Chapter 8

The typology of relative and adverbial clauses

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The present contribution surveys prominent patterns in the typology of relative and adverbial clauses, with particular reference to the notion of embedding. To this end, we unfold the notion of embedding into a three-dimensional space consisting of a functional, a syntagmatic and a formal axis along which a clause may be argued to be embedded in a (constituent of a) matrix clause. We show how these dimensions of embedding interact with each other to yield cross-linguistically recurrent subtypes of relative and adverbial clauses. In doing so, we also discuss the processing and diachronic dynamics of clausal embedding in these domains as well as correlations between the degree of embedding and other grammatical properties of the subordinate clause, such as accessibility to relativization or the reduction of overt markers of the embedding relationship.

1 Adjunct clauses and the notion of embedding

1.1 Goal and structure of the paper

The present chapter is concerned with clauses that function as adjuncts within a matrix clause of a complex sentence. As such, they typically provide further information on a certain element of the matrix clause, but they are not an argument of the main-clause predicator. The traditional classification of adjunct clauses rests on whether they relate to a nominal of the matrix clause (= prototypical relative clauses) or the predicate or the entire proposition expressed by

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the main clause (= prototypical adverbial clauses). Accordingly, our goal in the present chapter is to provide an overview of prominent cross-linguistic patterns of relative-clause and adverbial-clause formation.[1]

As it proves impossible for a single article to do justice to the enormous amount of typological research on these clause types that has accumulated over the last decades, we will pursue a narrower, more focussed agenda here. Specifically, we will attempt to systematize the typology of adjunct clauses from the central perspective of the present volume, that of embedding. To this end, we begin the paper (in Section 1.2) by unfolding the notion of embedding into a three-dimensional space consisting of a functional, a syntagmatic and a formal axis along which a clause may be argued to be embedded into a (constituent of a) matrix clause. In doing so, we also intend to lay the terminological groundwork for all subsequent sections. The ensuing Section 2 and Section 3 will then be concerned with the typology of relative and adverbial clauses, respectively, before Section 4 concludes the paper by situating commonalities between the two domains in a dynamic view of clausal embedding and grammatical structure more generally.

1.2 Dimensions and reflexes of embedding

In Lehmann's (1988) typology of clause linkage, embedding is the endpoint of a continuum of "hierarchical downgrading", a situation where a clause comes to behave as a "well-defined constituent" (ibid.: 184) of another unit, i.e. of a clause or even a phrase. In the present paper, we understand this to mean that a clause is *functionally*, *syntagmatically* and *formally* integrated with that other unit. In the following subsections, we introduce each of these three dimensions and begin to carve out their relevance for the typology of relative and adverbial clauses.

1.2.1 The functional dimension

A clause is fully integrated from a *functional* point of view if it has a specific semantic and syntactic function inside another unit. This is arguably the case when a clause "elaborates a site" (Langacker 1987: 304) or fills a gap (Lehmann 1983, Diessel 2019b: Ch. 9) projected by a relational element of the main clause, i.e. by

[1] We understand a MATRIX CLAUSE to be a superordinate clause in a complex sentence in which a subordinate clause has a dedicated syntactic function (more on this below). The term MAIN CLAUSE, by contrast, is here used to refer to the unit that remains of the matrix clause when the subordinate clause is removed. Using this terminological distinction, we would say, for example, that a given instance of an adverbial clause is part of a matrix clause and that it either precedes or follows its associated main clause.

a verbal, nominal or adjectival predicator in the main clause. Accordingly, such subordinate clauses are known as ARGUMENT CLAUSES. NON-ARGUMENT CLAUSES, by contrast, are not projected in the same way. This holds for all of the following clauses, taken from typologically diverse languages (a list of glosses is provided at the end of the paper):

(1) relative clause from Persian (Indo-Iranian: Iran; Mahootian 1997: 33)

[Film-i-(ro) [ke hæme dust+dašt-ænd]] næ-did-im.
film-DEM-(OBJ) REL all friend+have-3PL NEG-saw-1PL
'We didn't see the film that everyone liked.'

(2) adverbial clause from Noon (Atlantic-Congo, North-Central Atlantic, Cangin: Senegal; Soukka 2000: 278)

[Balaa mi le' kaad-aa], mi híd-oh-ha na húnísmun.
before 1SG arrive house-IRR 1SG meet-RECP-NARR with friend
'Before I arrived home, I met with a friend.'

(3) clause chaining from Mauwake (Nuclear Trans New Guinea, Madang: Papua New Guinea; Berghäll 2015: 335)

[Nainiw ekap-ep] maa me sesenar-e-mik.
again come-SS.SEQ food not sell-PST-1/3PL
'They did not come back and sell food.'

In the literature, it is thus said that the presence of the dependent clauses in (1–3) is not specifically licensed by a predicator. Since it has been pointed out, however, that the difference between arguments and non-arguments is gradient rather than categorical (see, e.g., Deutscher 2000 on Akkadian), we prefer the term *projection* to the more categorical *licensing* here. We will see later on that some relative and adverbial clauses are more closely associated with, or more strongly projected by, their head element than others, with interesting typological consequences (see Section 3.2–Section 3.3).

Despite not being projected by a main-clause element, non-argument clauses can still fulfil a semantic and syntactic role in another unit and thus be functionally embedded in that unit. This is what happens most clearly in (1) and (2) above. In (1), the dependent clause functions as an attributive modifier of a nominal, and hence has a dedicated function inside an NP; in (2), the dependent clause spells out part of the setting of the main-clause situation and thus functions just like a phrasal constituent with similar semantics. In both cases, then, the dependent clause acts as a modifier of an element in the matrix clause. This contrasts with

the situation in (3), where we see a succession of events in which the formally dependent clause – the one lacking tense and person inflection on the verb – cannot be said to function as a modifier of the final finite clause. The grammatical construction in (3) has aptly been called CLAUSE CHAINING in the typological literature, best-known from (but not limited to) languages of Papua New Guinea (see, e.g., Roberts 1988 for an overview). The dependent clauses in such chains have been argued not to have a syntactic function in a larger clause and hence not to be embedded within it (see Van Valin 1984, 2005: Ch. 6, who uses the term COSUBORDINATION for this phenomenon).[2] Accordingly, while the typological domain of "non-argument clauses" also includes dependent clauses like the one in (3), the latter are not functionally embedded like the dependent clauses in (1–2). Since (1) and (2) fulfil the syntactic function of adjunct (to a nominal and a clause, respectively), we refer to them as ADJUNCT CLAUSES, and this is the domain that the present paper seeks to investigate from a typological perspective.

It is widely recognized that adjuncts are extremely heterogeneous themselves (see, e.g., Maienborn & Schäfer 2011 for a survey). A coarse-grained but useful distinction is that between adjuncts that modify the descriptive meaning of an element of the matrix clause (= MODIFIERS) and adjuncts that provide additional comment on the element in question (= SUPPLEMENTS). Modifiers of a nominal element typically restrict the referential potential of the NP headed by that nominal and hence go by the name of RESTRICTIVE RELATIVE CLAUSES; modifiers that restrict a situation to a specific setting (time, place and manner) or specific contingent circumstances (condition, cause, purpose, result, etc.) are traditionally known as ADVERBIAL CLAUSES. They are often said to spell out "peripheral" information on the "core" expressed by the main-clause proposition (e.g. in Van Valin & LaPolla 1997: 26's terms).

Adjuncts that provide additional comment are called supplements here (extending a descriptive term used by Huddleston & Pullum 2002: 59 for English). Relative clauses can be used to express supplementary information on both an NP in the matrix clause (4) and a whole clause (5); they are also known as NON-RESTRICTIVE, SUPPLEMENTARY and – in the case of (5) – SENTENTIAL relative

[2]The term "cosubordination" is supposed to capture the fact that, in the languages in question, clause-chaining constructions are grammatically distinct from both coordinate and subordinate clauses. Unlike subordinate (and like coordinate) clauses, they do not fulfil a syntactic function in another clause and rather encode sequential (and often non-backgrounded) events in a narrative; unlike coordinate clauses (and like subordinate clauses in these languages), they are grammatically dependent on another clause, i.e. the final one in the chain, notably for the interpretation of tense, aspect and mood operators. The dependent clauses in such chains are also called 'medial clauses'.

clauses. In many languages, the clausal constructions used as adverbial modifiers can also be employed as adverbial supplements (see also Haegeman et al. 2026). In this function, they often provide the speaker's attitude towards the main-clause proposition or relate to the speech act (rather than the propositional content) expressed by the main clause (6–8):

(4) supplementary relative clause (with a nominal antecedent) from Basque (isolate: Spain, France; Hualde & Ortiz de Urbina 2003: 804)

Gure Jainkoak, [beti xuxen dabilana], ongi gidatzen baitu.
our god.ERG always right acts.SUB.DET well guide.IMPF SUB.AUX
'Because our God, who always acts rightly, guides well.'

(5) supplementary relative clause (with a sentential antecedent) from Avatime (Atlantic-Congo, Volta-Congo, Kwa Volta-Congo: Ghana; van Putten 2014: 85)

Áà-gu kpɛ [gì lí-tá-bụbɔ].
C_1:SG.POT-speak put.in REL C_3:SG.NEG-INT-easy
'He will be speaking into it, which will not be easy.'

(6) supplementary (conditional) adverbial clauses from English (Huddleston & Pullum 2002: 774)

a. Dick is coming to the party, [in case you're interested].
b. [If you must know], I wasn't even shortlisted.

(7) supplementary (purposive) adverbial clause from Yakkha (Sino-Tibetan, Himalayish, Kiranti: India, Nepal; Schackow 2015: 450)

[Yeppa cok-ma bhoŋ] i-ha-ca im-ma por-a
true do-INF COND/PURP what-NMLZ.NSG-ADD buy-INF must-NATIV
n-joŋ-me-ŋa-n.
NEG-do-NPST-1SG-NEG
'To be honest/If I'm honest, I do not have to buy anything.'

(8) supplementary (concessive) adverbial clause from Georgian (Kartvelian: Georgia; Kojima 2018: 436)

Ak sač'mel-i=a, [tumca es šen i-c-i].
here food-NOM=be.PRS.3SG although this.NOM 2SG.ERG *i*-know-THEM
'There is food here, although you know this.'

1.2.2 The syntagmatic dimension

There are several ways in which a clause can be more or less *syntagmatically* integrated into another unit. First, the more internally coherent the unit in question, the more likely it is to be considered a constituent of a higher unit. Coherence is achieved by keeping the constituting elements of the unit in linear adjacency (Behaghel 1932); the opposite pattern is to separate these elements from one another (see e.g. Hale 1983 for classic examples). Cross-linguistically, adverbial clauses seem averse to being split up by their main clause, even in languages that otherwise license "discontinuous constituents" (see, e.g., Reinholtz 1999 on Swampy Cree). If adverbial clauses are interrupted at all, it is usually by further adverbial (or other dependent) clauses, as in (9):

(9) Koyra Chiini (Songhay: Mali; Heath 1999: 281)

[jaa [nda baana kar], ganji-ije di yo o ñin]
since if rain hit forest-child DEF PL IMPF drink
'because, if rain falls, the wild animals will drink'

Discontinuities are more common in relativization, when the relative clause is separated from the head nominal it is meant to modify. This so-called EXTRAPOSITION from NP is illustrated in (10):[3]

(10) Slave (Athabaskan-Eyak-Tlingit, Northern Athabaskan: Canada; Rice 1989: 1327)

John łį wehk'é [ʔeyi ts'ǫ́dani kayįhk'a yįlé i].
John dog 3.shot the child 3.bit PST REL/NMLZ
'John shot the dog that bit the child.'

This leads us to the position of adjunct clauses more generally, the second and more important indication of their syntagmatic integration with the main clause: the more tightly a dependent clause can be joined to the main clause, the clearer its status as a constituent of the matrix clause and hence its degree of embedding. Along this continuum, we find dependent clauses that (i) are able to disrupt the

[3] One could argue that a similar pattern arises when adverbial clauses are represented by a correlate in the main clause, as in German *Ich habe es **deshalb** gesagt, weil es mir wichtig war* 'I said it **(therefore)** because it was important to me.' We consider these different from extraposed relative clauses precisely because the relative clause in (10) modifies its head nominal and thereby restricts the reference of 'dog', while the relationship between an adverbial clause and its correlate is not one of modification but of co-reference, with the correlate being a mere placeholder for the adverbial clause.

core predicate-argument structure of the main clause (CENTRE-EMBEDDING, as in (11)), (ii) attach to the left or right of the this core (12), (iii) are relegated to more marginal positions of the matrix clause, such as strictly before or after other adverbial modifiers of the core (13), or (iv) are removed from the main clause into a left- or right-detached position (14). The latter pattern typically goes hand in hand with the intonational separation of the two clauses (see also Van Valin 2005: §6.2 for discussion of these positional types):

(11) Urarina (isolate: Peru; Olawsky 2006: 690)

Nii hetau=te [ahe-ʉrʉ-a=ne hana] tʉrʉ-a kʉ-e.
that HRS=FOC get.drunk-PL-3.DF=SUB when arrive-NTR go-3.EF
'That [man] arrived when they [the people] were getting drunk.'

(12) English

Anna was angry [after she left the party] because of Mike's sexist jokes.

(13) Martuthunira (Pama-Nyungan, Pilbara: Australia; Dench 1995: 252)

Ngayu kartungu parla-marta purra-rninyji pal.ya-a,
1SG.NOM 2SG.ACC stone-PROP hit-FUT temple-ACC
[pungka-waa-rru].
fall-PURP.S=P-now
'I'll hit you in the temple with a stone, so that you fall down.'

(14) Supyire (Atlantic-Congo, North Volta-Congo, Senufo: Burkina Faso; Carlson 1994: 492)

[Myàhíí u a cèè gé], ci náhá mìì fúnŋí í.
song.DEF.3PL she PRF sing REL 3PL be.here my inside in
'The songs which she sang, they are here inside me.'
('I remember the songs which she sang.')

In (13), we see a typical representative of what has been called an "adjoined clause" (Hale 1975) in Australian languages, a dependent clause that precedes or follows the main clause, may be "bound intonationally" to it (e.g. Nordlinger 1998: 217 on Wambaya), but is not normally found inside it. In (14), finally, the relative clause is found in a left-detached position.[4] As Carlson (1994: 488) states, "relative clauses in Supyire are unembedded," and they are "typically followed

[4]For the sake of clarity, it should be pointed out that this relative clause is of the internally-headed type (see Section 2.2.1 below), so that it is the whole unit in brackets that is left-detached from the main clause here.

by a short pause before the main clause." In contrast to the relative clause in (10) above, constructions like the one in (14) are not due to an option of extraposition; they standardly occur in a left- or right-adjoined position and are not normally inserted between elements of the main clause (for further discussion, see Section 2.2.2 below).

Examples (11) to (14), then, illustrate a continuum from clearly integrated to clearly non-integrated adjunct clauses. As we shall see, this parameter is a crucial typological variable that distinguishes different construction types of relative and adverbial clauses cross-linguistically.

1.2.3 The formal dimension

When clauses are functionally and syntagmatically integrated into another unit, it is common for them to also approximate the form of the most typical syntactic constituent, i.e. a phrase. Haiman & Thompson (1984) and Lehmann (1988) introduce a wide range of dimensions that reflect the "decategorization" (Malchukov 2004) of a clause and its "recategorization" as a phrasal unit, a phenomenon also known in typology as DESENTENTIALIZATION (Lehmann 1988) or DERANKING (Cristofaro 2005, building on Stassen 1985). In the present paper, we will use the term deranking to refer to this dimension of clausal embedding.

Among the hallmarks of deranking are the restriction (or the lack) of clausal and sentential operators (illocutionary-force marking (see Verstraete 2007, Bickel 2010 for specific parameters), tense-aspect-mood marking, negation), the use of dependent verb forms, and the reduction and/or special coding of the arguments and modifiers. Dependent verb forms that are specifically associated with relativization have been called PARTICIPLES (see Shagal 2019), while dedicated adverbial verb forms have been labelled CONVERBS in the typological literature (Haspelmath 1995, Nedjalkov 1998), although it must be stated that there is considerable diachronic interaction and hence synchronic overlap between participles, converbs and nominalizations (Ylikoski 2003; on nominalization, see also Alexiadou & Kornfilt 2026). In (15–20) below, we illustrate different degrees and facets of deranking in adjunct clauses.

(15) weakly deranked concessive clause: internal structure as in independent clauses, except for a clause-initial subordinator
Tz'utujil (Mayan: Guatemala; Dayley 1985: 371)

[Maanaan xtipeeti ja Aa Lu?], majun nuub'an.
although 3ABS.might.come the youth Pedro nothing 3ABS.3ERG.do
'Even though Pedro might come, he won't do anything.'

(16) weakly deranked relative clause: no subordinator, internal structure as in independent clauses, except for reduced person indexation
Musqueam (Salishan: Canada; Suttles 2004: 76)

kʷƟə swə̓ẏqeʔ [c̓éw-ət-Samx-**Ø** ceʔ]
ART man help-TR-me-**Ø** FUT
'the man who will help me'
(compare céw-ət-S(amx)-**əs** ceʔ = help-TR-me-**3TR** FUT = 'He will help me.')

(17) more strongly deranked temporal/causal clause: subordinating conjunction, non-canonical subject coding (zero Accusative instead of overt Nominative case), dependent verb form (phonologically reduced), but retention of tense-aspect inflections
Wappo (Yuki-Wappo: USA; Thompson et al. 2006: 155)

K'anihtuč'm-i nale?-iš-khi? [k'ešu-ø pulu:mek-ta wen].
chief-NOM angry-INCH-STAT deer-**ACC** run:away-**PST.DEP** **when**
'The chief got angry when/because the deer ran away.'

(18) strongly deranked temporal clause: semantically specific subordinating suffix *-ka* attached to a bare verb stem (*aka* = converb), reduction of TAM and person inflection
Awa Pit (Barbacoan: Colombia; Curnow 1997: 272)

[Santos a-**ka**]=na, kula-ta-w.
Santos come-**when**=TOP hide-PST-LOCUT:SBJ
'When Santos came, I hid.'

(19) strongly deranked purpose clause: nominalized verb form, reduction of TAM and person expression, dative case marker (= "purposive phrase")
Konso (Afro-Asiatic, Cushitic: Ethiopia; Mous & Oda 2009: 349)

Innaannó [golpaytá pidd-a-'é] urmala-pá aan-é.
brother:1PL.POSS goat buy-NMLZ-DAT market-DEST go-PRF
'Our brother went to the market in order to buy a goat.'

(20) strongly deranked relative clause: nominalized verb form, reduction of tense, mood, person-number inflection and lack of separate negative suffixes
Dolakha Newar (Sino-Tibetan, Himalayan: Nepal; Genetti 2007: 390)

[Am pipāna ye-u] mi=pen gun?
that veranda come-NMLZ/REL person=PL who
'Who are the people who came to the veranda?'

In recent typological studies, the gradient nature of deranking has been captured empirically by developing fine-grained structural variables along which language-specific clause-linking constructions may differ (e.g. Cristofaro 2005, Bickel 2010, Schmidtke-Bode 2014, Hetterle 2015, Shagal 2019). This, in turn, allows a more rigorous comparison of the degree to which different types of adjunct clauses (e.g. different adverbial relations) are structurally downgraded and thus approximate the formal make-up of phrases rather than clauses (as in (19) above).

Care must be taken not to interpret deranking as a unidirectional diachronic process. While it is true that a fully-fledged independent clause may come to be structurally reduced or dependent, the opposite pathway from smaller to larger units is also well-known: as outlined by Heine (2009), a phrase may be expanded into a (more) clausal unit. For example, when the NP governed by a benefactive adposition ('for my wife') is replaced by a deverbal noun with its own arguments and modifiers, the result can be a fully deranked adverbial expression of purpose ('for (the) feeding (of) the children'). Such constructions can, in turn, gradually rid themselves of nominal properties and acquire a more clause-like treatment of their arguments and modifiers (e.g. Disterheft & Viti 2010 for infinitives in Indo-European, Fanego's (2004) detailed study of English gerunds). For further remarks on the diachrony of embedding, see also Viti (2026).

1.2.4 Interim summary

We have introduced three dimensions of clausal embedding that can be seen as three related scales in a typological space, as illustrated in Figure 1.[5] The idea behind this illustration is that language-specific dependent-clause constructions vary in terms of …

- how strongly they are associated with (or "projected" by) a relational element in the matrix clause (yielding a range from typical argument clauses to completely independent states-of-affairs as in typical coordinate structures);
- how closely they can be positionally integrated with their associated main clause (ranging from centre-embedded to detached positions);
- how strongly they are deranked in comparison to independent clauses (ranging from fully clausal to fully phrasal structures).

The first two criteria are thus concerned with "external" properties of a dependent clause, while the third one relates to its "internal" structure.

[5] Figure 1 was created by applying the package scatterplot3d (Ligges et al. 2018) in R 3.6.3 (R Development Core Team 2019) to purely fictitious data points.

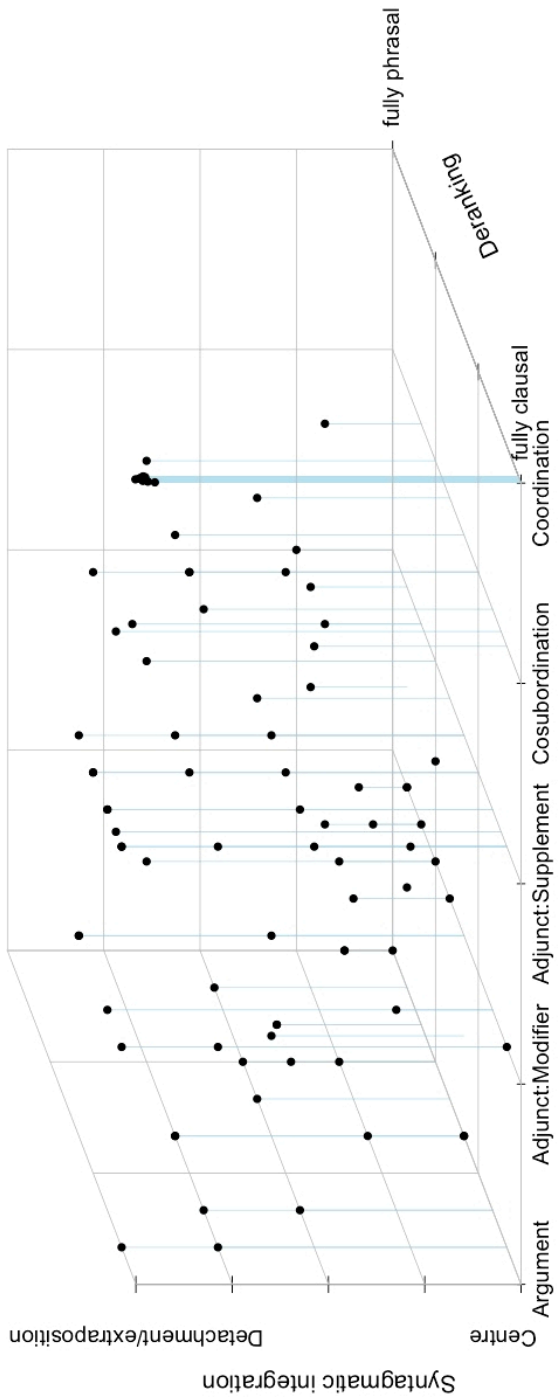

Figure 1: A three-dimensional space of embedding

A common result across typological studies is that each language-specific construction represents a unique point in a gradient multidimensional space such as Figure 1, but that certain clusters of points emerge as cross-linguistic types of dependent-clause formation. In this spirit, the following sections will show how the three dimensions of embedding combine with one another to yield typologically prominent patterns of relative-clause and adverbial-clause formation.

2 Relative clauses in typological perspective

In this section, we survey the cross-linguistic variation of relative clauses.[6] Loosely speaking, relative clauses (RCs) are often characterized as clauses which function as noun modifiers. But in order to discuss the cross-linguistic variation in the forms and functions of RCs insightfully, we offer a more technical definition here. A relative clause is a clausal construction that is semantically oriented towards one of its participants (Lehmann 2014: 4), in order to specify an entity of the matrix clause in such a way that the designatum of that entity occupies a participant position in the situation encoded by the relative clause. The participant towards which the relative clause is oriented is known as the RELATIVIZED POSITION.

The matrix-clause entity that is specified by the relative clause is most commonly a NOMINAL (e.g. *old man*) centred on a NOMINAL HEAD (*man*); in these situations, relative clauses are typically used to restrict the referential potential of the NP headed by the nominal head, as in *the old man I saw at the pub last night*, or in our earlier example (1). These relative clauses thus act as modifiers of a nominal and are known as RESTRICTIVE RELATIVE CLAUSES. By contrast, SUPPLEMENTARY RELATIVE CLAUSES specify an NP, the main-clause predicate or the main clause by providing elaborative information on it without restricting its referential potential, as in (4–5) above. In the following overview, we will concern ourselves primarily with the typology of restrictive relative clauses, as most cross-linguistic work has been done on this type of relativization.[7]

[6]The most comprehensive typological analysis of relative clauses is Lehmann (1984), crucial aspects of which are succinctly summarized in various follow-up publications (Lehmann 1986, 2008, 2014). Non-monographic systematizations of the typology of relativization can be found in work by Bernard Comrie (e.g. Comrie 1981, 1998, 2006), in Downing (1978), Keenan (1985), de Vries (2005, 2018), Andrews (2007), and in a number of volumes on (functional) syntax in cross-linguistic perspective (e.g. Dik 1997: Chs. 3–4, Givón 2001: Ch. 14, Dixon 2010: Ch. 17, Croft 2022: Ch. 19). Finally, Hendery (2012) provides a diachronic typology of relative clauses.

[7]In fact, many typological studies take restrictiveness as a crucial part of their comparative concept for relative clauses, such as Comrie & Kuteva (2013) or Andrews (2007). For some typological notes on supplementary relative clauses, readers are invited to consult a more elaborate version of this article here: https://doi.org/10.5281/zenodo.7971218.

2.1 Headedness

The first parameter of cross-linguistic variation for RCs is whether the nominal head to be modified is syntactically part of the RC, appears outside of it, or is left implicit. Accordingly, many typologies distinguish between INTERNALLY-HEADED, EXTERNALLY-HEADED and HEADLESS RCs. The externally-headed type is the familiar one from languages like English; we illustrate it for a typologically different language in (21):

(21) externally-headed RC from Chiapas Zoque (Mixe-Zoque: Mexico; Faarlund 2012: 162)

NP[Te' [jo'nchi REL[y-ku't-u=pü='is te' tüm]]]
DET bird.ABS 3ERG-eat-COMPL=REL=ERG DET fruit.ABS
Ø-kek-u.
3ABS-fall-COMPL
'The bird which ate the fruit fell down.'

In this example, the noun *jo'nchi* is external to the relative clause: it appears before the relative clause and is case-marked for its syntactic function in the main clause, that of absolutive S-argument.[8] In (22) below, by contrast, the noun to be modified by the relative clause, *úsa*, appears in the case form that is appropriate to its syntactic function *inside* the relative clause, namely its absolutive S-role. It is the RC as a whole that bears an ergative flag for its syntactic function in the matrix clause. This is, therefore, an internally-headed RC:

(22) internally-headed RC from Epena Pedee (Chocoan: Colombia/Ecuador; Harms 1994: 167)

[Úsa-ø t^{h}ot^{h}óo bí]-pa perőra pee-pa-čí.
dog-ABS white be-ERG spotted.cavy kill-HAB-PST
'The dog that is white used to kill spotted cavies.'

Because of its treatment as a RC-internal argument, *úsa* is bracketed in (22) as a proper part of the RC. The fact that it appears at the beginning of the RC does not make it external: it simply reflects the normal position of S-arguments in Epena Pedee clauses; if the relativized position were that of absolutive P argument (e.g.

[8] In the remainder of this paper, we will be using the typological labels S, A and P as comparative concepts for the nominative or absolutive argument of intransitive clauses (S), the nominative or ergative argument of transitive clauses (A) and the absolutive or accusative argument of transitive clauses (P); see Haspelmath (2011) for further clarification of these concepts.

the dog I saw), *úsa* would appear in its canonical P position in the relative clause (e.g. I-ERG dog-ABS saw).

A headless RC is illustrated in (23):

(23) Ute (Uto-Aztecan, Numic: USA; Givón 2011: 288)

[kani-vaa-tʉ̲ wúʉka-qha-tʉ̲]
house-LOC-DIR work-ANT-NMLZ
'the one who worked at the house'

In this example, the proposition of the subordinate clause is oriented towards one of its participants by virtue of a participant nominalizer, the suffix *-tʉ*, yielding the English translation 'the one who …' (rather than the unoriented proposition 'someone worked at the house'). Recent work on different areas of the world has brought out the importance of (participant) nominalizations for the typology of relative clauses. In particular, it has been pointed out that when such nominalizations are placed in apposition to an NP in the main clause, the resulting structure and initial interpretation is that of a supplementary relative clause – a looser, often phonetically unintegrated juxtaposition of two NPs with the same referent:

(24) Ute (Uto-Aztecan, Numic: USA; Givón 2011: 291)

Mamachi̲, [('ú) kani-vaa-tʉ̲ wúʉka-tʉ̲], tʉgʉvʉ-n 'ura-'ay.
woman.SBJ that.SBJ house-LOC-DIR work-NMLZ friend-1SG be-IMM
'The woman, the one who works at home, is my friend.'

Given the right circumstances, however, such appositions can come to be reanalyzed as restrictive, by the processes summarized succinctly in Lehmann (2008: 219ff., 2014: 3–4). This may or may not be accompanied by the structural integration of the participant nominalization with the nominal head, yielding a difference in the degree to which the two nominals form a single NP. In Ute, for example, there is also a prosodically integrated version of (24) above, even though it is less common in discourse than the appositive type in (24):

(25) Ute (Uto-Aztecan, Numic: USA; Givón 2011: 288)

mamachi̲ 'u [kani-vaa-tʉ̲ wúʉka-qha-tʉ̲]
woman.SBJ 3SG.SBJ house-LOC-DIR work-ANT-NMLZ
'the woman who worked at home'

2.2 Integration with the main clause

In the context of the present volume, perhaps the most crucial parameter of cross-linguistic variation is that RCs of all headedness types above can be either EMBEDDED in the matrix clause, where they form a syntactic constituent with the nominal head (if there is one), or be ADJOINED to a main clause. We will discuss this difference separately for internally- and externally-headed RCs.

2.2.1 Internally-headed RCs (IHRCs)

2.2.1.1 The circumnominal type

IHRCs are embedded in the matrix clause if they directly fulfil a syntactic function in it, as is the case in (22) above.[9] Lehmann (1984, 1986) reserves the term CIRCUMNOMINAL RC for this embedded variant of an IHRC. In much of the typological literature, the label IHRC is often used more narrowly to designate only this type of RC (see also Cole 1987, Culy 1990 and Basilico 1996 for relevant work). In Dryer's (2013a) sample of more than 800 languages, 24 exhibit the circumnominal type as their primary RC construction; these languages cluster conspicuously in North America and, moreover, they are overwhelmingly OV languages (all 24 except for Kutenai and Oneida).[10] A further 39 languages have the circumnominal type as one of several RC constructions. Since the hallmark of circumnominal RCs is that they operate like an NP in the matrix clause, they typically bear some nominal morphology at their right boundary, such as a case marker in (22) or a case-marked demonstrative in (26):

(26) Choctaw (Muskogean: USA; Broadwell 2006: 50)

[Hattak-mat ofi' chõpa-tok-mã] pĩsa-li-tok.
man-DEM.NOM dog buy-PST-DEM.ACC see:NGR-1SG.I-PST
'I saw the dog that the man bought.' (or: 'I saw the man that bought the dog.')

2.2.1.2 The correlative type

Circumnominal RCs contrast with those internally-headed constructions whose nominal head is also represented in the main clause, in different degrees of ex-

[9] Strictly speaking, therefore, such RC constructions are actually argument clauses in terms of their syntactic status, but they are semantically oriented towards one of their participant positions and hence to be interpreted as a modifier of a nominal.

[10] VO languages with circumnominal RCs beyond Dryer's (2013c) sample that have been mentioned in the literature include Mooré (Culy 1990: 214) and Dagbani (Lehmann 1984: 118).

plicitness. In all cases, this leads to the RC and the main clause containing a CORRELATIVE element, and typologists thus often use the term CORRELATIVE RC. The most explicit but arguably least economical way of creating this structure is by having a full noun in each clause, either a direct copy of the head nominal or a corresponding light noun like 'thing' or 'person'. Only a single language in Dryer's (2013a) database, Kombai, exhibits such **DOUBLY-HEADED RCS** as its primary RC type, and only four others (Jamsay, Mina (both Africa), Kobon and Yagarian (both Nuclear Trans-New Guinea)) as a secondary type. Two examples beyond Dryer's database come from Gooniyandi (27), where doubling occurs "occasionally" (McGregor 1990: 438), and from Santali (28), where doubling is part of a distinct RC construction called a CORRELATIVE DIPTYCH (Haudry 1973):

(27) Gooniyandi (Bunaban, Australia; McGregor 1990: 438)

[**Thangarndi** garndiwangooddoo gooddoomba-ya yoodjidi] **thangarndi**
word many paper-LOC we.put.it word
binaddigmiloona.
I.taught.them
'I taught them (some of) the many words we had put on paper.'

(28) Santali (Austroasiatic, Mundaic: Bangladesh; Neukom 2001: 199)

[**Oka disom-re** onko gadel hɔṛ-ko
which country-LOC those.ANIM.PL crowd person-3PL.SBJ
jarwa-akan-tahɛ̃kan], **ona disom-ren** raj-dɔ
gather-PRF.MID-COP.PST that.INAN **country-GEN.ANIM** king-TOP
tis-re cɔ-e gɔc'-akan-tahɛ̃kan.
when-LOC ever-3SG.SBJ die-PRF.MID-COP.PST
'The king of the country where these crowds of people had come together had died some time previously.'

(28) represents a correlative construction that is familiar from Latin or Hittite and which is a well-known areal feature of RC formation in South Asia as well as in Mande languages and their neighbours (Dryer 2013a). In this 'question-and-answer' construction, the IHRC contains a relative/interrogative determiner accompanying the nominal head, while the main clause either exhibits a demonstrative determiner with a copy of the head nominal (as in (28)) or else simply a (demonstrative or personal) pronoun. In fact, the latter pattern, with only a pronominal correlate in the main clause, is also found in Santali and even preferred to double heads in Gooniyandi. We encountered this type of correlative clause earlier, in (14) from Supyire. It was mentioned there that the IHRC in

Supyire is relegated to a left-detached (and less commonly, a right-attached) position, usually with a slight intonation break, and obligatorily correlated with a personal pronoun in the main clause. Another representative of this type is Bambara:

(29) Bambara (Mande, Manding-Vai: Guinea; Givón 2001: 183)

[Cɛ min ye muru san], n ye o ye.
man REL PST knife buy I PST him see
'The man who bought the knife, I saw him.'

The pattern that unites all correlative constructions is their (preferred) occurrence at the left sentence boundary ("preposed", "left-dislocated"), in a topical or expository discourse function (Lehmann 1984, 2008); this also holds for the RC illustrated in (27) from Gooniyandi (McGregor 1990: 438). What distinguishes the constructions in (27) and (28–29) is thus chiefly their relative degree of deranking: the RC in Gooniyandi shows all vestiges of an independent clause, while the ones in (28–29) bear a relative marker that would not be present if these were independent clauses. Some authors have thus described (27) as a PARATACTIC relative clause (e.g. Comrie & Kuteva 2013). Overall, however, correlative RCs show a low degree of deranking, which reflects their diachronic origin as a discourse strategy in which a (typically indefinite-specific) referent is "introduced as something to be resumed" in the main clause (Lehmann 2008: 217).

In the present context, it is interesting to point out how these adjoined clauses may develop into embedded structures. In fact, depending on the specific type of correlative RC, only small adjustments might be needed to turn it into a circumnominal one, notably the combination of the two clauses without a prosodic break and the omission of the anaphoric demonstrative in the second clause. If the demonstrative carried case markers, these may come to attach to the RC as a whole (which would account, for example, for a pattern like (22) above). Alternatively, the anaphoric demonstrative may be reanalyzed as the final element of the first clause, also yielding a clausal nominalization (which would account for structures such as (26) above).

Also, as observed by Lehmann (1984: 388), some languages allow their correlative diptychs to change the order of relative determiner and noun, making the head noun topical (e.g. [*book which you gave me*], *I lost it*). This structure may then be reanalyzed as postnominal, and if the correlative element in the main clause is dropped, the result is an embedded subordinate clause.

Finally, it is possible for preposed correlative clauses, as a whole, to be attracted to other positions in the matrix clause. Firstly, a correlative clause may

be postposed (i.e. right-adjoined) to the main clause, as an "inverted diptych" that codes presupposed information, from which it can develop into a postnominal RC (Lehmann 2008: 218; see also Section 2.2.2 below). Secondly, the normally preposed RC may be inserted directly into the main clause right after the nominal to be modified; this latter option is illustrated by Comrie (2006: 139) for Hittite, and he argues that these constellations gave rise to postnominal RCs with relative pronouns (Section 2.2.2), which subsequently spread across Europe through language contact. Thirdly, correlative constructions may show up, perhaps rather unexpectedly, in centre-embedded positions, as in Wappo (Thompson et al. 2006: 115) or in Cabecar:

(30) Cabecar (Chibchan: Costa Rica; Gonzáles Campos & Lehmann 2019: 10)

Bá te [jíjí tk-á=ju yikí] jé s-á?
2SG ERG earthquake cross-PRFV=AM yesterday DEM feel-PRFV
'Did you feel the earthquake that happened yesterday?'

With regard to their form, RCs in Cabecar are of the paratactic type, i.e. there is no trace of deranking, and they are often (but not obligatorily) resumed by the medial demonstrative *jé* in the main clause. Gonzáles Campos and Lehmann argue that this construction evolved from a sequence of independent main clauses, functionally equivalent to the preposed correlative clauses of the present section. By prosodic integration and omission of the demonstrative, one can easily obtain a 'standard' circumnominal RC which directly occupies a syntactic slot in the main clause. But as (30) shows, it is also possible to centre-embed the RC while retaining the co-referential demonstrative. As a result, the RC is no longer left-adjoined, unlike a typical correlative clause. This yields an interesting surface combination of a syntagmatically embedded clause that seems apposed to an anaphoric demonstrative. However, Gonzáles Campos & Lehmann (2019: 25) argue that "the sole function of the demonstrative" in these cases "is to mark the final boundary of the relative clause," which effectively makes (30) exactly parallel to the circumnominal RC in (26) and thus marks the "last step" (ibid.) in the development from a paratactic to an embedded structure.

2.2.2 Externally-headed RCs (EHRCs)

EHRCs can, in principle, occur before or after the nominal they modify. The latter option was exemplified in (1), (4) and (10) above, while the former option is illustrated in (31):

(31) Lezgian (Nakh-Daghestanian, Lezgic: Azerbaijan; Haspelmath 1993: 340)
[Mu'minat-a ktab ga-ji] ruš-a q^{h}fe-na.
Muminat-ERG book give-AOR.PTCP girl-ERG go.away-AOR
'The girl to whom Mu'minat gave the book went away.'

Cutting across this basic ordering distinction is, once more, the parameter of embedding: specifically, the question here is whether the EHRC occurs ADNOMINALLY, i.e. adjacent to the nominal it modifies (as in (31)) or EXTRAPOSED from it (as in (10)), and whether it is syntactically (and not just semantically) an attributive modifier of the head.

2.2.2.1 The adnominal type: Postnominal and prenominal RCs

We begin by inspecting the ADNOMINAL type of EHRCs, which is the typologically dominant relative construction by a clear margin. However, there is a strong asymmetry in the distribution of the PRENOMINAL and the POSTNOMINAL subtype: whereas postnominal RCs are extremely widespread (in geographical, genealogical and typological respects), prenominal RCs are much more confined. First, barring a few exceptions in mainland China and Taiwan (e.g. Bai (Tibeto-Burman), Chinese languages, Amis (East Formosan, see Comrie 2008a)), their occurrence is restricted to OV languages (Dryer 2013c), while postnominal RCs are common in both VO and OV ordering types. Second, among the OV languages, prenominal RCs are dominant mainly in Asia, while OV languages in the other macro areas appear to prefer different kinds of RC constructions (ibid.).[11] Finally, while languages with prenominal RCs sometimes have a postnominal alternative construction (29/170 languages = 17% in Dryer 2013a), only very few languages with postnominal RCs have a prenominal alternative (31/610 = 5% in Dryer 2013a).[12]

Several factors are responsible for this asymmetry. To begin with, it appears that attributive modification has a certain postnominal bias, as attributive adjectives – the structurally smaller equivalents of RCs – are cross-linguistically also preferred after the noun they modify (Dryer 1992). Furthermore, in contrast to postnominal RCs (and the preposed internally-headed types we surveyed above),

[11] Local pockets of OV and prenominal RCs are found in "(i) New Guinea; (ii) Ethiopia and Eritrea; and (iii) southern Colombia and the adjacent area of Brazil" (Dryer 2013c). However, all of these regions are parts of larger macro areas used for typological studies, and the OV languages of these macro areas do not generally favour prenominal RCs.

[12] These figures are not controlled for geographical or genealogical dependencies, and neither do they imply that the languages in question use the *same* RC construction in pre- and postnominal order. All that matters is that there is *some* prenominal counterpart to the dominant postnominal construction or vice versa.

prenominal RCs are oriented towards a certain participant before that entity is actually fully mentioned. This order of "gap before filler" (Hawkins 2004: 175) goes against the grain of the usual management of discourse referents, which is primarily anaphoric, i.e. backward-looking. Prenominal RCs have hence sometimes been argued to be less efficient for online processing than their postnominal counterparts (Antinucci et al. 1979, Hawkins 1994, 2004, 2014). All other types of RC avoid this problem by introducing the nominal first and resuming it, implicitly or explicitly, in the ensuing clause. The most explicit anaphoric devices are …

(i) RELATIVE PRONOUNS, which typically occur at the beginning of the postnominal RC, combining the function of a subordinator and an anaphoric pronoun. As argued by Comrie (2006) and documented in Comrie & Kuteva (2013), relative pronouns are rather common in Eurasia but rarely used elsewhere. (32) below provides an example from Hungarian, where the clause-initial relative pronoun inflects for the case role of the relativized position inside the RC:

(32) Hungarian (Uralic, Hungarian: Hungary; Kenesei et al. 1998: 38)

A könyv, [**amely-et** Anna olvas-ott], érdekes volt.
the book **which-ACC** Anna read-PST interesting was
'The book that Anna was reading was interesting.'

(ii) RESUMPTIVE PRONOUNS, i.e. in-situ pronominal representations of the antecedent inside the RC, as in (33):

(33) Krongo (Kadugli-Krongo: Sudan; Reh 1985: 253)

Òdínkò bílyáatà [ŋ-òkúrò-n-tú **ì^{ʔ}ìŋ**].
fall.M.PRFV child CONN.M-push.PRFV-TR2SG **him**
'The boy you pushed has fallen down.'

Indexing-prominent languages, i.e. those with verbal agreement markers for more roles than the subject, may show an index on the RC predicate instead, as in (34):

(iii) RESUMPTIVE VERBAL INDEXES[13]

(34) Modern Standard Arabic (Afro-Asiatic, Semitic; Holes 2004: 283)
ʔal-qiṣṣatu [llati: qaraʔa-**ha:**]
ART-story.F REL read.PST.3SG.M.SBJ-**3SG.F.OBJ**
'the story that he read (it)'

Even where the most economical and hence most widespread technique of co-reference, namely a so-called GAP in the relativized position, is chosen, postnominal RCs are still often marked by a clause-initial subordinating morpheme that has its diachronic roots in a topical pronoun, notably a demonstrative, such as *inde* 'this' in Mayogo:

(35) Mayogo (Atlantic-Congo, Volta-Congo, Ubangi: The Democratic Republic of the Congo; Sawka 2001: 170)
Ma dje engú [**inde** mu nga-pa-e ma _____] de.
1SG PST.hear affair **REL** 2SG PROG-say-REF 1SG NEG
'I don't understand (the) problem that you are talking to me about.'

In Hendery's (2012: 267ff.) sample, demonstrative and interrogative pronouns constitute the most common sources of subordinators of postnominal RCs (see also Kuteva et al. 2019 and Diessel 1999). Therefore, while invariant markers like Mayogo *inde* are not synchronically pronominal and merely serve to mark the RC as such rather than a particular referent inside the RC, they tie in diachronically with the more explicit anaphoric elements we find in other postnominal RCs.

The situation in prenominal RCs is rather different, as has been pointed out by numerous authors. Wu's (2011) survey of the syntax of prenominal RCs confirms the absence of relative pronouns, the prevalence of other types of subordinators (which we will turn to below), and a less systematic use of resumptive pronouns. As for the latter, it is telling, firstly, that in Comrie & Kuteva's (2013) sample, all languages with resumptive pronouns have postnominal relative clauses. Wu (2011) makes out only three clusters of prenominal-RC languages in which resumption is used more regularly for certain relativized positions, namely Semitic, Chinese and "some Causasian languages" (Wu 2011: 594). Secondly, as noted by Lehmann (1984: 230), the resumptive elements of prenominal RCs can

[13] As discussed in Comrie (1981: 220), resumptive pronouns and indexes are person forms whose presence is not required in the corresponding simple sentence. This is the case in both (33) and (34).

be markedly different from the anaphoric pronouns in postnominal RCs; in particular, they can take the form of (long-distance) reflexive pronouns (e.g. Turkish (Kornfilt 1997: 61), Korean (Sohn 1994: 66) or Tanti Dargwa (Sumbatova & Lander 2014: 192)), whose antecedent is unlikely to be found in the preceding sentence and thus expected in the upcoming main clause.

What these observations and the general filler-before-gap preference suggest is that prenominal RCs are the most difficult type of RC to grammaticalize from a sequence of referentially coherent (independent) clauses. In keeping with this, we find that the internal structure of prenominal RCs resembles that of independent clauses much less commonly than that of postnominal RCs. On the contrary, they characteristically show dependent verb forms with reduced verbal and clausal operators, as in the nominalized RC from Dolakha Newar in (20) above and the participial RC from Lezgian in (31). In fact, of all RC types, the prenominal one is associated with the highest degree of deranking and thus formal embedding into the matrix clause. In this respect, prenominal RCs also differ crucially from IHRCs: circumnominal RCs are typically 'externally' nominalized, i.e. they are sentential structures flagged by appropriate case markers and demonstratives at their right boundary; and correlative RCs are not normally nominalized at all, i.e. they, too, are basically sentential structures (Keenan 1985: 161).

Therefore, it has been proposed that prenominal RCs chiefly develop by processes of expansion of and substitution within nominal constructions rather than the integration of successive sentences in discourse. The expansion scenario accounts for RCs which carry morphological traits of other noun modifiers, such as attributive adjectives and genitives. Lehmann (1984: 376f.) mentions the Turkish *-An*, the Dravidian *-a* and the Dyirbal *-ŋu* participles as representative examples (see also Aristar 1991 for diachronic relationships between adjectives, genitives and relative clauses). Along the same lines, Wu (2011: 581) points out that what looks like a general "complementizer" in some relatively sentential prenominal RCs is actually identical to a genitive marker (e.g. Mandarin *de* or Alamblak *-ho*; see also Trask (1997: 247) on a possible genitive origin of the Basque relativizer *-en*). The general thrust of these examples is thus that a phrasal attributive construction becomes expanded into a clausal one, either by adding arguments and adjuncts to a deverbal adjective or by inserting a clause into the slot of a genitival or other modifying construction.

The second prominent diachronic source of prenominal RCs is that of participant nominalizations, such as agent-, patient- or various oblique-role nominalizations. A widely cited example comes from Lhasa Tibetan, where the suffixes used in relativization go back to lexical nouns in compounds:

(36) Lhasa Tibetan (Sino-Tibetan, Bodic: Bhutan, Nepal; DeLancey 1986)

a. mkhan
'teacher, expert'

b. s'i'n-mkhan
lit. wood-expert = 'carpenter'

c. [stag gsod-mkhan] mi
tiger kill-NMLZ man
'the man who killed the tiger'

While *-mkhan* is, quite predictably, a relativizer for the subject position, locative and instrument relativizers harken back to the nouns for 'place' and 'tool', respectively. Similar uses of participant nominalizers for relative-clause formation have been reported for many languages, particularly in Asia (Yap et al. 2011) and the Americas (Comrie & Estrada-Fernández 2012). In fact, many of the "oriented participles" in Shagal's (2019) world-wide study of relativization are participant nominalizations.

Importantly, while the diachronic pathway from (36a–36c) involves successively larger structures, and in this sense an expansion, it still often proceeds from looser to tighter syntactic configurations at the final stages: as we saw in (23–25) from Ute, the RC interpretation arises when an expanded participant nominalization is placed in apposition to another nominal element, i.e. 'man' in (36c) and 'woman' in (24). At least at the beginning, no dependency is involved, as the nominalization constitutes a separate NP rather than a modifier embedded into an NP (see also Comrie & Thompson 2007 [1985]: 378). This is nicely illustrated by Awa Pit, where the nominalization can be placed in either order with regard to the noun it modifies semantically (and can be completely separated from it); it can also be marked independently as a clausal topic and for its syntactic function in the matrix clause:

(37) Awa Pit (Barbacoan: Colombia; Curnow 1997: 287–288)

a. [A-mtu=mika]=**na** ashaŋpa=**na** wan pyan-ti-zi.
come-PTCP=NMLZ.SG=**TOP** woman=**TOP** all hit-PST-NLOCUT
'The woman who was coming hit everyone.'

b. [Santos=ta pyaŋta-ta=mika]=**ta** pyan-ta-w, ashaŋpa=**ta**.
Santos=ACC kill-PTCP=NMLZ.SG=**ACC** hit-PST-LOCUT.SBJ woman=**ACC**
'I hit the woman who killed Santos.'
(lit. 'I hit the one who killed Santos, the woman.')

In (37b), the RC and the 'head noun' are non-adjacent and hence they do not form a syntagmatic unit. In (37a), they are adjacent and hence the RC could be said to be 'adnominal', but it is still not embedded within a single NP by the criteria above. Thus while Awa Pit has retained the syntactic independence of the semantic modifier, Ute has kept this pattern (24) alongside a more integrated one where the nominalization is embedded as a RC (25).

Example (37) is also revealing for another reason: while the stages in (36) suggest a diachronic expansion, it has recently been argued that nominalizers in prenominal RCs can also come from nominal classifiers or semantically light and hence frequent head nouns in earlier RC constructions, such as 'thing', 'place', etc. These head nouns may come to be bound to the RC to yield exactly the participant nominalizers that are characteristic of prenominal RCs. This would account for =*mika* in Awa Pit, which synchronically cliticizes to a participial suffix. Curnow (1997: 290) speculates that this may be a remnant of an earlier RC construction which is no longer grammatical by itself, and Epps (2009) argues that these developments may generalize to various languages in South America (see also Genetti et al. 2009 for similar developments in Tibeto-Burman languages).

Whatever the precise direction by which these nominalizations emerge, our claim in the present section is *not* that this pathway, just like the expansion of deverbal adjectives and genitive modifiers, is restricted to prenominal RCs. As Ute demonstrates, it can also underlie the genesis of postnominal RCs (see also Lehmann 1984 on German, Deutscher 2009a on Akkadian and Cristofaro 2014 on Ewe). But the current typological picture suggests that these developments of expansion, "insertion" (Kibrik 1992) and apposition are *relatively* more important, and perhaps even the only ones, for the emergence of prenominal RCs.

2.2.2.2 The postposed (right-adjoined) type

We round off our discussion of EHRCs with a type of construction that is externally headed but attaches to the right of the main clause rather than the nominal head; in other words, this type of RC is not adnominal but POSTPOSED or RIGHT-ADJOINED. It can, however, appear in this position for two rather different reasons.

On the one hand, a postposed RC can result from a performance option of extraposition, as introduced in (10) above from Slave. Very similarly, "it is common" for the IHRC from Choctaw in (26) above "to be extraposed to the end of the [sentence], leaving the head of the relative clause in situ" (Broadwell 2006: 301):

(38) Choctaw (Muskogean: USA; Broadwell 2006: 301)

Ofi-it balii-it kaniiya-h [ipiita-li-k-aash-m-at].
dog-NOM run-PTCP go.away-TNS feed-1SG.I-TNS-PREV-NOM
'The dog that I fed ran away (lit. went away running).'

Where extraposition affects nominalized RCs (as in Slave and Choctaw), the result looks like the mirror image of the NP apposition pattern we saw in (37b) above, i.e. 'The dog ran away, the one that I fed.'

Sometimes the pattern of extraposition is such that the whole relative construction, i.e. the RC along with its head noun, is shifted to the right sentence boundary. In Evenki, for example, nominalized (or participial) RCs are typically prenominal constructions, as in (39a), but the order can be changed in such a way that the modified nominal and the RC appear sentence-finally (39b):

(39) Evenki (Tungusic: China, Mongolia; Nedjalkov 1997: 137)

a. [himat agi-tki tuksa-d'ari-va] asi-va.
quickly forest-ALL run-PTCP-ACC.DEF woman-ACC.DEF
'a/the woman who quickly ran into the forest'

b. Bi archa-ø-m asi-va [himat agi-tki
1SG meet-NFUT-1SG woman-ACC.DEF quickly forest-ALL
tuksa-d'ari-va].
run-PTCP-ACC.DEF
'I met a/the woman who quickly ran into the forest.'

While each language has its own specific set of motivating factors for RC extraposition (see, e.g., Nefedov 2012 on Ket, Strunk 2014 on German, Rasekh-Mahand et al. 2016 on Persian), a factor that appears to play a role in all of the languages for which corpus data have been scrutinized is the relative weight of clausal as opposed to single-word or phrasal modifiers. By shifting the RC, one can "minimize domains" (Hawkins 2004: 31) for processing the fundamental predicate-argument structure of the main clause. As this applies to languages of all basic word-order types, patterns of RC extraposition are productive in both OV and VO languages.

The second type of postposed RC is not due to a performance option of extraposition, but one that is canonically adjoined to the main clause in this position. In (13) above, we introduced this as a characteristic type of subordinate clause in Australian languages. And indeed, in Dryer's (2013a) database, there are only two languages outside of Australia in which adjoined RCs are the dominant RC

construction, namely Mekens (Tupian) and Kuikúro (Cariban), both spoken in Brazil. Another example of an adjoined RC from Australia is given in (40b):

(40) Kayardild (Tangkic: Australia; Evans 1995: 512, 517)

a. Ngada birrmurdami [ngijin-inja kajakaja-ntha bukawa-thurrk].
1SG.NOM sad.NOM my-COBL daddy-COBL die-IMM.COBL
'I can feel that my daddy has just died.'

b. Jina-a maku, [ngijuwa kurri-jurrk].
where-NOM woman.NOM 1SG.SBJ.COBL see-IMM.COBL
'Where's this woman who I'm seeing?'

The construction illustrated in (40) is characterized by special ("complementizing oblique") case marking on all elements of the dependent clause. And as in other Australian languages, this subordinate clause has a number of different grammatical functions and hence interpretations in Kayardild, as reflected by (40a–40b). But interestingly, when it is supposed to function as a relative clause, the free constituent order of Kayardild is usually adapted in such a way that the modified nominal appears as the last element of the main clause, effectively achieving an adnominal structure without centre-embedding it in the matrix clause (just as in (39b) from Evenki).

According to Hale (1975), this is a signal of the "attraction" of the subordinate clause to a nominal element in the main clause: Hale argues that such adnominal environments at the right sentence boundary enable a reanalysis of adjoined subordinate clauses as postnominal modifiers, and when this pattern is analogically extended to non-final NPs in the main clause, the result is a (centre-)embedded RC. This, then, constitutes another way in which embedding can emerge from syntagmatic adjunction.[14]

2.3 Orientation of the RC

A defining property of RCs is that they are semantically oriented towards one of their participant positions. While a typical argument clause designates a situation ('(that) I read the book'), a relative clause designates an entity participating

[14] In fact, Hale's "attraction"-and-extension scenario is also involved when postnominal RCs develop from independent clauses with topicalized anaphoric pro-forms, e.g. 'We met a woman. That one was feeding her child.' > 'We met a woman that was feeding her child.' (attraction) > 'The woman that was feeding her child looked happy.' (extension to an embedded position). This pathway is discussed, for example, by Lehmann (1984, 2008) for Homeric Greek, Haader (2002) for Hungarian and McConvell (2006) for Ngumpin-Yapa. Here, too, the overall process is one of combining and successively integrating two clauses.

in a situation ('which (book) I read'). The relative clause is thus said to be oriented towards that entity (Lehmann 2014: 2). Therefore, a major parameter of cross-linguistic variation is how explicitly this orientation is coded morphosyntactically, so as to enable the unambiguous and efficient processing of the RC and the complex sentence of which it is part. The different types of RC formation surveyed above present different challenges in this regard.

For IHRCs, the major processing challenge is to discover that a nominal element inside the RC is meant to be modified by the clause as a whole; in other words, one needs to discern the presence of a nominal head. This problem is illustrated by our earlier example (26) from Choctaw: as the translation shows, there are two possible ways of interpreting the relative clause, which results from the fact that there is no explicit means of orientation. It is thus not surprising that languages with IHRCs often develop grammatical strategies of what Lehmann (1984: 207) calls NUCLEUS FORMATION. The most common strategy is to move the relativized NP to the beginning of the RC; this is illustrated by our earlier example (14) from Supyire again, and found in a similar fashion in, for instance, Slave and Menya. Alternatively, speakers of Supyire can also leave the relativized NP in situ, but then it needs to be marked by a relative determiner (Carlson 1994: 491ff.), just as we saw for Bambara in (29) and in the typical correlative diptych in (28). Further means of nucleus formation include special agreement markers on the RC verb (Lavukaleve), an accompanying indefinite article (Lakota) or tonal adjustments (Jamsay).

For EHRCs, the processing challenges are, in a way, the opposite of those in IHRCs: the modified noun is given externally, but now the crucial task is to figure out the relativized position inside the RC. This is sometimes called the "CASE RECOVERABILITY PROBLEM" (Givón 2001: 180), and it becomes apparent whenever the RC does not contain an explicit representation of the relativized NP, i.e. in what we introduced as the gap strategy above. The syntactic function associated with such gaps can be recovered comfortably in languages with (i) high "referential density" (Bickel 2003), i.e. overt coding of even contextually salient participants, and/or (ii) fixed constituent order and/or (iii) the possibility of stranded case markers. In Abun, for example, constituent order is rather rigidly SVO, and adpositions can be left in situ without an overt complement:

(41) Abun (West Papuan: Indonesia; Berry & Berry 1999: 153–156)

a. ii bi buku [gato an gre _____ mo bot]
1SG POSS book REL 3SG burn LOC fire
'my book that she burned in the fire'

b. Ji mu kenyak nu [gato Isak sem mo _____ ne].
1SG go locate house REL Isak sleep at DET
'I went to find the house that Isak slept at.'

In these examples, it makes sense to speak of a gap *strategy*, as is often done, but where constituent order is more flexible and adposition stranding is ungrammatical, the gap itself cannot be called a strategy for role recovery. In such cases, the relativized position needs to be identified on the basis of other devices.

One such tool can emerge directly as a by-product of grammaticalization, namely when different participant nominalizers (or contrasting participles) come to be associated with different relativized positions. This is what we saw in (36) from Tibetan above, and a similar system is found, for example, in Mapudungun. (42) shows the agent nominalizer *-t* yielding relativization on a subject and the "objective verbal noun" in *-el* yielding relativization on an object, but there are several other nominalizers in addition to these.

(42) Mapudungun (Araucanian: Argentina, Chile; Smeets 2008: 216, 200)

a. Kim-nie-fi-y-m-i ti wentru [mi
know-PROG-OBJ-IND-2-SG the man 2SG.POSS
leli-nie-e-**t**-ew]?
watch-PROG-OBJ-**AVN**-SBJ:DAT
'Do you know that man who is watching you?'

b. Fey-chi chanchu [eymi mi ngilla-**el**] trongli-le-y-Ø.
that-ADJZ pig you 2SG.POSS buy-**OVN** lean-STAT-IND-3
'That pig you bought is lean.'

In a similar fashion, many languages distinguish (at least) between a subject-oriented affix (often an agent nominalizer or an 'active participle') and a non-subject-oriented affix (e.g. from a patient or an action nominalization or a 'passive participle'), e.g. Quechua, Wolaytta, Dolakha Newar, Finnish, Aguaruna, Kolyma Yukaghir and Maricopa. Some languages, like Yuracaré, exploit their switch-reference markers to make exactly the same contrast, i.e. here, too, a grammatical system that evolved for the purposes of reference tracking can function as a cue to serve the role recovery problem when such constructions are used for relativization. All of these cases have thus been referred to collectively as demonstrating a "verbal affix" strategy (e.g. Comrie 2003).

Considering the potential processing difficulties and the nominalizing/adjectival origin of prenominal RCs we discussed above, one would expect that such

role-distinguishing dependent verb forms are particularly common in prenominal RCs. However, Shagal (2019) finds exactly the opposite: in her study, languages which *only* have "contextually oriented participles" (i.e. verb forms that can be flexibly oriented towards several core roles) strongly tend to have them in prenominal RCs (28:6 languages), while languages which *only* have role-specific verb forms are more likely to have them in postnominal RCs (23:12 languages).

A similar observation can be made with regard to resumptive pronouns, the second device that can be used when a gap is judged not to be sufficient for role recovery. In their seminal study, Keenan & Comrie (1977) established an implicational hierarchy for the distribution of gaps and resumptive pronouns in RCs. A modified version of this hierarchy, adapted from Lehmann (1984: 211), is provided in (43):

(43) The accessibility hierarchy of relativization[15]
SBJ/ABS > DO/ERG > IO/'time', 'place' > oblique complements > adjuncts

According to (43), whenever a language uses resumptive pronouns instead of a gap for a certain position on the accessibility hierarchy, it will also use resumption on all lower positions. This is a statistical generalization that applies to all types of RC. However, it is noteworthy that prenominal RCs do not only make less frequent and less systematic use of resumptive pronouns (as we mentioned above), but that their resumptive elements do not extend as highly on the hierarchy than those of postnominal RCs: it is very uncommon to find prenominal RCs with resumptive elements for core syntactic functions (S, A, P), whereas resumptive pronouns for P are often at least licensed, if not required, in postnominal RCs (e.g. East Ambae, Arabic, Kera, Persian, Tongan).

It appears, therefore, that prenominal RCs are overall less prone than postnominal RCs to code their orientation explicitly, given the lack of relative pronouns, less systematic use of resumption, use of unoriented verb forms, infrequent adposition stranding and flexibility of constituent order in the OV languages in which they typically occur.[16]

[15] Keenan & Comrie's (1977) original hierarchy included possessors and objects of comparisons as the two lowest roles. But as pointed out by Lehmann (1984: 211), one needs to distinguish at least between an *ad-verbal* accessibility hierarchy (where the relativized position is a syntactic function in a *clause*) and an *ad-nominal* accessibility hierarchy (where the relativized position is a syntactic function in a *phrase*, like possessor or standard of comparison). In (43) above, we limit our attention to the ad-verbal hierarchy.

[16] This also ties in with the observation that prenominal RCs are often more general "noun-modifying constructions" (Matsumoto et al. 2017) whose specific semantic link to the nominal head can be highly diverse and needs to be inferred from the context.

In the absence of orienting devices, the relativized position of EHRCs can be "infer[red] by subtraction" (Givón 2001: 184), notably from the semantic and syntactic requirements of the RC predicator and the arguments that are already supplied in the RC. In this connection, it is noteworthy that some languages restrict gaps to those arguments that can be indexed on the dependent verb (e.g. Ungarinjin, Basque) or restrict relativization to the core syntactic functions more generally (e.g. Jarawara, Mangarrayi). Furthermore, where resumption occurs across argument and adjunct positions (e.g. Hebrew), corpus evidence shows that it is significantly more common for adjuncts (Ariel 1999).

All of this suggests, in accordance with (43) above, that RCs are most frequently oriented towards core syntactic positions, and hence core participants, whose involvement in the RC event is easiest to retrieve and in this sense most "accessible". Deviations from these most accessible roles correlate typologically with special marking strategies, either more explicit ways of indicating the relativized position (i.e. various forms of resumption) or by deriving relativizable core roles through valency-changing operations. The latter strategy is illustrated in the following example from Yakan, where only S and P are relativized on directly while A and lower roles require appropriate means of promotion to a higher argument position:

(44) Yakan (Austronesian, Malayo-Polynesian, Sama-Bajaw: Philippines; Brainard & Behrens 2002: 166–167)

a. {A} becomes {derived-S} by means of antipassivization and then takes the nominalized relative clause appropriate to {S}

Iyan nakanak [ma-**N**-polong buwa'-buwa'-in].
that child NMLZ-**ANTIPASS**-break toy-DEF
'That is the child who broke the toy.'

b. {OBL} recipient ('to the dog') becomes {derived-P} by means of applicativization and then takes the non-nominalized relative clause appropriate to {P}

Iyan asu [-in-teppad-**an**-ne tolang-in].
that dog -TR-throw-**APPL**-3SG.ERG bone-DEF
'That is the dog that she threw a bone to.'

There has been considerable debate in the literature as to how exactly constraints on the relativized position can be explained. On the one hand, there are discourse-pragmatic preferences that have been argued to lead to different degrees of accessibility even within the core roles (S, P > A, see Fox 1987). On the

other hand, there is a wealth of psycholinguistic research attempting to motivate accessibility differences between the core roles (subject > object) and between these and the non-core roles (see Norcliffe et al. 2015 for an overview of recent work). But as summarized succinctly in Hawkins (2014: 22–28), even the processing motivations are multifactorial in nature, involving several different ways in which the lower roles on the accessibility hierarchy create more processing effort and hence profit from more explicit coding strategies.

While these different facets of processing are beyond the scope of the present overview, we can conclude our discussion of RCs with a more general observation related to language processing. It has been argued, most prominently by Hawkins (2004, 2014) again, that OV languages face conflicting pressures in the grammatical expression of relativization. On the one hand, these languages favour structures in which dependent elements like NP complements of verbs and adpositions as well as subordinate clauses appear before their respective heads; this would promote the grammaticalization of prenominal RCs. On the other hand, the nature of reference management in discourse favours anaphoricity ("filler before gap") and hence actually militates against prenominal RCs. The result of these conflicting pressures is what we have seen throughout the present section, namely a greater diversity of RC types in OV languages: the internally-headed types deliver a dependent clause early in a sentence while adhering to the filler-gap principle; the right-adjoined RC also ensures that fillers come first while still allowing efficient processing of all main-clause dependencies; and the two major externally-headed RC types resolve one of these pressures each (see also Lehmann 1984 and Dryer 2013c). In VO languages, by contrast, no conflicting pressures arise in the first place, and different pathways of grammaticalization all converge on the postnominal type most straightforwardly.

3 Adverbial clauses in typological perspective

In this section, we turn to the cross-linguistics variation of adverbial clauses.[17] For the purpose of cross-linguistic comparison, adverbial clauses (ACs) are commonly defined extensionally, as subordinate clauses which encode one or more

[17] Monographic treatments of the typology of adverbial clauses include Kortmann (1997) on European languages and Hetterle (2015) with a world-wide scope. For non-monographic typological surveys of the adverbial domain, the reader is referred to Thompson et al. (2007) and Dixon (2009). In contrast to these latter overviews, we will not survey the different semantic relations and their coding properties individually, but focus instead on the comparison of the major adverbial relations from the perspective of the different facets of embedding introduced in Section 1.2 (see also Diessel 2013 for a like-minded overview).

of the following semantic relations between situations, henceforth adverbial relations (ARs):

- temporal simultaneity (WHEN/WHILE), anteriority (AFTER), posteriority (BEFORE), end points (UNTIL) and beginnings (SINCE)
- realis, irrealis and counterfactual CONDITIONALITY
- CAUSE and REASON[18]
- PURPOSE
- RESULT
- CONCESSION
- ADVERSATIVITY ('whereas/while')
- MANNER

For reasons of space, we will deal exclusively with ACs in a modifying function, leaving aside their uses as supplementary adjuncts (as in (6–8) above; see, e.g., the papers in Tsunoda 2018 for relevant work).

3.1 Coding, function and position of ACs

Just as some languages have been reported to make very little use of relative clauses in discourse (e.g. Donohue 1999 on Warembori), some have been said to make little use of grammaticalized adverbial clauses, even if the latter are available in the language system (see Deutscher 2009b on Akkadian and similar assessments for Lango (Noonan 1992), Warao (Romero-Figeroa 1997) and again Warembori). In Akkadian, for example, ARs are commonly inferred from an underspecified and hence highly versatile coordinate clause combination (*-ma* 'and'). And even where ARs are coded more explicitly, some of them may behave formally like coordinate constructions (see also Verstraete 2007 and Cristofaro 2014 on this issue) or simply be rendered by coordinate alternatives (Mithun 1984). This is particularly common with result relations and concessive relations: for example, the logical relation expressed by concessive clause linkage can equally well be expressed by adversative (BUT) coordination (see Dixon 2009: 28–30). It is not surprising, therefore, that distinct ACs of result and concession are less frequently grammaticalized than those encoding the other ARs from above.

[18]The terms CAUSE and REASON are not always distinguished systematically, but where they are, the term CAUSE tends to be reserved for external causality (*She couldn't go skiing because she had broken her leg*), while the term REASON captures internal causality, i.e. motivation (*She left the party because it was boring*). We will have to gloss over this distinction here, but Verstraete (2008) shows that it has empirical typological consequences.

ARs are most commonly encoded by a specific marker at the boundary of the AC, such as an adverbial conjunction (as in (2), (8), (9) and (11) above) or a bound marker that attaches to the AC verb stem (18), to a nominalized or other dependent form of the verb (19) or to the whole clause:

(45) Trumai (isolate: Brazil; Guirardello 1999: 391)

[Kumaru-k tete-kma-n-**es**] hen hi wa-pata.
Kumaru-ERG body.paint-PRFV-3ABS-**when** then 2 *wa*-arrive
'When Kumaru finished body-painting her, you arrived.'

In keeping with the general suffixing preference for grammatical material (Bybee et al. 1990), bound adverbial markers tend to be enclitics or suffixes (Dryer 2013b), but proclitics and adverbial prefixes are also occasionally attested (Grossman et al. 2018).

As laid out in detail by Hetterle (2015: Ch. 5), there are recurrent patterns of coexpression among adverbial subordinators. Particularly prominent overlaps are found between (i) WHEN and conditional relations, (ii) purpose, cause and result relations (sometimes including temporal UNTIL), and (iii) manner/instrument and WHEN/WHILE relations (see also Kortmann 1997, Martowicz 2011). In languages with highly polyfunctional (i.e. semantically underspecified) dependent clauses, such as the "generalized subordinate clauses" common in Australian languages, the specific AR may be cued by other grammatical devices (see Hetterle 2015: 39ff. for discussion). Chief among those are specific TAM markers and the position of the dependent clause. In Yuracaré (isolate: Bolivia), for example, a versatile same-subject irrealis clause can receive a temporal WHEN and a conditional interpretation in preposed position and is interpreted purposively in postposed position; and the temporal interpretation can change from WHEN to BEFORE when the AC is additionally marked for future tense (van Gijn 2006: 290ff.). In Haruai (Piawi: Papua New Guinea), a cosubordinate construction normally occurs in typical clause chains with a loosely successive interpretation ('and then'), but it can be centre-embedded in the matrix clause if it is meant to signal a more specific AR, such as a particular temporal interpretation (Comrie 2008b: 15). This shows, once more, an interesting correlation between the functional and the syntagmatic dimension of clausal embedding: the more a dependent clause is conceived of as an adverbial modifier of a main clause, the more it can be syntagmatically integrated with that clause.

This observation leads us to the more general point that the semantic nature of the AR often engenders typical discourse-pragmatic functions of the AC in question, and both of these factors give rise to characteristic ordering patterns

of ACs cross-linguistically. In Table 1, we juxtapose corpus data on the position of different types of ACs in Barbareño Chumash with the corresponding cross-linguistic data from a recent study by Diessel (2019a).

Table 1: Positioning patterns of ACs in corpus data and a typological sample

(a) Barbareño Chumash corpus (Wash 2001: 345)

AR	PREPOSED	POSTPOSED	TOTAL
TEMPORAL	142 (66%)	72 (34%)	214
CONDITION	76 (86%)	12 (14%)	88
CAUSE	3 (6%)	47 (94%)	50
PURPOSE	8 (9%)	83 (91%)	91
CONCESSION	3 (27%)	7 (73%)	10
MANNER	2 (13%)	13 (87%)	15

(b) Diessel's (2019a: 101) sample of 100 languages (numbers count constructions)

AR	PREPOSED	FLEXIBLE	POSTPOSED	TOTAL
TEMPORAL	119 (60%)	68 (34%)	12 (6%)	199
CONDITION	94 (91%)	9 (9%)	0 (0%)	103
CAUSE	40 (35%)	24 (21%)	49 (43%)	113
PURPOSE	33 (29%)	19 (17%)	63 (54%)	115

Both types of data show that temporal and particularly conditional relations are biased towards preposed position, while causal and purposive clauses gravitate towards postposed position. The postposing preference of concessive and manner clauses in Chumash, a VO language, may be due to an overall proclivity of dependent clauses towards the postposed position; from a typological perspective, concessive and manner relations are more typically coded by preposed ACs (Hetterle 2015: 124). And result clauses, which are missing in Table 1, show the strongest cross-linguistic bias towards the postposed position (ibid.). In Ojibwe (Algic: USA, Canada), for instance, ACs show very flexible positions, but result clauses strictly follow the main clause (Valentine 2009: 207). Importantly, when the category of time clauses is broken up into more specific temporal relations, the picture usually changes such that UNTIL- and BEFORE-clauses deviate from the general preposed trend (in Chumash, for example, 93% of all UNTIL-clauses are placed after the main clause). This is all the more striking when it happens in

verb-final languages that generally keep dependent clauses in preverbal position. Thus in Akkadian, it is only UNTIL- and BEFORE-clauses that can appear in postposed position while all other ACs precede the main clause (Deutscher 2009b: 64).

The primary semantic motivation for these ordering preferences is that of iconicity of sequence. As already observed by Greenberg (1963), AC order typically mirrors the underlying cause-effect or antecedent-consequence order of the AR in question, and this would account for the positioning preferences of conditional, SINCE/AFTER/BEFORE/UNTIL as well as purpose and result clauses (see also Diessel 2008). In addition to semantic considerations, however, there are important aspects of discourse organization that affect the placement of ACs (e.g. Chafe 1984, Thompson 1985, Ramsay 1987, Verstraete 2004). As Wash (2001: 551) remarks on her corpus of Chumash, "initial adverbial clause tokens often played a global role in structuring the discourse, while the final adverbial clauses tended to be limited to the more localized role of qualifying the main clause." This "global" role is typically reflected by preposed ACs having scope over several ensuing clauses (see also Thompson 1985).

The discourse-structuring or grounding function is particularly prominent with WHEN- and conditional clauses (Haiman 1978), and when other ARs assume such expository roles, they are sometimes explicitly marked with topic morphology (e.g. preposed purpose clauses in Awa Pit (Curnow 1997: 280)). Conversely, the fact that causal clauses are often used to provide a more "local" justification for an immediately preceding statement (Diessel & Hetterle 2011) may explain their anti-iconic ordering preference across languages: As cause-effect relationships, we would expect causal clauses to precede their main clause, but as Table 1 shows, this is strongly dispreferred in Chumash and mildly dispreferred from a typological perspective. In contrast to temporal and conditional relations, then, causal relations are less frequently used to provide an interpretative framework for the ensuing main clause (see also Ford 1993, Thompson et al. 2007: 280ff.). Similarly to purpose and result clauses, they rather tend to encode new information. In fact, when languages have several types of causal clauses that differ in their discourse-pragmatic functions, it is usually the case that preposed causal clauses encode presupposed information ('since') while postposed causal clauses are reserved for new or focal information ('because'), as in Iquito (Zaparoan: Peru; Michael 2009: 157f.).

In sum, we have seen that the semantic and discourse-pragmatic functions of the different ARs naturally lead to mixed ordering patterns in the adverbial domain. The only factor working against such heterogeneity is a consistent ordering preference for all ACs, and this appears to happen virtually only in strong

verb-final languages (like Korean) that keep all ACs in preverbal position (see Diessel 2019a: 100). This makes ACs crucially different from relative and argument clauses, which have an overall cross-linguistic bias towards postnominal and postverbal position, respectively; and where languages exhibit mixed ordering patterns of relative clauses or argument clauses, they will be OV languages. In other words, homogeneity of clause order is typical of relative and argument clauses in VO languages, but for adverbial clauses, it can only be found in OV languages (if at all). VO languages always allow at least some types of AC to precede the main clause.

3.2 Deranking of ACs

Another important aspect of the typology of ACs is the systematic correlation between specific ARs and their relative degree of deranking. Cristofaro (2005) and Hetterle (2015) provide ample empirical evidence for a deranking hierarchy of ARs, i.e. a systematic implicational scale which allows us to predict that the degree of deranking of any given AR is at least as pronounced as that of all ARs higher on the hierarchy. Figure 2 is the empirical result of Hetterle's (2015) study; the different positions on this hierarchy show statistically significant differences in their mean degree of deranking across languages, while the ARs that share a position do not differ in a significant way:

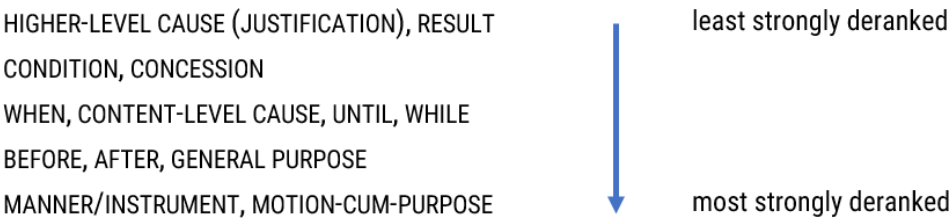

Figure 2: The deranking hierarchy of ACs (Hetterle 2015: 179)

There are (at least) two strands of functional explanation that can account for these patterns of grammatical coding, and they are convergent rather than competing motivations.

Firstly, building on a proposal by O'Dowd (1992), both Cristofaro (2005) and Hetterle (2015) invoke the idea that some ARs are open to reification, i.e. a construal as a THING in Langacker's (1987) sense. In keeping with this hypothesis, Hetterle (2015: 84) finds that the different ARs are unevenly associated with nominalized verb forms: AFTER, BEFORE, purpose, cause and WHEN relations show a

significantly higher degree of nominalization than, for example, condition, result and WHILE relations. Cristofaro uses this event-as-object metaphor to explain why conditional relations are the most sentential type of AC in her study; indeed, there are languages like Mapudungun in which conditional clauses are less deranked than any of the other ACs.

Conversely, it is easy to see how some of the strongly deranked ARs can emerge as expansions of NPs and PPs (see also Genetti 1991). In (46), we see a nominalized causal clause with ablative case morphology that treats the event of the AC as the metaphorical source for the event in the main clause:

(46) Kolyma Yukaghir (Yukaghir: Russian Federation; Maslova 2003: 432)

[Tīne tet ibil'-ōl-**get**] ediŋ nodo-pe āj kel-ŋi.
recently you cry-NMLZ-**ABL** this bird-PL CONN come-3PL:INTR
'Because you cried before, these birds came again.'

In a similar fashion, purposes can be seen as metaphorical goals (Lakoff & Johnson 1980), and events can also easily mark temporal reference points (AFTER, BEFORE, SINCE, UNTIL). This is again reflected in their diachronic origins: purpose clauses commonly bear allative, dative or benefactive marking (Thompson et al. 2007, Rice & Kabata 2007, Schmidtke-Bode 2009), and AFTER-, BEFORE-, SINCE- and UNTIL-clauses are transparently based on the corresponding adpositions or case affixes (e.g. Harris & Campbell 1995: 291f.). This line of explanation is also consistent with the fact that converbs (i.e. special adverbial affixes rather than case-marked nominalizations) are preferably found with ARs that are not as easily conceptualized in nominal terms, notably manner and temporal WHILE-clauses (Hetterle 2015: 92f.).

A second line of explanation for Figure 2 relates to the fact that the different ARs exhibit different degrees of what we called functional embedding in Section 1.2 above. Whilst ACs are generally not seen as argument clauses (because they are not selected by a main-clause predicator), some ACs do bear a closer semantic relationship with that predicator than others because the ARs they encode elaborate more crucial aspects of the main-clause situation. Manner clauses, to begin with, directly specify in which way the verbal action of the main clause is carried out and are hence particularly relevant, in Bybee's (1985) sense, to the main-clause verb.[19] Time clauses are sometimes explicitly referred to as "tem-

[19] Bybee (1985) observed that, across the world's languages, aspectual morphology tends to appear closer to the verb stem than tense morphology. She argued that this is because aspectual meaning has a stronger impact on the construal of the verb meaning than its mere location in time by tense marking. In this sense, Bybee deems aspect to be more "relevant" to verb meaning than tense.

poral arguments" (see, e.g., Van Valin 1984, who uses this criterion to say that temporal ACs are embedded in the main clause while chaining constructions are not). Incidentally, this is reflected in the ordering pattern in our earlier example (12) above, where the temporal clause attaches to the core of the main-clause predication while the causal adjunct appears only afterwards (see Van Valin's 2005: Ch. 6 difference between 'ad-core' and 'ad-clausal' relations). Finally, a particular subtype of purpose clause, the so-called "motion-cum-purpose" construction (Aissen 1984), could likewise be seen as an argument of a main-clause verb of directed motion: wherever we go deliberately, it is for the sake of carrying out an intended action, and hence it is not surprising that many languages have a distinct motion-cum-purpose construction which formally behaves like an argument clause (Schmidtke-Bode 2009: 94ff.). In line with Figure 2, we thus find that motion-cum-purpose clauses can be more reduced than general purpose clauses, as in the following example:

(47) Huallaga Quechua (Quechuan: Peru; Weber 1989: 117)

a. [Miku-**na**-nchi:-**paq**] yanu-ku-shka-:.
eat-**NMLZ**-1INCL.POSS-**PURP** cook-REFL-PRF-1
'I cooked it so that we could eat it.'

b. [Rika-**q**] aywa-shka-:.
see-**NMLZ** go-PRF-1
'I went to see (him/her).'

As can be seen, the construction in (47b) employs a different (and shorter) nominalizer than the one in (47a) and the purposive marker as such is optional and often missing; we will return to this observation in Section 3.3.

Note, however, that even beyond motion-cum-purpose clauses, purposive relations are often more strongly deranked than all other types of AR, as some important semantic features of purpose clauses are easily predictable from the main clause and do not need overt coding in the purpose clause. Specifically, purpose relations involve an intentional component, have fixed time reference relative to the main-clause event and a high probability of subject sharing. As a result, purpose clauses are prone to the omission of grammatical formatives (TAM, person marking) and to syntactic reduction (e.g. control constructions) even in languages without explicit deranking morphology (Schmidtke-Bode 2009). Therefore, as "the semantic difference between purpose relations and the other ARs is greater than the difference between any of the other ARs" (Cristofaro 2005: 179), we repeatedly find systems of ACs in which purpose clauses stand out as the only structurally deranked, or a significantly more deranked, construction

type (e.g. in Lango, Mekens, Ungarinjin, to name but three typologically and geographically diverse languages).[20]

The two parameters of nominal construal and elaboration of the main-clause predicator are logically independent, but they converge on the same result, namely ACs that behave like typical constituents of the matrix clause. As such, these ACs also stand a higher chance to be syntagmatically embedded in the matrix clause, as illustrated by the centre-embedded purpose clause in (19) above. What we thus observe is that the more deranked types of AC can occur in centre-embedded position while the less deranked ACs in the same language need to occur at the periphery of the matrix clause (see, e.g., Warao and Wambaya). Once again, there is a correlation between the formal and the syntagmatic dimension of embedding, both of which may themselves be determined by the degree of functional embedding of an AC into the matrix clause.

The opposite patterns are found with the ARs at the top of Figure 2. As we saw above, conditional (and often also concessive) clauses provide an interpretative frame for the proposition in the main clause and are hence more peripheral – both functionally and syntagmatically – to the matrix clause than temporal, manner or purpose specifications of the main-clause predicator. Causal clauses, especially in their discourse function of providing post-hoc justification of the main-clause proposition, are equally peripheral and, like result clauses, resemble an independent (i.e. coordinated) discourse move (Diessel & Hetterle 2011). And since, additionally, none of these relations predetermines any particular TAM or person constellation, they tend to be fully-fledged clauses, or at least less deranked, than the ARs discussed above.

Interestingly, Hetterle's (2015) study also shows that when causal and concessive clauses appear in preposed position (and hence with topical/presupposed rather than focal function), they are significantly more deranked than in postposed position (see also Hengeveld 1998 on this correlation). For purpose, manner and some temporal relations, by contrast, deranking is equally prominent in pre- and postposed position. This suggests that causal and concessive clauses, in keeping with their different pre- and post-main-clause functions, may also be associated with different diachronic origins in the two positions: a scenario of expanding phrases into clauses in preposed position, and a scenario of integrating successive clauses in postposed position. This is exactly parallel to the developmental trajectories of pre- and postnominal RCs from above.

[20] Note that Cristofaro's (2005) study does not include manner clauses, and these are, of course, not unlike purpose clauses in many of the above respects (fixed TAM constellation, same-subject constraint) and thus show a predictably high degree of deranking, as we see in Figure 2.

It is clear, then, that there is a systematic triangular relationship between the formal, functional and syntagmatic degree of embedding of ACs across the world's languages, just like in relative and argument clauses.

3.3 Properties of adverbial subordinators

The final correlation we wish to point out is that between the position of the AC and the primary marker of the AR in question. Based on what is known from other types of complex sentence, the typologically expected position of adverbial subordinators would be at the clause boundary that links the AC to the main clause, such that postposed ACs are introduced and preposed ACs are terminated by an adverbial marker. This expectation is nicely borne out, for example, in Abun, as illustrated in (48):

(48) Abun (West Papuan: Indonesia; Berry & Berry 1999: 195, 209)

a. [Ji ma **sa**] an yo ma nde tó.
1SG come **when.RL** 3SG NEG come NEG INCOMPL
'When I came, he had not yet arrived.'

b. Ji yo ma nde [**we** ji bi nggon i].
1SG NEG come NEG **because** 1SG POSS woman sick
'I did not come because my wife was sick.'

It turns out, however, that preposed ACs are actually often found with initial markers. In particular, as shown by Diessel (2001, 2019a), preposed conditional and temporal clauses (but not causal and purpose clauses) are often marked by free initial subordinators. This is in stark contrast again with relative and argument clauses, which only rarely have clause-initial markers in prenominal or preverbal position, respectively (Lehmann 1984, Hawkins 1994, Dryer 2009).

These patterns can arise when an AR is grammaticalized in postposed position but then commonly shifted to sentence-initial position for discourse-pragmatic reasons. However, a further explanation lies in the fact that a sizeable number of preposed ACs have their diachronic roots in postnominal RCs on "adverbial" head nouns like 'time'. This is illustrated by (49) from Fongbe:

(49) Fongbe (Atlantic-Congo, Volta-Congo, Kwa Volta-Congo, Gbe: Benin, Togo; Lefebvre & Brousseau 2002: 171)

[**Hwènù** ɖé-è à xá àtín jí ɔ́], ùn mɔ̀ wè.
time OP-REL 2SG climb tree on DEF 1SG see 2SG
'When you climbed up the tree, I saw you.'

In (43) above, we saw that 'time' ranks relatively high on the accessibility hierarchy of relativization, thus making it an easily available source for grammaticalization into a temporal AC construction. Crucially, it is this source construction itself that is commonly placed sentence-initially because of its expository function, even in VO languages, and the temporal AC resulting from it simply retains this positional preference. In this scenario, the combination of sentence-initial ACs and clause-initial subordinators is thus a "persistence effect" (Hopper 1991) from a source construction that was subject to similar discourse-pragmatic pressures. In keeping with this hypothesis, Hetterle (2015) finds that the adverbial linkers in her study that had a clearly identifiable origin in nouns (= 10% of all linkers) are distributed unevenly over the different ARs: they are common for WHILE, BEFORE and WHEN relations, but rather uncommon, for example, for PURPOSE and RESULT.

For conditional clauses, too, such persistence effects can be found. On the one hand, many sources have pointed out that conditional markers are often indistinguishable (or develop) from temporal WHEN-markers, thus occupying the same position in the clause. On the other hand, conditional connectors also derive from copulas ('is (the case) that …', 'it being that …'; see Hopper & Traugott (2003: 186) on Swahili, Japanese and Chickasaw), modal markers of various kinds ('perhaps', 'suppose') and markers of polar interrogatives (ibid., Kuteva et al. 2019: 479). Where these sources are clause-initial structures, they can give rise to preposed conditional clauses with initial markers. And as also shown by Hopper & Traugott (2003: 187f.), temporal and conditional clauses are themselves sources for other ARs, thereby bequeathing their (initial) markers to causal ('since') and concessive ('(even) if') clauses.

Overall, then, it appears that synchronic patterns in the position of adverbial connectives and the resulting AC as a whole are often directly explicable in terms of their diachronic origins. As argued by Diessel (2019a), this motivates the cases in which we find a neat correlation between the position of the AC and the placement of the connector, as in (48) above, as well as (at least some of) the non-correlating cases of preposed ACs with initial markers and postposed ACs with final markers.

A final aspect of subordinators worth pointing out concerns the reduction of their substance depending on contextual factors. We saw above that ACs may contain multiple markers that cue the specific AR in question; consequently, the primary adverbial connector may be dropped if the remaining markers are judged sufficiently informative (see Hetterle 2015: 108). In the following example from Turkish, the ablative marking on the nominalized verb licenses the optionality of the causal marker at the end of the AC:

(50) Turkish (Turkic: Republic of Türkiye; Kornfilt 1997: 69)

Hasan [kitab-ı san-a ver-diğ-im-**den** (**dolayı**)] çok kız-dı.
Hasan book-ACC you-DAT give-NMLZ-1SG-**ABL** (**because**) very angry-PST
'Hasan got very angry because I gave the book to you.'

In the recent typological and psycholinguistic literature, such patterns have attracted increasing attention under the label of redundancy management in grammar (e.g. Hawkins 2014, Jaeger & Buz 2018). As such, they join many other grammatical devices whose optional or differential occurrence is said to be motivated by efficiency: whenever a particular grammatical meaning is predictable (from the context or as a long-term frequency effect), it tends to receive shorter expression (relative to the less predictable contexts, see Haspelmath 2021 for an overview).

Following this line of argumentation, it has recently been shown that a strong predictor of subordinator omission is the relative likelihood that an argument clause or relative clause will appear given a certain main-clause verb or noun phrase, respectively (see Jaeger 2010, Wasow et al. 2011 for relevant corpus-linguistic work, and Norcliffe & Jaeger 2016 for experimental evidence). In this light, it is certainly no accident that ARs which are more intimately connected to the main-clause predicator show the same trend towards shortening and omission. First and foremost, this applies to the motion-cum-purpose clauses we encountered in (47b) above; as we saw there, the purposive connector as such is optional in purpose clauses with a main-clause verb of directed motion, and the nominalizer used in these constructions is also shorter than the one in general purpose clauses. Schmidtke-Bode (2009) shows that this is a more general typological pattern. In Korean, for example, the purposive connector commonly used with motion verbs (*-(u)le*) is shorter than the general-purpose connector *-ki wiha-ye* (Hwang 1997), and in Amele and Hausa (to name but two relevant languages), the purposive marker can be omitted particularly with a main-clause verb of directed motion.

Moreover, the fact that purpose clauses (in general) have a strong usage bias towards subject co-reference across main clause and subordinate clause leads, in some languages, to exactly the same reduction effects: where same-subject and different-subject purpose clauses are distinct constructions, the different-subject marker will usually be at least as long as the same-subject marker (e.g. Awa Pit); and a purpose connector may become optional only in same-subject constellations (e.g. Lango). These coding patterns are thus not only based on immediate contextual predictability but also on long-term effects of frequency-

sensitive linguistic memories (see also Haspelmath 2013 for the same effects in desiderative argument clauses).

4 Conclusion: The dynamics of clausal embedding

In this chapter, we have laid out some prominent typological patterns in the structure, function and use of relative and adverbial clauses. Apart from presenting the major cross-linguistic types of RCs and ACs as such, we have attempted to situate them in the more general context of clausal embedding. Specifically, we have argued that, for both RCs and ACs, there are systematic correlations between *functional*, *formal* and *syntagmatic* dimensions of embedding: prototypically, the more a clause can be conceptualized as being functionally embedded into another unit (i.e. into a phrase or a clause), the more it will assume the formal and distributional properties of typical constituents of that unit. It needs to be emphasized, however, that there can also be mismatches between form and function (e.g. syntactically appositive nominalizations used with restrictive meaning, as in (37)), and that our three dimensions of embedding are not to be understood as discrete entities but as continua: as we have seen throughout the chapter, clauses can be more or less embedded along all of the three dimensions, and the manifold combinations that can result from this reflect the enormous diversity of clause-combining constructions across the world's languages (Figure 1; see also Lehmann 1988 on this point).

Therefore, the view of embedding espoused in this paper is a synchronically gradient and diachronically dynamic one, in keeping with the more general understanding of grammar as a usage-based dynamic system (Beckner et al. 2009, Diessel 2019b). On this view, clausal embedding is an emergent phenomenon: for both RCs and ACs, we observed that looser syntactic configurations – such as juxtaposed clauses with anaphoric links, afterthoughts or appositions of NPs and clauses – can come to be integrated into formally more asymmetrical structures over time. On this account, many RCs follow similar diachronic trajectories as other constituents of NPs; determiners, for example, often emerge from appositive demonstrative pronouns (Himmelmann 1997). Alternatively, clausal embedding may come about by successively expanding the elements of phrasal constituents: RCs can thus be derived from the expansion of other noun modifiers, such as genitival or adjectival slots, and ACs can be expansions of flagged NPs and adverbial PPs. And once grammaticalized, embedded clauses continue to be dynamic entities, being reanalyzed into semantically and discourse-pragmatically related construction types (e.g. relative > temporal clauses, temporal >

conditional clauses, purpose > result clauses, etc.). They may also be analogically extended from one domain to the next (e.g. from purposive to argument environments (Haspelmath 1989), from reported speech to various adverbial relations (Heine et al. 1991, Saxena 1995) or from relative to both adverbial and argument relations (e.g. Givón 1991)). These developments yield dynamic networks of polyfunctionality (see van Lier 2009 and Hetterle 2015 for detailed studies), and as we have argued for ACs in particular, they can often directly account for larger typological regularities (such as word-order correlations between adpositional phrases, dependent clauses and subordinators; see Diessel 2019a).

In surveying different types of RCs and ACs, we have also seen that both domains of clause linkage are subject to very similar communicative and processing-related pressures. Concerning the former, we demonstrated how considerations of information structure, such as reference management ("filler before gap") and thematic grounding, influence the grammaticalization of different types of RC and AC. As far as processing is concerned, we saw that the more predictable the dependent clause is from its associated main-clause element (i.e. the head nominal or the main predicator) or from other aspects of the construction, the less overtly it needs to be marked itself. This principle extends from the subordinator to other aspects of economical coding, such as the gaps in relativization: the more recoverable the relativized position is from other cues in the RC construction (or the context), the more easily it can be gapped. Communicative pressures motivate which semantic roles are most commonly chosen as relativized positions, and these, in turn, are again the ones with the least overt coding.

Overall, then, both RCs and ACs cannot only be embedded in a structural sense, but they are always embedded (more metaphorically) into a language-specific ecosystem that is shaped by the cognitive, communicative and social demands of the respective language users.

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Abbreviations

The paper follows the Leipzig Glossing Rules (Comrie et al. 2008). Additional abbreviations are as follows:

I, II, III	agreement classes (e.g. Choctaw)
ADD	additive focus (Yakkha)
ADJZ	adjectivalizer
AM	autonomous motion (Cabecar)
ANIM	animate
ANT	anterior (aspect)
AOR	aorist (perfective past tense)
AVN	action verbal noun (Mapudungun)
C$_{\text{NUMBER}}$	noun class
COBL	complementizing oblique case (Kayardild)
CONN	connector
DEP	dependent form
DEST	destination
DIR	direction
DF	D-form (specific inflectional form of Urarina)
EF	E-form (specific inflectional form of Urarina)
HRS	hearsay (evidential)
INAN	inanimate
INT	intentional
LOCUT	locutor (1$^{\text{st}}$-person index in Awa Pit declarative clauses)
NARR	narrative (tense)
NATIV	nativizer (verbal affix in Yakkha attached to certain loan words from Nepali)
NGR	n-grade (aspectual marker for duration and incompletion in Choctaw)
NLOCUT	non-locutor (3$^{\text{rd}}$-person index in Awa Pit declarative clauses)
NTR	neutral form (specific inflectional form of Urarina)
OP	operator
OVN	object verbal noun (Mapudungun)
POT	potential
PREV	previous mention (Choctaw)
PROP	proprietive
REF	reference marker (Mayogo)
RL	realis
SEQ	sequential
SS	same subject
STAT	stative
SUB	subordinator
THEM	thematic suffix (Georgian)
TNS	tense marker
TR	transitivizer

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