DOCTORAL DISSERTATION

At the intersection of temporal & modal interpretation:
a view from Arnhem Land (northern Australia)
[working title]

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Chapter 0

Introduction

Dɪsᴘʟᴀᴄᴇᴍᴇɴᴛ has been proposed as universal and distinctive property of human language which permits us to make assertions that are embedded in different times, locations and possible worlds (*e.g.* Hockett's 'design features of human language' 1960:90). Linguistic work — descriptive, pedagogical, theoretical — has traditionally seemed to take for granted a categorical distinction between subtypes of verbal inflection: *viz.* the ᴛᴇᴍᴘᴏʀᴀʟ and ᴍᴏᴅᴀʟ domains. Whether or not these basic claims are intended as heuristic, the independence of tense, modality, aspect and related categories quickly unravels upon close inquiry into cross-linguistic data; a challenge for linguistic theory, and one that a growing body of literature is identifying (*e.g.*, Condoravdi 2002, Hacquard 2006, Laca 2012, Rullmann and Matthewson 2018 among many others).

The body of this dissertation consists of four more or less related studies that consider the roles of conventionalised linguistic expressions and context (*sc.* the interplay of semantics and pragmatics) in "displacing" discourse – that is, how, in a given discourse context, reference is established to different possible worlds and different times. In other words, we are concerned with the interactions between temporal reference, modal reference and negation/polarity, and the linguistic phenomena that these give rise to. Methodologically, these projects also engage with diachronic considerations in view of explaining variation and change across spatially and temporally separate language varieties. This is motivated by the desiderata formulated by the ᴀᴍᴘʜɪᴄʜʀᴏɴɪᴄ ᴘʀᴏɢʀᴀᴍ (*e.g.*, Anderson 2016, Deo 2015a, Kiparsky 2006, see also § 0.3).

The role of this introduction is to introduce (and motivate) the major assumptions and theoretical commitments that underpin these essays and to highlight how, they connect with one another and (hopefully) constitute data and analyses

that have the potential to further refine and nuance theories of natural language semantics, specifically in terms of what these have to say about the mechanics of displacement.

The essays variously consider data from English and from a number of languages spoken in Aboriginal Australia — particularly Yolŋu Matha and Australian Kriol — on the basis of both published and original data, collected on site in the Top End and in consultation with native speakers. While there is a rich tradition of Australian language description and recent work has attended to a number of distinctive features in the functional semantics of Australian Languages (*e.g.*, Stirling and Dench's special issue of *Aust. J. Linguist. 32*, Bednall's thesis on Anindilyakwa temporal and modal expression, Bowler 2014, Kapitonov 2018 a.o.), this continent, hugely linguistically diverse, has received little attention in formal semantic theory. As we will see, data from these languages promises to challenge and enrich the methodological and theoretical toolbox of formal semantics.

0.1   Chapter structure

This dissertation comprises four chapters that are related but distinct. While they can each be read as independent pieces of work that tackle discrete linguistic phenomena, the methodological tools, assumptions and upshots of each chapter are mutually informing. As described above, the four chapters all engage with various phenomena at the intersections of tense, mood/modality and negation. They each interrogate the linguistic manifestations of interactions between these semantic categories in view of contributing to a nuanced and cross-linguistically sound semantic theory, with particular implications for our theoretical conceptions of, for example, irreality and counterfactuality. Here, I provide a brief abstract of each of the dissertation's constituent chapters.

Chapter 1 provides a first formal semantic account of "**apprehensionality**", paying particular attention to an apparent meaning change trajectory, where future-oriented temporal expressions develop modal readings. In order to get at this, the Chapter describes and accounts for the changes in the distribution of the Australian Kriol adverb *bambai*. An observation originally due to Angelo and Schultze-Berndt (2016, 2018), *bambai* started its life as a temporal frame adverbial ('soon, shortly thereafter') and has developed so-called "apprehensional" uses. In many contexts *bambai* is translatable as 'otherwise' – on account of its reliance on accommodation processes, the account defended here treats *bambai*-type apprehensives as

discourse anaphors that involve the modal subordination of their prejacent to elements of foregoing discourse (*cf.* ch. **2**). The chapter provides a detailed explanation of the range of uses available to *bambai* in both its temporal and modal functions. On the basis of this, I propose a lexical entry that unifies these uses, in so doing, offering an account of the emergence of explicitly modal readings in a future-oriented ("subsequential") temporal adverb, as well as a semantics for apprehensional marking.

In **Chapter 2**, we propose an analysis of the meaning and interpretation constraints on the English lexical item *otherwise.* Drawing on a proposal by Webber et al. (2001), we treat *otherwise* as a "discourse anaphor", that is, an adverbial that signals 'discourse relations between adjacent discourse units' (Webber et al. 2001:1). In order to model its contribution, we argue that the antecedent is accommodated from the pronounced utterance preceding *otherwise* and can be furnished by any of the propositions (*sc.* sets of worlds) that serve to restrict the context set of this utterance, crucially deploying the "modal subordination" framework due to Roberts (1989 *et seq.*) in order to account for this. We appeal to information structural notions, and in particular to the notion of a current "Question under Discussion", in determining the nature of the antecedent. Consequently, the chapter constitutes a **dynamic analysis of a discourse anaphor** (*sc.*, one that considers the development of discourse participants' information states over time) that additionally accounts for its flexible distribution and previously unobserved limitations on its use.

Chapter 3 comprises a first semantic treatment of **the Negative Existential Cycle** (NᴲC), also demonstrating its instantiation in a number of subgroups of Pama-Nyungan on the basis of comparative data from Thura-Yura, Yolŋu Matha and Arandic. The Negative Existential Cycle (see Croft 1991, Veselinova 2016) is a proposed grammaticalisation process where negative existential predicates develop into markers of sentential negation. Here I propose a treatment where the ᴘʀɪᴠᴀᴛɪᴠᴇ—a grammatical category described in many Australian languages (*e.g.*, Dixon 2002)—is taken to realise the semantics of a negative existential. Diachronically, I provide evidence that erstwhile privatives generalise into sentential negators: an instantiation of the NᴲC, giving a unified semantics for nominal and verbal negation. I take this cycle to provide support for a treatment of **negation as a two-place (modal) operator** and additionally suggest that this cycle can be united with general observations made in the grammaticalisation literatures regarding the functional pressures underpinning meaning change.

Chapter 4 comprises a description and analysis of the encoding of mood/"reality status" in Western Dhuwal/a (WD)— a variety (or set of varieties) of Yolŋu Matha spoken in northern Arnhem Land. Unlike neighbouring varieties, WD exhibits **cyclic tense** (a species of *metricality*/temporal distance marking where a given inflectional category appears to encode the instantiation of a given property at discontinuous intervals) in addition to **negation-based asymmetries in reality-status marking** (*cf.* Miestamo 2005): a phenomenon where mood distinctions are collapsed in negative predications. This chapter provides a semantics for WD's four inflectional categories (in particular their modal contribution) which captures and predicts the negative asymmetry. Central to the analysis is the idea that the inflections encode a two-way mood (or "reality status") distinction. This is formulated as a presupposition that a metaphysical modal base is **nonveridical** with respect to the inflected predicate. The species of nonveridicality itself is encoded by a modal predicate modifier. In WD, the negative particles *yaka* and *bäyŋu* are two such modal expressions. In this sense, the account converges with observations made in Chapter **3**, *viz.* it advocates for a treatment of sentential negators as modal expressions. These two phenomena (to varying degrees) represent areal features of the languages of central Arnhem Land. Chapter 4 concludes with a note discussing change and variation with respect to the semantics of verbal inflections in varieties of Yolŋu Matha.

The remainder of this introduction introduces key assumptions and formal tools that will be used to analyse each of the phenomena introduced above. Additionally, each chapter separately engages with relevant literature.

0.2 Formal theories of displacement

As indicated above, the four chapters that constitute the primary contribution of this dissertation comprise four treatments of data about natural language expressions responsible for temporal displacement, modal displacement and negation. In this section, I provide an overview of the formal semantic assumptions that guide and motivate these analyses.

The primary goal of semantic theory is the development of models of linguistic meaning. To this end, an understanding of "meaning" as the conditions on the truth and felicity of a given linguistic expression has proved to be a particularly successful semantic methodology. A crucial distinction, and one that is key to the work presented here, is that between *extensional* and *intensional* semantics. An *exten-*

sional semantics is one where the truth of a given sentence is "defined entirely by its form and the extensions of its commponent sentences, predicates and terms" (Menzel 2017). Truth in an intensional logic requires appeal (or relativisation) to some object beyond these, *sc.* an index at which a sentence's truth or falsity is evaluated.

Formal approaches to semantics are largely developed from traditions of mathematical logic (*e.g.*, Montague 1970, see Janssen 2016 for an overview.) Importantly, the first formal temporal logics (*e.g.*, Prior 1957 *et seq.*) build on the frameworks of modal logic, in particular the notion of *possible worlds semantics*. Where a possible world w is an imaginable state of affairs, a possible 'way the world could be', the basic operationalisation of a possible worlds semantics lies in positing a modal "frame" $\langle \mathcal{W}, \mathcal{R} \rangle$ — a set of worlds $\mathcal{W}$ and an accessibility relation $\mathcal{R} \subseteq \mathcal{W}^2$ which makes "relevant" worlds available. Prior (1958 *et seq.*) analogised **P**ast and **Future** tense operators to possibility modals: effectively, these operators are all taken to existentially quantify over a set of states-of-affairs (reference points: times/possible worlds). In the case of temporal operators, the relevant accessibility relation $\mathcal{R}$ is provided by $\prec$ (or $\succ$): marking available only the temporal predecessors (or successors) of the evaluation index.[1]

An related consequence of theories of temporal and modal logic emerging out of the philosophical and semantic traditions is the notion of "branching time", which underscores the intimate relationship between temporal and modal reference (this framework is of particular relevance for the analyses proposed in Chs 1 & 4, see § 4.4.1). Models of branching time capture a crucial asymmetry between the past and future temporal reference: namely the indeterministic, inherently **unsettled** nature of predications about future times.[2] In effect, they formalise the idea that "for any given there may be not merelt a single future course of time, but multiple possible futures" (Dowty 1977:63, see also Thomason 1970). For the indeterminist (*i.e.*, assuming that the future isn't settled and predetermined), then, FUTURE markers, are inherently modal operators insofar as they can be taken to quantify over "branches" — potential futures as calculated from a given evaluation time; $\mathbf{F}_t p$ says that along all those futures branching from t, there's some later time at which t' such that p is true (Thomason 1970:267).

Building on the tense logics introduced above, following (Kratzer 1977, 1981,

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[1] See Copeland (2002, 2020) and Markoska-Cubrinovska (2016) for more on the foundational contributions of Arthur Prior to the development of modal (esp. tense) logic.

[2] Widely adopted and developed, the development of branching time models is attributed to Prior and Kripke, see also Ploug and Øhrstrøm (2012) for a history of the correspondence of the two logicians.

1991 a.o.), modal expressions are taken to denote **quantifiers over possible worlds**. Crucially, like other natural language quantifiers, modal auxiliaries are taken to contain (implicit) restrictions over their quantificational domain. For Kratzer the distinction between so-called *epistemic* and *deontic* readings of modal auxiliaries is a function of this restriction. This distinction is shown in the sentence pair in (1) below.

(1)   Two readings of English modal auxiliary *must* from Kratzer (1977:338)

    a.   *All Māori children **must** learn the names of their ancestors*

    b.   *The ancestors of the Māori **must** have arrived from Tahiti*

In effect, the different readings ("flavours") of *must* in (1a-b) arise as a consequence of different **restrictions** that are made over the set of possible worlds. In effect, the deontic reading (1a) makes a claim about only (and all) those worlds/possible states-of-affairs in which Māori children adhere to some set of societally-given rules, laws and expectations. Conversely (1b) makes a claim about only (and all) those possible worlds that are compatible with everything that the speaker knows. These subsets of $\mathcal{W}$ are referred to as **conversational backgrounds** (sc. an *epistemic* vs. *deontic* conversatitonoal background). By assuming that conversational backgrounds are supplied by broader lingusitic context, a major advantage of the Kratzerian program is that modal auxiliaries like *must* and *can* can be taken to be semantically unambiguous. A sentence of the form *must* ϕ asserts that ϕ is true in all relevant worlds (universally quantifying over a subset of $\mathcal{W}$) whereas one of the form *can* ϕ makes weaker claim, namely that the truth of ϕ is *compatible* with those worlds. That is, *must* is a universal quantifier and *can* is an existential quantifier over possible worlds.

could be enriched to distinguish **modal bases** *and* **ordering** *sources but unclear if this is nec. at this point?*

As mentioned above, the vast majority of work in the formal semantic program has taken European languages as its object of study. If model-theoretic approaches to semantics are to provide a complete theory of natural language phenomena, it is incumbent upon the field to demonstrate the applicability of these tools and principles to all possible human languages. This enterprise includes modelling and precisely describing the diversity of temporal and modal systems cross-linguistically. Recent work on cross-linguistic semantics has shown how the semantics for English modals – where quantificational force is lexically encoded and conversational backgrounds are provided by context – does not provide the correct semantics for other languages' modal systems.[3]

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[3]Rullmann et al. (2008) show that, in Sƛ́aƛ́imcets ([lil] Salish: British Columbia) deontic and

0.3 A note on the "amphichronic program"

Due to Kiparsky (2006 *et seq.*), *amphichronic* linguistics is an approach to linguistic theory that assumes that synchronic and diachronic levels of explanation "feed each other" (see also Bermúdez-Otero 2015). This research program is motivated by the necessity to dissociate *typological generalisations* from *language universals*. Are the phenomena that we see (or don't see) expressed in natural language a function of universal design features and constraints on the human language faculty? Or are they derivable "by-products" from tendencies of language change? (see also Anderson 2016, 2008).

In the semantic domain, for Kiparsky, "[grammaticalisation] reveals the langauge faculty at work. Formal renewal engenders new categories that conform to cross-linguistic generalisations regardless of their source" (Kiparsky 2015:73). Over past decades, research on meaning change has led to the discovery of regular grammaticalisation "clines/pathways/trajectories": that is, a given lexical expression with meaning α comes to denote β, then γ *etc.* as an independent development across languages separated in space and time (see Deo 2015a, Eckardt 2011). In view of these robust cross-linguistic tendencies emerges the question of what is driving this change and ***why***. In this dissertation, numerous such semantic changes are analysed. It is a goal, then, of the current research to contribute insights into the ætiology of these changes and to consider what, if any, light they may shed on the universal "structure" of the semantical domains that are investigated here.

0.4 Data & glossing conventions

Each of the four chapters in this dissertation makes use of (novel and published) data from different sources. Example sentences are glossed following (modified) Leipzig conventions (all adopted conventions listed on *pg.* **??**).

Much of the Australian Kriol and Yolŋu Matha data was elicited between 2016 and 2019 from native speakers in Arnhem Land (in particular the Ngukurr and Ramingining communities) and Darwin. Where data is sourced from published material, a numbered bibliographic citation is provided. Where data is sourced from original fieldwork, the consultant's initials and date of recording are provided in square brackets — *e.g.*, [JP 20201216].

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epistemic modals are separately lexified but that quantificational force is contextually determined.

Chapter 1

The emergence of apprehensionality in Australian Kriol

1.1 Introduction

'Apprehensional' markers are a nuanced, cross-linguistically attested grammatical category, reported to encode epistemic possibility in addition to information about speakers' attitudes with respect to the (un)desirability of some eventuality. Taking the meaning of Australian Kriol particle *bambai* as an empirical testing ground, this paper provides a first semantic treatment of apprehensionality, informed by a diachronic observation (due to Angelo and Schultze-Berndt 2016 in which apprehensional readings emerge from erstwhile temporal frame adverbials that encode a relation of SUBSEQUENTIALITY between a discourse context and the eventuality described by the prejacent predicate.

Consider the contributions of *bambai* in the Australian Kriol sentence pair in (2):

(2) **Context:** I've invited a friend around to join for dinner. They reply:

　　a. **Subsequential reading of** bambai

　　yuwai! ***bambai*** *ai gaman jeya!*
　　yes! ***bambai*** 1s come there

　　'Yeah! I'll be right there!'

b. Apprehensional reading of bambai

najing, im rait! ***bambai*** *ai gaan   binijim main wek!*
no   3s   okay ***bambai*** 1s   NEG.MOD finish   1s   work

'No, that's okay! (If I did,) I mightn't (be able to) finish my work!'

[GT 20170316]

To be explicated in this chapter, while the reading of *bambai* in (2a) roughly translates to 'soon, in a minute', this reading is infelicitous in (2b), where *bambai* is a discourse anaphor which contributes a shade of apprehensional meaning (i.e. indicates that the Speaker's hypothetically joining for dinner may have the undesirable possible outcome of him not finishing his work.) This chapter is concerned with the emergence of APPREHENSIONAL readings of the temporal frame adverbial *bambai* in Australian Kriol. Beginning with a brief overview of "apprehensionality" as a linguistic category (§3.2), it: describes the distribution of these two readings (synchronically, when do apprehensional readings "emerge" in context, (§ 1.2.3), considers how apprehensionality emerges out of so-called "subsequentiality" markers diachronically (§ 1.4), and proposes a unified meaning component for the two readings (§ 1.5).

1.1.1   Background

Having entered into their lexicons predominantly via the contact pidgin established in NSW in the late eighteenth century (Troy 1994), cognates of the English archaism *by-and-by* are found across the English-lexified contact languages of the South Pacific. Additionally, Clark (1979) describes *by-and-by* as a particularly broadly diffused feature of the *South Seas Jargon* that served as a predominantly English-lexified auxiliary means of communication between mariners of diverse ethnolinguistic backgrounds and South-Pacific islanders (21, cited in Harris 1986:262*ff* a.o.). The cognates across these contact languages have preserved the function of *by-and-by* as encoding some relationship of temporal subsequentiality between multiple

eventualities.[1,2]

As shown in 2, Australian Kriol (hereafter Kriol *simpliciter*) has retained this function: in (3), *bambai* serves to encode a temporal relation between the two clauses: the lunch-making event occurs at some point in the (near) future of the speaker's father's trip to the shop: *bambai* might well be translated as 'then' or 'soon after'.

(3) *main dedi   imin   go la   det shop ailibala **bambai** imin   kambek*
     my   father 3s=PST go LOC the shop morning **bambai** 3s=PST come.back

　　 bla   gugum dina   bla   melabat
     PURP cook   dinner PURP   1p.EXCL

'My dad went to the shop this morning, **then** he came back to make lunch for us'   [AJ 23022017]

In addition to the familiar 'subsequential' use provided in (3), *bambai* appears to have an additional, ostensibly distinct function as shown in (4) below.

(4) **Context:** It's noon and I have six hours of work after this phonecall. I tell my colleague:

*ai=rra dringgi kofi   **bambai** mi gurrumuk la   desk iya   gin*
1s=IRR drink   coffee *bambai* 1s fall.asleep LOC desk here EMPH

'I'd better have a coffee otherwise I might pass out right here on the desk' [GT 28052016]

In (4), the speaker asserts that if he doesn't consume coffee then he may subsequently fall asleep at his workplace. In view of this available reading, Angelo and Schultze-Berndt (2016) describe an 'apprehensive' use for Kriol *bambai* — a category that is encoded as a verbal inflection in many Australian languages and is taken to mark an 'undesirable possibility' (256). In this case, *bambai* is plainly not translatable as an adverbial of the 'soon'-type shown in (3). Rather, it fulfills the

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[1]*baimbai* (sic) is described as a 'future tense marker' by Troy (1994:112,418,711) and (Harris 1986:268). Indeed it appears to be a general marker of futurity in the textual recordings of NSW pidgin that these authors collate, although still retains a clear syntactic function as a frame adverbial. Their description of *bambai* (along with *sun, dairekli, etc*) as tense marker is possibly due to the apparent lack of stable tense marking in the pidgins, although is likely used pretheoretically to refer to an operator that is associated with future temporal reference. This is discussed further in § **??** below

[2]See also Angelo and Schultze-Berndt 2016 for further review of cognates of *bambai* across other Pacific contact languages.

function of a discourse anaphor like 'otherwise', 'or else' or 'lest' (see also Webber et al. 2001, **?**).

This chapter proposes a diachronically-informed and unified semantics for Kriol *bambai*. It begins with section 1.2, which motivates the grammatical category of 'apprehensional epistemics' as described in typological literatures. Section 1.2.3 describes the function and distribution of Kriol *bambai*, both in its capacity as a subsequential temporal frame adverbial (§1.3.1) and its apparent apprehensional functions (§1.3.2). Section 1.5 proposes a unified semantics for *bambai* and discusses the grammaticalisation of apprehensional meaning while section 1.6 concludes.

1.2   Apprehensionality cross-linguistically

While descriptive literatures have described the appearance of morphology that encodes "apprehensional" meaning, very little work has approached the question of their semantics from a comparative perspective. Particles that encode negative speaker attitude with respect to some possible eventuality are attested widely across Australian, as well as Austronesian and Amazonian languages (Angelo and Schultze-Berndt 2016:258). While descriptive grammars of these languages amply make use of these and similar categories,[3] Lichtenberk (1995), Angelo and Schultze-Berndt (2016, 2018) and Vuillermet (2018) represent the few attempts to describe these markers as a grammatical category).[4]

1.2.1   Apprehensionality as a semantic domain

In the first piece of published work dedicated to the properties of apprehensional marking, Lichtenberk (1995) claims that the To'abaita ([mlu] Solomonic: Malaita) particle *ada* has a number of functions, though generally speaking, serves to modalise ("epistemically downtone") its prejacent while dually expressing a warning or otherwise some negative attitude about its prejacent. Shown here in (5), he distinguishes: (a) **apprehensive-epistemic** function, a **fear** function (b) and (c-d) **precautioning** functions.

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[3] Timitive and particularly evitative a.o are also cited in these descriptive literatures.

[4] An edited collection on *Apprehensional constructions*, edited by Marine Vuillermet, Eva Schultze-Berndt and Martina Faller, is forthcoming via Language Sciences Press. The papers in this volume similarly seeks to address this gap in the literature.

(5)   **Apprehensional marking in To'abaita**

   a.   ***Apprehensive modal*** $\blacklozenge p$

   CONTEXT. Dinner's cooking in the clay oven; opening the oven is a labourious process.

ada	*bii*		*na'i*	*ka*	*a'i*	*si*	*'ako*		*ba-na*
APPR	oven_food		this	it:SEQ	NEG	it:NEG	be.cooked		LIM-its

   'The food in the oven may not be done yet'   (295)

   b.   ***Embedding under predicate of fearing***   ***FEAR***$(\blacklozenge p)$

nau	*ku*	*ma'u*		*'asia*	*na'a*	***ada***	*to'an*		*na'i*	*ki*	*keka*		*lae*
1s	FACT	be.afraid	very			APPR	people	this		PL	they:SEQ		go

mai	*keka*	*thaungi*	*kulu*
hither	they:SEQ	kill	1p.INCL

   'I'm scared the people may have come to kill us.'   (297)

   c.   ***Precautioning* ("AVERTIVE" function)** $\neg p \rightarrow \blacklozenge q$

riki-a	***ada***	*'oko*	*dekwe-a*	*kwade'e*	*kuki*	*'ena*
see-it	APPR	2s:SEQ	break-it	empty	pot	that

   'Look out; **otherwise** you may break the empty pot.'   (305)

   d.   ***Precautioning* ("in-case" function)** $\neg p \rightarrow \blacklozenge(R(q))$

kulu	*ngali-a*	*kaufa*	***ada***	*dani*	*ka*	*'arungi*	*kulu*
1p.INCL	take-PL	umbrella	APPR	rain	it:SEQ	fall.on	1p.INCL

   'Let's take umbrellas **in case** we get caught in the rain'   (298)

(5a) functions as a possibility modal encoding negative speaker attitude vis-à-vis the eventuality described in its prejacent (i.e. opening the oven in vain). This reading also obtains under the scope of a predicate *ma'u* 'fear' in (5b). Lichtenberk analyses this use of *ada* as a complementizer, introducing a subordinate clause (1995:296).

In each of (c-d), meanwhile, *ada* appears to link two clauses. In both cases it expresses negative speaker attitude with respect to its prejacent (the following clause), which is interpreted as a possible future eventuality, similarly to the English archaism *lest*. In the *avertive* function p *ada* q— translated as 'p otherwise/or else q' — a conditional-like reading obtains: if p doesn't obtain, then q may

$(\neg p \rightarrow \blacklozenge q)$. In "in-case" uses, while q is interpreted as a justification for the utterance of p, there is no reasonably inferrable causal relation between the two clauses. For AnderBois and Dąbkowski (2020), "in-case" uses involve some distinct "contextually inferrable" proposition r from which q follows. Effectively, if p doesn't obtain, then some r (a consequence of q) may. In (5d), failing to take umbrellas might result in getting wet (should we get caught in the rain). They appeal to a number of pragmatic factors (reasoning about the plausibility of relations between p and q) in adjudicating between these two readings. This treatment is discussed in some further detail below.

Of particular interest for present purposes is the categorical co-occurrence of SEQ-marking *ka* in the prejacent to *ada*. Lichtenberk notes that the sequential subject-tense portmanteau *appears categorically in these predicates*, independent of their 'temporal status.' He claims that this marking indicates that the encoded proposition '*follows the situation in the preceding clause*' (296, emphasis my own). Relatedly, Vuillermet tentatively suggests that the Ese Ejja *kwajejje* 'AVERTIVE' may derive from a non-past-marked auxiliary with "temporal subordinate" marking (2018:281). The analysis appraised in this chapter proposes a basic semantical link between the expression of the **temporal sequentiality** of a predicate and **apprehensional** semantics.

Drawing on comparative evidence (*viz.* with Lau ([llu] Solomonic: Malaita) and other SE Solomonic languages), Lichtenberk argues that the apprehensional functions of *ada* are a result of the grammaticalisation of an erstwhile lexical verb with meanings ranging a domain 'see, look at, wake, anticipate' that came to be associated with warning and imprecation for care on the part of the addressee, before further developing the set of readings associated with the present day APPR marker (1995:303-4).

Subsequent typological work has concentrated on fine-tuning and subcategorising apprehensional markers. Notably, Vuillermet (2018) identifies three distinct apprehensional items in Ese Ejja ([ese] Tanakan: SW Amazon) which she refers to as realising an apprehensive *(-chana)*, avertive *(kwajejje)* and timitive *(=yajjajo)* function. These three apprehensionals scope over entire clauses (as a verbal inflection), subordinate clauses (as a specialised complementiser) and noun phrases (as a nominal enclitic) respectively. Similarly to Lichtenberk, Vuillermet suggests that these data provide evidence for a "morphosemantic apprehensional domain" (287).

Adopting this taxonomy, AnderBois and Dąbkowski (2020) focus their atten-

tion on the "adjunct" uses of the A'ingae ([con] NW Amazon) apprehensional enclitic =*sa'ne* (*i.e.*, its functions as a precautioning marker and a timitive.) Adapting treatments of the semantics of rationale/purposive clauses, they propose the core meaning given in (6).

(6) AnderBois and Dąbkowski's (2020:12) semantics for A'inge apprehensional adjunct =*sa'ne* (on its avertive/*lest*-like reading)

$[\![=\textit{sa'ne}]\!] = \lambda q.\lambda p.\lambda w : \exists i[\text{RESP}(i,p)].p(w) \wedge \forall w' \in \text{GOAL}_{i,p}(w) : \neg q(w')$

Supposing that some agent i is the agent of p, =*sa'ne* takes a proposition q as its input and outputs a propositional modifier, asserting that, in w, both p holds and the (relevant) GOAL worlds of the agent i are those where q doesn't hold. The semantics can be extended to other precautioning ("in-case") uses and timitive uses by appealing to an third, "inferrable" proposition r.

On the basis of this semantics, AnderBois and Dąbkowski predict that an implicational hierarchy of the form AVERTIVE $\gg$ IN-CASE $\gg$ TIMITIVE holds (2020:16-17).

1.2.2 Apprehensionality in the Kriol context

Dixon (2002:171) refers to the presence of nominal case morphology that marks the AVERSIVE as well as the functionally (and sometimes formally, see Blake 1993:44) related verbal category of apprehensionals as 'pervasive feature of Australian languages' and one that has widely diffused through the continent.[5,6] Lichtenberk (1995:306) marshalls evidence from Diyari ([dif] Karnic: South Australia) to support his claim about a nuanced apprehensional category, drawing from Austin's 1981 grammar. The Diyari examples in (7) below are all adapted from **?**.

(7) **Apprehensional marking in Diyari**

a. ***wata*** *yarra*   *wapa-**mayi**, nhulu yinha parda-**yathi**, nhulu yinha*
   NEG that way go.IMP.EMPH 3S.ERG 2S.ACC catch-**APPR** 3S.ERG 2S.ACC

   nhayi-rna
   see-IPFV$_{SS}$

   'Don't go that way or else he'll catch you when he sees you!'   (230)

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[5]Dixon in fact attributes the paucity of work/recognition of this linguistic category to 'grammarians' eurocentric biases' (171).

[6]Aversive case is taken to indicate that the aversive-marked noun is "to be avoided." This corresponds to the TIMITIVE for other authors (e.g. AnderBois and Dąbkowski 2020, Vuillermet 2018)

b. ***wata*** *nganhi wapa-yi, karna-li   nganha nhayi-**yathi***

  NEG   1S.NOM go-PRES person-ERG 1S.ACC see-APPR

'I'm not going in case someone sees me'   (228)

c. *nganhi **yapa**-li   ngana-yi, nganha thutyu-yali matha~matha-thari-**yathi***

  1S.NOM **fear**-ERG be-PRES 1S.ACC reptile.ERG ITER~bite-DUR-APPR

'I'm afraid some reptile may bite me'   (228)

d. *nhulu-ka   kinthala-li yinanha matha-**yathi***

  3S.ERG-DEIC dog-ERG   2S.ACC bite-APPR

'This dog may bite you'   (230)

The sentences in (7) shows a range of syntactic contexts in which Diyari apprehensional *-yathi* 'APPR' appears. The *-yathi*-marked clause appears to be evaluated relative to a prohibitive in (a), a negative-irrealis predicate in (b) and predicate of fearing in (c), or alternatively occurs without any overt linguistic antecedent in (d).[7] In all cases, the predicate over which *-yathi* scopes is **modalised** and expresses a proposition that the speaker identifies as 'unpleasant or harmful' (**?**:227). Little work has been undertaken on the emergence of these meanings.[8]

As we will see in the following sections, apprehensional uses of preposed *bambai* in Kriol have a strikingly similar distribution and semantic import to the apprehensional category described in the Australianist and other typological literatures. Angelo and Schultze-Berndt (2016) focus their attention on demonstrating the cross-linguistic attestation of a grammaticalisation path from (sub)sequential temporal adverbial to innovative apprehensional marking. They suggest that, for Kriol, this innovation has potentially been supported by the presence of like semantic categories in Kriol's Australian substrata. Data from virtually all attested languages of the Roper Gulf are shown in (8). Note that for (almost all of) these languages, there are attested examples of the apprehensional marker appearing in both biclausal structures – the **precautioning**-type uses described in the previous section (p LEST q), as well as "apprehensive" (monoclausal) ones ($\blacklozenge p$).

(8) **Apprehensional/aversive marking in Roper Gulf languages**

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[7]Austin claims that these clauses are invariably 'structurally dependent' (230) on a 'main clause' (*viz.* the antecedent.) We will see in what follows a series of arguments (to some degree foreshadowed by Lichtenberk (1995: 307)) to eschew such a description.

[8]Dixon (2002:171) and Blake (1993:44) are partial exceptions although these both focus on syncretism in case marking rather than dealing explicitly with the diachronic emergence of the apprehensional reading.

a. **Wubuy**

*numba:-'=da-ya:::-ŋ   gada, nama:='ru-**ngun-magi***

2s>1s=spear.for-go-NPST oops 1d.INCL>ANIM=leave-**APPR-APPR**

'Spear it! Ey! Or it will get away from us!'

(Heath 1980d:86, interlinearised)

b. **Ngandi**

*a-ḏaŋgu-yuŋ   ŋaṛa-waṭi-ji,   a-waṭu-ḏu   aguṛa-**miliʔ-ŋu-yi***

NCL-meat-ABS 1s>3s-leave-NEG:FUT NCL-dog-ERG 3s>3s-**APPR**-eat-**APPR**

'I won't leave the meat (here), lest the dog eat it.'

(Heath 1978:106, interlinearised)

c. **Ngalakan**

*garku buru-ye **mele-ŋun**   waṛŋʼwaṛŋˀ-yiˀ*

high   3ns-put **APPR**-eat.PRES crow-ERG

'They put it up high lest the crows eat it.'   (Merlan 1983:102)

d. **Rembarrnga**

*ŋaran-**məʔ-ɲamʔ**   ŋa-na   laŋə ṛalk*

3s>1p.INCL-**APPR**-bite.PRES 1s>3-see.PST claw big

'He might bite us! I saw his big claws.'   (McKay 2011:182)

e. **Ritharrŋu**

*gurrupulu rranha nhe, **wanga** nhuna rra buŋu*

give.FUT   1s.ACC 2s   **or else** 2s.ACC 1s hit.FUT

'Give it to me, or else I'll hit you.'

(Heath 1980b, interlinearised & standardised to Yolŋu orthography)

f. **Marra**

*wu-ḻa   ṇariya-yur, **wuniŋgi** ŋula ṇiŋgu-way*

go-IMP 3s-ALL   **lest**   NEG 3s>2s-give.FUT

'Go to him, or else he won't give it to you.'

(Heath 1981:187, cited also in A&SB:284)

g. **Mangarayi**

*bargji ∅-ṇama **baḷaga** ña-way-(y)i-n*
hard   2s-hold   ***lest***   2s-fall-MOOD-PRES.

'Hold on tight lest you fall!'

(Merlan 1989:147, cited also in A&SB:284)

As shown in (8), there is a diversity of formal strategies deployed (or combined) in these languages to realise apprehensional meaning: suffixation inside the verbal paradigm (8a-b), prefixation to the verb stem (8b-d), a separate apprehensional particle (8e-g).

In view of better understanding the semantical unity of these categories and the mechanisms of reanalysis which effect semantic change in *bambai* and its TFA counterparts in other languages, the distribution and meaning of the 'subsequential' and apprehensional usages of *bambai* are described below.

1.2.3   Temporal frame adverbs and apprehensionality

Angelo and Schultze-Berndt (2016, 2018) provide convincing cross-linguistic evidence of the apparent lexical relationships between temporal frame adverbs and apprehensional markers. This can be taken, prima facie, to provide evidence of markers of temporal relations for recruitment as lexicalised modal operators. Table 1.1 (partially adapted from Angelo and Schultze-Berndt (2016, 2018)) summarises examples from a number of languages where temporal frame adverbials also appear to display a robust apprehensional reading. Further, Angelo and Schultze-Berndt (2016:288) additionally suggest that there is some evidence of apprehensional function emerging in the *bambai* cognates reported in Torres Strait Brokan, [tcs], Hawai'ian Creole [hwc] and Norf'k.

Table 1.1. Etyma and polysemy for apprehensional modals

Language	Adverbial	Gloss[6]	Author (grammar)
Std Dutch [nld]	*straks*	soon	Boogaart (2009, 2020)
Std German [deu]	*nachher*	shortly, afterwards	A&SB (2018)
Marra [mec]	*wuniŋgi*	further	Heath (1981)
Mangarayi [mpc]	*baḷaga*	right now/today	Merlan (1989)
Kriol [rop]	*bambai*	soon, later, then	

[6]This isn't to suggest that the semantics of those words provided in the 'GLOSS' column in the

Compare these uses of Mangarrayi *baḷaḷaga~baḷaga* in (9) to (8g) above. In (9a), Merlan (1989:138) notes that the temporal frame uses of *baḷaḷaga*—while often translated as 'today'—appears to correspond to 'right now' (she also notes that "Pidgin English informants use [...the reduplicated form] *today-today* to mean 'now' as well as 'today' in the English sense"). In all of these Mangarayi data, *baḷaga* appears to indicate that the event described in the clause that it introduces obtains (or may obtain) subsequently to some time established in the previous clause.

(9) **Mangarayi**

    a.   *ḏayi ŋa-yirri-wa-ya-b   gurrji, **baḷaḷaga** ga-ŋa-wa-n*
          NEG   1s>3s-see-AUG-PNEG long.ago **today**   3-1s>3s-go.to.see-PRES

        'I hadn't seen it before, today I'm seeing it.'
                                   (Merlan 1989:138, cited also in A&SB 2018:13)

    b.   *galaji   ŋanʔ-ma **baḷaga** yag*
          quickly ask-IMP **before** go

        'Ask him quick before he goes.'
                                       (Merlan 1989:147, cited also in A&SB: 284)

    c.   *a-ŋaḷa-yag   **baḷaga** miḷiḷitma*
          HORT-1p.INCL-go **before** sunset

        'Let's go before the sun sets.'   (Merlan 1989:147)

    d.   *ŋiñag ŋaḷa-bu-n   guṟuugguṟug-bayi, **wuṟay** ḏoʔ   a-ŋayan-ma*
          PROH 1p.INCL-kill-PRES white.people-FOC **later**   shoot IRR-3s>1p.INCL-AUX

        'We can't kill white people. Later on they might shoot us.'
                                            (Merlan 1989:147)

(10) **Marra**

    *wayburi   jaj-gu-yi   **wuniŋgi**: gaya bayi   gal-u-jingi*
     southward chase-3s>3s.PST **more**   there in.south bite-3s>3s-did

    'Then [the dingo] chased [the emu] a bit more in the south.'
                                                (Heath 1981:360)

---

table above ought to be treated as identical identical: the definitions seek to capture a generalisation about sequentiality. A prediction that falls out of this generalisation is that TFAs like 'later, soon, afterwards, then' might be best interpretable interpretable as subsets of this category.

Note additionally the apparently apprehensional use of *wuṛay* 'later' in (9d). While Merlan makes no mention of the "evitative/anticipatory" uses of this adverb, this type of use context is a likely source for the type of apprehensional and causal/elaboratory inferences invited by temporal frame adverbials.

Merlan (1989:147) glosses *baḷaga* as 'EVITATIVE/ANTICIPATORY', commenting that these two notions are "sometimes indistinguishable." She also notes the formal (reduplicative) relation to frame adverbial *baḷaḷaga* 'right now, today', commenting on the shared property of "immediacy" that links all these readings. Of *wuniŋgi*, Heath (1981:308) suggests translations of 'farther along, furthermore, in addition' (common in text translations) in addition to (elicited) apprehensional readings. He explicitly notes the similarity between this apparent polysemy and Kriol *bambay* (sic) (given the "closeness" of the sense of 'later' to that of 'farther along'.)

1.3   The distribution of *bambai*

This section (informally) describes the distribution and meaning of both temporal-frame and apprehensional readings of *bambai* in the data. The Kriol data cited here draws from Angelo and Schultze-Berndt ([*A&SB*], 2016) and the Kriol Bible ([*KB*], The Bible Society in Australia 2007) in addition to elicitations from, and conversations with, native speakers of Kriol recorded in Ngukurr predominantly in 2016 and 2017.

1.3.1   Temporal frame use

Temporal frame adverbials (TFAs) are linguistic expressions that are used to refer a particular interval of time, serving to precise the *location* of a given eventuality on a timeline. As an example, TFAs include expressions like *this morning* or *tomorrow*, which situate the eventuality that they modifies within the morning of the day of utterance or the day subsequent to the day of utterance respectively (see Binnick 1991:307).

Formally, we can model the contribution of temporal expression by assuming a set $\mathcal{T}$ of points in time which are all strictly ordered with respect to each other chronologically. This is represented by a PRECEDENCE RELATION $\prec$ (where $t_1 \prec t_2 \leftrightarrow t_1$ precedes t_2). A TFA like *today*, then, is a predicate of times: it picks out all the points in time between the beginning and the end of the day of utterance. In the sentence *Mel ate today*, the TFA restricts the instantiation time of the eating event

(t_e) to this interval. That is, *Mel ate today* is true iff Mel ate at t_e and $\underset{\text{start-of-day}}{t_1} \prec t_e \prec \underset{\text{end-of-day}}{t_2}$. This can be represented using an interval notation as $t_e \in [t_1, t_2]$.

As discussed in §1.1, Kriol *bambai* is derived from an archaic English temporal frame adverbial, *by-and-by* 'soon', a lexical item with some currency in the nautical jargon used by multiethnic sailing crews in South Pacific in the nineteenth century. The general function of *by-and-by* has been retained in contemporary Kriol, namely to temporally advance a discourse, much as Standard Australian English uses expressions of the type 'soon/a little while later/shortly after(wards)' or 'then.' These expressions represent a subset of 'temporal frame adverbials': clause modifiers that delimit the temporal domain in which some predicate is instantiated. In this work, I refer to the relevant set of TFAs as *subsequentiality* ('SUBSEQ') adverbials. The motivation for describing this as a semantic subcategory (a special case of the prospective) is the robust intuition that, in addition to temporally advancing the discourse (*i.e.*, marking the instantiation of the prejacent predicate posterior to a given reference time), SUBSEQ TFAs give rise to a salient, truth-conditional expectation that the predicate which they modify obtain in non-immediate sequence with, but in the **near future** of a time provided by the context of utterance. This general function of *by-and-by* is attested in the contact varieties (*i.e.*, pidgins) spoken in the nineteenth century in Australia; this is shown in (11).

(11) An excerpt from a (diagrammatic) explanation of betrothal customs and the genealogy of one couple as given to T A Parkhouse by speakers of a Northern Territory pidgin variety from the Larrakia nation in the late nineteenth century. (Parkhouse 1895:4, also cited in Harris 1986:299.) My translation (incl. subscript indexation).

> *... that fellow lubra   him have em nimm.*
> that ATTR woman 3s   have TR boy
>
> ***by-and-by*** *him catch him lubra,   him have em nimm.*
> ***bambai***   3s   catch TR woman 3s have TR boy
>
> *Him lubra   have em bun-ngilla.* ***By-and-by*** *girl big fellow, him*
> 3s   woman have TR girl   ***bambai***   girl big ATTR   3s
> *nao'wa   catch him, him méloa   have em bun-ngilla.*
> husband catch 3s   3s   pregnant have TR girl
>
> ***By-and-by*** *nimm big fellow, by-and-by bun-ngilla big fellow, him*
> ***bambai***   boy   big ATTR   ***bambai***   girl   big ATTR   3s
> *catch him.*
> catch 3s

'...That woman$_h$ had a son$_i$. Later, he$_i$ got a wife and had a son$_j$. This woman$_k$ had a daughter$_\ell$. Then, when the girl$_\ell$ had grown up, her husband got her$_\ell$ pregnant, she$_\ell$ had a daughter$_m$. Then, when the boy$_j$ was grown and the girl$_m$ was grown, he$_j$ got her$_m$.'

Note that, according to Parkhouse, (11) constitutes a description of the relationship history of one couple; each sentence is past-referring. There is no tense marking in the Pidgin narrative. In each of the *by-and-by* clauses in (11), the speaker asserts that the event being modified is *subsequent* to a reference time set by the previous event description. In this respect, *by-and-by* imposes a temporal frame on the event description that it modifies.

As we have seen above (e.g. 3), the SUBSEQ-denoting function of *bambai* shown here has been retained in Kriol. This reading is shown again in the two sentences in (12). The schema in (12c) provides an informal representation of this context-dependent, "subsequential" temporal contribution.

(12) a. **Context:** During a flood a group of people including the speaker have moved to a dry place up the road

*mela   bin ol mub deya na, jidan deya na, **bambai***
1p.EXCL PST all move there now sit   there now **bambai**

elikopta   bin kam deya na, detlot deya na garra kemra
helicopter PST come there now DET:PL there now have camera

'We all moved there, **then** a helicopter came, the people there had cameras'

[A&SB: 271]

b. **Context:** Eve has conceived a child.

***Bambai** imbin   abum lilboi*
bambai   3s.PST have   boy

'Subsequently, she had (gave birth to) a boy'   [KB: Jen 4.1]

c. **Instantiation for subsequential reading**   *(to be revised)*

$$t_r \text{———————} \boldsymbol{t_e} \text{⋯⋯⋯⋯⋯} t^+$$

The eventuality described by the predicate is instantiated at some time t_e in the future of a reference time t_r. t_r is contextually determined—by an antecedent proposition if present—or otherwise established by the discourse context. Further, subsequential TFAs impose a requirement that t_e obtain within some constrained interval subsequent to t_r (that is, before t^+).

As shown in (12a) above, the arrival of the helicopter (and its associated camera crew) is modified by *bambai qua* TFA. This has the effect of displacing the instantiation time forward with respect to the reference time provided by the first clause. *Bambai* has the effect of displacing the instantiation of helicopter-arrival forward in time with respect to the reference time provided by the first clause (*sc.* the time that the group had moved to a dry place up the road).

Similarly, (b) asserts that the eventuality described by the prejacent to *bambai* (namely the birth of Cain) is instantiated in the near future of some reference time t_r provided contextually, albeit not by a linguistically overt antecedent clause. That is, Eve gave birth at some $t_e \in \{t'_e : t_r \prec t'_e \prec t^+\}$.[9] The subsequent verse *Bambai*

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[9]This is not to suggest the referability of some 'latest bound' reference time t_r^+. The latter merely represents a (vague) contextual expectation by which the event described by the prejacent had bet-

na lb bin abum najawan lilboi (KB Jen 4:2) 'Soon after *that*, Eve had another boy' further displaces the birth event of Abel. Subsequential TFAs are distinguished by this 'near future' restriction, underpinned by a set of conversational expectations over reasonable degrees of "soonness."

Here we have seen an overview of the semantic contribution of *bambai* in its capacity as a 'subsequential' TFA. A discussion of apprehensional uses follows.

1.3.2   Apprehensional use

In his survey of "apprehensional modality", Lichtenberk describes apprehensionals like To'abaita *ada* as having a dual effect on their prejacents: *epistemic downtoning* — *i.e.*, 'signal[ling] the [speaker's] relative uncertainty [...] about the factual status of the proposition' — and (a shade of) *volitive modality* — 'the fear that an undesirable state of affairs may obtain' (1995:295-6). While we are not committed to Lichtenberk's metalinguistic labels a this stage (to be further investigated below), a modal meaning for Kriol *bambai* is shown below. We will see how use diverges from the subsequential/temporal frame uses described so far.

1.3.2.1   *p bambai q* : the conditional use

Indicative 'nonimplicationals.'   Angelo and Schultze-Berndt (2016:272*ff*) observe that apprehensional *bambai* occurs with both: an 'admonitory' illocutionary force in a precautioning/warning sense (*e.g.* 13a); in addition to declarative illocutionary acts where the speaker formulates a prediction of undesirable eventuality as the possible outcome of some discourse situation (e.g. 13c).

The sentence data in (13) demonstrate how *bambai*-sentences are used to talk about undesirable possible future eventualities. Modelling this, we enrich the time model introduced in the previous subsection by postulating a set of *possible worlds* $\mathcal{W}$. Following standard assumptions, a "proposition" ($p \in \mathcal{W} \times \{\mathbb{T}, \mathbb{F}\}$) is a set of possible worlds, namely those in which it is true (e.g. Kratzer 1977, Kripke 1963, Stalnaker 1979, a.o.)

Generally speaking, the construction *p bambai q*, on its apprehensional reading, appears to be encoding converse nonimplication between its arguments: 'if some situation p doesn't obtain in w, then the (unfortunate) situation described in q might' ($\neg p(w) \rightarrow \blacklozenge q(w)$). Additional data showing these uses is shown in (13) below.

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ter have obtained for the whole sentence to be judged true. See §1.5 for further discussion of this device.

(13) a. **Context:** Two children are playing on a car. They are warned to stop.

*Ey! **bambai**₁ yundubala breikim thet motika, livim. **bambai**₂ dedi*
Hey! **bambai** 2d   break DEM car   leave **bambai** Dad

graul la yu
scold LOC 2s

'Hey! You two might break the car; leave it alone. Otherwise Dad will tell you off!'   [A&SB: 273]

b. *yu stap ritjimbat mi na **bambai** ai kili yu ded en mi nomo*
2s stop chase.IPFV 1s EMP **bambai** 1s kill 2s dead and 1s NEG

leigi meigi yu braja jeikab nogudbinji
like make 2s brother jacob unhappy

'Stop chasing me or I'll kill you and I don't want to upset your brother Jacob (*sic*)'   [GT 22062016-21', retelling KB 2Sem 2.22]

c. *ai garra go la shop ba baiyim daga, **bambai** ai (mait) abu*
1s IRR   go LOC shop PURP buy   food **bambai** 1s (POSS) have

no daga ba dringgi main medisin
no food PURP drink my medicine

'I have to go to the shop to by food **otherwise** I may not have food to take with my medicine'   [AJ 23022017]

In (13a), there are two tokens of apprehensional *bambai*. The second *(bambai₂)* appears to be anaphoric on imperative *livim!* 'leave [it] alone!' Notably, it appears that the Speaker is warning the children she addresses that a failure to observe her advice may result in their being told off ($\neg p \rightarrow \blacklozenge q$) — unlike the uses of *bambai* presented in the previous subsection, *bambai* here is translatable as 'lest/otherwise/or else.' *bambai₁*, the first token in (13a), appears to have a similar function, although has no overt sentential antecedent.[10] In this case, the Speaker is issuing a general warning/admonition about the children's behaviour at speech time. In uttering the *bambai₁* clause, she asserts that, should they fail to heed this warning, an event of their breaking the car is a possible outcome. (a) shows a similar use. (13c) provides an example of an apprehensional/LEST-type reading occurring in a narrative context: here the Speaker identifies a possible unfortunate

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[10]In reconstructing this sentence context, a consultant unprompted introduced an explicit antecent: *gita burru det mutika, bambai yu breigim im* 'get off the car! Otherwise you might break it!' [GT 20170316]

future situation in which she has no food with which to take her medicine. Here, in uttering the *bambai* clause, she asserts that such an eventuality is a possible outcome should she fail to go to the shop to purchase food. This reading is robustly attested in contexts where the antecendent is modified by some irrealis operator. The example from (4) is repeated below as (14): here *bambai* makes a modalised claim: if κ is a set of worlds in which I drink coffee at t' (and $\overline{\kappa}$ is its complement), then an utterance of (14) asserts that $\exists w \in \overline{\kappa}$: I sleep by t^+ in w.

(14)   a.   **Context:** It's noon and I have six hours of work after this phonecall. I tell my colleague:

*ai=rra dringgi kofi   **bambai** mi gurrumuk la   desk iya   gin*
1s=IRR drink   coffee *bambai* 1s fall.asleep LOC desk here EMPH

'I'd better have a coffee otherwise I might pass out right here on the desk' [GT 28052016]

   b.   **Instantiation schema for *apprehensional* reading in (a)**

$$t* \qquad\qquad t' \qquad\qquad t^+$$
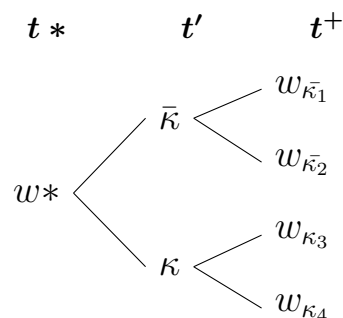
In the reference world $w*$ at speech time $t*$, the Speaker establishes a partition over possible futures: they are separated into those in which, at time t', he drinks coffee $\{w' \mid w' \in \kappa\}$ and those in which he doesn't $\{w' \mid w' \in \overline{\kappa}\}$. In those worlds where he fails to drink coffee, there exist possible futures $(w_{\neg\kappa_1} \vee w_{\neg\kappa_2})$ in which he is asleep by some future time t^+.

Of particular note is this behavior where *bambai* appears to be anaphoric on **the negation** of a proposition that is calculated on the basis of a linguistically represented antecedent (that is, the preceding clause.) This appears to be categorical. This is demonstrated in (15) below, where a SUBSEQ reading of *bambai* is infelicitous. Only the apprehensional reading is available, where the prejacent *mi gurrumuk* 'I fall asleep' is interpreted as a possible outcome of **not** watching a film.

(15) **Context:** The Speaker is experiencing a bout of insomnia

    $^{\#}$*airra   wotji muvi bambai mi gurrumuk*
    1s=IRR watch film *bambai* 1s fall.asleep

    $^{\#}$**Intended:** I'll watch a film, then I'll (be able to) fall asleep [AJ 23022017]
    Available reading: I'll watch a film, otherwise I may fall asleep

The relationship between the antecedent clause and the context on which *bambai* is anaphoric is further discussed below in §§1.5.4.

Counterfactual 'nonimplicationals'   *bambai* similarly receives an apprehensional reading in subjunctive/counterfactual contexts: those where an alternative historical reality is considered (see, e.g., von Fintel 2012). (16) below provides an example of apprehensional *bambai* in one such context.

In (16), the Speaker identifies that in some alternative world (w') in which he behaved differently to the way in which he did in the evaluation world ($w' \not\simeq w*$)[11] — namely one in which the event described in the antecedent failed to obtain — there is a (significant) possibility that he would have slept at work. Consequently, and comparably to the example (15) above, *bambai* modalises its prejacent: it asserts that $\exists w'[w' \notin \kappa \wedge$ I sleep by t^+ in $w']$.

(16) a. *ai=bin dringgi kofi   nairram **bambai** ai bina   silip~silip-bat*
       1s=PST drink   coffee night   **bambai** 1s PST:IRR sleep~DUR-IPFV

       la   wek
       LOC work

     'I had coffee last night **otherwise** I might have slept at work'

                                                            [AJ 23022017]

  b. **Instantiation schema for apprehensional reading in (a)**

$$t_0 \qquad\qquad t' \qquad\qquad t^+$$
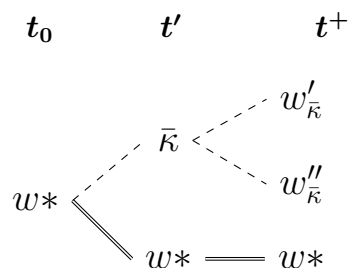
Here, the Speaker considers a set of worlds that historically diverge from the evaluation world $w*$, namely the set of worlds where, unlike the eval-

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[11]A definition and further discussion the $\simeq$-relation ("historical alternative to") is given in (36).

uation world, the Speaker did not drink coffee at t' — $\{w' \mid w' \in \overline{\kappa}\}$. The Speaker asserts that there are some possible near futures to $\langle t', w_{\overline{\kappa}} \rangle$ in which he falls asleep by some time t^+, posterior to t'.

The Kriol apprehensional data described so far is intuitively unifiable and bears some amount of syntactic similarity to familiar conditional constructions *(i.e.*, that of an "infixed" two-place relation between two propositions.) For all examples we have seen so far, *bambai* introduces an predicate that describes an eventuality q which construes as undesirable for the speaker. It appears to that this eventuality is a *possible, foreseeable* future outcome of some other contextually provided proposition, which is often interpreted as the negation of a previous clause.

The 'indicative' and 'counterfactual' uses presented here can be unified by appealing to the notion of "settledness" presuppositions (e.g. Condoravdi 2002:82, *passim*): in those contexts where the prejacent is understood to be being asserted of a future time ($t_e \succ t*$) or a different world ($w' \not\simeq w*$), those where the Speaker could not possibly have access to a determinate set of facts, the Speaker $\boldsymbol{R}$-implicates (see Horn 1984) that they are making a prediction; the entire proposition construes as modalised. The reference world and time are provided by some tensed or modalised antecedent proposition, linguistically overt or otherwise. Of additional interest is the fact that, in the examples we have seen so far, the instantiation of the predicate that is modified by *bambai* appears to be a potential consequence of the non-instantiation of the antecedent to *bambai.* This observation is further spelled out in §1.5.2 below. We turn first to additional, "apprehensive" uses of *bambai*.

1.3.2.2 *bambai* as a modal adverbial

In contrast to these 'nonimplicational' or precautioning (*i.e.* LEST/'in case'-type) readings presented immediately above, *bambai* also appears to function as an epistemic adverbial with apprehensional use conditions: Lichtenberk's *"apprehensional-epistemic"* function and Vuillermet's *"apprehensive"*.[12] As we will see, this function of *bambai* arises in monoclausal contexts in addition to within conditional constructions. Note that this distributional fact can be taken to demonstrate that (unlike apprehensive markers in other languages) , syntactically speaking, *bambai* is **not** a subordinator: it doesn't introduce a dependent clause (e.g., Blühdorn 2008, Cristofaro 2005). Consider first the elaboration of (14) in (17) below. Here there is no explicit linguistic antecedent for *bambai*, whereas its prejacent encodes an

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[12]Note however that *bambai*$_1$ in (13a) also represents a use like this.

unfortunate future possibility.

(17) **Context:** Grant's heading to bed. Josh offers him a cuppa.

    A. *yu wandi kofi   muliri?*
        2s want   coffee KINSHIP.TERM

        'Did you want a coffee, *muliri*?'

    B. *najing, im rait muliri!*   ***bambai*** *ai kaan   silip bobala!*
        no   3s okay KINSHIP.TERM ***bambai*** 1s NEG:IRR sleep poor

          Ai mait weik   ol nait... garram red ai...
          1s might awake all night POSS   red eye

        'No it's fine *muliri*! *bambai* I might not sleep, I could be awake all night... be red-eyed (in the morning)...   [GT 16032017 17']

Similarly, in the exchange in (18) below, **B** deploys *bambai* to thee same effect in two single-clause utterances; each encoding an unfortunate future possibility.

(18) **Context:** Two relatives (A, B) are planning a hunting trip; a younger relative wants to join.

    A. *im rait, yu digi im then gajin.*
        3s okay 2s take 3s then KINSHIP

        'It's fine, bring him along poison-cousin'

    B. ***Bambai*** *yunmi gaan   faindi bip*
        bambai 1d.INCL NEG.IRR find   meat

        'But then we may not be able to find meat'

    A. *Yunmi   garra digi im*
        1d.INCL IRR   take 3s

        'We'll take him'

    B. ***bambai*** *im gaan   gibi la   yunmi.*
        bambai 3s NEG.IRR give LOC 1s.INCL

        'But then [the country] may not provide for us.'   [DW 20170712]

Additionally, in (19) below, Lichtenberk's (1995) "epistemic downtoning" function is clearly shown, *bambai* behaving as a species of possibility modal (*bambai q =*

$\blacklozenge q$). In this case, where the speaker doesn't *know* who's at the door, she makes a claim about how—in view of what she *does* know and might expect to be happening—the (present-tensed) situation described in the prejacent is a distinct possibility (and a distinctly undesirable one at that.)

(19) **Context:** Speaker is at home to avoid running into her boss. There's a knock at the door; she says to her sister:

Gardi! ***Bambai*** *im main bos   iya   la   det dowa rait na*
Agh   ***bambai*** 3s my   boss here LOC the door right now

'Oh no! That could be my boss at the door.'   [AJ 02052020]

In these apprehensional-epistemic occurrences, *bambai* has entered into the functional domain of other epistemic adverbials (notably *marri~maitbi* 'perhaps, maybe'.) Note that the availability of epistemic readings to linguistic expressions with future-orientation is well-attested in English cross-linguistically (e.g., *the bell just rang, it'll be Hanna/it's gonna be Hanna*, see also Condoravdi 2003, Werner 2006, Winans 2016.) Giannakidou and Mari (2018), for example, defend an analysis of that unifies future tense morphology with epistemic modality, appealing to data like the English epistemic future and its corollaries in Greek and Italian to argue that future markers in these languages always encode epistemic necessity. We will have further observations to make on these facts below.

Apprehensive counterfactual   The relation between the counterfactual prejacent to *bambai* and the content of the preceding clause appears to diverge from the patterns of data described in the previous subsection. As with the epistemic adverb uses above, in (20), *bambai* appears to introduce a modalised assertion and expresses negative speaker affect. Its interpretation doesn't appear to be restricted by the preceding question. Similarly to the usage in (19), *bambai* appears to behave here as an apprehensive modal, encoding an unfortunate possible eventuality.

(20)   *Wotfo yu nomo bin jinggabat basdam,* **bambai** *ola men bina*
       why   2s NEG PST think   before, **APPR** all man PST:IRR

       silipbat   garram yu waif? Yu bina   meigim loda trabul blanga
       sleep.IPFV with   2s wife 2s PST:IRR make   much trouble DAT

       melabat
       1p.EXCL

       'Why didn't you think [to say something] earlier; the men might have slept
       with your wife. You could have caused many problems for us!'

       [KB Jen 26.10]

***if*-Conditionals**   In contrast to the 'nonimplicational' (*i.e.* precautioning/LEST-type) readings presented immediately above, Kriol also forms conditional sentences using an English-like *if...(then)* construction. The two sentences in (21) give examples of an indicative and subjunctive *if*-conditional, where *bambai* modiifies the consequent clause (the "apodosis.")

(21) a. *if ai dringgi kofi*   **bambai** *mi* [#]*(nomo) gurrumuk*
          if 1s drink   coffee **bambai** 1s [#](NEG)   sleep

          'If I drink coffee then I might not sleep'   [AJ 23022017]

      b. *if ai꞊ni꞊min-a   dringgi det kofi   **bambai** ai([#]꞊ni)꞊bin-a*
          if 1s꞊NEG꞊PST-IRR drink   the coffee **bambai** 1s([#]꞊NEG)꞊PST-IRR

          gurrumuk jeya
          be.asleep   there

          Intended:'If I hadn't drunk coffee then I may well have fallen asleep there'
          (This reading is available if ꞊*ni(m)o* 'NEG' is omitted)   [GT 16032017]

The contrast between (21a,b) and their *if*-less counterparts in (14a;16a) respectively, evinces some restriction that *if*-clauses apparently force on the interpretation of *bambai*. Whereas the *if*-less sentences presented previously assert that a particular eventuality may obtain/have obtained just in case the antecedent predicate **fails**/failed to instantiate (*i.e.*, the LEST readings), the sentences in (21) diverge sharply from this interpretation. That is, each of the *if p, bambai q* sentences in (21) asserts a straightforward conditional $p \rightarrow \blacklozenge q$: should the antecedent proposition hold (have held), then q may (have) obtain(ed).

In this respect, similarly to the monoclausal uses presented in this subsection, *bambai* appears to be behaving truth conditionally as a modal expression encoding possibility. The MODAL DOMAIN is explicitly restricted by the (syntactically subordinate) *if*-clause, whose sole function can be taken to involve the restriction of a domain of quantification (cf. Kratzer 1979, Lewis 1975, von Fintel 1994).

Apprehensionality: competition with *marri*   As with the other uses discussed in this subsection, then, *bambai* functions as a possibility adverbial whose domain can be restricted by the presence of an *if*-clause. As a possibility adverbial, *bambai* has entered into the semantic domain of other Kriol lexical items including *marri* 'maybe'. Crucially though, the examples in (22-23) below serve to evince the perseverance of apprehensional expressive content in these syntactic frames. In (22a), consultants reported that apprehensive *bambai* gives rise to an implication that the speaker may not go on holiday, where the minimally different (b) fails to give rise to this implication.[13]

(22)   **Context:** I'm planning a trip out to country but Sumoki has taken ill...

    a.   *if ai gu la   holiday,* ***bambai*** *main dog dai*
       if 1s go LOC holiday ***bambai*** 1s   dog die

       'If I go on holiday, my dog may die'   ⇝   I'm likely to cancel my holiday

    b.   *if ai gu la   holiday,* ***marri***   *main dog (garra) dai*
       if 1s go LOC holiday **perhaps** 1s   dog (IRR)   die

       'If I go on holiday, my dog may die'   ⇝̸   I'm likely to cancel my holiday

                                           [AJ 04082017]

Here, the contrast between (a) and (b) is attributable to the expressive content of *bambai* (e.g. Kaplan 1999). That *bambai* licenses an implicature that the Speaker is considering cancelling her holiday to tend to her sick pet, an inference that isn't invited by neutral epistemic counterpart *marri* provides strong evidence of the semanticisation of *bambai*'s expressive content (similar to 'sincerity'- or 'use-conditions' for a given lexical item.) The extent of this process is further evinced in (23) below, where the selection of *marri* instead of *bambai* gives rise to a conventional implicature that the Speaker's utterance of (23) ought not be interpreted as the expression of a desire to prevent her daughter's participation in the football game.

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[13]In this second example with *marri*, the consultant suggests that (in contrast to (a)): *tharran jeya im min yu garra gu la holiday* 'that one means you'll go on your holiday.'

(23) **Context:** I am cognizant of the possibility that my daughter injures herself playing rugby.

[#]**Context:** I am uncomfortable with the likelihood of my daughter injuring herself playing rugby.

if im pleiplei fudi, marri   main doda   breigi im leig
if 3s play   footy *perhaps* my   daughter break her leg

'If she plays footy my daughter may break her leg' $\not\leadsto$ [so she shouldn't play]

[AJ 04082017]

Based on this evidence, we may conclude that the ostensible encroachment of *bambai* into the domain of epistemic adverbials has given rise to a privative dyad (*i.e.* 'Horn scale', see Horn 1984: 33-8) of the type $\langle marri, bambai \rangle$ — that is, an utterance of *marri p* conventionally implicates that the Speaker was not in a position to utter *bambai p*. That is, the meaning of the 'weaker' expression comes (via hearer-based/$\mathcal{Q}$-implicature) to represent the relative complement of the stronger in a given semantic domain: here that the neutral epistemic adverbial comes to conventionally implicate *non-apprehensional* readings/modalities:

$$[\![marri]\!] \approx \Diamond \setminus [\![bambai]\!]$$

1.3.3   Summary

In the preceding sections, we have seen clear evidence that *bambai* has a number of distinct readings. Nevertheless, we can draw a series of descriptive generalisations about the linguistic contexts in which these readings emerge. These are summarised in (24).

(24) **Semantic conditions licensing readings of *bambai*.**

a. *bambai* is interpreted as a **subsequential temporal frame** when the state-of-affairs being spoken about is **settled**/the same as the actual world ($w' \simeq w*$) (*i.e.*, in **factual**, **nonfuture** contexts).

b. In other (**nonfactual**) contexts (that is, in predications that fail to satisfy SETTLEDNESS) apprehensional readings "emerge".

c. In apprehensional contexts, LEST-type uses occur in a p *bambai* q construction. Here, $\blacklozenge q$ is interpreted relative to $\neg p$

As discussed in the preceding sections, **nonfactual** utterances are those in which (a) a predicate is understood to obtain in the future of evaluation time $t*$/**now** or (b) the predicate is understood as describing some w' which is not a historic alternative to the evaluation world $w*$. It is in exactly these contexts that *bambai* give rise to a modalised reading. In Kriol, a number of linguistic operators (which we have seen in the data presented above) appear to "trigger" predication into an unsettled timeline. A selection of these is summarised in Table 1.2 below.

Table 1.2. Semantic operators[14] that give rise to modalised readings of *bambai*

GLOSS	Form	*Example*
IRREALIS	*garra*	*ai**rra** dringgi kofi **bambai** mi gurrumuk* 'I'll have a coffee or I might fall asleep'
NEGATIVE IRREALIS	*kaan*	*ai **kaan** dringgi kofi **bambai** mi nomo silip* 'I won't have a coffee or I mightn't sleep'
C'FACTUAL	*bina* PST:IRR	*aibin dringgi kofi nairram **bambai** ai**bina** gurrumuk* 'I had a coffee last night or I might've passed out'
IMPERATIVE	$\varnothing$	*yumo jidan wanpleis **bambai** mela nogud*[15] 'Youse sit still or we might get cross'
PROHIBITIVE	$\varnothing$ [*nomo*] IMPR	***nomo** krosim det riba, **bambai** yu flodawei* 'Don't cross the river or you could be swept away!'
GENERIC	$\varnothing$	*im gud ba stap wen yu confyus, **bambai** yu ardim yu hed* 'It's best to stop when you're confused, or you could get a headache'
NEGATIVE GENERIC	$\varnothing$ [*nomo*] GEN	*ai **nomo** dringgi kofi enimo, **bambai** mi fil nogud* 'I don't drink coffee anymore or I feel unwell'
CONDITIONAL	*if*	***if** ai dringgi kofi, **bambai** ai kaan silip* 'If I have coffee, then I mightn't sleep'

1.4 Apprehensional readings emerge in subsequential TFAs

Here I consider a number of linguistic factors that appear to have contributed to the emergence of apprehensional readings of TFAs. As shown in §1.2.3, this meaning change pathway (and apparent polysemy between temporal and apprehensional

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[8]This is not intended to suggest that these operators are in any way semantic primitives, Table 1.2 is to be read as a non-exhaustive list of linguistic devices that appear to associate with nonfactual mood.

[9]This example due to Dickson (2015:168 [KM 20130508]).

uses) has been observed by a handful of other authors (Angelo and Schultze-Berndt 2016, 2018, Boogaart 2020) on the basis of data including German *nachher* and Dutch *straks* in addition to Kriol *bambai* (see also Kuteva et al. 2019:427-8). Parallels between *bambai* and *straks*, for example, are shown in the contrast between a subsequential and apprehensional reading in (25) below.

(25)   The *straksconstructie* in Dutch (see also Boogaart 2020)

    a.   **context.** It's 3.30, the shop closes at 4. I tell my friend:

       de winkel is straks gesloten
       the shop is *straks* closed

       'The shop will be closed soon.'

    b.   **context.** It's 3.50, the shop closes at either 4 or midnight, I'm unsure which. I say to my friend:

       straks is de winkel gesloten!
       straks is the shop closed

       'The shop may be closed!'   [Mireille L'Amie, *p.c.* 20200130]

bambai and conditional modality   Numerous authors (*e.g.*, Blühdorn 2008, Culicover and Jackendoff 1997, Harder 1995, Klinedinst and Rothschild 2012, Schmerling 1975, Stukker and Sanders 2012 a.o.) have investigated the semantic dependencies that often obtain between clauses that are *syntactically coordinate.* These include the "conditional readings" of *and* and *or*, in addition to asyndetic constructions of the type: *John comes, I leave* (where my departure is interpreted as a consequence of his arrival.) In these cases, although the second clause is interpreted as being "semantically subordinate" to the first, this relation is not made explicit in the syntax (see Ch. 2 and also Roberts 1989, 1990a, 2020 for discussion and an implementation of "modal subordination".)

Relatedly, consider the parallels between interrogative and conditional clauses (operationalised in an information structure framework in § 2.3.3 above.) The functional motivation for these appears to be that conditional apodoses (consequent clauses) can be understood as answering a "question" posed by the antecedent/protasis. This is clearly demonstrated for Danish by Harder (1995:101-2), replicated in (26) below.

(26) a. **A two-participant discourse**

  A. *Kommer du i aften?*

   Are you coming tonight?

  B. *ja*

   Yes

  A. *Så laver jeg en lækker middag*

   Then I'll cook a nice dinner.

 b. *Kommer du i aften, (så) laver jeg en lækker middag*

  'If you're coming tonight, (then) I'll cook a nice dinner.'

Harder (1995:101) suggests that "the conditional can be seen as a way of *telescoping a discourse sequence into one utterance* so that **B** has to respond not only on the basis of the present situation, but also on the basis of a possible future."

Consider the discourses in (27-29) below.

(27) **Context:** A child is playing on a car and is told to stop.

 A. *gita la jeya!*

  get off LOC there!

 B. *ba wani?*

  why?

 A. *bambai yu breigim motika*

  bambai 2s break car

  'Get off of there [...why?...] In a minute, you'll break the car!'[GT 16032017]

(28) **Context:** It's the wet season and the Wilton River crossing has flooded.

 A. *nomo krosim det riba!*

  NEG cross.TR the river

 B. *ba wani?*

  why?

 A. *bambai yu flodawei!*

  bambai 2s float away

  'Don't cross the river [...why not?...] In a minute, you'll be swept away!'[GT 16032017]

(29)   **Context:** A snake slithered past *A*'s leg.

   A.   *det sineik bin bratinim   mi!*
      the snake PST frighten.TR me

   B.   *ba wani?*
      why?

   A.   *bambai imina   baitim mi!*
      bambai 3s.PST:IRR bite.TR 1s

      'The snake scared me [...why?...] It might've been about to bite me!'[GT 01052017]

In all of the short discourses above, the translation provided elucidates the capacity of the temporal properties of *bambai qua* sequential TFA to implicate additional nontemporal properties of the relation between the clauses it links. In each of the examples, **A**'s response identifies an eventuality that might obtain in the near future (of the speech-time for (27-28) and of the slithering/frightening-time for (29).

Via pragmatic strengthening *(viz.* an inference of the form *post hoc ergo propter hoc)*, *bambai* can be understood to assert that there exists some type of logical (*e.g.* etiological) relation between the predicate contained in the first proposition and the eventuality described in *bambai*'s prejacent: the second clause. In (27), for example, the child's failure to comply with **A**'s (precautioning) instruction could contribute causally to the car's breaking. Inferencing-based theories of meaning change will hold that, while there is no lexical item that encodes causality, in many contexts, reasoning about informativity and relevance "invite" the *propter hoc* inference (Geis and Zwicky 1971:see).

This type of implicature is well-documented in cross-linguistic studies of meaning change (see also Kuteva et al. 2019:403); the extension of English *since* (*siþþan*) from encoding subsequentiality (they report ostensibly similar shifts in numerous other language) to causality (particularly when talking about past events) is discussed by Traugott and Heine (1991):

(30)   a.   I have done quite a bit of writing **since** we last met   (temporal)

   b.   **Since** Susan left him, John has been very miserable   (temporal, causal)

   c.   **Since** you are not coming with me, I will have to go alone   (causal)

   d.   **Since** you are so angry, there is no point in talking with you   (causal)

Traugott & König go on to say:

> With *since*, when both clauses refer to events, especially events in the past, the
> reading is typically temporal, as in [30a] When one clause refers to a non- past
> event or to a state, the reading is typically causal, as in [30c] and [30d], but the
> causal reading is not required, as [30b] indicates. The contrastive readings
> in [30b] signal polysemy, i.e. conventionalized meanings, not just conversa-
> tional.   (1991:195)

It appears, then, that precautioning type uses of *bambai* arise from a related inference, namely the conventionalisation of an inference that emerges on the basis of reasoning about relevance: "if **A** is alerting me that a possible event e_1 may be followed by another possible event e_2, it's likely that they're drawing a causal connection between these two possible events" (viz. e_1 causes e_2).

***bambai* and apprehensional expressive content**   Crucially, apprehensionals additionally conventionally implicate information about the Speaker's attitude vis-à-vis their prejacent. Angelo and Schultze-Berndt (2016) propose that:

> The conventionalisation of the implicature of undesirability may come about
> through frequent use of a clausal sequence in which the first clause has the
> illocutionary force of a directive and the second is introduced by the temporal
> marker.   (285)

Synchronically, the apprehensional reading frequently occurs embedded under a predicate of fearing or with a directive/prohibitive antecedent all of the examples (27-29) also show examples of this. Relatedly, Boogaart (2020:192*ff*) suggests (of Dutch) that it is the "sense of immediacy" of this class of adverbials that associates with notions of "urgency" and that this is the source of the "expressive nature" of subsequential TFAs. Consequently, we might hypothesise that the frequent association of sequential TFAs with these discourse contexts (situations of urgent warning) has resulted in the **conventionalisation** of apprehensional use-conditions for *bambai* q. The selection of a subsequential TFA instead of a different epistemic adverbial in some unsettled context invites the inference that the Speaker is negatively disposed to the event described in the prejacent.

Marshalling cross-linguistic evidence of this path of change,[16] for German and Dutch respectively, an utterance *nicht jetzt, nachher!/niet nu, straks!* 'not now, later' is reported to involve a higher degree of intentionality and immediacy than

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[16]See also Angelo and Schultze-Berndt 2018 for these observations and insightful comments about the properties of these adverbials in Kriol and German. Related observations are made for Dutch by Boogaart (2020).

the less specialised *nicht jetzt, später!/niet nu, later!* 'not now, later.' What's more, tracking the facts for *bambai* presented above, these TFAs appear to have encroached into the semantic domain of epistemic adverbials, where they are reported to encode negative speaker affect with respect to their prejacents (relative to the other members of these semantic domains.)[17,18]

Additionally, *nachher* appears to have acquired a similar semantics to *bambai*,[19] shown by its felicity in the discourse in (31) below, where, tracking ⟨*marri, bambai*⟩, *nachher* appears to have encroached into the semantic domain of *vielleicht* 'perhaps.' In these contexts, *nachher* asserts negative speaker attitude with respect to its prejacent in terms relative to neutral *vielleicht* (Hanna Weckler, p.c.).

(31) **A two-participant discourse in German**

    A   *ich hoffe, dass es heute nicht regnet*

            I   hope COMP it today NEG   rain

    B   *warum?*

            why?

    A$_2$ *nachher wird die Party noch abgesagt!*

            nachher INCH the party *noch* cancelled

            'I hope it doesn't rain today [...why?...] Then the party might be cancelled!'

    B$_2$ *nein, das ist nicht möglich*

            no,   that is not   possible

    B$'_2$ #*nein, das wäre gut!*

            no,   that would.be good

    B$''_2$ *ja, das ist möglich aber das wäre nicht so schlimm!*

            yes, that is possible but that would.be NEG so bad!

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[17]Thanks to Hanna Weckler and Mireille L'Amie for discussion of German and Dutch intuitions respectively.

[18]Compare also the colloquial English expression *(and) next thing you know, q* As with the other subsequential TFAs we have seen, it appears that this adverbial tends reads less felicitously (or indeed invites an ironic reading) when *q* is not construed as an undesirable proposition.)

(i)   *The fields dried up, **and the next thing you know** our fleet dropped from 68 drivers to six in the matter of a few months.*   *[Google result]*

(ii) *The Supreme Court ruled that disabled golfer Casey Martin has a legal right to ride in a golf cart between shots at PGA Tour events. Man, **the next thing you know,** they're going to have some guy carry his clubs around for him.*   [Jon Stewart]

[19]Although see Angelo and Schultze-Berndt (2018:30) for a discussion of distributional differences between these two items.

Similarly to the Kriol data, German *nachher*, a TFA encoding susbsequentiality, has developed the characteristics of an apprehensional epistemic, a likely consequence of frequent embedding in the discourse contexts discussed above. Following the literature on expressive content and use-conditional semantics (e.g Gutzmann 2015, Kaplan 1999, Potts 2007), it is fruitful to model the 'negative speaker attitude' component of the meaning of apprehensionals as a conventional implicature, inhabiting a second semantic "dimension"—connected to but distinct from the truth conditions set out above. The infelicity of $(31\mathbf{B}_2)$'s utterance shows that negation cannot target this component of Speaker meaning, an argument for its treatment as a non-truth-conditional, not-at-issue component of the semantics: the domain of CONVENTIONAL IMPLICATURE. The proposals of Gutzmann (2015), McCready (2010), Potts (2007) (variants of a "logic of conventional implicature" $\mathcal{L}_{CI}$) develop a formalism that conceives of the semantic information contained in a given linguistic expression as a pair of truth- and use-conditional content. Borrowing rhe informal "fraction notation" deployed by these authors, we can tease apart the asserted and implicated components of the *bambai* clause in (29) – this is given in (32).

(32)
$$\frac{S \text{ is worried about/negatively disposed to snake bites}}{S \text{ might have been about to be bitten by a snake}}$$

If this mode of thinking about the speaker attitude implications of *bambai* q is on the right track, then, in addition to signalling possibility, *bambai* can be thought of as a context. In uttering *bambai* q at t in w, the Speaker has created a context just like $\langle t, w \rangle$, but one in which 'it registers that [they regard q] negatively somehow' (Potts 2007:175). I propose a formal analysis of both of these components of *bambai*'s semantics (*sc.* the asserted and the conventionally implicated content) in the following section.

1.5 A semantics for *bambai*

This section seeks to provide a semantics for Kriol *bambai* that unifies the available SUBSEQUENTIAL and APPREHENENSIONAL readings discussed above and explains how a given reading is privileged in particular linguistic contexts. In order to do this, we assume a Kratzerian treatment of modal operators (1977, 1981 *et seq.*)

1.5.1 Subsequentiality

§1.3.1 showed how Kriol has retained the temporal frame uses of *bambai* derived from 'by-and-by.' For Dowty (1979, 1982), time adverbials are taken to denote sets of sets of temporal intervals. A frame adverbial[20] then, takes a predicate and says that its instantiation is contained in a given temporal interval. Following assumptions made by Kamp (1971:238ff) and Johnson (1977:115), Dowty (1979:29ff) sees fit to appeal to a notion of truth which is relativised to an index containing two intervals of time. These roughly correspond to the notions of *reference time* and *speech time* familiar from Reichenbach (1947). I will use $t*$ and t_r to refer to each of these.

As we saw, the function of (what I have referred to as) the SUBSEQUENTIALITY class of frame adverbials is to effect the constrained forward-displacement of the reference time of their prejacents with respect to some contextually-provided reference time. (33) represents a proposal to capture this relation.

(33) **SUBSEQUENTIAL INSTANTIATION** (intensionalised)

$\text{SUBSEQ}(P, t_r, w) \underset{\text{def}}{=} \exists t' : t_r \prec t' \land P(t')(w) \land \mu(t_r, t') \leq s_c$

A subsequentiality relation SUBSEQ holds between a predicate P, reference time t_r and reference world w iff the P holds in w at some time t' that follows t_r.

Additionally, it constrains the temporal distance $\mu(t_r, t')$ between reference and event time to some value below a contextually-provided standard of 'soon-ness' s_c.

maybe the t' variable should be not existentially bound?

The relation between a contextually-provided standard and measure function $\mu(t_1, t_2)$ analysis[21] builds in a truth-condition that captures variable intuitions about the falsity of a statement such as *Eve fell pregnant then shortly afterwards gave birth to a son* in some situation where the birth of Cain succeeds the pregnancy described in the antecedent clause by some contextually inappropriate length of time (*e.g.* ninety years.) An additional advantage is that, in appealing to a pragmatically retrieved standard, we allow for faultless disagreement between interlocutors, in case speaker and addressee retrieve divergent standards of soonness from the discourse context (as in (34) below).

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[20]The term "temporal frame adverbial" due to Bennett and Partee 2004, and equivalent to "locating adverbial" for Kamp and Reyle 1993:613)

[21]Given that $\mathcal{T}$ is isomorphic with $\mathbb{R}$, formally $\boldsymbol{\mu} : \wp(\mathcal{T}) \to \mathbb{R}$ represents a Lebesgue measure function that maps any interval $[t_1, t_2]$ to its length $t_2 - t_1$.

(34) **Fry**.   When will that be?

     Glurmo.   Soon enough.

     Fry.   That's not soon enough.

<div align="right">('Fry and the Slurm Factory', Futurama)</div>

In (34), the source of the disagreement between Glurmo and Fry appears to be the contextual standard (s_c) that each of them retrieves.

In its capacity as a TFA then, *bambai* can be thought of as realising a subsequential instantiation relation, as shown in (35) below.

(35) **Lexical entry for *bambai* (TFA)**
$$\llbracket bambai \rrbracket^c \underset{\mathrm{def}}{=} \lambda P.\textsc{subseq}(P, t_r, w)$$
bambai asserts that the property described by its prejacent (P) stands in a SUBSEQ relation with a time and world provided by the discourse context.

1.5.2 'Settledness' & intensionalisation

A primary motivation for the current work is to better understand the linguistic reflex that underpins the availability of apprehensional/apprehensive-modality readings of *bambai*. The TFA treatment formalised in the subsection above fails to capture this readings, although, as I will show, provides an essential condition for understanding *bambai*'s synchronic semantics and diachronic trajectory.

In §1.3.2 above, the concept of **settledness** was introduced, as deployed by Condoravdi (2002) and otherwise well established in the literature. Thomason traces the notion of historical necessity to Aristotle and Jonathan Edwards (1984:138) (see also Kamp 1979). The notion is deployed to similar effect in Giannakidou and Mari (2018) in their modal account of the future tense. The primary intuition is that some property (be it of times or eventualities) P is settled just in case it is a fact in the evaluation world that the truth of P resolves at a given time.

Settledness/historical necessity is normally expressed in terms of **historical alternatives**. This refers to the notion of equivalence classes ($\simeq_t \subseteq \mathcal{W} \times \mathcal{W}$ of possible worlds: those worlds which have identical 'histories' up to and including a reference time t. The properties of the *historical alternative* relation are given in (36) and, on the basis of this, a formal definition of settledness is given as (37).

(36) **Historical alternatives** $\simeq \subset \mathcal{T} \times \mathcal{W} \times \mathcal{W}$

a. $\forall t[\simeq_t$ is an equivalence relation$]$

All world-pairs in $\simeq_t$ (at an arbitrary time) have identical pasts up to that time.

Their futures may diverge.

The relation is symmetric, transitive and reflexive (*i.e.*, an equivalence relation).

b. **monotonicity.** $\forall w, w', t, t'\big[(w \simeq_t w' \wedge t' \prec t) \rightarrow w \simeq_{t'} w'\big]$

Two worlds that are historical alternatives at t are historical alternatives at all preceding times t'.

That is, they can only differ with respect to their futures.

(Thomason 1984:146)

(37) **Settledness for P.**

$\forall w' : w' \in cg, \forall w'' : w' \simeq_{t_0} w'' :$

$AT\big([t_0, \_), w', P\big) \leftrightarrow AT\big([t_0, \_), w'', P\big)$ (Condoravdi 2002:82)

A property P (*e.g.* an eventuality) is settled in a reference world w' iff P holds at a reference time t_0 in all of w'''s historical alternatives w'' as calculated at t_0.[22]

Here, I defend a claim that the modalised meaning component of apprehensional readings of *bambai* arise in part (*i.e.*, Lichtenberk's *epistemic downtoning* — the 'epistemic' component of APPR markers) due to the conventionalisation of an R-based implicature that the Speaker is making a modalised claim when they make any predication that is epistemically unsettled. Given Horn's $\mathcal{R}$-principle "SAY NO MORE THAN YOU MUST" (1984:13), an utterance of *bambai P* licenses the (speaker-based) implicature that the Speaker is basing a predication (particularly an pre-monitory one, cf. § 1.4) about some unsettled eventuality on its possible truth in view of (perceived compatibility with) a the set of facts that they know of the world. The locus of this implicature is that the Speaker can rely on her hearer's knowledge of the world to reason that an unsettled subsequentiality predication has the valence of a prediction.

Appealing to a Kratzerian framework, we can modalise our entry for *bambai* in order to capture the "epistemic downtoning" effect associated with apprehen-

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[22]The AT relation holds between a time, world and an eventive property iff $\exists e[P(w)(e)\&\tau(e,w) \subseteq t]$ — *i.e.* if the event's runtime is a subinterval of t in w (Condoravdi 2002:70). This can accomodate stative and temporal properties with minor adjustments (see *ibid.*). For the sake of perpescuity, I abstract away from (davidsonian) event variables in this section.

sionals. A principal component (and advantage) of Kratzer's treatment of modals (1977, 1981, 2012) lies in the claim that the interpretation of modalised propositions relies on 'conversational backgrounds': that they quantify over sets of worlds retrieved by an 'accessibility relation' which is *contextually* made available. The entry in (38) proposes a unified, modalised semantics for *bambai*.

(38) $[\![bambai]\!]^c = \lambda m \lambda o \lambda P. \exists w' \big[w' \in \mathbf{best}_{o(w)}(m, t*, w*) \wedge \textsc{subseq}(P, t_r, w') \big]$

   bambai asserts that there exists some world w' in a set of worlds that are optimal with respect to a contextually-determined modal base m and ordering source o in the reference context $c = \langle t*, t_r, w* \rangle$. It additionally asserts that the SUBSEQUENTIAL INSTANTIATION relation (as defined in (33) above) holds between that world w', the prejacent P, and a reference time provided by the utterance context t_r.

With the entry in (38), we can formalise the intuition that, when (and only when) *bambai* p is understood as making a nonfactual predication, it constitutes a prediction of a possible — but unverified or (presently) unverifiable — state-of-affairs. Spelled out below, the availability of multiple readings to *bambai*-sentences is modelled as compatibility with a range of conversational backgrounds (*cf.* Kratzer 2012:55*ff*).

1.5.2.1   Deriving the subsequential reading

The so-called subsequential TFA use of *bambai* follows from general norms of assertion: given that the speaker is predicating about a settled property, her context set is understood as veridical and the assertion is taken to be factual (*cf.* the (super)maxim of quality: "try to make your contribution one that is true" (Grice 1991:27)).

   In these cases the intensional contribution of *bambai* can be captured by claiming that it quantifies (trivially) over a *metaphysical* modal base and an empty ordering source (see Kratzer 2012).)[23]

(39)   **A veridical conversational background: *bambai*'s subsequential reading**

   a. $\bigcap m_{\text{meta}}(w)(t) = \{w' \mid w' \simeq_t w\}$

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[23]In her treatment of Marathi present tense marking, Deo (2017b) makes similar appeal to veridical vs. nonveridical conversational backgrounds to capture ostensible polysemy associated with these (present-tense) forms.

A metaphysical modal base m_{meta} retrieves the set of propositions that are **consistent** with a world w at a given time t.

Consequently, the intersection of these propositions returns the set of **historical alternatives** to w at the given evaluation time t.

b. $o_{\text{empty}}(w) = \varnothing$

An empty ordering source o_{empty} contains no content (propositions) and hence induces no ordering over the modal base.

c. Because the ordering source is empty, the function $\textbf{\textit{best}}_{\varnothing}(m_{\text{meta}}, t, w)$ simply returns $\cap m(w)$: a set of worlds which are historical alternatives to w at t.
    _{meta}

Given that, by the definition in (36), historical alternatives have "identical pasts" to one another, in factual, past-tensed contexts, the metaphysical modal base over which *bambai* quantifies (trivially) are identical to the evaluation world. This is derived for (40) below (the sentence simplified from (3) above)

(40)   **Deriving the subsequential reading**

main	*dedi*	*bin*	*go*	*la*	*det*	*shop,*	*bambai*	*im=in*	*gugum*	*dina*
my	father	PST	go	LOC	the	shop	*bambai*	3S=PST	cook	dinner

'My dad went to the shop, **then** he made lunch'   [AJ 23022017]

a. **Taking *bin* 'PAST' to restrict t to before speech time $t*$**

$[\![bin]\!]^c = \text{PST} = \lambda t : t \prec t*.t$

bin is an partial identity function from times to times, defined only if a given (reference) time precedes speech time

b. **Meaning of the first clause**

$[\![main\ dedi\ go\ la\ det\ shop]\!](\text{PST}) = \lambda t \lambda w.\text{GO.SHOPPING}(t)(w)$

$$= \lambda w : t \prec t * .\text{GO.SHOPPING}(t)(w)$$

Defined only if $t' \prec t*$, the first clause asserts that the event of Dad's trip to the shop occurs at a contextually-retrieved time t'.

c. **Meaning of the second clause (*bambai*'s prejacent)**

$[\![im\ gugum\ dina]\!]^c(\text{PST}) =: t'' \prec t*.\text{MAKE.LUNCH}(t'')(w)$

d. **Meaning of *bambai* & substitution of meaning of (c) for λP**

$$\llbracket bambai \rrbracket^c = \lambda m \lambda o \lambda P. \exists w'\big[w' \in \mathbf{best}_{o(w)}(m, t, w) \wedge \text{SUBSEQINST}(P, t_r, w')\big]$$

$$\llbracket bambai\ imin\ gugum\ dina \rrbracket^c = \lambda m \lambda o : t'' \prec t*. \exists w'\big[w' \in \mathbf{best}_o(m, t_r, w*)$$
$$\wedge\ \text{SUBSEQINST}\Big(\big(\text{MAKE.LUNCH}(t'')(w) \big), t_r, w \Big)\big]$$

e. **substitution of conversational backgrounds m, o**

$$\llbracket bambai\ imin\ gugum\ dina \rrbracket^c =: t'' \prec t * . \exists w'\big[w' \in \mathbf{best}_\varnothing(m_{\text{meta}}, t_r, w*)$$
$$\wedge\ \text{SUBSEQINST}\Big(\big(\text{MAKE.LUNCH}(t'')(w) \big), t_r, w \Big)\big]$$

Given that MAKE.LUNCH is instantiated prior to speech time $t*$, the modal component of *bambai* involves quantifying over a veridical conversational background, *sc.* $\{w' \mid w' \simeq_{t*} w*\}$ (*per* general pragmatic principles/assertoric norms, *e.g.*, Grice's quality maxim.)
MAKE.LUNCH is in the SUBSEQ relation with t_r in w' in a historical alternative$_{t*}$ to $w*$.

f. **Spelling out the SUBSEQUENTIAL INSTANTIATION relation (cf. 33)**

$$\llbracket bambai\ imin\ gugum\ dina \rrbracket^c =: t'' \prec t_r. \exists w'\big[w' \in \mathbf{best}_\varnothing(m_{\text{meta}}, t*, w*)$$
$$\wedge\ \exists t''[t_r \prec t'' \wedge \text{MAKE.LUNCH}(t'')(w') \wedge \mu(t_r, t'') \leq s_c]\big]$$

The SUBSEQ component of *bambai*'s meaning further restricts the instantiation time (t'') of MAKE.LUNCH: it asserts • that a contextually-retrieved reference time t_r precedes t'' and • that the temporal distance between those two times is below some contextual standard ("soonness").

Note that, in (40f), it is exactly the same mechanism responsible for establishing the interclausal anaphoric relation between *im* and *main dedi* is responsible for the the equation of t_r with SHOPPING-time $(\lambda t.\text{GO SHOPPING}(t))$. In Kampian (discourse representation theoretic) terms (1993:Ch. 5) (also adopted in, *e.g.* Partee 1984) a new time referent has been introduced into the discourse by the first clause, which is accessible from the second, where it is equated with the reference time t_r.

really don't know what ⟩ put in an index and hat to lambda-bind and hat if any diff preds this akes. what's clear is at $t \neq t_r$

1.5.2.2 Deriving the apprehensional reading

In unsettled contexts, *bambai* selects for a nonfactual/nonveridical modal base (whether epistemic or metaphysical) and a stereotypical ordering source. These backgrounds are formalised in (41), adapting liberally from (Kratzer 2012:37-40 i.a.)

(41) **conversational background: *bambai*'s modal-apprehensional reading**

a. $\bigcap_{\text{meta}} m(w)(t) = \{w' \mid w' \simeq_t w\}$

(As above) a metaphysical modal base m_{meta} is a function that retrieves the set of historical alternatives to w at t.

b. $o_{\text{s'typ}}(w) = \{p \mid p \text{ will hold in the 'normal' course of events in } w\}$.

A sterotypical ordering source is a set of propositions that can be taken to hold in the "normal course of events" (Kratzer 1981:295).

c. $o_{s'typ}(w)$ then induces an ordering $\leqslant_{o_S(w)}$ on the modal base:

$\forall w', w'' \in \bigcap f_{\text{epist}}(w)(t) : w' \leqslant_{g(w)} w'' \leftrightarrow \{p : p \in g(w) \wedge'' \in p\} \subseteq \{p : p \in g(w) \wedge w' \in p\}$

For any worlds w' and w'', w' is 'at least as close to an ideal' than w'' with respect to $_{\text{s'typ}}(w)$ (*i.e.* it is at least as close 'normal course of events') if all the propositions of $o(w)$ true in w'' are also true in w'.

d. ***Best***$(m_{\text{meta}}, o_{\text{s'typ}}, t, w)$ then returns just that subset of historical alternatives to $w*$ that are closest to what might be judged as a "normally-unfolding course of events" in $w*$.

We can now derive the proper semantics for a "precautioning" use of *bambai*, as in (4), repeated here as (42).

(42) **Deriving the apprehensional reading**

ai=rra dringgi kofi **bambai** *mi gurrumuk (la desk iya gin)*
1s=IRR drink coffee *bambai* 1s fall.asleep LOC desk here EMPH

'I'd better have a coffee otherwise I might pass out (right here on the desk)'
[GT 28052016]

a. ***(ga)rra* as a necessity modal**

(adapted from the semantics forr WOLL cited in Condoravdi 2002:71)[24]

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[24]A satisfactory analysis of the semantics of *garra* (glossed here as 'IRR') is beyond the scope of this work. It is treated by Schultze-Berndt et al. (2019) as polysemous between a future and "obligation" marker, although I have also elicited tentative evidence of epistemic necessity readings. Abstracting away from these questions of modal flavour, it is treated here as a necessity modal and glossed sas IRR.

've written to cleo and
ave a number of things
o work out/add on the
choice of epistemic
modal base, especially
given the apparent
problems this will pose
for counterfactuals.
This draws largely from
Giannakidou and Mari
(2018), while trying to
harmonise this with
observations made at
the end of Condoravdi
(2002) (21feb email
exch.)

Given a modal base m, ordering source o and an evaluation time & world $t*, w*$:

$$\llbracket garra \rrbracket = \lambda P \forall w' \big[w' \in \text{BEST}_o(m, w*, t*) \to \text{AT}\big((t*, \infty], w', P \big) \big]$$

garra takes a predicate P and says that P holds in the future of t of all best-according-to-*o* worlds in the modal base.

b. **Meaning of the first clause**
$$\llbracket airra\ dringgi\ kofi \rrbracket = \forall w' \big[w' \in \text{BEST}_o(m, w*, t*) \to \text{AT}\big((t*, \infty], w', \text{DRINK.COFFEE} \big) \big]$$

c. **meaning of the second clause**
$$\llbracket mi\ gurrumuk \rrbracket^c = \lambda t \lambda w. \text{PASS.OUT}(t)(w)$$

d. **Meaning of *bambai* & substitution of meaning of (c) for λP**

$$\llbracket bambai \rrbracket^c = \lambda m \lambda o \lambda P. \exists w' \big[w' \in \textbf{best}_{o(w)}(m, t, w)$$
$$\wedge \text{SUBSEQINST}(P, t_r, w') \big]$$
$$\llbracket bambai\ mi\ gurrumuk \rrbracket^c = \lambda m \lambda o. \exists w' [w' \in \textbf{best}_o(m, t, w)$$
$$\wedge \text{SUBSEQ}(\text{PASS.OUT}, t_r, w')]$$

e. **substitution of conversational backgrounds m, o**

$$\llbracket bambai\ mi\ gurrumuk \rrbracket^c = \exists w' \big[w' \in \textbf{best}_{\mathcal{S}}(m_{\text{meta}}, t*, w*)$$
$$\wedge \text{SUBSEQINST}\big(\text{PASS.OUT}, t_r, w \big) \big]$$

In this instance, where the reference time retrieved from context is in the **future of speech time** (i.e. some time in an interval following speech time — $t_r \in (t*, \infty]$), the modal base m is **diverse with respect to the SUBSEQ property** — that is, the property $\text{SUBSEQ}\big([\lambda t' \lambda w. \text{PASS.OUT}(t')(w)], t_r, w \big)$ is **not settled in $w*$.**

f. **Spelling out the SUBSEQUENTIAL INSTANTIATION relation (cf. 33)**

$$\llbracket bambai\ mi\ gurrumuk \rrbracket^c = \exists w' \big[w' \in \textbf{best}_{\mathcal{S}}(m_{\text{meta}}, t*, w*)$$
$$\wedge \exists t' [\text{PASS.OUT}(t')(w') \wedge \mu(t_r, t') \leq s_c] \big]$$

The SUBSEQ component of *bambai*'s meaning asserts the instantiation of PASS.OUT at some time (t'). t' is preceded by a contextually-retrieved ref-

it kosher just to say
at these variables get
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nd of the derivation
hat is what the SSQ
ndition is meant to
ssert. Or would it be
etter to not lambda-bind
ose variables)

erence time t_r: • t_r is identified as some time in the interval $[t*, \infty)$ (i.e. the instantiation time of DRINK.COFFEE) and • the temporal distance between those two times is below some contextual standard ("soonness").

The crucial difference then, that distinguishes the pure (actualised) subsequential reading from the apprehensional one is that the property described by the prejacent is **settled by $t*$ in $w*$** — that is, in all historical alternatives to the evaluation world, the event described by MAKE.LUNCH in (40) holds. Conversely, the context **fails to satisfy** settledness for PASS.OUT in (42). As claimed in (e), it satisfies the *diversity condition* (Condoravdi 2002:83):

(43) **Diversity condition w/r/t prejacent in (42)**

$\exists w', w'' \in \cup \simeq_{t*} w* : \text{AT}\big((t*, \infty], w', \text{PASS.OUT}\big) \wedge \neg\text{AT}\big((t*, \infty], w'', \text{PASS.OUT}\big)$

There are metaphysical alternatives to $w*$ at $t*$ where the event described by the prejacent to *bambai* in (42) holds and others where it doesn't hold.

the omniscience restriction. Crucially, in the apprehensional cases presented above, those where predications about unsettled states of affairs timeline has been triggered (perhaps by one of the operators presented in Table 1.2 (*p.*33 above)), modalisation with respect to a non-settled property cannot reasonably select for the set of conversational backgrounds presented in (41). Such an operation would require the participants to be able to retrieve all propositions that are true in and characteristic of worlds with respect to a vantage point in the future or to be able to calculate all the ramifying consequences of eventualities that might have obtained in the past (in the case of counterfactual uses.)[25]

This condition allows us to unify the modalised and non-modalised readings of *bambai*: iff utterance context satisfies the diversity condition, the modal reading "emerges."

1.5.3 Use conditions

In §1.4, we saw how (along with the illocutionary "downtowning" analysed immediately above), the expressive content of *bambai* appears to be a result of frequent occurrence of *bambai* (and similar subsequential TFAs) in contexts of "preacautioning" and fearing. In these cases, *bambai* behaves as a discourse anaphor: a connective whose truth-conditional contribution is asserting that the eventuality

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[25]Compare this also to the epistemic constraint discussed in Kaufmann (2002).

described in its prejacent obtains subsequently to a contextually salient time made available in the discourse context.

In that section I additionally provided data from other languages where a subsequential TFA appears to have undergone similar functional change, developing apprehensional expressive content. German *nachher* is one such item. In (31), we saw how the expressive content of *nachher* appears to be not-at-issue: Pott's "nondisplaceability" criterion for identifying use-conditional semantic content.

Gutzmann (2015) proposes a compositional "hybrid semantics" that is capable of handling these "two dimensions" of meaning — *viz.* distinct truth- and use-conditional content. On this type of account, the semantics of a lexical item like *bambai* might be modelled as a "mixed use-conditional item." The previous section discussed the truth-conditional contribution of *bambai*, providing the lexical entry in (38) above. Following the proposal in Kaplan (1999)whee a "use-conditonal proposition" is understood to denote a set of contexts, Gutzmann (2015, following a suggestion in Portner 2007) appeals to a model with parallel types, interpretation functions and composition rules for both truth- and use-conditions that allow for the interaction of these condition types while distinguishing these two "dimensions" of meaning.

The use-conditional contribution of *bambai* (as suggested in §1.4) can then be informally stated as (44).[26]

(44) $[\![bambai\ p]\!]^u = \{c : c_s \text{ is negatively disposed to } p \text{ in } c_W\}$

   bambai p is expressively correct in a context where the speaker c_s is negatively disposed to p in $w*$

In this case, *bambai* p can be taken to conventionally implicate a proposition of the form given in (44), in addition to the asserted/truth conditional content presented in the above subsections.

1.5.4 The antecedent p: restriction and partition

We have seen throughout that *bambai* can give rise to readings of implicational relations between the two propositions. §1.5.2 defended an analysis of *bambai* that claims that the TFA and modal uses emerge follow from reasoning about the speaker's information state with respect to the realisation (*sc.* settledness) of the

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[26]This use condition is comparable to the condition proposed by AnderBois and Dąbkowski (2020): $\forall w' \in \text{GOAL}_{i,p}(w) : \neg q(w')$ (I.e. that some proposition p is performed/caused by i in order to achieve the speaker's goals (in which $\neg q$ holds))

predicate it modifies. The following discussion sketches a way to reconcile these observations.

As discussed in some detail in Chapter 2, a fruitful way of conceiving of conditionals is as a type of modality, where the quantificational domain of the modal is explictly restricted. This is achieved by intersecting a (contextually-retrieved) modal base with a proposition (*viz.* that proposition denoted by the conditional antecedent) (Kratzer 2012, von Fintel 1994).

The "precautioning" uses described here (*i.e.*, those of the form p *bambai* q are interpreted as introducing an eventuality which is a possible consequence of the antecedent subject's failure to attend to some situation which is described in the antecedent clause (roughly $\neg p(w) \rightarrow \blacklozenge q(w)$). In other words, these uses of *bambai* strongly resemble those of *otherwise*, as described in Ch. 2 (with the addition of apprehensional expressive content and apparent differences in modal force).

For the now-familiar example in (4 [=14]) above, as shown above, the presence of *garra* in the antecedent clause triggers an unsettled predication, yielding an apprehensional reading of the *bambai* clause. *bambai* merges with an anaphoric proposition (which is linguistically overt in the current example but need not be), taking its complement as a restrictor to the modal base (yielding m^+ to borrow Kratzer's (1981) notation). The denotation for (4) is given in (45) below.

(45) $[\![$*bambai mi gurrumuk*$]\!]^c =$

$$\exists w' \in \text{BEST}_o(m^+, t, w) \wedge \text{subseq}(\text{PASS.OUT}, t, w')$$

Where $m^+ = \{w' \mid w' \in \bigcap(m_{meta}(w) \cup \text{DRINK.COFFEE}\}$

The treatment as described in the current subsection is not, however, complete. A problem persists in understanding the relationship that the overt linguistic clausal antecedent bears to the proposition on which *bambai* is anaphoric. It is plainly not, for example, the case that the complement of *airra dringgi kofi* 'I must drink coffee', is the proposition on which provides the restriction on the conversational background that is being quantified over. Such a treatment would incorrectly yield an interpretation truth-conditionally identical to: 'I will fall asleep if it is not the case that I must drink coffee.' This particular question may be solvable by adopting a modal subordination approach following Roberts 1989 *et seq.*

Similarly, as discussed in §1.3.2.2, with *if…bambai* constructions, there appears to be no additional operation performed upon the *if*-marked antecedent — that is, the *if*-marked antecedent predicate is precisely the proposition upon which *bambai* is anaphoric.

This analysis has in part been superseded by Phillips and Kotek-ms, which deploys a modal subordination approach to understand the relation between p and q. What is clear is that the *bambai* clause is **not** syntactically subordinate to **p**.

These remaining questions — about the relation between the syntactic antecedent and the antecedent proposition which is responsible for anaphorically partitioning the modal base in order to yield the 'nonimplicational' readings of apprehensional *bambai* — are a remarkable linguistic phenomenon in and of themselves and a fertile domain for ongoing research. The analysis presented in this section takes the restricted modal base that is an outcome of this process and compositionally derives the proper semantics for *bambai* and its relationship with its prejacent.

1.6   Conclusion

This paper has proposed a formal account for the emergence of apprehensional epistemic markers from temporal frame adverbs, based on the central descriptive observation of Angelo and Schultze-Berndt (2016). It shows the potential of formal semantic machinery for better understanding the conceptual mechansims that underpin meaning change (in the spirit of much the emergent tradition appraised in Deo 2015) as applied to the modal domain. Further work may additionally extend the formal treatment of the expressive component of apprehensional (and other apparently use-conditional) items.

It has attempted to elucidate the mechanisms through which frame adverbs that originally encode a relation of temporal sequence come to encode causality, possility and speaker apprehension by way of the generalisation and conventionalisation of implicatures. The existence of this 'pathway' of grammaticalisation provides further evidence of the conceptual unity of these linguistic categories and sheds light on the encoding of (and relationship between) tense and modality in human language. Of particular note is the salient role played by 'settledness' (*cf.* Condoravdi 2002 a.o.) in adjudicating the available readings of relative tense operators (here exemplified in subsequential' TFAs.)

Additionally, an apparent cross-linguistic relationship between subsequentiality and the semanticisation of apprehensional use-conditions may have implications for our understanding of the development of linguistic markers which express speaker attitudes.

An open issue that demands further consideration is that of better understanding the relation between the proposition on which the *bambai* clause is anaphoric and which is interpreted as the restrictor of the modal base in apprehensional contexts and the antecedent clause to which it is syntactically linked. A satisfying answer to this question likely lies at the semantics-pragmatics interface. A successful

analysis may have ranging implications for understanding the interplay of factors that contribute to the proper interpretation of discourse anaphors.

Chapter 2

Discourse anaphora and dynamic interpretation: the case of *otherwise*

The work presented here develops an analysis of English *otherwise*, drawing on tools from the dynamic semantics and information structural literatures.[1] A simple example is given in (46):

(46) *A simple* 'otherwise' *sentence and a paraphrase of its meaning*:

    a.   Mary wears a yellow vest when she cycles.

                  Otherwise, drivers might not see her on the road.

    b. $\approx$ <u>If</u> Mary does <u>not</u> wear a yellow vest, drivers might not see her.

As (46) illustrates, *otherwise* can be paraphrased as a conditional: its antecedent is the *negation* of the sentence preceding it, and its consequent is the sentence following it. A first approximation of this intuition can be spelled out as in (47):

(47) *A first attempt at the meaning of* otherwise*:*   (to be revised)

$$[\![otherwise]\!] = \lambda p_{\langle s,t\rangle}\lambda q_{\langle s,t\rangle}\lambda w_s.\neg p(w) \to q(w)$$

Given two propositions p, q and some world w, *otherwise* states that, if p doesn't hold in w, then q holds in w.

In this paper, we focus on *otherwise*'s use as a discourse 'connective' or 'anaphor' (e.g. Kruijff-Korbayová and Webber 2001, Webber et al. 2001), so named because

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[1]This chapter represents a (very lightly modified) version of a manuscript emerging out of joint work with Dr Hadas Kotek. As of December 17, 2020, that manuscript is under review for *Journal of Semantics* (ID `JS-19-09-088.R1`).

of its apparent interpretive reliance on foregoing elements of discourse.[2] This is demonstrated by the sentence pair (48), from Webber et al. (2001:7). Each sentence is accompanied by a paraphrase that spells out its intended meaning.

(48)   *"Red Light sentences" with the discourse anaphor* 'otherwise':[3]

    a.   If the light is red, stop. *Otherwise* go straight on.
           $\approx$ If the light is <u>not</u> red…

    b.   If the light is red, stop. *Otherwise* you'll get a ticket.
           $\approx$ If the light is red and you <u>don't</u> stop…

As example 48 makes clear, the question of how to determine the antecedent to *otherwise* is quite subtle. While the pronounced utterance preceding *otherwise* is identical in both 48a and 48b, it is clear that the proposition that is interpreted as the antecedent of *otherwise* in each case is different. How, then, is this antecedent determined? It is clear that some pragmatic means must be in play.

In a nutshell, we develop an analysis of *otherwise* which draws on existing dynamic semantic analyses of conditionals. We'll argue that *otherwise* contributes a discourse move whose content is to predicate a subsequent proposition of the *complement* of some set of worlds computed based on the clause preceding *otherwise.* This will allow us to predict the set of possible antecedents to *otherwise* in a given sentence, how a particular antecedent is chosen out of this set, and how it is constrained.

At this point, it is important to be clear about the terminology and assumptions that we will adopt in this paper. As example 48 demonstrates, the *antecedent utterance* preceding *otherwise* need not be identical to the *antecedent proposition* used in the interpretation of *otherwise*, although, as we will show, the former informs and constrains the latter. In fact, the antecedent utterance need not be a proposition at all: it can be a conditional or a question, as well:

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[2]For the purposes of this current paper, we restrict our attention to these "inter-clausal" adverbial uses. As we will discuss in §2.6, however, we anticipate that our account could be expanded to account for other uses as well.

[3]In section 2.3.2.2, we identify a *third*, previously unnoticed reading of this sentence:

(49)   If the light is red, stop. *Otherwise* there'll be chaos on the roads.
        $\approx$ If the rules of traffic <u>aren't</u> obeyed…

At this point in the paper, however, our points can be made by concentrating on the two cited variants in 48 which have been recognized in previous literature.

(50) Otherwise*'s antecedent utterance may be a declarative, imperative, or (certain) interrogatives:*

    a. Jake's asleep, *otherwise* he would have come.

    b. Stop. *Otherwise* you'll get a ticket.

    c. Do you have your car? *Otherwise* I'll give you a lift.

    d. Do you want to get a beer at Three Sheets or Counterweight tonight? *Otherwise* you make a bloody suggestion.

[4]

A (declarative) *otherwise* statement, then, includes three components: (a) An *antecedent utterance* is put on the table as accurate to the best of the speaker's knowledge.[5] (b) An *antecedent proposition* is accommodated, representing the complement of a set of worlds introduced by this antecedent utterance.[6] (c) The *consequent* of *otherwise* provides a description of what happens in such worlds.[7] We spell this out below for examples 48a and 48b:

(51) *Components of the* otherwise *sentence in 48a:*

    a. Antecedent utterance: *If the light is red, stop.*

    b. Antecedent proposition: *The light is not red.*

    c. Consequent: *(You) go straight on.*

(52) *Components of the* otherwise *sentence in 48b:*

    a. Antecedent utterance: *If the light is red, stop.*

    b. Antecedent proposition: *The light is red and you don't stop.*

    c. Consequent: *You get a ticket.*

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[4]To our ears, (d) can be read with either polar question or alternative question intonation. In both cases, a proposition of the form 'you don't want to get a beer at either place' seems to be accommodated.

[5]That is, *asserted*, cf. Stalnaker 1979.

[6]We focus predominantly on declarative antecedents in this paper, but we believe that future work should lead to interesting discoveries about the shape of possible non-declarative antecedents and the accommodation step we describe here.

[7]Syntactically, we believe that only the *consequent* clause is an argument of *otherwise*. The *antecedent* that *otherwise* operates on is an accommodated pragmatic object, and we do not make a claim about its syntactic form. This might suggest that the term *prejacent* is more appropriate here. However, since we build heavily on the semantics of conditionals, and believe that *otherwise* relates two propositions to one another, we choose terminology that aligns with these theoretical choices.

The *antecedent propositions* in 51b and 52b are different, but we see that they are both derived from the same *antecedent utterance*, 51a = 52a. More specifically, we will argue in section 2.3 that the set of candidate propositions that can be accommodated from the antecedent utterance is any of the propositions that serve to restrict the context set of this utterance. We will compute this set appealing to Roberts' modal subordination framework. We will show how this proposal makes correct predictions about the distribution of possible antecedents to *otherwise* in cases such as 48 and, in addition, that it correctly predicts a previously unnoted interaction of *otherwise* with possibility modals as well as other restrictions on the choice of antecedent.

In order to identify the antecedent proposition that *otherwise* actually operates on in a given sentence, we take a view that emphasizes the *flow of information* in a discourse (see also Roberts 2012), and make reference to the Question under Discussion (QuD) and the current Information Structure.

In what follows, we first discuss in a bit more detail the previous analyses and additional properties of *otherwise*, which our analysis builds on (sections 2.1-2.2). We then develop our analysis of the semantics and pragmatics of *otherwise* in section 2.3. In section 2.4, we present several novel observations about *otherwise* that follow from our analysis. We conclude the paper by briefly discussing connections between our proposal and the phenomena of donkey anaphora and complement anaphora, in addition to an expansion of our proposal to nonclausal uses of *otherwise* (section 2.5). Two such examples are given in (53):

(53)   *Intra-sentential uses of* otherwise*:*

    a.   The income they earn from it is likely to be the only source of cash to supplement their *otherwise* subsistence economy.   (OED)

    b.   Amelia behaved well *otherwise.*   (Flament-Boistrancourt 2011[8])

2.1   Background: The meaning of *otherwise*

As we have seen, *otherwise* acts as a discourse connective or anaphor, relating an antecedent utterance with a second utterance, by way of an accommodated proposition computed from the pronounced antecedent. A key example which we will concentrate on in this paper is the *Red Light* example, repeated here from 48. This

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[8]Here, and throughout, examples from both Flament-Boistrancourt 2011 and Inkova-Manzotti 2002 have been translated from the original French by the authors.

example illustrates a key property of *otherwise*: that the continuation following *otherwise* appears to be discourse-dependent, and can't be strictly calculated based on the syntactic material preceding *otherwise*. In (54), the same material appears before *otherwise*, but with different consequents. The nature of the consequent allows us to calculate what *otherwise* is operating on, as we spelled out in 48a–48b.

(54) *The Red Light example:*   = 48

    a.   If the light is red, stop, *otherwise* go straight on.

    b.   If the light is red, stop, *otherwise* you'll get a ticket.

A satisfactory approach to *otherwise*, then, requires a consideration of the structure and "flow" of information in a given discourse context. Intuitively, the *otherwise* clauses in ((54)) have the semantics of conditionals: *Otherwise* targets a set of worlds in which some anaphoric proposition does <u>not</u> hold (*i.e.*, converse nonimplication).

Two prior accounts of *otherwise* by Webber et al. (2001) and Kruijff-Korbayová and Webber (2001) adopt information-structural analyses of *otherwise*, which will inform our analysis in section 2.3. In particular, Webber et al. argue for the existence of a "discourse anaphor" class (comprising lexical items including *then, nevertheless, otherwise*), and a distinct class of "structural connectives" (*or, and, but, because*). These authors appeal to an 'anaphorically-derived contextual (eventive) parameter' e_i and an *inferrable relation* between two event descriptions (in the absence of an explicit structural connective). An example of these notions is given in (55):

(55) *Two types of 'inferrable relations':*

    a.   If the light is red, stop, (**but**) *otherwise* go straight on.

    b.   If the light is red, stop, (**because**) *otherwise* you'll get a ticket.

Otherwise not only operates on different accommodated propositions, as we have already seen, but can also encode different relations between two event descriptions (*contrast* in 55a, and *explanation* in 55b). For Webber et al. (2001:17), these effects are pragmatically derived, and are crucially unavailable to "structural connectives" which are restricted in the relations they can encode and the antecedents they can retrieve.[9]

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[9]A similar observation is made in Corblin (1994, 2002). Additionally, recent work on discourse particles has shown that these lexical items crucially rely on the information structure of embedding

This observation about the limited distribution of structural connectives has been independently made in the literature on conditional uses of *or* ('pseudocoordination', see Biezma and Rawlins 2016, Culicover and Jackendoff 1997, Klinedinst and Rothschild 2012, a.o.). As examples 56a–56b show, the distribution of these uses is narrower than the equivalent use of *otherwise*. Although a conditional *otherwise*-like reading is available in 56b, in 56a, the conjoined imperatives *stop or go straight on* must be interpreted as two options of what the addressee ought to do when the light is red. The *otherwise*-like reading that was available in 48a/55a is infelicitous here.

(56)   *Conditional* or *has a more limited distribution:*

    a.   #If the light is red, stop, *or* go straight on.

    b.   If the light is red, stop, *or* you'll get a ticket.

Additional evidence that an adequate account of *otherwise* requires reference to a level of discourse representation comes from intra-sentential uses of *otherwise*, in cases such as (57). For Webber et al. (2001:7), these examples necessitate an E-type anaphor.[10] As these authors point out, this 'suggests that discourse adverbials are accessing discourse entities (in particular, eventualities) rather than signaling a structural connection between clauses.'

(57)   *Intra-sentential* otherwise*:*

    a.   Every person selling "The Big Issue" might *otherwise* be asking for spare change.   (Webber et al. 2001:7)

    b.   These moments give emotional ballast to what would *otherwise* be an exercise in wackiness.

On the basis of data similar to the *Red Light* example (*i.e.*, *otherwise* sentences with complex-clause antecedents), Kruijff-Korbayová and Webber (2001) model *otherwise* as a discourse connective that is sensitive to information structure in its retrieval of an antecedent. They assume that Logical Forms are partitioned into theme (θ_{is}) and rheme (ρ_{is}) "phases", which have the effect of updating a given discourse context. Following Steedman (2000), Kruijff-Korbayová and Webber (2001)

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discourses and imply specific types of relations between discourse moves/information states. See for example **?** on *then* and **?** on German *ja*.

    [10]Although see our analysis below, in particular section 2.5.1; for us, this move will not be required.

assume that both θ_{is} and ρ_{is} presuppose an alternative set (cf. Rooth 1985). *Otherwise* then updates the context with the complement of (a subpart of) either ρ_{is} or θ_{is} with respect to the relevant alternative set.

Along similar lines, Inkova-Manzotti (2002) and Flament-Boistrancourt (2011) provide descriptions of the broad range of uses of French *autrement* 'otherwise.' Like English *otherwise*, the French particle requires use of context and pragmatics.[11] Some examples are provided below.

(58) *On   peut se   voir mardi.*   Autrement *vendredi.*
      one can   REFL see Tuesday otherwise Friday

      We'll see each other Tuesday. Otherwise Friday.

                              (Inkova-Manzotti 2002:114)

(59) *Je pourrais faire une tarte. Je n'ai   pas de   farine.* Autrement
      I   could   make a   quiche I   NEG.have NEG PART flour   *otherwise*

      j'ai   tout ce   qu'il faut
      I.have all   DEM REL.it necessary

      'I could make a quiche. I'm out of flour. Otherwise I've got everything needed.'[12]
      (Inkova-Manzotti 2002:122)

In the analysis proposed below, we likewise acknowledge the importance of context and pragmatic computation in the use of *otherwise*. The existing analyses surveyed here suffer from the limitation that there are no constraints on the 'range of things that can serve as antecedents' (see Kruijff-Korbayová and Webber 2001 for an explicit discussion of this issue). Likewise, Webber et al. (2001), must make reference to complex event structures, and to yet another complex mechanism of E-type anaphora for examples such as 57. We will show in section 2.5.1 that these examples are naturally unified under our analysis, so that no additional assumptions must be made for intra-sentential cases as compared to inter-sentential cases.

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[11]Flament-Boistrancourt (2011) explicitly deals with distributional differences of French *sinon* and *autrement* (both are frequently translated as 'otherwise.') Francis Corblin (2002:252; pers. comm) points out that *sinon* (lit. 'if NEG') admits of a compositional analysis and an identical distribution/use to *si ce(la) n'est pas le cas...* 'if it is not the case that X...'

[12]Note that in 59, *otherwise* intuitively might still be taken to be anaphoric on the proposition *Je n'ai pas de farine* 'I'm out of flour'. The speaker has everything they need for a quiche if the fact of their flourlessness is excluded from consideration (see §2.5.2).

In the section that follows, we introduce several new observations regarding the distribution and use of *otherwise*, before spelling out a proposal which aims to capture these facts in section 2.3.

2.2   Other key properties of *otherwise*

We begin by laying out the key properties of *otherwise* that we set out to capture with our account. As we have seen in section 2.1, *otherwise* has a connective-like use. Example 50 showed that the antecedent of an *otherwise* sentence may be a declarative, an imperative, or an interrogative. Here we will concentrate on sentential cases, where *otherwise* connects two sentences, as in the *Red Light* examples in 48.

We have also established that the content of the continuation which follows *otherwise* is discourse-sensitive, and cannot be computed solely based on the pronounced content of the antecedent. This has been an important guiding observation in prior work on *otherwise*, and one that we take up in our analysis as well. We highlight here several additional properties of *otherwise* that will become important for our analysis.

2.2.1   *Otherwise* is an intensional operator

First, we argue that the notion of modality is crucial to the analysis of *otherwise*. Recall that Kruijff-Korbayová and Webber (2001) notice that the two components related by *otherwise* rely on an 'inferrable relation'. We claim this relation follows from a view of *otherwise* as containing a modal operator, admitting of different modal flavors/conversational backgrounds. We illustrate this in (60):

(60)   *Observation:* otherwise *admits different 'modal flavors':*

    a.   Hanna is home, *otherwise* I don't know where she could be.

    b.   Hanna is home, *otherwise* she's breaking curfew.

    c.   You must stop at the red light, *otherwise* you get a ticket.

    d.   You must stop at the red light, *otherwise* you continue straight.

    e.   You must stop at the red light, *otherwise* there'd be chaos on the roads.

The instance of *otherwise* in 60a requires an epistemic modal base for interpretation, whereas the minimally different 60b is interpreted under a circumstantial

modal base. Similarly, the *otherwise* clauses in (c), (d) and (e) seem to invite a deontic, teleological and a type of counterfactual reading respectively. Our analysis below builds in this interpretive flexibility of *otherwise* (a feature of conditionals, see Kratzer 2012:65*ff*), unlike prior accounts.

In section 2.3.1, we additionally defend the claim that *otherwise* makes crucial use of *modal subordination* (Roberts 1989 *et seq.*) This allows for a description of the fact that the *otherwise* statements in the two sentences in 61 appear to have different antecedents—here, including or excluding the modal:

(61)   Students are required to attend the lecture, *otherwise*...

    a. $\approx$ If $\neg\square$ (they ATTEND)...   ...it'll be empty.

    b. $\approx$ If $\neg$ (they ATTEND)...   ...they'll fail the class.

2.2.2   Non-emptiness

As our paraphrases above illustrate, *otherwise* asks us to consider what would be the case in the *complement* set of worlds to those introduced in its antecedent. That is, *otherwise* induces a partition over worlds, separating them into those that satisfy the conditions in the antecedent, and those that don't. A crucial requirement on this partition is that both cells are non-empty. To illustrate this, consider the contrast in (62):

(62)   a. . I must go to school, *otherwise* I'll get in trouble.

    b. [#]I can/am allowed go to school, *otherwise* I'll get in trouble.

This judgment contrast emerges because the prejacent of necessity modal *must* in 62a eliminates a set of worlds X from the context set (*viz.* those in which I don't go to school $\overline{X}$); *otherwise* is thus able to make a claim about those eliminated worlds (namely: in all the worlds in the context set where I don't go to school, I get into trouble.)[13] Conversely, the possibility modal *can* asserts the <u>existence</u> of an accessible world in which I go to school, but fails to exclude any worlds from consideration in 62b. As a consequence, a relevant complement set is unavailable to *otherwise*; we correctly predict the infelicity of 62b in this case.

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[13]Notice that, like in 61, an alternative pragmatic reasoning could have led us to choose as antecedent the set of worlds in which I *must* go to school. A felicitous *otherwise* statement in such a case might be: "...*otherwise* ($\approx$ if I didn't have to go to school), I'd skip class and go to the park." This reasoning is the focus of §2.3.

Compare this with the minimally different (63), which speakers judge as acceptable (on a counterfactual reading):

(63) I can go to school, *otherwise* I wouldn't be able to get an education.

Here, again following Kratzer (1981), the modal auxiliary *can* makes available a set of relevant propositions, including the fact that 'I am able to go to school.' This set of facts (a "circumstantial conversational background") restricts the context set. The resulting assertion is that — in those possible worlds where the relevant circumstances do not hold (*i.e.,* where it is *not the case* that I am able to go to school) — I don't receive an education. As a consequence, there is a non-empty complement set of worlds in which to evaluate the *otherwise* sentence. In (63), despite the presence of a possibility modal, we are still universally quantifying into the antecedent proposition.

Our account in section 2.3 will be able to explain the felicitous use of *otherwise* in such sentences. We return to this non-emptiness constraint on the distribution of *otherwise* and its consequences in section 2.4.

2.2.3   An *otherwise* sentence is non-commutative

Another observation that will inform our analysis is that *otherwise* is not a symmetric operator: p *otherwise* q is different from q *otherwise* p, even in cases where the two propositions related by *otherwise* are logically independent of one another — so that an 'inferrable relation' is difficult to establish.

(64) *Word order is important in an* otherwise *sentence:*

    a. She's in the living room. *Otherwise*, she's in the bathroom.

    b. She's in the bathroom. *Otherwise*, she's in the living room.

(65) a. . She'll be here. *Otherwise* she's in big trouble.

    b. [?#]She's in big trouble. *Otherwise* she'll be here.

Example (64) shows that even when the two utterances related by *otherwise* appear to be independent, speakers perceive a difference in the felicity conditions and contexts in which the two variants of the *otherwise* sentence will be appropriate. Roughly: 'my first guess is that she's in the {living room/kitchen}; if it turns out

that she's not there, then she'll be in the {bathroom, living room}.'[14] Predictably, then, the contrast between the two sentences in 65 shows when an 'inferrable relation' (here: causality) *is* introduced, changing the order of the two propositions connected by *otherwise* may lead to infelicity.

2.2.4   An *otherwise* sentence is conjunctive

An additional crucial component of our analysis is the behavior of an *otherwise* sentence as a kind of asymmetric conjunction, as evident from the paraphrases we have been providing, as well as the fact that it is non-commutative: the speaker puts the antecedent on the table for adoption, but also includes an explicit claim about how the world must be in case that antecedent is rejected or denied. Very broadly, in words, we might then say that *otherwise* asserts: p; and if not p, then q will hold:[15,16]

(66)   *An informal description of the meaning of a p otherwise q sentence:*   (to be revised)

$$p \wedge (\text{if } \neg p', \text{ then } \Box q)$$

If a sentence of the form p *otherwise* q has conjunctive semantics (as proposed in (66)), this ought to predict that its negation could be achieved by falsifying the first conjunct, the second conjunct, or the entire assertion. We show that this is the case in (67):

(67)   *Negating an* otherwise-*sentence shows its conjunction-like behavior*

A:. $\underbrace{\text{Sam is always home by 6pm}}_{p^{17}}$, *otherwise* $\underbrace{\text{little Susie has a tantrum.}}_{\text{if } \neg p, \text{ then } \Box q}$

B:.   That's not true...

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[14]See section 2.2.5 for more relevant discussion. Additionally, Ford 1997 provides a discussion of some discourse pragmatic effects of conditionals which is consonant with these observations about speaker commitment.

[15]Throughout, we adopt (and provide additional support for) a view of conditionals as a flavour of modality where a restriction on the modal base is syntactically explicit, as in Heim 1982, Kratzer 1981, 2012, Lewis 1975, among others. Crucially, note that this restriction (p') is calculated from, but need not be identical, to the syntactic antecedent (p), hence the *Red Light* examples 48. The nature of this calculation is discussed in detail in §2.3 below.

[16]Note also the similarity of this treatment to 'information parameter change' readings of structural connective *or* as formalized by Klinedinst and Rothschild (2012:155-6). On their dynamic (update semantic) account, an utterance of the form 'α or β' corresponds to $[\![\beta]\!]^{c,s\neg\alpha,w}$ (*i.e.*, an utterance of β where the "information parameter" s is updated with $\neg\alpha$ (the negation of the first disjunct)).

a. He often gets home late, and Susie's just fine.

b. Susie would be just fine if he did ever get home later, although it's true that Sam always get home on time.

c. He often gets home late, although it *is* true that little Susie indeed has a tantrum whenever that happens.

In (i), the speaker is negating both conjuncts: Sam isn't always home on time ($\neg p$), but Susie doesn't have a tantrum because of that ($\neg p \wedge \neg q$).[18] In (ii), only the second conjunct is negated: we assert that the first conjunct is true (Sam is always home on time), but that the implication nevertheless doesn't hold (Susie wouldn't have a tantrum if Sam were late). In (iii) only the first conjunct is negated: we assert that Sam is late ($\neg p$); but the implication in the second conjunct holds: if Sam is late, Susie has a tantrum.[19]

2.2.5 Weakening the antecedent

We have proposed that *otherwise* can be understood as encoding a type of asymmetric conjunction: the speaker puts the antecedent on the table for adoption, but also includes an explicit claim about how the world must be in case that antecedent is denied. As a consequence, we might predict the redundancy of *otherwise*-sentences with non-modalized antecedents like those in (68), contrary to fact:

(68) *Non-modalized antecedents should lead to infelicitous otherwise statements but they are acceptable:*

a. Hanna is home, *otherwise* she's breaking curfew.   = 60b

b. Sam is always home by 6pm, *otherwise* little Susie has a tantrum.   = 67

On the surface, both of these cases ought to be infelicitous: if I assert that, in the actual world, Hanna is home, then asserting the conjoined proposition that *If Hanna isn't home* (in the actual world) *then she's breaking curfew* ought to be judged

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[17]As with other examples we have seen, there are (at least) two possible antecedents to *otherwise* in this example: the sentence with the frequency adverbial *always* and the sentence embedded under *always* (i.e. its prejacent). We have kept the antecedent constant (sc. $p = p'$) across these examples for consistency.

[18]Recall that material implication is false just in case that its antecedent is true and its consequent is false. In (66), the implication under consideration is if $\neg p$, then $\Box q$. So, it is false just in case $\neg p \wedge \neg \Box q$. Recall further that $\neg p \rightarrow \neg \Box p$. (If p doesn't hold, then *must* p doesn't hold.)

[19]Some speakers we have consulted find our example with 'always' difficult to process, and prefer a variant with 'often'. The same point could be made with such an alteration, but we find our variant in the text even more striking. See section 2.2.5 for a relevant discussion.

as redundant. Similarly, if I'm willing to assert that *Sam is always home by 6pm*, then the claim that Susie has a tantrum shouldn't be verifiable in the actual world.[20]

In both of these cases, the felicity of the *otherwise* clause appears to function as a type of hedge that requires the accommodation of a "weakened" p. For 68a, notice that in contexts where the speaker has direct perceptual access to the subject, the sentence is severely degraded. (68)[a′] is infelicitous unless the speaker can be interpreted to have incomplete knowledge of where they are.[21]

(68) a. [??]I'm home right now, *otherwise* I'm breaking curfew.

Consequently, we take it that while the speaker of a sentence like 68a is willing to confidently assert p, their addressee accommodates information about their evidence base for this assumption on the basis of their willingness to admit of an alternative.

By virtue of a similar pragmatic mechanism, the interpretation of 68b involves accommodating a weakened assertion of p. The speakers we have consulted appear to go about this in two different ways, paraphrased below:

(69) b′. Sam is **normally/usually** home by 6pm, *otherwise* **(when he's not)** little Susie has a tantrum.

b″. **These days,** Sam is always home by 6pm, *otherwise* **(in the past, when he was sometimes late)** little Susie **would have** a tantrum

By weakening the quantificational force of the adverbial (69)[b′] or restricting the domain to stage-level predication (69)[b″], real-world alternatives to 'Sam BE home by 6pm' are made available. Both repairs allow for a non-empty complement set of worlds for *otherwise* to refer to, satisfying the *non-emptiness requirement* we discussed above.

Conversely, weakening is not necessary when we have an imperative or an interrogative antecedent, as both types of clauses by their nature always allow for a non-empty complement set of worlds: an addressee may fail to act on a command, admitting both worlds that satisfy the command and those that don't; likewise, polar and alternative questions presuppose more than one possible answer, requiring

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[20]This follows from a Stalnakerian view, where, by asserting p, we are proposing to eliminate all non-p worlds from the Common Ground (e.g. Stalnaker 1979).

[21]Compare von Fintel and Gillies' 2010 treatment of epistemic *must*, the (evidential) use conditions of which are met in this scenario (*viz.* INDIRECT INFERENCE.) Given the (conditional) modal component of *otherwise*, their analysis might be taken to extend to the use of *otherwise* in these hedged contexts.

a partition with non-empty cells.[22]Along similar lines, when the consequent of *otherwise* is counterfactual, the non-emptiness requirement can be satisfied without weakening the antecedent:

(71)   I'm home right now, *otherwise* I'd be breaking curfew.

In the next section, we build on these observations about the nature of *otherwise* to develop an analysis rooted in dynamic semantics, and making use of the information structural notions of the Question under Discussion.

2.3   Analysis

Our analysis draws on tools from the dynamic semantics and information structural literatures to model *otherwise*'s semantic contribution to a sentence. Section 2.3.1 introduces Discourse Representation Theory (Heim 1982, Kamp 1981), and in particular the notion of "modal subordination" (Roberts 1989, 1990a, 1995, 2004, 2012). Section 2.3.2 lays out our proposal for the semantics of *otherwise*. It discusses previously unremarked limitations on the distribution of *otherwise*, and shows that they naturally follow from the modal subordination analysis we lay out. Finally, section 2.3.3 illustrates our proposal for the pragmatics of *otherwise*, and in particular how information structural notions (notably, the *Question under Discussion*) can be recruited to provide a treatment of *otherwise* as a discourse anaphor (in the sense of Webber et al. 2001 a.o.). An appendix to the paper provides a more detailed formal definition of modal subordination, in particular as it relates to a formal treatment of the "satisfaction conditions" of *otherwise*.

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[22]A prediction that follows from this discussion here is that *wh*-questions will not serve as felicitous antecedents for *otherwise*. Although constituent questions have been argued to impose a partition over the possible worlds in the context (e.g. **?**), there will not be a *complement* set for *otherwise* to refer to:

(70)   a.   [??]Who wants to present first in the seminar? *Otherwise* Max will.
        b.   [??]Where do you want to go? *Otherwise* we can stay home?

Unlike in the case of declaratives, we are not able to offer a repair such as modal weakening, and instead the examples are judged as marginal. For some speakers, the negations of these questions' presuppositions — *viz.* 'if there is noone who wants to present' and 'if there is nowhere that you want to go' — are retrieved (*sc.* accommodated) with a long pause (and some amount of effort.) We discuss other cases of infelicity due to a lack of a non-empty complement set in section 2.4.

2.3.1   Background: Discourse representation & modal subordination

As we have seen, a key property of *otherwise* is its interpretational flexibility, which we have characterized as going beyond what is strictly contributed by the pronounced utterance it is contained in. A number of authors have proposed dissociated syntactic and semantic notions of "subordination" (e.g. Culicover and Jackendoff 1997, De Vos 2007, Yuasa and Sadock 2002), noting the ostensible independence of these modules. In particular, Craige Roberts' (1989) "modal subordination" formalism provides a way of capturing this dissociation, and consequently of explaining the different interpretations of *otherwise* that appear to be available in the *Red Light* sentences 48.

Roberts (1989) adapts *Discourse Representation Theory* (DRT), developed in Kamp 1981/Heim 1982, in order to formally implement a notion of subordination which operates independently of the syntax (i.e. where even in the absence of a conventional trigger, the interpretation of some quantificational operator is restricted.) Her definition of this is given in (72).

(72)   MODAL SUBORDINATION is a phenomenon wherein the interpretation of a clause α is taken to involve a modal operator whose force is relativized to some set β of contextually given propositions.   (Roberts 1989:718)

In effect, modal subordination provides a way of understanding the relationship between sentence mood and the nature of an assertion in context. It operationalizes the insights of work on the structure of natural language quantification (*i.e.*, the conception of modalized sentences as generalized quantifiers that relate 'restrictor' and 'scope'). An illustrative example is provided in (73).

(73)   *An example of modal subordination in discourse:*

   a.   If Edna forgets to fill the birdfeeder, she will feel very bad.

   b.   The birds will get hungry.   (Roberts 1989:683)

Notice that the birds need not get hungry (an entailment of (73)[b], if it were to act as a standalone assertion) for the entire discourse to be true. Instead, (73)[b] is *modally subordinate* to (*i.e.*, its interpretation is dependent on) the conditional antecedent in (73)[a]. Because the modal operator *will* is restricted by the antecedent of (73)[a], only in a context in which the antecedent conditions in (73)[a] are met must the consequent condition in (73)[b] also be satisfied.

We take statements involving *otherwise* to rely on a similar logic. As we have seen, the pronounced form of *otherwise* sentences underdetermines their interpretation. Appealing to modal subordination allows us to identify the relationship between the linguistic signal and its likely interpretation. Roberts (1989:712–5) provides a formal syntax and semantics for modal interpretations of DRSs. The pertinent details are presented here.[23]

Next we provide a basic overview of how to interpret the "box diagrammatization" of Discourse Representation Structures (DRSs), familiar from Kamp 1981, Partee 1984, Roberts 1989, 1990a, a.o. These visualization conventions are associated with a formal language (the Discourse Representation Language, DRL), releevant components of which are sketched in the appendix to this paper.

For a given DRS K, K denotes a pair $\langle X_K, C_K \rangle$, where X represents the *local domain* – a finite set of variables that represent discourse objects relevant in the context (including participants, eventualities, and times etc.); and C is a finite set of 'satisfaction conditions' that eventually determine the truth value of a given proposition. For diagrams where a DRS K is represented as a box, the top of the box lists the variables X_K and the bottom represents the satisfaction conditions C_K. For a simple discourse as in (74–75), we provide a DRS below. Notice that the indefinite is treated as a variable here, and is eventually existentially closed (Heim 1982): any variable that is not locally bound by another operator is assumed to be existentially bound by a global operator that applies to variables that remain free by the end of the derivation. DRT allows us to continue to refer to a variable introduced in the prior discourse as long as it is still accessible, as illustrated for the simple example here:

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[23]An appendix to this paper provides some additional technical detail. The interested reader is referred to Roberts (1989, 1990a) for a closer reading about the formal apparatus of modal subordination. See also **?**:47–58 for a detailed formal presentation of a Discourse Representation Language (DRL) that handles temporal relations.

(74)   A dog entered the room.   (75)   It barked.

x
dog(x)   entered-room(x)

x
dog(x)   entered-room(x)   barked(x)

A given DRS K contains atomic conditions of the form $P(x_{i_1}...x_{i_n})$ (where P is an n-place predicate). If a world-assignment pair **satisfies** ($\Vdash$) all of the conditions in K, then that pair can be said to **verify** ($\vDash$)K. Additionally, DRSs are recursively closed under the operations $\neg, \bigvee, \Rightarrow, \square, \Diamond$. That is, if K_i, K_j are DRSs and $\circ$ is one these (2-place) operators, then $K_i \circ K_j$ can represent a *complex condition* in K. This complex condition needs to be satisfied by w, if K is to be verified in w.[24] Here is an example using the possibility modal, illustrating that the variable x, which is introduced in the box to the left of the operator, remains accessible in the box on the right:

(76)   If a dog is hungry, Pedro might feed it.

x dog(x) hungry(x)	$\Diamond$	**y** Pedro(y) feed(y, x)

Crucial to the theory is the notion of an "accessible domain" A_{K_i} – a superset of the local domain (X_{K_i}) for any given K_i. As a discourse proceeds, the set of objects that can be referred to expands. The notion of 'accessibility', then, allows us to predict which objects can be referred to at a given stage in a discourse.

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[24]The semantics and interpretation of these operators is further discussed below, though Roberts (1989:714) provides formal satisfaction conditions for all condition types that she defines. See the appendix to this paper for some additional detail.

(77) The accessible domain A_{K_i} contains all the variables that occur:

    a. In K_i's local domain (X_{K_i})

    b. In the domains of all DRSs that graphically *contain* K_i

    c. If K_i is the right element of a (binary) modal condition $(\Rightarrow, \square, \lozenge)$, A_K also contains all the elements of the antecedent's (the DRS on the left's) local domain.

       I.e. $K_\ell \,\square\, K_i \longrightarrow K_\ell \leqslant K_i$ where '$\leqslant$' reads "is accessible from."

In (76), observe that the consequent box of the conditional makes reference to a variable introduced in the antecedent. Furthermore, note that the entire conditional statement is embedded inside a larger discourse, so that we are not committed to the existence of any dog in the context: the *feeding*-worlds are a subset of *hungry-dog*-worlds.

Based on the assumptions introduced in (77), a given DRS K that is interpreted in the scope of a modal operator can be *modally subordinate* to those DRSs whose domains it has access to. Example **??** illustrates such a case, from Roberts (1989:701). Here, the consequent clause is *modally subordinate* to the antecedent *in a given conversational background*. That is, the entire conditional is taken to assert that the speaker predicts that 'John will be at home reading a book' in those worlds *(that best conform with the speaker's expectations)* in which he bought a book. Like in (77), we need not be committed to the fact that John bought a book in the actual world; in other words, the entire statement is not a part of the matrix DRS K; it is further embedded.

(78) *A DRS illustration of modal subordination in a conditional sentence:*
    If Jake bought a book, he'll be at home reading it by now.

<div align="center">

K

</div>

K_i K_j

$x\ y$

john(x)
book(y)
bought(x,y)

$\Box$

reading(x,y)
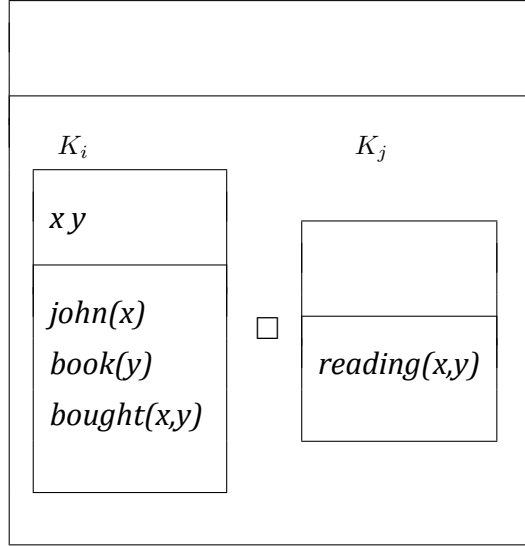
In (78), the DRS representing the consequent clause (K_j) is *modally subordinate* to its antecedent K_i and, as a result, can access the discourse entities introduced in K_i (i.e. $K_i \leqslant K_j$). Moreover, both K_i and K_j are subordinate to the matrix DRS K (i.e. $K \leqslant K_i \leqslant K_j$); had any variables been introduced in K, they would have been accessible to both K_i and K_j.

2.3.2   A dynamic semantics for *otherwise* and the role of discourse

We are now ready to propose a semantics for *otherwise*. At this juncture, recall again the key properties of an *otherwise* sentence described in section 2.2. *Otherwise* is an intensional operator that encodes a type of conditional modality; it asserts that – in the complement of a set of worlds introduced by its antecedent – some condition holds. This antecedent need not be identical to the pronounced utterance preceding *otherwise*, but is somehow related to it. Moreover, the operator is non-commutative: there appears to be an ordering component, whereby only the antecedent is asserted as true in the evaluation world (although, as discussed, the process we called "modal weakening" allows for consideration of what happens if it were not.) We believe that these properties lend themselves to a dynamic account; one concerned with the development of participants' information states across the discourse.

    We argue here that the possible sets of propositions that are available to constrain the interpretation of "*otherwise* K_j" are calculated on the basis of those discourse representations which **have access to** (*i.e.*, are contained within) the pronounced antecedent to *otherwise*, which will refer to throughout as $\boldsymbol{K_i}$. We will

illustrate that this is so in the next two sections. Before doing so, we first define
an operator over DRSs: $\ominus$ (and hence the condition $K_i \ominus K_j$) will represent the
contribution of *otherwise*:[25]

(79) *Proposal: A dynamic semantics for* otherwise

$K_i \ominus K_j \Longleftrightarrow (K_i) \wedge (\neg K_{i_{\text{sub}}} \square K_j)$

<u>In words</u>: $K_i \ominus K_j$ is satisfiable iff both K_i and $(\neg K_{i_{\text{sub}}} \square K_j)$ are satisfiable,
where $K_{i_{\text{sub}}}$ is some DRS that is contained within K_i.[26]

This proposal can be paraphrased as the claim that: "the conditions in K_i (should)[27]
hold; however, just in case that (some of) these conditions — those of $K_{i_{\text{sub}}}$ — do
not hold, the conditions in K_j must then hold." Notice that this treatment takes
otherwise to be akin in its structure to a conditional, referencing our informal de-
scription in 66 and elsewhere. Moreover, this brings an asymmetric conjunctive
element into the analysis, building on the observations in section 2.2 and recalling
elements from previous analyses discussed in section 2.1.

Notice additionally that we employ the necessity operator ($\square$) from Roberts'
DRL (1989:695, 715), building on our observation in 60 that *otherwise* comprises
a modal operator. A primary contribution of Roberts 1989 is an expansion of the
ontology of the discourse representation theory of Kamp 1981 to include worlds,
in view of modeling modality. In effect, $\square$ is a universal quantifier which also builds
in "conversational backgrounds"—sets of propositions: a modal base m and order-
ing source o—in order to capture the observations made by Kratzer (1981:§2.7)
regarding different "flavors" of modality.

In effect, $K_i \underset{m,o}{\square} K_j$ is satisfiable iff K_j can be verified in all the worlds in the
conversational background (as determined by m, o) in which K_i can be verified.
Consequently a DRS containing the condition $K_i \underset{m,o}{\square} K_j$ can be instructively rewrit-
ten as in (80):[28]

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[25]Again, a formal treatment of this proposal (*sc.* an extension of the DRL to include conditions of
the type $K_i \ominus K_j$) is spelled out in the appendix.

[26]More precisely, these conditions will be satisfied by the same set of world-assignment pairs
$\langle w, g \rangle$. See below for more discussion of the determination of $K_{i_{\text{sub}}}$.

[27]Recall our discussion of "modal weakening" in 2.2.5.

[28]Where BEST$_{o(w)}$ is a function that takes a set of worlds and returns the "best" worlds as determined
by an ordering source o (i.e. those worlds in m best conforming to the ideal contained in o.) Adapting
from von Fintel and Heim (2011), $\text{BEST}_{o(w)}(\cap m(w)) = \{w' \in \cap m(w) \mid \neg \exists w''[w'' \underset{o(w)}{\prec} w]\}$.
This same function is sometimes also given as ***max*** (e.g. Hacquard 2006, von Fintel and Heim 2011,
von Fintel and Iatridou 2008, a.o.) or ***O(pt)*** (Schwager 2006:247).

(80) *Roberts' necessity operator □ as a universal quantifier:*

$$K_i \underset{m,o}{\square} K_j \iff \forall w' \in \underset{o(w)}{\text{BEST}}\big(\cap m(w)\big) : w' \vDash K_i \rightarrow w' \vDash K_j$$

<u>In words</u>: The condition $K_i \underset{m,o}{\square} K_j$ is satisfied in *w* for all the best worlds w' (according to o) in a given modal base m, if it holds that if w' satisfies the conditions of (*i.e.,* verifies) K_i, then it also satisfies the conditions of K_j.

Simplifying the statement in (80) somewhat for current purposes, each of the three expressions on the right of the arrow can be understood as representing a set of worlds which verify a given condition set: (a) w' is among the 'best' worlds according to some contextually-determined criteria, (b) the conditions in K_i are satisfied in w', and (c) the conditions in K_j are satisfied in w'. We will see how this plays out below.

Although, as 79–80 makes clear, $\ominus$ is expressible in terms of other defined operators over conditions (viz. $\neg$ and $\square / \Rightarrow$), we use the notation $\ominus$ for both convenience as well as to define an *otherwise* condition in the DRL, thus showing how the language can deal with phenomena like the *Red Light* sentences.

Notice further that the definition in (80) leads to the following accessibility relations:

(81) *The accessibility relations determined by* otherwise*:*

$$(K_i \ominus K_j \in C_K) \rightarrow (K \leqslant K_i \leqslant K_j)$$

It follows from (81) that the condition $K_i \ominus K_j$ entails that the information contained in K_i is accessible to K_j (and both have access to some broader discourse context K that they are embedded in).

2.3.2.1 Representing modality in DRL

We return now to the notion of modality and its importance to the ambiguity that arises in *otherwise* sentences. Consider again the *Lecture sentence* data in 61, repeated as 82. Once again, there are two distinct interpretations of *otherwise*:

(82) Students are required to attend the lecture, *otherwise*...

    a. $\approx$ If $\neg\square$ (they ATTEND)...   ...the room will be empty.

    b. $\approx$ If $\neg$ (they ATTEND)...   ...they'll fail the class.

Roberts (1989:700) notes that "[for] sentences which are not conditional in form, modal subordination involves the pragmatic accommodation of a contextually salient [set of propositions] to serve as the antecedent for the nonfactual

clause." For 82, this means the necessity operator is taken to be restricted by some accommodated set of propositions—Kratzer's *conversational backgrounds* (marked β in (83), recalling the definition of modal subordination given in 72).[29]

(83)   *The components of a necessity modal under a Kratzer-Roberts framework:*

$$\underset{m,o}{\square}\, K_c \iff \underbrace{K_m}_{\substack{\text{conversational}\\\text{background } (\beta)}} \Rightarrow \underbrace{K_c}_{\text{prejacent } (\alpha)}$$

In a sentence with the modal operator $\square$, the prejacent clause (α) is interpreted as being modally subordinate to a (pragmatically-determined) set of propositions β, called conversational backgrounds.

In DRS terms, this means that necessity modals claim that for all embeddings of K_m (a DRS whose satisfaction conditions are determined by the conversational backgrounds), there is an embedding for K_c.

In 82, then, the prejacent *students attend the lecture* is interpreted in view of those worlds in which "the school rules in w are best followed." That is, $\forall w'[w' \in \underset{deo(w)}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(w)}\big) \to \text{ATTEND}(w')]$. This is illustrated by DRS structure in (84):

(84)   *A DRS representation for K_i: the pronounced antecedent in 82*
      Students are required to attend the lecture.

$$K_i = \;\; K_m \Rightarrow K_c =$$
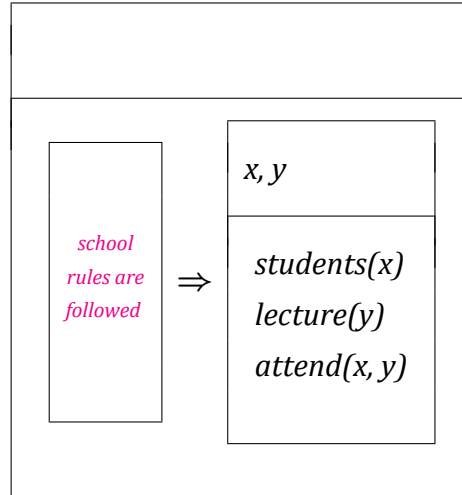
The first *otherwise*-consequent in 82a leads to the accommodation of the conversational background of the modal antecedent (represented in (84) as K_m) as the antecedent proposition to *otherwise*, $K_{i_{\text{sub}}}$.

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[29]Roberts (1989) doesn't represent an "antecedent" box for non-conditionals. This is taken to be a shorthand for a situation in which the modal operator retrieves conversational backgrounds that directly restrict the (realistic) context set ($\cap cg$). For our purposes, however, it will become important to explicitly spell this set out.

(85)   *A DRS structure for the otherwise clause in 82a*:

Otherwise (if school rules aren't followed) the classroom will be empty.

$\neg K_{i_{\text{sub}}} \,\square\, K_j =$

SUMMARY:

K_i :   *school rules $\Rightarrow$ attend*

$K_{i_{\text{sub}}}$:   *school rules are followed*

K_j :   *empty*
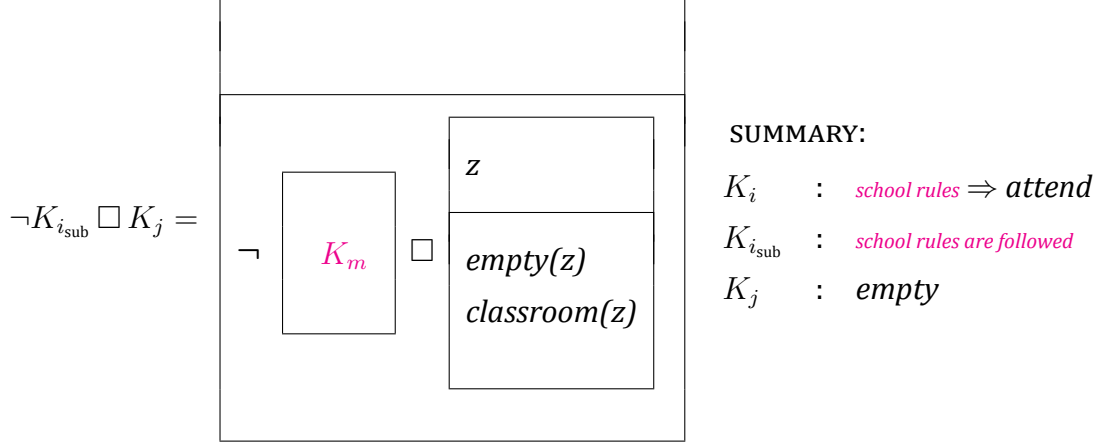
Conversely, in 82b, *otherwise* quantifies over the complement of the set of worlds in which students attend lectures *relative to* worlds in which they are required to do so. That is, *otherwise*'s contribution is to assert that *failing*-worlds include all those worlds where students' attendance *is* a requirement (K_m) that they do *not* observe $(\neg K_c)$. In 86 we provide a DRS representation of this denotation, where we accommodate the entire <u>pronounced antecedent</u> (represented in (84) as K_i) as the antecedent proposition to *otherwise*, $K_{i_{\text{sub}}}$.[30]

(86)   *A DRS structure for the consequent of 82b*:[31]

Students are required to attend the lecture. Otherwise (if they don't attend despite school rules requiring it) they will fail.

$\neg K_{i_{\text{sub}}} \,\square\, K_j =$

SUMMARY:

K_i :   *school rules $\Rightarrow$ attend*

$K_{i_{\text{sub}}}$:   *school rules $\Rightarrow$ attend*

K_j :   *fail*

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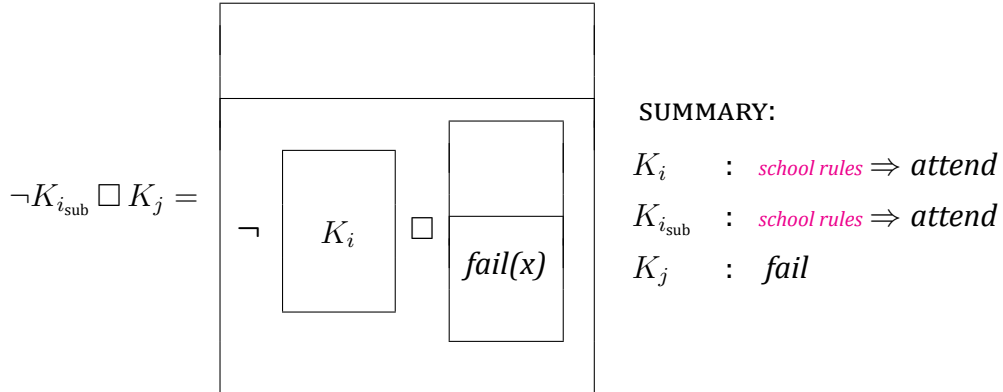
[30]Notice that $\neg K_i = \neg(K_m \Rightarrow K_c) = K_m \wedge \neg K_c$. That is, the negation of K_i is verified in precisely that set of worlds in which students are required to attend lecture and yet they do not do so.

[31]In 84, which shows the denotation of the pronounced antecedent proposition to *otherwise*, K_i, the variable x is used to represent the set of students. The consequent clause of *otherwise* will be subordinate to its antecedent, and hence we used the same variable x to denote the same set of students introduced there.

2.3.2.2 Representing conditionals in modality-sensitive DRL

We adopt a representation of conditionals as a species of modality — conditionals differ from modals insofar as the syntax of a conditional proposition permits for a (partially) *explicit* restrictor. That is, the conditional antecedent constitutes a temporary restriction on the common ground, and the consequent only holds in worlds which satisfy the conditions in the antecedent. Like with modals, however, we assume that conditionals always additionally encode a (usually *implicit*) modal base. In concert with the conversational backgrounds discussed above (an ordering source $o(w)$ which induces an ordering over $m^+(w)$) (Lewis 1975), we can model different subtypes of conditionals (deontic, counterfactual, etc., see Kratzer 2012:39, 66*ff*), as shown in (87).

(87) *Definition: a conditional modal base (following Kratzer 2012:65, 94)*
A conditional modal base $m^+(w) = \bigcap \big(m(w) \cup \{p\}\big)$ is given by intersecting some modal base $m(w)$ with an antecedent proposition p. This conditional modal base along with the same ordering source are then inherited by the consequent q.

Because it is important to the current analysis to separately discuss and access each of these two sets of propositions — the one introduced (explicitly) by the antecedent and the one introduced (implicitly) by the modal base — we draw on this insight to decompose $K_a \underset{m,o}{\square} K_c$ as given in 88.[32]

(88) *Decomposition of the complex $\square$ condition:*

$$K_a \underset{m,o}{\square} K_c \iff \underbrace{K_m \cap K_a}_{K_{m+}} \Rightarrow K_c$$

$$\iff \big(\underset{o(w)}{\text{BEST}}(\cap(m(w) \cup K_a) \Rightarrow K_c$$

<u>In words:</u> The condition $K_a \underset{m,o}{\square} K_c$ is satisfied in a world w if K_c is satisfied in

---

[32]We use the notation $\cap$ to illustrate an operator that takes a DRS K_m representing (a possibly implicit) set of conversational backgrounds and intersects the modal base with those worlds that satisfy the conditions in the antecedent K_a. As alluded to in fn 26, technically these definitions treat DRSs and the sets of worlds in which their conditions are satisfied as the same type. This is a heuristic decision that best facilitates the discussion in the text. We do not spell out an alternative formalization using $\langle w, g \rangle$ here as it will take us too far afield into the formal definitions of modal dynamic semantics, although see the appendix, especially 134 for more explanation and a partial operationalization (*i.e.*, a description of the possible condition sets for K_m/K_{m+}.)

all the best worlds (according to $o(w)$) in a modal base $m(w)$ that have been updated with the conditions in K_a.

As we will show next, this approach, where conditionals and modals are given parallel analyses (specifically, where conditionals are viewed as a species of modality), permits for an analysis of the *Red Light* examples that is parallel to the *Lecture* examples from above.

2.3.2.3   Analysis: A third *Red Light* sentence

We return now to the famous *Red Light* examples. Recall that the prior literature identifies two possible readings for the *Red Light* examples, which we spell in set terms in our paraphrases below:

(89)   *The Red Light examples, repeated:*   (= 48)

    a.   If the light is red, stop. *Otherwise* go straight on.

           ≈ in worlds in which the light <u>isn't</u> red… <u>.</u> If the light is red,

    stop. *Otherwise* you'll get a ticket.

           ≈ in worlds in which the light is red but you <u>don't</u> stop…

In (90), we provide a DRS structure for the pronounced antecedent in these examples, K_i. As in the *Lecture* examples, we explicitly spell out the contribution of the modal base; here we use the shorthand "road rules followed":

(90)   *A DRS structure for the pronounced antecedent in the* Red Light *examples:*
    If the light is red, stop.

$$K_i = K_a \underset{m,o}{\square} K_c =$$

| road rules fol-lowed | ⋒ | x ; light(x) red(x) | ⇒ | y ; Addr(y) stop(y) |
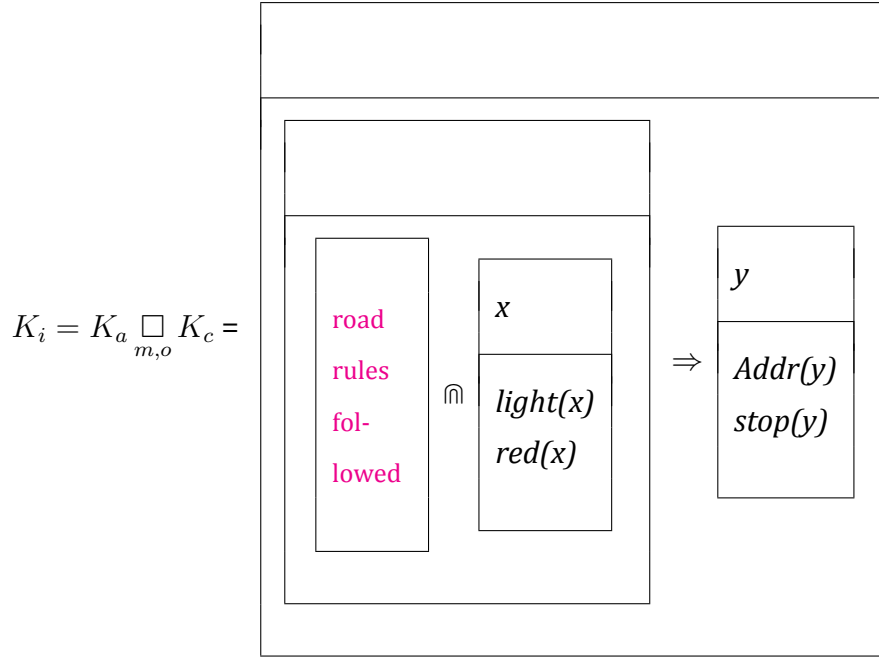
This pronounced antecedent in (90) serves as the DRS K_i in our proposal for *otherwise* in 79: $K_i \ominus K_j \Longleftrightarrow (K_i) \wedge (\neg K_{i_{sub}} \square K_j)$. Next, the consequents of the *Red Light* examples will have the same DRS structure, the skeleton of which is shown below:

(91)   *A skeleton DRS structure for the consequents of the* Red Light *examples:*

$$\neg K_{i_{sub}} \underset{m,o}{\square} K_j =$$

| ¬ | $K_{i_{sub}}$ | $\underset{m,o}{\square}$ | continue(y) or ticket(y) |
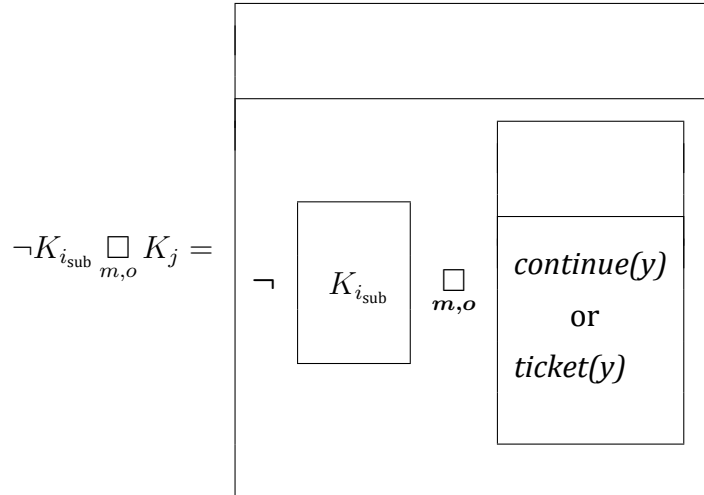
The usefulness of the explicit representation of the modal base in the *Red Light* examples becomes clear at this point: before turning to the identification of $K_{i_{sub}}$ in each example above, we first identify a third, as of yet unnoticed reading of the *Red Light* sentence, illustrated in (92):

(92) *A third reading of the Red Light example:*

    If the light is red, stop. *Otherwise* there'll be chaos on the roads.

        $\approx$ in worlds in which the rules of traffic <u>aren't</u> obeyed...

Although it may seem similar to the paraphrase in 89a, we argue that it is different. In (92), the relevant situation is not simply one in which *you* don't stop, but rather where *no one* stops — or at least where it's impossible to predict if anyone does: *no one* obeys the rules of traffic.[33]

    Here the importance of our dynamic approach to *otherwise* comes into play. We can view the pronounced antecedent to *otherwise* in the *Red Light* example as a series of updates to the common ground, each of which serves to (monotonically further) restrict the set of worlds under consideration in the sentence. We illustrate this in words in (93), and diagramatically, in Figure 1.

(93) *The pronounced antecedent in 92 as a series of contextual updates:*

    Pronounced antecedent: *If the light is red, (you) stop.*

    a. In worlds in which the rules of traffic are followed, ... $\text{\small BEST}\big(\cap m(w)\big)$

    b. In worlds in which the light is red, ... p

    c. You stop. q

Figure 2.1. Updates to the common ground as monotonic restrictions on the set of worlds under consideration. *Otherwise* can "target" the complement set of one of these restrictions (*i.e.*, any of the three disjoint, shaded regions).
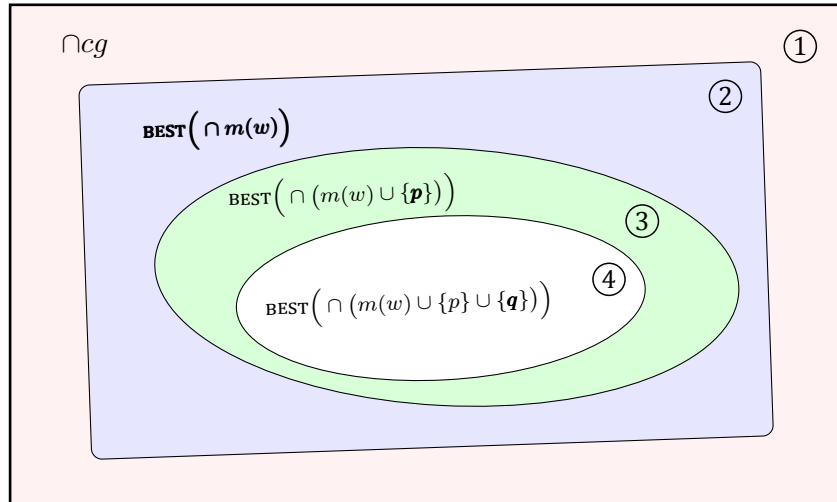
We propose that the antecedent proposition to *otherwise* — namely, that set of worlds whose complement the consequent of *otherwise* applies in, $K_{i_{\text{sub}}}$ — can be

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[33]Note that it is not clear how previous information structural approaches to *otherwise* would handle this different reading.

any one of these updates in Figure 1. We spell out the resulting denotations of the three readings of the *Red Light* examples in (94), where $\overline{X}$ denotes the complement of the set X.

(94) *Accommodated antecedent sets available in the* Red Light *sentences:*

a. *If the light is red, (you) stop.*   *The pronounced antecedent*
   (i.e. in those worlds w' in which the road rules are followed and the light is red, you stop)

$$\{w' \in \underset{deo(w)}{\text{BEST}}(\cap \underset{\text{CIRC}}{m(w)}) \mid \text{RED.LIGHT}(w') \rightarrow \text{STOP}(w')\}$$

b. *...otherwise there'd be chaos on the roads.*   =92
   (i.e. in those worlds w_1 where the road rules aren't followed)

$$\{w_1 \mid w_1 \in \overline{\underset{deo(w)}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(w)}\big)}\} \qquad = ① - ②$$

c. *...otherwise you can continue.*   =89a
   (i.e. in those worlds w_2 where the road rules are followed, but the light isn't red)

$$\{w_2 \mid w_2 \in \underset{deo(w)}{\text{BEST}}\Big(\cap \big(\underset{\text{CIRC}}{m(w)} \cup \overline{\text{RED.LIGHT}}\big)\Big)\} \qquad = ② - ③$$

d. *...otherwise you'll get a ticket.*   =89a
   (i.e. in those worlds w_3 where the road rules are followed and the light is red, but you don't stop)

$$\{w_3 \mid w_3 \in \underset{deo(w)}{\text{BEST}}\Big(\cap \big(\underset{\text{CIRC}}{m(w)} \cup \text{RED.LIGHT} \cup \overline{\text{STOP}}\big)\Big)\} \qquad = ③ - ④$$

The three denotations in (b–d) correspond to the three DRSs that are modally subordinate to K_i, which we have argued represent the set of possible accommodated antecedents in the *Red Light* examples:

(95) *DRSs subordinate to K_i which can serve as the accommodated antecedent* $(K_{i_{\text{sub}}})$ *to* otherwise*:*

a. **The modal base (K_m):**
   Road rules are followed

b. **The conditional antecedent (K_{m^+}):**

Road rules are followed and the light is red.

c. **The entire conditional (K_i):**

If road rules are followed and the light is red, (then you) stop.

To see that other choices of antecedent are unavailable, we consider next another possible variant of the *Red Light* example which, all things being equal, we might have expected to be felicitous. However, example 96, adapted from Kruijff-Korbayová and Webber (2001:76), appears to encounter interpretation problems: it is judged by speakers as either infelicitous or false.[34]

(96)   #If the light is red, stop; *otherwise* you'll get rear-ended.

INTENDED $\approx$ If the light is <u>not</u> red and you do stop...

The intended interpretation of *otherwise* in 96 relies on the accommodation of a set of worlds in which the addressee stops while the light is not red. Crucially, such a set is not made available by the foregoing discourse. The discourse-salient *stopping worlds* are modally subordinate to (a subset of) the *red light* worlds. That is, we predict that all *stopping* worlds are *red light* worlds in this discourse. We correctly predict then, that $\{w' \mid w' \in \textit{STOP} \setminus \textit{RED.LIGHT}\}$ cannot serve as an antecedent proposition to *otherwise*, explaining the infelicity of 96.[35]

Finally, consider an example with several conjoined clauses. In (99), either all three conjoined clauses or the *final* conjunct can be accommodated as an antecedent proposition to *otherwise*. The other conjuncts are not accessible antecedents

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[34]Kruijff-Korbayová and Webber do not consider explicitly the infelicity of 96 (although see their discussion on p. 78).

[35]Compare 96 with the vastly improved 97, where the relevant *if*-clause receives focus and associates with *only*.

(97)   (Only) if the light is RED, stop; *otherwise* you'll get rear-ended.

The felicity of 97 follows naturally from a standard semantics for *only*, where *only* is taken to assert the negation of alternatives to its prejacent (see Horn 1969:99). As shown by Barker (1993), McCawley (1974) and von Fintel (1994, 1997), the truth-conditional content of *only if* can be derived compositionally (*i.e.* as a function of the standard semantics of *only* and *if*), where the assertive content of q, *only if* p is modeled as $\neg p(w) \to \neg q(w)$ (that is, q holds in no worlds other than those in which p does).

(98)   *Presuppositional and assertive components of 97:*
Only if the light is RED, stop; *otherwise* you'll get rear-ended.
<u>Presupposes</u>: If the light is red, you stop.
<u>Asserts</u>: If the light is {yellow | green}, you don't stop. If you do stop, you get rear-ended.

for *otherwise* in this context on their own. Again, this is precisely what is predicted from a modal subordination account.

(99) You should have a snack, chill out for a bit, and then you should go to the gym, *otherwise* you'll feel bad later on.

In sum, we have shown that each of the three *Red Light* sentences investigated here can be represented by the *otherwise* condition (i.e. $K_i \ominus K_j$) given in 79 (formalized in DRL terms in the appendix as 133). As discussed at length, the choice of antecedent for *otherwise* varies between the examples, and cannot be determined from the preceding syntax alone. Instead, we have argued that the proposition which is accommodated as the antecedent to *otherwise* is selected from a set of propositions made salient by the pronounced antecedent K_i: those that are accessible from K_i and which monotonically restrict the context set/the domain of a modal operator.[36]

The consequent clause plays a crucial role in the reasoning about which proposition among this set represents the set of worlds under consideration in the evaluation of an *otherwise*-sentence. We discuss this reasoning in detail in section 2.3.3.

2.3.3 *Otherwise* as a discourse anaphor

As the preceding sections make clear, there is often more than one possible choice for the antecedent proposition of *otherwise*. How is this antecedent chosen, then? We propose that the antecedent proposition which *otherwise* operates on is calculated pragmatically from the prior discourse and the nature of the consequent clause.[37,38]

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[36]An anonymous reviewer queries the applicability of this proposal to relevance/biscuit-type conditionals such as (a) below. We believe that the analysis defended here can be reconciled with previous accounts of biscuit conditionals (e.g. Franke 2007, Siegel 2006 a.o.). Very roughly, a sentence of the type (a) below can be paraphrased as (b) — that is, the negation of the entire biscuit conditional furnishes an antecedent to *otherwise*.

(100) a. *If you're hungry, there's pizza in the fridge.* Otherwise*, there are biscuits on the sideboard.*

      b. (You are hungry $\wedge \neg$ RELEVANT (Pizza in fridge)) $\Rightarrow$ RELEVANT(biscuits on sideboard)

[37]This claim bears some similarity to the notion of an "anaphorically-derived contextual parameter" that features in the analysis of Webber et al. (2001:14).

[38]Relatedly, Corblin (2002) notes the possibility of *negative accommodation* without *otherwise* in *I didn't buy the car. I wouldn't have known where to put it (otherwise)* and *I should have accepted. I wouldn't have been fired.* (our translations: 256, 258).

By deploying the information structure notions developed in Carlson (1983) and Roberts (1996/2012), we can conceptualize of *otherwise* as representing a DISCOURSE MOVE (in effect, a stage in a given discourse), which adds to the QUESTION UNDER DISCUSSION in a given discourse context $\mathcal{D}$.

(101) *Two useful definitions:*

    a.   The **common ground** is a set of mutually assumed background information. The cg is often modeled as a set of propositions, i.e. a set of sets of possible worlds (e.g. Stalnaker 1979 *et seq.*).

    b.   The **QuD** is a partially structured set of questions which discourse participants are mutually committed to resolving at a given point in time. It is often modeled as a stack, consisting of ordered subsets of accepted question moves, the answers to which are not entailed by the cg (*i.e.*, a set of "open" questions in the discourse at a given time.)

With these concepts, we have a means of representing the 'flow' of information and changes in the interlocutors' information states over time. We take a sentence of the form p *otherwise* q to consist of (at least) three discourse moves. We propose that *otherwise* represents a discourse "setup" move with the effect of adding to the QuD.

(102) *Proposal: the pragmatics of* otherwise
    Otherwise represents a discourse "setup" move with the effect of adding to the QuD stack a question about the COMPLEMENT of a set of worlds calculated on the basis of the utterance preceding *otherwise*.

The importance of this pragmatic aspect of our analysis is illustrated for example (103) below.

(103) [*You must eat*]$_{m_i}$, **otherwise**$_{m_j}$ [*you won't grow!*]$_{m_k}$

m_i This is the pronounced antecedent. It represents a modalized assertion: the addressee eats in all worlds in some unspecified conversational background (here, likely some teleological ordering source containing the subject's goals or some set of nutritional standards — e.g. $\underset{tel(w)}{\text{BEST}}\left(\cap \underset{\text{CIRC}}{m(w)}\right)$

$$\forall w'\left[w' \in \underset{tel(w)}{\text{BEST}}\left(\cap \underset{\text{CIRC}}{m(w)}\right) \to \text{EAT}(\textit{Addressee})(w')\right]$$

m_j *otherwise* represents an instruction to consider the COMPLEMENT of some set of worlds accessible from the pronounced antecedent. This can be thought of as signaling the addition of a question to the QUD stack of the form:

$$\lambda p \,.\ \text{what if we are in some } w \in \overline{\boldsymbol{p}} \,?$$

(As above, the $\overline{\text{overline notation}}$ denotes a function that maps a set of worlds to its complement.) In this case, a plausible candidate is: what if we are in a world in which the addressee doesn't eat?

m_k The consequent clause to *otherwise* is interpreted as proffering a (partial) answer to the current QUD by asserting that – as far as the speaker is concerned – the addressee won't grow in the set of worlds made available to *otherwise* — here, the complement of the set of worlds that best adhere to some set of goals/nutritional standards in w.

$$\forall w'' \big[w'' \in \underset{o(w)}{\text{BEST}} \big(\cap\, m(w) \cup \underset{\text{CIRC}}{\overline{\text{EAT}(w'')}} \big) \square \neg \text{GROW}(w'') \big]$$

As we know, the process of establishing the context set for a given *otherwise* sentence is underdetermined by the syntax of the sentence.[39] In the context of the *Red Light* sentences, the discourse moves m_i, m_j, m_k in the pronounced antecedent are identical. However, the consequent clauses of 104a, 104b and 104c contribute the moves m_a, m_b, and m_c, respectively. The fact that these moves are different suggests that a different question move can be raised (added to the QUD) by *otherwise* in each case.

(104) *Three different discourse moves based on the same antecedent:*

  a. [*If the light is red,*]$_{m_i}$[*stop;*]$_{m_j}$ *otherwise*$_{m_k}$ [*there will be chaos.*]$_{m_a}$

  b. [*If the light is red,*]$_{m_i}$[*stop;*]$_{m_j}$ *otherwise*$_{m_k}$ [*keep going.*]$_{m_b}$

  c. [*If the light is red,*]$_{m_i}$[*stop;*]$_{m_j}$ *otherwise*$_{m_k}$ [*you'll get a ticket.*]$_{m_c}$

We provide an Information-Structure based analysis for this state of affairs. We spell this out in 105–107 below:

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[39]In our example in (103), an alternative QUD raised by *otherwise* could be "what if we are in a world in which the addressee doesn't have to eat?" However, this potential question can be dismissed on the grounds that the consequent "you won't grow" isn't a plausible answer to this question. We discuss this issue at length next.

(105) **An information-structural approach to the *Red Light* puzzle**

m_i The *if*-antecedent temporarily constrains the context set (Roberts 1989:687). This might be thought of as adding a question to the QuD stack of the form:

$$\text{what if we are in} \{w' \mid w' \in \underset{o(w)}{\text{BEST}} \Big(\bigcap \big(m(w) \cup \text{RED.LIGHT} \big) \Big) \}?$$

m_j Imperative *stop* represents an answer to QuD(m_i). As with the antecedent in 103, we treat it as a modalized proposition (again with some conversational background f)[40] which further restricts the domain established by m_i.

$$\forall w'' \big[\, w'' \in \underset{deo(w)}{\text{BEST}} \big(\bigcap \underset{\text{CIRC}}{m(w)} \cup \text{RED.LIGHT} \big) \to w'' \in \text{STOP}(\textit{Addressee}) \big]$$

Per our proposal, *otherwise* marks the addition of a question to the QuD stack which considers what would happen if we were in the *complement* to a proposition accessible from the pronounced antecedent:

(106) *The* otherwise *discourse move:*

m_k *Otherwise* represents an instruction to consider the **complement** of some set of worlds accessible from the pronounced antecedent.

$$\lambda p \, . \, \text{what if we are in some } w \in \overline{p} \, ?$$

m_i and m_j have both introduced sets of worlds constraining the context set: each of these sets of worlds represents a candidate that *otherwise* can be anaphoric upon. Moreover, as we have seen in previous sections, the *modal base* of a modalized proposition is also an accessible set of worlds that can be questioned. The Addressee is thus required to *infer* which of these multiple restrictions *otherwise* is anaphoric upon (*i.e.*, its antecedent), based on the content of the consequent. We dub this the *jeopardy! effect*: the addressee is provided with the consequent (=the answer) and must compute (*sc.* accommodate) the correct antecedent (=question) based on it:[41]

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[40]See Portner (2007) a.o. for a modal treatment of imperative sentences.

[41]This bears some similarity to the account of discourse-anaphoric uses of *then* laid out in **?**: "*then* is a discourse marker that signals that the utterance of the embedded clause is in some sense motivated by [and therefore is **anaphoric upon**] the preceding discourse move" (380, 383).

(107)   *The Jeopardy! effect*

m_a *there will be chaos* is interpreted as an answer to *what if we are in* **the complement** of the modal base? (those worlds in which the road rules of in w don't hold)

$$\forall w''\big[w'' \in \overline{\text{BEST}(\cap m(w))}\,\square\,\text{KEEP.GOING}(w'')\big]$$

m_b *keep going* is interpreted as an answer to *what if we are in* **the complement** of RED.LIGHT (relative to the modal base)?

$$\forall w''\big[w'' \in \text{BEST}(\cap(m(w) \cup \overline{\text{RED.LIGHT}}))\,\square\,\text{KEEP.GOING}(w'')\big]$$

m_c *get a ticket* is interpreted as an answer to *what if we are in* RED.LIGHT $\setminus$ STOP? (more accurately, the complement of STOP *relative* to the conditional modal base $m^+(w)$)

$$\forall w''\big[w'' \in \text{BEST}(\cap(m(w) \cup \text{RED.LIGHT} \cup \overline{\text{STOP}}))\,\square\,\text{GET.TICKET}(w'')\big]$$

Our claim, then, is that computing the antecedent of *otherwise* is a pragmatic process, subject to reasoning by the addressee and depending on the given context in which the sentence is uttered.[42] This follows from the pragmatic stipulation that, in a discourse, assertions represent 'at least partial answers [...] to the question under discussion at the time of utterance' (Roberts 2012:20–21, see also Roberts 2004 on the "domain goals" of discourse participants and how these can direct participants' "strategies of inquiry.")[43] Broadly, the discourse contribution of *otherwise* can be understood as representing a "set-up move": it signals to the addressee that its consequent is to be understood as a modal claim, relativized to the complement of a set of worlds accessible from the pronounced antecedent.

2.4   NON-EMPTINESS and possibility modals

Given that, on the analysis presented in the foregoing section, *otherwise* requires reference to a set of "eliminated worlds"—the complement of some set of worlds introduced by the antecedent clause—it follows that a sentence of the form p *otherwise* q

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[42]This makes predictions for online sentence processing — for example, that a given reading could be primed or ruled out by supporting contexts. We leave this for future work.

[43]In fact, this effectively serves as a reformulation and elaboration of Grice's maxim of Relation, adapted for an *Jeopardy!*-structural framework.

will be uninterpretable in discourses in which **no** worlds have been eliminated (i.e. where $\overline{p'} = \varnothing$). This principle is formulated in 108, and reflects the *non-emptiness* requirement we observed in section 2.2.2.

(108) *EXCLUSION: a felicity condition for* otherwise
 The interpretation of *otherwise* α depends on the retrieval of some discourse move whose function was to eliminate a (nonempty) set of worlds β from consideration (i.e., from the context set).
 Otherwise α predicates α of $\overline{\beta}$.

In this section we show two consequences of this criterion for the interpretation of *otherwise* in modalized sentences.

2.4.1 Unambiguous scope

A sentence like *Sam may not be a doctor* is ambiguous between circumstantial and epistemic readings for the modal. With this in mind, observe the contrast between 109/110 and 111 below, which we argue further demonstrates the interpretive constraints that *otherwise* is subject to — namely, that it must be able to refer to a non-empty complement set of worlds, computed on the basis of its antecedent and other components of the context. To illustrate this, consider the three contexts provided for these examples. These are designed to support a circumstantial possibility reading 109, and epistemic necessity and possibility readings 110–111, in the context of an *otherwise* statement:

(109) CONTEXT. Sam got horrible grades in school and is very clumsy

    a. She may not be a doctor, *otherwise*... $\neg \gg \Diamond_{\text{circ}}$

    b. $\approx$ If she were (to become) a doctor... ...she might kill someone.

(110) CONTEXT. Sam works in a hospital and wears a white coat; I'm unsure exactly what it is that she does, but upon soliciting her opinion on my shoulder pain, she shrugs and walks away.

    a. She must not be a doctor, *otherwise*... $\Box_{\text{epist}} \gg \neg$

    b. $\approx$ If she were a doctor... ...she'd know what to do about my pain.

(111)   CONTEXT. Sam works in a hospital and wears a white coat; I'm unsure what exactly it is that she does.

  a.   She may not be a doctor, *otherwise...* $*\Diamond_{\text{epist}} \gg \neg$

  b.   INTENDED $\approx$ If she <u>is</u> a doctor... $^{??}$...she's probably a surgeon.

Observe that, while examples 109 and 110 are acceptable, 111 is not. A crucial difference between the circumstantial 109 and epistemic 111 readings of the antecedent is the scope relation between the possibility modal and the negative operator. Just as for example 62 discussed in section 2.2.2 above, *otherwise* is only licit if it can predicate into a non-empty set of worlds. In the $\neg \gg \Diamond$ case (as in the $\Box \gg \neg$ case) we can successfully achieve this result. But in the $\Diamond \gg \neg$ case, where there is no set of worlds eliminated, *otherwise* is unavailable. That is, whether or not Sam is a doctor <u>is not determined</u> by the antecedent clause in 111. As a result of the infelicity of *otherwise* in these $\Diamond \gg \neg$ contexts (owing to the EXCLUSION criterion), epistemic readings of *may* are ruled out; only the (narrow scoping) circumstantial reading—as in 109—is available. Finally, example 110 as a control, to show us that, in general, an epistemic modal is able to scope above negation and hence that cannot be the source of the infelicity of 111.

2.4.2   Epistemic strengthening

A second, related result concerns so-called 'weak necessity' readings of possibility modals (Rubinstein 2012, von Fintel and Iatridou 2008).

The modals *ought* and *should* have been described as encoding "weak" necessity, distinguishing them from other modal necessity expressions (e.g. *have to* and *must*.) Two examples demonstrating the relation between weak and strong necessities from von Fintel and Iatridou (2008:117) are provided below.

(112)   *Weak and strong necessity:*

  a.   You *ought to* do the dishes but you don't *have to*.

  b. $^{\#}$You *must* do the dishes but you don't *have to*

(113)   a.   You *ought to* wash your hands – in fact, you *have to*.

  b. $^{?}$You *have to* wash your hands – in fact, you *ought to*.

Additionally, as with other modals, *ought* appears to admit of ambiguity between epistemic and circumstantial (e.g. deontic) readings, as shown in 114.[44]

(114) *Weak necessity and modal flavors:*

Morris *ought to* be in his office.   (von Fintel and Iatridou 2008:116)

In view of the co-occurence constraints on epistemic possibility modals with *otherwise*, compare the two sentences (both judged as acceptable) in 115:

(115) *A felicitous epistemic possibility modal with* otherwise*:*

a. She *must* be sick, otherwise she'd be here.

b. She *might* be sick, otherwise she'd be here.

The domain restriction in 115a proceeds similarly to the examples described in the previous section. That is, the antecedent has eliminated NON-SICK worlds from the epistemic context set. The *otherwise* clause is then predicated of these NON-SICK worlds that best conform to the speaker's knowledge state.

However, example 115b presents a puzzle: the use of a possibility modal suggests that as far as the speaker is concerned, the subject may or may not be sick. That is, NON-SICK worlds are *not* eliminated from the context set. Consequently, the felicity condition for *otherwise* as laid out in 108 is not met: unlike in 115a, the NON-SICK worlds cannot be accommodated as a restrictor to *otherwise*. We would therefore predict 115b to be ungrammatical, contrary to the facts.

This problem is repaired here by *strengthening* the meaning of *might*, so that it is interpreted as excluding a set of possible worlds (that is, requiring that it function as a universal quantifier: a hallmark of necessity modals). While the intended interpretation of 115b is weaker than that of its counterpart in 115a, it can still be understood as quantifying universally over possible worlds, albeit over a more restricted set. Following von Fintel and Iatridou (2008:116, fn. 11), 'while strong necessity modals say the prejacent is true in all of the favored worlds, weak necessity says that it is true in all the very best (by some additional measure) among the favored worlds.' With respect to the epistemic domain specifically, the difference could be understood as the difference between relativizing the prejacent to "hard and fast evidence" and "unreliable assumptions about the normal course of

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[44]Cf. Yalcin (2016) for a dissenting view, namely the claim that epistemic modality cannot be 'sensitive to normality orderings' (239) and that *ought* and *should* don't actually admit of a true epistemic reading.

events."[45] Consequently, we propose the paraphrases below:

(117)   *With* otherwise *the possibility modal is strengthened to weak necessity:*

    a. She *must* be sick, otherwise she'd be here.
        ≈ *In all worlds consistent with what I know,*
             if she is not sick, she'd be here.

    b. She *might* be sick, otherwise she'd be here.
        ≈ *In all worlds consistent with my perception of her general behavior*,
             if she is not sick, she'd be here.

The finding that *might/may* — generally understood as encoding modal possibility — are in these contexts apparently encoding weak necessity suggests that the felicity conditions of *otherwise coerce* a non-canonical interpretation of these modals.[46] This result follows from our proposal in section 2.3.2 (and the exclusion criterion in 108), that some non-empty set of worlds must be available for *otherwise* to predicate of.

2.5   Intra-sentential *otherwise* and complement anaphora

So far, the data we have focused on in this paper have comprised uses of *otherwise* that appear to signal a relation between clauses. We have claimed that, in these cases, *otherwise* adds a question of the form *what if the antecedent proposition doesn't hold?* to the QuD stack. Nevertheless, as shown in section **??**, intra-sentential uses of *otherwise* — namely, those which coordinate smaller structures — are also available. In this section, we briefly show how our analysis might be extended to account for such uses. We then relate our analysis to the phenomenon of

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[45]Von Fintel and Iatridou (2008) and Rubinstein (2012) model weak necessity by appealing to at least one additional ("secondary") ordering source which "refines the ranking of worlds" — weak necessity modals predicate their prejacent of "all the very best" (according to some set of criteria) of the worlds in the modal base that are already ranked best. In the current case, the secondary ordering source might be described as some species of *stereotypical* conversational background o_2 that includes propositions about the speaker's perception of the subject's disposition/general conduct. Adopting this analysis, the accommodated antecedent for 115b is:

(116) $\overline{\alpha} = \left\{ w' \mid w' \in \underset{o_2(w)}{\text{BEST}} \left(\underset{o_1(w)}{\text{BEST}} \left(\underset{\text{EPIST}}{\cap} (m(w) \cup \overline{\text{SICK}}) \right) \right) \right\}$

[46]We leave a proper analysis of the mechanism by which this "strengthening" occurs to future research, although, given that *might* is a "weak" scalemate of *must*, it follows that—in contexts which require a necessity interpretation—the interpretation of *might* would be "weak" relative to *must*.

complement anaphora, which has also benefited from an analysis within a dynamic semantic framework.

2.5.1 *Otherwise* with donkey anaphors

A key advantage of DRT is in providing an analysis of so-called Donkey Sentences, such as in (118):

(118)   *Donkey anaphora:*

    a.   If a woman is rich, she owns a donkey.

    b.   If a dog is hungry, Pedro might feed it.   =76

Such sentences were famously used as a counter-examples to Montague's formal analysis of quantification in natural language (**?**), as they defy an analysis in first-order predicate logic.[47] As we saw in section 2.3.1, DRT is able to provide a natural account, treating indefinites as variables rather than existential quantifiers (see Kamp 1981, Heim 1982). This is exemplified again in (119):

(119)

$$
\boxed{\quad\boxed{\begin{array}{|l|} \hline x \\ \hline woman(x) \\ rich(x) \\ \hline \end{array}} \;\Rightarrow\; \boxed{\begin{array}{|l|} \hline y \\ \hline donkey(y) \\ owns(x,y) \\ \hline \end{array}} \quad}
$$
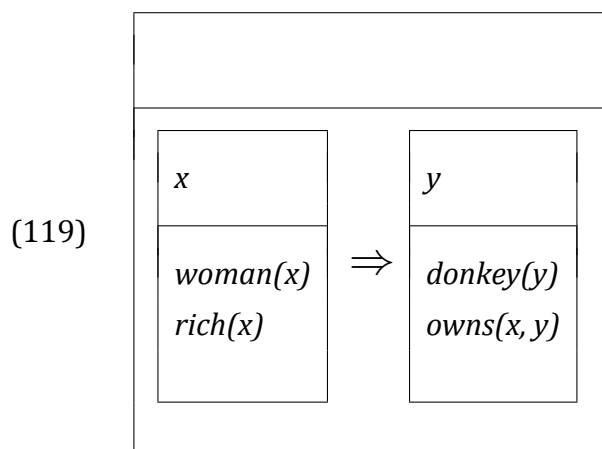
One payoff of the approaches espoused by these authors is the conception of universal expressions as complex conditions of the form $K_i \rightarrow K_j$, where K_i and K_j are sub-DRSs representing the restriction and the scope of the quantified statement, respectively (Roberts 1989:693-4).

Appealing to these same notions, we are able to naturally account for some intra-sentential uses of *otherwise*, as in (120) from Webber et al. 2001:7, repeated here for convenience:

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[47]A formula can be given, but only if the indefinite is translated using a universal quantifier — an arguably undesirable result.

(120)   *Intra-sentential* otherwise*:*

    a.   Every person selling "The Big Issue" might *otherwise* be asking for spare change.   =(57a)

    b.

X
$X = \sum x$ *person(x)*

sell.the.Big.Issue(x)	$\ominus$	$\Diamond$	*ask.for.spare.change(x)*
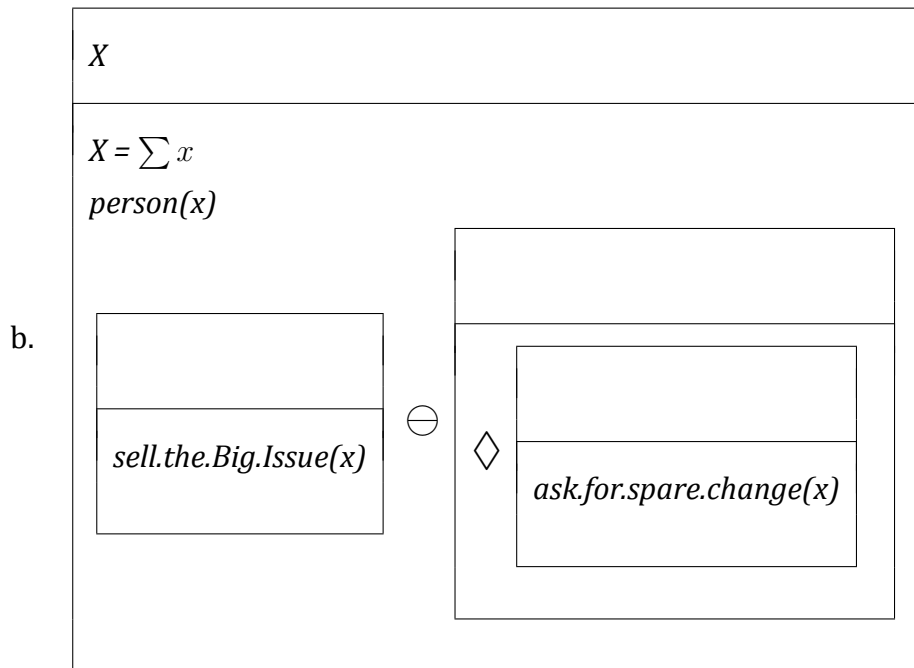
    c. $\approx$ In all worlds in which a person x isn't selling the Big Issue, it's possible that the person x is asking for spare change.

For Webber et al. 2001, example (120) requires the use of E-type pronouns. It thus receives a different analysis than inter-sentential uses such as the *Red Light* sentences. Our account, on the hand, doesn't resort to any additional assumptions, and does not predict any distinction between such examples. We take this to be another advantage of our approach here.

2.5.2   "Intrapredicative" *otherwise*

Expanding on examples such as (120), in this section we investigate intra-sentential uses of *otherwise* (termed *intra-prédicative* by Flament-Boistrancourt 2011). We show how such cases can be united with the analysis presented above. The examples in (121) illustrate several relevant cases:

(121)   *"Intrapredicative"* otherwise*:*

    a.   I started meditating to find a bit of stillness in an *otherwise* hectic life.

    b.   The income they earn from [tea production] is likely to be the only source of cash to supplement their *otherwise* subsistence economy.

    c.   Amelia behaved well *otherwise.*   (Flament-Boistrancourt 2011)

    d.   She's blonde. *Otherwise* she totally looks like her dad.

                (Inkova-Manzotti 2002:124)

Observe that all of these uses are united insofar as they rely on processes of **association** (contextual retrieval of some domain set) and the **exclusion** of the complement of the prejacent from that set (see Webber et al. 2001).

For the intrapredicative uses shown here, then, *otherwise* can be understood to denote a relation that holds between PROPERTIES ($P, Q \in \mathcal{D}_{\langle s, \langle e, t \rangle \rangle}$). Namely, where P is some accommodated property, *otherwise* Q can be understood as a property where if P didn't hold of x in w, then Q would. Building on our proposal in section 2.3, then, we would allow the (complement) set of worlds predicated of by *otherwise* to be constructed not only by considering a proposition (or set of propositions) and its negation, but also by considering a property (or set of properties) and *its* negation. In both cases, *otherwise* is to be understood to **quantify over intensions**. We leave the precise formulation of this extension to our analysis to future research.

2.5.3   Complement anaphora

Finally, we point out similarities between our analysis of *otherwise* and the phenomenon of complement anaphora, exemplified in (122) (Evans 1977, 1980, Nouwen 2003).[48] Complement anaphora occurs in sentences where an anaphor appears to refer to the *complement* of a set of individuals introduced earlier in the discourse:

(122)   *Complement anaphora:*
       Few congressmen admire Kennedy.

    a.   *They* are (all) very junior. $A \cap B$

    b.   *They* think he's incompetent. $A \cap \overline{B}$

---

[48]Some speakers struggle with the complement anaphora reading. The existence of complement anaphora was first extensively studied in a series of psycholinguistic experiments (Moxey and Sanford 1986, Sanford et al. 1994). These authors identify a small set of proportional determiners, including *few, few, very few, not many*, and *hardly any*, as allowing reference to the *complement* of a set of individuals introduced earlier in the discourse.

Moreover, while this has not (to our knowledge) been previously noted in the literature, we find similar effects in the temporal domain:[49]

(123)   *Complement anaphora in the temporal domain:*
        Senators *rarely* vote their conscience. They do what the Party tells them to.

Building on Kibble 1997, Nouwen (2003) develops a dynamic semantic analysis of complement anaphora, where reference to a complement set of <u>individuals</u> arises out of pragmatic constraints, key among them is the Non-Emptiness constraint.[50]

(124)   Non-Emptiness:
        As the antecedent of an expression do not choose a set which is potentially empty, except when this set is the reference set of a quantificational sentence.

Parallel to this proposal, we have argued that *otherwise* picks out a complement set of <u>worlds</u>, and is subject to the exclusion felicity condition, 108. We take *otherwise* to lexically specify complement set reference, which is therefore not subject to the same pragmatic constraints as complement anaphora. We take (125) to be a felicitous paraphrase of a sentence such as 122b:

(125)   *Complement anaphora with* otherwise*:*
        Very few congressmen admire Kennedy. *Otherwise* they (all) think he's incompetent.

Otherwise encodes the instruction to consider a complement set of worlds as part of its semantics. As a consequence, *otherwise* sentences are not marginal and are not subject to the same distributional restrictions as complement anaphora. This observation is similar to an observation Nouwen (2003:109ff) makes about the phrase 'the others':

(126)   *Complement anaphora with* 'the others'*:*
        Very few congressmen admire Kennedy. *The others* (all) think he's incompetent.

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[49]Such effects may be predicted by the discussion of 'generalized discourse subordination' effects of temporal quantifiers (Roberts 1989:716ff, Corblin 1994:8).

[50]See Corblin 1986 and Geurts 1997 for an alternative account whereby sentences described as involving complement anaphora in fact make reference to the *maximal set*, and not truly to the complement set. Nouwen 2003 provides several arguments against this *pseudo-reference* view.

As Nouwen notes, *the others* refers to the *maximal set* of individuals which forms the complement to the set introduced in the antecedent sentence. This use is felicitous is cases where this complement set is necessarily non-empty. Again, the resulting sentence, like in our *otherwise* examples, is then predicated of *all* individuals in this set.[51] See also Corblin (1994, 2002) for a discussion of *relativisations négatives* ("negative accommodation") in a modal subordination framework, which he takes as clear evidence of the need to appeal to some pragamtic phenomenon.[52]

2.6   Conclusion & further work

In this paper, we developed a formal semantic/pragmatic analysis of the interpretation and meaning contribution of the English discourse anaphor *otherwise.* The analysis was couched within the theory of dynamic semantics, and in particular relied on the notion of modal subordination for predicting the distribution of *otherwise* in English sentences.

We proposed that *otherwise* introduces a discourse move (in the sense of Roberts 2012) into the conversation, which encodes an instruction to consider the *complement* of a set of worlds introduced in the clause preceding *otherwise.* That is, p *otherwise* q asserts that proposition p holds (modulo assertoric norms), and that in the case that p' — some component proposition of p — doesn't hold, then some alternative proposition q must be true: $(p) \wedge (\neg p' \,\square\, q)$. We detailed the intensional/modal-dependent property of *otherwise*, its asymmetric conjunctive behavior, and the *weakening* process affecting declarative antecedents in section 2.2.

Following Webber et al. (2001) and other authors, we took as key the observation that the identity of the antecedent clause to *otherwise* — p' in the paraphrase

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[51]Ezra Keshet (pers. comm.) points out a related similarity between *the others* and *otherwise*. *The others* can pick up the members of the restrictor set *not* including the current individuals being quantified over:

(127)   Few/Most boys ganged up on the others.
(cf. #Few/Most boys ganged up on them)

In such configurations, *otherwise* is also available. In the examples below, *otherwise* picks up the worlds other than the winning or cheating worlds.

(128)   a.   If you win, you'll be happier than (you would have been) *otherwise*.

   b.   If you cheat, you'll always wonder if you could have succeeded *otherwise*.

This point is also addressed by Webber et al. (2001:8).

[52]For Corblin (2002:260) the solution is found in relations from Rhetorical Structure Theory like EVIDENCE and JUSTIFY (apud Mann and Thompson 1988).

in the preceding paragraph — cannot be determined by the syntax alone, although it is informed and restricted by it. An analysis that makes use of the notion of modal subordination (Roberts 1989, 1990a, 2020) captures these facts; the sets of propositions that can be accommodated to restrict the quantificational domain of *otherwise* are those which monotonically restrict the context set in the pronounced antecedent p.

Additionally, we argued that we must make crucial reference to the current information structure, in particular to the current Question under Discussion, in determining which of these accessible sets will be accommodated and serve as the antecedent proposition to *otherwise*, p'. We dubbed this phenomenon *the Jeopardy effect*: the nature of the *consequent* to *otherwise* plays a crucial role in determining its antecedent.

An interesting consequence of our analysis is that *otherwise* imposes a restriction on the nature of its arguments; namely the NON-EMPTINESS of that complement set into which it predicates. In section 2.2.2, we empirically motivated this felicity condition; section 2.4 detailed a number of its consequences.

Finally, we briefly showed how this dynamic account can be extended to cases of reference to individuals, and in particular how it can be related to the phenomenon of *complement anaphora*.

2.7 APPENDIX

Modal subordination with *otherwise* – the formal mechanics

In this appendix, we provide further detail about the "discourse representation language" that formalizes the structures (and the satisfaction conditions for $\ominus$) presented in the paper. Further, we show a complete derivation for an "*otherwise*-sentence" as a "proof-of-concept" for our analysis.

As described in §2.3.1, formally a DRS K is a pair $\langle X_K, C_K \rangle$. X_K represents K's *local domain* – a finite set of variables that are assigned to discourse objects at a given discourse stage. Consequently, each DRS can be thought of as introducing participants (represented by variables over the domain of individuals) as well as variables over eventualities and times (per Kamp's (1979, **?**) treatment of temporal/aspectual phenomena, see also Partee 1984).

C is a finite set of conditions that eventually determine the truth value of a given

proposition. An atomic condition is of the form $P(x_{i_1}...x_{i_n})$ (where P is an n-place predicate). Conditions are closed under the operations $\neg, \bigvee, \Rightarrow, \Box, \Diamond$.

Crucially, Roberts (1989:713) also defines the notion of an "accessible domain" A_K – a superset of the local domain for any given K. Accessibility is a partial order that obtains over DRSs such that for any K:

(129) *Accessibility relations for operators and DRSs in DRT:*

$$K_i \vee K_j \in C_K \qquad \to K \leqslant K_i\,;\ K_j$$
$$\neg K_i \in C_K \qquad \to K \leqslant K_i$$
$$\left.\begin{array}{l} K_i \Rightarrow K_j \in C_K \\[4pt] K_i \,\Box\, K_j \in C_K \\[4pt] K_i \,\Diamond\, K_j \in C_K \end{array}\right\} \ \to K \leqslant K_i \leqslant K_j$$

The **accessible domain** of a given DRS, then, is given by the set union of all accessible DRSs' local domains: $A_{K_i} = \bigcup_{K \leqslant K_i} X_K$. As pointed out in §2.3.1, this relation is graphically represented in the box diagrams.

One primary payoff of this conceptualization is an epiphenomenal notion of MODAL SUBORDINATION (Roberts 1989 *et seq.*), where the interpretation of subordinate DRSs is dependent on access to objects introduced by (*sc.*, in the local domains of) those DRSs to which they are subordinate:

(130) MODAL SUBORDINATION is a phenomenon wherein the interpretation of a clause α is taken to involve a modal operator whose force is relativized to some set β of contextually given propositions. (Roberts 1989:718)

In 79, we defined the *otherwise* operator $\ominus$ (and hence the condition $K_i \ominus K_j$) to represent the contribution of *otherwise*. In effect, $\ominus$ can be expressed in terms of other operators (i.e. $\wedge, \neg, \Box$). We repeat this proposal in 131.

(131) *Proposal: A dynamic semantics for* otherwise
$$K_i \ominus K_j \Longleftrightarrow (K_i) \wedge ((\neg K_{i_{\mathrm{sub}}})\Box K_j)$$
<u>In words:</u> $K_i \ominus K_j$ is satisfiable iff both the conditions in K_i and the condition $((\neg K_{i_{\mathrm{sub}}}) \,\Box\, K_j)$ are satisfiable.

Consequently, $K_i \ominus K_j \in C_K \to K \leqslant K_i \leqslant K_j$. As shown in §2.3.2.3, Roberts' accessibility relation between DRSs can successfully predict the range of possible antecedents for *otherwise*. The DRSs that are available to (be accommodated to) serve as $K_{i_{\mathrm{sub}}}$ are those that are embedded within K_i but *not* modally subordinate to other DRSs for their interpretation.

In her extension to the discourse representation language, Roberts (1989:714-5) provides a recursive definition of truth (*i.e.* verification in a model $\mathcal{M}$) for DRSs. Given in 132, effectively, truth in a model is defined for a DRS K with respect to a world if there is some assignment function that satisfies all of the conditions in K in that world (recalling that K itself is a pair including a condition set C_K.)

(132) $\langle w, f \rangle \vDash_{\mathcal{M}} K \leftrightarrow \forall c \in C_K \big(\langle w, f \rangle \Vdash_{\mathcal{M}} c \big)$

A DRS K is verified (or "embedded") in a model ($\vDash_{\mathcal{M}}$) relative to a world w and assignment f iff all the conditions in K are satisfied ($\Vdash$) by w and f.

Roberts spells out a semantics for the satisfaction of all (atomic and non-atomic) conditions in C_K. Extending this, we can define a semantics for the $\ominus$ operator. The satisfaction conditions for $K_i \ominus K_j \in C_K$ are given in 133, where monotonically-growing assignment functions formally model the accessibility relation $\leqslant$ described above. Effectively, they ensure that any modally subordinate DRS will be able to refer to ("access") superordinate structures.

The formalism in 133 spells out the satisfaction conditions laid out in 131, assuming the notational conventions and adapting the proposals in Roberts (1989:714). It makes use of a function BEST which returns those worlds in a given set $m \subseteq \mathcal{W}$ (the *modal base*) which best conform to a given ordering source o (*i.e.*, contextually provided set of propositions inducing an order over m).[53] Note that the notation $f'_{\langle X \rangle} f$ reads: "f' is exactly the same as f except perhaps for the values it assigns to X" (implying that $f' \supseteq f$).[54]

(133) *DRL formalization of $\ominus$ satisfaction conditions:*

$\langle w, f \rangle \Vdash (K_i \underset{m,o}{\ominus} K_j) \leftrightarrow \exists g [g_{\langle X_{K_i} \rangle} f \wedge \langle w, g \rangle \vDash K_i \wedge$

$\forall w', g' \big[g'_{\langle X_{K_{i_{\text{sub}}}} \rangle} g \wedge w' \in \underset{o(w)}{\text{BEST}} \big(\bigcap \big(m(w) \cup \{ w'' \mid \langle w'', g' \rangle \vDash (\neg K_{i_{\text{sub}}}) \} \big) \big)$

$\rightarrow \exists g'' [g''_{\langle X_{K_j} \rangle} g' \wedge \langle w', g'' \rangle \vDash K_j] \big]$

<u>In words</u>: A world w and assignment f satisfy the condition $K_i \underset{m,o}{\ominus} K_j$ iff:

- There is some assignment g (identical to f except perhaps in the values it assigns to K_i) that satisfies K_i;

- If there is an assignment g' (identical to g except perhaps in the values it assigns to $\neg K_{i_{sub}}$) that verifies the **negation of $K_{i_{\text{sub}}}$** in world w' — a world in

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[53]Described in fn 28, the deployment of a function BEST (given by authors elsewhere as *max* or *O(pt)*) significantly compresses the formalism given in Roberts (1989: 714, which follows Kratzer 1981). Given that an ordering source o is modeled as a set of propositions which can induce an ordering $\leq_o$ 'relative to o, at least as good as' over a given set of worlds. Consequently, $\underset{o(w)}{\text{BEST}} \big(m(w) \big)$ returns $\{ w' \in \bigcap m(w) \mid \forall u \in \bigcap m(w). w' \leq_{o(w)} u \}$ (see Hacquard 2006, Schwager 2006).

[54]In Roberts' formalism, $f_{\langle X \rangle} g \leftrightarrow \forall y \big(\neg (y \in X) \rightarrow f(y) = g(y) \big)$ (1989:714).

the modal base $m(w)$ best conforming to some ordering source $o(w)$ — then there will be an assignment g'' (identical to g' except perhaps in the values it assigns to K_j) that **verifies K_j** in w'.

A DRT representation for an adaptation of a (by now familiar) red light sentence is spelled out in 134. Alongside this representation, we list the set of satisfaction conditions introduced by the sentence.

(134) *A formal DRT analysis of an* otherwise *sentence:*
　　　　If the light is red, Randi will stop. *Otherwise* she'll continue straight.

　　　　a.　DRS making use of the $\ominus$-condition:
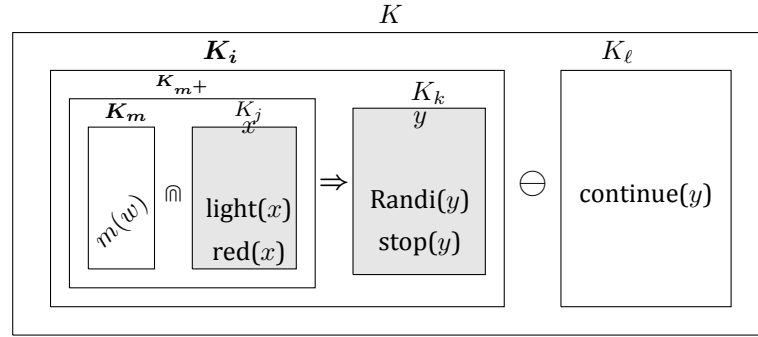
　　　　Where the following satisfaction conditions hold:

- $C_K = \{K_i \underset{m,o}{\ominus} K_\ell\}$

- $C_{K_i} = \{K_j \underset{m,o}{\square} K_k\} = \{K_{m^+} \Rightarrow K_k\}$

- $C_{K_j} = \{\text{light}(x), \text{red}(x)\}$

- $C_{K_k} = \{\text{Randi}(y), \text{stop}(y)\}$

- $C_{K_\ell} = \{\text{continue}(y)\}$

- $C_{K_m} = \{c \mid \langle w', f\rangle \Vdash c\}$ where $w' \in \underset{deo(w)}{\text{BEST}}\big(\cap m(w)\big)$ CIRC

- $C_{K_{m^+}} = \{K_m \pitchfork K_j\} = \{c \mid \langle w'', f\rangle \Vdash c\}$

　　　　b.　DRS illustration spelling out accommodation of the antecedent proposition $(K_{i_{\text{sub}}})$ (compare to §2.3.2, esp. exx. 90 & 91):
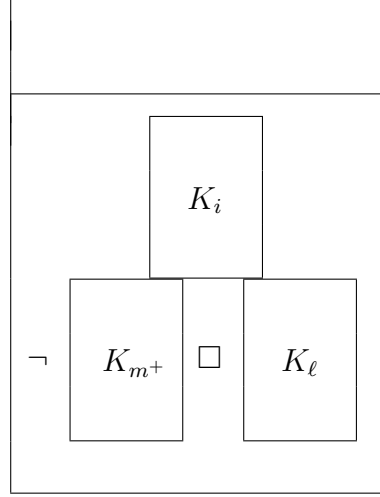
With the satisfaction conditions we introduced above, we can construct the truth-conditions that will verify the matrix DRS K:

(135) *Satisfaction conditions for 133:*

    a. <u>Simplex conditions:</u>
The DRSs K_j, K_k, K_ℓ all contain only atomic conditions.
Each of these DRSs is verified iff there is some world-assignment pair $\langle w, f \rangle$ which satisfies all of their respective conditions.

- $\langle w, f \rangle \vDash K_j \leftrightarrow \langle w, f \rangle \Vdash \text{red.light}(y) \leftrightarrow f(y) \in [\![\text{red.light}]\!]^w$

- $\langle w, f \rangle \vDash K_k \leftrightarrow \langle w, f \rangle \Vdash \text{Randi}(y) \wedge \text{stop}(y) \leftrightarrow f(y) \in [\![\text{Randi}]\!]^w \cap [\![\text{stop}]\!]^w$

- $\langle w, f \rangle \vDash K_\ell \leftrightarrow \langle w, f \rangle \Vdash \text{continue}(y) \leftrightarrow f(y) \in [\![\text{continue}]\!]^w$

    b. <u>The antecedent to *otherwise* C_{K_i}:</u>
The antecedent K_i is verified iff some world-assignment pair $\langle w, f \rangle$ satisfies the (complex) condition $K_j \square K_k$:

$$\langle w, f \rangle \Vdash (K_j \underset{m,o}{\square} K_k) \leftrightarrow$$
$$\forall w', g \big[g_{\langle x_{K_j} \rangle} f \wedge w' \in \underset{tel(w)}{\text{BEST}} \big(\bigcap \big(m(w) \underset{\text{CIRC}}{} \cup \{ w'' \mid \langle w'', g \rangle \vDash K_j \} \big) \big) \rightarrow$$
$$\exists g'' [g''_{\langle x_{K_k} \rangle} g \wedge \langle w', g'' \rangle \vDash K_k] \big]$$

That is: $\langle w, f \rangle \vDash K_i$ iff for all w' in a circumstantial modal base $m(w)$ that best conform to a teleological ordering source $o_{tel}(w)$: if there is

some assignment g' that verifies K_j in w', then there is some assignment g'' that verifies K_k in w'.

c. The matrix condition C_K:

A world-assignment pair $\langle w, f \rangle$ verifies the entire DRS K iff it satisfies the (complex) condition $K_i \ominus K_\ell$:

$$\langle w, f \rangle \Vdash (K_i \underset{m', o'}{\ominus} K_\ell) \leftrightarrow \exists g [g_{\langle X_{K_i} \rangle} f \wedge \langle w, g \rangle \vDash K_i] \wedge$$

$$\forall w', g' [g'_{\langle X_{K_i} \rangle} f \wedge w' \in \underset{tel(w)}{\mathrm{BEST}} \Big(\bigcap_{\mathrm{CIRC}} \big(m'(w) \cup \{ w'' \mid \langle w'', g' \rangle \vDash (\neg K_{i_{\mathrm{sub}}}) \} \big) \Big) \to$$

$$\exists g'' (g''_{\langle X_{K_\ell} \rangle} g' \wedge \langle w', g'' \rangle \vDash K_\ell)]$$

That is: $\langle w, f \rangle \vDash K$ iff:

- There is some assignment g that verifies K_i and

- If those worlds w' in a circumstantial modal base $m(w)$ that best conform
  $_{\mathrm{CIRC}}$
  to a teleological ordering source (likely one that contains Randi's desires to
  both get where she needs to be and to be an upstanding road user) **verify
  the negation of K_{m+}** (the antecedent to *otherwise*, accommodated due to
  the processes described in §2.3.3), then there'll be some assignment g'' that
  verifies K_ℓ in w'.

Notably, y is an unbound variable in its local DRS — however, because $K_i \leqslant K_\ell$, K_ℓ has access to the local domain of this DRS $(A_{K_\ell} \supseteq X_{K_i})$. As a result, the assignment function (g'' in 135c above) is able to assign to y an individual introduced earlier in the discourse (namely 'Randi'). We see, then, that our analysis is able to correctly model an *otherwise* statement, making crucial use of the notion of modal subordination and other tools that foreground discourse dynamics to provide the truth conditions for the sentence.

Chapter 3

Semantics of the Negative Existential Cycle

3.1 Introduction

This chapter brings the observations of the 'negative existential cycle' (see Croft 1991, Veselinova 2013, 2016, this volume among others.) to bear in the context of the Aboriginal languages of Australia. The Australian language ecology is a fertile area for comparative typological work, given its striking linguistic diversity and small, non-sedentary, frequently exogamous populations (Bowern 2010). Some 90% ($N \approx 290$) of the languages spoken on the Australian mainland have been reconstructed to the Pama-Nyungan family (see also Bowern and Atkinson 2012, O'Grady et al. 1966, Wurm 1972), with a common ancestor spoken in Northern Australia almost 6,000 years before present (Bouckaert et al. 2018).

Taking the negative domains of three Pama-Nyungan subgroups as an empirical testing ground, this chapter describes the relationship between so-called 'standard' (SN) and 'existential' negation in an investigation of predictions made by a postulated cyclic change: the Negative Existential Cycle (NƎC). Here, explicit markers of existential negation[1] emerge (stage $\mathcal{A} \to \mathcal{B}$), encroach into the semantic domain of an erstwhile general negative marker (stage $\mathcal{B} \to \mathcal{C}$), and finally displace the latter, becoming a standard negation marker without the formal or functional

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[1]For the purposes of this paper, similarly to others in the current volume, "existential negation" is understood as a linguistic strategy for predicating the *absence* of some entity at a certain location (adapting from Criessels' (2014:2) typology of existential constructions and consonant with the approach taken in Veselinova 2013:139.) Defining 'existential predication', McNally also points out the relevance of "noncanonical sentence types", distinguished syntactically or lexically, which serve to 'introduce the presence or existence of some individual(s)' (2016:210). See also Freeze 1992 for an analysis that explicitly relates existential to LOCATIVE and POSSESSIVE predications.

In neither the LSP volume (contribution objectives) and the NELS proceedings (space) do I give a deeper, typologist-style overview of the NEC, slowing down and showing what's going ˄n at each stage. Could ˄ do this reasonably ˄uickly here (the FodS/ ˄SA talks do give this.)

features of an existential negator (stage $\mathcal{C} \to \mathcal{A}$; see Croft 1991, Veselinova 2016 a.o.) The Pama-Nyungan data provided here give further evidence for the cross-linguistic validity of the NƎC, although, we will also see evidence of contact-induced change in the negative domains of some languages which are not clearly captured by the Cycle.
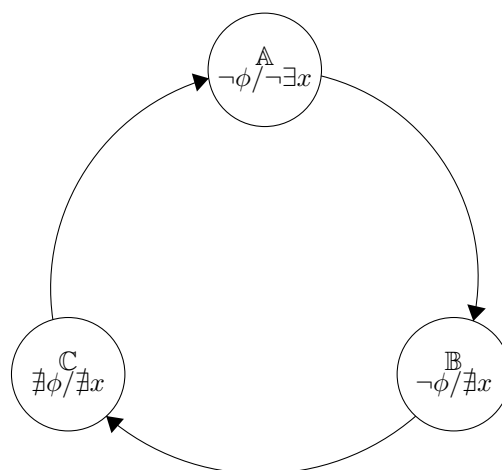
Figure 3.1. The 'Negative Existential cycle' — a typology (and proposed grammaticalisation trajectory) of standard & existential negation according to the analyticity of these markers (Croft 1991, see also Veselinova 2016.) Standard negators ¬ are used to negate both verbal ϕ and existential $\exists x$ predicates in stage $\mathbb{A}$, a suppletive 'negative existential' $\nexists$ arises in stage $\mathbb{B}$ and this marker comes to mark standard negation in stage $\mathbb{C}$. 'Transitional' stages are assumed to occur between each of the labelled stages.

This chapter is organised as follows: Section 3.2 provides an overview of typological generalisations that can be made of negation marking in Australian languages. Paticular attention is paid to the semantics of the category of the so-called "privative case" – for which I propose a semantics. Section 3.3 comprise investigations about apparent semantic change in the negative domains of three subgroups of Pama-Nyungan; as we will see, nominal and clausal negation in each these subgroups is realised quite differently. § 3.3.1 investigates evidence of change, replacement and renewal of negative markers in the Thura-Yura language group of South Australia. § 3.3.2 compares the negative domains of three Yolŋu languages, highlighting evidence of expansion in the domain of privative marking in a number of varieties. § 3.3.3 describes standard negation in Upper Arrernte, situating arguments made elsewhere in the literature (particularly Henderson 2013) that, in this language (in addition to related Arandic varieties), synchronic SN strategies are a result of reanalysis of an erstwhile nominal suffix, a set of changes that also appears to be playing out in a number of varieties of the neighbouring Western Desert dialect chain.
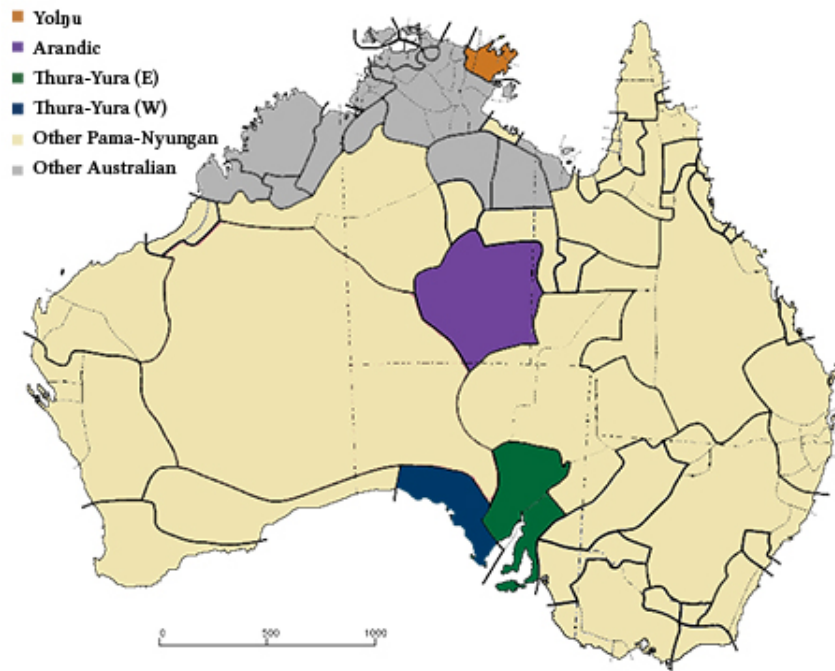
Figure 3.2. Subgrouping of Australian languages. Pama-Nyungan family in tan, with Yolŋu subgroup given in ochre, Arandic in purple and Thura-Yura divided into green (Eastern varieties) and blue (Western/Nangga varieties.)

Ultimately, Section 3.4 shows that a primary upshot of this comparative work trades on an insight, only briefly discussed in work on the NƎC (e.g. Croft 1991:17), that this process (at least insofar as it is actualised in these Australian languages) can largely be understood and predicted with reference to existing work on semantic change (*sc.* diachronic developments in the meaning of a given lexical item) and work that formally seeks to generalise over grammaticalisation pathways and cycles, particularly in terms of the apparent loss of indexical content inherent to the Cycle (e.g. Deo 2015a,b, 2017a).[2] (§ 3.4.1). Comparing these language families' negative domains suggests a unified, quantificational treatment of sentential and existential (nominal) negative expressions. Further, I spell out this analysis and propose a formalisation of the diachronic semantics of the NƎC (§ 3.5).

3.2 The Australian negative domain & a semantics for the privative case

Strategies that natural languages deploy to mark negation have long attracted the attention of philosophers and linguists (see Horn 1989, 2010). In a comprehensive piece of work on the subject, Horn (1989:xiii-xiv) observes that the 'simplicity and transparency' of logical negation (*i.e.*, that function which "reverses" the truth value of a given proposition) is not recapitulated in ordinary language, where the complex behaviour of markers of negation and their interaction with other linguistic categories have long been investigated.[3]

Recent work in the functionalist tradition (Miestamo *e.g.*, 2005 a.o.) has sought to propose a typology for the behavior of 'standard negation' marking strategies across a sample of world languages (including 40 Australian varieties.) *Standard negation* (SN) is understood as those language-specific mechanisms whose function is the inversion of the truth value of a proposition associated with a given (declarative) clause. Drawing a distinction between SN and 'special negation' is warranted in view of the empirical fact that many languages have distinct formal mechanisms for the negation of nonverbal (e.g. copular, existential) predications, imperatives and other types of 'subclausal' negation (Horn and Wansing 2017, Miestamo 2007, van der Auwera and Lejeune 2013, Veselinova 2013).

3.2.1 Negation & Australia: a typological snapshot

Mentioned above, roughly 300 Australian languages have been reconstructed to a single family, Pama-Nyungan, spoken across Australia except for some regions in the north of the continent. The most recent common ancestor of these languages is esimated to have been spoken roughly five to six thousand years BP (a similar timedepth to Indo-European, see Bouckaert et al. 2018:742). Many of these languages remain underdescribed, and consequently, typological and comparative work detailing the expression of negation across Australian languages is underdeveloped. Exceptions to this include Dixon 2002 and Phillips 2021, surveys that have turned up some generalisations about the formal and functional expression of negation in these languages. Based on the insights of these works, we might divide

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[2]See also the distinction drawn between "functional" and "formal" cycles as applied to the Jespersen's cycle in Ahern and Clark (2017).

[3]For Horn and Wansing (2017:1), *negation* is basically the phenomenon of "semantical opposition" – we are interested in that function which "relates an expression e to another expression with a meaning that is in some way opposed to the meaning of e."

the 'negative semantic space' so to distinguish four macro-categories of negator: (1) negative imperatives/prohibitives, (2) clausal/standard negators and (3) nominal negators, including specialised negative existentials and a commonly occurring 'privative' category, and (4) negative interjections. There is a substantial amount of variation in the formal exponence of each of these functions, some varieties distinguishing all four categories (e.g. Bidjara [bym]), some with a single syncretic marker for all four (e.g. Dyirbal [dbl], according to Dixon 2002:84–table 3.3).

An exceptionful (but otherwise fairly robust) formal tendency across Australian languages is for clausal negation to be marked with a particle pre-verbally and for privative case to be encoded as a nominal suffix. We will explore the implications of this generalisation and its exceptions below, in a general overview of negation strategies in Australia, in addition to a deeper discussion of the meaning contribution of the so-called "privative case" markers in Australian languages.

3.2.2 "Standard" negation

This subsection briefly provides some generalisations about clausal negation strategies in Australian languages. For a more comprehensive discussion of exceptions and significant interactions between SN and other aspects of the verbal complex in Australian languages, the reader is referred to Phillips 2021.

Dixon (2002:82) claims that "almost every Australian language marks 'not' by a non-inflecting particle which goes before the verb." He notes explicitly that this generalisation extends also to the most morphologically synthetic non-Pama-Nyungan languages spoken in the north of the continent. Negation in the Arandic subgroup of Pama-Nyungan, which provides a major exception (one of few) to this formal generalisation, and is particularly relevant for current purposes, is discussed in more detail in §3.3.3. The data from Nakkara ([nck] Arnhem, Maningrida, Eather 2011:191) and Ngiyambaa ([wyb] Pama-Nyungan: Wiradhuric) below clearly demonstrate this generalisation. In Nakkara 136, a preverbal negative marker *korla* takes scope over a fully inflected verbal predicate (also affecting the inflectional suffix licensed by the verb, see also Ch. 4 below.) In (137a), the preverbal SN particle *waŋa:y* takes scope over the entire sentence (crucially including the discourse anaphor *yingala:dhi-* 'because of that'), whereas it scopes underneath this item, over only the second predicate in (b), yielding two distinct propositions.

(136)   *Preverbal standard negation in Nakkara*   (Eather 2011:191)

      Korla *nga-y-bburda-ma.*
      NEG   1S.ERG-IRR-hit-TNS.NEG

      'I didn't hit him.'

(137)   *Preverbal standard negation in Ngiyambaa*   (Donaldson 1980:239)

    a. **Waŋa:y** *yiŋgala:-dhi=dju=na*   *girimiyi-la.*
        NEG   same-CIRC=1.NOM=3.ABS wake.PST-THEN

        'It wasn't because of that I woke her then.'

    b. *Yiŋgala:-dhi=dju=na*   **waŋa:y** *girimiyi-la.*
        same-CIRC=1.NOM=3.ABS **NEG**   wake.PST-THEN

        'Because of that I didn't wake her then.'

3.2.3   The "privative case" and existential predications

The privative case (PRIV) is a very robustly attested category in Australian languages (Dixon 2002:84).[4] Broadly speaking, it predicates the absence of some property denoted by the noun that it associates with, although the precise semantic domain of this category varies considerably across languages (*cf.* arguments for the predicative status of negative existential markers in Veselinova 2013:139). In Nyangumarta ([nna] Pama-Nyungan: Marrngu), for example, -*majirri* 'PRIV' can be used to predicate absence (*i.e.* as a negative existential, see (138). Muruwari ([zmu] Pama-Nyungan: SE) similarly makes use of a form -*kil~-til~-tjil*, shown in (139a-b).[5] PRIV case markers are frequently antonymous to another case suffix, frequently occurring in Australian languages, usually glossed as the comitative (COMIT), propritive (PROP) or '*having*' case. Uses of this marker are given in (140). The apparent synonymy of (139b) and (140b) demonstrate the antonymous relation between comitative and privative predications.[6]

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[4]Morphological cases with similar semantics are referred to as *abessive* and/or *caritive* in other literatures (*e.g.* for Uralic in Hamari 2011, 2015, Tamm 2015). 'Privative' is ubiquitous in Australian language description and will be used here throughout.

[5]Incidentally, Oates (1988:77) describes this suffix as the ABESSIVE: "the opposite of the comitative in that it signifies 'lacking' or 'being without' some person of thing.' She glosses it throughout as 'lacking.'

[6]The appendix to Singerman (2018) comments on the instantiation of a very similar distribution in Tuparí ([tpr] Tupian: NW Brazil), where the suffix -*psiro* 'HAVE' is antonymous to PRIV uses of the suffix -*'om* 'NEG'.

(138) *Function of -majirri 'PRIV' in Nyangumarta*   (Sharp 2004:140)

    a. *mungka-**majirri** karru-**majirri**-pa paru-**majirri** jungka jakun*

        tree-**PRIV**   stream-**PRIV**-CONJ spinifex-**PRIV** ground only

        'There were no trees, creeks, or spinifex; only the ground (in that country.)'

    b. *mirtawa mayi-**majirri***

        woman   vegetable-**PRIV**

        'The woman is without food'

(139) *Function of -kil 'PRIV' in Muruwarii*   (Oates 1988:77-8)

    a. *palanj mathan-**kil***

        nothing stick-**PRIV**

        '(There are no) sticks [...nothing]'

    b. *ngapa-**kil**-pu-n*

        water-**PRIV**-3.SG-NMLZR

        'He has no water.' (lit. 'he-waterless')

(140) Existential function of Muruwari *-pira, -yita* 'COMIT'   (Oates 1988:73-4)

    a. *thuu kuya-**yita** wartu*   [Muruwari]

        much fish-**COMIT** hole.ABS

        'The river has a lot of fish in it.' (=There's a lot of fish in the river)

    b. *wala mathan-**pira***   [Muruwari]

        NEG limb-**COMIT**

        '(There are) no sticks.'

    Australian languages have a number of strategies to express existential and non-existence (absence) predications. (138) shows the Nyangumarta privative marker functioning as an existential negator: it predicates the absence of trees, streams and spinifex (a culturally important tussock grass) of a particular location. Additionally, *contra* a prediction made by Croft (1991:19), it is the case in many Australian languages that "an existential sentence [can] consist solely of the noun phrase whose existence is predicated." Additionally, (138) includes an example of bare NP existential predication; the presence of *jungka* '[bare] ground' (in the relevant

location) is predicated.[7] These facts immediately present a challenge to the (formal) negative existential cycle as formulated: if existence predicates are frequently verbless, there is no way to formally distinguish between NEC stages $\mathbb{A}$ and $\mathbb{C}$ on the basis of synchronic data. I know of no Australian language with a *reserved* existential verb; like copular clauses, existence predications appear to frequently make use of a stance or motion verb (most frequently one that primarily means 'sit' or 'lie' and often polysemous with 'stay, live'), or are otherwise verbless.[8]

Relevantly for current purposes, then, the semantics of the privative suffix in this nonexistential use can be instructively captured by adapting existing analyses of existential propositions (*e.g.*, Francez 2007, McNally 2016). These analyses generally characterise existential predication as comprising **obligatorily** some (type of) entity whose existence is being predicated (known as the PIVOT) and some **optional** restriction (perhaps locative) on its existence (the CODA; see Francez 2007). Adapting Francez's analysis would mean treating privative noun phrases as generalised quantifiers of nonexistence. This is consonant with Croft's (1991:18) observation about the privileged status of existential predication: representable as a logical quantifier as opposed to the one-place predicates of other stative verbs. For Croft, the relevant semantic distinction is that, where statives predicate a *property* of a given individual, existentials are taken to "[indicate] the presence or absence of the object itself." This observation — an apparent conceptual distinction between the negation of a property versus the negation of existence — forms the basis of functionalist explanation of the "constant renewal" of negative existentials at stage $\mathbb{B}$ of the NEC (see also Veselinova 2016:173).

In (141), I adapt Francez's quantificational treatment of existential predication in order to give a semantics for PRIV (Francez 2007, **?**). Effectively, privative forms are taken to instantiate a negative quantificational determiner; they assert that the intersection of the two sets of individuals ($P, Q \in \mathcal{D}_{\langle e,t \rangle}$) represented by their arguments is empty (Barwise and Cooper 1981:169).

(141)   PRIV realises a negative quantifier

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[7]Such constructions have also been reported elsewhere in the literature, *e.g.*, for Māori [mao] where '"existence" statements have no copula or existence verbs' (Bauer 1993:78, cited by Chung and Ladusaw 2004 a.o). Similarly, sign languages tend to allow bare-NP existential predication (see de Weert 2016:26ff on Flemish and Finnish sign languages.). Even Marra [mec] (a language cited in Croft 1991:14) appears to permit bare NP existentials, if Heath's (1981:364) translations are to be trusted.

[8]Notable, however, is the fact that these stance/motion verbs often lend particular semantic nuances to the copular and existential predications in which they participate (see e.g. Wilkinson 2012:610-611).

a. $\mathbf{no} = \lambda P_{\langle e,t \rangle} \lambda Q_{\langle e,t \rangle}.P \cap Q = \varnothing$

b. $[\![\text{PRIV}]\!] = \lambda P_{\langle e,t \rangle} \lambda Q_{\langle e,t \rangle}.\mathbf{no}(P,Q)$

P and Q respectively represent those properties that can serve as the "pivot" and "coda" of an existential predication. Crucially Q need not have any syntactic representation, but is rather derived from context indexically (see 138a). This process, — Francez's "contextual closure" (2007:72)) — is spelled out in (143) below. Effectively, the variable Q over sets of individuals is saturated by a contextually given relation and discourse entity/set of parameters (142).

(142) **Contextual domains of entities** (from Francez 2007:71)

For any element $\alpha \in \mathcal{D}_\tau$, α's contextual domain is given as:

$$d_\alpha \underset{\text{def}}{=} \lambda y_{\tau'}[\mathcal{R}_{\langle \tau, \langle \tau', t \rangle \rangle}(\alpha, y)]$$

That is, the set of individuals $y \in \mathcal{D}_{\tau'}$ that are related to α_τ by some pragmatically-inferred relation $\mathcal{R} \subseteq \mathcal{D}_\tau \times \wp(\mathcal{D}_{\tau'})$

$\mathcal{R}$ might be associated, for example with some relation **loc** which takes a set of salient spatiotemporal parameters (Francez suggests that this might be represented as a tuple $st = \langle t, \ell \rangle$ and maps these to some set of entites **loc**ated within st (at that place, at that time.))

For Francez, the CODA, then, plays the role of a "contextual modifier", the same type as a frame adverbial. In effect, it serves to explicitly provide that entity whose contextual domain satisfies Q (78). For example, in (138b), the privative phrase is contextually "closed" by $d_{mirtawa}$ — some set of things related (perhaps possessed) by *mirtawa* 'the woman.'

A truth-conditional analysis of one privative-marked noun (*mungka* 'tree') from (138a) is provided in (143) below; each step is spelled out in prose.

(143) a. *mungka-majirri*

tree-PRIV

b. $[\![mungka]\!]_{\langle e,t \rangle} = \lambda x_e.\mathbf{Tree}(x)$

c. $[\![mungka\text{-}majirri]\!]_{\langle \langle e,t \rangle, t \rangle} = \lambda Q_{\langle e,t \rangle}\big[\mathbf{no}(\lambda x[\mathbf{Tree}(x)], Q)\big]$

The privative-marked NP *mungka-majirri* 'tree-PRIV' is a generalised quantifier: it states that there exists nothing in the domain in the intersection of the set of trees ($\lambda x.\mathbf{Tree}(x)$) and some other property Q

(which will be provided by the context of utterance, *sc.* Francez's *contextual domain* d_α (2007:71)).

d.
$$[\![\textit{mungka-majirri}]\!]^c = \mathbf{no}(\lambda x[\mathbf{Tree}(x)], d_\alpha)$$
$$= \mathbf{no}(\lambda x[\mathbf{Tree}(x)], \lambda y[\mathbf{loc}(st_c, y)])$$

Q is then saturated by d_{st_c}: the "set of things related [...] to the spatiotemporal parameters" being predicated of (*viz.* those things related to a particular patch of *warrarn* 'country' in the past, per Sharp's translation in (138a))
$$d_{st_c} = \lambda y_e.\mathcal{R}(\text{'that country'}, y)$$

As (143d) makes clear, in the absence of an explicit/linguistically-encoded "coda" to serve as a locus/restrictor for the privative predication, the **context** of utterance has made available an additional restriction as the second argument to **no**. This restriction may take the form of a function **loc**, which returns that set of things which are taken to be related to whichever salient spatiotemporal parameters the context provides.

3.2.4   Privatives and the NƎC

If we treat the privative marking on NPs as a type of negative existential predicate, a consequence of the NEC is the prediction that these markers ought to eventually generalise, displacing an erstwhile standard negator (*i.e.*, PRIV markers will participate in the NEC.) Phonological identity between privatives and SN is indeed well-attested in Australia (*e.g.*, Bardi [bcj] (Bowern 2012) and Warrongo [wrg] (Tsunoda 2011).) In these languages, negative existential/privative predication may be syntactically distinguished from standard clausal negation by placing the general NEG particle post-nominally instead of preverbally (shown in (144) as well as (145a–b) below.)

(144)   Negation in Warrongo ([wgu] Pama-Nyungan: Maric)

    a.   Senential negation with initial *nyawa* 'NEG'

        nyawa *ngaya*   *balga-lgo banjo-lgo.*
        NEG   1.SG.ERG hit-PURP   ask-PURP

        'I will not hit [him]. [I] will ask [him].'   (Tsunoda 2011:363)

b. Existential negation with postnominal *nyawa* 'NEG'

nyawa, yarro walwa yamba.
NEG this bad country.

*yori **nyawa**, gajarra **nyawa** worriba **nyawa**, barrbira*
kangaroo **NEG**, possum **NEG** sugarbag.bee **NEG** echinda

***nyawa**, jagay **nyawa**.*
NEG sand.goanna **NEG**

'No, this country is no good. There are no kangaroos, no possums, no bees, no echidnas, no sand goannas [in my country].'

(Tsunoda 2011:661)

A possible example of a postnominal existential negator acquiring the function of clause-initial standard negator is found in Wirangu ([wgu] Pama-Nyungan: Thura-Yura). This scenario is described in § 3.3.1 below, along with a discussion of its potential import for theories of the NꓱC.

3.3 The negative domains & the NꓱC in three Pama-Nyungan subgroups

In this section, comparative and langauge-internal data from three subgroups of Pama-Nyungan, as they relate to the NꓱC, are investigated.

§ 3.3.1 comprises a discussion of Thura-Yura — a family spoken along the South Australian coast. In Thura-Yura, we observe a likely trajectory where a suffixal privative form appears to have developed into a preverbal standard negator *maga*. In Wirangu, this has change created the conditions for the recruitment-by-borrowing of lexical material from an unrelated neighbouring language as a new privative.

§ 3.3.2 consideres data from Yolŋu Matha, a family spoken in Eastern Arnhem Land. This section considers the competition and structured variation between two markers, *yaka* and *bäyŋu* — the latter previously having been restricted to 'negative quantifier' functions. In addition to this, we consider comparative evidence which suggests that in Djambarrpuyŋu privative marker -*miriw* has expanded out of its traditional domain, to the extent that it is now showing signs of also being in competition with the preverbal negative particles. Conversely, the Ritharrŋu data show how a distinct sentential negative suffix -ˀ*may*ˀ appears to have been borrowed from a neighbouring language; a finding not predicted by (unidirectional)

accounts of the NƎC.

Finally, § 3.3.3 examines standard negation as realised by negative suffixation in Arrernte; a typologically unusual feature for Australian languages. It is shown that negated clauses in Arrernte are actually derived (de-verbal) nominal predicates. This fact of Arrernte appears to provide strong evidence in favour of a trajectory where the standard negation strategy in this language is an erstwhile privative (negative existential) marker *-tye=kenhe* that has completely displaced an older form (and then triggered the recruitment of a new special negator for negative existential predications *-kwenye*).

3.3.1 Thura-Yura: change & renewal in the negative domain

Thura-Yura is a Pama-Nyungan language family, with nine documented varieties historically centered on and around the South Australian coast. The Western varieties of these languages abut the Wati (Western Desert) family. Figure 3.3 describes the familial relations of the described Thura-Yura languages whereas Table 3.1 compares their negative lexica (including a possible reconstruction.) Examples of Wirangu negative predications are given in (145) below.[9]

Figure 3.3. A selection of the internal structure of the Thura-Yura family (spoken in South Australia) following Simpson and Hercus 2004:183. *Nangga* is the name given to the Western subgroup whereas core-ThuraYura refers to the Eastern varieties (see Figure 3.2 above for the approximate geographic distribution.)

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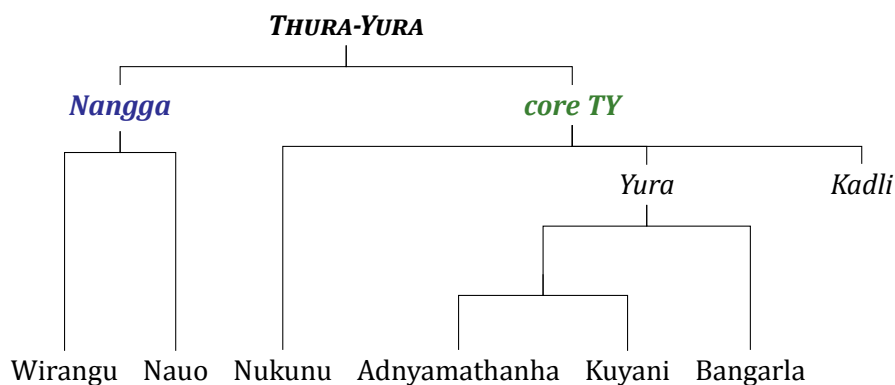
[9]Note that (Hercus 1999:57) describes a number of other markers with negative import in her Thura-Yura grammar (including two other lesser-used privatives, which she regards as older. *Cf.* Veselinova's (2016:173) "constant renewal of the negative existentials."

Table 3.1. Reported partitions in the negative semantic space (data adapted from Black 1917, Hercus 1992, 1999, Hercus and Simpson 1996, Schürmann 1844.) Colouring reflects hypothesised cognacy of lexical items across Thura-Yura. Dashed arrows represent borrowings from neighbouring languages, solid arrows semantic (functional) change.

(WATI)	NEGQ/PRIV	SN	'cannot'/'not yet'
Wirangu [wgu]	*-yudu* *-maga*	*maga*	*guda*
Nauo [nwo]	?	*makka*	
Bangarla [bjb]	*-maga*	*makka*	*kutta*
Adnyamathanha [adt] Kuyani [gvy]	*pari-*	*(g)uda*	–
Nukunu [nnv]	*-wakanha*?		
proto-TY	***maka**/***guda**		
DIYARI? ([dif] Karnic)			

Table 3.1 shows (colour-coded) four of the negative-associated lexical items in the Thura-Yura family, each of which will be discussed here. It allows for a probable reconstruction of a standard negator (or nominal negator) *maka* and/or SN *guda* in the ancestral language. Of Wirangu [wgu], Hercus (1999:57) claims that privative morpheme *-yudu* has entered the language as a borrowing from the Kokata language, a Western Desert dialect spoken in neighbouring territories to the North ([ktd] Pama-Nyungan: Wati). *-yudu* has largely displaced *-maga* as the form of the privative. The recruitment of a distinctive privative form (from lexical resources of a neighbouring, unrelated language) may well be taken as evidence of pressure for the privileged marking of negative existentials that is taken to motivate the beginning of the NEC (*sc.* stage transition $A \rightarrow B$).

(145) Examples of Wirangu negation strategies (from Hercus 1999)

    a. **_maga_ SN**

        *Warlba marnaardu-nga **maga** wina-rn!*
        wind   big-LOC   **NEG**   go-PRES

        '(I am) not going out in a gale!'   (142)

    b.   ***-maga privative***

        *Nganha gidya-**maga***
        1.SG   child-**PRIV**

        'I haven't got any children.'   (57)

    c.   ***-yudu privative*** ("most commonly used")

        *Nganha barnda-**yudu***
        1.SG   money-**PRIV**

        'I haven't got any money.'   (57)

    d.   ***guda SN (modalised)***

        *Ngadhu **guda**   wangga-rn*
        1.SG.ERG **NEG.**IRR speak-PRES

        'I can't talk (about this; it's too embarassing.)'   (143)

Similarly, Adnyamathanha [adt] and Kuyani [gvy] have recruited *pari-* as a negative existential/predicator of absence (Hercus 1999:141). This may also be a borrowing from the Karnic lanugages that abut Eastern Thura-Yura (e.g. Diyari [dif] *pani* 'PRIV', (Austin 1981, C. Bowern *p.c.*).[10] *maga* retains its function as the primary standard negator particle in Wirangu (and Bangarla [bjb]), whereas *guda* (the standard negator in Adnyamathanha and Kuyani), is restricted to a subset of negative meanings 'cannot' and 'not yet' (note that, particularly in northern Australia, the form of negative marking is often conditioned by speaker mood/reality status, see

A potential cognate in the southern Thura-Yura (Kadli) language, Kaurna [zku] (not represented in Figure 3.3.1 for a lack of available data) *wakka-* is found (possibly fossilised) in lexical items *wakkarendi* 'err, stray, be lost', *wakkariapendi*, 'forget, not think of, leave behind', *wakkariburka* 'ignorant person, simpleton' (Schürmann and Teichelmann 1840:II-52).[11] All three of these words appear to be analysable; *wakka-* contributing some notion of emptiness, characteristic of an erstwhile nominal negator/privative category. Apparently, Teichelmann et al. (1840, cited in

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[10]This remains to be demonstrated, but *pari-* may otherwise be cognate with Wirangu *bal-* 'die,' elsewhere described as a lexical source for negators (Veselinova 2013, van Gelderen this volume). An argument potentially in favour of this is found in a possibility of an example of lexical renewal likely born of euphemism; Adnyamanthana *inta-* 'die' appears to be cognate with Wirangu *inda-* 'spill.'

[11]Note attested stems in *pia-**rendi*** 'scattered, stray', *pia-**riappendi*** 'scatter, disperse', ***burka*** 'adult, man' (Schürmann and Teichelmann 1840:II-4,38).

Amery 1996) give *mukandariappendi* as the form for 'forget' — support for poten-tial *m~w* alternation and the cognacy of these forms.[12]

There are insufficient available data to adjudicate between competing hypothe-ses that (a) **guda* has been largely displaced by erstwhile nominal negator *maga* in Wirangu or (b) *guda* has replaced **maka* in Adnyamathana/Kuyani. Nevertheless, an analysis informed by the insights of the NEC favours and supports (a).

Under such an analysis, Wirangu – the Thura-Yura outlier – provides a partic-ularly clear example of a language, the negator forms of which are transitioning through the NEC. The erstwhile negative existential *-maga* has entered the domain of standard, clausal negation, adopting the morphosyntactic properties of a pre-verbal negative (stage $\mathcal{B} \rightarrow \mathcal{C}$),[13] and triggering the recruitment of a new privative marker from the lexical resources of a neighbouring language *-yudu* which is now in competition with the old marker (stage $A \rightarrow B$). The ostensible simultane-ity of these changes also provides further evidence for competition between func-tional and formal pressures for generalisation and recruitment (*sc.* Veselinova's "constant renewal of the negative existential" (2016:173)). Miestamo 2005:225, Phillips 2021.)

Additionally, if the directionality of change described here is indeed on the right track, Wirangu can be shown to resist classification into any unique NEC 'stage', transitional or "cardinal" (in which case the NEC as described in previous work does not represent a complete linguistic typology for negative existential marking strategies.)[14]

[margin note: there's sth strange going on w the T&S sourcing here, i'm not totally sure who says what & may need to go back to archives to find out.]

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[12]Data for Kaurna (and other extinct varieties) is scarce, effectively limited to the lexica pub-lished by nineteenth-century missionaries, Schürmann and Teichelmann (1840). A possible reflex of **guda* is found in items like *kudmunna* 'ignorant, not knowing' (II-12). Additionally, Narungga *-gu* (potentially a "compound form") appears in a number of words with a meaning akin to 'blocked', ac-cording to Eira and Narungga Aboriginal Progress Association (2010:82). Notably, compare *mina-gu* 'blind' (lit. 'eye-blocked') where the semantic connection to an inability/impossibility reading is clear.

Other negative lexical items reported here are *yakko* which appears to function as a SN marker and *-tinna* which is given as the most frequent form of 'without' (i.e. the privative.)

[13]Note that, while this change is consonant with functional grammaticalisation "generalisation", the transition from bound- to free-form is perhaps surprising in view of the (controversial) claim that grammaticalisation clines involve processes of phonetic reduction and syntactic "rigidification" (e.g. Geurts 2000). If the account described here is on the right track, the trajectory of *maga* in Wirangu constitutes a counterexample of these grammaticalization "form" paths (see Ahern and Clark 2017, van der Auwera 2008:40 for the dissociation of "formal" and "functional/semantic" grammaticalisation processes).

[14]The issues of "assigning" the entire negative domain of a given language to a unique stage in the NEC have been explored in some detail by (Veselinova 2016), who observes similar classificatory issues for a number of languages (e.g. East Futunan [fud]: Polynesian).

3.3.2 The Yolŋu negative domain

The Yolŋu languages, a Pama-Nyungan grouping of at least six dialect clusters (roughly coterminous with sociocultural groupings) are spoken through Eastern Arnhem Land (in the far north of the continent) by some 12,000 Aboriginal inhabitants (see Wilkinson 2012:18*ff*, Bowern 2009). Yolŋu are strictly exogamous – each cultural group (clan) being associated with a distinct dialect, a situation that has led to a significant amount of stable linguistic variation (and undetermined internal classification, see Schebeck 2001, Bowern and Atkinson 2012:836).

This section compares the negation systems of three distinct Yolŋu varieties: Djambarrpuyŋu [djr], Ritharrŋu [rit] and Wangurri [dhg] in view of making inferences about change in marking strategies over time. A pattern similar to that observed in Thura-Yura is shown. The key findings are tabulated in Table 3.2 below. The final subsection (§3.3.2.4) comprises a discussion of privative case semantics with particular reference to Yolŋu.

Table 3.2. Partitioning of the negative space in three Yolŋu languages. 'PROH' negates imperatives and SN represents 'standard negation'. 'PRIV' is taken to denote a suffix of the type described above. 'NEGQ' (Wilkinson's "negative quantifier") are independent words that appear to quantify over the NP which they modify (i.e. perform (minimally) the same work as a PRIV suffix.)

	PROH	SN	NEGQ	PRIV
Djambarrpuyŋu [djr]	*yaka*	*yaka bäyŋu*	*bäyŋu*	*-miriw*
Ritharrŋu [rit]	*yaka*	*-ˀmayˀ*	*yakaŋu*	*-miriw*
Wangurri [dhg]	*yaka ŋangawul bayaŋu*	*?yaka ŋangawul ?bayaŋu*	*ŋangawul bayaŋu*	*-nharra*

3.3.2.1 Djambarrpuyŋu

Djambarrpuyŋu [djr] appears to provide an example of Croft's $B \sim C$ transitional-stage language. Wilkinson (2012:356) describes the coexistence of two markers: *yaka* 'NEG' and *bäyŋu* 'NEGQ' (negative quantifier): claiming that 'both occur as propositional negators,' demonstrated in the data in (146) below, from Wilkinson (2012).

(146) a. yaka *as (full) clausal negator*

yaka *ŋayi dhu ga   ŋutha-n ŋaṉḏi-wal bäpa-wal*
NEG 3.SG FUT IPFV.INFL grow-INFL mother-OBL father-OBL

'They don't grow up with (their) mother and father.'

(Wilkinson 2012:691)

b. yaka *as negator in attributive (nonverbal) predication*

yaka *dhuwali ŋatha, dhuwali ŋula nhä-n   dhuwali botjin*
NEG MED   food MED   INDEF what-SEQ that   poison

'That isn't food, that's something else, that's poisonous.'

(Wilkinson 2012:560)

c. yaka *as negator in possessive construction*

*warrakan limurruŋ   **yaka** dhuwal*
animal   1.PL.INCL.DAT NEG   PROX

'This meat isn't ours/for us.'   [AW 20190505]

d. bäyŋu *as clausal negator*

bäyŋu *ŋarra gäthur ŋorranha manymak-ku nha   munhawu*
NEGQ 1.SG today lie.INFL   good-TR.INFL night

'I didn't sleep well last night.'   (Wilkinson 2012:357)

The distributional difference between these two markers is twofold. According to Wilkinson, *yaka* is ungrammatical in quantificational contexts and that *bäyŋu* does not appear in imperative (*i.e.* prohibitive) contexts. It seems, then, likely, that in Djambarrpuyŋu, *bäyŋu*, an erstwhile negative existential has begun to encroach further into the negation space, entering into competition with *yaka*. *bäyŋu*, with reflexes in other Yolŋu languages, derives from (fairly productive) verbal root *bäy-* 'leave.'[15] Examples of negative existential uses of *bäyŋu* are given in (147) and prohibitive uses of *yaka* in (148).

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[15]Note also that *-Thi* 'INCH' derives absence-associated change-of-state readings: *bäy-thi* 'be left over/behind'; *bäyŋu-thi* 'be/have none, pass away, die' (Wilkinson 2012:378).

(147) *Djambarrpuyŋu negative quantification*

    a.   *(*yaka/)**bäyŋu*** *ŋarra-ku* *gi*   *ŋorri*   *ŋula*   *dhiyal*
        ***NEG/**NEGQ**   1.SG-DAT IPFV.INFL LIE:INFL INDEF PROX.LOC

      wäŋa-ŋur-nydja
      place-LOC-FOC

      'I don't have any here' (lit. 'at this place lie (are) none of mine')(Wilkinson 2012:691)

    b. *bili*   *(#yaka/)**bäyŋu*** *limurruŋ*   *dhuwal* *bäwarraṉ*
       because #NEG/**NEGQ**   1.DL.INCL.DAT PROX   animal

      Intended reading: 'Because there's no meat for us.'
           (Wilkinson 2012:560, infelicity judgment AW20190505, cf. 146c)

(148) *Djambarrpuyŋu imperative negation (prohibitive, see also §3.3.2.4)*

    yaka(/*bäyŋu) *waŋi!*
    NEG(/*NEGQ)   talk.INFL

    'Don't talk!'   (Wilkinson 2012:360)

There are multiple arguments for a reconstruction of **yaka* 'NEG' to proto-Yolŋu. First, the fact that it is reported as a negative particle in all Yolŋu varieties (Schebeck 2001:31).

Secondly, possible lexical cognates are reported in likely sisters to Yolŋu in the Western Pama-Nyungan subfamily (a monophyletic branch reconstructed in Bowern 2012:838). Sharp (2004:226) and O'Grady (1963:67) both report a Nyangumarta ([nna] W. Pama-Nyungan: Marrngu) verb *-yaka-* meaning 'leave, quit.' McKelson (1974:35) additionally gives *yaga* as an alternative (potentially emphatic) negative particle in Mangala ([mem] Marrngu). It is very possible that these Marrngu verbs are cognate with the Yolŋu negator, despite Marrngu and Yolŋu having been distantly separated for centuries. Further, Dixon (2002:85) lists other potential cognates to negative *yaka* from a number of other dispersed Pama-Nyungan languages.

Thirdly, the generalisations of the NEC as formulated by Croft (1991) and Veselinova (2016 a.o.) provide a principled typological basis through which an erstwhile negative existential construction arises in a language and begins to encroach upon the functional domain of a standard (clausal) negator (transitional stage $\mathcal{B} \sim \mathcal{C}$.) If this diachronic analysis is on track it may have implications for our understanding

of the characteristics of stage $\mathcal{B} \sim \mathcal{C}$: negative imperatives (prohibitives) being one of the last 'holdouts' for an erstwhile SN marker that is threatened by competition from a negative existential or quantifier. Dixon's typology (2002:84) indeed entails an implicational relationship: if there is formal syncretism between privative and prohibitive marking, then these will be syncretic with the SN marker as well. Gumbaynggir ([kgs] Pama-Nyungan: Southeast; Eades 1979) and Nyawaygi ([nyt] Pama-Nyungan: Dyirbalic; Dixon 1983) are given as examples of a languages for which the prohibitive patterns distinctly from all other negative functions (a datum which is a potential indicator of a language in NEC stage $B \sim C$). The Ritharrŋu data presented in §3.3.2.2 below raise a potential counterexample.

3.3.2.2 Ritharrŋu

The facts outlined in Heath's description of **Ritharrŋu** (rit, 1980c) diverge in a number of significant ways from the Djambarrpuyŋu situation described above. Further, they appear to pose a potential problem for the generality/predictive power of the NEC as formulated.[16] While a form *bayŋu* has been retained in the language (glossed as 'nothing'), there is an additional suffixal form -*ˀmayˀ* used as the "basic" (Heath 1980c:101) general negator alongside *yaka* (the latter form is the standard means of forming prohibitives in Ritharrŋu, shown in 150).

(149)   *Standard and copular negative suffixation of -ˀmayˀ in Ritharrŋu*

    a. *wäni-na-ˀmayˀ napu*

        go-PST-**NEG**   1.PL.EXCL

        'We didn't go.'

    b. *munaŋa-ˀmayˀ rra*

        white.fellow-**NEG** 1s

        'I'm not white'   (Heath 1980c:101)

(150)   *Prohibitive formation with* yaka *in Ritharrŋu*

    yaka nhe baŋgurlˀ-yu-ru

    NEG 2.SG return-*them*-FUT

    'Don't come back!'   (Heath 1980c:76)

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[16]Data provided from Heath (1980c) has been standardised to an Australianist (Yolŋu) orthography from his original IPA transcription.

Existential negation, however, is introduced by the complex form *yaka-ŋu* (shown in 151 below). This form is clearly related to the Djambarrpuyŋu SN particle described above, with archaic Yolŋu suffix *-ŋu* (described as an 'adjective ⇒ substantive' derivation by Schebeck 2001:34, see also Wilkinson 2012:174ff, Heath 1980c:24.) Heath glosses *yakaŋu* as a particle meaning 'absent' (1980c:102).[17] Recalling the possible lexical sources of pan-Yolŋu form (table 3.2 *supra*) **yaka* discussed in the foregoing section, this is an appropriate translation.

(151) *Existential negation with* yakaŋu *in Ritharrŋu*

    a. **yakaŋu** *ŋay dhäŋgu*
       NEGQ   3.SG meat

       'There's no meat.'   (Heath 1980c:102)

    b. **yakaŋu** *ŋay (yaŋˀŋara)*
       NEGQ   3.SG (here)

       'He isn't here'   (Heath 1980c:102)

While it may be tempting to relate *bäyŋu*, as found in other Yolŋu languages, to a possibly lenited form *-ˀmayˀ*, as Heath (1980c:102) points out, it is much more likely to be a borrowing from the geographically neighbouring language Ngandi [nid], an unrelated, non-Pama-Nyungan language also spoken in southeastern Arnhem for which *-ˀmay* is a fusional negative-cum-present tense suffix. The structure of the negative domain in Ritharrŋu (*i.e.* the use of *-ˀmayˀ* in (zero-)copular clauses (149a) and the apparent unavailability of *-ˀmayˀ* in quantificational/existential predications) provides support for the borrowing account, which is considerably more parsimonious than an account by which the syntax, semantics, phonology and perhaps morphology of *bäyŋu* were radically reorganised into a SN suffix. If this is indeed the case, the trajectory runs counter to hypotheses of a unidirectional NEC (*e.g.*, Veselinova 2016:146): an innovative *standard negator* has been recruited into Ritharrŋu's negative space, whereas the so-called "special negators" have retained an older form (Figure 3.4).

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[17]Note that Heath also points out that stance predicates with copular/existential readings can also receive negative marking as in (151b′) below.

    (151b′)   *nhiena-**ˀmayˀ** ŋay yaŋˀ-ŋar̪a*
               sit.PRES-**NEG** 3.SG here

        'He isn't (sitting) there'   (Heath 1980c:102)

Whatever the providence of *-ˀmayˀ*, this is the marker of standard clausal negation whereas existential negation appears to be obligatorily marked by *yakaŋu*. Incidentally, on the basis of the limited data presented here, Ritharrŋgu, a language closely related to Djambarrpuyŋu, might *synchronically* be described as a stage B language *per* the negative existential typology described in this volume, although such a description plasters over the likely diachronic trajectory of Ritharrŋu negative marking.

3.3.2.3 Wangurri

Finally, negation in **Wangurri** [dhg], a northern Yolŋu dialect, appears to make use an additional particle with the semantics of a general negator, *ŋangawul* in addition to *yaka* and *bayaŋu*. McLellan (1992:195) claims that *ŋangawul* and *bayaŋu* can be used in all negative contexts and that *yaka* cannot be used as a "negative quantifier." These data are exemplified in (152) below, all adapted from McLellan (1992).

Figure 3.4. Not predicted by the NEC, Ritharrŋu appears to have recruited an innovative clausal negator $\neg'$ into negative space. This is likely to be an effect of extended contact with an unrelated non-PN language (Ngandi [nid]).

(152) a. *Negative existential use of* ŋangawul

    gulitj-ma **ŋangawul**-*nha* *ŋanapiliŋgura* *ŋapa-ŋa* *gayŋa* *nyena*
    true-DP   **NEG**-DP   1.PL.EXCL:loc   back-LOC   IPFV.INFL   sit.INFL

    'No true ones at our backs are living (*i.e.* descendants.)'   (246)

  b. *Clausal negation use of* ŋangawul

    ga   **ŋangawul** *ŋaya* *barpuru* *nhawun* *ŋunhuŋ* *yolŋu-wuŋ*
    and   **NEG**   1.SG   recently   like   that.ABL   person-ABL

    ŋäku   *dhäwu*
    hear.INFL   story

    'I didn't recently hear the story about that person.'   (136)

  c. *Negative imperative with* yaka

    Yaka *dhaŋu* *ŋäpikiˀ-murru*   *garruwa*
    NEG   this   white.person-PERL   speak.IMP

    'Don't talk through white (language)!'   (195)

    d. *Negative imperative with ŋangawul/bayaŋu*

Ŋangawul/bayaŋu *ŋäpaki²-murru-m*   *garrun,*   *bayaŋu/ŋangawul!*
NEG/NEG   white.person-PERL-DM speak.NEU[19] NEG/NEG

    'Don't talk through white (language), no!'   (195)

    e. *Potential ambiguity between standard and negative existential readings with ŋangawul*

Ŋangawul-*nha ŋaya rakaran nhangul*
NEG-DM   3.SG tell.PFV 3S.ALL

    (i)   'I told him nothing.' (≈ 'There is no thing such that I told him that thing.')

    (ii) 'I didn't tell him'(≈ 'It's not the case that I told him [that thing.]')

                                     (196)

 The Wangurri data show competition between three separate markers and provide a series of interesting insights and questions in view of predictions the NEC would make. The domain of *bayaŋu* (cognate with *bäyŋu* as described above) has further expanded into the prohibitive domain, behaviour that, taken in isolation, may suggest that this marker has moved further along the cycle drawing Wangurri further towards a C-type system (characterised by the availability of ambiguous readings shown in 152e).

Nangawul appears to be an innovation. It has an unclear etymology and stands in no obvious relation to a potential cognate in any related or borrowing from any neighbouring language. Given its wholesale entry into the negative domain – that is, this lexical item's ability to negate verbal clauses, existential clauses and imperatives, it is unlikely that the grammaticalisation of this item taken in isolation can be marshalled as evidence of the NEC. Further research on Northern Yolŋu has the potential to shed light on the change in available readings associated with *ŋangawul*, but until that point, our best hypothesis may be one of lexical replacement, where *ŋangawul* analogistically replicates the domain of the (likely older) negator *bayaŋu*, whose emergence in Yolŋu was described in §3.3.2.1.

The manifestation of the NEC in Yolŋu is further nuanced below, when we consider additional competition from privative morphology in these languages.

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[19]It is unclear whether the difference in verb inflection between *yaka-* and *ŋangawul-/bayaŋu-*prohibitive is categorical. If it is, this may be construed as additional evidence that the use of *ŋangawul/bayaŋu* for prohibitive formation is a more recent innovation (and consequently does not trigger the relatively infrequent imperative inflection.)

3.3.2.4 The PRIVative in Yolŋu

All Yolŋu languages make regular use of a *privative* suffix 'PRIV' (see Table 3.2 above). For most languages, the phonological form of this marker is *-miriw*. The only exceptions to this are found in Dhaŋu-Djaŋu ([dhg], including Wangurri), for which the form is *-nharra* (Schebeck 2001:34) and Yan-nhaŋu [jay] *-nharraŋu* (C. Bowern, p.c.). This latter form may be cognate with the Warluwarra [wrb] and Bularnu [yil] (Pama-Nyungan: Warluwaric) privative *-nharra(ŋu)*. Warluwaric is given by Bowern and Atkinson (2012) as the most likely closest sister node to Yolŋu in Western Pama-Nyungan. If this is the case, then ***nha-** can be reconstructed as a WH-particle to these subgroups' most recent common ancestor (cf. **?**:576). It is used as the basic root WH-words and indefinites (e.g. *nhä*[dhg]; *nhangarli*[yil] 'what, something') in Yolŋu and Warluwaric. *yarraba* shows up in Bularnu in some contexts as a word for 'nothing' (Breen 2000:626, 690) – the univerbation of ***nha* and ***(y)arra* into some type of negative indefinite is therefore a possible source for the *-nhärra* privative.[20]

The etymology for *-miriw* is unclear (although it possibly stands in some relation to *miḏiku(ʔ)* 'bad'[rit], 'rubbish (incl. a sororal kinship relation)'[djr]/[guf] and appearing in words like *miḏik-uma* 'make.badly' *miḏik-irri* 'go.badly', *noy-miḏiku'ŋu* 'feel-sad' *etc.*) In view of the facts above, we have reason to reconstruct a proto-Yolŋu privative *-nharra*, replaced by innovative *-miriw* in the bulk of contemporary (viz. non-Northern) varieties.

In §3.2.3 above, we saw a potential semantics for canonical uses of privative marking. This semantics, which understands the privative as a quantifier that predicates nonexistence of the NP in its scope, restricted to a domain that is provided elsewhere in the discourse, suitably captures nonexistence, absence, and non-possession readings of privative NPs. This semantics for the "canonical privative", however, papers over the significant degree of semantic variation in markers described as 'privatives' in the Australianist descriptive tradition. Djambarrpuyŋu *-miriw* appears felicitous in the broad range of contexts shown in (153) below.

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[20]Further support for this etymology comes from Wakaya ([wga] Warluwaric) *-nhawerru* 'PRIV' (Brammall 1991:36). *-werru* is the Wakaya proprietive marker (<Proto-Warluwaric **-warra* 'PROP'); consequently, *-nha-* seems to have acquired some type of negative semantics.

(153)   A broad range of meanings available to Djambarrpuyŋu [djr] *-miriw* 'PRIV'

    a.   -miriw *predicating non-possession*

        *weyin muka ŋarra dhuwal nhinana-ny yothu-**miriw***
        long okay 1.SG PROX sit.III-FOC child-**PRIV**

        'for a long time I lived here without children'   (Wilkinson 2012:445)

    b.   *Privative use of* -miriw; *synonymous with* bäyŋu 'NEGQ'

        *yolŋu-ny   gan   nhinan warraŋul bala'-**miriw**, **bäyŋu** bala'*
        people-PROM IPFV.INFL sit.INFL outside   house-**PRIV** **NEGQ** house

        'People used to live outside without houses, there were no houses'
                                       (Wilkinson 2012:443)

    c.   *Negative existential use of* -miriw

        *bili   yätjkurr ŋunha wäŋa warralŋur-nydja gapu-**miriw***
        because bad   DIST   land NAME-FOC   water-**PRIV**

        '...because the place is bad. (It's) without water.' (= there's no water)
                                         (Wilkinson 2012:443)

    d.   -miriw *predicating the absence of a de-verbal property*

        *maŋutji ŋorra-nha-**miriw** ŋunhayi wäŋa*
        eye   lie-IV-**PRIV**   DIST.LOC place

        'It's impossible to sleep at that place.'   (Wilkinson 2012:448)

    e.   *Privation of a de-verbal relation*

        *ḻuka-nha-**miriw** ŋayi nunhi dharpa-ny*
        eat-IV-**PRIV**   3s   ENDO tree-PROM

        'That tree is not edible.'   (Wilkinson 2012:446)

    f.   *Privation of an eventive de-verbal relation*

        *djamarrkuḻi-y' marrtji lakaram baḏatju-na-**miriw***
        children-ERG go.I   speak.I make.mistake-IV-**PRIV**

        'The children were speaking without making mistakes'
                                         (Wilkinson 2012:449)

g. -*miriw in a subordinate clause: privation of a de-verbal property/disposition*

...*ga yolŋu-wal-nha   ŋuri-kal-nha wäŋa nhä-nha-**miriw**-wal-nha*
and person-OBL-SEQ ANA-OBL-SEQ place see-IV-**PRIV**-OBL-SEQ

　miltjiri-wal-a
　blind-OBL-SEQ

'...and to the person who cannot see the place, the blind.'

(Wilkinson 2012:448)

h. *Negative predication (locative)*
Context: A response to the question 'is it inside?'

*yaka, djinawa'-**miriw***
NEG,   inside-**PRIV**

'No, it isn't inside.'   (Wilkinson 2012:445)

i. *Prohibitive use*

*l̠uka-nha-**miriw**-nha dhuwali-yi-ny   dhulŋuŋu-n   ŋatha*
eat-IV-**PRIV**-SEQ   there-ANA-PROM assigned-SEQ food

'Don't eat it, that food is for someone else.'   (Wilkinson 2012:446)

j. *Sentence fragment (likely restricted to informal use)*
Context: Playing a game where the researcher's pencil is grabbed off the table

Is this your pencil? ***Miriw.***
　　　　　　　　　　　　PRIV

'Is this your pencil? (There's) none!'   [AW 20180731]

The data in (153) are extremely relevant for current purposes. They show how the semantic domain of the PRIV, a lexical item with the semantics of canonical negative existential, has expanded (such uses of PRIV are reportedly ungrammatical in other varieties, including Yan-nhangu [jay], Claire Bowern, p.c.). Whereas these markers are generally thought of as quantifying over a domain of individuals (a-c) above, the remaining examples (d-i) all show -*miriw* ranging over a domain of *eventualities*. Morphologically, -*miriw* is suffixed to a verbal root in the fourth inflection -∅~-*na*~-*nya*~-*nha* 'IV', ostensibly the strategy for deriving eventive nominals from verbal predicates (*sc.* nominalisation, see Lowe 1996:103). In (g), for example, -*miriw* seems to actually scope over an eventive nominal whose semantics derive

from an entire VP: 'the person such that that person engages in no event of 'seeing places.' Similarly, (h) appears to mark the absence of a co-location relation between two objects. This verbless sentence gets its negative force from the privative suffix. Our common conceptions of privative marking certainly do not predict this function.[21] We will see how the semantics for PRIV can be simply extended to account for this (ostensibly innovative) usage.

Also notable is the use of privative constructions in forming prohibitives, shown in (153i). Wilkinson (2012:446) notes that here, privative-marked eventive NPs express "a complete negative predication...stronger, less polite than regular imperatives." This strategy indeed seems analogous to English utterances of the type 'no smoking' and 'no eating', which indeed do carry imperative force and are constructed in a manner that appears to quantify over 'smoking' and 'eating' events in the utterance context.

This subsection has marshalled data about an evident expansion in the semantic domain of the privative marker in Djambarrpuyŋu; from predicating *absence of "things"* to predicating the *nonactualisation of events* in a given context. This consequently points to the apparent generalisation of a lexical item out of the semantic space of traditional 'negative existentials' into functions that are normally asociated with standard (or other special types of) negation. The following section on Arrernte negation will investigate an ostensibly similar phenomenon further along the cycle; one that has rendered these languages outliers with respect to typological generalisations about negation strategies in Australian languages. This section should shed further light on the 'bleaching/generalisation' pathways of special negators.

3.3.3   Arandic: the nominal status of negated verbals

Along with a number of other Arandic varieties, Mparntwe (Alice Springs) Arrernte ([aer] Pama-Nyungan: Arandic) is spoken in the Central Australian desert. It is one of several of Australian languages that marks negation with a verbal suffix, fused into the verbal complex and diverging from the broad characterisation of Australian languages deploying preverbal SN marking made at the beginning of this chapter. According to Wilkins (1989:71), this negation suffix *-(t)yekenhe~-tyange*[22]

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[21]Note however, that Tamm (2009, 2015) reports the parallel use of abessive suffixes and a preverbal negator in Estonian. She suggests a difference between the two strategies that is anchored in some shade of modal meaning (i.e. "a presupposition about a plan, a standard or an expectation considering a normal state of affairs"). See §3.4 (note 39) for more.

[22]The form of this suffix is given as *-ety(e)=akenhe~-etayng* in Henderson 2013. I have not changed the orthography in example sentences cited here, rather opting to replicate the orthographic forms

'replace[s] tense [marking]' in this language; that is, the main verb of a negated clause carries none of the tense/mood/aspect information that it does in a positive Arrernte clause — effectively an instantiation of Miestamo's negative asymmetry with respect to *finiteness* (`A/Fin` 2005:73ff).

In Arrernte, an inflection-bearing auxiliary from the *"existential-positional" class* (predicates with stance or motion semantics which are grammaticalised in copular and existential constructions), is then optionally introduced to encode this information as shown in (154a). (154b) gives an example of temporal information (*viz.* pastness) being (presumably) supplied by the nonlinguistic context.

(154)   Upper Arrernte ([`aer`] Pama-Nyungan: Arandic)

   a.   *Anwerne-k-artweye mape-le pmere   kurn-ile-**tyekenhe** ne-**ke**.*
        1p-DAT-custodian   PL-ERG country bad-CAUS-**NEG**   be-**PST**

        'Our ancestors didn't (ever) hurt the country.'   (Wilkins 1989:235)

   b.   *Kweye, the   ng-enhe aw-**etye**=**akenhe***
        oops   1s.ERG 2s.ACC hear-**NEG**

        'Sorry, I didn't hear you'   (Henderson 2013:412)

Wilkins (1989:235, fn 17) suggests that the negative suffix is historically derivable from 'the nominalising suffix *-(n)tye*', to which a possibly erstwhile negative form *kenhe*,[23] with reflexes in other Arandic varieties, attaches (see also Yallop 1977:275). Support for this semi-complete univerbation is found in the fact that a number of formatives can be inserted at the boundary between the negative inflections two postulated components (see Wilkins 1989:378*ff*), shown in (155a). Seizing on this argumentation, Henderson (2013:411-26) goes to some lengths to demonstrate the nominal status of verbal roots inflected with *-etye=akenhe*; some of these arguments are rehearsed here in view of better understanding the diachrony of Arrernte negation, although the reader is referred to his work for more evidence in favour of this analysis.

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and glossing decisions of each author. The sole exception to this is standardisation to Leipzig glossing conventions and Henderson's VNeg$_{(1/2)}$ to NEG.

[23]A particle *kenhe* is also reported by Wilkins (1989:372) which is glossed as BUT and indeed appears to have the syntax of a coordinator. While the semantics may contain some element of negative/subtractive meaning, it is unclear what relation this particle bears to the verbal negator (including questions about possible directionality of semantic change or whether this is merely an example of homonymy.) In related Arandic language Kaytetye [gbb], this form is translated as 'might' (?:424)

(155)   The status of negative inflection in Eastern/Central varieties of Arrernte

a.   En(do)cliticisation of adverbial particles in the verbal negator

*Re=atherre untyem-eke~untyeme   an-err-eme   angk-err-**etye**«arlke»**akenhe***
3.DL.NOM   facing.away-DAT=REDUP   sit-.DL-PRES   speak-RECIP-**NEG**«also»

'The two of them are sitting down and not talking to each other.'

(Henderson 2013:417)

b.   Apparent ergative suffixation in cases of secondary predication (obligatory *iff* the main predicate is transitive)

*Re il-eke arlkw-**etye**=**akenhe**-ele*

'S/he cooked without eating.'   (Henderson 2013:418)

c.   Negated verb form taking nominal negator

*Angk-**etye**=**akenhe**-kwenye; irnterre   anthurre angk-eke*
speak-NEG-NomNEG   intensely   INTENS   speak-PST

'(She) wasn't *not* talking; she was talking a lot.'

(Henderson 2013:416)

The sentences in (155) suggest some convincing arguments for the emergence of a standard negation strategy out of an erstwhile special nominal negator. (a) provides formal evidence of the complex status of *-tyekenhe*: a set of adverbial particles (including *=arlke* 'also', *=nthurre* 'really', *=ante* 'only' *etc.*) appear to be able to intervene between the 'nominalising formative' *-etye* and the 'negating formative' *=akenhe*. It should be noted that cross-linguistically, this appears to be a set of (adverbial) operators that associate with focus (e.g Jackendoff 1972, Rooth 1985). According to Wilkins (1989:381), the locus of insertion of these particles indeed has scopal implications, compare *(ayenge) arlkwe-**tyekenhe**=ante* '(I) <u>only</u> didn't eat' and *(ayenge) arlkwe-**ty**«ante»**kenhe*** '(I) didn't <u>only</u> eat.'[24]

Ex. (155b) shows the negated verb receiving ergative marking when participating in secondary predication alongside a transitive verb. In this sense, the negated verb again behaves morphosyntactically identically to nominals (and unlike positive verb forms).

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[24]A complete analysis of this phenomenon is outside the scope of this paper, although assuming a standard semantics for *only* (e.g. Horn 1969), the correct truth conditions can be derived by understanding *=ante* as taking wider scope over the negated predicate in the first case ('not eating' is the only thing I did), whereas it scopes narrowly in the second case ('eating' is the only thing I didn't do).

Interestingly, (155c) shows a verb form with negative marking occurring with the privative[25] *-kwenye* in what is likely an example of metalinguistic negation (see e.g. Horn and Wansing 2017:19 for an discussion of this phenomenon). Further work remains to be done on this topic, but this provides striking evidence for both the (semi-)nominal status of the negated verb and the renewal of a special nominal negator in Arrernte. Additionally, Veselinova (2016:171) points out that nominalisation of lexical verbs is a component of the most common cross-linguistic 'pathway whereby negative existentials break into the domain of SN (i.e. $B \rightarrow C$, see also §3.4 for further discussion).

Data for related Arandic languages is sparse, it is therefore not possible at this time to reliably reconstruct the trajectory of negative marking in the the Eastern and Central dialects reported on here. Nevertheless, Katetye, the sole Arandic outlier (see Hale 1962, Koch 2004), is also reported to make use of a suffix *-wanenye* to negate 'actions' and to mark privative relations (Kaytetye 2012:826). That verbal suffixation, a standard negation strategy otherwise atypical of Australian languages,[26] is found at both ends of this subgroup, suggests a scenario in which privative markers came to displace other strategies of standard negation relatively early in its history. If this analysis is on track, then we can infer that the Arandic languages have undergone a full cycle of the NEC, and that, in view of the renewal of the privative form (*-kwenye*) described in various Upper Arrernte varieties above (a likely characteristic of stage $\mathcal{B}$), we can further postulate the recommencement of the cycle.[27] This diachronic trajectory is summarised in Figure 3.5. Consequently,

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[25]*-kwenye* is glossed by both Henderson 2013, Wilkins 1989 as a "Nominal Negator" 'NNEG', although at least Wilkins 1989:158 treats this term as synonymous with 'PRIV'.

[26]A sole exception to this is found in the neighbouring Western Desert varieties (including Pitjantjatjara [pjt]) express standard negation by way of a nominalised verbal predicate (note that the nominaliser *-nytja* is also phonologically very similar to the Arandic nominaliser described above) and postverbal negator *wiya*, pointing to a similar trajectory (Sasha Wilmoth, *pers. comm.*, 2020) This negator *wiya* is also used in privative constructions.

(i) a. *wiya* + nominalisation for sentential negation in Yangunytjatjara [kdd]

ngayulu kati-nytja   wiya, Anti-lu   kati-ngu
1s.ERG   take-NMLZR NEG   Andy-ERG   take-PRES

'I didn't take it. Andy took it.'   (Goddard 1983:244)

b. *wiya* + noun for negative existential in Yangunytjatjara

mitjini   wiya-ngka panya, iriti...
medicine   NEG-LOC   ANA   long ago

'(That was) in the old days, you know, when there was no medicine.'   (Goddard 1983:39)

[27]Note that a possible implication of this is the instantiation of a direct $\mathcal{C} \rightarrow \mathcal{B}'$ stage where a language with homophonous standard and existential negation directly recruits a new existential negator into the system. Given the tendency in Australian languages towards existential predication

it appears that the generalisation of a nominal negator in Arandic seems to have effected a wholesale restructuring of standard negation strategies and, consequently, the negative domain in these languages.[28]

Figure 3.5. Summary of reconstructed changes in the Arandic negative domain in terms of NEC stages $(\mathcal{A}, \mathcal{B}, \mathcal{C})$

**pre-p-Arandic

$^{**}\mathcal{B} \to \mathcal{C}$

*p-Arandic

$^{*}\mathcal{C} \to \mathcal{B}'$

Kaytetye   core Arrente

i By hypothesis, pre-proto-Arandic conforms with 'standard average Australian' preverbal SN strategies with a distinct post-nominal privative (***kenhe*) $\mathcal{B}$

ii In proto-Arandic (most recent ancestor to documented varieties), nominalisation plus privative suffix is repurposed as a productive negative strategy$\mathcal{C}$

- This strategy has likely been retained in Kaytetye [gbb]

iii A new nominal negator (*-kwenye*) emerges in core Arrernte varieties $\mathcal{B}'$

- Currently, there is insufficient evidence for an intervening $\mathcal{A}'$ stage in Arrernte.

3.4   The NƎC and a unified semantics

The data presented in § 3.3 above demonstrate a robust, grammaticalised sensitivity to a distinction between 'standard' clausal negation and the negative existential predication (*i.e.* predications of absence) in three distinct subgroups of Pama-Nyungan. This sensitivity is manifested in the cross-linguistic tendency to deploy/recruit discrete lexical and morphosyntactic devices to perform these two functions. We have also seen evidence of an ostensible diachronic tendency to flatten this distinction, as the conditions of use for negative existentials appear to relax, at which point they encroach into the domain of an erstwhile verbal negator (*e.g.* Yolŋu). By hypothesis, it is these two processes that underpin the NƎC as described.

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by bare NP (contra Croft 1991) or stance verb, discussed in §2.2 *supra*, this may be expected.

An alternative analysis, informed by the NEC, may involve treating the 'nominalising element' in Arandic negative suffixes as a (further) grammaticalised existential. Note for example the plausible phonological similarity between "existential-positional" verbs *-ne-* 'sit', *-nte-* 'lie' and the Kaytetye and Mpwarnte Arrernte nominalising elements *-nge, -tye*. Far from determined, such an analysis bears further research: a full diachronic account of Arandic verbal derivation is out of the scope of the current work.

[28]I make no particular claim about the form of these markers, although by hypothesis, the form of the privative in some common pre-proto-Arandic ancestor is a reflex of present day Arandic =*kenhe*.

This section proposes a semantics that unifies PRIV and NEG and seeks to situate the NƎC – as it appears to have been instantiated in these Australian languages – in the context of broader work on the cyclical nature of meaning change.

3.4.1 Semantic change and grammaticalisation pathways

The notion of 'grammaticalisation' – that process whereby grammatical categories arise in languages by way of the recruitment and reanalysis of lexical content – is one that has attracted a good deal of functional typological work (*e.g.*, Bybee and Dahl 1989, Bybee et al. 1994, Dahl 1985, Heine and Kuteva 2003, Traugott 1980 a.o.). Of particular importance is the finding that, cross-linguistically, these grammatical categories evolve along diachronic pathways that appear to be constrained and unidirectional. This observation is the explicandum at the heart of contemporary work on meaning change and one that is of significant importance for our understanding of semantics and language change. In recent years, bringing formal tools for describing the 'interpretation of functional expressions' to bear on these questions has been fruitful (see Deo 2015a for a detailed overview of this enterprise).

Figure 3.6. The structural properties of cyclical meaning change as formulated by Deo (2015b a.o.) A marker (form) **X** is ambiguous between two readings α, β at the context-dependent stage (CD), a marker **Y** is recruited to encode β at the partially context-dependent stage (PCD), whereupon it categoricalises, such that **X** can no longer be used to encode β: now the distinction between the two meanings is explicitly marked (EM). Eventually, the domain of use for **Y** generalises at which point **Y** is now ambiguous between α, β (CD').
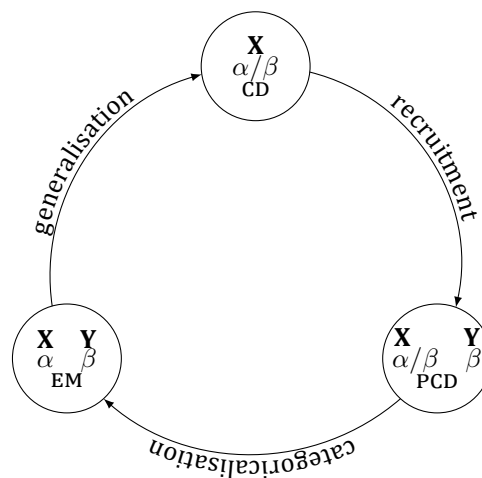
Deo (2015b) provides a framework to understand the general structure of – and motivating forces behind – a cyclical change. This is shown in Figure 3.6 (as

will be discussed below, note that this diagram is not isomorphorhic to the one in NEC diagrammatisation in Figure 3.1).

Insofar as the NEC is concerned, Deo's 'context dependent' (CD) stage corresponds to Croft's "relatively unstable" stage $\mathcal{C}$ (*i.e.*, that state of a language where negative existential markers have generalised into the domain of sentential negation.) Croft (1991:19) claims that the motivation for this stage is the idea that '[for] predication in general, existential predication is analogous to a verbal predication.' His suggestion that 'the analogy is strengthened if there is formal parallelism' underpins formal pressure to innovate an existential predicate, returning the system to stage $\mathcal{A}$. Additionally, as has been shown elsewhere (*e.g.*, 156, also 152e above), stage $\mathcal{C}$ negative predications can be ambiguous between the two readings; another likely source of functional pressure for the recruitment of new strategies.

The discussions of Yolŋu and Arandic above have provided some evidence for the trajectory of negative existential/privative marking as they generalise, encroaching into the functional domain of an erstwhile standard negator (transitions from $\mathcal{A}/\mathcal{B}$ into stage $\mathcal{C}$). For example, as shown, while privative marking initially appears to be restricted to absence predications of individuals, diachronically, they seem to become available to eventive nominals. Strong evidence of this was provided from Arrernte, where all negative predicates have the syntax of non-derived nominal predications (at the expense of inflection of tense, mood and aspect categories.) Additionally, on the basis of comparative evidence, we saw that Djambarrpuyŋu *bäyŋu* appears to have had the range of negative quantifier before acquiring the general semantics of a verbal negator. In the contemporary language, *yaka* and *bäyŋu* overlap in their distribution only if this does not create an ambiguity between a standard and existential negative reading (156). The following subsection further motivates this generalisation phenomenon.

(156) Incomplete generalisation of *bäyŋu* NEGEX in Djambarrpuyŋu (repeated from (146-147) above)   [AW 20190505]

   a. *bäyŋu/#yaka limurruŋ   dhuwal bäwarraṉ*
      NEGEX/NEG   1p.INCL.DAT PROX   meat

      'We have no meat.' (lit. 'there's no meat for us here')

   b. *yaka/#bäyŋu limurruŋ   dhuwal bäwarraṉ*
      NEG/NEGEX   1p.INCL.DAT PROX   meat

      'This meat isn't ours.'

3.4.2 Unifying PRIV and NEG

In this section, I propose a unified semantic treatment for both standard and existential negation; this proposal takes both of these types of negation to involve an operation over two sets (i.e., negation as a two-place operator). The semantic component of the changes to existential negators that are described in the NEC are modeled as *gradual relaxation in their quantificational domains.* A generalised lexical entry for negative markers—both "nominal" (existential) and sentential—is given as (157) below.

(157)   A generalised semantics for negation
$$[\![\textbf{NEG}\star]\!] = \lambda P_{\langle \sigma, t \rangle} \lambda Q_{\langle \sigma, t \rangle}.P \cap Q = \varnothing$$

On this analysis, the distributional differences between privatives/nominal negators and sentential negators is simply due to differences in the *types* of the sets P, Q over which they quantify. Canonical uses of the privative (e.g., those presented for Nyangumarta *-majirri* in §3.2.3 above) quantify over the domain of properties of individuals—$\mathfrak{D}_{\langle e, t \rangle}$. Those "expanded" uses of the privative, as affixed to deverbal predicates (e.g., Djambarrpuyŋu *-miriw* in 3.3.2.4 above) quantify over properties of events—$\mathfrak{D}_{\langle \epsilon, t \rangle}$. Finally, sentential negators (including Arrernte *-(e)tyekenhe*) can be thought of as quantifying over *propositions* (sc. sets/properties of possible worlds)—$\mathfrak{D}_{\langle s, t \rangle}$.

3.4.3 Event-privation

The idea is to put in relevant data to that intermediate stage here. This is copied from a footnote

We can adapt the formalism for privatives (§3.2.3, p.107) such that *-miriw* is able to range over $\mathfrak{D}_{\langle \epsilon, t \rangle}$, the domain of properties of events (here I use $e, e' \in \mathcal{E}$ — variables over $\mathfrak{D}_{\varepsilon}$/eventualities.) I take Djambarrpuyŋu verb stems to denote properties of events, which can be nominalised using the **IV** marker.[29] Shown in the examples below (and further in § 3.5.1), while still functioning as a nominal suffix, *-miriw* appears to scope over entire predicates with the same argument structure as their finite clausal counterparts. In (158), an injunction to not repeat a given story is ungrammatical when an intransitive root *WÄŊA* 'speak' occurs with an object. We might conclude from this that, as with verb roots, nominalised predicates are taken

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[29]**IV** is a polyfunctional suffix that encodes tense and mood information as well as forming nominal stems. The tense-mood semantics of **IV** are investigated in some detail in Ch **??**, although the account offered (at this stage) offers no insight that unifies the nominalising and the temporomodal usage.

to denote properties of events.[30]

(158) Argument-structure of verbal roots is maintained in (nominalised) privative forms suggesting (eventive) =*miriw* scopes over an entire phrase

*dhäwu   marŋgi-ku-nha=miriw/*waŋa-nha=miriw*
story   know-CAUS-**IV**=PRIV/*speak-**IV**=PRIV

'Don't let anyone know/No repeating the story!'   [AW 20190502]

(159) a. *yolŋu   wäŋa nhänha=miriw*
          person place see.**IV**=PRIV

          'person who doesn't see places'

   b. $[\![yolŋu\ wäŋa\ nhänhamiriw]\!] = \mathbf{no}(\lambda e.\mathbf{see}(e, \text{place}), d_\alpha)$

       $= \mathbf{no}(\lambda e.\mathbf{see}(\text{place})(e), \lambda e'.\mathbf{char}(\delta_{\text{person}}, e'))$

   c. That is, the intersection between the set of *eventualities of seeing places* and *the contextual domain of eventualities* $\mathbf{char}(\delta_{\text{person}}, e')$ – perhaps those that might be predicated of/taken to be **char**acteristic of the disposition of a (blind) person (δ_{person}) – is empty.

(160) a. *maŋutji ŋorranha=miriw ŋunha-yi wäŋa*
          eye   lie.**IV**=PRIV   DIST-ANA place

          'It's impossible to sleep at that place' (lit. that place has no eye-lying)
                                                                        (Wilkinson 2012:448)

   b. $[\![maŋutji\ ŋorranhamiriw]\!] = \lambda \mathcal{Q}_{\langle \varepsilon, t \rangle}.\mathbf{no}(\lambda e.\mathbf{lie}(\text{eye})(e), \mathcal{Q})$

   c. $[\![(160a)]\!] = \mathbf{no}\big(\lambda e.\mathbf{lie}(\textit{eye})(e), d_{[\![ŋunhayi\ wäŋa]\!]}\big)$

       $= \mathbf{no}\big(\lambda e.\mathbf{lie}(\textit{eye})(e), \lambda e'.\mathbf{char}(st_{\text{wäŋa}}, e')\big)$

   d. The intersection between the set of *sleeping eventualities* e and the events e' taken to best characterise that place indicated by the speaker/invoked earlier in the discourse (*ŋunhayi wäŋa*), is empty.

An additional virtue of this analysis is that the apparent introduction of a modal component in these eventive privative examples can be accommodated by Francez's (2007) "contextually-determined relation" ($\mathcal{R}$): for example, **char** can be taken to

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[30]The idea that deverbal nominals maintain their underlying argument structure is well-suppoted: "[t]he semantic interpretation of a gerundive nominalization is straightforward in terms of the grammatical relations of the underlying proposition in deep structure" (Chomsky 1970:187).

relate a given individual α to information about its disposition, or relatedly some relation **perm** can be taken to relate a given entity to the set of events that are permissible at that place. This captures the "abrupt imperative" and related prohibitve periphrasess uses (*e.g.*, (158=161) and (153i=162) below, see Wilkinson 2012:448).

(161)   a.   *dhäwu marŋgikunha꞊miriw!*
           story   know.CAUS.**IV**꞊PRIV

           'Don't let anyone know!' (lit. 'no story teaching!')   [AW 20190502]

   b. $\llbracket$*dhäwu marŋgikunhamiriw*$\rrbracket = \lambda\mathcal{Q}.\mathbf{no}(\lambda e.\mathbf{teach}(story)(e), d_\alpha)$
$$= \lambda\mathcal{Q}.\mathbf{no}\big(\lambda e.\mathbf{teach}(story)(e), \mathbf{perm}(\mathrm{st}_u, e')\big)$$

(162)   a.   *ḻukanha꞊miriw ŋayi ŋunhi dharpa-ny*
           eat.**IV**꞊PRIV   3s   ENDO   tree-PROM

           'That tree is inedible' (lit. that tree has no eating)

                                                 (Wilkinson 2012:448)

   b. $\llbracket$*ḻukanhamiriw*$\rrbracket = \lambda\mathcal{Q}.\mathbf{no}(\lambda e.\mathbf{eat}(e), d_\alpha)$

   c. $\llbracket$*(160a)*$\rrbracket = \mathbf{no}\big(\lambda e.\mathbf{eat}(e), d_{\llbracket ŋunhi\,dharpa\rrbracket}\big)$
$$= \mathbf{no}\big(\lambda e.\mathbf{eat}(e), \lambda e'.\mathbf{perm}(dharpa, e')\big)$$

   d.   The intersection between the set of *eating eventualities* e and the events e' that relate to some indicated 'tree' (its subparts/its kind...) that are taken to be permissible is empty.

Further, as (163) shows, the GQ-based analysis presented here correctly predicts the unavailability of a reading where the apparent modal operator is outscoped. Where (a) exhibits scopal ambiguity, a reading where the modal component (supplied by $\mathcal{R}$) outscopes negation is not found in (b).[31] A few additional observations about constraints on eventive *-miriw* are given in § 3.5.1.

(163)   Scope relations in negative existential sentences   [AW 20190501]

   a.   *bathi dhuwal bäyŋu biyak bili gi guḻguḻyurr*
           basket PROX   NEG   thusly.**II** CPLV IPFV.**II** sink.**II**

           'This basket doesn't always sink.'

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[31]See Horn (2001:Ch. 5) for a discussion of the properties of affixal/incorporated negative elements

b. *bathi   gulgulyunha-miriw*
basket sink.**IV**-PRIV

'The basket is unsinkable.' $\neg \gg \Box$

'The basket can not sink' $*\Box \gg \neg$
$[\![163b]\!] = \textbf{no}\big(\lambda e.\textbf{sink}(e), \lambda e'.\textbf{char}(bathi, e')\big)$

3.4.4   Negation as an impossibility operator

An outcome of this quantificational analysis (which unifies existential and sentential negation as 2-place operators) is a treatment of sentential negation as a modal operator (as opposed to a truth functional operator over sentences, as is normally assumed.) The idea that negations can be analysed as modal operators has been proposed in other literatures (see, *e.g.*, Došen 1986, Dunn 1993, Horn and Wansing 2017, Restall 1999, Wansing 2001 a.o.). In effect, logicians have traditionally treated modal operators ($\Box$ & $\Diamond$) as one-place operators, similar to negation $\neg$. Semantic treatments of modal operators in natural language enrich this analysis (in the Kratzerian tradtion), in effect modelling modals as quantifiers, asserting a relation between sets of possible worlds. In this section, I assess the utility of extending the two-place analysis of modal operators to negative operators.[32]

This idea is advantageous insofar as it captures observed behavioural similarities between negation and (irrealis) modalities. Assuming a standard Kripke model for current purposes—*viz.* a set of worlds, an accessibility relation and a verification function, $\mathcal{M} = \langle \mathcal{W}, \mathbb{R}, \mathfrak{v} \rangle$—a modal semantics for negation is given in (164) below. Crucially, the binary accessibility relation $(\mathbb{R} \subset \mathcal{W} \times \mathcal{W})$ is modelled as the *compatibility relation* $\mathbb{C}$ which relates a possible state (of a world) to those that comport with the facts in that world.

(164)   Negation $\neg$ as (alethic) impossibility

a. $\mathcal{M},w \vDash \neg A \Longleftrightarrow \forall u.w\mathbb{C}u \to \mathcal{M},u \nvDash A$
Relative to some model $\mathcal{M}$, the negation of A holds in w iff A fails to hold in any world u that is compatible with w.

b. $[\![\textsc{neg}]\!]_{\langle\langle s,t\rangle,\langle\langle s,t\rangle,t\rangle\rangle} = \lambda p_{\langle s,t\rangle}\lambda q_{\langle s,t\rangle}.\textbf{no}(p, q)$

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[32]Notably, Kratzer herself makes a similar proposal in 'Lumps of thought' (1989:§ 6) (*i.e.*, a quantificational semantics for negation.) The motivation for this treatment, a rationale for situation semantics, intersects with that which is reviewed in Restall (1999:60*ff*).

In § 3.3.3, we saw how, as in other Arandic varieties, Mpwarnte Arrernte realises propositional negation by means of a formative *-(e)tyekenhe* which is affixed to verb stems. This is shown again in (165) below:

(165) a. *Kweye, the   ng-enhe aw-**etyekenhe***
          oops   1s.ERG 2s.ACC   hear-**NEG**

          'Sorry, I didn't hear you'   (Henderson 2013:412)

   b. $[\![\text{the ngenhe awetyekenhe}]\!] = \lambda q_{\langle s,t \rangle}.\textbf{no}(\lambda w_s.\text{I heard you}(w), q)$
                    $= \textbf{no}(\lambda w.\text{I heard you}(w), \lambda w'.w'\mathbb{C}w*)$

-(e)tyekenhe is taken to scope over the entire clause. On the analysis defended here, then, this is taken to assert that the intersection of the proposition 'I HEAR you' (viz. $\lambda w.I\ HEAR\ you$ in w) and the set of worlds compatible with the reference world $w*$ (the CONTEXTUAL DOMAIN, *viz.* $\lambda w.w\ \mathbb{C}\ w*$) is empty.

3.4.5 Domain expansion

'Negation relates an expression e to another expression with a meaning that is somehow opposed to the meaning of e'

Horn and Wansing 2017

The denotation for generalised negation **NEG**⋆ given in (157) above (repeated below) captures a semantics for both existential and "standard" negators; the central concern of the NEC.

(157 rpt'd)   A generalised semantics for the negative operator
          $[\![\textbf{NEG}\star]\!] = \lambda P_{\langle \sigma,t \rangle}\lambda Q_{\langle \sigma,t \rangle}.\textbf{no}(P, Q)$

A consequence of this treatment is that the usage changes in relevant lexical material are modelled as generalisations — changes to the restrictions on the domains of operators with negative semantics. Table 3.3 spells out how this formalism can deal with each of these three stages in the meaning of a negative element, clarifying how we can understand this change as a species of *generalisation*. Recall from the discussion above, the adoption of terminology commonly used to describe existential predication (*e.g.*, Francez 2007, McNally 2016):

PIVOT — represented as the set P — that obligatorily encoded element 'whose existence or location is under discussion' (McNally 2016:212)

CODA — represented as the set Q — represents the contextual domain d_α. This can be optionally restricted by a *coda* phrase which represents the locus (α) of the contextual domain (see Francez 2007, 2009). α is related to Q by some contextually-determined relation $\mathcal{R}$.[33]

Table 3.3. Domain expansion from existential (PRIV) to standard negation (NEG) Negative elements are analysed as quantifiers asserting that the intersection between two sets P, Q is empty.

NEG⋆	$\boldsymbol{\lambda P}$ – pivot $\langle \sigma, t \rangle$	$\boldsymbol{\lambda Q}$ – contextual domain $\langle \sigma, t \rangle$
PRIV	$\lambda x_e.P(x)$ set of entities $\langle e, t \rangle$	$\lambda y.\mathbf{loc}(st_c, y)$ entities in some location
PRIV$_{\mathcal{E}}$	$\lambda e_\varepsilon.\mathcal{P}(e)$ set of events $\langle \varepsilon, t \rangle$	$\lambda e'.\mathbf{loc}_{\mathcal{E}}(st_c, e')$ events instantiated at some location
NEG	$\lambda w_s.p(w)$ set of worlds $\langle s, t \rangle$	$\lambda w'.\mathbb{C}(w*, w')$ worlds compatible with eval. world

As shown in (165), a generalised quantifier-type of analysis (157) can handle both existential and sentential negation. As discussed above, these uses differ in terms of the domains over which they quantify. The next section discusses the implications of this change for theories of grammaticalization and semantic change.

3.5   Grammaticalization and indexicality

The "types" of negation summarised in Table 3.3 can be thought of as corresponding to various stages of the NEC: a reserved PRIV marker that realises nominal ("existential") negation as distinct from sentential negators might be construed as instantiating stage $\mathcal{B}$ of the Cycle (this is the strict distinction between the nominal suffix -*majirri* 'PRIV' and the preverbal sentential negator (*munu* 'NEG') in Nyangumarta.) Conversely, a language in which a privative marker has *displaced* a sentential negator and is responsible for both nominal/existential and sentential negation evinces stage $\mathcal{C}$. This is, by hypothesis, the case for proto-Arandic and potentially the current case in Kaytetye.[34]

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[33]Note however that in the case of privative constructions of the type *subject* + *pivot-PRIV*, the subject NP is taken to serve as coda (and the privative phrase as an (non)existential predicate.) The current paper abstracts away from the syntactic differences between this type of construction and the English-like existential predications that form the primary source of data in Francez and McNally's work. I contend that these syntactic differences are harmless to the semantic analysis described here.

[34]Croft (1991:19) points out that stage $\mathcal{C}$ is "relatively unstable" given potential ambiguity between existential and propositional negations (again, compare constraints on non-existential read-

One outcome of this research is the observation that privatives which tolerate "eventive" arguments ($\text{PRIV}_\mathcal{E}$ in Table 3.3) represent a likely bridge between NEC stages $\mathcal{B}$ and $\mathcal{C}$. Morphosyntactically, PRIV, a noun marker, comes to modify event descriptions with nominal morphosyntax. Eventually, as in Arrernte, this strategy can become the main way of realizing sentential negation: the erstwhile privative scoping over entire propositions.

In recent work, Deo (2017a) has suggested that grammaticalisation trajectories in general are characterisable by the loss of *(discretionary) indexical content* (*e.g.,* Perry 2012, 2017). That is, reanalysed forms tend to lose their dependence on context for retrieving discourse reference.[35] Deo appeals to this notion in describing a number of cross-linguistically reported grammaticalisation pathways, including: where (distal) demonstratives gradually lose their indexical force to become markers of definiteness, specificity and eventually noun class markers (see also de Mulder and Carlier 2011, Greenberg 1978, Stevens 2007:61). In a different domain, the progressive-to-imperfective aspect shift can also be fruitfully understood as the relaxation of a requirement, peculiar to the progressive aspect, for a specific, discourse-salient reference interval ("temporal frame", Kearns 1991) that relies on pragmatics ($\approx$ discretionary content provided by some construal of 'speaker demonstration') for evaluation. The newly emergent (general) IMPERFECTIVE lacks this indexical/context-dependent content (see Deo 2015b, Fuchs 2020).

Crucial to the current proposal, at the core of Francez's analysis of existential propositions is their "radical context dependence" (2007:2). That is, the interpretation of an existential predication involves explicit appeal to a contextual domain/parameter (formally represented above as d_α). In a (bare/codaless[36]) negative existential proposition like *There's no water* (*bäyŋu gapu* or *gapu-miriw* in Djambarrpuyŋu), d_α is a discretionary indexical, which *may but need not* be identified with that set of things that is somehow related to [e.g ., **loc**ated at] the spatiotemporal parameters of the utterance context $\langle \ell_u, t_u \rangle = st_u$ (Francez 2007:72)—that is, $\lambda y.\mathbf{loc}(st_u, y)$. The identity of the set is therefore dependent on the contextual retrieval of some relation $\mathcal{R}$ (*e.g.,* **loc**) that picks out a set of entities that relate

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ings of Djambarrpuyŋu *bäyŋu* in ambiguous contexts: (156) above.) This potential ambiguity is the source of functional pressure to distinguish these two possible readings by the "recruitment" of a new existential marker ($\mathcal{A}$).

[35]Perry's (2012:68ff, a.o.) 2×2 typology of indexicals contrast those that: (A) depend on notions of (i) "wide" vs. (ii) "narrow" context to designate and (B) on the basis of context, either designate (i) "automatically" or otherwise (ii) require appeal to "speaker intentions". Those indexical items that require appeal to speaker intention are 'discretionary' indexicals (compare Kaplan's 'true demonstratives', see Braun 2017 for a general discussion of this literature.)

[36]*...acaudate?*

to some pragmatically determined set of parameters.[37]

The meaning change described by the NEC seems, then, to be associated with a concomitant loss in *discretionary indexicality*. On the quantificational (modal) analysis of negation described in the previous section, the meaning contribution of a sentential negator is that its prejacent — $p \in \wp(\mathcal{W})$) — *does not intersect* with the set of worlds which are *compatible* with the actual world $\lambda w'.\mathbb{C}(w*, w')$. That is, the establishment of reference is automatically set and speaker meaning (the hallmark of discretionary indexicality) isn't factored in.

3.5.1   A note on existential codas and the NƎC

An interesting parallel in terms of thinking about the recruitment of formal mechanisms for existential predication is the observation that existential *there* in English is homonymous with deictic *there* (a discretional indexical par excellence.) This is suggestive of some functional connection between existential propositions and notions of indexicality, referenced above (indeed, formal similarities between locative/existential predications have been observed elsewhere *e.g.,* Freeze 1992). Francez 2007-style treatments of existential predications (like that adopted here), crucially make reference to their context dependence (formally represented as a contextual parameter d_α). This captures the intuition that the utterance of an existential proposition relies on **wide, discretionary** construals of context for domain restriction and evaluation: an bare-existential proposition *there are no sticks* cannot be evaluated without reference to speaker's intentions: most likely, but not necessarily, the contextual parameters of the utterance (perhaps the spatiotemporal conditions under which it was uttered: $\alpha = st_u$.)

As shown above however, explicit restrictions on d_α can also be supplied by way of a "coda." Examples are given for Djambarrpuyŋu in (166), where the 'coda' is underlined.

(166)   *Absence predications in Djambarrpuyŋu:* CODA *underlined*

> a.   *Gapuwiyak guya-miriw*
>   PLACE   fish-PRIV
>
>   'There are no fish in Gapuwiyak. / Gapuwiyak is fishless.'

---

[37]Following from fn 35, note that these are the characteristics of discretionality: "narrow" discretionality iff α is identified with the utterance parameters, otherwise "wide" in Perry's taxonomy.)

b. *Bäyŋu guya Gapuwiyak (gulun-ŋur)*

   NEGQ fish   PLACE (stomach-LOC)

   'There are no fish in Gapuwiyak (waterholes).'

The availability of coda phrases additionally provides a syntactic location for the subject in the "eventive-privative" sentences that have been described above. In (167), the privative phrase predicates that *events* of a particular type (*viz.* that event described by the privative-marked verb form) are not **char**acteristic of whichever entity or location is specified in the coda position.

(167)   *"Eventive-privatives" in Djambarrpuyŋu: CODA underlined*

   a. *lukanha-(mirr/**miriw**) maranydjalk*

      eat.NMLZR-PROP/PRIV   stingray

      'The stingray is edible/inedible.'   [AW 20190502]

   b. ***bäyŋu**n   dhalakarr marrtjinyara-w*

      NEGQ.FOC space   move.NMLZR-DAT

      'There's no space to move≈there's no moving in the space'

   c. *dhuwali mulmu bäyŋu ŋuli nhärranha*

      MED grass   NEG   HAB   burn.**IV**

      'That grass would never burn.'

   d. *nhärranhamiriw   dhuwal mulmu*

      burn.**IV**-PRIV   PROX grass

      '(Even in a fire) That grass is unburnable.'   [AW 20190501/02]

As shown in the discussion of the Yolŋu privative (§ 3.4.3) *-miriw* appears to be attach to an entire nominalised (event-denoting) verb phrase, suggesting the reanalysis of this form as "phrasal morphology" (*i.e.*, a special clitic, see Anderson 2005.) Events of the type described by the privative phrase then are then taken to be related (by $\mathcal{R}$) to some set of events associated with the coda (which is re-alised as grammatical subject). Contextually-retrieived $\mathcal{R}$ is locus of the (pragmat-ically ambiguous) modal reading of propositions containing an eventive-privative. What's more, there are a number of constrants on the types of relations that are made available.

(168) a. #*ŋarra ḻukanhamiriw*

      1s   eat.**IV**-PRIV

    INTENDED. 'I'm not eating.'

    AVAILABLE. 'I'm poisonous/inedible.'   [AW 20190502]

constraints on permissible coda-pivot relations/thematic roles obviously aren't worked out here. Can keep trying or drop this.

In Arrernte, where -*tye꞊kenhe* has completed the PRIV → NEG change, remaining morrphosemantic constraints on the syntactic unit to which attaches appear to be removed.

3.6   Conclusion

In view of providing a formal perspective on the Negative Existential Cycle, this chapter has comprised a diachronically- and comparatively-informed discussion of change and variation in the negative domain informed by three geographically distant and temporally deep subgroups of the Pama-Nyungan family of Australian languages. Each of these case studies suggests nuances and provides further insights into the formulation of the Negative Existential Cycle as discussed in the work of Croft (1991) and Veselinova (2016 a.o). Of particular interest is the relationship between the privative case—which I have argued represents the morphologisation of a negative existential predicate—and standard negation.

We have seen that the expansion of the domain of the negative existential construction predicted by the NƎC ($\mathcal{B} \to \mathcal{C}$) can be understood as a diachronic *generalisation* in its semantics. Generalisation refers to that stage in a grammaticalisation cycle where '[a functional expression] is diachronically reanalyzed as instantiating a broader, more general functional expression at a later stage...involv[ing] a systematic expansion in the domain of application [for that expression]' (Deo 2015a:187). The treatment of the privative given above, for example, has shown how, in multiple language groups, the domain of this marker has expanded. Broadly speaking, whereas at an initial state, PRIV seems to quantify over a domain of properties of individuals $\mathfrak{D}_{\langle\langle e,t\rangle,\langle\langle e,t\rangle,t\rangle\rangle}$, it comes to quantify over properties of eventualities and, in some instances, further generalises to quantify over propositions (*sc.* properties of worlds; the domain of modals, and possibly, negative operators, see Horn and Wansing 2017:34*ff*.) Importantly, even if restrictions on the type of the sets is relaxed, the *relation* ($\mathbf{no}$) that is taken to hold between the sets being quantified

over is identical (*i.e.* ɳo $=_{\text{def}} \lambda \mathcal{P}_{\langle \sigma, t \rangle} \lambda \mathcal{Q}_{\langle \sigma, t \rangle}. \mathcal{P} \cap \mathcal{Q} = \varnothing$).[38],[39]

The negative domains of Australian languages provide an opportunity to nuance our understanding of the NƎC, and perhaps grammaticalisation paths more generally. In view of how robustly Australian languages draw a formal distinction between clausal negation (overwhelmingly with a pre-verbal particle) and absence predications (overwhelmingly with a nominal suffix), deviations from this tendency are likely indicators of systemic formal and functional change in the negative domain. To the extent that a diachronic relationship can be drawn between the lexical material used to encode each of these categories, semantic change can likely be inferred from deviations from this pattern. Furthermore, in view of the strikingly distinct morphosyntactic properties of pre-verbal particles and nominal suffixes, the displacement of standard negation markers by negative existentials (*esp.* privatives) calls for an account of this 'functional' cycle, one that foregrounds the possibility of semantic reanalysis and meaning similarity between these categories: indeed as has been suggested in the foregoing discussion, there is good reason to conceive of a subset relation between existential and standard negation.

Here I have argued that:

1 Sentential negation can be assigned a single lexical entry, accounting for apparent polysemy emerging as nominal negators encroach into the domain of sentential negation.

2 This change can be characterised as a generalisation in the quantificational domain over which negative quantifiers range and that, consequently,

3 We can fruitfully conceive of sentential negators as two-place operators.

Finally, I have suggested that:

4 This treatment unites the NEC with independent observations about the trajectories of semantic change: namely that they are associated with a *loss of discretionary indexicality* (a decreased reliance on the pragmatics for reference establishment.)

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[38]Kiefer (2015:609) observes that the Hungarian cognate does attach to verbal bases but is restricted to transitive stems with eventive semantics. This is an observation with potential implications for future work on the grammaticalisation pathway for privative marking.

[39]Similarly, Tamm (2015:416) observes that 'abessive negation' in Estonian is a strategy that (unlike the distribution of cognates elsewhere in Uralic) also permits of clausal-type negative (SN-like) uses and carries a 'presupposition of an intention [to instantiate the abessive-marked predicate.]' In view of potential modal analyses of negators mentioned here, the emergence of this reading is extremely interesting.

Chapter 4

Reality status & the Yolŋu verbal paradigm

4.1 Introduction

In a 1999 monograph, Bhat posits a typological parameter along which languages variably assign prominence to TENSE, ASPECT or MOOD. For Bhat, determining which of these grammatical macrocategories a given language appears to assign "prominence" gives rise to a number of generalisations about characteristics of that language's grammar ("correlatable characteristics"). In particular, he suggests that, in a language where $\mathcal{C}$ is given prominence, notions belonging to the other two categories tend to be "viewed in terms of $\mathcal{C}$" (7).

An important consequence of developing this typology, in which languages can be classified and differentiated on the basis of these three broad types, is the implication that languages can "move between them" — that is observable, synchronic variation across this parameter points to a history of reanalysis of, for example, temporal categories as modal ones. While Bhat does not explore this consequence of his typology in detail, he does point to observations in the grammaticalisation literature that have demonstrated "cross-categorial change" — that is, situations where lexical material denoting some temporal, modal or aspectual category come to be reanalysed conveying meaning about a category in another semantic domain. Bhat suggest, for example, that the well-attested alternative grammaticalisation trajectories described by Bybee et al. (1994) (among others) and represented in Figure 4.1 are determined by the "prominence" that a given language accords to either temporal or aspectual distinctions (1999:182). Of course, this treatment to some degree begs the question. In a given pair of related languages, what is it that

underpins the change from, e.g. perfect marking to perfective marking for $\mathcal{L}_1$ versus past-tense marking in $\mathcal{L}_2$?

Figure 4.1. Two examples of attested meaning change between the aspectual and temporal domains

(a) PERF grams develop into PFV markers (e.g. Condoravdi and Deo 2015 for Indo-Aryan) or PST markers (e.g. Schaden 2012 a.o.)
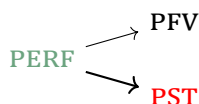
(b) PROG grams develop into IPFV markers (see Deo 2015b) or PRES markers (e.g. Heinrichs 2002 for Neo-Aramaic)

$$PERF \nearrow \quad PFV \\ \searrow \quad PST$$

$$PROG \nearrow \quad IPFV \\ \searrow \quad PRES$$

4.1.1 Futurity and mood-prominence

Bhat marshalls data from Tibeto-Burman to show that "mood-prominent" languages have a tendency to grammaticalise a FUTURE/NONFUTURE distinction. He points to Manipuri, where this tense distinction appears to have 'developed from an earlier realis-irrealis modal distinction' (1999:19). The same verbal suffix *-le* is a future tense marker in Manipuri, whereas Bhat (1999:67ff) shows that in related Mao Naga, it encodes irrealis modality, occurring in a number of modal, counterfactual and evidential constructions.

Additionally, going back to Aristotle, the truth of a future predication has frequently been analysed as changing with the passage of time —- that is "'future contingent" statements can be neither true nor false' (Thomason 1970:265). Consequently, these utterances about the future are often associated wth predictive illocutionary force. Contemporary formal treatments often embrace a modal semantics for "future" operators: one that departs from the earlier, priorian tense logic type approaches where truth is defined relative to time and — the mirror image of PAST — FUTURE is a sentential operator that serves to locate their prejacent subsequent to evaluation time.[1] Modal accounts of future, then, generally tend to take future-oriented morphology to universally quantify over a modal base. Thomason (1970:274) proposes that a the semantics of a future-tensed predication is as fol-

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[1]This is not to suggest that Arthur Prior was unconcerned with this asymmetry between the future and the past — indeed, over the course of his career he departs from an earlier belief in determinism and develops branching time models concerned with the indeterminate nature of the future. (see Copeland 2020 and also Copley 2009:13). Generally speaking, on a deterministic view of the future, future morphemes can be unuderstood to universally quantify over an epistemic modal base, whereas on non-deterministic views they quantify over a metaphysical modal base.

lows:[2]

(169) $\llbracket \text{FUT } p \rrbracket^{w,t} = \begin{cases} 1 \leftrightarrow & \forall w'\big[w' \simeq_t w \rightarrow \exists t'[t \prec t' \wedge p(w')(t')]\big] \\ 0 \leftrightarrow & \forall w'\big[w' \simeq_t w \rightarrow \neg\exists t'[t \prec t' \wedge p(w')(t')]\big] \\ & \text{undefined otherwise} \end{cases}$

FUT p is true if there's a time t' in the future of all metaphysical alternatives to w at t which p holds and false if there is no such time.

Note that this semantics draws on the mechanics for futurity introduced in Ch. 1 above. *I.e.*, $\cup \simeq_t w$ is an equivalence class of worlds with identical histories to w up to t — equivalent to Kratzer's *metaphysical modal base*.

4.1.2   Negation and mood

Developing a broad cross-linguistic typology of sentential negation, Miestamo (2005:208) proposes a class of languages (A/NONREAL) which have 'grammaticalized the fact that negation belongs to the realm of the non-realized.' In many languages this means that a grammatical distinction between REALIS and IRREALIS modalities, drawn in positive clauses, is *neutralised* in negative clauses. If irrealis markers are taken as operators which displace the instantiation of a given eventuality into the realm of the nonrealized, we can think of this semantic space as including or excluding negative declaratives. It is on these functional grounds that negation and mood interact; predicting parametric variation across languages.
  .

4.1.3   Yolŋu Matha

Yolŋu Matha is a small language family spoken in North-Eastern Arnhem Land, in the Northern Territory of Australia. The family is a subgroup of the larger Pama-Nyungan family, representing something of an enclave in Northern Australia; surrounded by a diversity of unrelated languages.

Most Yolŋu linguistic phylogenies posit a high-level split between Western, Northern and Southern subgroups. This is schematised in Figure 4.3. Yolŋu society is traditionally organised according to a moiety system — *Yirritja* and *Dhuwa* — and continues to be strictly exogamous with respect to moiety. Given that each Yolŋu

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[2]This following Copley's (2009:14) conversion of Thomason's account based on "histories" (which effectively imply sets of historical alternatives) into an equivalent one that speaks in terms of possible worlds. Thomason himself develops $\mathcal{T} \times \mathcal{W}$ frames in a 1984 paper.

Figure 4.2. Traditional language communities in Northern Australia (Horton 1996).Yolŋu Matha is the gold coloured area within the square in the primary map. **Inset.** Northeast Arnhem land (colourised from Wilkinson 2012:2. Yellow shading indicates the *Yolŋu Wäŋa* (homeland). Brown and green circles indicate the contemporary distribution of Yolŋu languages investigated. Purple circling indicates the neighbouring (but genetically unrelated) Maningrida language family.
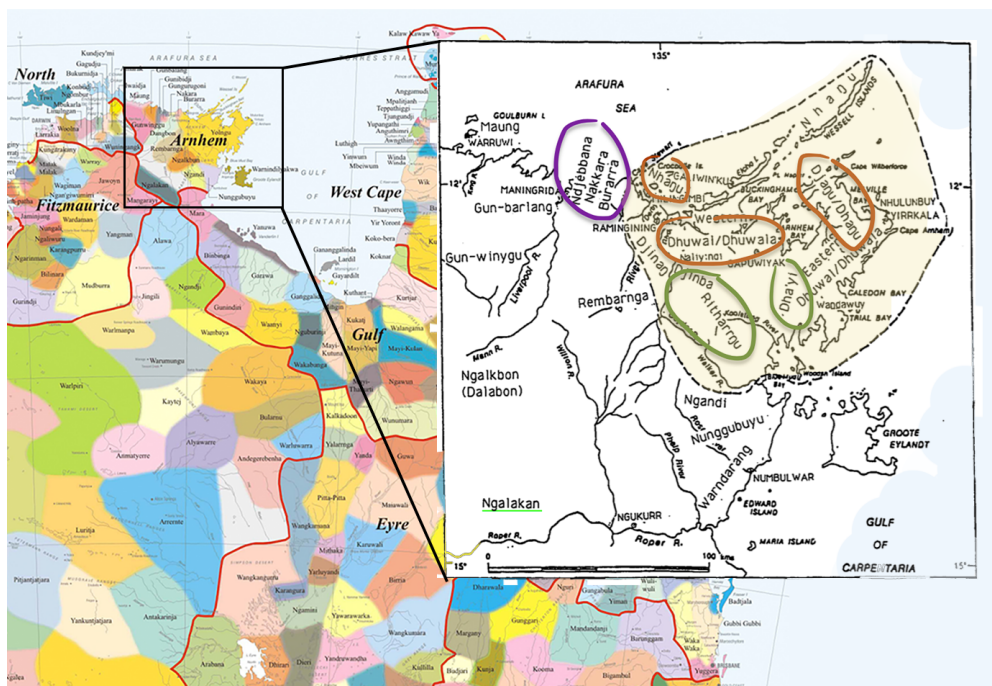
clan is associated with a single patrilineal moiety and language variety, households are necessarily multidialectal, one member of a couple speaking a *Yirritja* lect, the other speaking a *Dhuwa* lect. This chapter focuses primarily on a number of Southern Yolŋu varieties (see Fig 4.4).

As indicated in the diagram, the *Dhuwal* and *Dhuwala* groupings effectively represent the distinct clan-lects of a single speech community — associated with *Dhuwa* and *Yirritja* moieties respectively. Incidentally, Wilkinson (2012) points out that the degree of similarity between Western Dhuwal and Dhuwala are more closely related to one another than either is to Eastern Dhuwal and Dhuwala (I assume that this fact is representable phylogenetically and has been represented in Figure 4.4). The primary distinction between Dhuwal and Dhuwala varieties results from a productive apocope rule (Morphy 1977:51, see also Wilkinson 2012:94*ff* for further details.). The formal consequences of Dhuwal apocope on the verbal paradigm are partially indicated in parentheses in Table 4.1 below. The table gives examples of the verb paradigm for each of the major Djambarrpuyŋu conjugation

right this is the classification in Wilk 91 which follows Dixon 80 presumably? Claire's phylogeny is different in a number of ways. how to handle?

Figure 4.3. A broad phylogenetic classification of Yolŋu subgroups, following Schebeck 2001, Waters 1989, Wilkinson 2012 a.o.
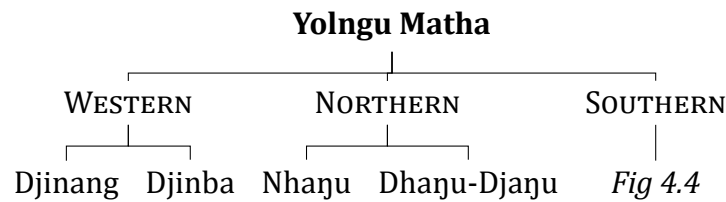
Figure 4.4. Varieties (dialects) of Dhuwal-Dhuwala in the context of the Southern Yolŋu languages (following Wilkinson 2012:13) with some adaptation following Schebeck 2001:15.
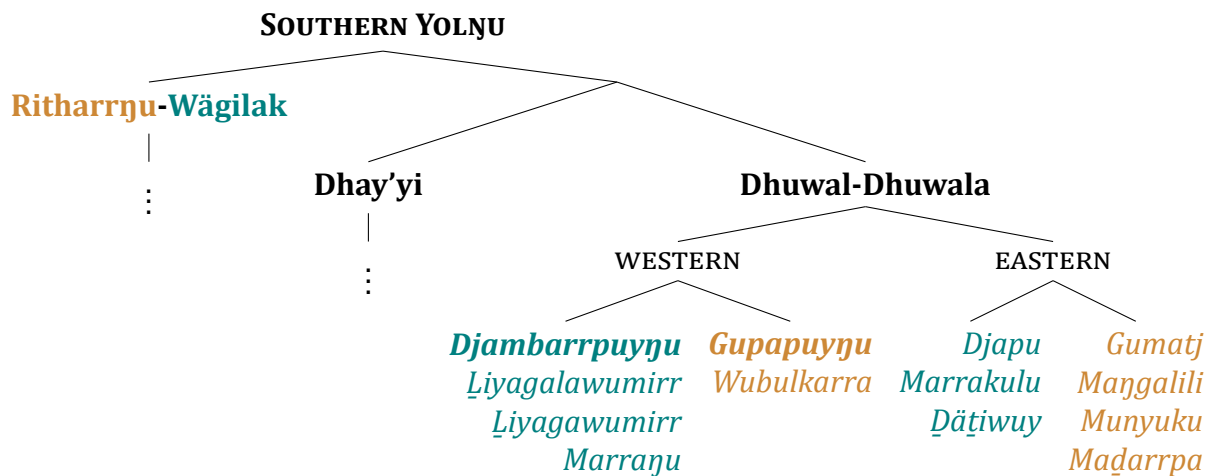
classes as described by Wilkinson (2012:306ff) (parentheses give the corresponding verb group number assigned by Lowe (1996) for Gupapuyŋu.)

4.2 Verbal inflection in Western Dhuwal(a)

TMA distinctions in Dhuwal(a) are partially encoded in a paradigm that distinguishes four 'inflections', which are cognate with a number proto-Yolŋu inflections according to the reconstructions provided by Bowern (2009). Work on Dhuwal and Dhuwala varieties (notably Lowe 1996, Wilkinson 2012) has tended to eschew a metalinguistic gloss for these inflections, given the ostensible non-unifiability of their semantics: the distribution of each of these inflectional categories is discussed in greater detail in what follows. In addition to these inflections, the labour of encoding TMA relations is shared by a (closed) class of auxiliaries, which appear to interact with the verbal paradigm.

Further complicating the exposition of this, is the fact that there are a number of *conjugation (sub)classes*: Lowe (1996) identifies nine classes. The (more detailed) description by Wilkinson (2012) shows that these correspond to three larger conjugation classes — the *Ø-*, *N-* and *Ŋ-*classes — each associated with a number of subclasses,[3] in addition to "non-inflecting" and (semi-)irregular categories Wilkinson (2012). The paradigm for four WD verbs, taken to be representative of four different conjugation patterns is given in Table 4.1.

Of course I can provide more detailed information (the subclasses) but that feels like it'd be better appended? The comparative spreadsheet I've made/Claire's 2009 stuff has most of this normative data... **Note: Andrea Simms strongly suggests more exposition of the formal paradigm**

Class	*Example*	*I*	*II*	*III*	*IV*
Ø*ᵢ* (2)	*marrtji* 'go'	*marrtji*	*marrtji*	*marrtji**n(a)***	*marrtji**nya***
Ø*ₐ* (3)	*ḻuka* 'consume'	*ḻuk**a***	*ḻuk**i***	*ḻuka**n(a)***	*ḻuka**nha***
Ø*ᵣᵣ* (4)	*waṉdirr(i)* 'run'	*waṉd**irr(i)***	*waṉd**i***	*waṉd**in(a)***	*waṉd**inya***
N (5)	*ḻupthun* 'wash'	*ḻupthu**n***	*ḻupthu**rr(u)***	*ḻupthu**rr(una)***	*ḻupthu**na***
N*ₗ* (6)	*gurrupan* 'give'	*gurrup**an***	*gurrupu**l(u)***	*gurrupa**ra***	*gurrupa**na***
Ŋ (7)	*nhäma* 'see'	*nhä**ma***	*nhä**ŋu***	*nhä**ŋal(a)***	*nhä**nha***

Table 4.1. Examples of the paradigm of four morphological TMA inflections in Djambarrpuyŋu [djr] and (Gupapuyŋu [guf] resyllabification in parentheses). [djr] data and classification from Wilkinson (2012); [guf] data and classification from *Gupapuyŋu* (1996).

Above, I alluded to Beulah Lowe's eschewal of a "semantic description" for each of the four inflectional classes, also followed by Melanie Wilkinson. In the following subsections, I provide examples of the functional domains of each of the four inflections in Dhuwal-Dhuwala and other lexical material relevant to encoding TMA relations in this language. Throughout, these categories will be glossed with bold-faced Roman numerals, following the conventions established by Lowe (see also Table 4.2, which adapts Wilkinson's summary of glossing decisions made by other grammarians.)

	I	II	III	IV
Wilkinson 2012 djr	FIRST	SECOND	THIRD	FOURTH
Lowe 1996 guf[4]	Primary	Secondary	Tertiary	Quartenary
Tchekhoff and Zorc 1983 djr	BASE	FUTURE	Past₁	Past₂
Heath 1980c dwu	Pres/Fut	Fut/Imp	Past	Past Remote
Morphy 1983 (Djapu)	Unmarked	Potential	Perfective	Past Non-indicative

Table 4.2. Summary of metalinguistic descriptors deployed by a number of grammarians for the four inflectional classes in a number of Dhuwal/Dhuwala varities, adapted from Wilkinson (2012:336).

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[3]Wilkinson appears to identify 14 distinct inflectional patterns in addition to a "non-inflecting" class (1991: 307).

Figure 4.5 comprises a (colourised) reproduction of Wilkinson's schematisation of the functional domain and collocation features of each Djambarrpuyŋu inflection. Data exemplifying the distribution of WD's four inflectional categories is provided in the subsections below in conjunction with a discussion of the approximate range of each.

Figure 4.5. Melanie Wilkinson's (2012:326) schematisation of the complex semantic space associated with each of the four inflectional categories in Djambarrpuyŋu. My colourisation.
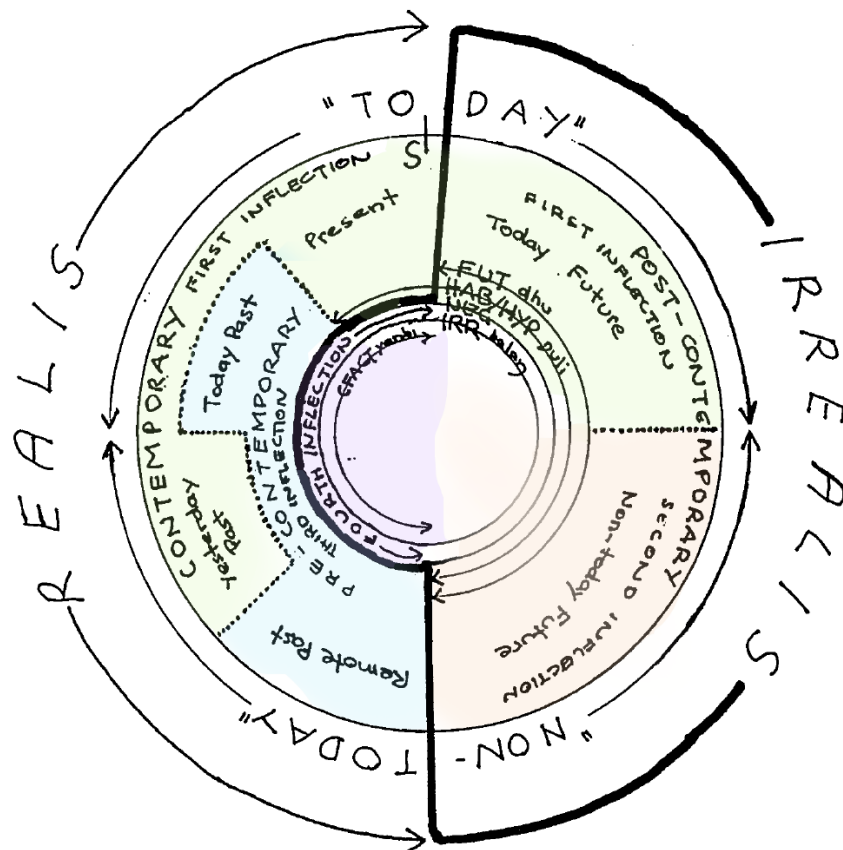
4.2.1 The Primary inflection

The 'primary' inflection (**I**), cognate with inflections in other Yolŋu languages which have been described as "unmarked" or "base", surfaces in predications about the present, past and future. Here I provide examples of **I**-inflected clauses receiving each of these temporal interpretations.

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and i suspect all
entences in this
ssection) context ought
o be modulable s.t. a
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sted in the field

[4]van der Wal 1992 adopts the same labelling scheme as Lowe 1996 although her analysis of the distribution of each category diverges somewhat.

(170)   *Present-reference encoded with **I***

    a.   *Ŋunhi-y   ŋunhi ḏirramu **nhina** ga*
        ENDO-ERG TEXD man   sit.**I**   IPFV.**I**

        'There that man is sitting.'   (Tchekhoff and Zorc 1983:856)

    b.   *Ŋarra ga   **ḻuka**   gapu (dhiyaŋu bala)*
        1s   IPFV.**I** consume.**I** water ENDO.ERG then

        'I'm drinking water at the moment.'   [DhG 20190405]

The sentences given in (170) show the compatibility between present temporal reference and the **I** inflection: in both cases, the event described by the predicate (*nhina* 'sit.**I**' and *marrtji* 'go.**I**') — in both cases modified by the aspectual auxiliary *ga* — is understood as being contemporaneous with speech time.

(171)   *Past-reference encoded with **I***

    a.   *ga **ŋayatham** ŋunha baṉ'thula-wuy ŋayambalk*
        and reach.**I**   DIST   PLACE-ASSOC place

        'And (then we) reached the place (associated with) Baṉthula.'
                                    (Wilkinson 2012:461)

    b.   *ḏirramu-wal yothu-wal bäpa-'mirriŋu-y rrupiya barpuru*
        man-OBL   kid-OBL   father-PROP-ERG money yesterday

        *djuy'yu-**n** märr   barpuru ga barpuru **buna**-ny*
        send.**I**   somewhat yesterday and yesterday arrive.**I**-PROM

        dhiyal-nydja
        PROX.ERG-PROM

        'The father sent money to the boy recently and it arrived here yester-day'   (Wilkinson 2012:343)

In addition to those present-referring sentences in (170), the data in (171) show compatibility between **I** and past time reference. For both examples, the events described by the predicates (*e.g.*, the seeing event described by *nhäma* in (a)) *precede* speech time. Similarly, the two past events in (b) both receive **I** inflection. The instantiation times of both of these events are restricted by the temporal frame adverb *barpuru* ≈ 'yesterday.

Futher, the examples in (172) above, show the compatibility of **I**-inflected verb forms and FUTURE temporal reference.

(172)   *Future-reference encoded with I*

    a.   *yalala ŋarra dhu nhokal lakara-**m***
       later   1s   FUT   2s.OBL tell-**I**

       'Later (today) I'll tell you.'   (Wilkinson 2012:373)

    b.   *dhiyaŋ bala walal dhu **buna**,   yalala*
       now   3p   FUT arrive.**I** later

       'They are coming later today.'   (Wilkinson 2012:256)

    c.   Deontic force with *dhu*+**I** (see §**??**)

       *Way! Nhe dhu gurruka-**m** helmet! Rom ga   **waŋa**.*
       Hey! 2s   FUT wear-**I**   *helmet* law IPFV.**I** say.**I**

       'Oy! You wear a helmet! The law says so!   [AW 20170730]

In both sentences, the event described by the predicate is understood to obtain in the <u>future</u> of speech time (modulo additional constraints on imminence/immediacy described below). In these sentences the presence of FUT marker *dhu* is apparently obligatory in order to establish future reference.

4.2.2   The Secondary inflection

Like **I**, the Secondary inflection (**II**) has a range of uses. It is notably obligatory when predicating of future times <u>beyond the current day</u> and is the main strategy for forming <u>imperative sentences</u>.

(173)   *Future-reference encoded with II*

    a.   Co-occurring with *dhu* 'FUT'

       *yalala-ŋu-mirri-y   ŋula nhätha ŋarra dhu nhokal lakara-**ŋ***
       later-ŋu-PROP-ERG sometime   1s   FUT   2s-OBL tell-**II**

       'I'll tell you sometime later on'   (Wilkinson 2012:346)

    b.   Infelicity of **I** with non-today future

       *Barpuru goḏarr   ŋarra dhu nhä(-**ŋu/***-**ma**)*
       funeral tomorrow 1s   FUT see(-**II**/*-**I**)

       'I'll see the funeral tomorrow'   [AW 20180730]

The two sentences in (173) show how **II** is used in concert with the particle *dhu* to establish future temporal reference. A notable contrast between (172a) and (173a) is the apparently obligatory retrieval of a TODAY-reference time for **I**-inflected futures, as against a (probable) BEYOND-TODAY-reference time for **II**-inflected futures.[5] Effectively, this distinction seems to be one place where the grammar of Dhuwal(a) grammaticalises "temporal remoteness" (Comrie (1985), Dahl (1985) referred to elsewhere in the literature as "metrical tense" e.g. Chung and Timberlake 1985:204).[6]

(174) shows the compatibility of **II** with a (future-oriented) possibility reading. Modal particles including *balaŋ(u), ŋuli* and *bäynha* are responsible for the 'weakening' or 'downtowning' of the speaker's commitment to the prejacent proposition.

(174) a. *Ŋarra ŋuli **bäynha** dhiŋgu-**ŋ** ŋawulul-yu*

          1s   HYP MOD   die-**II**   smoke-ERG

          'I might die from the smoke.'   (Buchanan 1978:164)

  b. *ŋayi bala   **balaŋu** bukthu-**rru***

          3s   MVTAWY IRR   break-**II**

          'It (the recorder) might break.'   [DG 20190417]

II is additionally used to encode imperative clauses (175). Shown in (175b), negative imperatives (probibitives) are treated identically.[7]

(175) *Imperative force with **II***

  a. *wäy! gurtha   ŋunha, nhawi, ḏutji   män-**ŋu**, bakmara-**ŋu***

          hey! fire(wood) DIST   what's.it firesticks get-**II**   break-**II**

          'Hey! Get that firewood, what's it, those firesticks, and break them.'

                                            (van der Wal 1992:114)

---

[5]Wilkinson (2012:347) gives an example of a speaker using a *dhu*-**II** structure in the context of a narrative she is telling, signalling that she 'will (return to the time of the old people).' Wilkinson takes this as evidence of an association between **II** and the irrealis. This generalisation is pursued in detail in this chapter.

[6]Although Heath (1980c:39) suggests of the **II** future in Dhuwal Proper (his FUT/IMP) that this form encodes a type of "normative nuance" (a clear extention of imperative flavour into future assertions.)

[7]Although, as discussed in Ch. 3 (see also Phillips ms. 'Negation (in Australian Languages)') the use of privative-marked nominals is another common, more "indirect" strategy.

b. *yaka walala-ŋ buku-bakamara-**ŋ***

   NEG 3p-DAT   head-break-**II**

   'Don't answer them!'   (Wilkinson 2012:360)

c. *nhä-**ŋu** nhanŋu dhurrwara!*

   look-**II** 2s.DAT   door

   'Look at her mouth!'   [AW 20180731]

4.2.3   The Tertiary inflection

The Tertiary inflection (**III**) is generally associated with predications about the
PAST. An important caveat, however, is that this inflection is <u>infelicitous when de-</u>
<u>scribing RECENT events instantiated BEFORE THE CURRENT DAY.</u> The examples in
(176) below show the compatibility between **III** and a reference time that is 'earlier
today.'

<div style="color:gray">how the compatibility of
I with IPFV by adding
ome examples with
ana. (Perhaps a minimal
air, though this might be
etter placed below.)</div>

(176)   *TODAY PAST and the **III** inflection*

a. *Gäthur ŋayi **marrtjin** räli   Galiwin'ku-ŋur*

   today 3s   go.**III**   hither PLACE-ABL

   '[Earlier] today he came from Galiwin'ku.'   (Buchanan 1978:150)

b. *Bili   ŋayi **marrtjin** dhipuŋur natha-ŋur nyan'thuna-ŋur*

   COMPL 3s   go.**III**   PROX.ABL food-ABL eat.**IV**-ABL

   'He has already gone from having lunch here.'

                                          (Buchanan 1978:150)

c. Infelicity of **III** with RECENT PAST

   *barpuru   ŋarra nhä**(-ma/*-ŋala)** ḏetuŋ*

   yesterday 1s   see**(-I/[#]-III)**   buffalo

   'I saw a buffalo yesterday.'   [MD 20180802]

d. Infelctity of **I** with TODAY PAST

   *gathura ŋarra nhä**([#]-ma/-ŋala)** ḏetuŋ   dhukarra-ŋura*

   today   1s   see[#]**-I/III**   buffalo road-LOC

   'I saw a buffalo down the road today'   [MD 20180802]

<div style="color:gray">otentially look for a ref
or this or provide data
hat makes this
nambiguous...</div>

(176a) shows the compatibility between temporal frame adverbial (TFA) *gäthur(a)* 'today' and **III** in djr, which leads to an temporal interpretation of 'earlier today.'[8] However even in the absence of a TFA, the event described in (b) is interpreted as having been instantiated EARLIER.TODAY/in the immediate past of speech time. Nonetheless, as the data in (177) show **III** cannot be properly described as a 'hodiernal past.'

(177)   *REMOTE PAST and the **III** inflection*

   a. *nhä   nho-kiyin-gal wäwa-'mirriŋu-y warkthu-rr ŋäthil*
      what 2S-EMPH-OBL bro-PROP-ERG   work-**III**   before

      rarrandharr-yu
      dry season-ERG

      'What did your brother do last summer?'   (Wilkinson 2012:343)

   b. CONTEXT. The speaker is describing a locality as it was in her youth.

      *märrma' ga-**n**   malwan-dja   dhärra-**n** yindi maṇḍa-ny*
      two   IPFV-**III** hibiscus-PROM stand-**III** big   3d-PROM

      'Two big hibiscus flowers were (growing).'   (Wilkinson 2012:339)

   c. CONTEXT. A man is telling a story from long ago . His friend's dog has spotted a water goanna.

      ...ŋunhi wurkaḏi-y nhä-ŋal-na ŋinya   dharpa-lil-a ŋal'yu-na
      ENDO   NAME-ERG see-**III**   3s.ACC tree-ALL-SEQ ascend-**III**

      nhäwi   wan'kawu-ya
      whatsit water.goanna-ANA

      '*Wukaḏi* watched it scramble up into a tree, the water goanna.'
                                                        (Heath 1980c:193)

Unlike the HODIERNAL temporal interpretations that the sentences in (176) receive, the two sentences in (177) are evaluated to obtain in the 'REMOTE PAST.' In (177a), the instantiation time of the predicate is restricted by two frame adverbials: *ŋäthil(i)*, which picks out a time 'in the distant past; prior to/earlier than (some other time)' (Wilkinson 2012:158) and *rarrandharryu* 'dry season':[9] The cooccur-

---

[8]Note however that the reckoning of TFA *gäthur(a)* differs to that of English and other familiar languages as shown in ([neg-pst.munha]), where *gäthur munhawa* 'today nighttime' is interpreted as "last night" and still triggers **III** marking on the verb.

[9]The suffix *-Thu* (*-yu* as a postsonorant allomorph), glossed here as ERG is used to mark ergative NPs as well as instrumental (INSTR) NPs and to form TFAs out of nominals TEMP.

rence of these expressions restricts the predicate being questioned to *a prior dry season*. Conversely, the declarative sentence in (177b) requires no adverbial specification. A REMOTE PAST interpretation arises as a result of the **III** inflection alone, which is precised pragmatically by the discourse context (*sc.* a narrative that the speaker is telling about her childhood.) (b) will be able to retrieve a same-day past interpretation as well, with sufficient contextual support.

The ostensible 'discontinuity' of the times that predicates receiving **I** and **III** inflection can refer to has been described in preceding literature as CYCLIC TIME REFERENCE (Comrie 1983:88). In her treatment of Burarra [bvr], Glasgow (1964) draws a distinction between 'tense' and 'frame of reference' ('timescale' for Green 1987:48). The interaction between these is, in effect, taken to give rise to a reference interval. This analysis has been adopted and developed by others working on Maningrida languages (Eather (2011:165) for Nakkara [nck], Green (1995) for Gurr-goni [gge] and McKay (2000) for Ndjébanna [djj].) The interpretation of interacting "tense" morphology and reference frames is schematised in Table 4.3.

		FRAME	
		today	**before today**
INFL	**I**	now	yesterday/recently
	III	earlier today	long ago

Table 4.3. A Glasgow 1964-style analysis of **past-time restrictions** introduced by the verbal inflections, adapted for the Dhuwal(a) data. **I** and **III** inflections correspond to Eather's **contemporary** and **precontemporary** "tenses" ("precontemporary" is Eather's (2011:166) relabelling of Glasgow's "remote" tense.)

4.2.4 The Quaternary inflection

The Quartenary inflection (**IV**) has a broad range of uses in Dhuwal(a) varieties that correspond in part to categories described in Australian languages including *past potentialis* (Heath 1980b), *past counterfactual* McKay (2011), *[past] irrealis* (Austin 1998:159) *etc.* It co-occurs with modal auxiliaries (especially *ŋuli* 'HAB' and *balaŋ(u)* 'IRR') in order to describe past habituals (178) and hypothetical/counterfactual descriptions as in (179).

(178) a. *Ŋayi **ŋuli** märra-**nha** ŋunhi meṉḏuŋ-nha*

        3s   HAB get-**IV**   ENDO snail-ACC

        'She would (used to) get (collect) snails'   (Buchanan 1978:147)

b. *...ŋorra-**nha** walal **ŋuli** marrtji-**nya** ŋunhi-li-yi,   galku-**na** walal*
    lie-**IV**   3p   HAB   go-**IV**   TEXD-LOC-ANA   wait-**IV**   3p

    ***ŋuli** ga-**nha** gapuw   wirwiryu-**na**+ra-w*
     HAB   IPFV-**IV**   water-DAT   turn-NMLZR-DAT

    'They would be lying there, they would be waiting for the water to stir.'
                                                 (DB Djon 5:4)

c. *waṯuy   **balaŋu** ḻuka-**nha** chocolate*
    dog.ERG   IRR   eat-**IV**   chocolate

    'The dog could've/must've eaten the chocolate.'   [DG 20190413]

(179)   a.   CONTEXT. Speaker had a toothache.

    *barpuru   balaŋ ŋarra bala   dentist-kal marrtji-**nya** dhiyak*
    yesterday   IRR   1s   MVTAWY   dentist-OBL   go-**IV**   PROX-DAT

    'Yesterday I should have gone to the dentist for a filling'
                                                 (Wilkinson 2012:353)

b. *Yaka balaŋ nhe marrtji-**nya** Darwin-lil*
    NEG   IRR   2s   go.**IV**   Darwin-ALL

    'You should not go to Darwin.'   (Buchanan 1978:164)

These data demonstrate the relationship between the **IV** inflection and combinations of past temporal reference and various modal and aspectual operators.

4.2.5   Summary

As mentioned above, a number of authors have eschewed assigning a metalinguistic label to the four inflectional categories that are realised on Western Dhuwal verbs. This due to the data's apparent resistance to an analysis where each marker realises some unified semantic category (*i.e.*, PAST, PRESENT etc.) Wilkinson's diagramatic representation of the relevant semantic categories and how they are partitioned by the inflectional system is reprooduced as Figure 4.5.

Ultimately, a consequence of this distribution gives rise to a phenomenon which Comrie (1985:83) refers to as "cyclic tense" : where a given verbal inflectional category appears to be licensed by "discontinuous intervals." These licensing intervals are schematised in Figure 4.6. On the basis of these data, a formalisation of the

observations made by Glasgow 1964 *et seq.* (those summarised in Table 4.3) can be represented as (180) below, where the domains of each of these inflections are discontinuous intervals.[10] *today* $: \mathcal{T} \to \wp(\mathcal{T})$ is that function which returns the interval spanning from the beginning until the end of the day of utterance.[11]

Figure 4.6. Past-time temporal expression in the Yolŋu Matha varieties of Central Arnhem, demonstrating two descriptive phenomena: (a) cyclicity — the interspersion/discontinuity of **I** and **III** forms and (b) metricality — the (subjective) division of the past domain between these two forms.

$\lfloor today \rfloor$ indicates the boundaries of the day of utterance. $t*$ is utterance time.
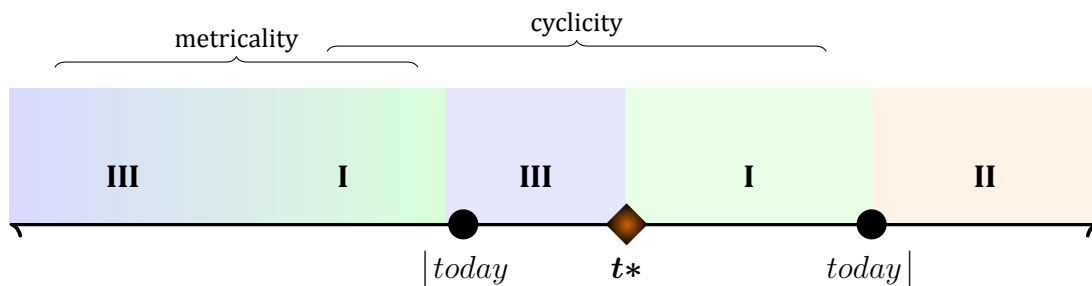
(180) **A polysemy treatment of the temporal contribution of I and III (to be rejected)**

a. $[\![\text{ } \mathbf{I} \text{ }]\!]^c = \lambda P \lambda t*.\exists t' \begin{cases} t \in today \leftrightarrow t \succeq t* & . P(t') & [\text{NONPAST}] \\ t \prec today \leftrightarrow \mu(t, t*) < s_c & . P(t') & [\text{RECENT PAST}] \end{cases}$

I asserts that P holds at t where:

EITHER the reference time t doesn't precede speech time $t*$,

OR if t PRECEDES $today$, then the temporal distance by which t precedes $t*$ is ***below*** some contextually provided standard s_c

b. $[\![\mathbf{III}]\!]^c = \lambda P \lambda t*.\exists t' \begin{cases} t \in today \leftrightarrow t' \prec t* & . P(t') & [\text{TODAY PAST}] \\ t \prec today \leftrightarrow \mu(t', t*) > s_c & . P(t') & [\text{REMOTE PAST}] \end{cases}$

III asserts that P holds at t where:

EITHER the reference time t falls within $today$, in which case it precedes speechtime $t*$,

OR if t PRECEDES $today$, the temporal distance by which t precedes $t*$ is ***above*** some contextually provided standard s_c

---

[10]NOTE that the disjunctive semantics given in (180) is not intended to represent a proper treatment of these inflectional categories in Djambarrpuyŋu. This is a topic of current and ongoing work which is sadly out of the scope of the current dissertation.

[11]The basics of this treatment of temporal metricality (or "remoteness") converge to some degree with Cable's 2013 proposal for Gikũyũ tense and Klecha and Bochnak on Luganda tense.

4.2.6 Cyclic tense

While the lexical entries given in (180) are descriptively adequate, they are also arbitrary and disjunctive. Here, I will claim that **I** and **III** differ because **III** (compatible with strictly past temporal reference) presupposes that **non-final instantiation** (NFI) of its prejacent (cf. Condoravdi and Deo 2015).

Figure 4.7. Appealing to 'nonfinal instantiation' to provide a unified entry for the temporal reference of **III**
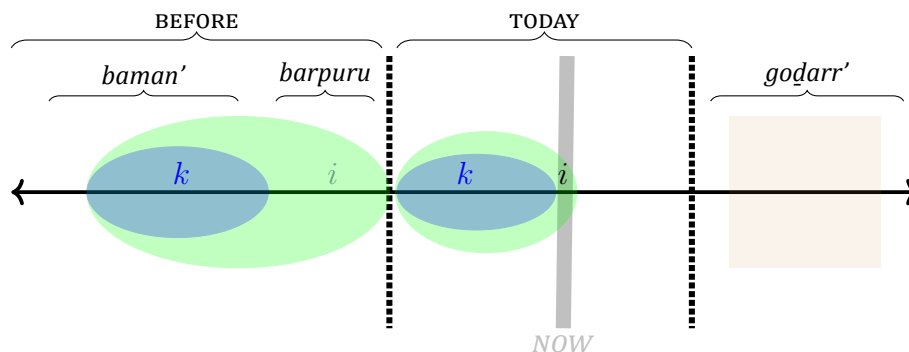
Context makes available two possible reference intervals i_c: TODAY and PRE-TODAY. **III** situates its prejacent within a nonfinal subinterval of i_c. The infelicity of **I**-inflected predicates with REMOTE and TODAY PAST instantiation times then emerges as a result of pragmatic blocking. It is well demonstrated that oppositions between specific and general meanings give rise to a division of pragmatic labour in which the general form is conventionally restricted to the complement of the domain of the specific form (Deo 2015a, citing Horn 1984 & Horn and Abbott 2012).

(181) **An NFI-based attempt at a lexical entry for the THIRD inflection**

$\llbracket\mathbf{III}\rrbracket^{g,c} = \lambda P \lambda i_c : \exists j[j \underset{\text{FINAL}}{\sqsubseteq} i_c.\textsc{NfInst}(P, i_c, j)]$

The context makes available either a TODAY or PRETODAY interval i_c. **III** presupposes the existence of a final subinterval j. **III** asserts that P is instantiated at some subinterval of i that wholly precedes j (i.e. that $\textsc{NfInst}(P, i_c, j)$ holds.)

Meanwhile, as demonstrated above, **II** and **IV** both appear to co-occur with modal particles. Predications about the future (beyond the day of utterance $today$) obligatorily occur with *dhu* 'FUT' and receive **II** inflection. As shown in §4.2.2, however, *dhu*+**II** can also receive a range of modal necessity readings; suggesting a treatment of *dhu* as a circumstantial modal.[12]

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[12]In view of the range of readings available to *dhu*, van der Wal (1992:110) glosses this particle as MOD.

So far, we have only considered "positive" clauses. In the section that follows, we see how the picture of WD inflection we have developed here complexifies significantly under negation.

4.3 Sentential negation: *yaka & bäyŋu*

Discussed in Ch. 3.3.2, Djambarrpuyŋu has two negative particles, *yaka* and *bäyŋu*, both of which are deployed for standard negation (*i.e.* those particles whose effect is to reverse the truth value of a given proposition.) The primary distributional distinction between these is that only *yaka* is used to generate negative imperatives (prohibitives) whereas only *bäyŋu* is found in negative existential/quantificational contexts. Both of these sentential negators, however, interact with verbal inflection.

Descriptively, as shown in the data in (182-183), negation appears to trigger a "switch" from the 'realis-aligned inflections' (**I** and **III**) to their 'irrealis counterparts', (**II** and **IV**) which otherwise turn up predominantly in hypothetical or counterfactual contexts. Effectively, this evinces a reality status-based distinction that is neutralised in negated sentences (see also Wilkinson 2012:356) for Western Dhuwal(a). This is schematised below in Table 4.4.

POLARITY	
−NEG	+NEG
I **II**	**II**
III **IV**	**IV**

Table 4.4. Neutralisation of **I** and **III** inflections under negation.

The following examples in (182) show how sentences that receive **I**-marking in positive sentences — encoding temporal reference to the present or recent past — instead receive **II**-marking under the scope of negation. Each example contains a predications about the present or about the recent past, each receiving **II**-marking under negation. (a-b) presents a near-minimal pair, where a predicate with present reference "switches" inflection from **I** to **II** under negation.s

(182) *Exponence of present and recent past reference as **II** under negation*

    a. *Nhaltja-**n** **ga**   limurru-ŋgu-ny   rom waŋ-**a**?*
       do.how-**I** IPFV.**I** 1p.INCL-DAT-PROM law say-**I**

       'What does our law say?'   (DB Luk 14.3)

    b. ***yaka** **gi**   **biyak**   rom waŋ-**i***
       NEG   IPFV.**II** do.thusly.**II** law say-**II**

       'That's not how the law is/what the law says.'

                                   (Wilkinson 2012:357)

    c. ***bäyŋu** ŋarra **gi**   nhä-**ŋu***
       NEGQ 1s   IPFV.**II** see-**II**

       'I can't see (it).'
       COMMENT. 'I didn't see (it) (yesterday)' also available.

                                     [AW 2018030]

    d. *Ŋarra gi   bäyŋu maḻŋ'mara-**ŋu** waṯu (ŋarraku). Bili   ŋayi ga*
       1s   IPFV.**II** NEG   appear.CAUS-**II** dog   1s.DAT   CPLV 3s   IPFV

         *nhin-**a** wäŋaŋura*
         sit.**I**   house.LOC

       'I can't find my dog. It lives in the house.'   [DG 20190417]

    e. *Ŋarra ga   djäl-thi-rri   giritjirrinyarawu, yurru ŋarra bäyŋu-nha*
       1s   IPFV.**I** want-VBLZR-**I** dance.NMLZR-DAT but   1s   NEG-SEQ

         girritji
         dance-**II**

       'I was wanting to dance (at the *buŋguḻ* yesterday) but I didn't dance (because I'd hurt my leg yesterday.)'   [DG 20190417]

Similarly, in contexts where the temporal reference of the event description predicts that the verb will receive **III**-inflection — that is the same-day or the remote past — , when under the scope of a negative particle (*yaka/bäyŋu*), the verb instead receives **IV**-inflection. This is shown by the data in (183), where (a-b) represents a minimal pair, negative marking triggering the "switch" from **III** to **IV** inflection. (c) shows the negation of an immediate past event licensing **IV** inflection, (d) shows how a negated, **IV**-inflected predicate can be embedded under a propositional attitude predicate to encode a false belief, and (e) an example of a negated description

of the remote past receives **IV** inflection.

(183)   *Exponence of* TODAY PAST *and* REMOTE PAST *reference as* **IV** *under negation*

    a. *gathur munhagumirr ŋarra nhä-**ŋal** warrakan*
        today   morning   1s   see-**III**   bird

        'I saw a bird this morning'   [FW 20180802]

    b. *gathur munhagumirr **bäyŋu** ŋarra nhä-**nha** warrakan*
        today   morning   **NEGQ**   1s   see-**IV**   bird

        'I didn't see a bird this morning'   [FW 20180802]

    c. **CONTEXT**. Speaker has dropped a coin.

        *Way! **Bäyŋu** ŋarra nhä-**nha**?*
        Hey!   **NEGQ**   1s   see-**IV**

        'Ah! Did you see (it)?'   [AW 20180830]

    d. **CONTEXT.** I'm at work explaining to my coworker why my *galay* is angry at me.

        Ŋarraku miyalk maḏakarritj-thi-na bili ŋayi ga guyaŋa ŋarra
        1s.DAT   wife   anger-INCH-**III**   CPLV 3s   IPFV.**I** think.**I**[14] 1s

          *ga-**nha** bäyŋu djäma*
          IPFV-**IV** NEG   work

        'My wife got angry because she thought I wasn't working today.'
                                          [DG 20190417]

    e. **CONTEXT.** The speaker grew up in the desert.

        ***bäyŋu** ŋarra ŋuli ganha nhä-**nha** (waltjaṉ) ŋunhi ŋarra yothu*
        NEG   1s   HAB IPFV   see.**IV**   rain   ENDO 1s   child

          yän
          just

        'When I was young, I hadn't seen [rain]/never saw [rain].'
                                          [AW 20190501]

The data in (182-183), demonstrate the interaction between temporal reference and negative polarity in WD, consistent with Miestamo's A/NONREAL class — the distinction between *realized* and *nonrealized* states of affairs is neutralised is negative contexts in WD. We can then provide a modified version of Figure 4.6 to

give the parallel diagram in Figure 4.8. The differences between these two diagrams schematise the effects of negation on the licensing of particular WD inflectional categories.

Figure 4.8. Apparent interactions between temporal relations and reality status in Djambarrpuyŋu: cyclicty and metricality under negation.
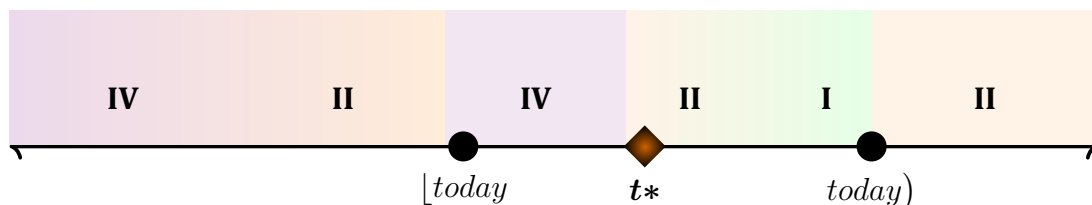
Note additionally the surprising occurrence of a **I**-marked interval in Fig 4.8. Predications about the SAME-DAY FUTURE — which receive **I**-marking in positive sentences — appear to be "immune" to the neutralising effects of negation, exemplified by data including (184). We return to a discussion of this fact §4.4.5.

(184) a. *Ŋunhi ŋarra dhu bäyŋu ḻuk-**a**,   ŋarra dhu rirrikthu-**n***
           HYP 1s   FUT NEG consume-**I** 1s FUT sick-INCH-**I**

       'If I don't drink (water) (soon), I'll get sick.'   [AW 20190409]

    b. *yaka ŋarra dhu ḻuplupthu-**n** bili bäru   ŋuli ga ḻuk-**a***
        NEG   1s   FUT swim-**I**   CPLV crocoodile HAB IPFV.**I** eat-**I**

        yolŋu'yulŋu
        people

        'I'm not going to swim; crocodiles eat people.'   [AW 20190428]

4.4   The realm of the nonrealized

So far we have seen that predicates which receive **II**- and **IV**-inflection co-occur with some operator that encodes some flavour of irrealis-associated meaning — what Palmer (2001:145) labels a "joint marking system." For **II**, these are predominantly represented by *dhu* 'FUT' and *balaŋ(u)* 'IRR' in addition to clauses with imperative syntax. **IV** tends to co-occur with *balaŋ* 'IRR' in addition to *ŋuli* 'HAB'.[15] As

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[15]I adopt the (metalinguistic) labels FUT and IRR as glosses for *dhu* and *balaŋ(u)* following Wilkinson (2012). As we will see, these descriptions aren't necessarily completely adequate, but will be sufficient for current purposes.

we will see, these expressions all appear to lexicalise strictly **root** (non-epistemic) modalities (contra van der Wal 1992:123).

This section begins with a brief review of the "branching time framework" before providing an overview of the semantics of WD modal particles and forming a set of generalisations over the distribution of inflections **II** and **IV** in WD.

4.4.1 The branching time framework

Authors working in intensional semantics have, in recent work, deployed a "branching time" framework in order to model relationships between temporal and modal reference (some of this work was introduced in Chapter 1). Here, I spell out a number of basic assumptions that will ultimately assist in formalising temporal and modal expressions in WD. One of the primary payoffs of the branching time is the formalisation of Prior's observations about the asymmetries of the past and the future (see also Copeland 2020, Dowty 1977, Thomason 1970, 1984). The version I adopt here follows closely from recent work on the realis-irrealis distinction (Krifka 2016, von Prince 2019) and other insights about temporal and modal interaction (e.g. Condoravdi 2002, Ippolito 2013, a.o.)

A branching-time frame $\mathfrak{U} = \langle \mathcal{I}, \prec \rangle$ assumes a partially ordered set of indices $\mathcal{I}$ — in effect world-time pairs $\langle w, t \rangle$. A branch (similar to "history" for other authors (Dowty 1977, Thomason 1970)) $b \ni i$ through any $i \in \mathcal{I}$ is a linearly ordered subset of $\mathcal{I}$ — that is, where $i = \langle w, t \rangle$,
$b \ni i = \{\langle \langle w, t \rangle, \langle w, t' \rangle, \langle w, t'' \rangle, \ldots, \langle w, t_n \rangle \rangle\}$. A branch, then, effectively models the possible development of a given world through time.[16]

Von Prince (2017, 2019) establishes a formal trichotomy between the ACTUAL, POTENTIAL and COUNTERFACTUAL domains by appealing to this framework. This is reproduced in (185).

(185) Given a contextually defined ACTUAL PRESENT $(i* = \langle w*, t* \rangle)$, $\mathcal{I}$ can be partitioned into three subdomains:

    a. The ACTUAL (past/present) = $\{i \mid i \preceq i*\}$
       Compare this notion to the equivalent one of *metaphysical alternatives to w at t* introduced in Ch. 1: $\{w' \mid w \approx_t w\}$.

    b. The POTENTIAL (future) = $\{i \mid i \succ i*\}$

---

[16]Note that these frameworks normally take indices to represent world-time pairs. I assume that this model can be extended relatively straightforwardly to capture interval semantic notions (Bennett and Partee 2004, Dowty 1982, Landman 1991:e.g. a.o.).

Figure 4.9. A branching times frame following von Prince (e.g., 2019:591). Vertically aligned indices are taken to index the same time.
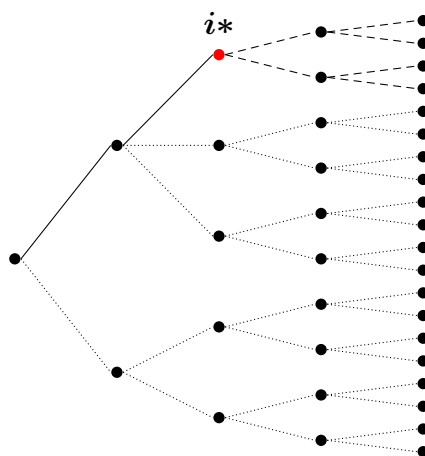
c.   The COUNTERFACTUAL = $\{i \mid i$ is unordered w/r/t $i*\}$

4.4.2   Semantics of modal particles

Shown in §4.2.2, *dhu* 'FUT' occurs in sentences with future temporal reference (186). Relatedly, the data in (187) show that *dhu* appears to also be compatible with other circumstantial modalities; in a deontic (a), bouletic (b) and teleological (c) context. In all these contexts, we can model *dhu* as universally quantifying over a (subset of) a circumstantial modal base.

(186)   ***dhu* 'FUT' encoding future tense with I- and II-inflections**

a.   *barpuru goḏarr   ŋarra **dhu** nhä-**ŋu***
      funeral   tomorrow 1s   FUT   see-**II**

      'I'll watch the funeral tomorrow.'

b.   *mukul **dhu gi**   nhin-**i** raŋi-ŋur   goḏarr*
      aunt   **FUT** IPFV.**II** sit-**II** beach-LOC tomorrow

      'Aunty will be sitting on the beach tomorrow.'   [AW 20190409]

c.   *limurru **dhu** ḻuk-**a**   maypal   yalala milmitjpa*
      1d.EXCL FUT consume-**I** shellfish later   evening

      'We're having shellfish this evening.'   [DG 20190417]

(187) ***dhu* 'FUT' and other flavours of modal necessity**

    a. *Way! Nhe **dhu** gurruk-**ama** djoŋgu'!*
       Hey! 2s   FUT carry-**I**   hat

       'Hey! You must wear a helmet!'   [DG 20190405]

    b. *djamarrkuḻi **dhu** yaka wurraŋatjarra'**y-irr***
       children   FUT NEG cruel.INCH-**I**

       'The children mustn't be disobedient.'   [AW 20190429]

    c. *ŋarra **dhu** plane-dhu marrtji, bili   mutika-miriw*
       1s   FUT plane-ERG go-**I|II** CPLV car-PRIV

       'I'll have to go by plane because I don't have a car.'   [AW 20190429]

Figure 4.10. (In)compatibility of modal particle *dhu* 'FUT' with temporal reference & inflectional category.
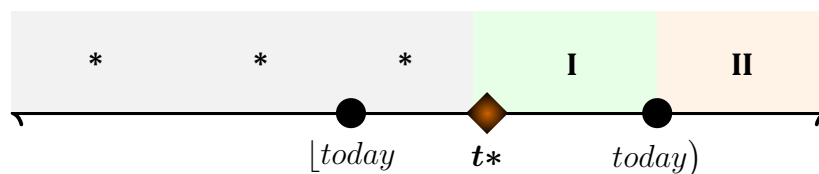
On the basis of this range of usage, we might adopt the following lexical entry for *dhu*, treating this particle as a modal expression and adapting the meaning of *will* provided in Condoravdi (2002, 2003). The function BEST selects the best worlds in a circumstantial modal base, according to a set o of: • speaker expectations (in the case of FUTURE uses), • relevant rules & regulations (in the case of *deontic* uses), • relevant wants (in the case of *bouletic* uses) or • in view of achieving relevant ends (in the case of *teleological* uses) *etc.* We lexically specify the modal base on account of the apparent incompatibility between WD modal particles and epistemic conversational backgrounds (e.g. Kratzer 2012, Peterson 2010 a.o.).

(188) $[\![dhu]\!] = \lambda o \lambda m \lambda P \lambda i : \forall b \ni i \big[b \in \underset{o}{\text{BEST}} \big(\cap \underset{\text{CIRC}}{m(i)} \big) \rightarrow \exists i' \in b[i' \succeq i \wedge \text{AT}(P, i)]\big]$
     dhu P asserts that – in the best branches that contain the reference index $(b \ni i)$ (according to some ordering source o) – the property P is instantiated in the at some index i' that is a successor to i.[17]

---

[17]The relation "INSTantiation" (also given as AT) is taken to hold between a property of events, a time, and a world when there is some event of a given type that is contained within that time:

$$\text{INST}(P, w, t) = \exists e[P(e) \wedge \tau(e, w) \sqsubseteq t]$$

In addition to *dhu*, WD deploys a number of other modal particles: *balaŋ(u)* 'IRR' the most frequently occurring among them. *balaŋ(u)* occurs with verbal predicates categorically inflected for either **II** (shown in 189) or **IV** (shown in 190).

The distinction in interpretation between these two sets of data is the *temporal interpretation* of the modal. In all cases *balaŋ(u)* appears to trigger existential quantification over a circumstantial modal base, although whereas **II**-marking induces a future interpretation of the predicate, **IV**-marking induces a past possibility (including counterfactual) reading.

balaŋ may be better glossed as just MOD, where IRR is reserved to describe verbal mood.

(189) ***balaŋ(u)* 'IRR' and II-inflection**

   a. *ŋarra **balaŋu** (bäynha)*[19]*dhiŋ-**uŋu** nawalulyu*
      1s   **IRR**   (MOD)   die-**II**

      'I could die from the smoke.'   [DG 20190405]

   b. *ŋarra **balaŋu** ḻuk-**i**   gapu, ŋanydja monuk ŋayi gapu*
      1s   **IRR**   consume.**II** water but   saline 3s   water

      'I would drink some water but this water's salty.'   [DG 20190405]

   c. *ŋarra ŋuli ga   bitjan bili   warguyun ŋunhi recorder **balaŋu***
      1s   HAB IPFV.**I** thus.**I** CPLV worry.**I**   ENDO recorder **IRR**

      *bakthu-**rru***
      break-**II**

      'I'm always worried that the recorder will/could break.'

      [DG 20190417]

(190) ***balaŋ(u)* 'IRR' and IV-inflection**

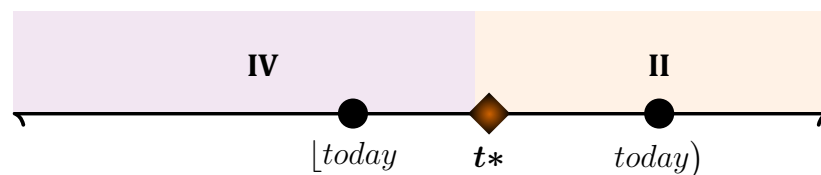   a. *nhe **balaŋu** malkthu-**nha***
      2s **IRR**   accompany-**IV**

      'you should/would have gone with (him).'   [DG 20190413]

See also Condoravdi (2003), Condoravdi and Deo (2015) a.o.

[19]Here I treat *bäynha* as semantically identical to *balaŋ(u)*.

b. *ŋarra gana guyaŋa-na waṯuy **balaŋu** ḻuka-**nha** chocolate*
   1s   IPFV.**III** think-**III**   dog.ERG **IRR**   eat-**IV**   chocolate

   'I'd thought the dog might/would eat the chocolate.'   [DG 20190413]

c. *ŋarra-nha **balaŋu** ḻuku walala mitthu-**na**... yurru ŋarra*
   1s-ACC   **IRR**   foot 3p   cut-**IV**   but   1s

     manymak-thirri
     good-INCH.**I**

   'They would have amputated my foot, but I got better.'

                           [DG 20190417]

I actually don't currently have any way of specifying that *dhu* is necessarily assumes pres-persp & future-orientn unlike *balaŋ*.

Figure 4.11. Compatibility of modal particle *balaŋ* 'IRR' with temporal reference & inflectional category.

On the basis of these data then, we propose a lexical entry for *balaŋ(u)* as in (191) below. *balaŋ(u)* is taken to differ from *dhu* in terms of the "force" of the modal quantification it realises, in addition to its lability with respect to instantiation time.

(191) $[\![balaŋ(u)]\!] = \lambda o\lambda m\lambda P\lambda i.\exists b \ni i'\big[b \in \underset{o}{\text{BEST}}\big(\cap\underset{\text{CIRC}}{m(i)}\big) \wedge \exists i' \succeq i \wedge \text{AT}(P,i)\big]$
     Defined iff the modal base m is circumstantial, *balaŋ(u)* P is true iff one of the best (according to o) branches b that contains the reference index.......

There's this right edge thing in the instantiation interval acc. C02 which apparently is constrained by past ense, i'm not sure how or whether this needs representing. there's also the nonactuality implicature that comes out at the end of the paper which maybe ould do the nec. work?

The distinction between the temporal interpretations in **II**- and **IV**-inflected clauses then in effect reflects the distinction drawn by Condoravdi (2002) between *present* and *past* TEMPORAL PERSPECTIVE respectively. For Condoravdi (2002:62*ff*), temporal persepctive is the time at which some modal claim is calculated. A counterfactual predication like (190c), for example, communicates that 'we are now located in a world whose past included the (unactualized) possibility of a foot amputation. The contribution of *balaŋ* is spelled out in (192).

(192)   *balaŋu* on a counterfactual reading (past temporal perspective contributed
by **IV**)

> *ŋarra-nha* **balaŋu** *ḻuku walala mitthu-**na***
> 1s-ACC   **IRR**   foot 3p   cut-**IV**

'They would have amputated my foot.'   [DG 20190417]

$[\![(190c)]\!]^c$ iff $\exists i', i'' [i' \prec i_c \wedge \exists b \ni i'[b \in \mathrm{MB}(i') \wedge i'' \succ i' \wedge [\![(190c)]\!]^{i''})]]$

In words: at an evaluation index, the proposition is true if, in the past of
that index, there was some future index at which the proposition is true.

4.4.3   Semantics of the "NONREALISED" inflections

Various authors in the functional-typological tradition have identified a semantic
category in REALITY STATUS, (perhaps) to be distinguished from MOOD and (per-
haps also from) MODALITY (see Bowern 1998, Chafe 1995, Elliott 2000, McGregor
and Wagner 2006, Michael 2014, Mithun 1995, Roberts 1990b.) For these authors,
significant utility is to be found in drawing a broad dichotomy between REALIS and
IRREALIS: that is, propositions can be taken as either a description of eventuali-
ties that correspond with observed/observable reality versus a description of a
hypothetical, imagined, non-actualised eventuality. Consequently, for its defend-
ers, IRREALIS can be conceived of as whatever semantical concept might be taken
to collect: future, modalised and conditional predications and imperatives, in addi-
tion (for some languages) to negative and habitual predications and interrogatives
(see also Givón 1994, Palmer 2001, Plungian 2005).[20]

Conversely, the concept of REALITY STATUS and the *realis/irrealis* distinction has
also been roundly criticised by a number of authors, predominantly due the fact
that few languages appear to grammaticalise the realis/irrealis contrast as a "bi-
nary morphological distinction" as well as the apparent heterogeneity of these cat-
egories cross-linguistically. That is, the semantic domain of an IRREALIS marker on
the basis of the analysis of one language tends tends to include and exclude parts of
the semantic domain of others (see Bybee et al. 1994:238, *apud* Foley 1986:158*ff*.
See also, *e.g.*, Bybee 1998, de Haan 2012, Portner 2018.) Of course, the actual

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[20]Conversely, Cristofaro (2012) explicitly takes issue with the inference that linguists have made
that the notion of irreality "plays some role in [the use of irrealis-denoting forms]" (132), which she
attributes to a broader methodological issue in the discipline — *viz.* that description of observed
grammatical patterns should be kept distinct from the formulation of explana- tory generalizations
about these patterns, including generalizations about particular grammatical categories" (145).

semantic contribution of any given class of marker can vary radically across languages, whence the difficulty in providing a unified semantics for, *e.g.*, the Romance subjunctive.

On the basis of cross-linguistic data, Cristofaro (2012:138*ff*) argues that there languages crucially tend to draw a distinction between 'as-yet unrealized' and 'non-realized (in the past)' – *i.e.*, these domains are grammaticalized separately. She deploys this observation to argue against an empirical basis for a unified IRREALIS category — suggesting that the "multifunctionality" for a given form ought to be attributable to "contextual inference" or "generalization" rather than furnishing evidence of the semantic import a dichotomous reality status category. Relatedly, Portner and Rubinstein (2012:467) make a parallel observation regarding a potential necessity to "invoke grammaticalization" in their analysis of subjunctive-selecting predicates in Romance — suggesting that in at least some cases (*sc.* for some predicates) the INDICATIVE/SUBJUNCTIVE distinction is inert.

Nevertheless, the co-occurrence constraints between the "irrealis-aligned inflections" **II** and **IV** and modal expressions described above (*e.g.*, *dhu* and *balaŋ(u)*) suggest a semantic treatment of these inflections that aligns with current analyses of verbal mood — those where the "subjunctive" paradigms of various European languages are taken to be "obligatory and redundant" — dependent on a range of irrealis-aligned (modal) operators, predominantly propositional attitudes (Palmer 2001).[21] Portner (2018:§ 2.2) identifies two broad sets of intuitions about the semantics of verbal mood (predominantly on the basis of the INDICATIVE-SUBJUNCTIVE contrast in a number of European languages) which have driven analytic work: analyses that hinge on the semantics of **comparison** versus **truth in a designated set of worlds**. Comparison-based approaches claim that, iff a given predicate involves a non-empty ordering source (*i.e.*, involves comparison & relative rankings of possible worlds), it will select for a subjunctive complement. Truth-based approaches generally claim that the function of the INDICATIVE is to assert the truth of a given clause in some set of worlds — in effect, the *realis* domain.[22] On the basis

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[21]Chung and Timberlake (1985:238) explicitly suggest an equivalence between REALIS and the INDICATIVE. See also Matthewson 2010 on the Sƛ́atimcets "subjunctive" and for a discussion (following Palmer 2001) of a proposed distinction between SUBJUNCTIVE and IRREALIS as grammatical categories. In large part, authors seem to treat the distinction as stemming from the fact that SUBJUNCTIVE morphology is often restricted to syntactically subordinate clauses (i.e. the complement of particular verbal predicates) — likely in addition to established descriptive traditions for European languages (see also Mauri and Sansò 2016:169*ff*, *cf.* Matthewson (2010:13, fn 9) who takes issue with this criterion).

[22]Portner (2018) takes comparison-based analyses to be exemplified in Anand and Hacquard 2013, Giorgi and Pianesi 1997, Portner and Rubinstein 2012, Villalta 2008 and truth-based analyses to include Farkas 1992, 2003, Giannakidou 2011, Huntley 1984, Portner 1997, Quer 2001. Although

of this generalisation, Giannakidou (2016), Giannakidou and Mari 2021) a.o. take the subjunctive to indicate "nonveridicality" with respect to a proposition — that is, it indicates that there exists at least one world in a given set of worlds in which that proposition is not true (schematised in 193.)

(193) M is **nonveridical** w/r/t p iff

$\exists w'[w' \in M \land w' \in \neg p]$ (see Giannakidou 2016:190)

Portner (2018:71) argues, these two intuitions ought to be unifiable (the *"proto-standard theory of mood"*, see also Portner and Rubinstein 2012, 2018) given that ordering semantic approaches effectively designate a "most relevant" set of worlds in the modal base which can be taken to be the set of worlds for which truth is being asserted in indicative-marked clauses. Drawing inspiration from a number of these approaches, we can posit a semantics that captures intuitions about the "irrealis"-alignment of the **II** and **IV** inflections.

In effect, I take **II** and **IV** to realise the temporal contribution of **I** and **III** respectively, while also enforcing a presupposition of **nonveridicality** with respect to the eventuality introduced by given predicate. This hypothesis is summarised in (194) and spelled out in the section below.

(194)   **Licensing conditions for IRR**

  a. **II** and **IV** are the irrealis counterparts of the temporal inflections **I** and **III** (that is, they impose the same set of temporal constraints on the instantiation of their prejacent.

  b. They additionally presuppose **nonveridicality** with respect to the modal frame of the local clause[23]

4.4.3.1 Subjunctivity

The discussion above draws on the literature on VERBAL MOOD, an enterprise which attempts to capture intuitions about the meaning contrasts between the INDICATIVE and SUBJUNCTIVE categories of (almost exclusively)[24] European languages. In his comparison of IRREALIS and SUBJUNCTIVE as putative grammatical categories, Palmer (2001:186) in part attributes these distinct metalinguistic conventions to

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as noted here, for him the "current state of the art in mood semantics" appears to unite/"treat as correct" both of these observations.

[23]See also the "locality of binding" principle in Percus 2000:201, Hacquard 2010:99.

[24]As mentioned Matthewson (2010) describes mood morphology in St́átimcets th.at she argues is a realisation of a SBJV category.

different "different traditions", but also notes that an apparent difference between the categories; namely that, "[SBJV]is generally redundant only in subordinate clauses, where the subordinating verb clearly indicates the notional feature." Conversely, IRR is frequently found in matrix clauses, co-occurring with other modal expressions.

(195)   a.   French SUBJUNCTIVE

    *Il   faut   qu'[il   se   **taise**]*
    3s   be.necessary.INDIC   COMP=3s   R/R   be.quiet.**SBJV**

    'It's necessary that he be quiet.'

    b.   Caddo IRREALIS

    *kas-**sa**-náyʔaw*
    OBLIG-3AG.**IRR**-sing

    'He should/is obliged to sing.'   (Chafe 1995:356)

Crucially, WD inflections are **not sensitive to** embedding predicates. Canonical subjunctive-licensing predicates like 'want' do not in themselves trigger an IRR-aligned inflection.

(196)   Desiderative embedding predicate doesn't license mood shift in WD
                                  (Wilkinson:23)

    a.   *walal ga   djälthi-rr walala-ny dhu **gäma** hunting-lil   wämut-thu*
        3p   IPFV.I want-I   3p-PROM FUT take.I *hunting*-ALL *MÄLK*-ERG

    'They want that Wämut take them hunting.'

    b.   *ŋuriki   waṯu-w ŋarra ga   djälthi-rr ŋayi dhu ḏarrkthu-**n***
        ENDO.DAT dog-DAT 1s   IPFV.I want.I   3s   FUT bite-I

        nhuna-ny
        2s.ACC.PROM

    'I want of that dog that it bite you.'

Similarly surprising, as with embedding predicates the epistemic adverb *mak(u)* is also completely invisible to the inflectional paradigm.

(197)   Epistemic *mak(u)* doesn't license mood shift in WD

maku ga   nhina raŋiŋura   maku bäyŋu. Yaka marŋgi.
EPIST IPFV.I sit.I   beach-LOC EPIST NEG   NEG know

'Maybe she's at the beach, maybe not. Dunno.'   [DB 20191416]

Given that the mood-shift in WD inflections appears to be triggered within the clause by root modals (to the exclusion of subordinating attitude predicates and epistemic modal expressions), diverging from the canonical distribution of subjunctive morphology in Europoean languages, we have reason (following Palmer 2001) to treat the mood category inflected on WD verbs as IRREALIS.

4.4.3.2   Modelling assumptions

I assume that verbs in WD denote properties of events $\langle \varepsilon, st \rangle$. These are bound by aspectual operators, which existentially bind the event variable and map them to temporal properties $\langle \iota, st \rangle$ (a standard assumption, see Kratzer 1998). Denotations for aspect operators, including the inflecting auxiliary *GA* 'IPFV' and a covert PFV operator are given below in (198).[25]

(198)   Denotations for WD aspectual operators

a. $[\![\, GA \,]\!] = \lambda P_{\langle \varepsilon, st \rangle} \lambda i. \exists e [P(e) \wedge \tau(e) \sqsupseteq i]$

b. $[\![\text{PFV}]\!] = \lambda P_{\langle \varepsilon, st \rangle} \lambda i. \exists e [P(e) \wedge \tau(e) \sqsubseteq i]$

WD aspect morphology existentially binds the event variable in a property of events, mapping it to a property of indices. *GA* 'IPFV' asserts that the reference index (i) is contained within the event's runtime $\tau(e)$, $\varnothing$ 'PFV' asserts that $\tau(e)$ is contained within i.

The WD (root) modal expressions (*e.g.*, *dhu* and *balaŋu*, described in 188 & 191 above) take a predicate P in their scope and determine the subset of relevant worlds (indices) in which P holds. That is, they express a restriction over the modal base, in effect encoding **objective nonveridicality**.

Additionally, The LF of a simple (unembedded) clause is taken to be headed by a silent ASSERT operator (similar assumptions made in Alonso-Ovalle and Menéndez-Benito 2003, Hacquard 2010, Kaufmann 2005) which takes an inflected proposi-

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[25]Of course there are considerably more sophisticated treatments of aspect in the semantics literature (e.g., Deo 2009, Dowty 1979 a.o.) Nothing in the forthcoming analysis is reliant on the one provided here, which is similar to that described in Taylor (1977).

tion as its sister.[26] This approach effectively formalises (some) ideas about the illocutionary force and sets of norms that apply to assertoric speech acts (e.g. Brandom 1983, Williamson 1996 a.o.) by postulating a covert doxastic modal which is anchored by the actual world $i*$. $\sim_\alpha$ is a doxastic accessibility relation anchored to some individual $\cap \alpha$.

(199) **An assertability relation**

$[\![\text{ASSERT}]\!]_{\langle s, \langle s, t \rangle \rangle} = \lambda i. \cap \sim_\alpha i$

ASSERT is an accessibility relation that, given a speech index i returns all the propositions that are believed/"assertable" by a given judge α at that index.

The force of this model can additionally be weakened by epistemic possibility adverb *mak(u)*. Given its apparent variable modal force, *maku* takes an accessibility relation (*e.g.*, ASSERT) as its sister and returns a subset of the modal base it picks out. Following Matthewson 2010, Rullmann et al. 2008 a.o., force-variable modality is modelled as universal quantification over a a (contextually-determined) subset of the modal base (as determined by a "contextually given" choice function f_c.) Modal strength, then, is proportional to the proportion of the modal base that is understood to be quantified over.

(200) **Epistemic possibility**

a. $[\![mak(u)]\!]_{\langle \langle s, \langle s, t \rangle \rangle, \langle s, \langle s, t \rangle \rangle \rangle} = \lambda r_{\langle s, \langle s, t \rangle \rangle}. f_c(r)$

b. $[\![maku]\!]([\![\text{ASSERT}]\!]) = \lambda i. f_c(\cap \sim_\alpha i)$

With these assumptions in place, we can propose lexical entries for the verbal inflections.

4.4.3.3 Nonveridicality as presupposition

The WD inflections, then, all denote partial functions. They provide temporal information about a given proposition by existentially binding the time variable (compare 180, replicated in 201).

Additionally, the nonveridicality constraint is modelled as a presupposition that the truth of the inflected sentence does not follow from (that is, it is unsettled) in

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[26]A similar strategy (in the spirit of update semantics) is adopted in Krifka 2016:570, where ASSERT is taken to perform an operation on a common ground. See also references in Hacquard 2010:102.

the evaluation context: in a simple/matrix clause, the evaluation context is to be understood to be anchored to the speakers belief state in the actual world.

(201) a. $\llbracket \textbf{II} \rrbracket = \lambda P_{\langle s,t \rangle} \lambda i_s : \exists i' \in \cap \approx_i \wedge \neg P(i').P(i)$

II presupposes that there is some metaphysical alternative to the reference index i at which P doesn't hold.
It asserts that P holds at i.

b. $\llbracket \textbf{IV} \rrbracket = \lambda P_{\langle s,t \rangle} \lambda i_s : \exists i' \in \cap \approx_i \wedge \neg P(i') \wedge \exists j \underset{\text{final}}{\sqsubseteq} i.\textsc{nfInst}(P, i, j)$

IV presupposes that there is some metaphysical alternative to the reference index i which P doesn't hold and asserts that P is instantiated at some non-final subinterval of i.

This actually doesn't get the temporal stuff to come out right, it seems to require stuff to be instantiated at speech time. Need to add another index (see cyclic tense stuff.)

Effectively here are the concerns:

- circumstantial modals *dhu, balaŋ* quantify over circ conv bkgd. *dhu* is future oriented. *balaŋ* is force-variable.

- negation can be taken to quantify over compatible worlds.

- these operators need to license the irrealis.

  – Confusingly, cyclic tense is neutralised under *balaŋ*. To summarise:

  – *dhu* occurs with **II** (except SDF-**I**)

  – *balaŋ* occurs with **II** with nonpast persp or **IV** with past persp

  – *bäyŋu* (NEG) occurs with **IV** when negating a **III**-past or **II** when negating a **I**-past (except SDF-**I**)

- the intuition is that they are nonveridical in some objective way.

- epistemic modals (*mak(u)*) **do not** license the irrealis.

- propositional attitudes **do not** in themselves license the irrealis.

- the immediate/today future with ***dhu* does not** license the irrealis, (including under negation) the intuition is because these future predications are assertable..

Conditionals: not sure where these are from

(202)   a.   ***wäniya*** *ŋay ŋunbalaya bulu,* *ŋayi* ***guyupiya***   **[SBJV]**
          go.IV   3s   that way   again   3s   die.IV

          'If he had gone that way, he would've died'

     b.   ***wäni*** *ŋay ŋunbalaya bulu,* *ŋayi* ***guyupi***   **[COND]**
          go.II   3s   that way   again   3s   die.II

          'If he goes that way, he'll die'

4.4.3.4   The proposal in action
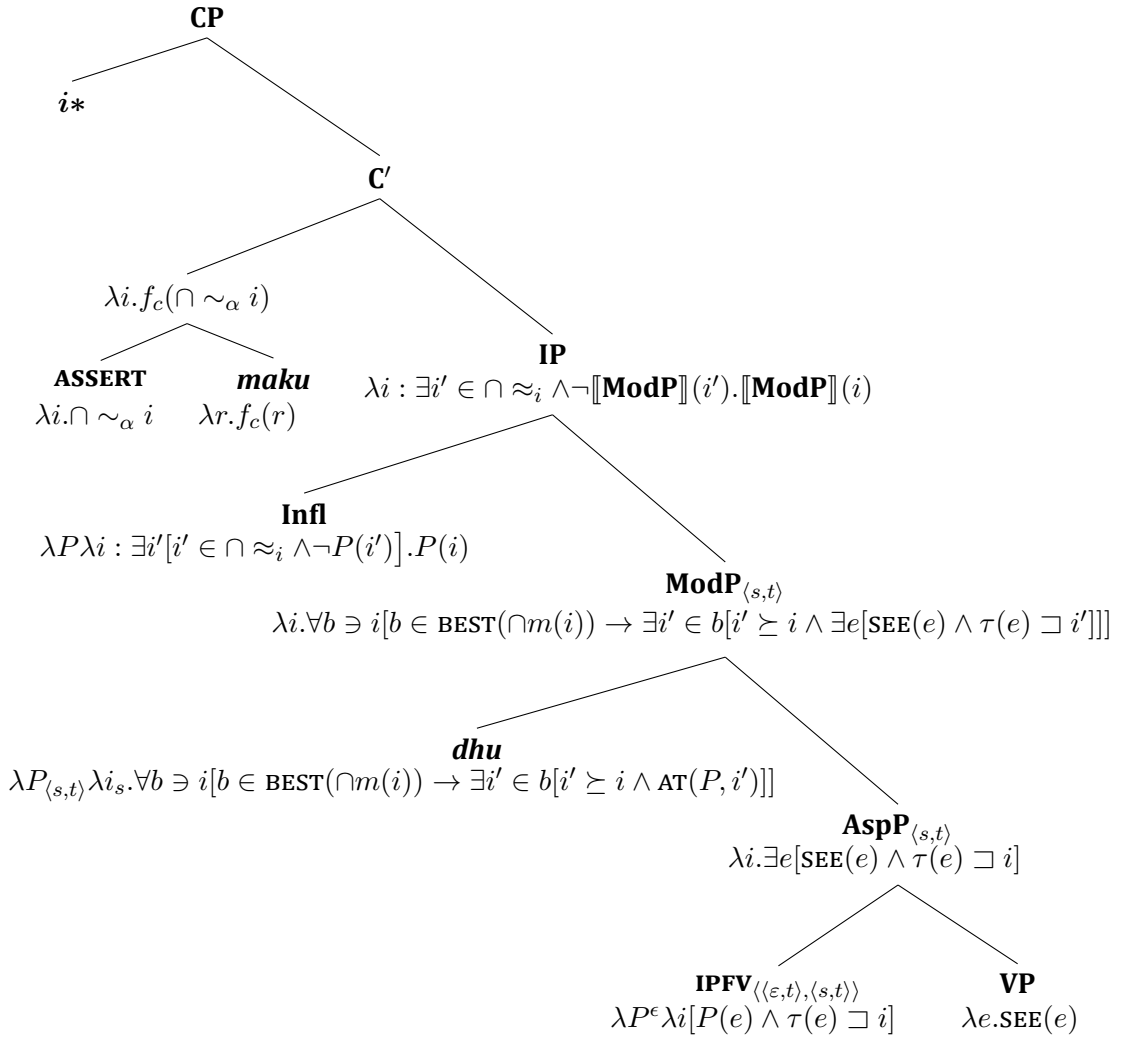
(203)   *maku ŋarra dhu gi   nhäŋu mukulnha*
       EPIST   1s   FUT   IPFV.**II**   see.**II**   aunt.ACC

       'Maybe I'll be seeing aunty'

$$\pi : \exists i' \in \cap \approx_{i*} \wedge \neg \forall b \ni i' \left[b \in \underset{o}{\text{BEST}}\left(\cap\text{CIRC}(i) \right) \rightarrow \exists i'' \in b\left[i'' \succeq i' \wedge \exists e[\text{SEE}(e) \wedge \tau(e) \sqsupset i''] \right] \right]$$

   Presupposes that at some metaphysical alternative to $i*$, *ŋarra dhu* NHÄ- *mukulnha* 'I'll be seeing my aunt' doesn't hold.

$$f_c(\cap \sim_{Spkr} i*) \vDash \forall b \ni i* \left[b \in \underset{o}{\text{BEST}}\left(\cap\text{CIRC}(i) \right) \rightarrow \exists i' \in b\left[i' \succeq i* \wedge \exists e[\text{SEE}(e) \wedge \tau(e) \sqsupset i'] \right] \right]$$

Some subset (as defined by f_c) of the speaker's doxastic alternatives at the speech index $i*$ verify the (modal) claim: 'For all of the best branches (according to m, o) that pass through $i*$, there is some successor index i' which is contained by the run time of an event of my seeing my aunt.

CP

$i*$

C$'$

$\lambda i.f_c(\cap \sim_\alpha i)$

ASSERT
$\lambda i.\cap \sim_\alpha i$

maku
$\lambda r.f_c(r)$

IP
$\lambda i : \exists i' \in \cap \approx_i \wedge \neg[\![\textbf{ModP}]\!](i').[\![\textbf{ModP}]\!](i)$

Infl
$\lambda P \lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')].P(i)$

ModP$_{\langle s,t \rangle}$
$\lambda i.\forall b \ni i[b \in \textsc{best}(\cap m(i)) \to \exists i' \in b[i' \succeq i \wedge \exists e[\textsc{see}(e) \wedge \tau(e) \sqsupset i']]]$

dhu
$\lambda P_{\langle s,t \rangle} \lambda i_s.\forall b \ni i[b \in \textsc{best}(\cap m(i)) \to \exists i' \in b[i' \succeq i \wedge \textsc{at}(P,i')]]$

AspP$_{\langle s,t \rangle}$
$\lambda i.\exists e[\textsc{see}(e) \wedge \tau(e) \sqsupset i]$

IPFV$_{\langle \langle \varepsilon,t \rangle, \langle s,t \rangle \rangle}$
$\lambda P^\epsilon \lambda i[P(e) \wedge \tau(e) \sqsupset i]$

VP
$\lambda e.\textsc{see}(e)$

[margin note:] **Infl** maybe needs to introduce variable that wants an acc. relation in order to introduce the assertability stuff in the C-layer. Kaufmann does this with ∅ much lower down in the derivation.

4.4.4   Negation

In light of the proposal introduced above, we can model clausal negators *bäyŋu* and *yaka* as scoping over the AspP but below inflection. As shown above, the "irrealis" categories, **II** and **IV** presuppose that the instantiation of some event is *unsettled* — that is, the metaphysical alternatives to the evaluation index i are **nonveridical** with respect to INFL's prejacent.

Given the distributional similarities between (root) modals in and *yaka/bäyŋu* in WD, we have independent support (in addition to that described in Chapter 3) to propose a modal semantics for these negative particles.

As in Ch. 3, on this type of analysis, a modal treatment of *yaka/bäyŋu* involves a compatibility relation $\mathbb{C}$. *Bäyŋu P* asserts that no world compatible with the state of affairs at i is such that P is instantiated at i.)[27] This is shown in (204)

(204) $[\![\textsc{neg}]\!]^c = \lambda P_{\langle s,t \rangle} \lambda i.\nexists w'[w' \in \cap \mathbb{C}(w) \to \textsc{at}(P,i)]$

---

[27]Note that this diverges from Krifka (2015, 2016) where Daakie's REALIS NEGATION and POTENTIALIS NEGATION (*ne* and *(te)re*) are both treated as "modalit[ies] in [their] own right[s]."

The entry for NEG given in (204) aligns with those for the other modals both in terms of • its type (that is, the shape of the lex entry) as well as • in terms of the fact that like the other modal particles, NEG indicates that the speaker/attitude holder fails to assert that P is instantiated at all metaphysical alternatives to i — satisfying the shared presupposition of the irrealis moods **II** and **IV**. In terms of the branching times framework negative operators can be interpreted as situating the reference index in the COUNTERFACTUAL domain.

A wrinkle

While much of this analysis emphasises distributional similarities between negative operators in WD and the modal particles *dhu, balaŋ(u)...* in view of assimilating the former into a "modal operator" class, it is also worth considering distributional differences between them, demonstrated in (205) below (compare also Figs 4.8/4.11 above).

possible intuition for neutralisation of metricality: vagueness of *balaŋu* relative to *bäyŋu*

(205) Neutralisation of temporal remoteness distinctions with *balaŋ(u)* 'IRR'

*barpuru   ŋarra guyaŋa... balaŋ limurr   bu-**nha** maypal.*
yesterday 1s   think-**I**   IRR   1d.EXCL hit.**IV**   shellfish

    *Yurru bäyŋu napurru bu-**ŋu** maypal*
    but   NEG   1p.EXCL hit-**II** shellfish

'Yesterday I'd thought that we might collect shellfish, but we didn't collect shellfish'
[AW 20190429]

Albert does seem to give the first instance **II** marking in a rep 64'

The three predicates in (205) — each of which receives yesterday past temporal reference — are each inflected differently. Note in particular that while *buma* 'hit, kill, collect (shellfish)' is inflected with **II** in a negative context, (**II** being the "negative counterpart" of **I**), it receives **IV**-marking in a non-negative modal context (with *balaŋ*). In effect, the temporal remoteness effects in the past are lost in modal contexts, but not in negative predications.

4.4.5 The same-day future

The same day future, both in positive and negative clauses receives **I**-inflection — this is the only place where the neutralisation doesn't happen.

(206) Negated same-day future predications fail to license irrealis-mood shift (unlike negated present predications)   [AW 20190501]

a. *ŋarra (yaka) dhu nhä-**ma** mukulnha*

   1s   (NEG) FUT see-**I**   aunt.ACC

   'I will (won't) see aunty (tonight).'

b. *(goḏarr)   ŋarra (yaka) dhu nhä-**ŋu** mukulnha*

   toomorrow 1s   (NEG) FUT see-**II** aunt.ACC

   'Tomorrow I will (won't) see aunty.'

c. *(dhiyaŋ bala) bäyŋu ŋarra gi   nhä-**ŋu** mukulnha*

   now   1s   (NEG) FUT see-**II** aunt.ACC

   'At the moment, I'm not looking at aunty.'

Recent work on futurate constructions (see e.g., Copley 2008, 2009 *et seq.*, Kaufmann 2002, 2005) formalises an intuition that these constructions involve some "presumption of settledness" or "certainty condition"[28] While the WD same-day future construction is not technically a morphosyntactic futurate,[29] analysis of these devices can shed potential insight on the (functional) motivation for this phenomenon.

The surprising contrast between (206a) and (c), then, becomes less surprising when we consider that the latter eventuality is situated at a counterfactual index and consequently licenses an irrealis-aligned inflection (**II**). The same-day future, in which *dhu* and **I** co-occur can in effect be understood as a **grammaticalised futurate construction**. While *dhu* obligatorily advances the instantiation time of the eventuality, the unexpected occurrence of **I** implicates the "presumed settledness" of its prejacent in context. Given that the instantiation and non-instantiation of a given event are, in principle, equally plannable, they are both asserted to be metaphysically "actual."

*this needs to be foregrounded as support for treating the nonveridicality condition on **II**/**IV** as presuppositional*

Above, we have modelled irrealis mood as a presupposition of unsettledness built into the semantics for **II** and **IV**. These inflections are generally obligatory in irrealis contexts (as triggered by modal (incl. negative) operators) in view of general pragmatic principles (*viz.* MAXIMIZE PRESUPPOSITION.[30]) The analysis of the same-day future, then, is based on the hypothesis that the same-day future — even if it's taken to inflect a property of future (POTENTIAL) indices — receives a NON-IRREALIS inflection (**I**) in view of/**Q**-implicating plannability and "presumed settledness."

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[28]Kaufmann (2002) cites commentary including Comrie (1985), Dowty (1979) among numerous others on this distinction. See also Copley (2008:note 1)

[29]Copley (2008:261) defines *futurates* "sentence[s] with no obvious means of future reference that nonetheless conveys that a future-oriented eventuality is planned, scheduled or otherwise determined.' Given that same-day futures in WD are obligatorily indicated with *dhu*, they shouldn't be described as futurate.

[30]A operationalisation of scalar implicature (*i.e.*, using a "weaker" alternative Q-implicates that the speaker was not in a position to use its "stronger" counterpart, *e.g.*, Horn 1984), MAXIMIZE PRESUPPOSITION is a formulation of a pragmatic principle that appears to be originally due to Heim (1991) and further developed by Percus (2006), Sauerland (2009) a.o.

4.5 Semantic change in Southern Yolŋu

The negative asymmetry described above, exhibited in WD varieties, is not manifested in most other Southern Yolŋu (SY) varieties. As suggested by the glossing decisions summarised in Table 4.2 above, existing descriptions of Eastern *(Miwatj)* Dhuwal(a) varieties (Heath 1980c, Morphy 1983) do not appear to exhibit the cyclic tense or mood neutralisation effects described above for WD.[31] Additionally, Melanie Wilkinson observes that these effects appear to be variable in the Djambarrpuyŋu varieties spoken further east in Galiwin'ku (Elcho Island) and aren't manifested in *Miwatj* varieties more generally (2012:431, 359*ff*; *pers. comm.*) These phenomena *are*, however, exhibited in the westernmost Yolŋu varieties (Djinaŋ and Djinba, see Waters 1989:192) — strongly evidence of an areal effect. Here we briefly survey the synchronic variation between WD and some neighbouring varieties in view of forming a diachronic account of the Yolŋu Matha inflectional paradigm.

4.5.1 Semantics of the Ritharrŋu-Wägilak verbal paradigm

Ritharrŋu and Wägilak, the southernmost SY varieties also provide examples of the absence of sensitivity to negation in the inflectional paradigm. The data below demonstrate how, in keeping with the glossing conventions adopted by Heath (1980a), inflections cognate with WD I, II and III are robustly associated with present, future and past reference respectively, a fact that survives under negation (generally marked by verbal enclitic =*'ma'*). Examples of these are given in (207-209). Heath notes that the Ritharrŋu imperatives are formally identical to corresponding future predications (1980a:76) — this is shown in (208).

(207) ***nhäma(-'ma')*** *rra yakuthi mukulnha*   **[PRESENT]**
       see.**I**-**NEG**   1s now   aunt.ACC

       'I'm (not) looking at my aunt currently.'   [RN 20190520]

(208) a. *goḏarrpuy ŋarra* ***nhäŋu(-'ma')*** *mukulnha*   **[FUTURE]**
           tomorrow 1s   see.**II**-**NEG**   aunt.ACC

           'I will (not) see my aunt tomorrow.'   [DW 20190522]

      b. ***ḻuki*** *nhe!*
           eat.**II** 2s

           'Eat it!' (OR 'you'll eat it')   (Heath 1980a:76)

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[31]Though there is an incompatibility between *yaka* 'NEG' and III in Djapu (Eastern Dhuwala), according to Morphy (1983:72), possible evidence of an earlier stage in the emergence of the asymmetry.

c. *yaka nhe baŋguḻ’-yu**rru***
    NEG 2s return-VBLZR.**II**

    'Don't come/go back!'   (Heath 1980a:76)

(209) a. *gätha ŋarra **nhäwala(-'ma')** mukulnha*   **[TODAY PAST]**
        today 1s   see.**III**-**NEG**   aunt.ACC

        'I saw (didn't see) my aunt this morning.'   [RN 20190522]

    b. *ripurru-mirri ŋarra **nhäwala(-'ma')** mukulnha*   **[YESTERDAY PAST]**
        yesterday   1s   see.**III**-**NEG**   aunt.ACC

        'I saw (didn't see) my aunt yesterday.'   [RN 20190522]

Heath (1980a:74-5) glosses Ritharrŋu's fourth inflectional category as PAST POTENTIAL. Heath's PAST POTENTIAL, is <u>not cognate</u> with the "irrealis past" marker **IV** in WD. Conversely, Heath identifies an alternation in the past paradigm that is made in a number of Ritharrŋu conjugation classes. That is, the Ritharrŋu PAST is cognate with either **III** or **IV**, depending on the conjugation class. Further, within this category, when two forms are available (one apparently cognate with **III** and the other with **IV**), he suggests tentative evidence of a semantic distinction between these Providing a number of examples, he suggests that:

> *wäni-na* is usual for 'went', but *wäni-nya* can be used to indicate habitual or substantially prolonged activity, especially in the distant past ... [but] these semantic distinctions [are limited to a minority of verb stems,] are not rigorous and not all textual examples fit with my remarks above.
>
>   (Heath 1980a:75)

Perhaps lending further tentative support to Heath's analysis, in predications about the ***remote past*** (for verbs that maintain a split), speakers split between the two forms documented by Heath — PAST_{III}/PAST_{IV} (*i.e.*, those inflections cognate with WD **III** and **IV** respectively.) That is, in elicitation, a distinction between **III** and **IV** appears for speaker RN but *not* for AL, pointing to a near-complete merger of **III** and **IV** in Ritharrŋu-Wägilak.

(210) a. Past habituals with **IV**-cognate marking

        *ŋarra yothu-ganyaŋ', nhä-**nha**(-'ma') ŋarra ŋuli mukul-ŋ'nha-ya*
        1s   child   see-**PST**_{IV}-(NEG) 1s   HAB aunt.1s.ACC-PROM

        'When I was young, I would (n't) see my aunt.'   [RN 20190522]

b.   Remote past with PAST (**III**) marking

    *nhä-**wala** ŋarra yothu'thaŋ'dja   mukulnhaya*
    see-**PST**_{III} 1s   child-TEMP-PROM aunt-ACC-PROM

    'When I was young I saw/would see my aunt.'   [AL 20190522]

Heath also indicates that that Ritharrŋu's FUTURE (cognate with **II**) and PAST POTENTIAL (no WD cognate: **V**)[32] categories appear to be variable in terms of modal force. This is indicated by the examples in (Heath's translations, 211) and (212) below.

(211)   FUTURE and PAST POTENTIAL in modalised contexts in Ritharrŋu

                                   (adapted from Heath 1980a:104)

a.   ***wäni*** *nhe*
    go.**II** 2s

    'You can/should/will go.' (or 'Go!')

b.   *wäni-**ya** nhe*
    go-**V**   2s

    'You could/should/would/were about to go.'

(212)   Wägilak FUTURE (**II**) with variable modal flavour

a.   *blijiman   ŋay waŋa-na "gulu-**rru** nhe yiŋ'-ŋiri꞊dhi wäŋa-ya.   Yakaŋu*
    policeman 3s say-**III**   stay-**II**   2s   DIST-LOC꞊FOC home-PROM NEG

      *nhe **wäni-'may** garra nhe git lokdap-**urru**"*
      2s   go.**II**-NEG *garra* 2s *get* locked.up-**II**

    'The policeman said you must stay here at home. Don't go (anywhere) or you'll be locked up.'   [RŊ 20190520 18']

b.   ***wäni*** *lima*   *Numbulwar-li'-ya ŋatha   lima märra-**wu**, wo*
    go-**II** PLACE-ALL-PROM food   1p.INCL food get-**II**   or

      dju̲-kurru?
      road-PERG

    'Should we go to Numbulwar and (should we) get food or (continue) along the road?'   [PW 20190520 25']

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[32]For Bowern (2009), the Ritharrŋu PstPot is retained from a distinct inflectional category, re-constructable to Proto-Yolŋu. Relatedly, implied in Heath (1980a:20,23,104), the PstPot may be (historically) derived from **II** and an additional suffix. The compatibility of these reconstructions is not further considered in this dissertation.

An important difference between the WD varieties described above and the Ritharrŋu-Wägilak data presented here is the absence of TMA particles in the latter. Consequently, the verbal paradigm itself is the primary grammatical device that R-W deploys to encode relevant temporal, modal and aspectual distinctions. Von Prince's branching-time trichotomy provides a neat way of describing the domain of each inflection (described in 185, *p.166* above). This is summarised in (213): the four inflections draw a clear distinction between the present and past, in addition to the 'as-yet-unrealised' and 'nonrealized' (cf. Cristofaro 2012), discussed above.

(213) **Domains of the four inflections in Ritharrŋu-Wägilak**

$[\![\text{I}]\!]^{i*}$ 'PRES' : ACTUAL PRESENT $\{i \mid i = i*\}$

$[\![\text{II}]\!]^{i*}$ 'FUT' : POTENTIAL $\{i \mid i \succ i*\}$

$[\![\text{III}]\!]^{i*}$ 'PST' : ACTUAL PAST $\{i \mid i \prec i*\}$

$[\![\text{V}]\!]^{i*}$ 'PstPot' : COUNTERFACTUAL $\{i \mid i = i*\}$

A distinctive difference, of course, central to this chapter, is the observation that sentential negation has no effect on the tense-mood inflection of a given clause in R-W; the type of "counterfactuality" introduced by a negative operator — key to the analysis of the WD irrealis laid out above — is apparently invisible to mood selection. Recall that the cross-linguistic heterogeneity of *irrealis* as a category (exemplified by the fact that for some (nall) languages, the category is said to be licensed by negation.)

This difference might be modelled as a contrast in the scope-taking behaviour of R-W -*'may'* as against WD *bäyŋu/yaka* — Mithun (1995) makes a similar suggestion in her discussion of the relationship between "reality status" marking and negation in Central Pomo as against Caddo.

4.5.2 Morphosemantic change

On the basis of these data, we can formulate a number of hypotheses about semantic change in the inflectional domains of these closely related Southern Yolŋu varieties. In view of the extended language contact situation between Western Yolŋu varieties and the Arnhem languages spoken around Maningrida (a major West Arnhem indigenous community), the ostensible semantic reorganisation of the Yolŋu inflectional paradigm is likely to be a function of this language contact. Support for this observation is found in the fact that the neutralisation of mood distinctions in negated clauses is a phenomenon that is attested in a number of the non-Pama-Nyungan languages of northern Australia (Arnhem Land in particular).[33] Similarly, with the exception of the Maningrida family (Burarra, Gun-narpta

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[33]Australian Languages in which this type of asymmetry is manifested in Miestamo's (2005:411) sample include: Burarra, Laragia, Mangarrayi, Maung, Tiwi, Warndarang, Wubuy, Nyulnyul, Ngarinyin, Wambaya — 10 of the 15 non-Pama-Nyungan languages he surveys. He claims that

Gurr-goni, Nakkara Ndjebanna), I am not aware of any languages other than the (geograph-ically) western varieties of Yolŋu Matha (Djinaŋ, Djinba and WD) that exhibit the distinctive cyclic tense phenomenon briefly described earlier.[34] The absence of these features in other Pama-Nyungan (genetically related) languages suggests that this paraidgm reorganisation in the western varieties is a function of this stable contact with their Maningrida/Burarran neighbours.[35,36]

A potential hypothesis underpinning this change is that, with the advent of cyclic tem-poral reference, I — the erstwhile PRESENT tense — comes to fail to reliably encode a dis-tinction between past and present temporal reference. Consequently, there is a greater reliance on other lexical material (particularly *ga* 'IPFV') to disambiguate past and present events (given the well-understood incompatiblity between present reference and perfec-tivity.) Note the vivid contrast with Ritharrŋu-Wägilak where it's not clear that there is any grammatical device that distinguishes imperfective from imperfective descriptions in the past.

This shift in the division of TMA labour in favour of free preverbal elements results in a decreasing semantical burden for the inflectional paradigm in general. While no root modals are reported in Ritarrŋu-Wägilak, in contemporary WD, *dhu, balaŋ(u)* etc. are re-sponsible for encoding modality. This (partial) redundancy of the inflectional paradigm then leads to an analysis of the irrealis-aligned inflections (II and IV) as containing an ir-reality presupposition (which is satisfiable by a root modal operator.) In effect, they II and IV come to mark the **nonveridicality**, *sc.* the *unknowability* of their prejacent in a given context.

The distinctive negative asymmetry, then, emerges as a consequence of this semantic reorganisation. Given that negation can be taken to encode a species of *counterfactuality* (insofar as the truth of an assertion of the type $\neg p(w)$ requires that p not be a realised (let alone known) fact of w), negative operators also satisfy nonveridicality. In view of these facts of the language, then, sentential negators (*viz. yaka, bäyŋu*) are reanalysed as predi-cate modifiers of the same type as (other) modal operators which license the irrealis mood inflections.

Australia is the only geographic region for which this particular asymmetry is particularly well-represented (192). Note that these ten varieties are *all* non-Pama-Nyungan spoken in the northern part of the continent.

[34]Comrie (1985:75) refers to the description of Burarra tense marking (Glasgow 1964) as his sole example of "cyclic tense."

[35]Green (2003) shows that these languages represent a single subgrouping within a larger "Arn-hem" family.

[36]An alternative hypothesis — "western Yolŋu as a relic area" — would be that an ances-tral form of Yolŋu Matha developed these features as a contact phenomenon that were subse-quently/gradually lost in varieties spoken in Eastern *Yolŋuw wäŋa*. Further work is required to satisfactorily distinguish between these alternatives.

4.6 Conclusion

In this chapter, I have proposed a semantics for the four inflectional categories that are obligatorily marked on Western Dhuwal(a) verbs. These are given in (214).

(214) **Semantics for the inflectional paradigm of WD**

a. $[\![\textbf{I}]\!]^{i*} = \lambda P \lambda i . P(i)$

$[\![\textbf{II}]\!]^{i*} = \lambda P \lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')].P(i)$

$[\![\textbf{III}]\!]^{i*} = \lambda P \lambda i : \exists j[j \sqsubseteq_{\text{FINAL}} i.\text{NfInst}(P,i,j)]$

$[\![\textbf{IV}]\!]^{i*} = \lambda P \lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')] \wedge \exists j[j \sqsubseteq_{\text{FINAL}} i.\text{NfInst}(P,i,j)]$

b.

	−IRR	+IRR
−NfInst	I	II
+NfInst	III	IV

In a nutshell, the proposal laid out in (214) proposes a 2×2 paradigm where WD's four inflections encode ±NONFINAL INSTANTIATION (capturing *cyclicity*) and ±IRREALIS. I have proposed that the robustly tense-prominent systems of other Yolŋu languages (conserved in, *e.g.*, Ritharrŋu-Wägilak) have been radically restructured under the influence of Western Arnhem languages which also exhibit cyclic tense and asymmetric negation phenomena. The bulk of the chapter has been devoted to showing that the IRREALIS inflections are licensed when there is a modal operator in their c-command domain (*i.e.*, an operator that indicates that its prejacent is not a settled fact of the evaluation world.)

As a result of these phenomena, the synchronic distribution of verbal inflections in WD seems to suggest that its paradigm expresses modal and reality status distinctions "more systematically" than it does temporal ones — Bhat's **mood-prominence** (1999:136). Bhat (1999:183) makes a number of generalisations which he takes to be "correlatable" with mood prominence, including the grammaticalisation of temporal remoteness[37] and the development of a future/nonfuture tense distinction:[38] features exhibited (to varying degrees) in WD.

- Djapu (E Dhuwal) could be like a midpoint bw Wag and the West.

- modal particles pick up the slack as mood/inflections do less of the lifting (matthewson's comparisons of salish and european)

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[37]Bhat describes the marking of temporal distance as "a "modal" tendency in the sense that these distinctions of temporal distance correspond to [certainty...] One can be more certain about a past event that took place today than one that took place yesterday or last year" (1999:183).

[38]While certainly WD has no obvious 1-to-1 FUT vs. NFUT contrast, we have seen how predications at ACTUAL indices are systematically inflected differently to POTENTIAL ones. Relatedly I has been shown to be broadly compatible with NONFUTURE reference.

As discussed in § 4.4.3, the typological literature has entertained a significant amount of debate about the explanatory utility and adequacy of notions of REALITY STATUS and the REALIS/IRREALIS dichotomy. A major reason for this is the hugely heterogenous set of assumptions made by different scholars about the semantic domain and breadth of the irrealis domain (e.g., Mithun (1995:380) who points out that while, "negatives are systematically categorized as Irrealis [in Caddo]", negation has no effect on reality status marking for Central Pomo and Amele.) A compositional treatment of the inflectional/mood systems of irrealis languages has the potential to establish/formalise intuitions about the unifiability (or otherwise) of the IRREALIS as a cross-linguistic grammatical category.

This chapter, then, has provided one of the first formal treatments of an apparent IRREALIS MOOD, joining previous accounts (*e.g.*, Krifka 2016,Matthewson 2010,[39] Von Prince et al. 2019). It also represents the first formal treatment of mood in an Australian language. As we have seen, the distribution and licensing conditions of mood morphology in WD (as with the Vanuatuan languages described by those authors mentioned above) diverge sharply from the more familiar indicative-subjunctive distinctions of European languages; the locus of virtually all existing work on verbal mood.

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[39]Though as stated above Matthewson (2010:13) argues that the relevant mood morphology in Sƛáƛimcets ought to be treated as a SUBJUNCTIVE (As distinct from REALIS.) *N.b.* also that Matthewson explicitly excludes "obligatory and redundant" occurences of the subjunctive from her analysis (26).

General conclusion

The four essays that constitute this dissertation have sought to provide new data, analysis and insights of how the conceptual domains of modality, temporality and negation interact. In particular, each represents an investigation of some dimension of irreality.

Chapter 1 showed how an Australian Kriol future-oriented temporal frame expression has developed APPREHENSIONAL meaning. From advancing the temporal reference of its prejacent (SUBSEQUENTIALITY-marking), *bambai* has come to encode possibility and negative speaker affect. Further, it is a discourse anaphor that appears to, by default, restrict its modal base to (a subset of) the negation of some foregoing proposition.

Relatedly, chapter 2 develops a "dynamic" account for the interpretation of *otherwise* on the basis of contemporary theories of **modal subordination** (Roberts 1989, 1995, 2020) and **information structure** (e.g. Roberts 2012). Building on existing treatments of *discourse anaphora* (Kruijff-Korbayová and Webber (2001), Webber et al. (2001)), we propose to treat a sentence of the form **p otherwise q** as asserting both p and *if not p′*, $\Box q$. The second conjunct has the form of a conditional — i.e. q is *modally subordinate* to the negation of some proposition related to p, calculated from discourse context. Chapter 2, then, constituted an exploration of a lexical item that encodes negative conditionality and requires a pragmatic/discourse structure-sensitive modal restriction (one of several available readings to *bambai*.)

Chapter 3 proposed a formal semantic treatment of the Negative Existential Cycle — a grammaticalisation cycle described in the typological literature where nominal negators develop into sentential negators. I showed that the generalisation of PRIVATIVE case morphology in a number of Australian languages instantiates this cycle. By analysing PRIV as a (negative) generalised quantifier, the NƎC can be conceived of as a stemming from the generalisation in the quantificational domain of this operator. A consequence of this unified treatment of PRIV and NEG is a modal semantics for sentential negation.

Finally, chapter 4 comprised an account of verbal mood semantics in the Western Dhuwal(a) language, including a type of "asymmetric negation" where the ±IRREALIS mood distinction drawn on WD verbal predicates is neutralised in negative predications. By assuming the "branching time" framework familiar from work on intensional logic and appealing to other notions from the formal literature, a compositional account that unifies the disparate distri-

bution of each of WD's four inflectional categories is proposed. As in chapter 3, an apparent quantificational semantics for negation makes a number of felicitous predictions.

In this dissertation, I hope to have made a contribution to the following related enterprises:

1 The pay-off of deploying tools from the formal semantics and symbolic traditions in developing a systematic and precise understanding the meaning contributions of cross-linguistic phenomena as well as "grammaticalisation" trajectories and synchronic variation.

Particularly crucial from the perspective of the empirical phenomena treated here is the insight that temporal and modal logics are intimately related, a fact that predicts visible interactions between linguistic tense and modal operators.

2 The importance and utility of rigorous investigation of understudied (and particularly threatened) language varieties and typological phenomena in developing a nuanced and complete theory of natural language semantics.

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