Q =_{df} (P \rightarrow Q) \wedge (Q \rightarrow P)$

The pragmatic explanation goes as follows: the use of a conditional in natural language implicates its biconditional meaning. In other words, what is excluded in the biconditional meaning is the situation where the antecedent is false and the consequent is true. This means that a conditional can be true in only two cases: first, when both antecedent and consequent are true and, second, when both are false. These two situations are, from a pragmatic point of view, quite plausible: when both the antecedent and the consequent are true, it makes sense that the conditional relation is true. Conversely, if there is a conditional link, this link is still the case when both propositions are false. These two cases are respectively represented by the suppositional use of conditionals, often called "ordinary conditional" (Moeschler and Reboul 2001) and the "counterfactual" use (Lewis 1973).

So, from a strict truth-conditional perspective, both the ordinary and the counterfactual uses make sense of the truth conditions of the biconditional. Let us examine first the ordinary use in (12).

(12) *If Peter comes to the party, Mary will be happy*.

If both the antecedent and the consequent are true in (12), then, if the antecedent is true, the consequent must be true. There are two possible explanations for this fact. The first one is the result of an invited inference: by asserting *if P, Q*, the speaker means or conversationally implicates *if not-P, not-Q*. Thus, the biconditional meaning is, from a strict logical point of view, what the speaker conveys or communicates: what is said (*if P, Q*) plus what is implicated (*if not-P, not-Q*) equals what is communicated (*if and only if P, Q*).

Of course, the implicature type of explanation should accommodate the cancellation of the implicature. This seems to be correct, since (13) is not contradictory. In other words, the biconditional implicature can be cancelled without contradiction.

(13) *If Peter comes to the party, Mary will be happy but, if he does not come, Mary will be happy anyway*.

The second explanation is more pragmatic but it only covers a small part of conditional uses, that is, conditionals implying a causal relation. In effect, some ordinary conditionals do not imply any causal relation between the antecedent and the consequent, as in (14).

(14) *If this is a triangle, then the sum of its angles equals 180°*.

In (14), the relation between the two propositions is that of a definition: the sum of the angles of a triangle is equal to 180° (see Blochowiak 2017 for more on definitions in relation to connectives).

In contrast, in (12), the relation is causal: Peter's presence at the party will cause Mary's happiness. This causal relation is between events and, more specifically, future events. The temporal operator FUTURE, in this case, scopes over each proposition and not over the conditional relation. So, (15) is the correct semantic interpretation but (16) is not. (16) is best translated as in (17) whereas, in French, the consequent is most frequently in the simple future, as in (18).

(15) if FUTURE (*Peter comes*), then FUTURE (*Mary is happy*)

(16) FUTURE (*if Peter comes, then Mary is happy*)

(17) *In the future, if Peter comes, Mary will be happy*.

(18) *Si Pierre vient à la réception, Marie* sera *heureuse*.
'If Peter comes to the party, Mary will be happy.'

The causal interpretation is not restricted to ordinary conditionals. In the counterfactual one, as in (19), the causal relation is still the case but it concerns past counterfactuals events.

(19) *Si Pierre était venu, Marie aurait été heureuse*.
'If Peter had come, Mary would have been happy.'

What about a causal past relation with no counterfactual interpretation? Apparently, the conditional connective cannot express such a relation. This does not mean that such relations cannot be expressed. A typical causal connective is *because* (French *parce que*). So, the content causal interpretation of *parce que* may be a past content causal relation (Sweetser 1990), as in (20), as well as a present one as in (21), but not a future one as in (22), whose only possible reading is that of a speech act (Sweetser 1990), as in (23).

(20) *Marie était contente parce que Pierre est venu*.
'Mary was happy because Peter came.'

(21) *Marie est contente parce que Pierre est là*.
'Mary is happy because Peter is there.'

(22) # *Marie sera contente parce que Pierre sera là*.
'Mary will be happy because Peter will be there.'

(23) (*J'affirme que*) *Marie sera contente, parce que Pierre sera là*.
'(I affirme that) Mary will be happy because Peter will be there.'

So, ordinary conditionals express future causal relations, while causal connectives are devoted to past and present causal ones. What is more striking is the systematic use of irrealis tenses (like the French conditional and the English subjunctive) for expressing counterfactual conditionals. French *imparfait* describes a counterfactual state or event in the present whereas the French *plus-que-parfait*

describes a past counterfactual state or event (Moeschler and Reboul 2001). The same holds, respectively, for the consequent clause, with the present conditional and the past conditional, as (24) to (27) show.

(24) *Si Marie était heureuse, elle nous le dirait.*
'If Mary were happy, she would tell us.'

(25) *Si Marie avait été heureuse, elle nous l'aurait dit.*
'If Marie had been happy, she would have told us.'

(26) *Si Pierre venait, Marie partirait avec lui.*
'If Peter came, Mary would leave with him.'

(27) *Si Pierre était venue, Marie serait partie avec lui.*
'If Peter had come, Mary would have left with him.'

2.4 Conclusion

In sum, conditionals in natural language seem to be much more complex than involving simply a logical conditional relation (material implication) or the biconditional interpretation (equivalence relation). Moreover, the classic Gricean story seems to be rather poor as an explanation of the pragmatic enrichment of conditionals.

The temptation is thus to abandon the logical description of logical connectives in natural language and to look for more basic cognitively motivated concepts for describing the uses of logical connectives. For instance, concepts like temporal succession and causality for *and*, doubt for *or* and supposition for *if* could be invoked. Although this path is often followed in cognitive and functional linguistics, I would like to propose a formalist explanation and come back to a very strong argument given by Gazdar (1979) for explaining truth-functional connectives in natural language. I will argue that his explanation can give some answers to the question of relations between logical connectives and semantic universals (von Fintel and Matthewson 2008).

3 The formalist approach

To my knowledge, Gazdar's (1979) approach has not been developed in pragmatics (for an exception, see Moeschler and Reboul 1994: Ch. 6). However, he proposes a very convincing argument restricting truth-functional connectives (TFCs) to *and* and *or*.

3.1 TFC

There are sixteen possible TFCs, because the two arguments (propositions) are combined with four truth values: 1-1, 1-0, 0-1, 0-0. They are provided in Table 4 (Gazdar 1979: 69; see Lohiniva 2014 for a full discussion) – the alphabetic labels are Gazdar's (1979).

Tab. 4: Sixteen possible TFCs

P	Q	A	B	C	D	E	F	G	H	I	J	K	L	M	O	V	X
1	1	1	1	1	0	1	0	0	1	1	0	1	0	0	0	1	0
1	0	1	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0
0	1	1	0	1	1	0	1	0	1	0	1	0	0	1	0	1	0
0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1

A corresponds to $\vee$ (inclusive disjunction), B to $\leftarrow$ (material implication from Q to P), C to $\rightarrow$ (material implication), D to $\uparrow(\neg\wedge)$, E to $\leftrightarrow$ (biconditional), F to P, G to $\neg Q$, H to Q, I to P, J to $\bar{\vee}$ (exclusive disjunction), K to $\wedge$ (conjunction), L to $\nrightarrow$ ($\neg\rightarrow$), M to $\nleftarrow$ ($\neg\leftarrow$), O to $\bot$ (contradiction), V to $\top$ (tautology) and X to $\downarrow(\neg\vee)$.

To make this system easier, Gazdar (1979) proposes to reduce the number of connectives to eight, by grouping the arguments to three sets of truth values: {1} = 1-1, {0,1} = 1-0 and 0-1, {0} = 0-0. Table 5 shows the new set of TFCs, that is, the relevant set for deciding which connective is a TFC.

Tab. 5: Candidates for TFCs in natural language

Arguments	A*	D*	E*	J*	K*	O*	V*	X*
{1}	1	0	1	0	1	0	1	0

Arguments	A*	D*	E*	J*	K*	O*	V*	X*
{0,1}	1	1	0	1	0	0	1	0
{0}	0	1	1	0	0	0	1	1

Now, we must decide which connective is a TFC. O* (contradiction) is not relevant for natural language: it would mean that sentences in (28) receive the same truth value, that is, the value "false", whether the sentences are true or false. It can thus be abandoned.

(28) a. *Geneva is an international city* (1) O* (0) *Bern is the capital of Switzerland* (1).
b. *Geneva is not an international city* (0) O* (0) *Bern is the capital of Switzerland* (1).
c. *Geneva is not an international city* (0) O* (0) *Bern is not the capital of Switzerland* (0).

The same argument can be used for V* (tautology), because it would result in considering all sentences in (28) to be true.

The criterion used by Gazdar (1979) is the *principle of confessionality*. This principle states that a TFC cannot yield a true proposition from false arguments. In other words, a TFC (C) must confess the falsity of its argument, by giving thus a false truth value to false arguments:

(29) *A connective $c \in C$ is confessional iff $c(\{0\}) = 0$*
(Gazdar 1979: 76)

This criterion, which refers to the first maxim of Quality ("do not say what you believe to be false"), allows us to reject connectives D*, E* and X*, all yielding a truth value true 1 with false arguments 0. O* and V* have been put aside for reason of relevance, as discussed before. D* is not a classical connective in logic ($\uparrow$ or $\neg\wedge$), but E* corresponds to the equivalence or biconditional connective ($\leftrightarrow$, *if and only if*). So, the last candidates are A*, J* and K*. A* corresponds to inclusive *or* (inclusive disjunction), J* to exclusive *or* (exclusive disjunction) and K* to *and* (conjunction). As we demonstrated that exclusive *or* can be derived from inclusive *or*, the only possible TFCs in natural language are inclusive disjunction and conjunction, that is, *or* and *and*. These two connectives are predicted to be semantic universals.

So far so good, but what about negation and conditional? I would like to argue that negation satisfies the same test as disjunction and conjunction and that conditional, being a non-confessional connective, must be explained at another level, that is, reasoning. Finally, if the principle of confessionality is the right *pragmatic* criterion, then it must follow that all connectives in natural language must be confessional. I will show in Section 5 that this is the case, at least for causal and concessive connectives.

3.2 Negation

Negation is a unary operator, because it has only one argument. There are four possible unary operators, because the truth values for the argument are combined (2^2). They are provided in Table 6 (Gazdar 1979: 68).

Tab. 6: Possible unary operators in natural language

Argument	T	N	P	Q
1	1	0	1	0
0	0	1	1	0

So, what has to be explained is why natural language only have *N* as an operator, that is, negation.

First, T is eliminated by the submaxim of Manner ("be brief"): there is an equivalence between any proposition ϕ and $T\phi$: $T\phi \leftrightarrow \phi$.

Second, P and Q are eliminated because of the maxim of Relation ("be relevant"): whatever the truth value of ϕ and ψ, $P\phi$ is true and $P\psi$ is true, which yields the equivalence between $P\phi$ and $P\psi$: $P\phi \leftrightarrow P\psi$. The same reasoning holds for the operator Q, but with a false truth value: $Q\phi$ is always false and $Q\psi$ is always false, so $Q\phi \leftrightarrow Q\psi$. Thus, only N is available for natural languages. Moreover, N can be used to define T: $T\phi \leftrightarrow NN\phi$.

In sum, negation is the only unary possible operator for natural language. This is good news, because it implies that a negative statement is the falsehood of the proposition over which the negation scopes.

3.3 Conditionals and reasoning

The last issue regards conditionals, because material implication and the equivalence connective are not confessional TFCs – they yield a true proposition from false arguments.

One argument against the principle of confessionality for maintaining conditional and equivalence connectives as TFCs is *reasoning*. In what follows, I will give a similar argument to Gazdar's (1979) for disjunction: as the more specific connective can be obtained via implicature, only the broader one should be considered as a TFC, that is, either the unilateral conditional or material implication ($\rightarrow$ or $\supset$).

Contrary to other connectives, like conjunction, which gives rise to analytic deductive elimination rules ($P \wedge Q \vdash P$, $P \wedge Q \vdash Q$), deductive elimination rules for conditional are synthetic rules (Sperber and Wilson 1995): they yield a true conclusion from two premises, and not from one premise as with analytical rules ($\wedge$-elimination rule).

There are two deductive elimination rules for the conditional connective: *modus ponens* and *modus tollens*, given in (30) and (31) respectively.

(30) *Modus ponens*

inputs	(i)	$P \rightarrow Q$
	(ii)	P
output		Q

(31) *Modus tollens*

inputs	(i)	$P \rightarrow Q$
	(ii)	$\neg Q$
output		$\neg P$

These deductive rules contrast with the deductive schema of an invited inference, which leads to a logically false conclusion (see Mercier and Sperber 2017: 26 for an explicit discussion of conditional inferences), as in (32).

(32) Invited inference

inputs	(i)	$P \rightarrow Q$
	(ii)	$\neg P$
output		$\neg Q$

Imagine the following situation: Paul and Susan are concerned about Mary, because Peter might be present or absent. Susan says *if Peter comes, Mary will be happy*. Two scenarios could happen. First, Peter comes and then Paul and Susan are relieved: Mary will be happy, unless Susan has said something false. So, Susan and Paul's reasoning assumes a true premise, yielding a true conclusion. In other words, what makes sense then of a conditional is that it is presumed to be true. Of course, the bet is the truth of the antecedent.

What happens if the antecedent is false? In that case, the conclusion is pragmatically inferred as false. In our scenario, if Susan hears that Peter cannot come (he missed his plane), then she concludes that Mary will not be happy. However, there is absolutely no logical grounding for this conclusion. The conditional could be true in case the antecedent is false and the consequent true, as Table 3 shows.

Now, what about the counterfactual interpretation? Susan says *if Peter had been there, Mary would have been happy*. Here, neither the antecedent nor the consequent are true: the counterfactual interpretation is obtained because both propositions are supposed to be false. In that case, two ways of obtaining the counterfactual interpretation are possible. The first path is to use the invited inference schema: in that case, the falsehood of the antecedent implicates the falsehood of the consequent. The second path is using the *modus tollens* schema. Suppose Mary appears to be unhappy: in that context, the conditional plus the negation of the consequent leads to the negation of the antecedent, that is, Peter did not come. In other words, the counterfactual interpretation is obtained either by forward (invited inference) or backward (*modus tollens*) reasoning.

So, if the inference schemas are incorporated in the semantics of *if*, then *if* can be a TFC even though it is not a confessional connective.

3.4 Conclusion

In conclusion, we have good reasons to define the set of TFCs as including conjunction, disjunction, conditional and negation. As they are defined truth-conditionally, this means that their semantics are minimal and can be captured by their logical meanings. All the possible pragmatic readings (temporal for *and*, exclusive for *or*, biconditional for *if*) are obtained by pragmatic inference.

To have a complete picture, we should explain some uses of negation classified as metalinguistic, because they are *a priori* non-truth-conditional.

4 Metalinguistic negation

4.1 The classic approaches

Metalinguistic negation is a use of negation where the speaker does not want to deny a positive utterance, as in descriptive negation, but refuses to assert a previous assertion (Horn 1985, 1989), as in (33) to (41).

(33) *Around here we don't eat tom[eiDouz] and we don't get stressed out. We eat tom[a:touz] and we get a little tense now and then.*

(34) *Mozart's sonatas weren't for violin and piano, they were for piano and violin.*

(35) *I didn't manage to trap two mongeese: I managed to trap two mongooses.*

(36) *Anne doesn't have three children, she has four.*

(37) *You didn't eat some of the cookies, you ate all of them.*

(38) *It isn't possible she'll win, it's downright certain she will.*

(39) *John isn't patriotic or quixotic, he's both patriotic and quixotic.*

(40) *I'm not happy – I'm ecstatic.*

(41) *It's not warm out; is downright hot.*

In all these examples, there is no denial of a proposition but the speaker's refusal of asserting a proposition. In Horn's (1985, 1989) analysis, negation is unambiguously truth-conditional but the use of negation in (33) to (41) is not truth-conditional: the speaker refuses to assert the proposition under the scope of negation.

Let us take as a paradigmatic example (36) – for examples such as (33) to (35), see Moeschler (1997). Let us analyse (36) as follows (Moeschler 2013a):

(42) *Anne doesn't have three children* (NEG), *she has four* (COR).

a. *COR* → *POS*

b. not (*Anne has exactly three children*)

First, the corrective clause (COR) entails the positive counterpart of the negative clause (POS): in effect, if X has four children, then X has three children. Second, what does negation scope over? It cannot be POS, because this would imply that POS is under the scope of negation and simultaneously entailed by COR, which would lead to a contradiction, as shown in (43).

(43) not (*Anne has three children*) and (*Anne has three children*)

So, in (42), negation does not scope over the positive counterpart (POS) but over the implicature of POS (i.e., 'Anne has no more than three children'). In that case, (42) is no longer contradictory, as (44) shows.

(44) not (Anne has exactly three children) and (*Anne has four children*)

Now we know why utterances of the form *NEG, COR* with metalinguistic negation are not contradictory. However, there is a surprising consequence of this analysis.

4.2 The representational approach

In some recent papers (Moeschler 2013a, 2017c), I demonstrated that metalinguistic negation, when it scopes over an implicature, has representational effects. In Moeschler (2010) and (2013a), I use the same types of arguments to describe propositional effects resulting from presuppositional negation, when negation scopes over the assertion and the presupposition:

(45) *Abi does not regret to have failed* (NEG), *because she passed* (COR).

In (45), *she passed* (COR) defeats both the assertion *Abi regrets that P* (POS) and its presupposition *Abi failed*.

In both cases, metalinguistic negation scoping over an implicature and a presupposition, the contextual effects are representational:

(46) Contextual effect of metalinguistic negation scoping over a scalar implicature:
strengthening of POS

(47) Contextual effect of presuppositional negation:
suppression of POS and POS presupposition

In other words, both uses of metalinguistic negation entail and implicate representational effects. If this is true, then metalinguistic negation *not-P* means 'the speaker cannot affirm that *P*' and has representational effects. As a conclusion, metalinguistic uses are not special cases of non-truth-conditional meaning: on the contrary, they support a truth-conditional analysis.

5 Discourse connectives as TFCs

One of the main questions that pragmatics must answer is why natural languages display a great number of discourse connectives, such as causal, temporal and concessive ones. At a first glance, none of these connectives seems to exhibit a truth-conditional meaning. Even though a truth-conditional meaning could be partially relevant at the semantic level, the meanings of discourse connectives seem to focus on other properties.

Let us take the *but* example. *But* has truth-conditional properties, like the conjunction *and*. One test for this type of meaning is the equivalence of truth-conditional meanings between *P but Q* and *Q but P*:

(48) a. *Paul is smart but lazy*.
b. *Paul is lazy but smart*.

(48a) has the same truth conditions as (48b) but certainly not the same pragmatic meaning. (48a) is *negatively oriented* and leads to the conclusion that Paul's laziness is a stronger argument than his smartness (Anscombre and Ducrot 1977, 1983). On the other hand, (48b) is *positively oriented*: the sequences in (49) and (50) show that different conclusions are obtained (cf. Ducrot 1980 for the concept of argumentative orientation).

(49) a. *Paul is smart, but lazy: he is not the right person for the TA position.*
b. *# Paul is smart, but lazy: he is the right person for the TA position.*

(50) a. *Paul is lazy, but smart: he is the right person for the TA position.*
b. *# Paul is lazy, but smart: he is not the right person for the TA position.*

As a second property, both conjuncts with *but* must be true: all the combinations in (51) show that *Paul is smart* and *Paul is lazy* must be true if they appear in the sequence *X but Y*.

(51) a. *# Paul is smart but not lazy.*
b. *# Paul is not smart but lazy.*
c. *# Paul is not smart but not lazy.*

Which conclusions can we draw from these facts? Are they specific to *but* or do they, on the contrary, illustrate a general property of discourse connectives? I would like to make the following stipulation: all discourse connectives exhibit factivity, only a few of them being non-factive.

Let us first discuss one possible counterexample. In French, *puisque* 'since' exhibits some interesting properties (Groupe λ-l 1975; Zufferey 2010, 2012).

First, *puisque* can have a counterfactual use (Groupe λ-l 1975). In (52), the speaker knows that his addressee does not know everything and is therefore unable to give him the first three finishers.

(52) *Puisque tu sais tout, donne-moi le tiercé.*
'Since you know everything, give me the first three finishers (in horse race).'

Second, and more generally, *puisque* introduces old or presupposed information, belonging to the common ground, as (53) shows.

(53) *Puisque tu es là, allons dans le salon.*
'Since you are here, let us go to the living room.'

Other causal connectives, like *parce que* 'because', are factive: *parce que* cannot be used if the cause and the consequence are false (Blochowiak 2010, 2014; Moeschler 2016). Even when the causal relation is under the scope of negation, as in (54), negation does not scope over any propositions (presupposed as true) but over the causal relation, as in (55).

(54) *Paul n'est pas tombé parce que Marie l'a poussé, mais parce qu'il s'est pris les pieds dans une racine*.

'Paul did not fall because Mary pushed him but because he walked on a root.'

(55) not (*Mary pushed John* CAUSE *John fell*) and (*John walked on a root* CAUSE *John fell*)

Concessive connectives, on the other hand, defeat one specific inference, like *mais* 'but', *pourtant* 'however' and *bien que* 'although' (Lakoff 1971; Anscombre and Ducrot 1977; Moeschler 1989; Lohiniva 2017). For instance, the same concessive relation can be expressed by different connectives in French, as (56) to (58) show.

(56) *Il est républicain mais honnête*.

'He is a Republican but honest.'

(57) *Il est républicain, pourtant il est honnête*.

'He is a Republican; he is honest, however.'

(58) *Bien qu'il soit républicain, il est honnête*.

'Although he is a Republican, he is honest.'

In each example, a false inference contrasts with the second conjunct: the expected inference is *he is not honest*. This is clearly an unexpected statement in the case of *bien que*: in *bien que P, Q*, *Q* is less likely to be the case than *not-P* (Lohiniva 2017) – see the use of the French subjunctive with *bien que*. On the other hand, in the case of *mais*, the inference is forward (*X is republican +> X is not honest*) whereas, in the case of *pourtant*, the reading is either forward or backward (*X is honest +> X is not a Republican*). In each situation, both conjuncts are asserted as true, as the negation test in (59) and (60) shows for *pourtant* and *bien que*.

(59) a. # *He is not a Republican,* pourtant *he is honest*.

b. # *He is a Republican,* pourtant *he is not honest*.

c. # *He is not a Republican,* pourtant *he is not honest*.

(60) a. # Bien que *he is not a Republican, he is honest*.
b. # Bien que *he is a Republican, he is not honest*.
c. # Bien que *he is not a Republican, he is not honest*.

So, what is the difference in meaning between these quasi-synonymous connectives in French? Contrary to logical connectives, where the pragmatic meaning is the result of a narrowing of their logical meaning (enrichment), the semantic meaning of concessive cannot be extended from the logical conjunction meaning.

In Moeschler (2016), I proposed a general answer to this puzzle, which is crucial for explaining why connectives are so pervasive in natural language.

First, some connectives show a general conceptual relation, or a relational concept, which can be captured by concepts like CAUSE or CONTRAST. These concepts are assumed to be part of the conceptual meaning of connectives. These meanings are not truth-conditional because they cannot be expressed by one of the sixteen TFCs. Conceptual meaning includes not only a conceptual relation, like cause, but also all its possible entailments. For instance, in its causal uses, *donc* 'therefore' does not entail the consequence *Q* in *P donc Q*, because the speaker is responsible for the inference. Hence, *donc* is not a factive connective. A test for demonstrating the non-factivity of *donc* is the possible adjunction of an epistemic modal predicate in the consequence clause, as in (61).

(61) a. *Marie a poussé Jean, donc il est tombé*.
'Mary pushed John *donc* he fell.'
b. *Marie a poussé Jean, donc il a dû tomber*.
'Mary pushed John *donc* he must have fallen.'

Second, beside its conceptual meaning, a connective has a *procedural* meaning, which is about, as regards causal connectives, the direction of the causal relation. What is striking is that French *parce que* is the only backward connective (Moeschler 2011), as in (62). In effect, when *donc* is backward, its use is not causal, but inferential: in *P donc Q*, the speaker's inference is about a possible cause *Q*, as in (63).

(62) *Jean est tombé parce que Marie l'a poussé*.
'John fell because Mary pushed him.'

(63) *Jean est tombé, donc Marie l'a poussé.*
'John fell, *donc* Mary pushed him.'

Finally, conceptual meaning can intervene at the level of explicature (*parce que*) or implicature (*et, donc*), this distinction being based on the cancellation test – implicatures are cancellable, explicatures are not. Table 7 gives a summary of such an analysis (Moeschler 2016: 134).

Tab. 7: A chart for causal connectives

Meaning	**Conceptual**				**Procedural**
Connectives	**Entailment**		**Explicature**	**Implicature**	**Direction of CAUSE**
parce que	P	Q	CAUSE (X,Y)		Q → P
donc	P			POSSIBLE_CAUSE (X,Y)	P → Q
et	P	Q		POSSIBLE_CAUSE (X,Y)	P → Q

In sum, what makes discourse connectives specific in natural languages is not their non-truth-functionality but their conceptual and procedural meanings. The proposal made in Moeschler (2016) assumes that the slight meaning differences between quasi-synonymous connectives do not lie in the difference of conceptual or procedural meanings but in the way conceptual and procedural meanings are distributed within different layers of meanings. Broadly speaking, the meaning bricks of connectives are dispatched at different layers of meaning, such as entailment, explicature and implicature (Moeschler 2013b), as well as distributed over different conceptual/procedural drawers.

6 Conclusion

This article had the ambition to come back to a very classical analysis of TFCs in natural languages. Doing so, we obtained unexpected results.

First, the formalist view of TFCs does not only explain why conjunction, disjunction and negation are TFCs in natural language but also why a non-confessional connective like the conditional can join the restricted set of TFCs.

Second, a classical counterexample to a truth-conditional analysis of negation is metalinguistic negation. I assumed in this paper that, even in metalinguistic uses, negation has representational cognitive, truth-conditional effects.

Third, I have given an argument explaining why natural languages have a large set of discourse connectives. I first showed that, first, almost all of them exhibit truth-conditional properties and, second, even if their meaning is non-truth-conditional, it is conceptual and/or procedural and distributed within different layers of meanings, such as entailment, explicatures and implicatures.

Only few explicit proposals have been made in this direction. A new research program, capitalizing on a large set of descriptions of connectives in different languages, should emerge to answer positively to new research questions, such as why some connectives of different languages are at the same time so close and so remote in meaning.

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Vladimir Plungian

Notes on Eastern Armenian verbal paradigms

"Temporal mobility" and perfective stems

Abstract: The paper discusses two "hidden" semantic oppositions in the Armenian verbal system: both have no specific segmental markers but are manifested in the division of verbal forms into certain formal classes. In the first case, we deal with the the division into synthetic and periphrastic forms, which corresponds to the expression of the so-called "temporal mobility" (or the ability to express the opposition between present and past). In the second case, it is the morphological opposition between the basic verbal stem and the stem with an alternation. The choice of the alternating stem is related to the perfective semantics of the verbal form, so that one can speak of a general aspectual opposition of perfective and imperfective sets of forms in Armenian (not isolated in traditional analysis).

Keywords: Armenian, verbal inflection, tense, aspect

1 Introduction

The main focus of the present paper will be certain formal properties of verbal paradigms in Armenian, first of all those which may have special cross-linguistic relevance. To the best of our knowledge, these properties have not been discussed in the specialized literature at any length (if at all). The main bulk of our material comes from the standard written language of the Republic of Armenia, i.e., Average East Armenian (cf. Vaux 1998). Hereafter, we will refer to it simply as "Armenian", unless otherwise stated. Similar properties of other idioms of Modern Armenian (both Eastern and Western dialects) deserve a separate and a more detailed discussion, which is far beyond the scope of the present study.

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Inflectional morphology of the Armenian verb has been extensively described in grammars and works of narrower perspective (e.g., Abrahamyan 1962; Aġayan 1967; Abrahamyan, Paṙnasyan and Ōhanyan 1974; Minassian 1980; Kozintseva 1991, 1995a, 1995), so we can rely here on a body of facts that may be considered generally agreed upon. However, when describing an inflectional system, it is important to establish not only the size of the paradigm and the rules of form composition but also what may be called a grammatical interpretation of these forms. The latter is related to grammatical semantics rather than to inflectional morphology as such and is a far less studied area. What will be addressed below are mainly problems belonging to this domain.

Firstly, we will briefly present the basic facts of verbal inflection (Section 2). We will then discuss the possibility to isolate, within the Armenian verbal paradigm, two "hidden" grammatical oppositions: "temporal mobility" (Section 3) and morphological marking of perfectivity (Section 4).

2 The general configuration of the Armenian verbal paradigm

One of the basic structural oppositions within the Armenian verbal paradigm is that of synthetic and analytic (periphrastic) forms. From a diachronic perspective, it is also important that the majority of periphrastic forms (according to a widely attested cross-linguistic pattern) have a more recent origin and display a greater variability in dialects. The older group of synthetic forms (well-documented already in Classical Armenian, which is known in its written form since the 5th century AD) has conserved, to a considerable degree, phonological shape and morphological structure but has undergone considerable semantic changes and migrated from the domain of aspectual-temporal forms of the indicative to the domain of non-indicative modality. An exception to this tendency is presented by the form of the so-called aorist, which remained in the system of indicative forms, conserving entirely its synthetic character.[1] Thus, the opposition of

1 As Vaux (1998: 2) points out, "excepting the aorist, none of the classical formation remained in place". This type of evolution of present and past forms of the indicative is well-attested cross-linguistically. Bybee, Perkins and Pagliuca (1994: 230–236), for instance, provide sufficient detail on it (Armenian data are also made mention of there). The authors suggest that non-indicative meanings of originally indicative forms arise out of their usage in subordinate clauses with modal semantics.

periphrastic and synthetic forms in Modern Eastern Armenian may be roughly characterized as that of the forms of indicative and non-indicative modality respectively. However, this preliminary characteristic needs further specification (see Section 3).

Another important exception is a little group of four stative verbs (*arže-* 'cost', *gite-* 'know', *ka-* 'exist, be available', *une-* 'have'), as well as the closely adjacent irregular existential copula *ē-* (also used as an auxiliary in the majority of periphrastic forms). This group has no periphrastic forms at all. To express the indicative, these verbs use the old synthetic forms (of which only the present and the imperfect are available in their paradigm). Thus, this is a typical "relic group", untouched by grammatical innovation — a very widespread phenomenon in the inflectional morphology of the world's languages.[2] Naturally, our further discussion will not concern these verbs. We are also not going to discuss in detail the morphological rules of affixation to the verbal stem (which vary within different conjugations and, besides, have a number of important exceptions pertaining to frequency verbs). Some notes on the formal structure of the paradigm essential for our subject will be made in due course. In particular, the choice of a necessary verbal stem is essential: different verbal forms may differ not only in affixes but also in the type of the stem. This will be dealt with in more detail in Section 4.

Periphrastic forms consist of the copula *ē-*, the locus of expression of tense and subject person/number, and the main converb marking aspect (with the help of various suffixes), as this is more closely connected with the semantics of the verbal stem. Although, from a grammatical point of view, converbs within periphrastic forms basically express aspectual oppositions, one should bear in mind that the actual range of meanings of periphrastic forms is somewhat wider and includes evidential and modal values as well.

All in all, there exist four forms of aspectual (in the wide sense determined above) converbs and, respectively, four classes of periphrastic forms: imperfective (in *-um*), perfect (in *-el*), resultative (in *-ac*), and destinative (in *-lu*). Each converb can combine with the present and past forms of the copula. Thus, all the four aspectual values listed above have a present and past series of personal forms.

2 A parallel case is found, for example, in Modern Basque, where only several frequent verbs (including auxiliaries) have a synthetic conjugation while all the others display a periphrastic paradigm. From an areal perspective, it might be useful to draw a comparison with the Modern Persian verbal system, where a small group of stative verbs like 'lie', 'stand' and 'sit' demonstrates a narrowed set of forms, which also differ from most other verbs in their grammatical meaning (for more detail, see Rubinčik 2001: 233–234).

Now, we briefly explain the choice of labels for periphrastic forms, since not all of them are readily established in the literature. The Armenian linguistic tradition (reflected, for example, in Dum-Tragut 2009) tends to use different terminology, somewhat apart from what is typically expected in a cross-linguistically oriented study.

Imperfective forms express two main aspectual meanings, the progressive (to indicate the on-going activity) and the habitual. This type of polysemy (or "grammatical cluster") is typical of aspectual systems in different areas. In particular, it is characteristic of all Slavic languages, Greek, Latin and many others. The present imperfective (i.e., forms like *grum ē*) is the most frequent form, which expresses the present tense as such. Traditional grammars usually call the past imperfective (i.e., forms like *grum ēr*) "imperfect", which, in this case, is quite legitimate: the imperfect is commonly regarded as a past tense form combining aspectual meanings from both actual and habitual domains.

The forms of the *perfect* and *resultative* express the present and past tense of the perfect and (subject) resultative respectively. The meaning of resultative aspect is more specific and boils down to asserting the existence, at the moment of speech (or in some reference point in the past), of a "natural" (i.e., lexically inferable) result of the situation. This form (diachronically later than the perfect) is mainly possible with telic processes and has a relatively weak degree of grammaticalization in Modern Eastern Armenian (it is no accident that, in traditional descriptions, there are certain hesitations about its inclusion in the core inventory of grammatical forms).

The perfect, apart from its central value of "current relevance" (whatever it should mean), is also used in evidential contexts to report events not witnessed by the speaker personally, i.e., to express an inferential or a reportative meaning – more or less in keeping with what is observed in a variety of Great Evidential Belt languages (including Iranian, Turkic, Kartvelian and many others). In Western Armenian, as compared to Eastern Armenian, the grammaticalization of resultative forms is more advanced. There, the form that etymologically corresponds to the Eastern Armenian resultative is used as the (generalized) perfect while a cognate of the Eastern Armenian perfect (the form with the suffix *-er*) is now a dedicated evidential marker. For a more detailed account of the Eastern and Western Armenian perfect-resultative distinction, see, for example, Kozintseva (1988, 2000) and Donabédian (1996, 2001).[3]

3 Forms of the past perfect (like *grel ēr*) have their own range of uses, in many ways differing from that of the present perfect, and deserve a separate study. For a preliminary overview, see Kozintseva (1998) and Sitchinava (2013).

Finally, *destinative* forms denote a situation which, at the reference point, is considered by the speaker as bound to occur, mainly due to external circumstances. The present destinative (forms like *grelu ē*) is one of the functional equivalents of the future tense, yet with a strong tinge of modality (one may speak here of external deontic modality, according to van der Auwera and Plungian 1998). Some contexts where this form is used are reminiscent of what is now usually called "prospective aspect" but, in many respects, the Armenian destinative is not a typical prospective. For all intents and purposes, the meaning of the destinative is virtually close to the aspectual semantic domain, approaching varieties of the prospective.

Thus, despite somewhat different degrees of grammaticalization (which is the highest in the imperfective and the perfect and is lower in the destinative and especially in the resultative), the four series of periphrastic forms represent, in total, an orderly system of forms, a nucleus of the indicative paradigm. Besides, the system of the indicative also includes a synthetic aorist denoting, in full accordance with its name, perfective situations referring to the past and having (in contrast with the perfect) no connection with the moment of speech (for a recent in-depth treatment, see Donabédian 2016). In certain contexts, aoristic forms may be construed as expressing (in opposition with the perfect) an additional evidentiality-related component, indicating that the speaker has personally witnessed the situation referred to.

Morphologically, the formation of the aorist strongly differs from that of all other forms in the verbal paradigm. Aoristic forms are immediately distinguished from all other forms and may be easily identified. This is due to the fact that, in a given verbal form, the aorist is simultaneously marked several times. It always requires a special suffix, which may be of two types: in most verbs, it is the marker *-cʻi-* (however, in the third person singular, before a zero subject marker, it has a reduced form *-cʻ*)[4] while some (sometimes called "strong") verbs have a vocalic marker *-a-*. The aorist also has a special set of personal endings that differ from those in other synthetic paradigms of the singular (i.e., in the present and past subjunctive considered below). Plural endings are always the same. The strongest distinction is shown by the form of the third person, in which the aorist is opposed not only to all other verbal forms but is characterized, in strong verbs, by a non-zero ending *-v*, unique for all verbal forms. On the surface, third person singular forms of a "weak" aorist with the suffix *-cʻ* and a zero ending (like *grecʻ*

4 Special morphonological phenomena before the zero subject marker of the third singular are also characteristic of other forms of the Armenian verb, for instance, of the subjunctive (see below), so this allomorphic distribution is not unique.

from *grel* 'write') and of a "strong" aorist with the suffix *-a-* and the ending *-v* (like *ənkav* from *ənknel* 'fall') differ quite considerably not only from other verbal forms but also from each other. Finally, in many verbs, the aorist is formed with a special stem, which is frequently suppletive.

All other synthetic forms belong to different non-indicative moods, which represent a rich system in Modern Eastern Armenian (for a traditional nomenclature, see also Dum-Tragut 2010). Non-indicative moods include, in the first place, the imperative, inherited from Classical Armenian and represented only by forms of the second person with special endings (in the first or third person, commands are expressed with the help of other moods). A core element within the system of non-indicative moods is the so-called subjunctive, with a wide range of functions. It is used both in dependent clauses and independent sentences with optative and directive semantics, as well as in the protasis of conditional constructions. The subjunctive present and past are morphologically distinguished and these are the forms that historically go back to the present and imperfect indicative in Classical Armenian (i.e., to indicative forms of the imperfective series, which were substituted, in Modern Armenian, by periphrastic forms with converbs in *-um*).

The present and past subjunctive are formed with the help of special sets of personal endings (of the present and of the past respectively), which coincide in the plural. The forms of the past also have a suffixal marker *-i-* in all persons, except for the third singular.

In general, the third person singular of the subjunctive present and past (and also of the aorist indicative) displays a number of morphological peculiarities. In the present (forms like *gri* or *gna*), it is natural to isolate a zero person/number subject marker, which, however, causes the transition of the thematic vowel *-e* in the final position of the word-form into *-i* (the thematic vowel *-a* is not affected by this type of alternation). This seems more coherent than the traditional interpretation of the element *-i* in forms like *gri* as a personal ending.

Somewhat more difficult is the problem of a morphological interpretation of the past subjunctive third person singular form. It has a marker *-r* consisting of one phoneme (cf. the whole series of forms for the past subjunctive singular: first person *gre-i*, second person *gre-i-r* and third person *gre-r*). It would be most reasonable to believe that, in this case, one deals with a cumulative expression, by a phonologically indivisible marker, of past subjunctive and third person singular. Remarkably, in the paradigm of the past subjunctive, there is already a non-cumulative zero person marker (first person singular) and a non-cumulative person marker *-r* (second person singular). Certainly, as an alternative solution, one could speak of a special marker of the third singular, also a zero one (like in other

forms), which, unlike all other zero forms, causes the appearance of a unique past subjunctive suffix *-r*. However, this interpretation is, for obvious reasons, much more cumbersome and artificial, since it requires too many arbitrary assumptions.

Furthermore, in the system of non-indicative moods, one can distinguish the so-called conditional mood, which is morphologically formed by the addition of the prefix *k(ə)-* to the forms of the present and past subjunctive. In many modern dialects (including Western Armenian), it is this form (or its diachronic continuation) that occupies the niche of the imperfect in the indicative. Certainly, if we rely on its semantics, there are no special grounds to postulate a formation of the conditional "from" the subjunctive, as traditional practical grammars usually do: this form is used in the apodosis of conditional constructions and denotes a real or hypothetical consequence, as well as a probable future occurrence.

We are not going to consider here the form of the debitive (like *piti gri* 'must write'), often referred to in the grammars as the fourth non-indicative mood, since its meaning reduces to a combination of the meaning of the predicative invariable particle *piti* 'is needed' with the meaning of the subjunctive, with which this particle is combined as a head predicate. Accordingly, the debitive construction practically does not differ from constructions with verbs of volition or command also requiring subjunctive marking on the dependent verb. So, in terms of both its meaning and form, it belongs to the domain of the subjunctive.

Such is, in the most general lines, the structure of the Armenian verbal paradigm. The question is: what are the non-trivial consequences for a description of the grammatical semantics of Armenian verbal forms that one can draw from analyzing formal properties of this structure (if any)? Now, we proceed to discuss this matter.

3 Periphrastic and synthetic forms

As has already been said, one of the main structural oppositions within the paradigm formed in the course of the transition from Middle to Modern Armenian is the opposition of periphrastic and synthetic forms. Thus, a natural question arises, viz., whether there is some semantic difference behind that formal opposition, which is so important in the Armenian verbal system. Our answer would be positive but defining this semantic opposition in a clear and unambiguous way is not a simple task.

At first sight, it seems that periphrastic forms are connected with the indicative while synthetic ones are connected with non-indicative moods (somewhat

similar statements have been made explicitly or, more often, implicitly in many traditional descriptions). However, the problem with this opposition lies in the fact that the notion of non-indicative mood itself has no positive content. Rather, it denotes a class formed on the basis of a negative principle. Generally speaking, for a typologically oriented description, an appeal to such purely "structural" classes is not very informative.

Let us look more carefully at the two classes of forms within the Armenian verbal paradigm. Their names are shown in Table 1.

Tab. 1: Periphrastic and synthetic forms of the Armenian verb

Periphrastic forms	**Synthetic forms**
imperfective (present and past)	aorist
perfect (present and past)	imperative
resultative (present and past)	subjunctive (present and past)
destinative (present and past)	conditional (present and past)

The system presented in Table 1 is rather interesting. It can be seen that the division in two classes is connected neither with the opposition of the indicative and non-indicative moods nor with the opposition of diachronically "new" and "old" forms. The former opposition is contradicted, on the one hand, by the existence of a synthetic form of the aorist indicative and, on the other hand, by the presence of a modal component in perfect forms and particularly in destinative ones – while the latter opposition is contradicted, for instance, by the periphrastic character of the perfect as attested as early as in Classical Armenian.

The closest correlation between the opposition of synthetic and periphrastic forms seems to be related to the expression of the category of tense. It is primarily tense that is expressed by periphrastic markers (through auxiliaries) – and, hence, the verbal forms that allow tense oppositions are periphrastic. They may be called "temporally mobile". On the other hand, we find synthetic forms either among those without any temporal reference at all (as in non-indicative moods, whose "tense" forms, as is well-known, are not related to time) or with a fixed temporal reference (as with the imperative and aorist, rigidly connected with the future and past respectively). Accordingly, verbal forms with a fixed tense reference have no separate morphological tense marker: their temporal reference is expressed cumulatively, together with aspect or mood.

Thus, in a sense, one may say that the Armenian verb expresses formally a highly specific category of temporal mobility. It contrasts the forms allowing the

opposition of both present and past events and the forms disallowing a change of temporal reference (or, in general, having no such reference at all). Interestingly, it is the capacity to denote present time situations that appears to be a crucial semantic criterion for entering the class of temporally mobile forms: when such a capacity exists, the verbal form also has a past reference. However, if a present time interpretation of the verbal form is impossible, the temporal mobility is obviously absent. One can roughly identify this feature with so-called actuality, i.e., with the capacity to refer to situations occurring directly at the moment of speech.[5] In this case, the distribution of periphrastic and synthetic verbal forms may be formulated more easily: the categories that, in principle, can mark actual situations are expressed by periphrastic forms while the categories excluding, for some reason, an actual interpretation have a synthetic expression.

Once again, although we see the opposition of temporally mobile (actual) and non-actual verbal forms as rather specific and, so to speak, idiosyncratic, one typological parallel seems nonetheless useful here. It is the verbal category of reality status, which also consists of two values conventionally called "realis" and "irrealis". The category of reality status usually divides the verbal system into two classes of forms. One of them qualifies a situation as belonging to the real world (the world of events that are actually occurring or took place in the past) while the other does not (for a more detailed discussion, see Eliott 2000; Plungian 2005).

The opposition of real and irreal forms can be based on different semantic strategies. Therefore, the size and the structure of real and irreal forms may not coincide cross-linguistically. Along with the forms whose interpretation in the languages that grammatically mark reality status is always identical, there exist forms that are marked as real in some languages and as irreal in others. Such are, for instance, forms of the imperative and habitual: they have properties of both classes of situations. Imperatives denote a situation which does not belong to the real world but is believed to occur after the moment of speech in all likelihood. On the other hand, habituals describe not a real situation but a kind of abstract property: it expresses the speaker's judgment about the world and not a specific situation observed. This ambiguity can explain the not infrequent existence of imperatives with realis marking and habituals with irrealis marking.

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5 The term "actuality" is also often used in another sense, i.e., to denote the capacity of a verbal form to refer to a definite temporal interval (which does not necessarily include the moment of speech). However, the term "temporal localization" (used, for instance, in Kozintseva 1991) is more preferable to denote this sense. Notably, the Armenian aorist has the property of temporal localization (but not actuality, as we understand it here).

Hence, a comparison of the category of temporal mobility with that of reality status may be of interest, since the strategies of ascribing these two categories to verbal forms look similar. This similarity becomes particularly striking if we consider the role of actuality in the choice of both categories. Recall that the temporally mobile forms are exactly those verbal categories that are able to express the semantics of actuality. However, actuality is one of the most crucial factors that determine the marking of a given verbal form as real (see also Plungian 2005 for more discussion). Thus, generally speaking, the category of temporal mobility may be considered a non-conventional variant of the category of reality status. It is non-conventional both at the level of content (since it opposes forms allowing and disallowing actual reference) and at the level of expression (since it opposes periphrastic and synthetic verb forms).

4 Two verbal stems

The second salient opposition in the Armenian verbal paradigm is the distinction between two types of verb stems. As already noted in Section 2, verbal stems may differ not only with regard to specific suffixal or prefixal grammatical markers or with regard to sets of person/number endings (providing subject person/number marking) but also with regard to the type of the stem itself.

Traditionally, Armenian grammars distinguish two types of conjugation depending on the stem-final thematic vowel (*-e-* or *-a-*). The information about the conjugation type is necessary for building a wide range of grammatical forms which have a different shape in each conjugation, such as the singular and plural imperative and the resultative and perfective converbs. In particular, the thematic vowels behave differently before suffixes with a vocalic initial: the vowel /e/ is truncated while the vowel /a/ requires, as a rule, a consonant augment *-cʻ-*. Some forms use different markers in different conjugations, such as the forms of the imperative singular *ktr-ir* 'cut!' from the stem *ktr-e-* and *xaġa* 'play!' (with a zero marker) from the stem *xaġ-a-*.

In both conjugation types, one can additionally distinguish "simple" stems and stems with suffixal "extensions".[6] These extensions include the following elements: *-n(e)-*, *-čʻ(e)-*, *-an(a)-* and *-en(a)-*, as well as the causative suffix *-cʻn(e)-*

6 The term "stem extension" is more preferable than "suffix" because one can rarely ascribe an independent meaning to these elements (though causative suffixes, for instance, also belong to the class of extenders). On top of that, not all verbal suffixes can determine the type of conjugation.

(in parentheses, we indicate the thematic vowel immediately following the extension). One can see that each extension unambiguously determines the choice of the thematic vowel. Stems with extensions are found among verbs of both conjugations.

It is stems with extensions that have an additional morphonological peculiarity in Armenian: they exist in two variants forming the so-called "two-stem conjugation".[7] The forms of the aorist, perfect, resultative, and imperative display a variant with alternation while other forms show a basic variant (the forms of the converbs of simultaneity behave in a particular way, see below). The alternation involves a simple truncation (in the case of a one-phoneme extension) or the replacement of the phoneme /n/ with the phoneme /r/ (in the causative suffix) or with the phoneme /cʰ/ (in other longer suffixes). Consider the building of resultative converbs: *ənk-n-el* 'fall' and *ənk-ac*, *mot-en-al* 'come closer, approach' and *mot-ecʿ-ac*, *mot-ecʿn-el* 'bring closer' and *mot-ecʿr-ac*.

Thus, in verbs with extensions (as well as in suppletive verbs close to them, of the type *dnel* 'put'), one can single out two stems with their distribution depending on the grammatical meaning of the corresponding verbal form: the basic stem is maintained in the imperfective, destinative, subjunctive and conditional (as well as in the infinitive and in the converb of simultaneity) while a stem with alternation appears in the aorist, perfect, resultative and imperative. Semantically, this division seems to be sufficiently transparent: overall, it corresponds to the (aspectual) opposition of imperfective versus perfective forms.

The only exception to this interpretation may be the participle of simultaneity (or the "subject" participle) with the marker *-oġ*. Forms of this participle have different structures in different conjugations. All verbs with the thematic marker *-e-* use a basic stem (e.g., *ənk-n-oġ* 'falling') while verbs with the thematic marker *-a-* use an alternating stem (e.g., *mot-ecʿ-oġ* 'approaching' instead of the expected **mot-ena-cʿoġ*). Most probably, forms like *motecʿoġ* emerged under the influence of participles from verbs of the *a*-conjugation without extension (like *xaġa-cʿoġ* 'playing'), where the suffix *-cʿoġ* is an allomorph of the marker *-oġ,* which regularly appears after the thematic vowel *-a-*. Thus, the deviant behavior of the participles of simultaneity (which are imperfective from a semantic point of view) may be explained by morphological contamination.

To sum up, the opposition of two stem types, though not entirely systematic and not applying to all verbal lexemes, expresses one more hidden category of

7 A number of irregular verbs have a two-stem conjugation. These are verbs whose stems are suppletive or connected by irregular alternations: *ta-*/*tve-* 'give', *dne-*/*dre-* 'put', *ga-*/*ek-* 'come', *line-*/*eġe-* 'be' and some others.

the Armenian verb: the aspectual category of perfectivity. The value of perfectivity is attributed to all resultative verbal forms, to the aorist (in keeping with Donabédian 2016's analysis) and to the imperative, the latter deserving special attention. An interesting typological feature of the Armenian imperative appears to be its "default" perfective interpretation. Cross-linguistically, this is not unique: the imperative tends to suggest a kind of completed event.

5 Conclusion

We have considered two "hidden" semantic oppositions in the Armenian verbal system. They are hidden in the sense that they have no specific segmental markers but are manifested in the division of verbal forms into certain formal classes.

In the first case, the role of a formal correlate is played by the division into synthetic and periphrastic forms, which, we believe, corresponds to the division of all Armenian verbal forms into those that are able to express the opposition of the present and past ("temporally mobile") and those that either do not express the category of tense at all or do not oppose different tenses. Typologically, the category of temporal mobility seems to be rather idiosyncratic but it is reminiscent of that of reality status (with the binary distinction of realis and irrealis).

In the second case, it is the opposition of the basic stem and the alternating one that plays the role of a formal correlate. Alternation is conditioned by some grammatical elements in the verbal form, so a meaningful division of verbal forms also takes place here. In our view, the choice of the alternating stem is related to the perfective semantics of the verbal form and one can speak of a general aspectual opposition of perfective and imperfective sets of forms in Armenian.

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‘Perhaps’ in Cape York Peninsula

Ignoratives and verbs of visual perception in epistemic marking

Abstract: This paper analyzes a pattern of epistemic marking that is found in several Paman (Pama-Nyungan) languages of Cape York Peninsula, in the north-east of Australia. Formally, the pattern consists of a marker that is identical to the imperative form of a verb of visual perception, optionally accompanied by an ignorative of the ‘thing’ category or another type of marker. Semantically, these elements mark potential verification, i.e., a weak type of epistemic meaning. The pattern is interesting for two reasons. From a typological perspective, it adds to the inventory of direct lexical sources for epistemic modality that have been identified in the literature. The paper examines the semantics of the pattern in more detail, showing that, at least in its origins, its meaning can be linked to an instruction for verification marked by the imperative of visual perception, with the ignorative as a modal reinforcer. The pattern is also interesting from an areal perspective, because it is attested in five languages from three different subgroups of Paman, which neighbor each other geographically and which are linked by recurrent patterns of personal multilingualism. The spread of the pattern reinforces existing arguments for the identification of a small linguistic area centered on Princess Charlotte Bay and its hinterland, on the east coast of Cape York Peninsula.

Keywords: epistemic modality, ignoratives, perception verbs, Australian languages, linguistic areas

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1 Introduction

This paper analyzes a pattern of epistemic marking that is found in several Paman (Pama-Nyungan) languages of Cape York Peninsula, in the north-east of Australia. The pattern is illustrated in the Umpithamu structure in (1), where the combination of *ngaani* and *ngamal* serves to mark epistemic possibility.

(1) Umpithamu (Pama-Nyungan, Paman; Middle Paman)[1]
Yupa miintha iluwa ngaani ngama-l
today good 3SG.NOM IGNOR see-IMP
'Perhaps she is better today.'

This pattern is interesting for two reasons. On the one hand, the markers involved can very easily be related to their lexical sources, as reflected in the glosses in (1). *Ngaani* is identical to an ignorative of the 'thing' category, basically a marker of lack of knowledge that can be glossed as 'what' or 'something' (see Section 3.1) while *ngamal* is identical to the imperative form of the verb *ngama-* 'see, look'. The literature on the development of modality has often presented epistemic modal markers as "highly grammaticized" (Bybee, Perkins and Pagliuca 1994: 205) and has tended to focus on their origins in other, non-epistemic, modal markers (e.g., Goossens 1982; Traugott 1989; van der Auwera and Ammann 2013). However, more direct lexical sources for epistemic modals have also been identified, like 'happen', 'seem', 'befall', 'I don't know' or 'think' (see Bybee, Perkins and Pagliuca 1994: 206; van der Auwera and Plungian 1998: 92; Boyer and Harder 2007). The pattern illustrated in (1) partly overlaps with one of these but also adds a new one. Given the remarkable transparency of the pattern, it is worth investigating in more detail how exactly its epistemic meaning relates to the meanings of its lexical sources.

On the other hand, this type of epistemic marking is found in a clear areal pattern. Markers that can be traced back to verbs of seeing, in combination with ignoratives or other elements, are attested in five of the about 40 different languages of Cape York Peninsula. These five languages belong to three different subgroups of Paman but they neighbor each other geographically, they are linked by recurrent patterns of personal multilingualism and there is good ethnographic

1 The following abbreviations will be used here: 1,2,3 first, second and third person; ACC accusative; APP apprehensive; DAT dative; DEM demonstrative; DU dual; EXC exclusive; FUT future; GEN genitive; IGNOR ignorative; IMP imperative; LOC locative; NFUT non-future; NOM nominative; PL plural; POT potential; PRS present; PST past; RM remote; SG singular.

evidence for strong social links between the clans owning the languages (see Rigsby 1997; Verstraete 2012). In other words, there is good evidence for a small linguistic area here, of which the modal marker illustrated in (1) is just one reflection.

In this paper, I address both the semantics of the pattern of epistemic marking illustrated in (1) and its distribution in Cape York Peninsula as part of a linguistic area. In Section 2, I provide a morphosyntactic description of the pattern in Umpithamu, the best-documented language in which it is attested. In Section 3, I use these data to examine the semantics of the pattern in more detail, especially in relation to earlier analyses of ignoratives as markers of epistemic status (e.g., Mushin 1995) and the available literature on the development of verbs of visual perception (e.g., Van Olmen 2010; Takahashi 2012). I argue that, at least in its origins, the semantics of the pattern can be linked to an instruction for verification marked by the imperative of visual perception, with the ignorative as a modal reinforcer (confirming a combinatorial possibility identified in Boye 2012: 258–260). In Section 4, I examine the spread of the pattern in Cape York Peninsula, using a survey of modal marking in the available grammars for the region. I argue that the spread coincides nicely with the linguistic area identified with the Princess Charlotte Bay region, for which we have other evidence of *Sprachbund* phenomena, and I hypothesize that the marker itself arose in the Lamalamic subgroup of Paman languages. I also discuss interaction with other strategies for epistemic marking found in Cape York Peninsula and, specifically, developments from apprehensional markers, which, in at least one language, intermeshes with the pattern identified in (1).

2 Epistemic marking in Umpithamu

As a first step in the argument, I describe the pattern illustrated in (1) in some more detail. The pattern is attested in five languages of Cape York Peninsula but, in this section, I focus on Umpithamu, the best-documented of the five. Examples from the other languages, viz., Umbuygamu, Lamalama, Kuku Thaypan and Aghu Tharrnggala, can be found in Section 4. Unless otherwise marked, data for Umpithamu (as well as for Umbuygamu and Lamalama) are taken from my own field notes.

Umpithamu is a Pama-Nyungan language of the east coast of Cape York Peninsula, at the northern end of Princess Charlotte Bay (see Verstraete 2012 for more details). Genetically, it belongs to the Middle Paman subgroup of Paman lan-

guages (see Verstraete and Rigsby 2015: 173–194). Like most Pama-Nyungan languages, Umpithamu has a number of markers with modal values in its paradigm of verb suffixes. For instance, there is a counterfactual marker *-rra* for events that could or should have taken place but did not, and a potential marker *-ku* for events that are likely, weakly desired or simply located in the future (as well as an imperative marker *-l*). In addition, there is a slot right before the verb that can take negation markers, and a specialized apprehensive marker, which designates that an event is likely but undesirable. Verstraete (2011a) provides a more detailed analysis of these markers and their semantic values.

None of these features is remarkable for a Pama-Nyungan language, but the pattern in (1) is remarkable, both within Pama-Nyungan and in a broader typological perspective. There are quite a few Pama-Nyungan languages that have one or more epistemic particles (see Section 4 for some examples) but there are very few cases where they can be linked back to specific lexical sources, with such transparency. As already mentioned, the epistemic pattern in Umpithamu can be related to *ngaani*, an ignorative of the 'thing' category that can be glossed as 'what' or 'something', and to *ngamal*, the imperative of a verb stem glossed as 'look, see'. The basic ignorative use of *ngaani* is illustrated in the question-answer sequence in (2) while the basic verbal use of *ngamal* is illustrated in (3).

(2) A: *Amiya,* ngaani *ngaympi-n=inu,* *pigipigi?*
mother IGNOR hit-PST=2SG.NOM pig
'Mum, what did you get, a pig?'
B: *Minya* *murrkan* *ngaympi-n=ayuwa*
meat.animal fish hit-PST=1SG.NOM
'I got some fish.'

(3) Ngama-l=*inuwa* *yenu*
see-IMP=2SG.NOM up
'You look up there [up in the tree].'

The example in (1) illustrates the maximal extent of the epistemic pattern, i.e., *ngaani* and *ngamal* combined, in clause-final position. The Umpithamu corpus also shows a few permutations, however, which provide some indications about the origins of the pattern, as will be argued in Section 3.3. First, *ngaani* and *ngamal* can both occur independently with epistemic meanings, most typically so for *ngamal*. *Ngamal* occurs on its own quite frequently, without *ngaani*, as illustrated in (4). When it does, it is always clause-final. *Ngaani* can also occur without *ngamal*, as shown in (5), but much less frequently. In such uses, it usually takes

clause-initial position. There is no obvious semantic difference between *ngaani* and *ngamal* combined, or used independently, but, in Sections 3.1 and 3.3, I will argue that the greater ease for *ngamal* to be used independently suggests that *ngamal* may be the primary modal marker in the combination, with *ngaani* having arisen as a reinforcer.

(4) *Yupa* *uyngka-n=ilu* ngama-l
today break-PST=3SG.NOM see-IMP
'Perhaps, nowadays, it's broken.' [discussing the current state of a particular rock feature]

(5) Ngaani *miintha* *iluwa*
IGNOR good 3SG.NOM
'Perhaps she is better now.'

A second type of permutation found in the corpus concerns the position of the markers. While the combination of *ngaani* and *ngamal* typically occurs clause-finally, it is also found more rarely split over the clause, as in (6), with *ngaani* and *ngamal* in their typical initial and final positions respectively. Again, there is no discernible semantic difference between the two options but, as I will argue in Section 3.3, this type of variation may offer some clue to the development of *ngaani ngamal*. Finally, there is also one attestation of *ngaani ngamal* in initial position, in the 'disjunctive' use illustrated in (9) at the end of this section. The existence of these variants shows that we are really dealing with a set of markers in a range of patterns rather than one single pattern. In what follows, I will refer to the whole set as *ngaani*/*ngamal*.

(6) ngaani *iya-ku=ayu* ngama-l
IGNOR go-POT=1SG.NOM see-IMP
'Perhaps I will go.'

The semantics of this pattern can be described broadly in terms of epistemic possibility, usually glossed by speakers as *mait* or *maitbe*, which is a typical possibility marker in local creoles and forms of Aboriginal English (see Crowley and Rigsby 1979: 192 on Cape York Creole; Schultze-Berndt and Angelo 2013 on parallel forms in Kriol). At first sight, this may seem to overlap with the meaning of the verbal suffix *-ku*, which marks potential realization of an event and often co-occurs with *ngaani*/*ngamal*, as in (6) above. There is an important difference, how-

ever. The feature of possibility marked by *ngaani*/*ngamal* does not refer to potential realization of an event but to potential verification – in other words, it is exclusively propositional in scope. *Ngaani*/*ngamal* is not only used with potential-marked verbs but also with verbs in the past or the present or with non-verbal predicates (which are implicitly present), as shown in (7) and (8). In such cases, potentiality does not relate to the occurrence of the event being described (which is marked as preceding or coinciding with the moment of speaking) but to verification of the speaker's claim about the event. The structure in (7), for instance, follows a lengthy description of an animal behaving strangely and states that this may be a sign: the predicate in (7) describes what may have happened while the animal was acting strangely, and *ngaani*/*ngamal* marks that this is subject to future verification. With potential-marked verbs, by contrast, both the realization of the event and the verification of claims about the event are potential.

(7) *Omoro* *ingkuna* ngaani *wuypu-n* ngama-l
father 2SG.GEN IGNOR die-PST see-IMP
'Perhaps your father has died.'

(8) *Kaantyu* ngama-l
kaantyu see-IMP
'It might be a Kaanju person.'

In addition to the basic epistemic modal function of *ngaani*/*ngamal*, there is also one extended use, illustrated in (9). As in many languages, markers of epistemic possibility can also be used to convey a relation of disjunction between alternatives (see Mauri 2008). Thus, the two tokens in (9) are fully in line with the meaning of *ngaani*/*ngamal* as stated above but, in combination, they also serve to convey the existence of alternative interpretations of an event: the speaker is commenting on the fact that she has seen a man talking to a woman and offers two alternative interpretations of his motivations. As mentioned above, this use seems to be associated with a different position for *ngaani*/*ngamal*. There are not enough examples in the corpus to check if this is more than just a pragmatic strategy – the key would be to find examples that do not involve a feature of verification – but it is clearly in line with Mauri's (2008) findings about the semantic relation between epistemic modality and disjunction.

(9) Ngaani ngama-l *wompil-ku,* ngaani *yaapala-ku*
IGNOR see-IMP sweetheart-DAT IGNOR talk-DAT
'Perhaps he wants to court her, perhaps just talk to her.'

3 Ignoratives, visual perception and the epistemic domain

Given that the sources of the pattern described here are so transparent, the next obvious question is how ignoratives and verbs of visual perception could come to function as markers in the epistemic domain. In this section, I first discuss how each of these two elements separately can be linked to epistemic modality and then I present a hypothesis about how they could have come to be combined in the pattern described in the previous section.

3.1 Ignoratives and epistemic modality

The use of *ngaani* in question-answer sequences like (4) suggests that it could simply be analyzed as a question word like English *what*. For most Australian languages, however, this is not an adequate analysis, and this is precisely why such forms are relevant to the epistemic domain. As shown by Mushin (1995), these forms can systematically be used both in questions and in statements about lack of knowledge, which suggests that they are not simply interrogatives. Following Durie (1985) and McGregor (1990), Mushin (1995) argues that apparent interrogative forms in Australian languages usually have a basic meaning of lack of knowledge. In Umpithamu, for instance, *ngaani* can be used in questions, as in (10), and in statements, as in (11). What the two uses have in common is that *ngaani* signals a lack of knowledge. The distinction between "question" and "other" uses simply falls out from the context, i.e., whether the clausal context has other features that mark it as a request for information and whether this gets picked up by the interlocutor as the first turn of an adjacency pair. In (11), for instance, there is no indication in the first clause that it is to be taken as a request for information. Accordingly, the same speaker simply continues the turn, in this case by specifying what exactly was being made.

(10) A: *Minya* ngaani*?*
meat.animal IGNOR
'What kind of animal?'
B: *Yaathantyi*
carpet.snake
'A carpet snake.'

(11) *Iluwa* ngaani *yula-n=iluwa.* *Wiingal* *yula-n=iluwa.*
3SG.NOM IGNOR make-PST=3SG.NOM boomerang make-PST=3SG.NOM
'He made something/I-don't-know-what. He made a boomerang.'

This basic meaning shows some further extensions in Umpithamu, again in line with the general paths of development proposed in Mushin's (1995) typological study. On the one hand, the ignorative can also be used as a hesitation marker, as shown in (12), where *ngaani* signals a brief word search that is immediately resolved locally. On the other hand, it can also be used as a determiner-like element (whose precise semantics remains unclear), as in (13).

(12) Ngaani, *yeerra-mpal* *ungki-ngka=ilu-ungku*
IGNOR coffin-LOC put-PRS=3SG.NOM-3SG.ACC
'He puts it into, what-do-you-call-it, a coffin.'

(13) *Yukurun* ngaani *yitha-n=antyampa* *kuurra*
gear IGNOR leave-PST=1PL.EXC.NOM behind
'We left some gear behind.'

Given that the basic meaning of apparent interrogative forms in Australian languages relates to lack of knowledge, Mushin (1995) proposes to call them "epistememes", following Durie (1985). In the context of this analysis, I prefer the alternative term "ignorative" because it highlights the feature of lack of knowledge. Regardless of terminology, however, Mushin's analysis shows quite clearly why such markers could come to serve as epistemic elements. Their basic function is already in the broad domain of marking knowledge states – in this case, marking lack of knowledge about a specific entity. How, then, could a marker of lack of knowledge become part of a larger pattern for marking epistemic possibility as described in Section 2? I believe this involves two steps, one explained in this section and a second to be explained in Section 3.3.

The first step is to consider the nature of the category targeted by the ignorative. As shown by Mushin (1995), Australian languages usually have a range of ignoratives for different categories, such as things, persons and places. In Umpithamu, *ngaani* is the ignorative for the 'thing' category, which contrasts with *wanthamu* for the 'person' category, *wanthawa* for the 'place' category and *angampal* for the rest (mainly manner, time and quantity). 'Things' are the most obvious referent for *ngaani*, as shown in the examples above, where the marker consistently targets a discrete non-human entity. But these are not the only possible targets. In Umpithamu, *ngaani* also serves as a more abstract ignorative,

marking a lack of knowledge about propositions and events rather than just entities. This is illustrated in (14), where *ngaani* does not mark lack of knowledge about a specific entity but about what is happening: the father's response to the child's ignorative is a full proposition describing an event rather than an entity. The structure in (15) illustrates a related use, also analyzed in Mushin (1995), where *ngaani* forms the basis for an ignorative of reason ('why, what for'), with the dative marker *-ku*. Again, the target of this marker is not an entity but a proposition or event: the people being addressed are crying because they thought the speaker had died.

(14) *"Yoompi-l=inuwa,* *yoompi-l!"*
stand-IMP=2SG.NOM stand-IMP
Yoompi-n=ayu "Ngaani *omoro?"*
stand-PST=1SG.NOM IGNOR father
"Anharra *alu* *wuna-ngka=iluwa."*
saltwater.crocodile DEM lie-PRS=3SG.NOM
'"Stop, stop!" I stopped, "Dad, what's going on?" "There's a saltwater crocodile over there."'

(15) Ngaani-*ku* *mi'athi-ngka=uurra-athungku*
IGNOR-DAT cry-PRS=2PL.NOM-1SG.ACC
'Why are you all crying for me?'

Thus, *ngaani* in Umpithamu is also a more abstract type of ignorative, which can mark lack of knowledge about events rather than just non-human entities. If its basic meaning is to express lack of knowledge about events, this is not actually that far from signaling potential verification, the basic meaning of *ngaani*/*ngamal* as discussed in Section 2. A very similar argument is actually made by Boye (2012: 24–27), who argues that these two meanings are different instantiations of what he calls "neutral support", the lowest value on a scale of epistemic strength. The two meanings are not entirely equivalent, of course, because expressing a lack of knowledge about an event need not imply a need for future verification. Conversely, however, signaling potential verification does typically imply that one lacks knowledge about the event being discussed. In this sense, uses of *ngaani* targeting events or propositions are semantically close to the meaning of *ngaani*/*ngamal*, but not equivalent. I believe this is also the reason why *ngaani* is not the dominant partner in the set *ngaani*/*ngamal* (see also Sections 2 and 4). In the next section, I will argue that *ngamal* has a more directly epistemic meaning

and, in Section 3.3, I will round off the analysis by providing some tentative evidence that *ngaani* may have arisen as a reinforcer of *ngamal*, semantically compatible with but not equivalent to the more basically epistemic marker *ngamal*.

3.2 Verbs of seeing and epistemic modality

At first sight, the use of verbs of seeing in epistemic marking may seem less surprising than that of ignoratives. There are well-known proposals about metaphorical links between the domains of vision and knowledge or understanding (most prominently, Sweetser 1990) and there is a rich literature about the grammaticization of imperatives of verbs of vision (e.g., Van Olmen 2010). Neither of these lines of argument can be used in a direct way to explain the epistemic meaning of *ngamal* in the *ngaani*/*ngamal* set, however. On the one hand, there is no evidence in Umpithamu (or in any of the other languages studied in this paper) that 'see' verbs have secondary senses of knowing or understanding, which could then serve as a bridge to epistemic uses. This is in line with the more general argument developed in Evans and Wilkins (2000) that, in Australian languages, the domain of understanding tends to be conceived in terms of hearing rather than vision,[2] as also reflected in the Umpithamu structure in (16), where wisdom is described in terms of strong hearing rather than strong vision. On the other hand, the typical grammaticization targets of visual perception verbs are in the domains of information structure and expressivity (Van Olmen 2010), with argument-introducing uses like the English structure in (17) coming closest to the epistemic domain (see Van Olmen 2010). Again, such uses do not provide any parallels to *ngamal* as studied in this paper, since argumentative uses are epistemically much stronger than the possibility markers studied here. For instance, the use of *look* in (17) suggests a strong degree of epistemic commitment to both the argument and the conclusion that can be derived from it.

(16) *Omoro* *athuna* wina wakara *iya-n=iluwa*
father 1SG.GEN ear strong go-PST=3SG.NOM
'My father was clever.'

2 In fact, the only exception described in Evans and Wilkins (2000) is in a number of languages of southern Cape York Peninsula, like Guugu Yimidhirr, where verbs of visual perception do have a sense of knowing (which may itself be due to a secondary development of seeing to hearing; see Evans and Wilkins 2000: 551). This pattern is not attested in any of the languages studied in this paper, however, and even if it was, a sense of knowing would be unlikely to develop into a weak epistemic marker like the one studied here.

(17) *The end of the stage would be hard for any team to control, just* look *what happened to Movistar when Simon Yates won.*
(http://www.ciclismointernacional.com/vuelta-a-espana-2016-stage-9-preview)

How, then, could the imperative form of a verb of visual perception develop into an epistemic marker? The first point to note is that *ngama-* in Umpithamu is vague between an intentional sense ('look') and a non-intentional one ('see'), as illustrated in (18) and (19). This is a well-known pattern in Australian languages, attested for many verb meanings besides visual perception (see Dixon 2002: 57).

(18) Ngama-n=*ina-ingku,* *ngo'oyi*
see-PST=3PL.NOM-3SG.ACC nothing
'They looked at it, but nothing [it had disappeared].'

(19) *Nhuwal* ngama-n=*ayu-ungku*
bubble see-PST=1SG.NOM-3SG.ACC
'I saw a bubble.' [speaker noticing a sign of an animal in the water]

This distinction is relevant to the current discussion, because many of the grammaticization targets for imperatives of visual perception described in the literature are in fact derived from verbs of intentional perception. As shown by Van Olmen (2010), these tend to develop into strong markers that imply or even encode relatively strong epistemic commitment on the part of the speaker, like attention-getters or argument-introducing markers like (17). This is precisely the type of development that is largely absent in Australian languages (see Evans and Wilkins 2000), and even if it were attested, it is unlikely as a source for weak epistemic markers like *ngamal*.

The development of verbs of non-intentional visual perception is much less well-studied in the literature, but if we look at what is available, there are indications that they tend to develop into weaker markers than their intentional counterparts, which do not imply or encode strong commitment on the part of the speaker. One path that has been reasonably well-studied is the development of verbs of seeing to conative meanings of trying (e.g., Voinov 2013), as illustrated in the Yimas structure in (20), where the conative marker is analyzed as deriving from a 'see' verb in a serial verb construction (Foley 1986: 152, as quoted in Voinov 2013). Conative structures like these do not encode modal meanings as such, but

if they trigger any modal inferences, they will not imply strong modal commitment, given that the speaker conceives of the event as being attempted rather than realized.

(20) Yimas (Lower Sepik-Ramu, Lower Sepik)
Na-mpi-kwalca-tay-*ntut*
3DU>3SG-arise-see-RM.PST
'They both tried to wake him up.'
(Foley 1986: 152)

There is another path, however, that is not really well-described in the literature but more immediately relevant to modality. The key to this path lies in the interpretation of the imperative marker in *ngamal*. In principle, an imperative form is most easily compatible with the intentional sense, because imperatives entail some degree of control over the action being described: thus, 'look!' is more easily interpretable than 'see!'. As just mentioned, however, grammaticized 'look!' forms typically imply or even encode strong epistemic commitment and are therefore not a good candidate source for a weak epistemic marker. The alternative is the non-intentional sense, i.e., 'see!', but the question is how this could be interpreted with an imperative marker. As argued in Jary and Kissine (2016), in such cases, imperatives generally tend to coerce intentional readings: for instance, the use of the imperative with the uncontrolled verb *know* in English, as in (21), coerces an interpretation along the lines of 'make sure you know the answer!'.

(21) *Know the answer!*
(Jary and Kissine 2016: 143)

Along the same lines, in the case of 'see!' forms, one cannot be ordered to perceive something but one can be ordered to be open to such perception, i.e., to be receptive to information that is not yet available. Thus, for instance, in English, *see* can be used in imperatives and other deontic forms addressing the interlocutor, as illustrated in (22). In all of these cases, *see* can be analyzed as an instruction to be receptive to future information in order to make a judgement or decision: this information may concern the further course of current events in (22a), the results of one's actions in (22b) or arguments for the validity of a proposal in (22c).

(22) a. *Wait and* see *before you make a judgement.*
(http://www.pbs.org/newshour/rundown/students-eastern-michigan-u-protest-kkk-racist-graffiti)

b. *Set aside $25 for a test and* see *how you go*.
(http://www.blogtyrant.com/start-a-blog-2014)
c. *"But, you know, Terry, the St. Anne's case is highly technical, and of course there's a lot at stake. I think it calls for the judicial temperament and expertise of someone who has experience in these difficult matters, someone like, say, Judge Irving Samuels." "*Let's see.*" Terrence consulted the court docket and turned a few pages. "Yes, Samuels. He's sitting on criminal cases. But let me see what I can do."*
(Takahashi 2012: 29)

This type of use offers an interesting model to explain the contribution of *ngamal* to the *ngaani*/*ngamal* set. In the English examples in (22), the scope of the judgement is potential action: 'be receptive to future information in order to decide whether you (or we) should do X'. If the scope is propositional, however, i.e., knowledge rather than action, an instruction to be receptive to future information amounts to potential verification: 'be receptive to future information in order to decide if X is true'. In other words, if the model of structures like the ones in (22) is relevant, *ngamal* may have started its course toward epistemic meaning in *ngaani*/*ngamal* as a hedge, meaning something like '(let's) see if it's true'.

This type of analysis is tentative, of course, but it does account for some peculiarities of *ngamal* in *ngaani*/*ngamal* that are hard to deal with in alternative accounts, specifically: (i) the implausibility of the volitional sense of *ngama-* as a relevant source, (ii) the interpretation of the imperative with the non-volitional sense of *ngama-* and (iii) the specific meaning of potential verification associated with *ngaani*/*ngamal*. In addition, this analysis is also compatible with the few Australian cases for which extensions of visual perception into the domain of cognition have been observed: the data in Evans and Wilkins (2000: 575–576) suggest that if verbs of visual perception do develop meanings relating to the domain of cognition (e.g., meanings like 'recognize' or 'deduce'), the relevant source is usually the non-intentional sense rather than the intentional one.

3.3 Ignoratives and verbs of seeing combined

The two previous sections have presented hypotheses about how ignoratives and verbs of seeing could have developed epistemic meanings: ignoratives mark lack of knowledge about events while 'see' imperatives may have originated as instructions for verification. In this sense, the meaning of 'see' imperatives is semantically closest to the meaning of the *ngaani*/*ngamal* pattern as a whole, as also reflected in the fact that they are dominant overall. In this section, I present

a final hypothesis – more speculative than the other ones – about how *ngaani* and *ngamal* may have come to be combined. I suggest that *ngaani* may have originated as a reinforcer of *ngamal*, through a discourse pattern that favors initial indeterminacy. The resulting pattern is in line with Boye's (2012: 257–274) typology of epistemic combinations, representing a "harmonic" combination of two distinct instantiations of the lower value of the epistemic scale ("neutral support").

In order to substantiate this hypothesis, I start out from three relevant observations. One, just mentioned, is that *ngaani* is optional in the *ngaani*/*ngamal* pattern, with *ngamal* frequently occurring without *ngaani*. The second is that, when combined, *ngaani* varies between its typical position next to *ngamal* at the end of the clause and a rarer split pattern whereby *ngaani* is in initial and *ngamal* in final position, as shown in (23) and (24) (see also Section 2).

(23) *Errpe-n=ilu-ungku* *"Omoro* *ingkuna* ngaani ngama-l"
tell-PST=3SG.NOM-3SG.ACC father 2SG.GEN IGNOR see-IMP
'He told him: "Perhaps it's your father."'

(24) Ngaani *atha-ku=ayu* ngama-l
IGNOR eat-POT=1SG.NOM see-IMP
'Perhaps I'll eat it.'

The third observation is that *ngaani* as a thing-ignorative is also found as part of a specific discourse pattern, whereby a referent is initially introduced by an ignorative and then further specified by the same speaker at the end of the same clause, as in (25) and (26), or in the following clause, as in (11). Examples like these are not just instances of word searches, unlike (12). In fact, this discourse pattern is in line with a marked preference for indeterminate expressions in many Aboriginal languages (e.g., Povinelli 1993; Blythe 2009; Garde 2013: 10–14), especially in contexts that require circumspection, like talking about supernatural beings or recently deceased people – both (25) and (26) describe the actions of supernatural beings.

(25) Ngaani *maarra-n=ilu* *yaangkun*
IGNOR bring-PST=3SG.NOM shell
'He brought something, a type of shell.'

(26) Ngaani *angampal* *yongki-n=ilu* *yawul*
IGNOR IGNOR come-PST=3SG.NOM big
'Something was coming like that, something big.'

Taken together, these three observations suggest a hypothesis about the relation between *ngaani* and *ngamal*. Given that *ngamal* is the primary epistemic marker, *ngaani* may have originated as a reinforcer, with the indeterminate-first discourse pattern providing a model for the use of the ignorative *ngaani* as a hedge preceding the description of the event. If *ngaani* can refer to both an entity and an event, as shown in Section 3.1, the indeterminate-first pattern *ngaani* X can apply not just to entities, i.e., 'I don't know what, X' as in (25) and (26), but also to events, i.e., 'I'm not sure but I say X'. In other words, an initial ignorative could serve as a general hedge for the proposition that follows (incidentally, this could also explain the rare cases where *ngaani* serves as an epistemic marker on its own, as in [5]). If that is the case, structures that are otherwise epistemically marked, like *X ngamal* 'I say X, (let's) see if it's true', could have been reinforced by an initial ignorative as a hedge. Thus, *ngaani X ngamal* could be glossed as 'I'm not sure about this (initial hedge), but I say X (event), let's see if it's true (epistemic marker)'.

This is speculative, of course, but it is plausible in that it does account for some of the specifics of the relation between *ngaani* and *ngamal*: (i) the dominance of *ngamal* and the optionality of *ngaani* as described in Section 2, (ii) the more specifically epistemic meaning of *ngamal* and the more general meaning of *ngaani* as described in Sections 3.1 and 3.2 and (iii) the variation between split and joint final positions, with the split position possibly reflecting the origins of the structure. Interestingly, even *ngaani ngamal* in final position can (rarely) be accompanied by initial *ngaani*, which suggests that reinforcement could still be productive and work in a cyclical pattern.

(27) Ngaani *kali-ku=ayuwa,* ngaani ngama-l
IGNOR carry-POT=1SG.NOM IGNOR see-IMP
'Perhaps I will take him.'

The broader regional survey in the next section provides a further argument in favor of the reinforcement hypothesis, in the sense that not all languages with 'see' imperatives combine these with ignoratives and one even combines them with another type of marker.

4 The pattern in its regional context

To round off this study, this section examines the pattern presented in (1) in its broader regional context, with a survey of epistemic particles in the languages of Cape York Peninsula. Similar patterns are found in four other languages in the region, which belong to three different subgroups of Paman but are linked geographically, socially and sociolinguistically in a small linguistic area centered around Princess Charlotte Bay, on the east coast of the peninsula. There is independent linguistic evidence for this areal grouping, which means that the epistemic pattern described here joins a number of other phenomena shared across the languages.

In order to place the pattern in its regional context, I examined all of the grammars, sketches, dictionaries and word lists of languages of Cape York Peninsula to which I have access. In total, I examined materials for 31 languages, 23 of which have epistemic particles with meanings that are broadly comparable to the pattern in (1). I also checked for potential sources for these particles, by further examining the word lists for related verbal or nominal roots and the grammars for related morphosyntactic elements. The majority of cases have no obvious source at all. There are a few particles with potential grammatical sources and, apart from the pattern in (1), there are no other lexical sources.

The grammatical sources found in the survey are mainly conditional and apprehensive markers. In Umpila, for instance, the conditional marker *achu* can mark epistemic possibility when suffixed by an epistemic clitic *-ki* (Thompson 1988: 48, 103). In Kuku Thaypan, there is an epistemic marker *ame*, illustrated in (28), which most likely derives from an apprehensive marker that is itself derived from the lexeme *ame* 'person'.[3] Conditionals and apprehensives are obvious grammatical sources for epistemic modality, because they already serve to mark potentiality for events – events in possible worlds in the case of conditionals,and

3 I could not find the apprehensive meaning in the (limited) materials I have access to for Kuku Thaypan, but it is attested in the closely related language Aghu Tharrnggala (e.g., Jolly 1989: 54; see also example [31]). Also, apprehensive and/or prohibitive markers derived from the lexeme 'person' are well-attested in the neighboring Lamalamic languages to the north of Kuku Thaypan.

potential but undesirable events in the case of apprehensives.[4] The final step toward epistemic modality would then appear to be a transfer from potential events to potential verification, i.e., toward a strictly propositional scope.

(28) Kuku Thaypan (Pama-Nyungan, Paman, Alaya-Athima)
Ame *aca* *anhdhi-n* *anay*
maybe mouth burn-NFUT 1SG.ACC
'Maybe my mouth got burned.'
(Rigsby n.d.)

Apart from the grammatical sources just mentioned, all of the lexical sources found in the survey follow the pattern observed in (1), i.e., an imperative of a 'see' verb, possibly accompanied by another element. In addition to Umpithamu, this pattern is found in Umbuygamu and Lamalama, two Lamalamic languages to the south of Umpithamu, and in Aghu Tharrnggala and Kuku Thaypan, two Alaya-Athima languages (see Alpher 2016) to the south and southwest of Lamalamic. The pattern in Umbuygamu is most similar to that in Umpithamu, consisting of a 'see' imperative with an optional thing-ignorative, as shown in (29) and (30). The available corpus is not large enough to be sure about positions but *magal* on its own appears to be mainly clause-final. The pattern in Lamalama only consists of a 'see' imperative in final position, as shown in (31), with no evidence for support from an ignorative. The same applies to Kuku Thaypan, for which *tang*, identical to *ta-ng* 'see!', is glossed as 'perhaps' (Rigsby 1976: 70). In Aghu Tharrnggala, finally, the same marker *tang* is found, again identical to *ta-ng* 'see!', optionally with the support of the apprehensive marker *me*, as shown in (32). The one constant element in all five languages is the 'see' imperative, which again confirms that this is the most basically epistemic element in the pattern and that other elements like ignoratives or apprehensives may have developed as reinforcers that are compatible with epistemic possibility but do not necessarily encode it (cf. Boye's 2012: 258–260 harmonic combinations).

(29) Umbuygamu (Pama-Nyungan, Paman, Lamalamic)
Ani maga-l *pipim* *te-y=la*
IGNOR see-IMP tomorrow come-POT=3SG.NOM
'Maybe he will come tomorrow.'

4 In some cases, it is hard to distinguish between apprehensives and epistemic modality, especially if the only examples available are future-oriented, for which event potentiality and verification potentiality coincide.

(30) Umbuygamu
Udom maga-l
salt see-IMP
'Maybe it's poisonous.'

(31) Lamalama (Pama-Nyungan, Paman, Lamalamic)
Lam *ˈawarr* *nua-y=ta* makal
hand three lie-POT=2SG.NOM perhaps
'Will you stay three days perhaps?'

(32) Aghu Tharrnggala (Pama-Nyungan, Paman, Alaya-Athima)
Me ta-ng *liə* *ta-ng* *tuə-gə* *ya* *ninh*
APP see-IMP now see-IMP hit-FUT 1SG.NOM 2SG.ACC
'I might hit you.'
(Jolly 1989: 104; partly re-glossed)

From a genetic perspective, the pattern described here is found across three distinct subgroups of Paman, viz., Middle Paman (Umpithamu), Lamalamic (Umbuygamu, Lamalama) and Alaya-Athima (Aghu Tharrnggala, Kuku Thaypan). This distribution is not random. First, the five languages are geographically contiguous, centered on Princess Charlotte Bay and its hinterland: Umpithamu is the only Middle Paman language that neighbors Lamalamic languages (to its south) and Aghu Tharrnggala and Kuku Thaypan are the only Alaya-Athima languages that neighbor Lamalamic (to their north and east). For Umpithamu and the Lamalamic languages, moreover, there is good evidence that the languages were linked through recurrent patterns of personal multilingualism, themselves mediated through patterns of intermarriage between Umpithamu-, Umbuygamu- and Lamalama-owning clans (for more details, see Rigsby 1997; Verstraete 2012; Verstraete and Rigsby 2015: 8–17). This strong social network has resulted in a small linguistic area, with a whole range of morphosyntactic features that are shared among the languages, usually transferred from Lamalamic to Umpithamu, which is structurally very different from other Middle Paman languages (see Verstraete 2011b, 2012 for some examples, including pronominal marking and impersonal constructions). We can now add the rare epistemic pattern in (1) to this set of features. It is unclear if there was a similarly strong social network linking Aghu Tharrnggala and Kuku Thaypan to Lamalamic clans, but there is again some evidence of patterns of multilingualism and intermarriage (Verstraete and Rigsby 2015: 62–63). In any case, the fact that the epistemic pattern is also shared with

these languages suggests that the linguistic area may have reached into neighboring Alaya-Athima languages. Moreover, it reinforces the idea that Lamalamic languages form the core of the area, from which features are spread to the other languages. In the case of the epistemic pattern described here, all of the Lamalamic languages show the pattern (except for Rimanggudinhma, the most poorly documented of the Lamalamic languages, for which no epistemic particle has been documented). Conversely, none of the Middle Paman languages other than Umpithamu shows the pattern. Nor do those Alaya-Athima languages for which I was able to check (Ikarranggal and Ogh Undjan; most of the other languages in this subgroup are very poorly documented). In other words, it is most likely that the pattern is an originally Lamalamic feature that spread to its Middle Paman and Alaya-Athima neighbors.

5 Conclusion

With this small study of an epistemic marker in a few languages of Cape York Peninsula, I hope to have contributed to our understanding of epistemic modality in a number of ways. First, the pattern studied here adds to the inventory of direct lexical sources of epistemic modality identified in the literature (Bybee, Perkins and Pagliuca 1994: 206; van der Auwera and Plungian 1998: 92; Boye and Harder 2007), with ignoratives and especially verbs of visual perception. Second, I have also proposed hypotheses about how these elements could be relevant to epistemic meaning, refining an earlier analysis by Mushin (1995) in the case of ignoratives and proposing a new path to epistemic meaning in the case of 'see' imperatives as instructions for verification. I have also presented a more speculative idea about how ignoratives may have originated as hedges reinforcing the more basically epistemic pattern of the 'see' imperative. Finally, the distribution of the pattern studied in this paper confirms the existence of an areal pattern in the Princess Charlotte Bay region, which may reach further than previously thought, also taking in languages from the Alaya-Athima subgroup.

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Jacqueline Visconti

On the origins of Italian *anzi*

Abstract: The diachronic investigation of discourse markers has proven challenging since its inception in the late Eighties. Their context dependency and frequent association with informal, colloquial usage have raised methodological, as well as theoretical, questions, as historical work has to rely on written texts, which record speech with varying degrees of accuracy, and provide no access to prosodic cues. Using Old to Present Day Italian databases, in particular the *Opera del Vocabolario Italiano*, the contribution details the evolution of discourse marker *anzi* 'on the contrary' from spatial and temporal uses to its present-day contrastive-corrective function, by focusing on the role of the comparative structure in the shift. The importance of different types of contexts and genres will be discussed, for instance, Old Italian *volgarizzamenti*, translations or adaptations (or both) of Latin prose originals into vernacular versions, where the rendering with *anzi* can be compared to the original item in the Latin source text.

Keywords: contrast; discourse markers, diachrony, Italian

1 The evolution of *anzi*: Bazzanella (2003), Visconti (2015) and Musi (2016)

Beside the mesmerizing cross-linguistic span of his research, a more subdued thread underlies, in my perception, Johan van der Auwera's vast and diverse production: the love for the more challenging "procedural" aspects of meaning, may these be realized in modality or in "little words", such as scalar additive operators, negative markers or connectives.

In this contribution, I will look at the origins of the Italian contrastive-corrective marker *anzi* 'on the contrary'. Starting from Bazzanella (2003), Visconti (2015) and Musi (2016), I will highlight some unresolved questions and suggest a possible new hypothesis. Data are from the large corpus *Opera del Vocabolario*

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Italiano (OVI), totalling 17,677,486 tokens of Tuscan texts from the thirteenth and fourteenth centuries and available online (e.g., Beltrami and Boccellari 2006).

Bazzanella (2003) considers both Latin *ante* and Italian *anzi*. Whereas *ante* has spatial, temporal and comparative functions, Old Italian *anzi* has both a temporal function, as in (1), and "contrastive-corrective" uses, as in (2). Only the latter survive in Present-Day Italian.

(1) *pregò Domenedio e disse: Segniore Dio io ti prego, che tu mi facci due cose* anzi *ch'io muoia*
'He prayed to the Lord and said: Lord I pray that you do two things to me *anzi* (before) I die.'
(OVI, Andrea da Grosseto, 1268 (tosc.) L. 3, cap. 2, 182.5)

(2) *ché quelli che non teme Dio* non *è forte,* anzi *è pazzo*
'For he who does not fear God is *not* strong, *anzi* (rather) he is mad.'
(OVI, Egidio Romano volg., 1288 (sen.), L. 1 pt., 2 cap. 13, 43.16)

As can be seen in (2), the contrastive-corrective use, which is available from the very first data, is typically realized in the form *non* p, *anzi* q, where negation has scope over an entity already present in the discourse, typically someone else's point of view, which is refuted and replaced by q.

In some cases, the negation is absent, as in (3), where *anzi* is used to introduce a "better" formulation to replace the first one (p, *anzi* q).[1]

(3) *non ti maravigliare se li uomini vanno a Dio, ché Dio venne alli uomini,* anzi *ne li uomini*
'Do not wonder if men go to God, as God came to men, *anzi* (rather) in men.'
(OVI, Fiori di filosafi, 1271–1275 (fior.), pag. 194.10)

The evolution of *anzi* is considered by Bazzanella (2003: 135) as a case of "modal drift" (*deriva modale*), which proceeds from spatial and temporal values to comparison and then contrast, according to the cline (which is not to be intended as strictly unidirectional, however) *correlazione-opposizione-confronto-preferenza-contrasto-correzione* 'correlation-opposition-comparison-preference-contrast-correction'.

1 The proposed study is qualitative in nature. Indications on frequency are thus merely indicative.

Building on this account, Visconti (2015) tries to identify the contexts that may have favored the shift from the temporal to the corrective value. According to her study, based on the OVI corpus, a crucial role in the shift from temporal to corrective is played by the construction *anzi* p *che* '*anzi* p than q', which takes the form of a comparative structure. Consider (4) and (5):

(4) *li buoni debbono* anzi *amare lo giudice* che *temere*
'Good men must *anzi* (before/rather) love the judge than fear him.'
(OVI, Andrea da Grosseto (ediz. Selmi), 1268 (tosc.) L. 2 cap. 40, 133.26)

(5) *affaticati* anzi *per te* che *per altrui*...
'Labour *anzi* (before/rather) for yourself than for the others.'
(OVI, Fiori di filosafi, 1271–1275 (fior.), 119.9)

Placing two states of affairs in a relation of temporal sequence, in a deontic or future reference context like (4) and (5), may indeed suggest an inference of precedence and priority, well-attested in studies on different languages.[2] The subsequent step is an inference of rejection of the alternative in q, which paves the way for the shift from preference to correction. Let us look at *hraðor*, the comparative of *hræþe* 'quick, early', for instance. In Old English, it had both temporal precedence and preference values. As pointed out by Traugott and König (1991: 206), in contexts such as (6), we have an inference of refusal of one of the alternatives ('not to get married').

(6) *His daughter, who had chosen the Lord, would* rather *die* than *get married.*
(Traugott and König 1991: 206)

Similarly, in (4), *anzi amare che temere* 'rather love than fear' would invite the inference 'not fear' and thus *non temere, anzi amare* 'not fear, rather love': the construction *anzi* p *che* q would thus prepare the ground for the shift from temporal sequence to correction, via precedence and priority.

In her study of the diachrony of *anzi* and *invece* 'instead', Musi (2016) separates adverbial/prepositional *anzi* from the conjunction *anziché*. Her argument is that, for the former, as seen, spatial-temporal and contrastive uses coexist from the beginning while, in the latter, the different stages in the development can still be identified (Musi 2016: 8). In particular, for *anziché*, cases like (7) can be found,

2 See, for instance, Traugott and König (1991) on English *hraðor* to *rather*, Cuenca (1992: 187) on Catalan *ans*, Rodriguez Somolinos (2002) on French *ainz* and Bazzanella (2003) on *ante*.

in which the conjunction can be interpreted as either expressing anteriority between two states of affairs or as a marker of contrast.

(7) *eh, maestro: i' ho veduto cosa che molto mi dispiace all'animo mio: ch'io vidi un vecchio di grandissimo tempo fare laide mattezze: onde, se la vecchiezza n'ha colpa io m'accordo di voler morire giovane* anziché *invecchiare e matteggiare*
'Eh, master: I saw something which really displeased me: I saw an old man of really advanced age committing terrible follies: therefore, if old age is responsible for that, I have decided that I want to die young *anziché* (before/rather than) become old and go mad.'
(OVI, Novellino, 68, thirteenth century, Musi 2016: 9)

According to Musi (2016: 10), the conjunction's function of indicating preference is even clearer in examples where *anzi* is separated from the complementizer, as in (8).

(8) *io le diedi per no' potere fare altro, e Vollile* anzi *mandare* che *ritenerlle*
'I have given them because I could not do anything else and I wanted *anzi* (rather) to send them than to keep them.'
(LIZ, Lett. Pist., 1320–1322, Musi 2016: 10)

In examples of this kind, it is argued, the conjunction *anziché* expands to contexts that are incompatible with a temporal meaning, such as (9).

(9) *Tuttavolta il dolore somiglia* anzi *la quiete* che *l'inquietudine*...
'Sometimes pain resembles *anzi* (rather) quietness than anxiety...'
(LIZ, Tasso, De la Gelosia, 2. 137. 1585, Musi 2016: 11)

We notice, however, how the label of conjunction may be problematic in this example, given that *anzi* is followed by a nominal phrase. Interestingly, moreover, the use in (9) resembles the structure called "comparative" by Visconti (2015) for (4) and (5). For Musi (2016: 11) too, indeed, "the parallelism between two entities plays a fundamental role in the rise of the contrastive value".

As far as the evolution of the adverb *anzi* is concerned, Musi (2016) suggests that the contrastive value emerges from contexts following a negative clause, such as (2).

2 Unresolved questions

The main issue, left open by Visconti (2015), concerns the role of the comparative structure in the development from the temporal to the corrective value of *anzi* and thus the relationship between the constructions: *anzi* p *che* q '*anzi* p *than* q' and *non* q, *anzi* p 'not p, *anzi* q'.

The hypothesis of a crucial role of the comparative in the evolution from spatial-temporal to preference and correction finds support both in other languages, as noted above, and in the development of other conjunctions in Italian, such as *ma* 'but' or *piuttosto* 'rather' (e.g., Mauri and Giacalone Ramat 2015). In particular, the derivation of *ma* (and its equivalents in Romance languages) from the Latin comparative adverb *magis* 'more' represents a significant precedent for *anzi*. The hypothesis, detailed in Marconi and Bertinetto (1984), concerns the shift from a construction of the kind p *magis quam* q 'p more than q' to corrective (of the German *sondern* type) *non* q, *ma(gis)* p 'not q, but p', as in (10).

(10) *id, Manli, non est turpe,* magis *miserum est*
'This, Manlio, is not foul, *magis* (more) it is miserable.'
(Catullo, 68, 30, Ducrot and Vogt 1979)

As suggested by Marconi and Bertinetto (1984: 482), such a shift could originate in elliptical structures such as (11).

(11) *non q,* magis *(quam q) p* > *non q,* ma *(piuttosto che q) p*
'not q, *more* (than q) p' > 'not q, *but* (rather than q) p'

An analogous elliptical structure could be assumed to have played a part in the evolution of *anzi*, as (12) shows.

(12) anzi *q che p* > *non p,* anzi *(che p) q* > *non p,* anzi *q*
anzi *amare che temere* > *non temere,* anzi *(che temere) amare* > *non temere,* anzi *amare*
'before/rather love than fear' > 'not fear, rather (than fear) love' > 'not fear, rather love'

However, as argued by Marconi and Bertinetto (1984), explanations of this kind should not be accepted lightly, as the reconstruction of subjacent phenomena, when not made on the basis of compelling syntactic evidence, can easily border arbitrariness. Moreover, it is unlikely that speakers really opt for such convoluted

ways to achieve their communicative purposes. This appeal to the speakers suggests an alternative hypothesis.

3 A new hypothesis

Let us start by refining the chronology of the phenomena, on the basis of the historical dictionary of Old Italian *Tesoro della Lingua Italiana*. *Anzi* is attested here already in 1211, with the value of a preposition expressing anteriority in time. It appears even earlier, already in the 12th century, as an adverb/conjunction with an adversative value (albeit with temporal connotations). The corrective value (i.e., the one without negation, as in p, *anzi* q) is attested at the end of the 13th century. A few examples of the spatial value persist into the 14th century.

As is well-known in diachronic research, due to the paucity and non-representativeness of the data, a definitive reconstruction of the phenomena is not always possible. Often, as for particles in physics, the only way is to look for their traces. One of the most interesting traces, which relates to the question of the complex relation between Latin and Vulgar of the time, is provided by *volgarizzamenti*, translations and adaptations of Latin and French texts into Vulgar. By looking at what *anzi* is a translation of, we can try to understand how it was perceived by the translator in those centuries.

Using the *Dizionario dei Volgarizzamenti* (Guadagnini and Vaccaro 2016; DiVo),[3] we discover that, in the temporal uses, *anzi* translates Latin *ante(quam)*, *pridie (quam)* and *prius quam* 'before'. In the comparative, *anzi* p *che* q renders *nimis/potius/magis* p *quam* q 'more p than q'. Yet, the most conspicuous Latin originals are *sed* 'but' in the adversative uses like (13) and *immo* 'rather' in the corrective ones like (14).[4]

3 Thanks to Elisa Guadagnini for her precious help with the database.

4 On *immo*, see Rosén (2003).

(13) a. *e se lli sovrani uomini e conosciuti cittadini Saturnini, Gracchi e Flacchi e molti altri maggiori non solamente non si contaminaro di sangue,* anzi *se n'adornaro d'onestade…*

b. *etenim si summi viri et clarissimi cives, Saturnini et Gracchorum et Flacci et superiorum complurium sanguine non modo se non contaminarunt,* sed *etiam honestarunt…*
'If the highest and most famous citizens, Saturninus, and the Gracchi, and Flaccus and many that were not stained with blood, *sed* (but) also honored…'
(DiVo, Prima catilinaria volg. (red. A), a. 1294 (fior.), p. 5004.37: LAT)

(14) a. *le cui bactaglie,* ançi *sotto le cui battaglie…*

b. *cuius bella* immo *sub cuius bellis…*
'whose wars, *immo* (rather), under whose wars'
(DiVo, Bono Giamboni, Orosio volg. (ed. Matasci), a. 1292 (fior.), L. III, cap. 8, p. 30r.30: LAT)

Thus, if *anzi* is perceived as the equivalent of *sed* and *immo* (which moreover contains a scalar component) in the 13th century, its contrastive-corrective value appears to be fairly conventionalized already then. Assuming that this value is derived from a comparative structure, it is reasonable to conclude that the transition had already taken place in the documented period.

However, the high polysemy of *anzi* right from the start may induce us to consider a different hypothesis, according to which the contrast component would be in some way already present and inherent in *anzi*.[5] By using *anzi*, whether to follow a negative clause or to introduce a reformulation, the medieval speaker would use it with the meaning of 'in front of, opposite', which is inherent in the spatial value of the particle. The spatial value in *anzi* is indeed of a relational kind – 'p *in front* (of q)' – and contains a component of contrast, as already pointed out by Bazzanella (2003) and Musi (2016: 23).

As highlighted by Banfi and Arcodia (2009: 179) in a study of the derivation of coordinative markers in Indo-European languages, "the primary idea at the basis of the process of seriation is represented via morphs that highlight the 'antithesis', the 'contraposition' between the elements of a series", in particular continuations of the Indo-European root **-ṇt-i*. The outcomes of this basis indicating opposition/contrast, are locative forms, such as Sanskrit *ánti* 'opposed to, instead

5 I thank Lele Banfi for this important suggestion.

of', Greek *ἀντί* 'in place of, in the face of, close to' and, indeed, Latin *ante/antea* 'ahead of, before'.

The evolution of the meaning of *anzi* from spatial and temporal to contrast and correction would thus not have taken place in a linear way, through the mediation of the comparative structure, as envisaged by Visconti (2015). Rather, it would be the outcome of a series of parallel processes, by which the component of contrast, inherent in the spatial value, manifests itself in the different constructions in which *anzi* is realized: by following a negation, to suggest a point of view "in front" of a negated one or to introduce a better formulation "in front" of a previous, less adequate, one.

Both hypotheses look at the insidious ground of the relationship with the Latin tongue. Whereas the spatial, temporal and comparative uses of *anzi* continue those of Latin *ante*, the contrastive-corrective uses form an apparent innovation. From a first, yet authoritative survey,[6] a corrective construction of the kind *non turpe, ante miserum* 'not foul, rather miserable' does not appear to exist in documented Latin. Such a construction was instead possible with *magis*, as in (10).

Yet, the existence in Medieval Latin of comparative structures such as (15) could, in the absence of further documents, endorse the original hypothesis of the development through the comparative.

(15) *addere fecimus ut* antea *supercrescat quam deficiat*
'Let us add so that there *antea* (rather) be too much than too little.'
(Adalhardi abb. Corbejens. statuta (a. 822), c. 6 ed. Levillain, LMA t. 13 (1900) p. 356)

Many unsolved questions, or, seen differently, many fascinating paths face us at this point – for instance, the role of Greek *ἀντί*, in which the component of contrast is strongly present or the Gallo-Romance influences, in particular the role of French *ainz* in the diffusion of *anzi*, as can be seen in the intermediate texts in DiVo, as in (16)

6 For which I thank Raffaella Tabacco.

(16) a. *se alcuna leggie difende che homo non frusti alcuno homo che ssia giudichato a morte, alcuna leggie dice che homo none ucida citadini dapnati,* ansi *ne i vé homo tucto giorno ischanpare*

b. *se aucune loi deffent que l'en ne frustast home jugé a mort, aucunes lois redient que l'en n'occie pas citien dampné,* ainz *l'en envoit l'en en exil a touzjors*

c. *an quia lex Porcia vetat? at aliae leges item condemnatis civibus non animam eripi, sed exilium permitti iubent. an quia gravius est verberari quam necari*
'But according to other laws, the condemned should not be deprived of life, *ansi* (but rather) sent into exile.'
(DiVO, Orazioni di Cesare e Catone (red. alfa), 1285/99 (pis.), Oraz. di Cesare [Tes., III.35], pag. 122r.10: FR 51.22)

Moreover, an interesting hypothesis to be pursued further, given the dialogic nature of both contrast and correction, is the one of an origin of such values in rebuttal contexts, thus in orality.

4 Conclusion

The context dependency of procedural items like *anzi* and their frequent association with informal, colloquial usages make their diachronic investigation particularly challenging, as historical work has to rely on written texts, which record speech with varying degrees of accuracy and provide no access to prosodic cues. In this respect too, Johan's research has been paving the way across many languages and textual traditions.

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