DOCTORAL DISSERTATION

At the intersection of temporal & modal interpretation:
Essays on irreality
[working title]

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Contents

Chapter 1

Introduction

Dɪsᴘʟᴀᴄᴇᴍᴇɴᴛ has been proposed as a 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). Traditionally, linguistic work — descriptive, pedagogical, theoretical — has often 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 or on consideration of cross-linguistic data: a challenge for linguistic theory, and one that a rapidly expanding body of literature is identifying (*e.g.*, Condoravdi 2002; Hacquard 2006; Laca 2012; Rullmann & Matthewson 2018 among many others).

The body of this dissertation consists of three 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 — that is, I assume that studying ostensible changes in language use over time has something to teach us about synchronic systems and vice versa, all in the service of developing an understanding of language as a cognitive system (*e.g.*, Anderson 2016; Deo 2015a; Kiparsky 2006, see also § 1.3).

The role of this introduction is to lay out (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.

Each essay considers data 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, in places deploying formal tools, the languages of this continent, hugely linguistically diverse, has otherwise received vanishingly little attention in formal semantic theory (some exceptions to this include Stirling & Dench's 2012 special issue of *Aust. J. Linguist. 32*,[1] James Bednall's 2019 thesis on Anindilyakwa temporal and modal expression and Bowler 2014 & Kapitonov 2018 on quantificational expressions in Warlpiri and Kunbarlang respectively.) As we will see, data from these languages promise to challenge and enrich the methodological and theoretical toolbox of formal semantics, just as insights from contrastive work on, *e.g.*, the indigenous languages of the Americas and the Pacific have (*e.g.*, Bochnak et al. 2019; Krifka 2016; Matthewson 2006; von Prince et al. 2019; Tonhauser 2007, among many others.) Furthermore, it is a general contention throughout this work formal perspectives hold exceptional promise in terms of better understanding this diversity and developing typologies of the expression of functional categories across these languages.

1.1   Overview

The body of this dissertation comprises three discrete parts, which represent three related but distinct projects. While they can each be read as independent pieces of work that tackle separate linguistic phenomena, the methodological tools, assumptions and upshots of each component 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 parts.

Part I provides a first formal semantic account of "**apprehensionality**" — a "mixed modal" category that encodes possibility and negative affect with respect to some described eventuality. I pay particular attention to an apparent meaning change trajectory, where future-oriented temporal expressions develop modal readings: the semantical connections between futurity and modality are elegantly

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[1]*Australian Journal of Linguistics*'s special issue contained six pieces on various TAME phenomena in Australian languages emerging out of a four-year European Commission-funded grant. Of particular interest from a formal perspective are the contributions of Caudal et al. (2012) and Ritz et al. (2012).

modelled by formal apparatus like that described in §1.2 below. In order to get at this, Chapter 2 describes and accounts for the changes in the distribution of the Australian Kriol adverb *bambai*. An observation originally due to Angelo & Schultze-Berndt (2016, 2018), *bambai* started its life as a temporal frame adverbial ('soon, shortly thereafter') and has developed so-called "apprehensional" uses. The chapter provides a detailed explanation of the range of uses available to *bambai* in both its temporal and modal functions.

In many contexts *bambai* is translatable as 'otherwise': the account defended here treats *bambai*-type apprehensionals as discourse anaphors that involve the "modal subordination" of their prejacent to elements of foregoing discourse (Ch 3, *cf.* Phillips & Kotek forthcoming).

On the basis of this, Ch. 4 comprises a proposed lexical entry which 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.

Part II 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 (in Ch. **??**) I propose a treatment where the PRIVA-TIVE—a grammatical category described in many Australian languages (*e.g.*, Dixon 2002a; Phillips 2021)—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 Negative Existential Cycle, giving a unified semantics for nominal and verbal negation in Ch **??**. I take this cycle to provide support for a treatment of **negation as a two-place operator** (comparable to contemporary treatments of modal expressions) and additionally suggest that this cycle can be united with general observations made in the grammaticalisation literatures regarding the functional pressures underpinning meaning change — particularly the diachronic loss of the property of "strict/discretional" indexicality (see Perry 2012).

Part III 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. **Part III** 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 in-

flections 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 Part **II**, *viz.* it advocates for a treatment of sentential negators and modal expressions as a natural class. These two phenomena (to varying degrees) represent areal features of the languages of central Arnhem Land. Part **III** concludes with a note discussing change and variation with respect to the semantics of verbal inflections in varieties of Yolŋu Matha.

The next section introduces a number of the key assumptions and formal tools that will be used to analyse each of the phenomena introduced above. Each individual subpart further engages with literature relevant to the respective analysis (*e.g.*, existing treatments of *apprehensionality, modal subordination, existential predication* and *verbal mood.*)

1.2   Formal theories of displacement

As indicated above, the three 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 methodologies. A crucial distinction, and one that is key to the work presented here, is that between *extensional* and *intensional* semantics. An *extensional 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). On the other hand, truth in an *intensional* logic requires appeal (or relativisation) to some object beyond these, *sc.* some semantical index at which a sentence's truth or falsity is evaluated. These indices represent the parameters at which a given sentence is uttered – that is, they might be taken to contain information about the time and world of utterance, the discourse participants, etc. — also perhaps describable as "qualifications (of states of affairs)" (Nuyts 2005).

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' (*e.g.*, Lewis 1986). 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. That is, when a pair of worlds $\langle w, w' \rangle$ is in $\mathcal{R}$, w' can be said to be *accessible* from w or *possible-relative-to* w (alternatively, if $w\mathcal{R}w'$, then w *can see* w' (Hughes & Cresswell 1996:37). With a set of worlds and a way of relating them (a modal frame), a semantics can be defined for unary modal operators (normally $\square$ or **L** $\doteq$ 'it is necessary that' and $\lozenge$ or **M** $\doteq$ 'it is possible that'.) A standard semantics for these operators given a model $\langle \langle \mathcal{W}, \mathcal{R} \rangle, [\![\bullet]\!] \rangle$ — that is, a modal frame and a valuation function $[\![\bullet]\!]$ is provided in (1).

(1) A modal semantics for formulae containing the modal operators $\square$ (necessity) and $\lozenge$ (possibility) (*e.g.*, Hughes & Cresswell 1996:39)

   a. $[\![\square\varphi]\!]^w = 1 \leftrightarrow \forall w'[w\mathcal{R}w' \rightarrow [\![\varphi]\!]^{w'}]$
       Where φ is some well-formed formula, $\square\varphi$ is true in some world w iff φ is true in **all** worlds w' accessible from w.

   b. $[\![\lozenge\varphi]\!]^w = 1 \leftrightarrow \exists w'[w\mathcal{R}w' \wedge [\![\varphi]\!]^{w'}]$
       Where φ is some well-formed formula, $\lozenge\varphi$ is true in some world w iff φ is true in **some** world w' accessible from w.

Building on these modal logic traditions, Prior (1957; 1958; 1967) analogised **P**ast and **F**uture tense operators to possibility modals: effectively, these operators are all taken to existentially quantify over a set of states-of-affairs (set of accessible reference points: times/possible worlds).[2] In the case of temporal operators, the relevant accessibility relation $\mathcal{R}$ is identified as $\prec$ (or $\succ$), where $t \prec t'$ reads: 't precedes t''. Consequently, $\prec_{\langle w,t \rangle}$ ($\succ_{\langle w,t \rangle}$) make available only the temporal predecessors (successors) of the evaluation index, assuming a dense, linearly-ordered set of times $t, t', t'' \ldots \in \mathcal{T}$.[3] The sets of times that are made available by each of these relations is schematised in Fig. 1.1.

  By analogy, then, with possibility modals, a past tense operator might be taken to existentially quantify over times preceding the reference time (as in 2 below.)

(2) $[\![\mathbf{PAST}\varphi]\!]^{w,t} = 1 \leftrightarrow \exists \langle w, t' \rangle [\langle w, t' \rangle \prec \langle w, t \rangle \wedge [\![\varphi]\!]^{w,t'}]$
     PASTφ is true at t iff there is some time t' that is a predecessor to the reference index (formally, a world-time pair $\langle w, t \rangle$) such that φ was true at t'.

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[2]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.

[3]For completeness:

A binary relation (*e.g.*, $\prec$ over $\mathcal{T}$) is:

   a. LINEARLY ORDERED iff it is connex, transitive, irreflexive and asymmetric

   b. DENSE iff it is isomorphic to $\mathbb{R}$(*i.e.,* $\forall t, t'' [[t \prec t''] \rightarrow \exists t'[t' \neq t \neq t'' \wedge t \prec t' \prec t'']]$)

Figure 1.1. Temporal accessibility relations: the sets of world-time pairs preceding and following $\langle w, t \rangle$ are labelled $\prec_{\langle w,t \rangle}$ and $\succ_{\langle w,t \rangle}$ respectively (adapted from Kaufmann, Condoravdi & Harizanov 2006:93). Time is assumed to "flow" infinitely rightwards.
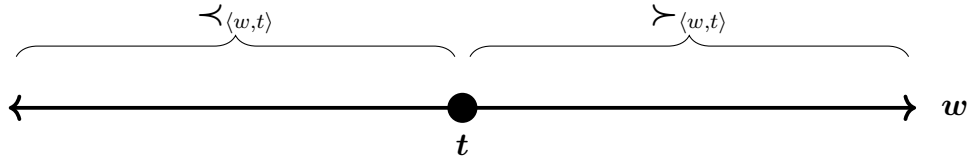
1.2.1   Indeterminist tense logic: on future contingents & branching times

A 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.

Models of branching time capture a crucial asymmetry between past and future temporal reference: namely the indeterministic, inherently **unsettled** (or *contingent*) nature of predications about future times — an intuition frequently attributed to Aristotle's example of tomorrow's sea battle (*De Interpretatione*: Ch. 9; see Øhrstrøm & Hasle 1995 for a review of the thinking around this issue.) Widely adopted and developed, the formulation of branching time models is attributed to Arthur Prior and (a 17-year old) Saul Kripke (see Ploug & Øhrstrøm 2012 for a history of the correspondence of the two logicians.)

In effect, branching time formalisms seek to capture the idea that "for any given time there may be not merely a single future course of time, but multiple possible futures" (Dowty 1977:63, see also Burgess 1978; Thomason 1970 a.o.) — that is, a model of time as *right-branching* (rather than linear.) This asymmetry between the past and the future is observed in multiple places by Prior (1957; 1967, see also Copeland 2020), who develops what he refers to as a couple of alternative solutions, developed by indeterminists, to the problem of future contingency (*e.g.*, 1967:121*ff*): namely an *Ockhamist* versus a *Peircian* conception of the truth of tensed propositions.[4] Here, the distinction between tense and modality begins

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[4]In adopting these descriptors – recast in Burgess 1978 as the *actualist* and *antactualist* schools respectively – Prior alludes to observations made in William of Ockham's tract *De Prædestinatione* (1945 [ca. 1322-4]) and by Charles Sanders Peirce (*e.g.*, Collected Works, Vol 6, ¶368). The primary flection point between these two notions of truth is the "Peircian" collapse of the distinction between Ockhamist notions of future necessity and contingency. For the Ockhamist $\mathbf{Fut}_t\varphi$ is valuable at t, even if its truth value is unknown, whereas for the Peircian $\mathbf{Fut}_t\varphi$ is false until that point in the future of t where (perhaps) p comes to be true (that is, the systems differ on whether or not $\mathbf{Fut}_t\varphi \wedge \mathbf{Fut}_t\neg\varphi$ is valid.) Prior (1967:126*ff*) formalises and give a detailed comparison of these two systems (also additional discussion in Nishimura 1979; Øhrstrøm & Hasle 1995, 2020 including the so-called "Leibnizian" extensions made to the Ockhamist system.)

to come apart.

For the indeterminist (*i.e.*, on the assumption that the future isn't settled and predetermined), then, FUTURE markers, are inherently modal operators insofar as they can be taken to quantify over different possible worlds — here to be represented as "branches."[5] (Potential) futures, then, are calculated from with respect to a given evaluation time. Broadly speaking, **Fut**φ, when evaluated at t, can be taken to say that, along all those futures branching from t, there's some later time (t') at which φ is true (see Thomason 1970:267).[6]

Here, I briefly lay out a version of the "branching time frame" as laid out by authors including Thomason (*e.g.*, 1984:§5) and Burgess (1978 a.o.)

The mechanics A branching-time/tree frame $\mathfrak{T}$ is a partially-ordered set (*i.e.*, a pair $\langle \mathcal{I}, \prec \rangle$). That is, we assume a set of semantical indices (referred to elsewhere as *moments*) that is partially-ordered by the transitive precedence relation 'PRE-CEDES' $\prec$. In effect, this set $\mathcal{I}$ can be recast as comprising a set of world-time pairs $\langle w, t \rangle \in \mathcal{W} \times \mathcal{T}$ (which is assumed in the so-called "parallel worlds" model, presented in Figure 1.2.)[7]

At any given index $i \in \mathcal{I}$, there is a single past and an infinity of branching futures. Left-linearity (*i.e.*, the tree's trunk) is meant to depict the intuitive fixity ("settledness") of the past versus the right-branching property, depicting the indeterminacy and openness of the future. The framework is diagrammed in Figure 1.3 below.

Branches A branch b which runs through any $i \in \mathcal{I}$ is a (maximal) linearly $\prec$-ordered subset (*sc. chain*) of $\mathcal{I}$. In this sense, a branch can be taken to correspond to a possible world/a complete possible course of events charting "an entire possible temporal development of the world" (Rumberg 2019:148). If all indices i are analogous to world-time pairs $\langle w, t \rangle$, then some b which contains i (notated $b \ni i$) is formally a chain of indices, effectively modelling a timeline/set of possible developments of a given world through time — analogous to a chain over $\mathcal{W} \times \mathcal{T}$:

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[5]"Branches" — the set of (maximal) chains within the (poset) $\mathfrak{T}$ — refers directly to this apparent "right-branching" property of time (*sc.* future contingents). Prior also refers to "routes." This terminology s apparently equivalent to the "histories" of other authors (Belnap et al. 2001; Dowty 1977; Tedeschi 1981; Thomason 1970 a.o.) or "chronicles" of yet others (Øhrstrøm & Hasle 1995). For some authors histories are distinguished from branches in that branches consist only of sequences of indices $\prec$-posterior to a specified branching point – that is, $\prec$-final subsets of histories (*e.g.*, Zanardo 1996:4). I'll be using the terms interchangeably.

[6]Given a **Peircian** conception of truth-in-the-future (see fn 4). In fact, on Thomason's modified, trivalent account of truth valuation, a given sentence is generally true at α iff it is is true in all $h \in \mathcal{H}_\alpha$ (*i.e.* all those histories h that run through α) (1970:274*ff*). Thomason (1984) uses B_t equivalently. Tedeschi (1981:247) uses a closely related strategy. Note that this semantics yields NECESSITY-in-the-future on an Ockhamist account.

[7]For an excellent overview of the related set of objects $\mathcal{W} \times \mathcal{T}$-frames — adopted in Condoravdi (2002); Kaufmann (2005) a.o., see Kaufmann et al. (2006). For comparisons with branching times models, see Rumberg 2016a; Thomason 1970, 1984.

$\langle \langle w, t \rangle, \langle w, t' \rangle, \langle w, t'' \rangle, \ldots, \langle w, t_n \rangle \rangle$. Note that these frameworks normally appear to assume that indices correspond to the state of a world at a moment of time. I assume that this model can be extended relatively straightforwardly to capture interval semantic notions (*e.g.*, Bennett & Partee 2004; Dowty 1982; Landman 1991 a.o.). [8]

I will refer to these indices, which constitute the elements of a given branch as **branchmates**. Given that branches are linearly ordered by $\prec$, pairs of branchmates are necessarily related by $\prec$ (and equally by the related linear orders: the weak counterpart $\preccurlyeq$ and the complements of these two orders $\succ, \succcurlyeq$ respectively.)

(4)   Two indices i, i' are branchmates iff $i \prec i' \vee i = i' \vee i \succ i'$

And Priorian-type tense operators can be reformulated as asserting relations between pairs of branchmates i, i'(along a given branch b):

(5)   a. $[\![\text{PAST} \varphi]\!] = \lambda i. \exists i' [i' \prec i \wedge \varphi(i')]$

    b. $[\![\text{FUTURE} \varphi]\!] = \lambda i. \exists i' [i' \succ i \wedge \varphi(i')]$

Given that there are, in-principle, infinite logically possible futures for a given index, B_i will be taken to represent the set of all possible branches b that run through (that is, contain) a given index i ($\cup_{\ni} i$ or $b, b', b'', \ldots \ni i$). I'll sometimes also use the

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[8]This extensibility is also suggested in Dowty 1977 and Tedeschi 1981, which propose an interval semantic formalism for branching futures. Dowty gives a branching time (re)definition of an interval $\imath$ as a connected proper subset ($\sqsubset$) of a history (1977:64) — *i.e.*, a "sub-branch." Formally:

An interval $\imath$ is a subset of $\mathcal{I}$ such that: $\exists b [\imath \sqsubset b \wedge \forall i, i', i'' \in b [i, i'' \in b \wedge i \prec i' \prec i'' \rightarrow i' \in \imath]]$
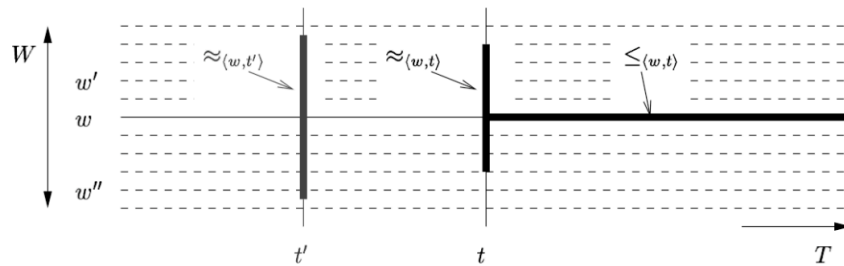
Figure 1.2. Two-dimensional modal logic. The thick lines represent sets of individual indices accessible from $\langle w, t \rangle$ by the modal relation $\approx$ (vertical) and the temporal relation [$\preccurlyeq$] (horizontal). For example, the worlds accessible via $\approx$ from w and t are also accessible at t', but not necessarily vice versa (diagram and caption from Kaufmann, Condoravdi & Harizanov 2006:95)

Figure 1.3. A branching times frame $\mathfrak{T} = \langle \mathcal{I}, \prec \rangle$ following von Prince (*e.g.*, 2019:591). Time "flows" rightwards and vertically aligned indices are taken to be "copresent". $i*$ represents the *evaluation index* (present time & actual world.)
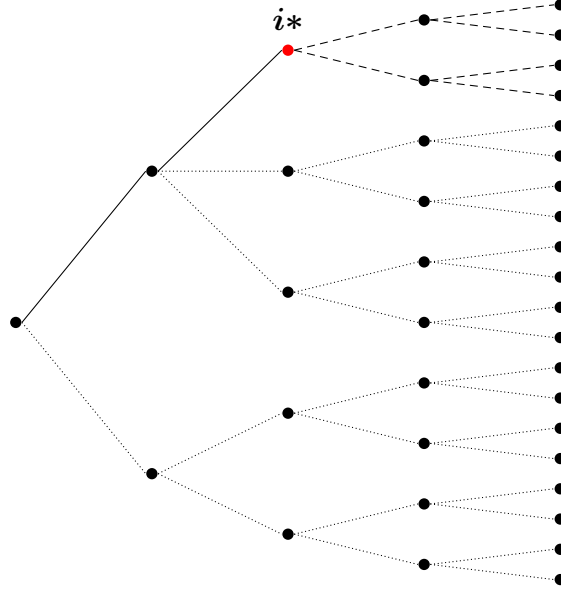
notation ^{b}i in quantified expressions as a shorthand restricting the domain of $\mathcal{I}$ to a specified branch — *i.e.*, $\mathcal{I}$ its subset $\{i \in \mathcal{I} \mid i \in b\}$.[9]

The "co-present" Øhrstrøm & Hasle (2020) additionally point out that, for Kripke, these points are ranked with respect to one another — where each rank (or, diagrammatically, layer) of the tree constitutes an equivalence class of "co-present" indices (modally accessible in a $\mathcal{W} \times \mathcal{T}$-model, see Kaufmann, Condoravdi & Harizanov 2006:95).[10] That is, indices that are neither successors nor predecessors of one another – *i.e.*, those are not ordered by $\prec$ with respect to one another – can still be temporally compared. In developing a branching-time semantics for conditionals,[11,12]

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[9]*E.g.*, $\exists^{b}i\varphi = \exists i[i \in b \wedge \varphi]$ reads 'there exists some index along b s.t. φ.'

[10]Similarly, Belnap et al. (2001:194*ff*) distinguish between *moments* (=indices) and *instants*, where the latter are partitions of a tree structure that represent "[a] horizontal counterpart of histories (=branches)." "Rank" is attributed to Kripke in a 1958 letter to Arthur Prior (published in Ploug & Øhrstrøm 2012:373*ff*).

[11]A crucial desideratum of their account is that it formalise Stalnaker's notion of maximal "similarity" between the evaluation world and the antecedent proposition, following Stalnaker 1968; Stalnaker & Thomason 1970.

[12]This formalism, related to the alternativeness relation ($\approx$) of Thomason (1984:149), has a similar outcome/motivation to the "instant" or "time (value) function" of Rumberg (2016b:27), Belnap et al. (2001:195) and von Prince (2019:592), where *time* maps an index to a set of "clock times" ordered by $\prec$ (isomorphic to branches). Similarly Landman (1991:102) provides a number of ways of establishing equivalence classes of co-present indices. *E.g.*, in what turns out to be an operationalisation of the Kripke's observation referenced above, "rank" can be measured using a function $d : \mathcal{I} \to \mathbb{N}$ that returns the how many "nodes" a given index is from $\mathfrak{T}$'s defined "origin" node (*viz.*

Thomason & Gupta (1980) propose an additional "co-present" relation ($\simeq \subseteq \mathcal{I}^2$) which defines an equivalence class of co-present indices. With the relation $\simeq$ over $\mathcal{I}$, an index can be compared across, *e.g.*, all possible futures. As Landman (1991:101) points out, in counterfactuals like: *if she hadn't left me a week ago, I wouldn't be so miserable now*, the indexical adverb *now* appears to pick out an index co-present with the time of speech, but crucially on a different "branch."

Armed with this relation then, Thomason & Gupta define an (anti)posteriority relation that holds between indices that aren't branchmates:

(6) (Anti)posteriority (Thomason & Gupta 1980:311)

    a. i is **posterior** ($\succsim$) to j iff there is some copresent index of j (say, j') that is a successor to i $i \succsim j \Leftrightarrow \exists j'[j' \simeq j \wedge i \succ j'])$

    b. i is **antiposterior** to j iff i is not posterior to j or is copresent with j

Settledness As suggested above, models of branching time seek to formalise intuitions about asymmetries between past and future predications. We have seen above how the truth of future contingents can be modelled using "forking paths" (i.e. branches of linearly ordered subsets of $\mathcal{I}$). Conversely, the model is "left-linear", depicting 'our notion of necessity *given* the past, [where] only one past, the actual one, is possible' (Burgess 1978:159). That is, for any index there is only one unique sub-branch representing its history/set of predecessors

(7) **Left linearity** — *i.e.*, $\mathfrak{T}$ is not branching to the past iff — where $a, b, b' \in \mathcal{I}$:
$\forall a.b, b'[(b \prec a \wedge b' \prec a) \rightarrow (b \prec b' \vee b = b' \vee b \succ b')]$ (Landman 1991:105)

Settledness/historical necessity is normally expressed in terms of **historical alternatives**. This refers to the notion of equivalence classes of possible worlds ($\approx_t \subseteq \mathcal{W} \times \mathcal{W}$) : those worlds which have identical 'histories' up to and including a reference time t.

The properties of the *historical alternative* relation (in a $\mathcal{T} \times \mathcal{W}$ model) are given in (8) which will permit for a formal definition of settledness as in (9).

(8) **Historical alternatives** $\approx \subset \mathcal{T} \times \mathcal{W} \times \mathcal{W}$

    a. $\forall t[\approx_t$ is an equivalence relation]
        All world-pairs in $\approx_t$ (at an arbitrary time) have identical pasts up to that time.
        Their futures may diverge.

$\bigcirc$ — the $\prec$-minimal element of $\mathcal{I}$, *cf.* Zorn's lemma). Equivalence classes can then be defined as sets of indices the same number of nodes from the origin, *sc.* $\approx \underset{\text{def}}{=} \lambda i \lambda i'.d(i) = d(i')$.

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

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

The monotonicity property (8b) captures the intuition that the metaphysical alternatives that are available at given world-time pair change (monotonically) through time: that is, there is a unique possible state of the worlds at all times in the past. Given that branching-time models are definitionally taken to be left-linear, this additional equivalence relation isn't needed for them: it is a theorem of the system that $\preccurlyeq$ is monotonic (compare 8b′ below.)

(8) b′. **monotonicity of** $\preccurlyeq$
$$\forall i, i', i'' \big[[i' \preccurlyeq i \wedge i'' \preccurlyeq i] \rightarrow [i' \preccurlyeq i'' \vee i'' \preccurlyeq i' \vee i = i''] \big]$$

Importantly, the notion of historical alternativeness/necessity is deployed in linguistic semantics to capture a number of natural language phenomena (e.g., Condoravdi 2002; Kaufmann 2002; Thomason 1984). Settledness, a related property, is satisfied if the instantiation of a given predicate is identically determined at all historical alternatives to a given world-time pair $\langle w*, t_0 \rangle$ is adapted in (9) below.

(9) **Settledness for *P* in** $w*$
$$\forall w' : w* \approx_{t_0} w' :$$
$$AT\big([t_0, \_), w', P\big) \leftrightarrow AT\big([t_0, \_), w'', P\big)$$
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.[13]

Further developing this notion, Condoravdi (2002:82) gives a definition of "presumed settledness" — a property of predicates (see also Kaufmann 2002, 2005). In effect, P is presumed settled in a given discourse context iff 'the instantiation of the property it applies to is presupposed to be historically necessary if true (or equivalently, impossible if false.) This is formalised in (11).[14]

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[13]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.

[14]As a property holding between sentences (rather than properties) and doxastic agents, Kaufmann similarly defines this condition ('presumption of decidedness') as:

(11) a. **The common ground**

Common beliefs (somewhat heuristically) are the set of propositions that are taken to be believed by all discourse participants (doxastic agents) α in the discourse context (c).

$$CB_c(\varphi) \underset{\text{def}}{=} \varphi \in \bigcap_{\alpha \in c} \text{DOX}_\alpha(w*)$$

The common ground cg_c, then, is the transitive closure of the common belief relation (that is, an ancestral relation that) (see Fagin et al. 1995; Kaufmann 2010; Stalnaker 2002).

$$cg_c(\varphi) = \varphi \in \bigcup_{i=1}^{\infty} CB_c^i \text{ where } CB_c^{i+1}\varphi = CB_c CB_c^i \varphi$$ That is, a proposition φ is in the common ground iff it is a common belief of all participants that it is a common belief of all participants *etc.* that φ.

b. **The presumption of settledness for P**

$$\forall w' : w' \in \cap cg, \forall w'' : w' \approx_{t_0} w'' :$$
$$AT\big([t*, \_], w', P\big) \leftrightarrow AT\big([t*, \_], w'', P\big) \qquad \text{(Condoravdi 2002:82)}$$

A property P (*e.g.* an eventuality) is presumed settled in a common ground cg iff P is settled at all historical alternatives w'' to all worlds w' compatible with cg.

Here, a common ground is taken to be to be equivalent to a context set ($\cap cg$, *cf.* Stalnaker 1978:321*ff*) — *sc.* the set of worlds that the speaker takes to be epistemically accessible for participants in the discourse context/the set of worlds where all propositions known by the discourse participants are true (compare also Kaufmann's definition of settledness ("decidedness") in fn. 14).

Once again, and drawing on the relations described above, this relation between context set and property can be recast in a branching-time model as in (9′); again $i* \in \mathcal{I}$ represents the evaluation/reference index (analogous to $\langle w_0, t_0 \rangle$ above).

(9′) **Settledness-at-$i*$ for P** (branching times)

$$\forall b \Big[b \in B_{i*} \rightarrow \exists i' \Big[i' \in b \wedge \forall j \big[i' \simeq j \wedge [AT(i', P) \leftrightarrow AT(j, P)] \big] \Big] \Big]$$

A property P is settled at an evaluation index $i*$ iff all branches running through evaluation time $i*$ contain a co-present index $j \in \cup \simeq i'$ such that P is instantiated at i' iff it's also instantiated at j. (*I.e.*, P is settled at $i*$ iff it's instantated at all or none of the indices that are copresent with i' (a branch-mate of $i*$.))

φ is **presumed decided** by agent α at i iff $\underset{\sim\alpha}{\square}(\varphi \rightarrow \underset{\approx}{\square}\varphi)$ is true at i. (Kaufmann 2005:240)

That is, iff: in all of α's doxastic alternatives, if φ holds at i, then it holds at all of i's historical alternatives.

Similarly, in a branching time framework, we would stipulate that P is **presumed settled** iff, for any possible branch b that is compatible with a given common ground, P is identically determined at b and all of the historical alternatives to that particular b.

A modal trichotomy   As a consequence of this, Von Prince (2017, 2019) establishes a neat formal trichotomy between the ACTUAL, POTENTIAL and COUNTERFACTUAL domains by appealing to this framework (see also Rumberg 2016b:41, 2019). This is modelled as having $\prec$ induce a partition of $\mathcal{I}$: that is, all $i \in \mathcal{I}$ can be sorted into (exactly) one of these three sets. This partition is reproduced in (12).

(12)   Given a contextually defined ACTUAL PRESENT $(i* = \langle w*, t* \rangle)$, $\mathcal{I}$ can be partitioned into three subdomains:

    a.   The ACTUAL (past/present) = $\{i \mid i \preccurlyeq i*\}$
         The utterance index $i*$ and its predecessors are the realm of the ACTUAL. Compare this notion to the equivalent one of *historical alternatives to w at t*. These indices will be shown to be associated with the (notional semantic category of) REALIS.

    b.   The POTENTIAL = $\{i \mid i \succ i*\}$
         Successors to the index of utterance $i*$ are the realm of the POTENTIAL: the full set of metaphysically possible futures to $i*$.

    c.   The COUNTERFACTUAL = $\{i \mid i \textbf{ is unordered by } \prec \textbf{ w/r/t } i*\}$
         Those $i \in \mathcal{I}$ which neither precede nor succeed the utterance index $i*$: i.e., indices that are not (possible) branchmates of $i*$.

Each cell of this partition is represented in Figure 1.3 above: solid lines join those indices that are $i*$-ACTUAL, whereas dashed and dotted lines represent $i*$-POTENTIAL and -COUNTERFACTUAL branches respectively. This trichotomy is shown to have significant linguistic import (which will be explored throughout the dissertation.)

1.2.2   Modal auxiliaries as quantifiers: Kratzer 1977 *et seq.*

Building on the tense logics introduced above, following (Kratzer 1977; 1981b; 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 (13) below.

(13)   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 (13a-b) arise as a consequence of different **restrictions** that are made over the set of possible worlds. In effect, the deontic reading (13a) 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 (13b) 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* conversational 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. The accessibility relations against which modal propositions were verified in earlier modal logics (sc. modals as unary operators) are reconceptualised as contextually-retrieved functions from worlds to (sets of) propositions (see Kaufmann, Condoravdi & Harizanov 2006).

A sentence of the form *must* φ asserts that φ is true in all relevant worlds (universally quantifying over a subset of $\mathcal{W}$, returned by a **modal base** (*i.e.*, a conversational background) f) whereas one of the form *can* φ makes a 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 (14).

(14)   The semantics of necessity/possibility modal auxiliaries (adapting from Kratzer 1977:346)

    a. $[\![must]\!] = \lambda f \lambda p \lambda w. \forall w'[w' \in \cap f(w) \rightarrow w' \in p]$
       must p is true given a modal base $f(w)$ if p follows from $f(w)$

    b. $[\![\,can\,]\!] = \lambda f \lambda p \lambda w. \exists w'[w' \in \cap f(w) \wedge w' \in p]$
       can p is true given a modal base $f(w)$ if p is compatible with $f(w)$

A second type of conversational background, the **ordering source**, is formally similar to the modal bases invoked above insofar as it comprises a set of propositions $o(w)$. This set can induce an *ordering* over the worlds in the modal base in terms of how well each world conforms with $o(w)$. Appealing to multiple interacting conversational backgrounds has allowed for successful modelling of linguistic expressions that denote/appeal to graded possibilities and probability and subtle differences in modal "flavours." That more than one conversational background is required is well illustrated in (15) (adapted from Kaufmann, Condoravdi & Harizanov 2006).

(15)   *Randi must pay a fine for drink-driving*
       $\not\Rightarrow$ 'In all those worlds where the rules are best followed, Randi must drink-drive.'

(15) shows that a deontic conversational background can't serve as the modal base for *must* (as this would require that all law-abiding worlds be characterised by Randi's drink-driving.) Instead, we appeal to a "circumstantial" modal base $f(w)$: that is, we consider worlds where relevant circumstances (including Randi's drink-driving) obtain, and universally quantify into a subset of those, namely the ones that best conform to whichever set of rules/laws govern drink-driving (*sc.* those propositions in the deontic ordering source $o(w)$.) Generally this is operationalised by appealing to a function $\underset{o(w)}{\text{BEST}}$ which takes a set of worlds and returns the "best" worlds as determined by an ordering source o (*i.e.*, those worlds in f best conforming to the ideal contained in o as in (16) adapted from von Fintel & Heim 2011:61.)[15]

(16)   The best worlds in a modal base f according to an ordering $\underset{o(w)}{\prec}$

$$\underset{o(w)}{\text{BEST}}\big((\cap f(w))\big) = \{w \in \cap f(w) \mid \neg\exists w'[w' \underset{o(w)}{\prec} w]\}$$

(17)   *must* relativised to two conversational backgrounds (modal base f and ordering source o)

$$\llbracket must \rrbracket^{o,f} = \lambda p \lambda w.\forall w'[w' \in \underset{o(w)}{\text{BEST}}(\cap f(w)) \to w' \in p]$$

must p is true in w, given conversational backgrounds $\langle f, o \rangle$ if p is in true in all the worlds that are best conforming to $o(w)$ in $\cap f(w)$

The formal implementation of orderings and comparisons of sets of worlds (or branches) will be further discussed in the main part of this dissertation.

Quantifying over $\mathfrak{T}$ Once again, we can recast the contribution of modal expressions within a branching-times type ontology (suggested in von Prince 2019:594, note 9). In such a system, modals will be taken to quantify over branches ($\mathcal{B} \subseteq \wp(\mathcal{I})$) — again, maximal chains within $\mathcal{I}$ or sets of indices that are linearly ordered by $\prec$. Given that each unique branch represents a possible course of events, modal operators can be taken to quantify over $\mathcal{B}$, much as they do over $\mathcal{W}$ in possible world semantics.

This involves recasting conversational backgrounds — sets of propositions — as functions from indices to sets of possible branches of $\mathcal{I}$. A deontic conversational background $\text{DEONT}(i)$, for example, is a set of propositions which represent the body of laws at a given index i. As in possible worlds analyses, these conversational backgrounds restrict the domain of quantification to some contextually relevant subset of B_i — i.e. a subset of those branches that run through i.

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[15]This same function is sometimes also given as *max* (e.g. von Fintel & Heim 2011; von Fintel & Iatridou 2008; Hacquard 2006, a.o.) or *O(pt)* (Schwager 2006:247).

Proposals for Branching-theoretic lexical entries for the English modal auxiliaries in (14) are modified accordingly below.[16]

(14′) Proposed modification to semantics for modal auxiliaries (14) for $\mathcal{T}$-frames.

    a. $[\![must]\!]^f = \lambda p \lambda i. \forall b \ni i[b \in \cap f(i) \rightarrow \exists i' : i' \in b \land p(i')]$
        must p is true if, along all the branches through i that are selected by the modal base $f(i)$, there is a branchmate i' such that p holds at i'.

    b. $[\![can]\!]^f = \lambda p \lambda i. \exists b \ni i[b \in \cap f(i) \land \exists i' : i' \in b \land p(i')]$
        can p is true if, there is some branch running through i, which is selected by the modal base $f(i)$ and along that branch there is an index i' such that p holds at i'.

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.

For example, 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. Rullmann et al. (2008), for example show that, in St́átimcets (Salish: British Columbia), deontic and epistemic modal clitics are separately lexified whereas quantificational force is contextually determined (*viz. ka* 'IRR', *kʔa* 'EPIST' and *kelh* FUT') (see also Matthewson 2010; Peterson 2010). They model this with a choice function $f_{\mathfrak{c}}$, pragmatically provided that restricts the size of the set (*sc.* modal base) which is being universally quantified over (18).

(18) Semantics for *kʔa* 'EPIST' (St́átimcets epistemic variable-force modal, from Rullmann et al. 2008:340)
$[\![kʔa]\!]^{c,w}$ presupposes an epistemic modal base m &
$[\![kʔa]\!]^{c,w} = \lambda f_{\mathfrak{c}} \lambda p. \forall w'[w' \in f_{\mathfrak{c}}(m(w)) \rightarrow p(w')]$

Building on other insight on usage of possibility modals (notably Klinedinst 2007), for Rullmann et al. (2008) the "appearance" of force variability in St́átimcets modals is a result of the relative size of the subset of the modal base picked out by $f_{\mathfrak{c}}$ (that is, quantifying over a smaller subset makes a commensurately weaker modal claim.) Numerous authors have since pointed out that this appeal to $f_{\mathfrak{c}}$ seems to be actually equivalent to deploying an ordering source as described above (and

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[16]Ordering sources can be added back in straightforwardly (*i.e.*, again as sets of propositions which induce an order over a modal base.) They are not given in these entries for the sake of exposition.

similarly to von Fintel & Iatridou's 2008 treatment of *ought* "strong necessity" — see Matthewson 2010; Peterson 2008; Portner 2009.) A similar phenomenon (*viz.* force variability) is exhibited in Western Dhuwal(a); see Part **III**, which will deploy components of this analysis. As we will see through this dissertation, additionial elaborations and assumptions will permit us to capture facts about the grammars of these Australian languages.

1.3 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).

further elaboration; explanation of "diachronic level of explanation"

   In the semantic domain, for Kiparsky, "[grammaticalisation] reveals the language 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, I apply a methodology where the precise synchronic meaning of particular linguistic expressions is analysed while simultaneously attending to changes in the interpretive conventions associated with these expressions.[17] It is a goal of the current research, then, to contribute insights into the ætiology of these changes and to consider what light, if any, they may shed on the universal "structure" of the semantic domains that are investigated here.

1.4 Languages

Some three hundred 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 estimated to have been spoken roughly five to six thousand years BP (a similar timedepth to

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[17]See also James Leow's recent (2020) dissertation where he reports change in the modal necessity domain of Cuban Spanish.

Indo-European, see Bouckaert et al. 2018:742). Many of these languages remain underdescribed, and consequently, poorly integrated into (model-)theoretic treatments of cross-linguistic semantics...

ARnhem land more generally (esp given the survey Roper languages in tthe appr chapter)

1.5   Data & glossing conventions

Each subpart of 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 dataset was elicited between 2016 and 2019 from native speakers in Arnhem Land (in particular the Ngukurr and Ramingining communities) and Darwin. Where data are 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
field methods in square brackets — *e.g.*, [JP 20201216].

Part I

The emergence of apprehensionality in Australian Kriol

Chapter 2

bambai as an apprehensional

'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 & Schultze-Berndt 2016) in which apprehensional readings emerge from erstwhile temporal frame adverbials that encode a relation of temporal SUBSEQUENTIALITY between a discourse context and the eventuality described by the prejacent predicate.

To illustrate the issue, consider the contributions of *bambai* in the Kriol sentence pair in (19):

(19)   **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]

While the reading of *bambai* in (19a) roughly translates to 'soon, in a minute', this reading is infelicitous in (19b), 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.)

2.1 Background

Having entered into their lexicons predominantly via the contact pidgin established in colonial New South Wales (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.

(20) *baimbai*, translated as 'soon, eventually, (in the) FUTURE' in Troy (1994)[18]

    a. *stopabit massa **baimbai** mi paiala dat agen aibliv*
       'Wait, master, soon I'll speak to them again, I think.'   (252, 571)

    b. ***Baimbai** Potfilip blakfela Waworong blakfela kwambi ded olgon*
       'Soon Port Phillip ($\approx$ Melbourne) Aboriginal people, the Waworrong, will be "asleep": dead and completely gone.'   (697)

    c. *Wool Bill been choot him kangaroo; **by and bye** roast him*
       'Old Bill shot a kangaroo, then cooked it.'   (575)

cite source for Troy & promote footnotes?

    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.[19,20] Clark takes this shared feature (along with other cognates) to be a retention, evincing a shared history between these varieties (see also fn 21 below.)

    As shown in 19, Australian Kriol (hereafter Kriol *simpliciter*) has retained this function: below, in (21), *bambai* serves to encode a temporal relation between the

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[18]Troy (1994) collates a corpus of n texts, predominantly from settler journals. (20a,c) are taken from Dawson (1831) (Port Stephens) and (b) is taken from James Dredge's diary (Melbourne, 1839). Page numbers given in the example index Troy's (re)publication in the appendices to (and/or orthographically standardised in the body of) her doctoral thesis.

[19]*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 a 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 § 2.3.1 below.

[20]Clark (1979:10-11) lists cognates of *bambai* (transcribed as *baymbay* for Roper Kriol) in the contact languages of New Guinea, Solomon Islands, Vanuatu, Cape York, Norfolk Island and Hawai'i. According to Romaine (1995), in Tok Pisin *baimbai* grammaticalised into a general future tense marker. On the basis of a corpus oof Pacific Jargon English, she also hypothesises emergent irrealis-type readings in admonitory contexts. (this claim is discussed further in Ch. 3.) See also Angelo & Schultze-Berndt 2016 for further review of cognates of *bambai* across other Pacific contact varieties.

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'.

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

        kambek   bla   gugum   dina   bla   melabat
        come.back   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 (21), *bambai* appears to have an additional, ostensibly distinct function as shown in (22) below.[21]

(22)   **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 (22), 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 & 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 (21). Rather, it fulfills the function of a discourse anaphor like 'otherwise', 'or else' or 'lest' (see also Phillips & Kotek; Webber et al. 2001).

     This chapter proposes a diachronically-informed and unified semantics for Australian Kriol *bambai*, concerned especially with the apparent emergence of AP-PREHENSIONAL readings in this (erstwhile) temporal frame adverbial. The current

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[21]Note though that Clark also observes that the Pitkern cognate appears to have developed LEST/IN CASE-type readings (*i.e.*, an APPR reading) as in (22'). Pitkern – the variety spoken by *Bounty* mutineers – is generally described as an outlier among other Pacific contact varieties (*i.e.*, not a descendant of the South Seas Jargon, see Clark 1979:48); this is likely to be an entirely independent innovation.

(22')   Apprehensional-like cognate in Pitkern-Norfolk   (Clark 1979:15)

       *kʌm   dʌʊn   **bɛmbɛə**   ju   fɔl*
       'Come down, lest you fall.'

chapter reviews and motivates the grammatical category of 'apprehensional epis-temics' as described in typological literatures (§ 2.2). Section 2.2.3 describes the function and distribution of Kriol *bambai*, both in its capacity as a subsequential temporal frame adverbial (§2.3.1) and its apparent apprehensional functions (§2.3.2).

In the data we have seen so far, *bambai* appears to connect two propositions. In Chapter 3, we consider how *bambai* is interpreted in view of the relationship be-tween these two propositions: specifically how the prejacent of *bambai* is **modally subordinate** to material accommodated in a discourse context. Somewhere we put in the diachronic story... probably here. Flowing from the use conditional discus-sion. These can maybe all be taken to motivate components of the analysis chapter?

»»»todo

Finally, Chapter 4 comprises a proposal for a unified semantics for *bambai*.

2.2 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 nega-tive speaker attitude with respect to some possible eventuality are attested widely across Australian, as well as Austronesian and Amazonian languages (Angelo & Schultze-Berndt 2016:258). While descriptive grammars of these languages amply make use of these and similar categories,[22] Lichtenberk (1995), Angelo & Schultze-Berndt (2016, 2018) and Vuillermet (2018) represent the few attempts to describe these markers as a grammatical category).[23]

2.2.1 Apprehensionality as a semantic domain

In the first piece of published work dedicated to the properties of apprehensional marking ("apprehensional-epistemic modality"), 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 pre-jacent while dually expressing a warning or otherwise some negative attitude about its prejacent. The symbol ◆ is used throughout to signify these two 'APPREHENSIONAL' properties. Shown here in (23), Lichtenberk distinguishes: (a) **apprehensive-epistemic** function, (b) a **fear** function and (c-d) **precautioning** functions.

(23) **Apprehensional marking in To'abaita: four uses of *ada* 'APPR'**

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[22]The terms TIMITIVE and particularly EVITATIVE, a.o. are also used in these descriptive litera-tures.

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

a. ***Apprehensive modal***   ♦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**(♦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" reading)**   ¬p → ♦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" reading)**   ¬p → ♦($\mathfrak{r}(q)$)

   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)

(23a) 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 (23b). 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*. On the *avertive* reading p *ada* q— translated as 'p otherwise/or else q' — a conditional-like interpretation obtains: if p doesn't obtain, then q may (¬p → ♦q). On "in-case" readings, while q is interpreted as a justification for the utterance of p, there is no reasonably inferrable causal relation between the two clauses — Lichtenberk is somewhat ambivalent about whether these whether these two readings constitute a single or multiple readings (1995:298-302). For AnderBois & Dąbkowski (2020), "in-case" uses involve some distinct "contextually inferrable" proposition r from which q follows ($\mathfrak{r}(q)$). Effectively, if p doesn't obtain,

then some r (a consequence of q) may. In (23d), the failure to take umbrellas ($\neg p$) might result in getting wet (r) (should we get caught in the rain – (q)). 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 ([ese] Tanakan: SW Amazon) AVERTIVE marker (*kwajejje*) may derive from a non-past-marked auxiliary with "temporal subordinate" marking (2018:281). The analysis appraised in this chapter proposes a basic semantic link between the expression of the **temporal sequentiality** of a predicate and **apprehensional** semantics.

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

Adopting this taxonomy, AnderBois & Dąbkowski (2020) focus their attention on the "adjunct" uses of the A'ingae ([con] NW Amazon) apprehensional enclitic *=sa'ne*. That is, they model the contribution of *=sa'ne* in its functions as • a *precautioning*/avertive marker, analysed as encliticising to (subordinate) clauses (24a-b), compare To'abaita (23c-d), in addition to • a TIMITIVE function, where the APPR functions as a DP enclitic (*e.g.*, c). Adapting treatments of the semantics of rationale/purposive clauses, they propose the core meaning given in (25).

(24) Adjunct uses of apprehensional *=sa'ne* in A'ingae

(AnderBois & Dąbkowski 2020)

    a. AVERTIVE use

       sema-'je=ngi   *dû'shû=ndekhû*   *khiphue'sû=**sa'ne***
       work-IPFV=1   child=PL   starve=**APPR**

       'I'm working lest my children starve.'   (381)

    b.   IN-CASE use

      *tsa'khû=ma=ngi guathian-'jen [ña yaya   khuvi=ma i=**sa'ne**]*
      water=ACC=1   boil-IPFV   1SG father tapir=ACC bring=**APPR**

      'I am boiling water <u>in case</u> my father brings home a tapir.'   (383)

    c.   TIMITIVE use

      *anae'ma=ni=ngi   phi [thesi=**sa'ne**]*
      hammock=LOC=1 sit   jaguar=**APPR**

      'I'm in the hammock <u>for fear of</u> the jaguar.'   (374)

(25)   AnderBois & Dąbkowski's (2020:382) semantics for A'inge apprehensional adjunct uses of =*sa'ne* (on its avertive/*lest*-like reading)

$[\![$=*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 entity 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.

For AnderBois & Dąbkowski, the semantics for this *lest*-type usage can be extended to other precautioning ("in-case") uses and timitive uses by appealing to an third, "inferrable" proposition r. That is, on the IN-CASE reading, all GOAL$_{i,p}$-worlds are such that $\neg r(w')$ — as they point out, on this analysis, AVERTIVE is a special case of the precautioning use where $r \Leftrightarrow q$. On the TIMITIVE reading, =*sa'ne* takes an argument $x \in \mathfrak{D}_e$ (instead of $q \in \mathfrak{D}_{\langle s,t \rangle}$), now asserting that • x "is involved in" $r(w')$ and that • $\neg r(w')$.[24]

    On the basis of the apparent loosening of morphosyntactic restrictions between each these three uses, the authors additionally predict that an implicational hierarchy of the form AVERTIVE $\gg$ IN-CASE $\gg$ TIMITIVE holds (2020:386-87), and provide some cross-linguistic data in support of this conjecture. [25]

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[24]AnderBois & Dąbkowski (2020:15) retain a lexical entry for =*sa'ne*$_{\text{TIMITIVE}}$ distinct from the precautioning uses. They suggest that an alternative to avoid this polysemy would be to adopt a "coercion" style analysis or (less plausibly) an ellipsis one.

    A fourth possibility which they do not address would be to reanalyse the timitive DP as a (verbless) existential proposition (see Part II of the current dissertation.) It is unclear whether this accords with available strategies of existential predication in A'ingae, although there is a reserved negative existential predicate (*i.e.*, one not derived from a (positive) existential one) *me'i* 'NEG PRED' (according to Hengeveld & Fischer 2018). In this case, $\text{EXIST}(x) = r$. Typological support for such a strategy might be found in Pitjantjatjara pjt, where again, a single formative -*tawara* 'APPR' attaches to nouns and verbs. When functioning as a nominal suffix, -*tawara* selects for a LOC marked noun. Pintjupi [piu] deploys similar strategies (Zester 2010:16-9). Locative-marking of NPs is a strategy related to/often used in existential predication.

[25]Beyond the adjunct uses (24) analysed in AnderBois & Dąbkowski 2020, A'inge =*sa'ne*, Dąbkowski & AnderBois (forthcoming) additionally report uses corresponding to the APPREHENSIVE and COMPLEMENTIZER uses described above. Examples are replicated below (24'). It is not

Finally, on the basis of a comparison with the neighboring Lau language ([`llu`] Solomonic: Malaita) and other SE Solomonic languages, Lichtenberk argues that the apprehensional functions of To'abaita *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). According to Lichtenberk, Lau *ada* admits of an *appr* reading while also functioning as a a fullly-inflected predicate. Its To'abaita cognate has lost this function, recruiting a new verb *riki* 'see, look', which apparently has shown signs of being recruited into apprehensional space (evincing a possible grammaticalisation cycle from perception verbs to apprehensionals.)

2.2.2 Apprehensionality in the context of Australian Kriol

Dixon (2002a: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.[26] 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 (26) below are all adapted from Austin (1981), labelled for the apprehensional uses described in the previous section.

immediately clear what alterations to the semantics in (25) would be needed to account for these uses.

The analysis of Kriol *bambai* that follows shares a number of properties with this treatment of A'ingae apprehensive =*sa'ne* — notably the (possibly) indirect relation between clauses connected by apprehensional morphology. As we will see, however, the numerous distributional and morphosyntactic differences between these two items (in addition to a number of diachronic concerns) will lead us down a somwhat different path.

(24′) Non-adjunct uses of =*sa'ne* (Dąbkowski & AnderBois forthcoming:3)

    d. COMPLEMENTISER use

       tsai–ye=***sa'ne***
       bite–pass=**APPR**

       'You might get bitten.'

    e. APPREHENSIVE use

       tsama ña dañu=***sa'ne***=*khe dyuju–je*=*ya*
       but   1s   be hurt=**APPR**=thus be afraid–IPFV=VERID

       'I was afraid I'd get hurt.'

[26]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 & Dąbkowski 2020; Vuillermet 2018).

(26) Apprehensional marking in Diyari

    a. Avertive (precautioning)

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

          yinha *nhayi-rna*
          2S.ACC see-IPFV$_{SS}$

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

    b. In-case (precautioning)

        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. Fear complementizer

        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. Apprehensive use

        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 (26) 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).[27] In all cases, the predicate over which *-yathi* scopes is **modalised** and expresses a proposition that the speaker identifies as 'unpleasant or harmful' (Austin 1981:227). Little work has been undertaken on the grammaticalisation of apprehensionality.[28]

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 & Schultze-Berndt (2016) focus their attention on demonstrating the cross-

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

[28]Dixon (2002a: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.

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. 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 ($\blacklozenge p$). Data from virtually all attested languages of the Roper Gulf are shown in (27).

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

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!'
<div align="right">(Heath 1980d:86, interlinearised)</div>

b.   **Ngandi**

*a-ḏaŋgu-yuŋ   ŋaṛa-waṭi-ji,   a-waṭu-ḏu   aguṛa-**mili?-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.'
<div align="right">(Heath 1978:106, interlinearised)</div>

c.   **Ngalakan**

*garku buru-ye **mele**-ŋun   waṛŋ'waṛŋ?-yi?*
high   3ns-put **APPR**-eat.PRES crow-ERG

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

d.   **Rembarrnga**

*ŋaran-**maʔ**-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.'
<div align="right">(Heath 1980b, interlinearised & standardised to Yolŋu orthography)</div>

f. **Marra**

wu-ḷa   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 (27), there is a diversity of formal strategies deployed (or combined) in these languages to realise apprehensional meaning: suffixation inside the verbal paradigm (27a-b), prefixation to the verb stem (27b-d) and a separate apprehensional particle (27e-g).[29] While detailed work on the expression of apprehensionality in these languages (including the syntactic status of apprehensional clauses) is not currently available,[30] a number of generalisations can be made on the basis of the data in (27). In all cases, the apprehensional appears to modify a fully-inflected (finite) clause, in most cases, ostensibly linking two (the p LEST q-type usage, see discussion above) predicates, each completely inflected for agreement/TMA information. Conversely, the Rembarrnga datum in (d) provides an example of an apprehensive (monoclausal/♦p) type use. It is unclear at this stage whether/for which languages the apprehensional-marked clauses invite an analysis as syntactically subordinate, althouogh in all cases, the prejacent to APPR can be shown to be modally subordinate to information in the discourse context (often constrained by p, see Ch. 3).

In view of better understanding the semantic 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.

2.2.3 Temporal frame adverbs and apprehensionality

Angelo & Schultze-Berndt (2016, 2018) provide convincing cross-linguistic evi-

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[29]Nominal suffixes are also reported in Australian languages, often described as EVITATIVES, AVERSIVES, ADVERSATIVES in the Australian descriptive literature (Zester 2010:9, Browne et al. forthcoming).

[30]Although see Zester (2010) for a typology and Browne et al. (forthcoming) for an overview of apprehensional morphosyntax in Australian languages. The latter includes a detailed description of the variety of strategies deployed across the Ngumpin-Yapa family — *viz.* nominal marking, specialised complementisers and apprehensional auxiliaries. They argue that the precautioning-type apprehensional constructions in these languages are syntactically coordinate.

dence 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 2.1 (partially adapted from Angelo & 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 & 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 (see fn 21).

Table 2.1. Etyma and polysemy for apprehensional modals

Language	Adverbial	Gloss[31]	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	

Compare these uses of Mangarrayi *baḷaḷaga~baḷaga* in (28) to (27g) above. In (28a), 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.[32]

(28) **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)

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[31]This isn't to suggest that the semantics of those words provided in the 'GLOSS' column in the table above ought to be treated as 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.

[32]Note that *baḷaga* is glossed by Merlan as 'before' in the imperative sentences (28b-c). In both cases, the speaker appears to indicate that event described in the following clause is imminent (note that in declarative contexts this might be translated as 'then').

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

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

d. *bargji nama*   **balaga** *iia-way-(y)i-n*
    hard   2s.hold.IMP **lest**   2sf

    'Hold on tight lest you fall!'   (Merlan 1989:147)

e. *ŋiñjag*   *ŋaḷa-bu-n*   *guṛuugguṛug-bayi,* **wuṛay** *ḍoʔ*
    PROH   1p.INCL-kill-PRES white.people-FOC **later**   shoot

     a-ŋayan-ma
     IRR-3s>1p.INCL-AUX

    'We can't kill white people. Later on they might shoot us.'

                                                (Merlan 1989:147)

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.[33] Note additionally the apparently apprehensional use of *wuṛay* 'later' in a prohibitive context in (28e). While Merlan makes no mention of any conventionalised "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. A similar patter in attested in Marra (29):

(29)   **Marra *wuniŋgi***   (Heath 1981:360, interlinearised)

    a.   Subsequential use

      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.'

    b.   Apprehensional use (see also 27f above)

      ŋa-naŋgu-wa,   **wuniŋgi** *ṛag-ṇiŋ-anjiyi*
      2s>1s-give.IMP **lest**   hit-1s>2s-AUX(EVIT)

      'Give it to me, otherwise I'll hit you!'

Per Heath's analysis (1981:308), Marra has an inflectional apprehensional category (his 'EVITATIVE') which is realised only in positive *lest*-type clauses (29b).

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[33]A common derivational process in Australian languages (Dineen 1990:113,209; Dixon 2002b:201), Mangarayi reduplication frequently functions as an property intensifier (Merlan 1989:166-7). In this sense, *baḷaḷaga* 'imminently/right now' can be read as an intensified form of *baḷaga* 'soon, later.'

These frequently co-occur (in elicitation) with the adverbial *wuniŋgi* 'farther along, furthermore, in addition' (common in text translations.) Heath suggests that negative *lest*-clauses are "conveyed by the future negative along with *wuniŋgi*" (187). He explicitly notes the similarity between this strategy/apparent polysemy between subsequential-type TFAs and apprehensionals in neighbouring languages, incuding Kriol *bambay* (*sic*; 187, 308). Further discussion and a diachronic account of this apparent polysemy is given in § 3.2.

2.3   The distribution of Kriol *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 & 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 (see Ch. 1). Figure 2.1 represents a coarse taxonomy of the readings available to *bambai*, cross-referenced for the subsection in which each is discussed[34]

Figure 2.1. Range of functions for *bambai*
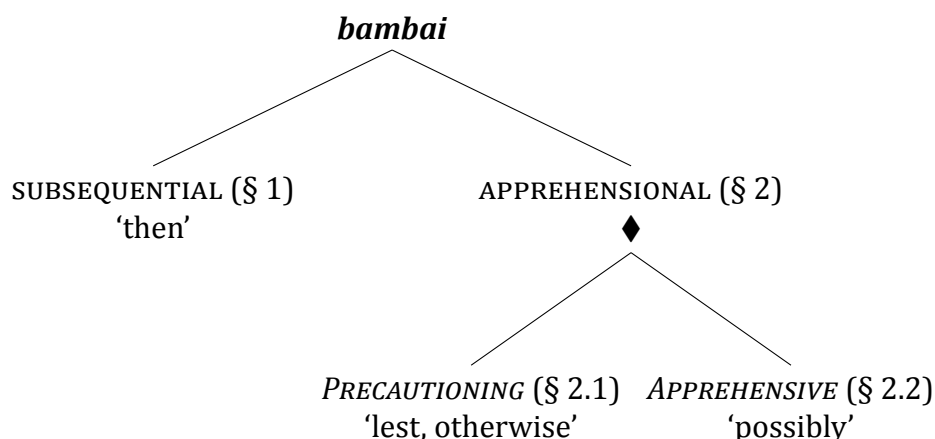
2.3.1   Temporal frame reading

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).

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[34]As we will see, uses corresponding to Lichtenberk's FEAR function (discussed above) and co-occurrences of *bambai* with *if*-clauses are taken to be subsumed under the *bambai*'s APPREHENSIVE function.

As shown in Chapter 1, formally, we can model the contribution of temporal expression by assuming a set (chain) $\mathcal{T}$ 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 a temporal *frame* for the predicate — that is, 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 mentioned in § 2.1, 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 the 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 (30).

(30) 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, (30) 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 (30), 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.*, 21), the SUBSEQ-denoting function of *bambai* shown here has been retained in Kriol. This reading is shown again in the two sentences in (31). The schema in (31c) provides an informal representation of this context-dependent, "subsequential" temporal contribution.

(31)   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)*

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

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 (31a) 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 $t_e \in \{t'_e : t_r \prec t'_e \prec t^+\}$.[35] The subsequent verse: *Bambai na Ib bin abum najawan lilboi* (KB Jen 4:2) 'Soon after *that*, Eve had another boy' further forward-displaces the birth event of Abel. Subsequential TFAs are distinguished by this 'near future' restriction, underpinned by a set of conversational

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[35]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 better have obtained for the whole sentence to be judged true. This device is described in more detail in § 4.1.

expectations over reasonable degrees of "soonness."

Narrative cohesion   *bambai* additionally occurs with an undoubtedly related en-dophoric use (along with the apparently phatic discouse particle *na* < 'now').[36] This function is particularly frequent in the Kriol Bible and can be taken to rely on a metonymic relationship between the structure of time and the structure of a text/discourse (compare English *now then* or *so next*).

(32)   **Discourse cohesion uses of SUBSEQUENTIAL** *bambai*

    a.   *Wal deya na deibin jidan longtaim.* **Bambai na** *wen imbin brabli olmen, Tera bin dai.*

      'So they lived there for a long time. And then, when he was very old, Terah died.'   [KB Jen. 11.32]

    b.   *Longtaim God bin meigim det pramis garram Eibrahem, en imbin tok im garra kipum det pramis.* **En bambai na** *430 yiyastaim God bin gibit det lowa langa Mosis.*

      'Long ago, God made a covenant with Abraham and said that he would keep the promise. **Now then,** 430 years later, God gave Moses the laws...'   [KB Gal. 3:17]

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

2.3.2   Apprehensional reading

In his survey of 'apprehensional epistemics' (reviewed in §2.2.1 above), Lichtenberk describes apprehensionals like To'abaita *ada* as having a dual effect on their prejacents ("mixed modality"):

- *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.'   (Lichtenberk 1995:295-6)

While we are not at this stage committed to Lichtenberk's metalinguistic labels, a modal semantics for Kriol *bambai* is suggested on the basis of the data below. We will see how this use diverges from the subsequential/temporal frame readings described above, broadly dividing *bambai*'s apprehensional contribution into two main subtypes that align with the *avertive* (§ 2.3.2.1) and *apprehensive* (§ 2.3.2.2)

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[36]There are 455 tokens of clause-intial *Bambai na* in the Kriol Bible.

functions identified in previous literature (Lichtenberk 1995; Vuillermet 2018) and described above.

2.3.2.1 *p bambai q* : the precautioning/conditional use

The "precautioning" uses of apprehensional morphology are characterised by serving to "connect a clause encoding an apprehension-causing situation to a preceding clause encoding a precautionary situation" (Lichtenberk 1995:298). The data provided below show *bambai*'s function in conditional-like constructions, where it precedes both indicative and counterfactual consequent clauses.[37]

Indicative 'nonimplicationals.'   Apprehensional *bambai* occurs in situations where the speaker identifies some undesirable eventuality as a potential outcome of the discourse situation. Angelo & Schultze-Berndt (2016:272*ff*) observe that these readings may or may not constitute "admonitory" speech acts — *i.e.*, can serve as direct warnings or threats (directive illocutionary force in 33a-b), or merely as predictions of a negative outcome for the subject (*e.g.*, 33c).

The sentence data in (33) demonstrate how *bambai*-sentences are used to talk about undesirable possible future eventualities. Extending the model introduced above to modelling this (following the "possible worlds" semantic framework introduced in chapter 1), we postulate a set $\mathcal{W}$ of *possible worlds*. On 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 1976, a.o.)

Generally speaking, the "precautioning" construction — *i.e.*, *p bambai q* on its apprehensional reading — appears to convey converse nonimplication between p and q: 'if some situation described in p doesn't obtain in w, then the (unfortunate) situation described in q might' — *i.e.*, $\neg p(w) \rightarrow \blacklozenge q(w)$.

(33) 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]

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[37]Given the availability of these counterfactual LEST-type uses of *bambai*, Lichtenberk's "precautioning" label may be less appropriate. Lichtenberk doesn't provide evidence of counterfactual uses for To'abaita *ada*, although his discussion of colloquial Czech *aby* 'APPR' shows that this item is apparently compatible in counterfactual contexts (1995:309). In any case, I continue to describe all LEST-type uses as *precautioning* given this term has been adopted by other authors (AnderBois & Dąbkowski 2020; Vuillermet 2018).

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 (MOD) have

    no daga ba   dringgi main medisin
    no food PURP

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

d. *ai=rra gu la   det airport ailibala, **bambai** mi mis   det erapein*
1s=IRR go LOC the airport early   **bambai** 1s miss the æroplane

'I'll go to the airport early, **otherwise** I could miss my flight.'
[GT 16032017-21']

In (33a), 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: ¬ *(livim)* → ♦ *(dedi graul)*. Unlike the uses of *bambai* presented in the previous subsection, *bambai* here is translatable as 'lest/otherwise/or else.' *bambai₁*, the first token in (33a), appears to have a similar function, although has no overt sentential antecedent.[38] 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. (33b) shows a similar use.

(33c) provides an example of an apprehensional/LEST-type reading occurring in a narrative context (that is a representational/predictive-type illocutionary act). Here, the Speaker identifies a possible unfortunate 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: ¬(*go.shop*) → ♦(*foodless*). This reading is robustly attested in contexts where the antecedent is modified by some irrealis operator. For example, in (34) – repeated here from (22) above – *bambai* makes a similarly modal claim: if κ is a set of worlds in which I drink coffee at t' (and $\overline{\kappa}$ is its complement),

---

[38]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]

then an utterance of (34) asserts that $\exists w \in \overline{\kappa} :$ I sleep by t^+ in w.

(34) 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)**

$$t* \qquad\qquad t' \qquad\qquad t^+$$
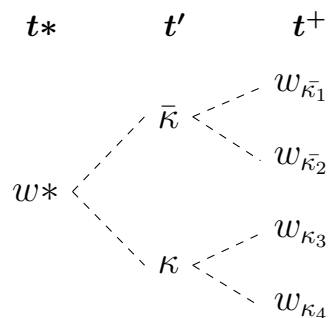
In the reference world $w*$ at speech time $t*$, the Speaker establishes a partition over possible futures: they are separated into those in which, at time t', he drinks coffee $\{w' \mid w' \in \kappa\}$ and those in which he doesn't $\{w' \mid w' \in \overline{\kappa}\}$. In those worlds where he fails to drink coffee, there exist possible futures ($w_{\overline{\kappa}_1} \vee w_{\overline{\kappa}_2}$) by which he's fallen asleep by some future time t^+.

Of particular note is this behaviour 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.) Demonstrated in (35), This appears to be categorical. where a SUBSEQ reading of *bambai* — viz. [#]*watch.movie*$(t_2)\wedge$ *sleep*(t_3) — is infelicitous. That is: only an APPREHENSIONAL reading is available: watching a film is a measure taken to avert asleep ¬*(watch.movie)* → ♦*(sleep)*.

(35) **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.'
Available reading: 'I'll watch a film, otherwise I may fall asleep.'

[AJ 23022017]

The relationship between the antecedent clause and the context on which (apprehensional) readings of *bambai* is anaphoric is further discussed below in chapter 3.

Counterfactual 'nonimplicationals'   *bambai* similarly receives an apprehensional reading in subjunctive/counterfactual contexts: those where an alternative historical reality is considered.[39] The occurrence of apprehensionals in these contexts is little-reported cross-linguistically (described as "rare" in Angelo & Schultze-Berndt 2018 for German *nachher.*)

In (36), the Speaker identifies that in some alternative world (say w') in which he behaved differently to the way in which he did in the evaluation world ($w' \not\approx_{t*} w*$)[40] — 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 (35) above, *bambai* modalises its prejacent: it asserts that $\exists w'[w' \notin \kappa \wedge$ I sleep by t^+ in $w']$.

(36)   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 t' t^+
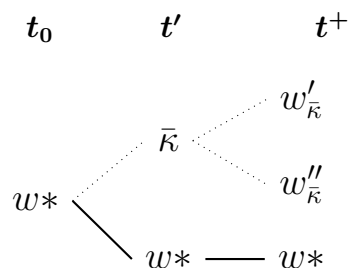
         Here, the Speaker considers a set of worlds that historically diverge from the evaluation world $w*$, namely the set of worlds where, unlike the evaluation world, the Speaker did not drink coffee at t' — $\{w' \mid w' \in \overline{\kappa}\}$. The Speaker asserts that there are some possible near futures 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 insofar as it bears some resemblance to more familiar conditional constructions — *(i.e.,* that of an "infixed" two-place relation between two propositions.) Unlike *if... then-*conditionals, in all the apprehensional data, we have seen so far, *bambai* introduces a predicate describing some eventuality which construes as undesirable for the speaker. It appears to that this eventuality is a *possible, foreseeable* future consequence of some other contextually provided proposition — in the examples dis-

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[39]See von Fintel 2012 for a general overview of counterfactual conditionals.

[40]A definition and further discussion the $\approx$-relation ("historical alternative to") is given in (8). A formal account is further developed below.

cussed so far, this proposition is often interpreted as that of the non-instantiation of q (see Ch. 3).

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 all sentences of the form p *bambai* q, a reference world and time are provided by some (perhaps modalised) antecedent proposition. In those contexts where q is understood to be being asserted of a future time ($t_e \succ t*$) or a different world ($w' \not\approx_{t*} w*$); the entire proposition construes as modalised. This intuition will be spelled out in detail in Ch 4).

In effect, the contribution and distributional properties of *bambai* examined in this subsection — the conditional-like or so-called *precautioning* uses, in Lichtenberk's typology — resembles that of English *otherwise* (and parallels that of *lest.*) All of these observations are further spelled out in chapters 3 and 4 below.

We turn first, however, to a description of additional "apprehensive" uses of *bambai*.

2.3.2.2 *bambai* as a modal adverbial: the APPREHENSIVE use

In contrast to the 'nonimplicational' or PRECAUTIONING (*i.e.* LEST/'in case'-type) readings presented above (§ 2.3.2.1), *bambai* also functions as an epistemic adverbial with apprehensional use conditions; a usage corresponding to Lichtenberk's *'apprehensional-epistemic'* function and to Vuillermet's *apprehensive* (proper).[41] 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 as evidence that *bambai* is **not** a (syntactic) subordinator: that is, it doesn't introduce a dependent clause (unlike other purposive/apprehensional expressions cross-linguistically.)[42] Consider first an elaboration of (34), provided as (37) below. Here there is no explicit linguistic antecedent for *bambai*, whereas its prejacent encodes an unfortunate future possibility.

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

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

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

---

[41]The first token of *bambai* in (33a) also represents an apprehensive use like this.

[42]See, *e.g.,* Blühdorn 2008; Cristofaro 2005 for overviews of subordination.

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

mait weik ol nait… garram red ai…
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 (38) below, B deploys *bambai* to the same effect in two single-clause utterances; each encoding an unfortunate future possibility — namely an unsuccessful trip (♦*no.meat*) in the event that the two *gajin*s permit their young relative to join in.

(38) **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]

Finally, (39) below provides a clear example of Lichtenberk's (1995) "epistemic downtoning" function for apprehensionals. Here, *bambai* clearly behaves as an epistemic possibility modal (*bambai q = ♦*$_{\text{EPIST}}$ *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.)

(39) **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 apparently 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/that's gonna be Hanna*, see also Condoravdi 2003; Werner 2006; Winans 2016.) Giannakidou & 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 in fact always encode epistemic necessity (*sc.* that its *epistemic modals* that perform the work of signalling predictive illocutionary force.) We will have further observations to make on these facts in the chapters that follow (ch. 3 for a discussion of pragmatic competition with *marri* and ch. 4 for presentation of an analysis that unifies these uses.)

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 (40), *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 uses shown above, *bambai* appears to behave here as an apprehensive modal insofar as it encodes an unfortunate possible eventuality. Unlike the above examples, however, the prejacent (*viz.* one of the Philistines committing adultery with Rebekah) is taken to describe a counterfactual event in view of Isaac's deception.

(40) **Context.** Abimelek (king of the Philistines) chides Isaac for having earlier identified his wife Rebekah as his sister.

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]

Apprehensives with *if*-restrictors   Contrasting with the 'nonimplicational' (*i.e.*, precautioning/LEST-type) readings in § 2.3.2.1 above, Kriol also forms conditional sentences using an English-like *if...(then)* construction. The two sentences in (41) give examples of an indicative and subjunctive *if*-conditional, where *bambai* modifies the consequent clause (the "apodosis.")

(41) 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 *=no(m)o* 'NEG' is omitted)   [GT 16032017]

The contrast between (41a,b) and their *if*-less counterparts in (34a and 36a) respectively (*pp.* 40-41), 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 (41) diverge sharply from this interpretation. That is, each of the *if p, bambai q* sentences in (41) asserts a straightforward conditional $p \rightarrow \blacklozenge q$: should the antecedent proposition hold (have held), then q may (have) obtain(ed).

In this respect, *bambai* appears to be behaving truth conditionally as a modal expression encoding possibility — *sc.* a modal adverbial — similarly to the monoclausal uses presented above in this subsection. The MODAL BASE (*i.e.*, those worlds

over which bambai quantifies) 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. von Fintel 1994; Kratzer 1979; Lewis 1975; Roberts 1989, 1995). Additional argumentation to this effect is included in ch. 3.

2.3.3 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 (42).

(42) **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 ($w' \approx_{t*} w*$) (*i.e.*, in **factual**, **nonfuture** contexts).
Consequently, *bambai*'s prejacent generally contains past marking *(bin)* in subsequential contexts

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

    c. In apprehensional contexts, precautioning (LEST-type) readings occur in a p *bambai* q construction. That is, in a sentence of the form p *bambai* q is interpreted as an admonition that $\neg p \rightarrow \blacklozenge q$

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* gives 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 2.2 below.[43]

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[43]This is not intended to suggest that these operators are in any way semantic primitives, Table 2.2 is to be read as a non-exhaustive list of linguistic devices that appear to associate with nonfactual mood.

Table 2.2. Semantic operators co-occurring with modal (apprehensional) 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'
NEG 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	∅	*yumo jidan wanpleis **bambai** mela nogud*[44] 'Youse sit still or we might get cross'
PROHIBITIVE	∅ [*nomo*] _{IMPR}	***nomo** krosim det riba, **bambai** yu flodawei* 'Don't cross the river or you could be swept away!'
GENERIC	∅	*im gud ba stap wen yu confyus, **bambai** yu ardim yu hed* 'It's best to stop when you're confused; you could get a headache'
NEG GENERIC	∅ [*nomo*] _{GEN}	*ai **nomo** dringgi kofi enimo, **bambai** mi fil nogud* 'I don't drink coffee anymore or I'd feel unwell'
CONDITIONAL	*if*	***if** ai dringgi kofi, **bambai** ai kaan silip* 'If I have coffee, then I mightn't sleep'

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

Chapter 3

An apprehensional pragmatics

Chapter 2 provided a detailed account of the distribution of the Kriol adverb *bambai*, the numerous syntactic environments in which it surfaces and the numerous interpretations that it appears to license. The current chapter proposes a way of understanding the synchronic relationship that holds between these different uses and readings of *bambai*, crucially interrogating the relationship between clauses of the type *bambai q* and the context in which they're embedded/their "matrix discourse" (§ 3.1).

In developing this understanding of the crucial role of context in the interpretation of *bambai*, § 3.2 proposes an account of the diachronic emergence of apprehensional expressions from temporal frame adverbials (*sc.* devices that encode SUBSEQUENTIALITY.) Deploying insights from the diachronic semantics literature, we will see that this apparent meaning change arises from the conventionalisation of a (subtype) of *post hoc ergo propter hoc*-type conversational implicatures.

In contemporary Roper Kriol — due to the developments described in this chapter (and the distribution described in ch. 2) — *bambai*, the erstwhile TFA, can be shown to function as a modal adverb. Consequently, it has entered into the functional domain of other possibility adverbials, notably *marri* 'perhaps.' Incidentally, the competition between *marri* and apprehensive *bambai* provides a frame to investigate the attitudinal component of apprehensionality, the key distinguishing feature of this category. § 3.3 compares Kriol data with that of other apprehensionals and proposes a treatment of the "undesirability" component of apprehensional meaning as *use-conditional* or *expressive* content.

3.1   A modal subordination account

The first examples presented in Chapter 2 are repeated below in (43):

(43) **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]

As we have seen, an important way in which the range of uses of *bambai* are united is in the fact that they appear to modify the proposition that they precede (the PREJACENT), crucially relating it to some component of the discourse context. For clarity, paraphrases and schemata for (43a-b) are provided below.

(43) a′. The prejacent (that the subject comes to dinner) is taken to hold at i_e, SUBSEQUENTLY to (*i.e.*, in the near future of) some contextually-specified reference time (i_r= speech time $i*$ in this case.)

$$i_r \text{————————} \boldsymbol{i_e} \text{- - - - - - - - - - - -} \succ$$
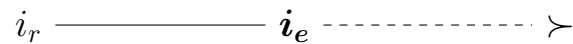
    b′. In (43b), the prejacent (the subject's failure to complete his work) is taken to represent a possible outcome (*e.g.*, at i_e) of (the negation of) some contextually-supplied proposition (*e.g.*, the subject's not declining their addressee's dinner invitation at i_r.)
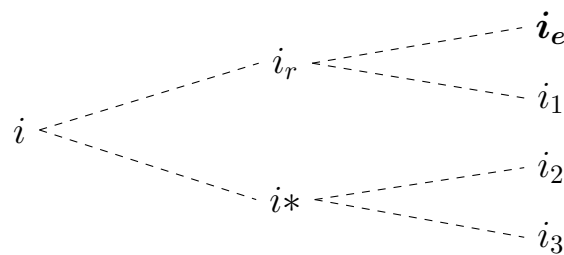
Craige Roberts (1995:663) draws an explicit connection between the retrieval of a "Reichenbachian reference time" and the retrieval of a reference "situation", both of which she identifies as "species of domain restriction on an operator" (over intervals/possible worlds respectively.) She therefore analogises the logical structure of temporal and modal (incl. conditional) operators to other types of quantifiers (44).

(44) The logical structure of quantificational expressions in natural language
      [Operator, Restriction, Nuclear Scope] following Roberts (1995:665)[45]

$$\lambda Q[\text{Operator } \mathcal{R} \ Q]$$

Q represents the nuclear scope of some quantificational Operator. The first argument $\mathcal{R}$ represents a "restrictor clause" – a free variable that is furnished by context and restricts the domain of the quantificational operator.

We have clear evidence, then, that the interpretation of *bambai* is constrained by and dependent on elements of the foregoing discourse that, crucially, **need not be linguistically explicit**/overt. The phenomenon of interest is that of *discourse anaphora* and the observation that particular linguistic expressions (incl. lexical items) "specify entities in an evolving model of discourse" (see Webber 1988). The uses of *bambai* in 19 exhibit this property: this lexical item apparently an intensional operator whose domain is restricted by entities (prima facie of different types) in its SUBSEQUENTIAL (temporal entities?) and APPREHENSIONAL uses (eventive? propositional entities?)

In order to account for these types of anaphor phenomena (particularly in the modal domain), Roberts (1989, 1990a, 2020) develops the notion of MODAL SUB-ORDINATION, defined in (45):

(45) 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 *bambai*'s 'AVERTIVE'-type uses (*sc.* those of the form p *bambai* q, described in § 2.3.2.1), *bambai* q often functions to introduce an eventuality which is interpreted as a possible consequence of the antecedent subject's failure to attend to some situation which is described in the antecedent clause — what we had above represented as $\neg p(w) \rightarrow \blacklozenge q(w)$. In other words, these uses of *bambai* have usually been translated as, and strongly resemble, uses of the English adverb *otherwise* (albeit with possible differences in modal force and the conventionalised expressive (apprehensional) content described in §3.3.) Phillips & Kotek provide an account of the interpretation (and meaning contribution) of utterances of the form p *otherwise* q, where *otherwise* is analysed as a discourse anaphor that triggers modal subordination. In the subsections below, their (our) analysis of *otherwise* as (1) invoking modal subordination and (2) sensitive to information structure is adapted to account for analogous components of the behaviour of *bambai*.

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[45]This terminology likely due in part to Heim (1982: *e.g.* 89) although the idea of quantifiers as second-order relations appears to stem from Aristotle's syllogistic logic (see Westerståhl 2019).

3.1.1 Accommodation and restriction

As introduced above (and informally defined in (45)), the notion of MODAL SUBOR-DINATION captures the idea that a modal operator scoping over a clause has visibility of elements of the foregoing discourse.[46] Roberts's schematisation of this type of relation is reproduced in (46) and a classic operationalisation is given in (47).

(46) The general logical form of a modal subordination relation — given two (syntactically independent) clauses K_1, K_2 — where the prejacent to a modal operator (MOD$_2$) is "modally subordinate" to the content in the scope of OP$_1$, another (intensional) operator (Roberts 2020).

$$\left[_{K_1} \ldots \text{OP}_1\left[\ldots \text{X} \ldots\right]\ldots\right]\ldots\left[_{K_2}\ldots \text{MOD}_2\left[\ldots \text{Y}\ldots\right]\ldots\right]$$

1. Y is a presupposition trigger and only the content X (under the scope of OP$_1$) would satisfy this presupposition.

2. MOD$_2$ is a modal operator scoping over Y.

3. The constituent in K_2, headed by MOD$_2$, has an interpretation wherein part of its restriction consists of X.

(47) An example of modal subordination in discourse.　　　　(Roberts 2020:1)
    CONTEXT. Hansel & Gretel are arguing about whether to lock the door.

    G. *A wolf **might** come in. It **would/will** eat you first!*

    $$\underset{\text{OP}_1}{\Diamond}\, \exists x\left[\text{Wolf}(x) \wedge \text{Come.in}(x)\right] \,\&\, \underset{\text{MOD}_2}{\Box}\, \text{Eat.you}(y)$$

This schema is straightforwardly reflected in Gretel's two sentence utterance in (47) below, where crucially:

- the domain of MOD$_2$ is somehow restricted to those worlds in which 'a wolf come[s] in' (*sc.* the proposition in the scope of K_1's possibility modal—OP$_1$) and

- the presuppositions associated with the pronoun *it* in K_2 are satisfied by the (hypothetical) wolf bound, existentially bound in K_1 (*i.e.*, $y = x$).

That is, in (47), K_2 is **modally subordinate** to K_1 (and material in K_1 is consequently accessible to K_2.) According to Phillips & Kotek, the English adverb *otherwise* is a discourse anaphor and sentences containing this lexical item are taken to rely on

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[46]Much of the content of this subsection draws on the presentation of a similar analysis for *otherwise* in Phillips & Kotek; **?**, available at `lingbuzz/004800`. The arguments in this analysis are summarised and modified in view of accounting for *bambai*'s different properties. The introduction to Discourse Representation Theory and modal subordination are particularly close to the text in :§4.

a similar logic. Given that the Avertive uses of *bambai* are taken to have a similar meaning contribution to *otherwise*, pertinent details of Phillips & Kotek's analysis are adapted here (which in themselves are an implementation of Craige Roberts's extended DRL for modal subordination.) An overview of the basic assumptions of this version of Discourse Representation Theory (DRT) are given in § 3.1.1.1, which are then used to model the contribution of *bambai* in the subsequent sections.

3.1.1.1   A modal discourse representation language

Discourse Representation Theory (originating simultaneously with Kamp 1981 and the related system of Heim 1982) is a framework for modelling the development of participants' "mental representations" of a given situation as a discourse unfolds (see Geurts et al. 2016).[47] Because it models the accretion of information over the course of a discourse, DISCOURSE REPRESENTATIONS — effectively "pictures of the world [≈ partial models] described by sentences that determine them" — are the basic meaning-bearing units in a discourse, mediating between syntactic units (*i.e.*, sentences) and the determination of truth.

For a given DISCOURSE REPRESENTATION STRUCTURE (DRS) $\boldsymbol{K}$, K denotes a pair $\langle X_K, C_K \rangle$, where X represents a *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 (48), 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 model continued reference to a variable introduced earlier in a discourse as long as it is still accessible. The first sentence of 48 introduces a discourse referent and condition set, represented as (a), expanded in the second (b).[48]

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[47]While these frameworks are often described as empirically equivalent, Heim's *File Change Semantics* differs crucially insofar as it denies or makes no claim about mental representation and or the "procedural aspects" of interpretation (Kamp 1988:102, this property also addressed in Geurts et al. 2016:§ 6.) Nothing in the current work hinges on commitment to a particular dynamic semantics/pragmatic framework.

[48]These representations are somewhat abbreviated in subsequent diagrams. See Kamp & Reyle (1993) for further detail.

(48)   A duck entered the room. It quacked.

a.
x
duck(x)
entered-room(x)

b.
x   y
duck(x)
entered-room(x)
x=y
quacked(y)
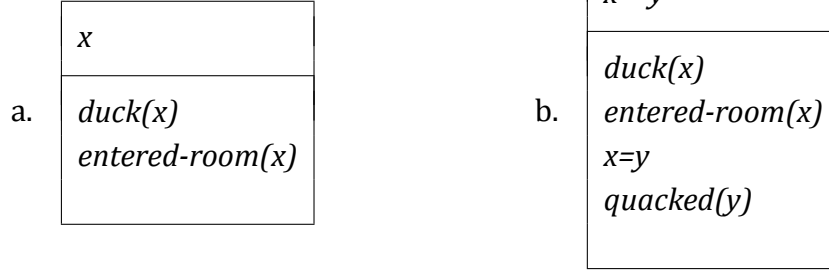
A given DRS K contains atomic conditions of the form $P(x_{i_1}...x_{i_n})$ (where P is an n-place predicate). In a given model $\mathcal{M}$, if a world/variable-assignment pair $\langle w, f \rangle$ **satisfies** ($\Vdash_{\mathcal{M}}$) all of the conditions in K, then that pair **verifies** ($\models_{\mathcal{M}}$)K. Additionally, DRSs are recursively closed under the operations $\neg, \bigvee, \Rightarrow, \Box, \Diamond$. That is, if K_i, K_j are DRSs and $\circ$ is one of 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.[49] (49) is an example containing a 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:

(49)   If a duck is hungry, Hanna may feed it.

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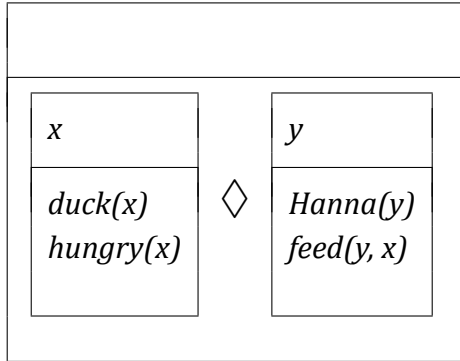
Crucial to the theory is the notion of an "accessible domain" A_{K_i} – a superset of the local domain (X_{K_i}) for any given K_i. As a discourse proceeds, the set of objects that can be referred to expands. The notion of 'accessibility', then, allows us to predict which objects can be referred to at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

(50)   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 $(\Rightarrow, \Box, \Diamond)$, A_K also contains all the elements of the antecedent's (the DRS on the left's)

---

[49]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 also the appendix to this paper for some additional detail.

local domain.

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

In (49), the consequent box of the conditional makes reference to a variable introduced in the antecedent. Furthermore, 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 (50), 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 (51) 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 (50), 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.

(51) *A DRS illustration of modal subordination in a conditional sentence:*
      If John bought a book, he'll be at home reading it by now.
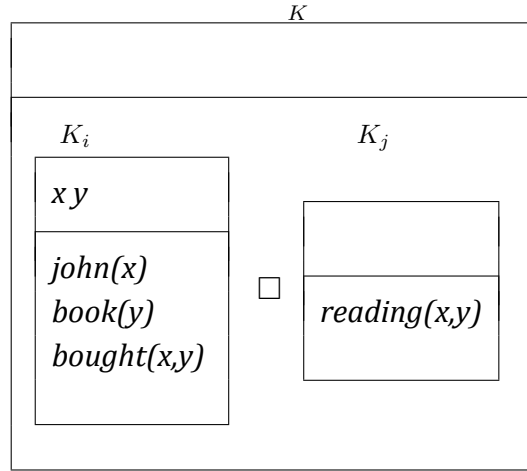
In (51), the DRS representing the consequent clause (K_j) is *modally subordinate* to its antecedent K_i and, as a result, can access the discourse entities introduced in K_i (i.e. $K_i \leqslant K_j$). Moreover, both K_i and K_j are subordinate to the matrix DRS K (i.e. $K \leqslant K_i \leqslant K_j$); had any variables been introduced in K, they would have been accessible to both K_i and K_j.

3.1.1.2 *p bambai q* and discourse representation

On the basis of this framework, we can propose an account for the apparent clause-linking (avertive/precautioning) uses of *bambai*, representing each clause as a discourse representation structure (DRS) — *sc. K_1 bambai K_2*. On the basis of the description given in chapter 2, (52) enumerates some key properties of these uses.

(52)   **In sentences of the form K_1 bambai K_2 :**

    a   *bambai* functions as an intensional operator encoding a type of conditional modality; it asserts that – in a set of worlds (according to some criterion), some condition holds (q).

    b   The (modal) domain of *bambai* is restricted to some nonfactal proposition derived from K_1: that is, the **negation** of a "basic proposition" (which may be in the scope of another other modal operator.)[50]

    c   The speaker asserts K_1.

For clarity, the three sentences in (53) illustrate these interpretation conventions for precautioning uses of *bambai* and different relations between the syntactic antecedent K_1 and the prejacent to *bambai* K_2, recalling (46), the modal subordination schema from Roberts (2020).

(53)   **Modal subordination with *bambai***

    a.   The negation of K_1 restricts the domain of *bambai*

       [$_{K_1}$ *ai~bin dringgi kofi   nairram*] ***bambai*** *ai* **bina**   *silip~silip-bat*
          1s=PST drink coffee night   *bambai* 1s PST:IRR sleep~IPFV

       la wek
       LOC work

       'I drank coffee last night otherwise I would have fallen asleep at work'
       $\approx$ 'If I hadn't had coffee, I might've fallen asleep'   [AJ 23022017]

    b.   The negation of the proposition in the scope of *garra* 'must, will' restricts the domain of *bambai*

       [$_{K_1}$ *ai=**rra** dringgi kofi*   ] ***bambai*** *mi gurrumuk la   desk iya*
          1s=IRR drink coffee   *bambai* 1s fall.asleep LOC desk here

       gin
       EMPH

       'I'll/ought to have a coffee; otherwise I might pass out right here on the desk'   [GT 28052016]
       $\approx$ 'If I don't have coffee, I might fall asleep'
       $\not\approx$ [#] 'If I need not have a coffee, I might fall asleep'

---

[50]Operationalised in the discussion of (53) below, where some sentence K_1 is of the form $OP_1\varphi$ (*i.e.*, headed by a modal operator), the corresponding *basic proposition* (prejacent) is φ.

c. *kaan* φ 'won't/can't/mustn't φ' has the logical form $\Box\big[\neg[\varphi]\big]$. The negation of the proposition in the scope of $\Box$ restricts the modal.

[$_{K_1}$ *yu* **kaan** *gu la shop*] **bambai** *yu spendim yu manima*
   3s IRR.NEG go LOC shop *bambai* 2s spend 2s money

'You mustn't go to the shop; (otherwise) you could end up spending all your money.'   [AJ 23022017]
$\approx$ 'If you don't not go to the shop, you might spend all your money.'
$\not\approx$ #'If it's not the case that you mustn't go to the shop...'

d. The negation of the (generic) complement of a propositional attitude

BI gud 'be good to' restricts the domain of *bambai//*

[$_{K_1}$ *im gud ba stap wen yu konfyus*] **bambai** *yu ardim*
   3s good PURP stop when 2s confused *bambai* 2s hurt

yu hed
your head

'It's best to stop when you're confused, (otherwise) you'll get a headache!'
$\approx$'If you don't stop when you're confused, you might get a headache!.'
$\not\approx$ #'If it's not best to stop when you're confused, then you might get a headache!.'

As the infelicitous paraphrases in (53b-d) make clear, K_1 *bambai* K_2 doesn't have a straightforward conditional semantics. It is **not** the negation of K_1, but rather material under the scope of some modal (or otherwise intensional) operator within K_1 (*viz.* OP$_1$) whose negation ends up being accommodated.

Again, following the analysis laid out in Phillips & Kotek, the possible sets of propositions that are available to constrain the interpretation of *"bambai K_2"* 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 $\boldsymbol{K_1}$. A new operator over DRSs $\ominus$ (and hence the complex condition $K_i \ominus K_j$) will represent the (truth-conditional) contribution of *bambai*:

(54) *Proposal: A dynamic semantics for* bambai
  $K_i \ominus K_j \Longleftrightarrow (K_i) \wedge (\neg K_{i_{\text{sub}}} \Diamond K_j)$
  <u>In words</u>: $K_i \ominus K_j$ is satisfiable iff both C_{K_i} and $(\neg K_{i_{\text{sub}}} \Diamond K_j)$ are satisfiable, where $K_{i_{\text{sub}}}$ is some DRS that is contained within K_i.[51]

This proposal can be paraphrased as the claim that: "the conditions of K_i hold; however, in case (some of) these conditions — those of $K_{i_{\text{sub}}}$ — do not hold, the conditions in K_j may then hold." Notice that this treatment takes precautioning apprehensionals to be akin in their (logical) structure to a conditional as

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[51]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 $K_{i_{\text{sub}}}$.

Notice additionally that we employ the possibility operator ($\lozenge$) from Roberts' DRL (1989:695, 715), building on the observation throughout that apprehensionals (incl. *bambai*) involve a modal (possibility) component. A primary contribution of Roberts 1989 is an expansion of the ontology of the discourse representation theory of Kamp 1981 to include possible worlds, in view of modeling modality. In effect, $\lozenge$ is an existential quantifier which also builds in "conversational backgrounds"—sets of propositions: a modal base m and ordering source o—in order to capture the observations made by Kratzer (1981b:§2.7) regarding different "flavors" of modality.

A complex condition of the form $K_i \underset{m,o}{\lozenge} K_j$ then, is satisfiable iff K_j can be verified in some worlds in the conversational background (as determined by m, o) in which K_i can be verified. Consequently a DRS containing the condition $K_i \underset{m,o}{\lozenge} K_j$ can be instructively rewritten as in (55):[52],[53]

(55) *Satisfaction conditions for Roberts' possibility operator $\lozenge$ as an existential quantifier, given a world w:*

$$K_i \underset{m,o}{\lozenge} K_j \iff \exists w'\big[w' \in \underset{o(w)}{\text{BEST}}\big(\bigcap[m(w) \cup \{w'' \vDash K_i\}]\big) \wedge w' \vDash K_j\big]$$

<u>In words</u>: The condition $K_i \underset{m,o}{\lozenge} K_j$ is satisfied in *w* if there's some world w' in the "best worlds" (according to o) within m and verifying K_i which also satisfies the conditions of K_j.

3.1.1.3 Modal subordination in action

Described above, the second (*bambai*) clause of (53b) is interpreted as *modally subordinate* to antecedent material. Following the discussion of the previous subsection, its discourse representation structure can be diagrammed as in (56). In (a), K_1 is asserted. In (b), the content <u>in the scope of OP$_1$</u> (*viz. K_{1_sub}*) is accommodated; its negation restricts the domain of the possibility modal encoded in *bambai*.

(56) Discourse representation structure for (53b)

[$_{K_1}$*airra dringgi kofi*] *bambai mi gurrumuk*

'I'll have a coffee, otherwise I may (fall a-)sleep.'

---

[52]See Chapter 1 for a definition of BEST and a brief overview of ordering semantics.

[53]Roberts (1989) in fact equivalently defines the satisfaction conditions for 'possibility (in view of)' $K_i \underset{m,o}{\lozenge} K_j$ as the dual of 'necessity (in view of)' $\neg(K_i \underset{m,o}{\square} \neg K_j)$. Relevant adjustments are made here. Mentioned in the previous section, satisfaction (verification) is a property that holds between a 4-tuple: a model, world, assignment and set of conditions (DRS). This is simplified here for perspicuity.

K_1.   DRS for first clause K_2.   DRS for full sentence

☐ | I drink coffee

☐ | I drink coffee

¬ | *I drink coffee*   ◇ | I BE asleep
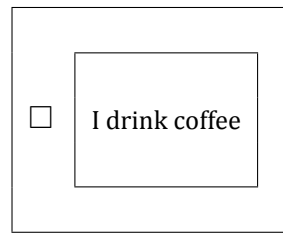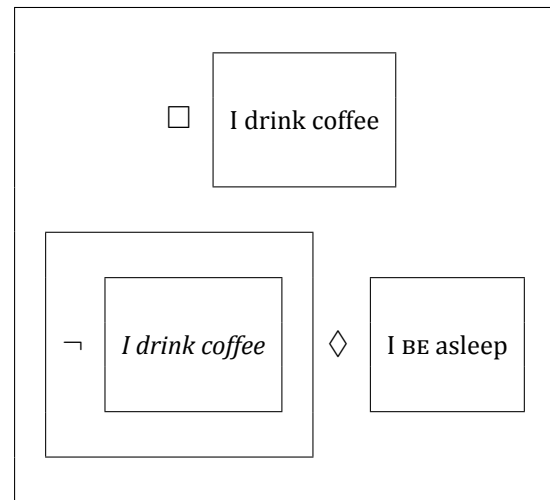
Crucially, when *airra dringgi kofi* 'I'll have a coffee' is asserted, its prejacent is presumed unsettled at speech time (that is, the sentence presupposes that at the relevant (future) time, the subject's drinking coffee (or failure to do so) is not a settled fact of the world (Roberts's NONFACTUAL mood.) Because of this, NEG('I drink coffee') is available as a restrictor to *bambai* — in other words K_2 is **modally subordinate** to K_1. Similarly, in (c), it is presumed unsettled that the addressee go to the shop (again at some future time, retrieved from context). The negation of the prejacent of the modal — NEG('You don't go to the shop') — restricts the domain of *bambai*.

The second clause of (53a) is interpreted as a counterfactual (while it has past temporal reference, *bina* explicitly marks its nonfactual status.) Consequently, *bambai* needs a nonfactual antecedent and the negation of the foregoing proposition is accommodated to restrict its domain. Reminiscent of standard treaments of counterfactuals (*i.e.*, where worlds in a nonrealistic proposition are ranked by their "similarity" to the actual world, see von Fintel 2001, 2012; Kratzer 1981b; Lewis 1973). This is represented in (57) below: the first clause (coffee-drinking) is asserted as actual, the second a nonrealised possible outcome had the coffee-drinking not obtained.

(57)   Discourse representation structure for (53a)
        [$_{K_1}$ *aibin   dringgi   kofi*] *bambai   aibina   silip*

        'I had a coffee, otherwise I might've slept.'

K_1. DRS first clause K_2. DRS full sentence

I drank coffee

I drank coffee
$\neg$ | *I drank coffee* | $\Diamond$ | I PST asleep |
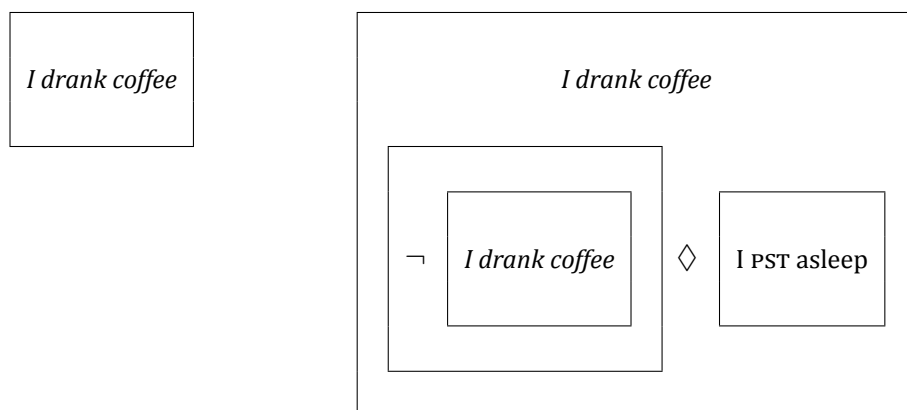
Unlike *otherwise* (as examined in Phillips & Kotek), possible antecedents appear to be predictably constrained by the form of the foregoing linguistic material. The *"Red Light"* sentence pair described in that work is translated in (58); accommodation of the entire conditional as an antecedent appears to be infelicitous (that is *bambai* is not available to translate *otherwise* on the reading presented in (58b) *cf.* Kruijff-Korbayová & Webber 2001; Phillips & Kotek; Webber et al. 2003.)[54] A DRS for (58a) is additionally provided in (59).

(58)   *bambai* accommodates the smallest antecedent: the *Red Light* examples

    a. *If det lait im redwan, stap; **bambai** yu gaji tiket.*
       if the light 3s red   stop ***bambai*** 2s catch ticket

       'If the light's red, stop; **otherwise** you might get a ticket.'

    b. *If det lait im redwan, stap; **if najing**, kipgon.*
       if the light 3s red   stop **if no**   CONT

       'If the light's red, stop; **otherwise** continue.'   [GT 19032017]

need to introduce RL sentences

In both Red Light sentences, the *bambai*-clause is modally subordinate to a conditional imperative 'If the light's red, stop!' As with the other precautioning uses analysed above, the "simple" satisfaction conditions (*i.e.*, the conditions of K_i stripped of its own modal restrictions (*viz.* the conditional modality) are accommodated as the restrictor to *bambai*.

(59)   DRS for (58a) $K_i \ominus K_j \Leftrightarrow K_i \wedge K_{i_\text{sub}} \Diamond K_j$

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[54]These judgments have only been tested on a single speaker and bear confirmation of a negative judgment/further investigation. Of course the felicity of (58b) would also be predicted to be independently degraded without establishing negative speaker attitude vis-à-vis the prejacent.
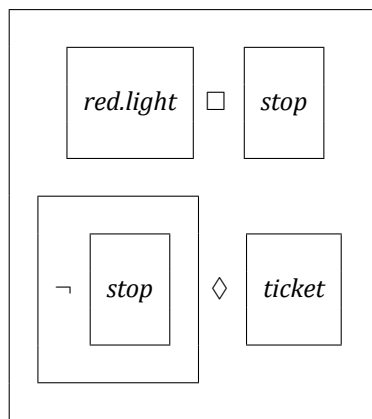
summary.
$K_i = red\ light\ \square\ stop$
$K_{i_{sub}} = stop$
$K_j = get\ ticket$

In this subsection, we have considered the relation between the two clauses involved in "precautioning" uses of *bambai* — that is, those uses occurring in *p bambai q* '*p*, otherwise *q*' contexts. Crucially, we have considered evidence that *q* — *bambai*'s prejacent — is **modally subordinate** to material in the foregoing discourse. As shown in Roberts (1989:§ 2.2), this operation involves a process which she calls "accommodation (of the missing antecedent)", that is, given a non factual assertion (*i.e.*, $[_{S_2} \text{MOD}_2 \ldots \text{Y} \ldots]$), an antecedent (X) that determines the modal domain must be found among accessible discourse referents (*i.e.*, $[_{S_1} \text{OP}_1 \ldots \text{X} \ldots]$).

In this chapter, I defend an analysis that treats all APPREHENSIONAL uses of *bambai* invariably as a modal operator that takes a single, nonfactual propositional argument (q).[55] When (as in *precautioning* contexts) *bambai q* immediately follows a (conjunct) sentence p, it accommodates the negation of the basic proposition associated with that sentence (that is, the prejacent of an imperative or modal operator/the content of p, stripped of any mood/modal information.)

The next subsection (§ 3.1.2) contains a discussion of the pragmatic mechanisms by which an antecedent is selected.

3.1.2 Information structure

In the previous subsection, we saw how (when it is interpreted as nonfactual), p — the prejacent to *bambai* — is obligatorily modally subordinate to some antecedent proposition. Again following the proposal of Phillips & Kotek, and modulo the constraints in precautioning uses described above, "accommodation of the missing antecedent" operates on a pragmatic basis with reference to prior discourse and the content of the prejacent.[56,57]

By deploying information-structural notions developed in Carlson (1983) and Roberts (1996/2012), we can conceptualize of *otherwise* as representing a DIS-

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[55]Additionally, a proposal for unifying *bambai*'s range of apprehensional uses with its subsequential use is detailed in Ch. 4.

[56]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).

[57]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.* (author's translation: 256, 258).

COURSE MOVE (m_n : in effect, a temporally-ordered stage in a given discourse), which adds to the QUESTION UNDER DISCUSSION (QuD) in a given discourse context $\mathcal{D}$.

(60)   An information structure for $\mathcal{D}$ (INFOSTR$_\mathcal{D}$) includes:

   a.   The **common ground** is a set of mutually assumed background infor-
        mation. The cg is often modeled as a set of propositions, *i.e.*, a set of sets
        of possible worlds (*e.g.*, Stalnaker 1978 *a.o.*, also introduced in § 1.2.1).

   b.   A totally ordered set of discourse moves $m \in$ **M**, partitioned into ques-
        tions (setup moves) and answers (payoff moves). A subset of **M** is **Acc**epted
        in $\mathcal{D}$.

   c.   The **QuD** is a partially structured set of questions which discourse par-
        ticipants 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.*, the
        QuD is a set of "open" questions at a given stage m in $\mathcal{D}$)

An important consequence of the conceit of a *QuD stack* is that its structure and management are governed by *strategies of inquiry* (Roberts 1998, 2004, 2012). A (segment) of $\mathcal{D}$ is associated with a *discourse question* (DQ) (or "Big Question.") Subsequent discourse moves (including additional questions) are appropriate iff they are taken to "constitute a reasonable strategy of inquiry" for answering the DQ (Simons, Beaver, Roberts & Tonhauser 2017).

   These concepts provide a way of representing the 'flow' of information and changes in the interlocutors' information states over time. Again beginning with *bambai*'s *precautioning* uses, take an utterance p *bambai* q to consist of (at least) three discourse moves. A discourse anaphor, *bambai* represents a "setup" move with the effect of adding to the QuD.

(61)   *Proposal: the pragmatics of* bambai
        bambai 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 discourse in which a *bambai* sentence is uttered .

The role of this information-structural aspect to the interpretation of *bambai* is shown in (62). Crucially, this treatment takes the role of *bambai* to be the "introduction of a question" into the discourse (62-m_j): an approach that converges with observations of formal and conceptual links between conditionals, interrogatives and "topichood." That is: an utterance q *if* p links the assertion of $[\![q]\!]$ to the raising of a question $[\![?p]\!]$' (Starr 2010:36). This fact is especially clear when considering "advertising conditionals": *e.g., Single? You haven't visited Match.com*, where an affirmative answer to the question is "supposed", much as a conditional antecedent

would be (Starr 2014:4).[58]

The information-structural analysis of *p bambai q* in (62) provides a heuristic to capture some of these insights on functional similarities between conditionals and questions.

(62)   INFORMATIONSTRUCTURE$_\mathcal{D}$ and precautioning *bambai*
[*airra dringgi kofi*]$_{m_i}$, **bambai**$_{m_j}$ [*mi silip!*]$_{m_k}$

> m_i This is the pronounced antecedent. It represents a modalized assertion: the addressee has a coffee in all worlds in some unspecified conversational background (here, potentially some teleological ordering source containing the subject's work goals / expected office behaviour at the Ngukurr Language Centre — *e.g.*, $\underset{tel(w)}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(w)}\big)$
>
> $$\forall w'\big[w' \in \underset{tel(w)}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(w)}\big) \to \text{HAVE.COFFEE}(w')\big]$$

> m_j Per (61) and the discussion that follows, *bambai* can be understood to encode an instruction to consider the COMPLEMENT of some set of worlds p that has been made contextually discourse-salient. This set-up move can be thought of as signalling the addition of a question to the QuD stack of the form:[59]
>
> what could (unfortunately) happen next in $w \in \overline{p}$?
>
> In this case, a plausible candidate is: what if we are in a world s.t. the speaker doesn't have a coffee in that world?

> m_k The second clause – *bambai*'s **prejacent** – is necessarily interpreted as proffering a (partial) answer to the CQ (current QuD, a reflex of the maxim of RELEVANCE.)[60] Here, the speaker predicts that he may pass out as his desk in $\overline{p}$: the set of worlds made available to *bambai*. In this case, $\overline{p}$ is

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[58]For discussion of these links, see especially Starr (2010, 2011, 2014), containing a proposal for a unified (dynamic/inquisitive) semantics for conditional and interrogative-embedding uses of *if*. Relatedly, the "conditional question under discussion (cQuD)" in Ippolito 2013a, following insights from Isaacs & Rawlins' 2008 dynamic treatment of conditional questions. These accounts similarly take a conditional antecedent/*if*-clause to induce a temporary restriction over the common ground—"the answer to the question is an answer to the modally subordinated question" (Ippolito 2013a:200). These observations are picked up again in § 3.2

[59]As in the previous chapter, I use the overline notation to denote a function that maps a set of worlds to its complement.

[60]For Craige Roberts, the notion of *Relevance* — a derivative of the Gricean maxim — she defines it as follows (boldface added):

> A [discourse] move m **is RELEVANT to the question under discussion** q (*i.e.*, to the last QuD(m)), *iff* m either **introduces a partial answer to q (m is an assertion)** or is part of a strategy to answer q (m is a question).   (Roberts 2004:216)

the complement of the set of worlds in which he has a cup of coffee.

$$\exists w'' \big[w'' \in \underset{s'typ(w)}{\text{BEST}} \big(\cap \underset{\text{CIRC}}{\{m(w) \cup \overline{\text{DRINK.COFFEE}(w'')}\}} \big) \wedge \text{SLEEP}(w'') \big]$$

3.1.3 Apprehensive domain restriction

So far, this section has focussed on theorising the relationship between the two clauses in *precautioning* uses of *bambai* — utterances of the form p *bambai* q are interpreted as $p \wedge \blacklozenge q$. § 3.1.1 showed that the assertion of $\blacklozenge q$ (in utterances of the form is interpreted relative to (*sc.* modally subordinate) to some antecedent derived from p. § 3.1.2 has shown how appeal to information-structural notions (*viz.* the QuD) is helpful in understanding how this antecedent is accommodated. Here, the accommodation analysis is extended to other apprehensional uses described in Chapter 2 (*e.g.*, Figure 2.1), again by appealing to pragmatic notions.

In describing her notion of relevance – introduced in $(62\text{-}m_k)$ & fn 60 above – Roberts additionally notes that, just as assertion moves are felicitous iff they constitute a (partial) "answer" to the QuD: "a question can only be accepted **if it furthers answering those [questions] to which the interlocutors are already committed**" (2012:21, emphasis added). The *apprehensive* uses of *bambai*, are distinguished insofar as there need not be an explicit, pronounced p to constrain the option space for an antecedent to $\blacklozenge q$.[61] Consider again, for example, (38) from § 2.3.2.2, repeated here as (63).

(63) **Context:** Two relatives **(A, B)** are planning a hunting trip; a younger relative (say, **C**) 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'

---

[61]The Robertsian model permits for "[q]uestions [to be] raised explicitly, with interrogatives; implicitly, by question-introducing assertions; or by real world goals" (Simons et al. 2017:200).

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]

In each of B's utterances in (63), there is no "pronounced antecedent." In view of our account of *bambai* as adding to the QuD stack and the (relevance) constraints on felicitous question moves (*i.e.*, any additional questions must form part of a strategy of inquiry for a given *discourse question*), accommodation is guided by pragmatic principles in concert with salient extralingusitic context.

(64) **Context.** The speaker is looking at a high-end stereo in an electronics store.
      *My neighbors **would** kill me*   (Stone 1997:5-6)

While likely uninterpretable in an "out of the blue"-type context, note that the modal proposition in (64) is felicitous on a reading where the speaker's neighbours would be furious in the event that the speaker bought an expensive stereo and played it sufficiently loudly (compare fn 61).

Similarly, the uses of *bambai* are interpretable in (63) in view of pragmatic calculations on the basis of the development of each speakers' information state through this dispute ($\mathcal{D}_{(63)}$). In this context, the DQ is $\langle$ Should C accompany A & B on their hunting trip? $\rangle$. Additionally, the perspective of each speaker has been established — *i.e.*, A favours a situation where their younger relative accompanies them on the hunt, B disfavours this eventuality and both are arguing in favour of these domain goals (compare Roberts 2004:215). As a consequence of this, both of B's utterances are likely to be interpreted as justifications for his perspective: that is, in both instances *bambai q* is modally subordinate to a sentence similar in content to: 'we shouldn't permit C to accompany us.' This is spelled out in (65).

(65) INFORMATIONSTRUCTURE$_{\mathcal{D}_{(63)}}$ and apprehensive *bambai*
      bambai$_{m_j}$ [*im gaan gibi la yunmi!*]$_{m_k}$

   m_j As shown previously, *bambai* signals the addition of a question: *what could (unfortunately) happen next in* $w \in \overline{p}$*?* to the QuD stack. Per Roberts' felicity condition on questions, admissible questions have to contribute to a "strategy" to answering the questions to which the speakers are already committed" — viz. *Should C come hunting?*
   That B is opposed to this idea (*sc.* the proposition *B believes that C should not come hunting*) is in the common ground.

   m_k As previously argued, the prejacent is interpreted as a response to the current QuD (CQ). Here the speaker predicts that a unsuccessful hunting trip ("the country may not provide) in $\overline{p}$. In this case $\overline{p}$ is the complement

of the set of worlds in which **c** <u>does not</u> join the hunting expedition.

$$\exists w'' \big[w'' \in \underset{s'typ(w)}{\text{BEST}} \big(\cap \{ m(w) \cup \underset{\text{CIRC}}{\overline{\neg \textbf{C}.\textsc{comes.hunting}}}(w'') \} \big) \ \wedge \ \textsc{hunting.failure}(w'') \big]$$

Ultimately, this section has sought to demonstrate that an appeal to modal subordination (particularly the accommodation of an antecedent) and information structural notions (the relevance of the QuD) allows for a unified account of the pragmatics of apprehensional uses of *bambai* – that is, in all cases, *bambai q* represents a modal claim — $\blacklozenge q$ — against a predictive conversational background restricted by (the negation of) some salient proposition accommodated from the (explicit or implicit) discourse context.

The following section provides a diachronic perspective on the relationship between p and q in view of better understanding the relationship between these apprehensional uses and the subsequential (temporal frame) meaning from which they are understood to have arisen.

3.2 Apprehensional readings emerge in subsequential TFAs

> Of course borderline cases can arise because language changes. Something that was not originally employed as a means of expressing a thought may eventually come to do this because it has constantly been used in cases of the same kind. A thought which to begin with was only suggested by an expression may come to be explicitly asserted by it.
>
> (Frege 1897/1979, cited in Horn 2013:241)

Here I consider a number of linguistic factors that appear to have contributed to the emergence of apprehensional readings of TFAs. As shown in § 2.2.3, this meaning change pathway (and the apparent synchronic polysemy between temporal and apprehensional uses) has been observed by a handful of other authors (Angelo & Schultze-Berndt 2016, 2018; Boogaart 2020) on the basis of data including analyses of German *nachher* and Dutch *straks*, in addition to Kriol *bambai* (see also Kuteva et al. 2019b:427-8). Parallels between *bambai* and *straks* are shown in (66) below for example, where the contrast between a subsequential (a) and apprehensional (b) reading is apparent.

(66) **Subsequential and apprehensive readings of the *straksconstructie* in Dutch**

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 4.10, 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 (already) be closed!'   [Mireille L'Amie, *p.c.* 20200130]

3.2.1 Temporal sequence & conditional modality

Many authors (*e.g.,* Blühdorn 2008; Culicover & Jackendoff 1997; Harder 1995; Klinedinst & Rothschild 2012; Schmerling 1975; Stukker & 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: *Matt comes, I leave.* In these cases, although there is no explicit conditional morphology, it is R-implicated that the second sentence should be interpreted as modally subordinated to the first: that is, my departure is a consequence of John's arrival. As mentioned above in fn 57, Corblin (2002:256-258) additionally notes the possibility of *negative accommodation* in coordinate sentences:

(67) **Negative accommodation of a modal antecedent**

a. *Je n'ai pas achetée la   voiture. Je ne **saurais**   pas où   la*
   I   have NEG bought   the car   I   NEG **know.COND** NEG where it
   mettre.
   put

'I didn't buy the car. I wouldn't have known where to put it.'

b. *J'aurais   dû   accepté. On ne m'**aurait**   pas viré.*
   I.have.COND ought   accepted one NEG me.**have.COND** NEG fired

'I should have accepted. I wouldn't have been fired.'

Crucially, the second sentence in each of (67a-b) contains a modal operator (realised as a conditional inflection, COND$_2$). The (nonfactual) **negation** of a proposition contained in the previous clause is accommodated as the restrictor for COND$_2$.[62]

---

[62]Note that while the first sentence is not under the scope of a modal operator, its **negation**—which is accommodated to restrict the domain of *saurais*—is interpreted as nonfactual making available a modal subordination reading.

In §3.1.2, we considered the formal and conceptual links between conditional and interrogative clauses. It was claimed that a functional motivation for these appears to be that conditional apodoses (consequent clauses) can be understood as answering a "question" posed by the antecedent/protasis. The illocutionary effect of both interrogatives and conditionals is often taken to be the "supposition" of a proposition: that is, adding a proposition to the common ground (or partitioning contextual possibilities, see Starr 2010). These conceptual parallels have clear linguistic reflexes, shown clearly for Danish, *e.g.* by Harder (1995:100-2), replicated in (68) below.

(68) **Conditionals as "telescoped" discourse**   (Harder 1995)

    a.   A two-participant discourse   (101)

        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.'   (101)

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."

In view of the data presented in (67-68), consider the discourses in (69-71) below.

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

    A. *gita   la   jeya!*   [compare (33a)]

        get off LOC there!

    B. *ba wani?*

        why?

    A. *bambai yu breigim motika*

        bambai 2s break   car

        'Get off of there [...why?...] You're **about to** break the car!'

                                [GT 16032017]

(70)   **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?...] You're **about to** be swept away!'
                                              [GT 16032017]

(71)   **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.IRR:PST bite.TR 1s

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

In each of the short discourses above, the translation provided elucidates: **(a)** that each of these dialogues can be "telescoped" onto a single utterance, and that **(b)** the capacity of the temporal properties of *bambai qua* sequential TFA to implicate additional nontemporal properties of the relation between the clauses it links — that is, the *bambai* clause is modally subordinate to the content of **A**'s first utterance. In each of the examples, **A**'s response identifies an eventuality that might obtain in the near future (of the speech-time for (69-70) and of the slithering/frightening-time for (71).

Further, in all three cases, this *bambai* clause is obligatorily interpreted as nonfactual. In the first two cases it describes an eventuality that is posterior to a possible future event (the one described by the previous imperative and one that is therefore only felicitous if it is presumed unsettled.) In (71), the *bambai* clause has explicit irrealis marking, indicating its coounterfactual status: it expresses that **A**'s psychological state at the event time was such that biting was an unsettled, possible future.

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 (69), 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 (*e.g.*, Geis & Zwicky 1971:564).

This type of implicature is well-documented in cross-linguistic studies of meaning change (see also Kuteva et al. 2019b: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 & Heine (1991):

(72) 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 [72a] When one clause refers to a non- past event or to a state, the reading is typically causal, as in [72c] and [72d], but the causal reading is not required, as [72b] indicates. The contrastive readings in [72b] signal polysemy, i.e. **conventionalized meanings, not just conversational**. (Traugott & Heine 1991:195, emphasis added)

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" (e_1 causes e_2). § 3.3 below further investigates this process in view of the expressive/speaker attitude component of *bambai*'s conventional meaning.

3.2.2 *Conventionalized...not just conversational*

Subjectification — associated especially with related concepts from the work of Elizabeth Traugott (1989; Traugott & Dasher 2002) and Ronald Langacker (*e.g.*, 1989) — refers to an observed meaning change tendency whereby linguistic expressions diachronically come to encode increasingly "subjective" meanings — those concerning the private beliefs and attitudes of the speaker in a given context. Subjectivity as a relevant linguistic notion has been construed in a number of ways (73).

(73) **The loci of SUBJECTIVITY in according to Finegan (1995:4)** are
A LOCUTIONARY AGENT'S:

1. PERSPECTIVE as shaping linguistic expression;

2. expression of AFFECT towards the propositions contained in utterances;

3. expression of the MODALITY or epistemic status of the propositions contained in utterances.

To my knowledge, at the time of writing, no work has explicitly interrogated the role of (inter)subjectification as a force in meaning change from a formal perspective (Eckardt acknowledges this in her 2006 monograph (239).)[63] As a driver of meaning change, *subjectification* has been evoked especially in view of explaining the development of modal readings of verbal and adverbial elements, where these expressions come to encode the epistemic status of a speaker vis-à-vis a given proposition (Finegan 1995; Traugott 1989, 1995, 2003, 2006). Apparent connections between "non-challengeability"/NOT-AT-ISSUEness and *subjectivity*, however, are implicit in recent formal work, particularly as this relates to the EVIDENTIAL and EXPRESSIVE domains (*e.g.*, Faller 2002; Korotkova 2016, 2020; Murray 2014 a.o.)[64]

<div style="float:left">more? lexicalisa-
on/grammaticalisation
of social knowledge</div>

The meaning change pathway that *bambai* has traced — *i.e.*, the trajectory from temporal frame adverbial to (multifunctional) apprehensional modal — clearly can be characterised as conforming with generalisations about subjectification in meaning change in each of the criteria in (73).

In chapter 4, a unified lexical entry for *bambai*'s temporal and apprehensional uses is proposed. This proposal relies on the "emergence" of modal readings in **nonfactual contexts** as a function of reasoning about discourse context, a reflex of what I've called the "omniscience restriction" (a component of the asymmetry of past and future/the "problem" of future contingents: outlined in § 1.2.1.) This condition is described in (74) and resembles the epistemic constraints identified in Kaufmann (2002), to be further discussed in Ch. 4.

(74) **The omniscience restriction**
Predications of subsequentiality (near-future instantiation, see ch. 4) are interpreted as carrying predictive illocutionary force (*i.e.*, modalised or "epistemically downtoned") when they are presumed unsettled.

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[63]Jucker (2012) (cited in Traugott 2012:562) expresses skepticism that a "cognitive-inferential conceptualization" (what he refers to as the "Anglo-American" approach, apparently including (neo)-Gricean theories) is capable of accounting for these types of phenomena, which apparently invite a "performance-based"/"socio-interactional" pragmatics (which he associates with European research programs.) It is not clear that this is a thoroughly fair assessment (see *e.g.*, discussions of the social motivations for **R**-based implicata in Horn 1984, 1993, 2007; Horn & Bayer 1984 a.o.) Eckardt (2006:43) does also suggest a role for semanticisation of implicatures in apparently subjectivisation-driven changes.

[64]Korotkova (`ms.`) explicitly suggests links between "nonchallangeability" and subjectivity on the basis of linguistic reflexes of 'first-person authority' (that is the "immunity" of ascriptions of self-knowledge to correction.)

In view of this general pragmatic principle, when a *bambai* clause is interpreted as making an unsettled claim — that is, some future-oriented claim that the discourse participants know that the speaker cannot possibly know the truth of — a modal (predicted possibility) interpretation is invited. This implicature can be understood as resulting from reasoning on the part of language users: discourse participants mutually understand that the *bambai* predication is unsettled and therefore must represent a prediction.[65]

More specifically, given the apparently frequent use of *bambai* $q_{nonreal}$ in directive contexts and under fear predicates, encoding an "apprehension-causing situation" (Lichtenberk 1995:298) and the justification for an utterandce of p *bambai* has come to be associated with *admonitory* predictions. Similarly, Angelo & Schultze-Berndt (2016:285) 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.

The status and emergence of this "undesirability implicature" is further investigated directly below, in § 3.3.

In this section, I have proposed that the apparent subjectification of *bambai* is unifiable with observations about the diachronic conventionalisation of conversational implicature (*e.g.*, Cole 1975:273*ff* and especially Traugott's invited inferencing theory of semantic change (1980 *et seq.*)) The frequent occurrence of *bambai* in admonitory contexts and consequent generalisation and conventionalisation of these **R**-implicatures[66] is the source of *bambai*'s apparent (epiphenomenal) subjectification trajectory and present day "lexically denoted information."

3.3 *bambai* and apprehensional expressive content

Of course, a crucial, characterising meaning component for apprehensionals is that they express information about the Speaker's attitude vis-à-vis their prejacent. This contrast is demonstrated by the minimal pair in (75), where the utterance in (b) is not "expressively correct" (*cf.* Kaplan 1999) because the conditions on speaker attitude are not satisfied.

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[65]A related account might appeal to Eckardt's Avoid Pragmatic Overload principle (2009), where, faced with an utterance that carries an unaccommodable presupposition (*pragmatic overload*), a (charitable) hearer/reader surmises that the speaker has "used words or phrases in a sense that were formerly unknown to the hearer" (22) and "hypothesize[s] a new meaning...for the item that gave rise to the problematic presupposition" (35). In the present case, *bambai* q asserts q in the future of some presupposed reference index (see ch. 4). Given the infelicity of making non-modal assertions about nonactual events, the domain accessible to *bambai*, pragmatic overload is "avoided" by expanding the modal domain of *bambai*.

[66]That is, implicatures following from conversational principles of relevance and avoidance of "overinformativeness" (Horn 1984 *et seq.*)

(75) **Apprehensional use conditions for *bambai***

a. *mi nomo wandi gu la mataranka **bambai** mi luk la main*
   1s NEG   want go LOC Mataranka **bambai** 1s look LOC my

   banjimob.
   cousin.ASSOC

'I don't want to go to Mataranka, (because) then I might see my cousins.'

b. ?? *mi wandi gu la mataranka **bambai** mi luk la main*
     1s want go LOC mataranka **bambai** 1s look LOC my

     banjimob.
     cousin.ASSOC

Intended: 'I want to go to Mataranka so/then I'll see my cousins.'

[AJ 072017]

As suggested above (see also Angelo & Schultze-Berndt 2016), the apprehensional reading frequently occurs embedded under a predicate of fearing or in conjunction with a directive (prohibitive) antecedent: corresponding to Lichtenberk's FEAR and *precautioning* uses respectively (shown in exx. 69-71 above).

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.

In contemporary Kriol, then, the selection of an erstwhile subsequential TFA when making some unsettled predication (instead of a different epistemic adverbial) conventionally implicates that the Speaker is negatively disposed to the event described in the prejacent.

3.3.1 The status of apprehensional "attitude conditions"

Marshalling cross-linguistic evidence of this path of change 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 the less specialised *nicht jetzt, später!/niet nu, later!* 'not now, later.'[67] What's more, tracking the facts for *bambai* presented above, these TFAs appear to have encroached into the semantic domain of epistemic/modal adverbials, where they are reported to encode negative speaker affect with respect to their prejacents (relative to the

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[67]See also Angelo & 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).

other members of these semantic domains.)[68]

As with *straks* (*e.g.*, 66), *nachher* appears to have a similar distribution to *bambai*,[69] shown by its felicity in the discourse in (76) where it represents an alternative to *vielleicht* 'perhaps.' In these contexts, *nachher* asserts negative speaker attitude with respect to its prejacent.[70]

(76) **German apprehensional *nachher* and the not-at-issueness of speaker attitude** [H. Weckler, *pers. comm.*]

Context. 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!

Similarly to the Kriol data, German *nachher*, a TFA encoding imminence or "subsequentiality", has developed the characteristics of an apprehensional epistemic, a likely consequence of frequent embedding in the discourse contexts discussed above (§ 3.2). Crucially, the contrast between the possible responses (in particular the infelicity of 76**B$_2'$**) illustrates that, while the use of *nachher* in **A$_2$** does commit the speaker to the proposition 'I am negatively disposed to the possibility of rain today', this commitment has the status of a conventional implicatum (not-at-issue).[71]

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[68]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]

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

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

[71]*I.e.,* "there is no simple way to indicate just the rejection of something that is conventionally

Following insights from the the literature on expressive content and use-conditional semantics (*e.g.*, Gutzmann 2015; Kaplan 1999; McCready 2010; Potts 2007, ostensibly developing Karttunen & Peters's 1979 proposed extension to PTQ), 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 conditional contribution (see ch. 4). The infelicity of $(76\mathbf{B}_2')$'s utterance shows that negation cannot target this component of Speaker meaning: an argument for the treatment of this component of its semantics as non-truth-conditional/not-at-issue component. These proposals (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.

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" — a lexical item whose meaning can be represented as a pair of metalinguistic formulæ. The previous section discussed the truth-conditional contribution of *bambai*, providing the lexical entry in (89) above. Following the proposal in Kaplan (1999) where a "use-conditonal proposition" is understood to denote a set of contexts, Gutzmann (2015), appeals to a model with parallel types, interpretation functions (*i.e.*, $[\![\bullet]\!]^t$ and $[\![\bullet]\!]^u$) 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.[72]

Borrowing the informal "fraction notation" deployed by some of these authors, we can tease apart the implicated and asserted meaning components of the *bambai* clause in (71) – this is given in (77).

(77)   a.   ***Bambai*** *imina*   *baitim mi!*
          bambai 3s.PST:IRR bite   1s

        '...It might've bitten me!'   [GT 01052017]

     b. $$\frac{S \text{ is worried about/negatively disposed to snake bites}}{\text{'}S \text{ might have been about to be bitten by a snake}}$$

If this mode of thinking about the speaker attitude implications of *bambai* q is on the right track, then, in addition to asserting $\Diamond q$, a speaker's utterance of *bambai* q at t in w can be thought of as creating an updated context in which 'it registers that [they regard q] negatively somehow' (Potts 2007:175). The use-conditional contribution of *bambai* can then be informally stated as (78).[73]

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implicated (Karttunen & Peters 1979:14).

[72]This system closely resembles the proposal of Karttunen & Peters (1979), which these authors attribute (their fn 17) to the "two-dimensional logic" apparently discovered by Herzberger (1973).

[73]This use condition is comparable to the condition proposed by AnderBois & Dąbkowski (2020):

(78) **A use-condition for *bambai***

$[\![bambai\ q]\!]^u = \{c : c_s$ is negatively disposed to q in $c_W\}$

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

In this sense, *bambai* p can be taken to conventionally implicate a proposition of the form given in (78).

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.

3.3.2   Competition in the modal-adverb domain

A predicted consequence of this meaning change — that is the "encroachment" of *bambai* into the modal adverbial domain — is that *bambai* enters into competition with other modal adverbs.

One arena in which this is made particulary clear is in *bambai*'s *apprehensive function* (§ 2.3.2.2) — that is, where it realises a possibility modal whose domain can be restricted by the presence of an *if*-clause. In these contexts *bambai* has entered into the semantic domain of other Kriol lexical items including *marri/maitbi* 'maybe'. The examples in (79-80) below show the perseverance of apprehensional expressive content in these syntactic frames. In (79a), 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.

(79) **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
   SPEAKER COMMENT. *Tharran jeya im min yu garra gu la holiday*
   'That one means you'll go on your holiday.'   [AJ 04082017]

Here, the contrast between (a) and (b) is attributable to the expressive content of *bambai*. 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

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$\forall w' \in \text{GOAL}_{i,p}(w) : \neg q(w')$ (I.e. that some proposition p is performed/caused by i in order to achieve the speaker's goals (in which $\neg q$ holds))

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 (80) below, where the selection of *marri* instead of *bambai* gives rise to a conventional implicature that the Speaker's utterance of (80) ought not be interpreted as the expression of a desire to prevent her daughter's participation in the football game.

(80) **Context:** I am cognizant of the possibility that my daughter injures herself playing football.
[#]**Context:** I am uncomfortable with the likelihood of my daughter injuring herself playing football.

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' ↛ [so she shouldn't play]
[AJ 04082017]

Based on this evidence, we may conclude that the ostensible encroachment of *bambai* into the domain of modal/epistemic adverbials has given rise to a dyad (*i.e.*, "Horn scale", Horn 1984) with the form $\langle marri\ p, bambai\ p \rangle$ — selection of the "weaker" expression *marri p* **Q**-implicates that the Speaker was not in a position to utter its stronger (more specific) scalemate, *bambai p*. That is, the meaning of the 'weaker' expression comes to represent the relative complement of the stronger in a given semantic domain. In this case, use of the neutral modal adverb *marri* comes to conversationally implicate **non-apprehensional** readings/modalities.

(81) **Competition in the modal adverbial domain**

$$\llbracket marri \rrbracket \approx \Diamond \setminus \llbracket bambai \rrbracket$$

Situations in which *marri* is felicitous are those in modal possibility claims in which *bambai* is inappropriate/expressively incorrect.

3.4 Summary

This chapter has considered a number of crucial issues relating to the interpretation of apprehensional *bambai*, particularly as it relates to the role of context in the synchronic interpretation and the diachronic reanalysis of this lexical item. In view of the emergence of *bambai*'s modal readings, § 3.1 developed an account of the interpretation of *bambai* clauses as involving modal subordination to some accommodated antecedent. Appealing to basic principles of communication (RELEVANCE and the implementation of this notion as the QUESTION UNDER DISCUSSION), *bambai*'s prejacent is taken to encode a response (specifically a prediction) to a question about a salient eventuality.

In § 3.2, we saw how the development of apprehensional readings of *bambai* (both its modal and expressive content) appears to be a result of its (as with subsequential-TFAs in other languages) frequent occurrence in contexts of "preacautioning" and fearing. These contexts gave rise to inferences creating the conditions for the renalysis of *bambai* as conventionally encoding apprehensional meaning. The reanalysis of *bambai* as a modal adverb permits for the set of uses that correspond to its *APPREHENSIVE* function.

Further developing these observations, the final section — § 3.3 — considered data from other two other languages in which a subsequential TFA appears to have undergone similar functional change, developing apprehensional expressive content (*viz.* Dutch *straks* and German *nachher*). These data support an analysis of the distinctive negative attitude reading that is associated with apprehensionals as NOT-AT-ISSUE CONTENT. As with the diachronic emergence of modal readings of erstwhile TFAs, this expressive content/use condition is understood to have arisen as a result of the conventionalisation of an implicature arising under certain frequent (*sc.* future-oriented + admonitory) discourse contexts.

This chapter has shown that the interpretation of *bambai* is highly context-dependent. An utterance of the form *bambai* q in a discourse context $\mathcal{D}$ asserts that q could happen (in a $\mathcal{D}$-provided modal base and as a consequence of the non-obtention of some $\mathcal{D}$-salient eventuality) and conventionally implicates that q would undesirable. Drawing on these observations, chapter 4 proposes a lexical entry for *bambai* which unifies its two distinct readings — *viz.* SUBSEQUENTIALITY and APPREHENSIONALITY.

Chapter 4

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. Figure 2.1 is repeated here for reference.

Figure 4.1. Possible readings of *bambai*
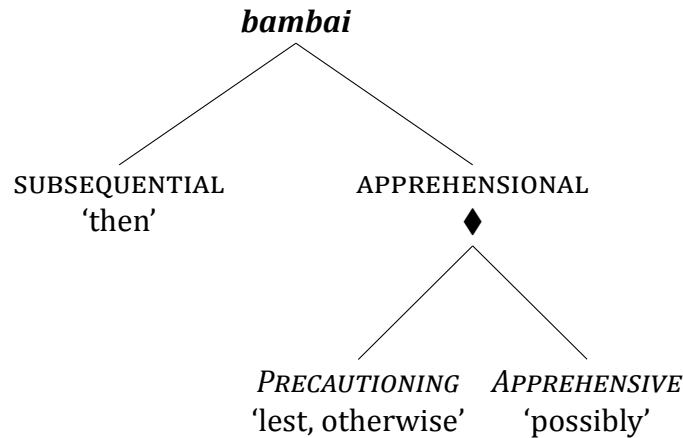
In order to settle on a unified semantics, we assume a version of a Kratzerian treatment of modal operators (*e.g.*, Kratzer (1977, 1981b) *et seq.*, see § 1.2). The primary insight of Kratzer's treatment is that modal expressions are lexically underspecified for modal "flavour"; different readings emerging as a consequence of a contextually-provided conversational background (see also Hacquard 2011:1490*ff* for an overview.)

4.1 Subsequentiality

In § 2.3.1, we saw how Kriol has retained the temporal frame uses of *bambai* derived from archaism 'by-and-by.' For Dowty (1979, 1982), time adverbials are taken to denote predicates of times/sets of temporal intervals — that is, the set of all those intervals that intersect with the interval specified by the adverb (82).

(82)   A lexical entry for the (indexical) TFA *today* (adapted from Dowty 1979:328, cited in Ogihara 1996:43)

$[\![today]\!]^c = \lambda P_{\langle i,t\rangle}\exists t_i[t \subseteq \text{today}' \wedge P(t)]$

today holds of some property of times $P \in \mathcal{D}_{\langle i,t\rangle}$ if there there is some time t at which P holds which is a subinterval of the day-of-utterance (today' is an interval supplied by context — *viz.* the timespan of the day in which utterance time ($t*$) is located.)

A frame adverbial, then, takes a predicate and says that its instantiation is contained within a given temporal interval.[74] Following assumptions made by Kamp (1971:238*ff*) and Johnson (1977:115), Dowty (1982:29*ff*) 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. (83) represents a proposal to capture this relation.

(83)   **SUBSEQUENTIAL INSTANTIATION**

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

A subsequentiality relation SUBSEQ holds between a predicate P, reference time t_r and reference world w iff 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.

The relation between a contextually-provided standard and measure function $\mu(t_1, t_2)$ analysis builds in a truth-condition that captures variable intuitions about the falsity of subsequential claims in context (84-85).[75]

(84)   a.   The birth of Cain succeeded Eve's pregnancy by some contextually inappropriate length of time (*e.g.,* ninety years.)

$\mathbb{F}$*Eve fell pregnant then shortly afterwards gave birth to a son*

   b.   **Context.** Dad went to the shop on Monday and returned to make lunch the following week.

$\mathbb{F}$*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]

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[74]The term "temporal frame adverbial" due to Bennett & Partee 2004, and equivalent to Kamp & Reyle's "locating adverbial" (1993:613).

[75]Given that $\mathcal{T}$ is isomorphic with $\mathbb{R}$, formally $\mu : \mathcal{T}^2 \to \mathbb{R}$ represents a Lebesgue measure function that maps any interval $[t_1, t_2]$ to its length $t_2 - t_1$.

That is, the category of "subsequential" TFAs makes explicit reference to a time provided by the discourse context (e.g., identified with the instantiation time of a previous clause.) The assertion of a relation between this reference time and the instantiation of the prejacent is a component of these items' semantics.

An additional advantage is that, in appealing to a pragmatically retrieved standard for subsequentials, we allow for faultless disagreement between interlocutors, in case speaker and addressee retrieve divergent standards of soonness from the discourse context (as in (85) below).

(85) **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 (85), 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 (86) below.

(86) **Lexical entry for *bambai* (TFA)**
$$[\![bambai]\!]^c \underset{\text{def}}{=} \lambda P.\text{SUBSEQ}(P, t_r, w)$$
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.

4.2   '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 § 1.2 above, the notion of **settledness** was introduced, as deployed by Condoravdi (2002) (and Kaufmann 2005) using $\mathcal{W} \times \mathcal{T}$ frames, where it is cast as derived from the concept of *historical necessity* (Thomason 1970).

Settledness/historical necessity is normally expressed in terms of **historical alternatives**. This refers to the notion of equivalence classes ($\approx_t \subseteq \mathcal{W} \times \mathcal{W}$ 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 (87) and, on the basis of this, a formal definition of settledness is given as (88).

(87) **Historical alternatives** $\approx \subset \mathcal{T} \times \mathcal{W} \times \mathcal{W}$

    a. $\forall t \in \mathcal{T}[\approx_t$ is an equivalence relation$]$
        All world-pairs in $\approx_t$ (where t is 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**
        $\forall w, w', t, t'\big[(w \approx_t w' \wedge t' \prec t) \rightarrow w \simeq_{t'} w'\big]$
        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)

Formally then, the truth value of proposition p is settled at t iff it is uniformly true or false at all historical alternatives to w at t. Also shown in § 1.2.1, Condoravdi and Kaufmann *i.a.* additionally derive a related property, *viz.* PRESUMED SETTLED-NESS/DECIDEDNESS repeated here as (88). The presumption of settled is effectively understood to be a relation between a discourse context and a predicate (or proposition). Following standard pragmatic assumptions, the *common ground* (***cg***) represents the set of propositions taken to be mutually understood by participants in a discourse context (see 11a). The intersection of these propositions ($\cap cg$) — the *context set* — is modelled as the set of worlds that is compatible with the *cg* (those worlds in which all propositions in the common ground are true.)

(88)   **Presumption of settledness for *P*.**
      $\forall w' : w' \in \cap cg, \forall w'' : w' \approx_{t*} w'' :$
      AT$\big([t*, \_], w', P\big) \leftrightarrow$ AT$\big([t*, \_], w'', P\big)$ (Condoravdi 2002:82)
      A property *P* is presumed settled if it uniformly holds or does not hold in all historic alternatives to worlds compatible with the discourse participants' beliefs.

As indicated in § 3.2, in this dissertation I defend a claim that the modalised meaning component of apprehensional *bambai* arises as a consequence of a dia-chronically-conventionalised implicature that claims that SUBSEQ holds of a predicate represent predictions when that predicate is interpreted as nonfactual. This explains the *"epistemic downtoning"* function which characterises apprehensionals on Lichtenberk's description (1995).

Specifically, given notions of RELEVANCE (*e.g.*, 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 (specifically an premonitory one, *cf.* § 3.2) 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 apprehensionals. A principal component (and advantage) of Kratzer's treatment of modals (1977; 1981b; 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 (89) gives an intensionalised (modal) semantics for *bambai.*

(89) ***bambai* includes a modal expression**
$[\![bambai]\!]^c = \lambda P.\exists w'\big[w' \in \underset{o(w)}{\text{BEST}}(\cap m(w)) \wedge \text{SUBSEQ}(P, t_r, w')\big]$

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 (83) above) holds between that world w', the prejacent P, and a reference time provided by the utterance context t_r.

With the entry in (89), 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/unverifiable — state-of-affairs; that is, one that is presumed unsettled.

As a consequence, the apparent subsequential/apprehensional polysemy exhibited by *bambai* is modelled as deriving form a single core meaning, where different contexts make different conversational backgrounds available (*cf.* Kratzer 2012:55*ff*). We can conceive of this in terms of a pragmatically-enforced OMNISCIENCE RESTRICTION.

4.3   A pragmatic ambiguity:
The omniscience restriction

Crucially, in the apprehensional cases we've seen, *bambai*'s prejacent is understood to encode a predication about an unsettled state of affairs. That is, it involves reference (by means of existential quantification) to either • some time succeeding utterance time $t' \notin \cap \preccurlyeq_{t*}$ (the indicative cases) OR • some world that is not a historic alternative of the actual world $w' \notin \cap \approx_{t*} w*$ (the subjunctive cases.) These two types of contexts can be unified as involving a NON-ACTUAL/NONFACTUAL predication — one without the presumption of settledness. Recalling the discussion

of branching-time models in § 1.2.1, the non-actual property can be easily stated over indices as $\{i' \mid i' \nleq i*\}$.[76] In Kriol, the prejacent of *bambai* is interpreted as actual iff *bin*/past marking is present (and *bina*/explicit counterfactual marking is absent.) These contexts were summarised in Table 2.2 (*p.* 47 above.)

The *omniscience restriction*, also described in (74) is a pragmatic principle implementing the ACTUAL/NONACTUAL distinction to explain the distribution of SUBSEQUENTIAL vs. APPREHENSIONAL *bambai*.

(90) **The omniscience restriction.** Predications of subsequentiality (posterior instantiation) are interpreted as carrying predictive illocutionary force (*i.e.,* modalised or "epistemically downtoned") when they are presumed unsettled.

The idea here is that a speaker who makes a predication about the temporal properties of a non-settled eventuality cannot reasonably make an assertion that presumes appears to presume its settledness. 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.)

This restriction reflects a pragmatic reflex of Condoravdi's (2002:83) diversity condition[77] and the twin epistemic constraints on the relations between doxa and settledness given in Kaufmann 2002, 2005; Kaufmann et al. 2006 (*viz.* historicity/lack of foreknowledge), axioms which guarantee that "only what is settled can already be known" (Kaufmann et al. 2006:101). Consider again the truth conditions of *bambai* in (91) with the SUBSEQ relation spelled out. The entry in (91) is translated into a branching-times formalism in order to draw the parallel treatment of "indicative" and "subjunctive" uses of *bambai*. The relevant modelling assumptions were introduced in § 1.2.1.

(91) $[\![bambai]\!]^c = \lambda P.\exists b \big[b \in \underset{o(i)}{\mathrm{BEST}}(\cap \approx_i^+) \wedge \exists i'_b \big[i' \succsim i_r \wedge P(i') \wedge \mu(i_r, i') \leq s_c \big] \big]$

bambai asserts that P is instantiated at some index i' which is **posterior** (temporally subsequent) to some contextually-retrieved reference index i_r according to some branch that is metaphysically accessible from i.[78]

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[76]See also the Rumberg/von Prince partition in (12).

[77]That is, a property holding between properties P and modal bases $m : \mathcal{W} \times \mathcal{T} \to \wp(\mathcal{W})$ that they be unsettled w/r/t the instantiation of P (Condoravdi 2002:83):

$$\exists w \big[w \in cg \wedge \exists w', w'' [w', w'' \in m(w,t) \wedge \mathrm{AT}\big([t,\infty), w', P\big) \wedge \neg\mathrm{AT}\big([t,\infty), w', P\big)] \big]$$

[78]Additionally there may be contextually-derived additional restrictions on the modal base, hence $\approx^+$, following the notational convention $(f^+(w))$ introduced by Kratzer (1981b) in modelling conditionals.

Table 4.1. *bambai* clauses relate three semantical indices: the instantation time of the prejacent (i'), the utterance index $(i*)$ and a contextually-retrieved reference index (i_r). *bambai* requires that $i_r \prec i*$

	FUNCTION	*relations*	Text
	a. SUBSEQ	$i_r \prec \boldsymbol{i'} \preccurlyeq \boldsymbol{i*}$	'I had coffee$_{i_r}$ **then** fell asleep'$_{i' \prec i*}$
APPR	b. INDIC	$i* \prec i_r \prec i'$	'I'll have coffee$_{i_r}$ **otherwise** may fall asleep'$_{i' \succ i*}$
	c. SBJV	$i_r \begin{smallmatrix} \measuredangle\, i' \\ \prec\, i* \end{smallmatrix}$	'I had coffee$_{i_r}$ **otherwise** may've fallen asleep'$_{i' \not\prec i*}$

This condition allows us to unify the modalised and non-modalised readings of *bambai* — in view of the constraints discussed above, retrieval of a proper reading for *bambai* in a given context is a function of the relation between evaluation indices. Summarised in table 4.1, a subsequential reading obtains *only if* the instantiation of the prejacent is ACTUAL w/r/t the utterance index — that is *bambai* receives its *subsequential* reading/*apprehensionality* "fails to emerge" when $i' \preccurlyeq i*$.

Conversely, if the prejacent's instantiation index (i') is understood to be **posterior** to $i*$, a subsequentiality claim is subject to the omniscience restriction.

This can be modelled by assuming that context provides a species of *metaphysical* (circumstantial) modal base. Recall, among the ontological metaphysical assumptions reflected in branching-times structures is *left linearity* (7) — representing historical necessity — and *right branching*, reflecting the problem of future contingency. It will be a property, then, of all metaphysical conversational backgrounds, that all branches undivided at i_n will also be undivided at i_{n-1} ($\therefore$ B$_{i_n} \subseteq$ B$_{i_{n-1}}$)[79]

(92) **The structure of the modal base**

   a. *Undividedness-at-$\boldsymbol{i}$*   (Müller 2014; Rumberg 2016b)
   $\boldsymbol{b} \equiv_{\boldsymbol{i}} \boldsymbol{b'} \triangleq \exists i'[i' \succ i \land i' \in b \cap b']$
   <u>That is:</u> two branches are undivided at some index i iff they both run through some successor index i'.

   b. A metaphysical modal base ($\approx$) contains all metaphysically possible propositions at an evaluation index i.

   c. Metaphysical modal bases therefore assume actualness/fixity of the past.
   $\forall i, j \big[i \succcurlyeq j \rightarrow \forall b, b'[b \underset{i}{\approx} b' \rightarrow b \underset{j}{\equiv} b'] \big]$ (compare 8/87b)
   <u>That is:</u> metaphysically-accessible branches are undivided at any evaluation index i and at all indices preceding that evaluation index.

Shown above (*e.g.,* table 4.1), subsequential readings of *bambai* are limited to contexts where instantiation time is taken to precede utterance time. Against a

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[79]See Rumberg (2016b:79-80) for a proof of this theorem.

metaphysical modal base then, the instantiation of the prejacent is presumed settled at utterance time (93).

(93) Assuming that the past morphology restricts instantiation of *P* (*e.g.*, that property described in *bambai*'s prejacent) to $\{i' \mid i' \prec i*\}$:
$$\forall b \in \cap cg_{i*}\left[i' \in b \wedge P(i')\right] \rightarrow \forall b'\left[b' \underset{i*}{\approx} b \rightarrow \left[i' \in b' \wedge P(i')\right]\right]$$
All branches b that are compatible with the common ground are such that if *P* at i' is true, then it is metaphysically necessary (*i.e.*, holds at all historical alternatives to b.)

Conversely, in the absence of past morphology, no such restriction is made on the instantiation index of *P*: the modal base can therefore be *diverse*: the truth (or falsity) of $P(i)$ is contingent/unsettled with respect to $P(i)$ — that is, the common ground is compatible with branches at which *P* is settled differently (*i.e.*, (93) is not valid if $i' \not\prec i*$).

This is implemented more precisely in the following sections.

4.4   Deriving the subsequential reading

What we've called the *subsequential* (TFA) use of *bambai* follows from general norms of assertion: given that the speaker is making a predication about a property that is presumed settled, her context set is understood as veridical and the assertion is taken to be factual — *cf.* Grice's (super)maxim of quality: "try to make your contribution one that is true" (1991:27).

As shown above, given the notion of historical necessity/the left-linearity of branching models of time, an evaluation index is associated with a unique past.

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

   a. *A metaphysical modal base* $\underset{\text{meta}}{m} / \approx$
       A metaphysical modal base $\approx$ is a function from indices to a set of propositions that are **consistent** with metaphysical assumptions about the state of the world at a given index i.
       Consequently, the intersection of these propositions: $\cap\approx_i$ returns the set of **historical branching alternatives** to i — a set of branches that share i's history and branch into its future (while according with metaphysical notions of possibility.s)

   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 $\textbf{BEST}_\varnothing\left(\cap\approx_i\right)$ simply returns $\cap\approx_i$: the set of historic/branching alternatives to i.

By the (BT-adaptation of Thomason's) definition in (87), historical alternatives have "identical pasts" to one another and to the evaluation index $i*$. In the relevant sense, then, the quantification is trivial. With/respect to some $i' : i' \prec i*$, all branches in the modal base are undivided-at-i'. This is shown in the shaded portion of the BT diagram of $\cap \approx_{i*}$ in fig. 4.2.

Figure 4.2. A possible representation of $\cap \approx_{i*}$: a "subtree" of $\mathfrak{T}$.

shaded portion. All metaphysically accessible branches are undivided at indices preceding $i*$.
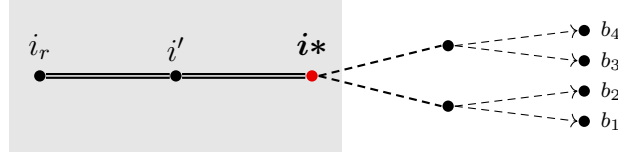
This is derived for (95) below (the sentence simplified from (21) above). The derivation is further explicated below.

(95) **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 i to before speech time $i*$**
   $[\![bin]\!]^c = \lambda P \lambda i.i \prec i* \wedge P(i)$
   bin realises 'PST' — a past tense operator which restricts the instantation time to some index i that precedes the speech index $i*$.

b. **Meaning of the first clause**

$[\![bin]\!]^c([\![main\ dedi\ go\ la\ det\ shop]\!]^c) = \lambda P \lambda i.i \prec i* \wedge P(i)\left(\lambda i'.\text{GO.SHOPPING}(i')\right)$
$[\![main\ dedi\ bin\ go\ la\ det\ shop]\!]^c = \lambda i.i \prec i* \wedge \text{GO.SHOPPING}(i)$

   i is then existentially bound (Dowty 1979; Ogihara 1996; Stump 1985). The first clause, then, asserts that the event of Dad's trip to the shop occurs at some index that precedes the utterance index — I'll call this index j.

$[\![main\ dedi\ bin\ go\ la\ det\ shop]\!]^c = \exists j[j \prec i* \wedge \text{GO.SHOPPING}(j)]$

c. **Meaning of *bambai* & assignment of i_r**

$[\![bambai]\!] = \lambda P.\exists b\left[b \in \underset{o(w)}{\text{BEST}}\left(\cap m(i*)\right) \wedge \exists i'_b[i' \succ i_r \wedge P(i') \wedge \mu(i_r, i') \leq s_c]\right]$

   j is assigned to i_r, per standard assumptions about temporal anaphora (*e.g.*, Hinrichs 1986; Partee 1984, these insights have been implemented

in DRT frameworks § 3.1, see chapter 5 of Kamp & Reyle 1993.)

$$[\![bambai]\!]^c = \lambda P.\exists b\big[b \in \underset{o(w)}{\text{BEST}}\big(\cap m(i*)\big) \wedge \exists i'_b[i' \succ j \wedge P(i') \wedge \mu(j, i') \leq s_c]\big]$$

d. **Meaning of the second clause (*bambai*'s prejacent)**
   $$[\![imin\ gugum\ dina]\!]^c = \lambda i.i' \prec i* \wedge \text{MAKE.LUNCH}(i')$$

e. **Substitution of prejacent (d)**

$$[\![bambai\ \text{(d)}]\!]^c = \exists b\big[b \in \underset{\varnothing}{\text{BEST}}(\cap\approx_{i*}) \wedge \exists i'_b[i' \succ j \wedge \lambda i'.i' \prec i* \wedge\text{MAKE.LUNCH}(i') \wedge \mu(j, i') \leq s_c]\big]$$

$$= \exists b\big[b \in \underset{\varnothing}{\text{BEST}}(\cap\approx_{i*}) \wedge \exists i'_b[i' \succ i_r \wedge \text{SUBSEQ}\big(\lambda i.i' \prec i* \wedge\text{MAKE.LUNCH}(i'), j\big)]\big]$$

the binding is not working here, moving on. i probably need to substitute something in, maybe bambai should still be a relation bw indices and **propositions** instead of temp abstracts.

In (b-c]), the mechanism responsible for establishing the interclausal anaphoric re-lation between *im* and *main dedi* is similar to that which equates of i_r with the index at which Dad's SHOPPING trip was instantiated: *viz. j*. As described in § 3.1, in the Kampian/DRT terms (*e.g.*, Kamp & Reyle 1993:Ch. 5) – also adopted in, *e.g.* Partee 1984 – this relies on the notion of an expanding universe of discourse: modelled as sets of assignments.

Shown in (e), MAKE.LUNCH is instantiated prior to the utterance index $i*$; the modal component of *bambai* involves quantification over a totally realistic conver-sational background. That is, given that the prejacent is predicated of a preced-ing index $i' \prec i*$, all branches in the metaphysical modal base are undivided at $\{i \mid i \preccurlyeq i*\}$ (fig. 4.2). Because the SUBSEQ predication involves branchmates of $i*$, it is interpreted as factual.

4.5 Deriving the apprehensional reading

In unsettled contexts, *bambai*'s metaphysical modal base gives rise to a nonfac-tual/nonveridical conversational background. In view of pragmatic principles (the "omniscience restriction"), the metaphysical alternatives are sorted by a "stereo-typical ordering source" (*e.g.*, Kratzer 2012:37*ff i.a.*.)

Figure 4.3. A possible representation of $\cap\approx i*$: a "subtree" of $\mathfrak{T}$.
shaded portion. Multiple accessible branches (metaphysically "possible futures") succeeding $i*$.
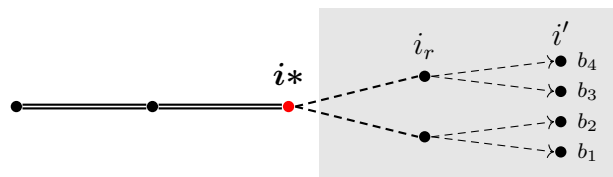
(96) **conversational background: *bambai*'s modal-apprehensional reading**

    a.   (As above) a metaphysical modal base $\approx$ is a function that retrieves the of metaphysically possible branches from a given index.

    b. $\mathfrak{s}(i) = \{p \mid p \text{ will hold in the 'normal' course of events at } i\}$.
A sterotypical ordering source is a set of propositions that are "normally true" in w/can be taken to hold in the "normal course of events" in w (Kratzer 1981b:295, see Yalcin 2010 for discussion.)

    c.   A set of propositions $\mathfrak{s}(w)$ then induces an ordering $\leqslant_{\mathfrak{s}(w)}$ on the modal base:

$$\forall b', b'' \in \cap \approx_i : b' \leqslant_{\mathfrak{s}(i)} b'' \longleftrightarrow$$
$$\{p' \mid p' \in \mathfrak{s}(i) \wedge i'[i' \in b' \wedge p'(i')]\}$$
$$\rotatebox{90}{$\circlearrowright$}$$
$$\{p'' \mid p'' \in \mathfrak{s}(i) \wedge i''[i'' \in b'' \wedge p''(i'')]\}$$

That is, b' is more normal (stereotypical) than b'' iff $\mathfrak{s}(w)$ – the propositions "normally true given i" that are true of indices along b' are a superset of those true of indices along b''.

    d. $\underset{\mathfrak{s}(i)}{\mathbf{BEST}}(\cap\approx_i)$ then returns just that subset of metaphysical alternative branches that are closest to what is judged to be a "normally-unfolding course of events" at i.

Armed with these assumptions, we can now derive the proper semantics for a "precautioning" use of *bambai*, as in (22), repeated here as (97).

(97) **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**
Let's take *garra* to instantiate the abstract (untensed) modal particle WOLL.[80]
$$[\![garra]\!] = \lambda P \lambda i \forall b \big[b \in \underset{o(i)}{\mathbf{BEST}}\big(\cap m(i)\big) \to \exists^b i'[i \succ i \wedge P(i')]\big]$$

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[80]Semantics for WOLL adapted from Condoravdi (2002:71)).

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 species of necessity modal and glossed as IRR.

garra takes a predicate P and an evaluation index i and asserts that P holds at some successor of i in all of the best-according-to-*o* worlds in the modal base.

b. **Meaning of the first clause**
Without explicit tense marking, the (evaluation) index variable for i is identfied as the utterance index (this is represented as a covert NPST morpheme below, the alternative to *bin* in 95a)

$$[\![garra]\!]^c([\![ai\ dringgi\ kofi]\!]^c) = \lambda P\lambda i.\forall b'\Big[b' \in \underset{o(i)}{\text{BEST}}\big(\cap m(i)\big)$$

$$\to \exists i'[i' \in b' \wedge i' \succ i \wedge P(i')]\Big]\ \big(\lambda i'.\text{I.DRINK.COFFEE}(i')\big)$$

$$\text{NPST}([\![airra\ dringgi\ kofi]\!]^c) = \lambda P\lambda i.i = i* \wedge P(i)$$

$$\big(\lambda i.\forall b'\big[\underset{o(i)}{\text{BEST}}\big(\cap m(i)\big) \to \exists i'[i' \in b' \wedge i' \succ i \wedge \text{DRINK.COFFEE}(i')]\big]\big)$$

$$[\![airra\ dringgi\ kofi]\!]^c = \forall b'\Big[\underset{tel(i*)}{\text{BEST}}\big(\underset{\text{CIRC}}{\cap m(i*)}\big) \to \exists i'[i' \in b' \wedge i' \succ i* \wedge \text{DRINK.COFFEE}(i')]\Big]$$

airra dringgi kofi is true in a context c iff all branches in the modal base that conform best with some ordering source (in c, likely a teleological background, consisting of the speaker's goals) contain some index in the future of utterance time at which the speaker drinks coffee.

maybe an issue here: i' isn't a successor of the coffee index, rather a posterior non-successor…

c. **Meaning of *bambai* & substitution of (97b-i' ($= i_\kappa$) for i_r**

$$[\![bambai]\!] = \lambda P.\exists b\Big[b \in \underset{o(w)}{\text{BEST}}\big(\cap m(i*)\big) \wedge \exists^b i'[i' \succ i_r \wedge P(i') \wedge \mu(i_r, i') \leq s_c]\Big]$$

$$[\![bambai]\!]^c = \lambda P.\exists b\Big[b \in \underset{o(w)}{\text{BEST}}\big(\cap m(i*)\big) \wedge \exists^b i'[i' \succ i_\kappa \wedge P(i') \wedge \mu(i_\kappa, i') \leq s_c]\Big]$$

As in (95c), the "reference time" i_r is assigned to the existentially-bound index i' from (b) — here notated as i_κ (coffee-drinking time).

d. **Meaning of the second clause**
$[\![mi\ gurrumuk]\!]^c = \lambda i.\text{PASS.OUT}(i)$
Temporal abstract *mi gurrumuk* denotes a set of indices at which the speaker passes out.

e. **(d) saturates *bambai*'s *P* argument; temporal abstract is existentially bound**

$$[\![bambai]\!]^c(\text{d}^c) = \lambda P.\exists b\Big[b \in \underset{o(w)}{\text{BEST}}\big(\cap m(i*)\big)$$

$$\wedge \exists^b i'[i' \succ i_\kappa \wedge P(i') \wedge \mu(i_\kappa, i') \leq s_c]\Big]\big(\lambda i.\text{PASS.OUT}(i)\big)$$

$$[\![bambai\ (\text{d})]\!]^c = \exists b\Big[b \in \underset{\mathfrak{s}(w)}{\text{BEST}}(\cap\approx^+_{i*}) \wedge \exists^b i'[i' \succ i_\kappa \wedge \text{PASS.OUT}(i') \wedge \mu(i_\kappa, i') \leq s_c]\Big]$$

$$= \exists b\Big[b \in \underset{\mathfrak{s}(w)}{\text{BEST}}(\cap\approx^+_{i*}) \wedge \exists^b i'[i' \succ i_\kappa \wedge \text{SUBSEQ}\big(\text{PASS.OUT}(i'), i_\kappa\big)\Big]$$

The SUBSEQ component of *bambai*'s meaning asserts that • the speaker's

PASSING OUT obtains at some index (i') preceded by a contextually-retrieved reference time i_κ DRINK.COFFEE and • the temporal distance between those two times is below some contextual standard ("soonness").

In the context of (97), $i* \prec i_\kappa \prec i'$. Given that i_κ (and therefore i') is in the **future of speech time**, the modal base $\approx_{i*}$ is **diverse with respect to the SUBSEQ property** — that is: SUBSEQ$\big([\lambda i'.\text{PASS.OUT}(i')], t_\kappa\big)$ is **not presumed settled at $i*$** (compare fig. 4.3.)

On this analysis, then, the crucial property that distinguishes the pure (actualised) subsequential reading from the apprehensional one is that the property described by the prejacent is presumed **settled at $i*$** (or alternatively, by $t*$ in $w*$.) In all historical alternatives to the evaluation world, the event described by MAKE.LUNCH in $c_{(95)}$ holds at i'. Conversely, in (97), the context ($c_{(97)}$) **fails to satisfy** settledness for PASS.OUT because the relation between modal base and predicate here satisfies the *diversity condition* — that is, there are metaphysical alternatives branching from $i*$ which booth verify and falsify PASS.OUT(i') (*cf.* Condoravdi 2002:83):

(98) **Diversity of the common ground at $i*$ w/r/t prejacent in (97)**

$$\exists b \in \cap cg \wedge \exists b', b''[b, b'' \in \underset{\mathfrak{s}(^{b}i*)}{\text{BEST}}(\cap \approx_{b_{i*}}^{+})$$
$$\wedge \text{ SUBSEQ}\big(\text{PASS.OUT}(^{b'}i'), {}^{b'}i_\kappa\big) \wedge \neg\text{SUBSEQ}\big(\text{PASS.OUT}(^{b''}i''), {}^{b''}i_\kappa\big)]$$

There are metaphysical alternatives branching from i where the event described by the prejacent to *bambai* in (97) holds and others where it doesn't hold.

Finally, following the discussion and interpretation conventions discussed in § 3.1, the accommodation of an antecedent (the "apprehension-causing situation") is intersected with the modal base — that is, it is from that subset of metaphysical branching futures to $i*$ <u>in which the speaker doesn't have coffee</u> that $\underset{\mathfrak{s}(i*)}{\text{BEST}}$ selects a domain to be quantified over.

(97) f. **Modal subordination**

$$[\![bambai\ mi\ gurrumuk]\!]^c = \exists b \big[b \in \underset{\mathfrak{s}(w)}{\text{BEST}}(\cap (\!|\approx_{i*} \cup \overline{[\![ai\ dringgi\ kofi]\!](i_\kappa)}|\!))$$
$$\wedge \exists^b i'[i' \succ i_\kappa \wedge \text{SUBSEQ}\big(\text{PASS.OUT}(i'), i_\kappa\big)]$$

The modal base is intersected with a (negated) proposition derived from the discourse context. *bambai* signals that *mi gurrumuk* is **modally subordinate** to the proposition *ai dringgi kofi* 'I drink coffee (at i_κ).

The meaning of the sentence (97), then, is the conjunction of (97b) and (97f). The "dynamic" interpretive conventions (*i.e.*, the update of c) are clearly vital in terms of retrieving the relevant parameters of interpretation and the subordinative relation between the propositions in a precautioning-apprehensional (*p bambai q*) usage of *bambai*.

4.5.1 The semantics of a counterfactual apprehensional

Subjunctive/counterfactual uses (*e.g.*, ex. (36) or table 4.1) are assumed to be derivable in much the same way as above. That is, the modal reading emerges as a consequence of a (conventional) implicature that the relation between the common ground and the SUBSEQ relation meets the diversity condition/is presumed **un**settled.[81] A complete derivation is not provided, although truth conditions can be composed for (36, repeated below as 99) drawing on standard treatments of counterfactuals. That is a nonrealistic modal base where alternative branches are ordered by their similarity to $i*$—*i.e.*, a *totally realistic ordering source* — *cf.* Kratzer 1981a, 2012; Lewis 1973, 1981 a.o.)

Described previously, in these "subjunctive" uses, *bambai* marks a counterfactual apprehensional proposition. In (99), the subject may have fallen asleep subseqently to a (nonrealistic/counterfactual) **non**instantiation of the coffee-drinking event.

The *counterfactual bambai* construction is similar to the *subsequential* use insofar as the reference time and antecedent upon which *bambai* is anaphoric are past marked ($i_r \prec i*$). Crucially though, as in other apprehensional uses, the common ground is nonveridical/**diverse** with respect to *bambai*'s prejacent. *Bambai*'s diverse quantificational domain is represented by the shaded region in Figure 4.4.

Figure 4.4. A possible representation of $\cap \approx_{i_0}$: a "subtree" of $\mathfrak{T}$.

shaded portion. $\underset{\{p|i*\in p\}}{\text{BEST}} (\cap \neg \kappa)$

Multiple accessible branches (possible developing counterfactuals) succeeding i_0 (the greatest lower $\prec$-bound of $i*$ and i'.)

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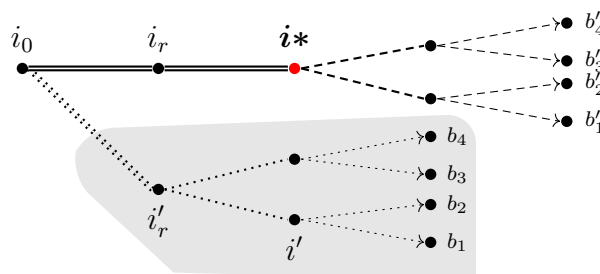
[81]A precondition for diversity to be satsfied is that "the common ground must be compatible with their being some past time at which [the truth of the prejacent is unsettled]" (Condoravdi 2002:85).

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

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

<div align="right">[AJ 23022017]</div>

   a. **The syntactic antecedent** (κ stands for the predicate 'I DRINK COFFEE')
$[\![aibin\ dringgi\ kofi\ nairram]\!]^c = \exists i'[i' \prec i* \wedge i' \in last\ night^c \wedge \kappa(i')]$
That is, I DRINK COFFEE holds some index i' preceding speech time and
contained within the interval denoted by *last night*.

   b. **The prejacent**
bina 'PST:IRR' is taken to be a composite auxiliary: in effect a modal
with back-shifted temporal perspective (compare treatments of English
would.)[82] Compare with the present (NPST) perspective reading derived
in (97b).
s stands for the predicate 'I BE SLEEPING (AT WORK).'

$$[\![ai\ bina\ silipsilipbat]\!]^c = \lambda i'.i' \prec i* \wedge \forall b\big[b \in \underset{\mathfrak{s}(i')}{\text{BEST}}(\cap \underset{\text{CIRC}}{m(i')})$$
$$\rightarrow \exists^b i''[i'' \succ i' \wedge s(i'')]\big]$$

That is, along all branches best conforming with circumstances/expectations
at some past index i', I BE SLEEPING holds at some index i'' that is a suc-
cessor of i'.

   c. **Application to *bambai***
Here, $\underset{i'}{\square} s(i'')$ will be used to abbreviate the truth translation of the pre-
jacent given in (b) above.
$$[\![bambai\ ai\ bina\ silipsilipbat]\!]^c = \exists b\big[b \in \underset{\mathfrak{s}(i_0)}{\text{BEST}}(\cap(\!|\approx_{i_0} \cup\{b' \mid \kappa(i_\kappa) \notin b\}|\!))$$
$$\wedge\ \exists^b i'[i' \succsim i_\kappa \wedge \text{SUBSEQ}\big(\underset{i'}{\square} s(i'), i_\kappa\big)\big]$$

That is, there's some branch b which was a metaphysical alternative of
i_0 along which the speaker didn't have coffee at i_κ ($\kappa(i_\kappa)$). In b, there's
an index i', posterior to i_κ at which s holds.

<div style="font-style:italic">serious composition problems here. probably subseq can harmlessly be changed to specify that $i' \succsim i_r$ rather than $\succ$ though.</div>

4.5.2 Possibly pessimistic

A surprising consequence of the above proposal is the bifurcation of uses of *bambai*
into subsequential (interpreted as purely temporal) and apprehensional readings.

---

[82]This observation, supported by a number of synchronic distributional facts about the Kriol IP
has diachronic origins, see Phillips (2011:45) for a discussion of evidence that *bina* is the result
of fusion of *bin* and *wandi* 'DESIDERATIVE' < *AEng.* semimodal 'wanna.' According to Verstraete,
"formally composite" counterfactuals are frequently occurring in Australian languages (2006:72).

This section has predominantly been concerned with the emergence of modal (possibility) readings from a temporal frame adverbial. In §§ 3.2–3.3, we investigated the diachronic emergence and synchronic status of *bambai*'s speaker-attitude/expressive character. This component (*viz.* that *bambai* expresses that the Speaker is apprehensive about or somehow disfavours the instantiation of the prejacent) is modelled as a conventional implicature.

We have seen how a branching-time semantics provides insights into how a single meaning can capture *bambai*'s modal behaviour in contexts where the instantiation of the prejacent is presumed unsettled — *sc.* by modelling *bambai* as a quantifier over metaphysical alternatives. But we have had nothing to say about why the use-conditional component "emerges" only (and exactly) in this set of contexts.

Here, there are again clues from the diachronic account provided above. As discussed in § 3.2, both characterising components *apprehensionality* (its modal and its expressive character) are taken to have developed simultaneously in view of the conventionalisation of implicatures emerging in admonitory contexts. Given that these admonitions obligatorily concern eventualities which are presumed unsettled, the associated expressive content is attached to these "irrealis" uses of *bambai*, presumably extending into counterfactual uses via this abductive meaning change process. In a perhaps related observation, Verstraete suggests that subordinate purposive and apprehensional clauses can be conceived of as unsettled given that the doxastic state of the *subject* (rather than speaker) is diverse with respect to the states of affairs they describe ("non-actualized and inherently unknowable from the agent's perspective" 2006:71).

From a functionalist perspective, this association in unsurprising, given that speaker (or other agent's) attitude is likely to be more discourse relevant when discussing a potential or a hypothetical state of affairs (*i.e.*, describing an eventuality without committing to its truth, see also Verstraete 2006:74-76.)

4.5.3   Apprehensionalisation and the synchronic system

Angelo & Schultze-Berndt (2016) present a number of examples of *bambai* used to modify predications about unsettled states of affairs. Notably, these uses are virtually always constrained to clause-final occurrences of *bambai* and with distinct prosodic properties. In these cases, *bambai* likely performs a related narrative cohesion function rather than behaving a (discourse anaphoric) modifier function as described here. Dutch *straks* displays similar restrictions (66). Negative judgments in (53b) and elsewhere furnish further evidence of this complementary distribution. Otherwise, unsettled predications of (mere temporal) subsequentiality are encoded with other TFAs, including *dregli* < 'directly' or *streidaway* < 'straightaway.' An example is given in (100).

(100) *Wal deibin larramgo wi braja Timathi fri brom det jeil, en if im kaman langa mi **dregli**, wal minbala garra kaman en luk yumob.*

'So they've let our brother Timothy out of jail. If he comes to me in time, then we'll come to see youse.' [KB Hibrus 13:20]

no account given of apparently epistemic readings like ([bos]) — *p.44*

4.6 Conclusion

Part **I** of this dissertation has proposed a formal account for the emergence of apprehensional epistemic markers from temporal frame adverbs, based on the central descriptive observation of Australian Kriol *bambai* made in Angelo & Schultze-Berndt (2016). A meaning change trajectory documented in other literature (Angelo & Schultze-Berndt 2018; Kuteva et al. 2019a,b), this analysis 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 2015a) as applied to the modal domain.

These three chapters have attempted to elucidate the mechanisms through which temporal frame adverbs that originally encoded a relation of temporal sequence come to encode causality, possibility and speaker apprehension by way of semantic reanalysis performed by language users, driven by the generalisation, conventionalisation and semanticisation of conversational 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) temporal and modal expression in human language. Of particular note is the salient role played by (presumptions of) "settledness" (*cf.* Condoravdi 2002; Kaufmann 2005 a.o.) in adjudicating the available readings of relative temporal operators (here exemplified in subsequential TFAs.) That is, the apparent polysemy of *bambai* reported by Angelo & Schultze-Berndt (2016) can be unified by assuming that this item uniformly quantifies over accessible metaphysical alternatives and asserts the instantiation of its prejacent in one such alternative.

As shown, the apprehensional reading of *bambai q* "emerges" when that set of metaphysical alternatives is understood to be diverse with respect to the instantiation of the eventuality described by *q*. A BRANCHING TIME semantics for temporal and modal operators perspicuously captures this property of metaphysical alternatives: namely the presumed settledness of a given index's unique past in contradistinction to branching future and counterfactual possibilities. Reasoning about settledness – and the proper interpretation of *bambai* sentences – crucially involves the retrieval of particular referents (temporal/propositional) from the broader discourse context, whether or not these are syntactically overt. On the basis of this, *bambai* is understood uniformly as a temporomodal operator, triggering modal

(but *not* syntactic) subordination of its prejacent: a finding that can likely be applied to related devices in other languages (*e.g.*, apprehensionals and purposives in addition to other discourse anaphors.)

Further, the apparent cross-linguistic relationship between subsequentiality and the semanticisation of apprehensional use-conditions (*i.e.*, the generalisation of implicatures about speaker attitude previously associated with "admonitory" discourse contexts) likely has implications for our understanding of the development of linguistic markers which express speaker affect and the relation of these SUBJECTIVE experiences to predication about non-actual states of affairs.

Part II

Semantics of the Negative Existential Cycle

Part III

Reality status & the Yolŋu verbal paradigm

Chapter 5

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 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 5.1 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 $\mathcal{L}_2$?

5.0.1 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

Figure 5.1. Two examples of attested meaning change between the aspectual and temporal domains

(a) PERF grams develop into PFV markers (e.g. Condoravdi & 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)
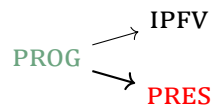
tense marker in Manipuri, whereas Bhat (1999:67ff) shows that in related Mao Naga, it encodes irrealis modality, occurring in a number of modal, counterfactual and evidential constructions.

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.[83] 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 follows:[84]

$$
(101) \quad \llbracket \text{FUT } p \rrbracket^{w,t} = \begin{cases} 1 \leftrightarrow & \forall w'\big[w' \simeq_t w \to \exists t'[t \prec t' \wedge p(w')(t')]\big] \\ 0 \leftrightarrow & \forall w'\big[w' \simeq_t w \to \neg\exists t'[t \prec t' \wedge p(w')(t')]\big] \\ & \text{undefined otherwise} \end{cases}
$$

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. I above. *I.e.*, $\cup \simeq_t w$ is an equivalence class of worlds with identical histories to w

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[83]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.

[84]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.

up to t — equivalent to Kratzer's *metaphysical modal base*.

5.0.2 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.

.

5.0.3 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 5.3. 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 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 5.4).

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?

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 5.4). 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 5.1 below. The table gives examples of the verb paradigm for each of the major Djambarrpuyŋu conjugation classes as described by Wilkinson (2012:306ff) (parentheses give the corresponding verb group number assigned by Lowe (1996) for Gupapuyŋu.)

Figure 5.2. 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.
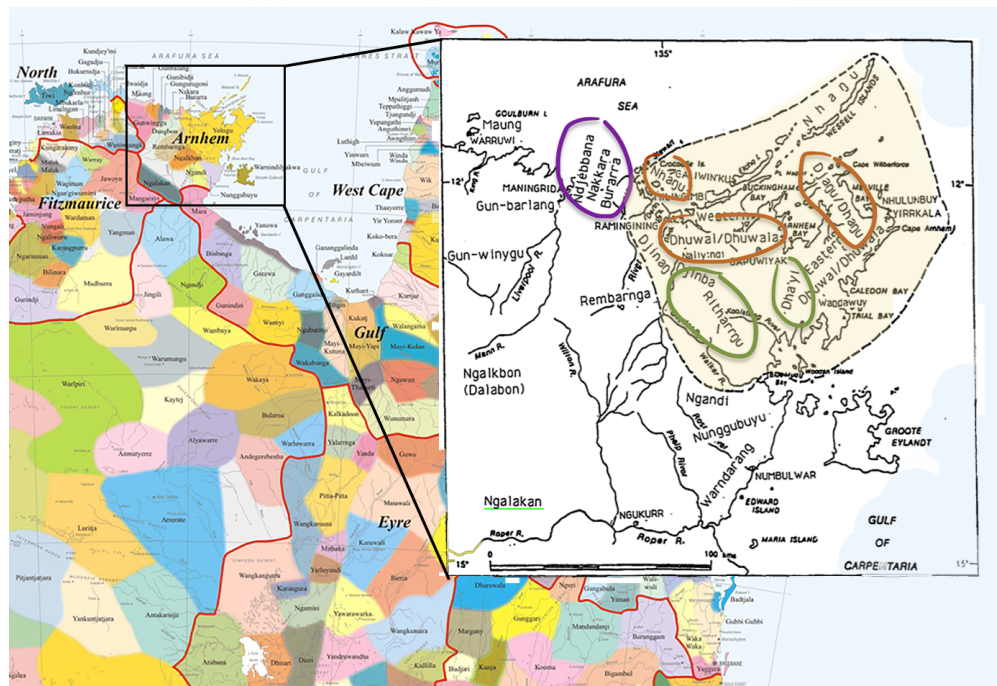
5.1   Verbal inflection in Western Dhuwal(a)

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,[85] in addition to "non-inflecting" and (semi-)irregular cate-

---

[85]Wilkinson appears to identify 14 distinct inflectional patterns in addition to a "non-inflecting" class (1991: 307).

Figure 5.3. A broad phylogenetic classification of Yolŋu subgroups, following Schebeck 2001; Waters 1989; Wilkinson 2012 a.o.

Yolngu Matha

WESTERN — NORTHERN — SOUTHERN

Djinang Djinba Nhaŋu Dhaŋu-Djaŋu *Fig 5.4*

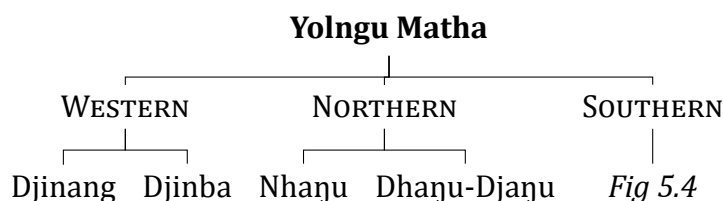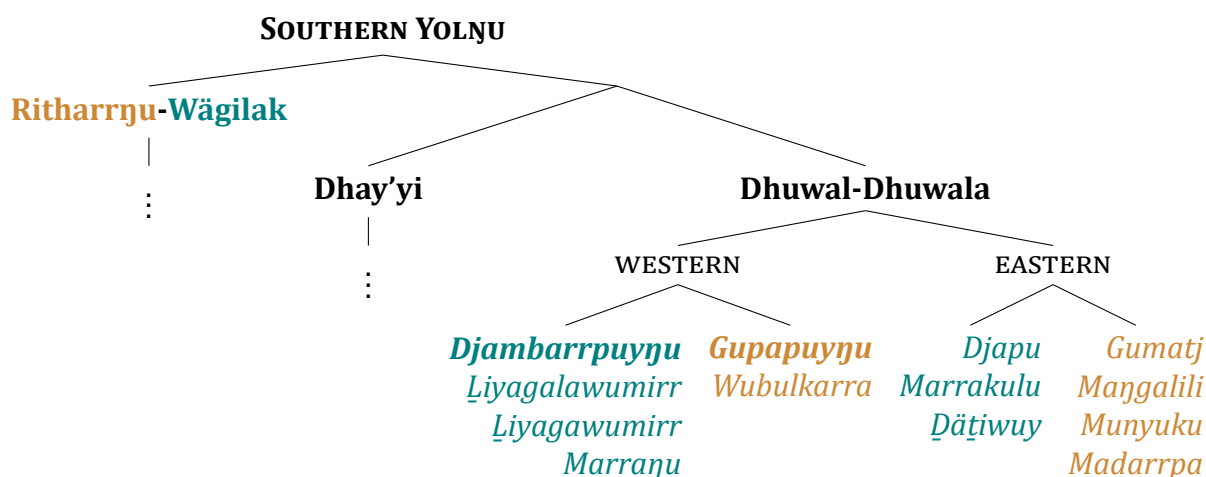**Figure 5.4.** Varieties (dialects) of Dhuwal-Dhuwala in the context of the Southern Yolŋu languages (following Wilkinson 2012:13) with some adaptation following Schebeck 2001:15.

SOUTHERN YOLŊU

Ritharrŋu-Wägilak

Dhay'yi **Dhuwal-Dhuwala**

WESTERN EASTERN

Djambarrpuyŋu *Gupapuyŋu* *Djapu* *Gumatj*
Ḻiyagalawumirr *Wubulkarra* *Marrakulu* *Maŋgalili*
Ḻiyagawumirr *Ḏäṯiwuy* *Munyuku*
Marraŋu *Maḏarrpa*

gories Wilkinson (2012). The paradigm for four WD verbs, taken to be representative of four different conjugation patterns is given in Table 5.1.

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 boldfaced Roman numerals, following the conventions established by Lowe (see also Table 5.2, which adapts Wilkinson's summary of glossing decisions made by other grammarians.)

Figure 5.5 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.

[86]van der Wal 1992 adopts the same labelling scheme as Lowe 1996 although her analysis of the distribution of each category diverges somewhat.

f course I can provide
more detailed
nformation (the
ubclasses) but that feels
ke it'd be better
ppended? The
omparative spreadsheet
ve made/Claire's 2009
tuff has most of this
ormative data...
**ote: Andrea Simms
trongly suggests more
xposition of the formal
aradigm**

Class	Example	I	II	III	IV
$\emptyset_i$ (2)	*marrtji* 'go'	*marrtji*	*marrtji*	*marrtji**n(a)***	*marrtji**nya***
$\emptyset_a$ (3)	*l̠uka* 'consume'	*l̠uk**a***	*l̠uk**i***	*l̠uka**n(a)***	*l̠uka**nha***
$\emptyset_{rr}$ (4)	*wan̠dirr(i)* 'run'	*wan̠di**rr(i)***	*wan̠d**i***	*wan̠di**n(a)***	*wan̠di**nya***
N (5)	*l̠upthun* 'wash'	*l̠upthu**n***	*l̠upthu**rr(u)***	*l̠upthu**rr(una)***	*l̠upthu**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 5.1. 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).

	I	II	III	IV
Wilkinson 2012 djr	First	Second	Third	Fourth
Lowe 1996 guf[86]	Primary	Secondary	Tertiary	Quartenary
Tchekhoff & Zorc 1983 djr	Base	Future	Past$_1$	Past$_2$
Heath 1980c dwu	Pres/Fut	Fut/Imp	Past	Past Remote
Morphy 1983 (Djapu)	Unmarked	Potential	Perfective	Past Non-indicative

Table 5.2. 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).

5.1.1 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.

(102)   *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 & Zorc 1983:856)

    b.   *Ŋarra ga   **l̠uka**   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 (102) 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

ow for both of these
nd i suspect all
ntences in this
ssection) context ought
be modulable s.t. a
on-present reading is
ailable. This
n/should/will be
sted in the field

Figure 5.5. Melanie Wilkinson's (2012:326) schematisation of the complex semantic space associated with each of the four inflectional categories in Djambarrpuyŋu. My colourisation.
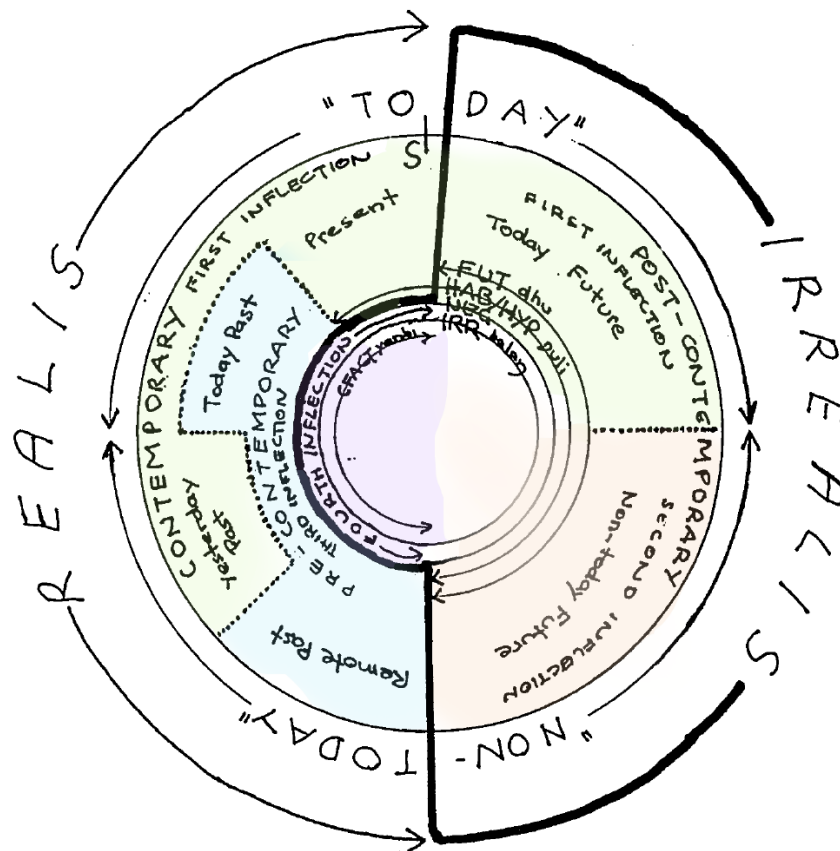
ga — is understood as being contemporaneous with speech time.

(103)   *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 yesterday'   (Wilkinson 2012:343)

In addition to those present-referring sentences in (102), the data in (103) 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 (104) above, show the compatibility of **I**-inflected verb forms and FUTURE temporal reference.

(104)   *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.

5.1.2 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>.

(105)   *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 (105) show how **II** is used in concert with the particle *dhu* to establish future temporal reference. A notable contrast between (104a) and (105a) 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.[87] 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 & Timberlake 1985:204).[88]

(106) 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.

(106)   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 (107). Shown in (107b), negative imperatives (probibitives) are treated identically.[89]

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[87]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.

[88]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.)

[89]Although, as discussed in Ch. II (see also Phillips ms. 'Negation (in Australian Languages)') the use of privative-marked nominals is another common, more "indirect" strategy.

(107)   *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)

    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]

5.1.3   The Tertiary inflection

The Tertiary inflection (**III**) is generally associated with predications about the PAST. An important caveat, however, is that this inflection is infelicitous when describing RECENT events instantiated BEFORE THE CURRENT DAY. The examples in (108) below show the compatibility between **III** and a reference time that is 'earlier today.'

how the compatibility of
I with IPFV by adding
ome examples with
ana. (Perhaps a minimal
air, though this might be
etter placed below.)

(108)   *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]

(108a) shows the compatibility between temporal frame adverbial (TFA) *gäthur(a)* 'today' and **III** in `djr`, which leads to an temporal interpretation of 'earlier today.'[90] 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 (109) show **III** cannot be properly described as a 'hodiernal past.'

(109)   *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 wurkaḍi-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

        '*Wukaḍi* watched it scramble up into a tree, the water goanna.'

                                          (Heath 1980c:193)

Unlike the HODIERNAL temporal interpretations that the sentences in (108) receive, the two sentences in (109) are evaluated to obtain in the 'REMOTE PAST.' In (109a), 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':[91] The cooccurrence of these expressions restricts the predicate being questioned to *a prior dry season.* Conversely, the declarative sentence in (109b) requires no adverbial specification. A REMOTE PAST interpretation arises as a result of the **III** inflection

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[90]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.

[91]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.

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 5.3.

| | | FRAME | |
		today	**before today**
INFL	**I**	now	yesterday/recently
	III	earlier today	long ago

Table 5.3. 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.)

5.1.4 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 (110) and hypothetical/counterfactual descriptions as in (111).

(110) a. *Ŋayi **ŋuli** märra-**nha** ŋunhi meḏuŋ-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]

(111) 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.

5.1.5 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 reproduced as Figure 5.5.

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 5.6. On the basis of these data, a formalisation of the observations made by Glasgow 1964 *et seq.* (those summarised in Table 5.3) can be represented as (112) below, where the domains of each of these inflections are discontinuous intervals.[92] *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.[93]

(112) **A polysemy treatment of the temporal contribution of I and III (to be rejected)**

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[92]NOTE that the disjunctive semantics given in (112) 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.

[93]The basics of this treatment of temporal metricality (or "remoteness") converge to some degree with Cable's 2013 proposal for Gikũyũ tense and Klecha & Bochnak on Luganda tense.

Figure 5.6. 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.
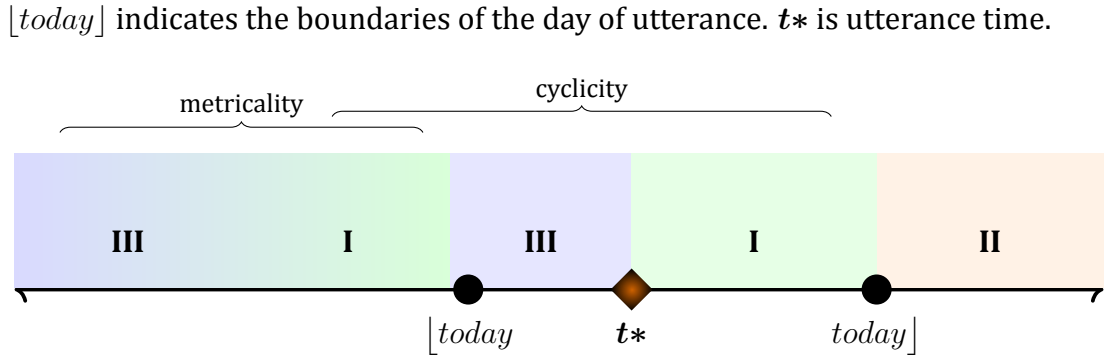
a. $[\![\textbf{I}]\!]^c = \lambda P \lambda t*.\exists t' \begin{cases} t \in today \leftrightarrow t \succeq t* & . P(t') & [\text{NONPAST}] \\ t \prec today \leftrightarrow \mu(t, t*) < s_c & . P(t') & [\text{RECENT PAST}] \end{cases}$

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. $[\![\textbf{III}]\!]^c = \lambda P \lambda t*.\exists t' \begin{cases} t \in today \leftrightarrow t' \prec t* & . P(t') & [\text{TODAY PAST}] \\ t \prec today \leftrightarrow \mu(t', t*) > s_c & . P(t') & [\text{REMOTE PAST}] \end{cases}$

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

5.1.6 Cyclic tense

While the lexical entries given in (112) 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 & Deo 2015).

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

Figure 5.7. Appealing to 'nonfinal instantiation' to provide a unified entry for the temporal reference of **III**
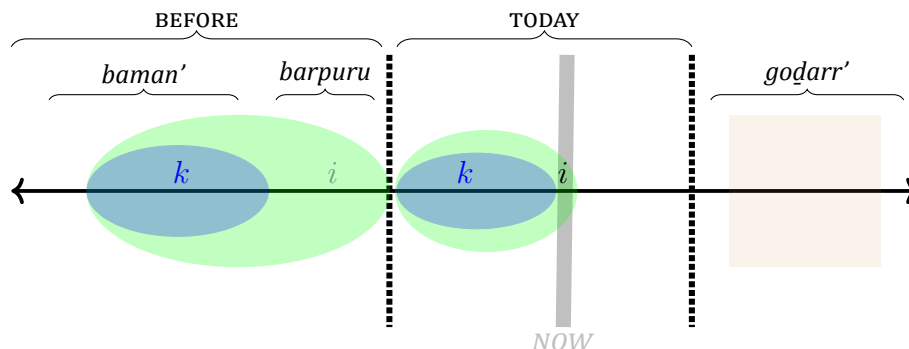
in which the general form is conventionally restricted to the complement of the domain of the specific form (Deo 2015a, citing Horn 1984 & Horn & Abbott 2012).

(113) **An NFI-based attempt at a lexical entry for the THIRD inflection**

$[\![\textbf{III}]\!]^{g,c} = \lambda P \lambda i_c : \exists j [j \underset{\text{FINAL}}{\sqsubseteq} i_c.\text{NFINST}(P, i_c, j)]$

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 $\text{NFINST}(P, i_c, j)$ 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 §5.1.2, however, *dhu*+**II** can also receive a range of modal necessity readings; suggesting a treatment of *dhu* as a circumstantial modal.[94]

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.

5.2   Sentential negation: *yaka* & *bäyŋu*

Discussed in Ch. **??**, 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.

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[94]In view of the range of readings available to *dhu*, van der Wal (1992:110) glosses this particle as MOD.

Descriptively, as shown in the data in (114-115), 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 5.4.

	POLARITY	
	−NEG	+NEG
	I	
	II	**II**
	III	
	IV	**IV**

Table 5.4. Neutralisation of **I** and **III** inflections under negation.

The following examples in (114) 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

(114) *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 (115), 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.

(115)   *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**[96] 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 (114-115), 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 5.6 to give the parallel diagram in Figure 5.8. The differences between these two diagrams schematise the effects of negation on the licensing of particular WD inflectional categories.

Figure 5.8. Apparent interactions between temporal relations and reality status in Djambarrpuyŋu: cyclicty and metricality under negation.
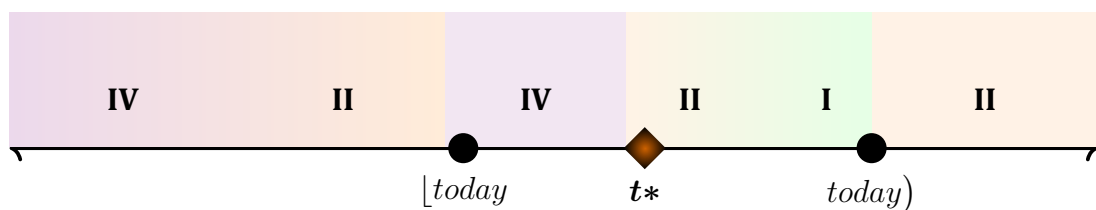
Note additionally the surprising occurrence of a **I**-marked interval in Fig 5.8. Predications about the SAME-DAY FUTURE — which receive **I**-marking in positive sentences — appear to be "immune" to the neutralising effects of negation, exemplified by data including (116). We return to a discussion of this fact §5.3.5.

(116) 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]

5.3   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'.[97] As 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.

## 5.3.1   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 I). 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 2013b, 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.[98]

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[97]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.

[98]Note that these frameworks normally take indices to represent world-time pairs. I assume that

Figure 5.9. A branching times frame following von Prince (e.g., 2019:591). Vertically aligned indices are taken to index the same time.
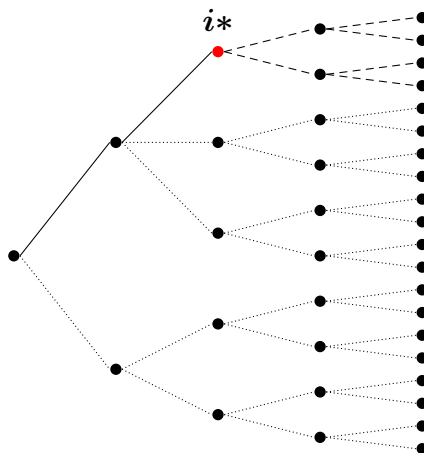
Von Prince (2017, 2019) establishes a formal trichotomy between the ACTUAL, POTENTIAL and COUNTERFACTUAL domains by appealing to this framework. This is reproduced in (117).

(117) 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. I: $\{w' \mid w \approx_t w\}$.

    b. The POTENTIAL (future) = $\{i \mid i \succ i*\}$

    c. The COUNTERFACTUAL = $\{i \mid i$ is unordered w/r/t $i*\}$

5.3.2 Semantics of modal particles

Shown in §5.1.2, *dhu* 'FUT' occurs in sentences with future temporal reference (118). Relatedly, the data in (119) 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.

(118) ***dhu* 'FUT' encoding future tense with I- and II-inflections**

---

this model can be extended relatively straightforwardly to capture interval semantic notions (Bennett & Partee 2004; Dowty 1982; Landman 1991:e.g. a.o.).

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]

(119) ***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 5.10. (In)compatibility of modal particle *dhu* 'FUT' with temporal reference & inflectional category.
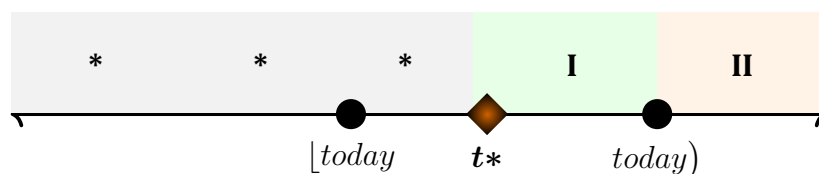
On the basis of this range of usage, we might adopt the following lexical entry for *dhu*, treating this particle as a modal expression and adapting the meaning of *will* provided in Condoravdi (2002, 2003). The function BEST selects the best worlds in a circumstantial modal base, according to a set 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.).

(120) $\llbracket dhu \rrbracket = \lambda o \lambda m \lambda P \lambda i : \forall b \ni i \big[b \in \underset{o}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(i)} \big) \to \exists i' \in b [i' \succeq i \wedge \text{AT}(P, i)] \big]$

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.[99]

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 121) or **IV** (shown in 122).

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.

(121) **balaŋ(u) 'IRR' and II-inflection**

    a. *ŋarra* **balaŋu** *(bäynha)*[101]*dhiŋg-**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]

(122) **balaŋ(u) 'IRR' and IV-inflection**

    a. *nhe* **balaŋu** *malkthu-**nha***
        2s   **IRR**   accompany-**IV**

        'you should/would have gone with (him).'   [DG 20190413]

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[99]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:
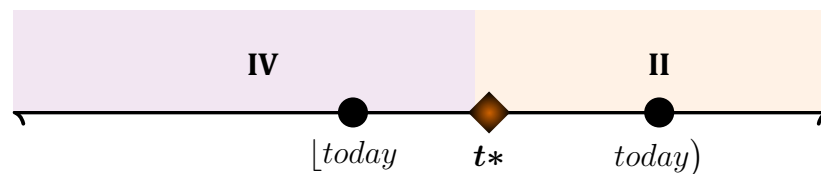
$$\text{INST}(P, w, t) = \exists e[P(e) \wedge \tau(e, w) \sqsubseteq t]$$

See also Condoravdi (2003); Condoravdi & Deo (2015) a.o.

[101]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 5.11. 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 (123) 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.

(123) $\llbracket balaŋ(u) \rrbracket = \lambda o \lambda m \lambda P \lambda i. \exists b \ni i' \big[b \in \underset{o}{\text{BEST}} \big(\cap \underset{\text{CIRC}}{m(i)} \big) \wedge \exists i' \succeq i \wedge \text{AT}(P, i) \big]$
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 tense, 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 (122c), 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 (124).

(124)   *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]

$$\llbracket (122c) \rrbracket^c \text{ iff } \exists i', i'' \big[i' \prec i_c \wedge \exists b \ni i'[b \in \text{MB}(i') \wedge i'' \succ i' \wedge \llbracket (122c) \rrbracket^{i''})] \big]$$

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.

5.3.3   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 (perhaps also from) MODALITY (see Bowern 1998; Chafe 1995; Elliott 2000; McGregor & 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 eventualities that correspond with observed/observable reality versus a description of a hypothetical, imagined, non-actualised eventuality. Consequently, for its defenders, IRREALIS can be conceived of as whatever semantical concept might be taken to collect: future, modalised and conditional predications and imperatives, in addition (for some languages) to negative and habitual predications and interrogatives (see also Givón 1994; Palmer 2001; Plungian 2005).[102]

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 "binary morphological distinction" as well as the apparent heterogeneity of these categories 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 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 & Rubinstein (2012:467) make a parallel observation regarding a potential

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[102]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).

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).[103] 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.[104] On the basis of this generalisation, Giannakidou (2016), Giannakidou & 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 125.)

(125) 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 & 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.

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[103]Chung & Timberlake (1985:238) explicitly suggest an equivalence between REALIS and the INDICATIVE. See also Matthewson 2010 on the St̓át̓imcets "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 & Sansò 2016:169*ff*, *cf.* Matthewson (2010:13, fn 9) who takes issue with this criterion).

[104]Portner (2018) takes comparison-based analyses to be exemplified in Anand & Hacquard 2013; Giorgi & Pianesi 1997; Portner & Rubinstein 2012; Villalta 2008 and truth-based analyses to include Farkas 1992, 2003; Giannakidou 2011; Huntley 1984; Portner 1997; Quer 2001. Although as noted here, for him the "current state of the art in mood semantics" appears to unite/"treat as correct" both of these observations.

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 (126) and spelled out in the section below.

(126) **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[105]

5.3.3.1   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)[106] European languages. In his comparison of IRREALIS and SUBJUNCTIVE as putative grammatical categories, Palmer (2001:186) in part attributes these distinct metalinguistic conventions to 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.

(127) 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.

---

[105]See also the "locality of binding" principle in Percus 2000:201, Hacquard 2010:99.

[106]As mentioned Matthewson (2010) describes mood morphology in Sťáťimcets th.at she argues is a realisation of a SBJV category.

(128) 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.'

c. From Djr bible Mäk 6:19.

Bala   ŋayiny   ŋunhi miyalktja   ŋoy-dhärra-na-n   nhanŋu
MVTAWY 3s.PROM ENDO woman.PROM soul-stand-III-SEQ 3s.DAT

   Djon-gu-ny,   ga   djälthinany   ŋayi
   John-DAT-PROM and want-INCH-III3s IPFV.IIIkill-IV-DAT-SEQ

   gan   bunharawnha   nhanŋu murrkay'kunharawnha
   3s.DAT hard-CAUS.IV.DAT.SEQ EMPH   but

   yan, yurr bäyŋu.
   NEGQ

   'So that woman was upset with John and she was desirous of his violent death.'

Similarly surprising, as with embedding predicates the epistemic adverb *mak(u)* is also completely invisible to the inflectional paradigm.

(129) 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.

5.3.3.2 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 (130).[107]

(130)   Denotations for WD aspectual operators

    a. $[\![\, GA \,]\!] = \lambda P_{\langle \varepsilon, st \rangle} \lambda i. \exists e[P(e) \wedge \tau(e) \sqsupset i]$

    b. $[\![\text{PFV}]\!] = \lambda P_{\langle \varepsilon, st \rangle} \lambda i. \exists e[P(e) \wedge \tau(e) \sqsubset i]$

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 120 & 123 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 & Menéndez-Benito 2003; Hacquard 2010; Kaufmann 2005) which takes an inflected proposition as its sister.[108] 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 $\cap \alpha$.

(131)   **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

---

[107]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).

[108]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.

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.

(132) **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. $[\![maku]\!]([\![\textsc{assert}]\!]) = \lambda i.f_c(\cap \sim_\alpha i)$

With these assumptions in place, we can propose lexical entries for the verbal inflections.

5.3.3.3   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 112, replicated in 133).

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 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.

(133) a. $[\![\mathbf{II}]\!] = \lambda P_{\langle s,t\rangle}\lambda i_s : \exists i' \in \cap \approx_i \wedge \neg P(i').P(i)$
       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. $[\![\mathbf{IV}]\!] = \lambda P_{\langle s,t\rangle}\lambda i_s : \exists i' \in \cap \approx_i \wedge \neg P(i') \wedge \exists j \sqsubseteq_{\text{final}} i.\textsc{nfinst}(P,i,j)$
       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
>
> (134) 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'

5.3.3.4 The proposal in action

(135) *maku ŋarra dhu gi   nhäŋu mukulnha*
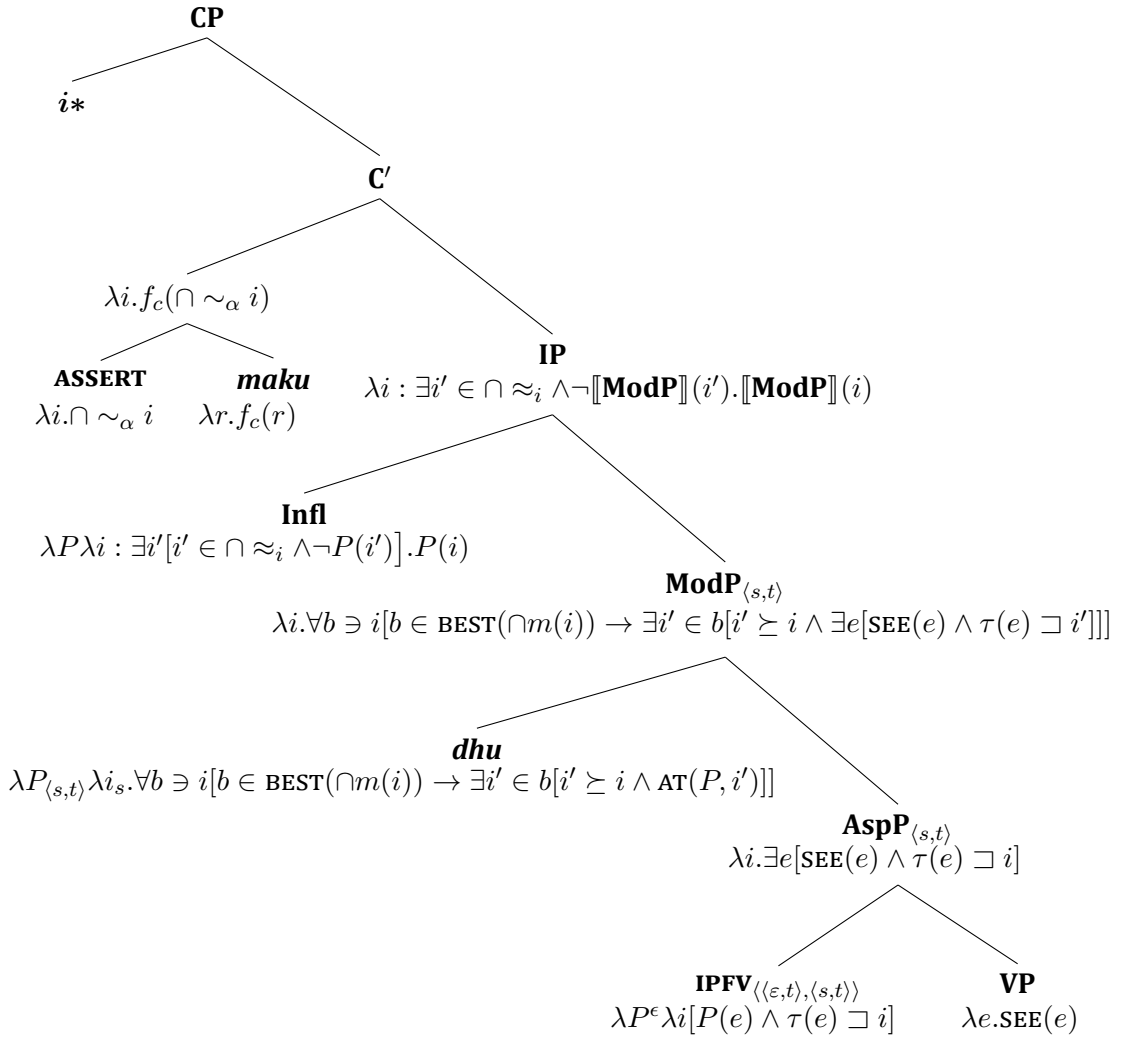   EPIST 1s   FUT IPFV.**II** see.**II** aunt.ACC

'Maybe I'll be seeing aunty'

$$\pi : \exists i' \in \cap \approx_{i*} \wedge \neg \forall b \ni i' \left[b \in \underset{o}{\text{BEST}}\big(\cap \text{CIRC}(i)\big) \rightarrow \exists i'' \in b \big[i'' \succeq i' \wedge \exists e[\text{SEE}(e) \wedge \tau(e) \sqsupset i'']\big] \right]$$

Presupposes that at some metaphysical alternative to $i*$, *ŋarra dhu* NHÄ- *mukulnha* 'I'll be seeing my aunt' doesn't hold.

$$f_c(\cap \sim_{Spkr} i*) \vDash \forall b \ni i * \left[b \in \underset{o}{\text{BEST}}\big(\cap \text{CIRC}(i)\big) \rightarrow \exists i' \in b \big[i' \succeq i* \wedge \exists e[\text{SEE}(e) \wedge \tau(e) \sqsupset i']\big] \right]$$

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
$\lambda i : \exists i' \in \cap \approx_i \wedge \neg[\![\mathbf{ModP}]\!](i').[\![\mathbf{ModP}]\!](i)$

Infl
$\lambda P\lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')].P(i)$

$\mathbf{ModP}_{\langle s,t\rangle}$
$\lambda i.\forall b \ni i[b \in \textsc{best}(\cap m(i)) \rightarrow \exists i' \in b[i' \succeq i \wedge \exists e[\textsc{see}(e) \wedge \tau(e) \sqsupset i']]]$

dhu
$\lambda P_{\langle s,t\rangle}\lambda i_s.\forall b \ni i[b \in \textsc{best}(\cap m(i)) \rightarrow \exists i' \in b[i' \succeq i \wedge \textsc{at}(P,i')]]$

$\mathbf{AspP}_{\langle s,t\rangle}$
$\lambda i.\exists e[\textsc{see}(e) \wedge \tau(e) \sqsupset i]$

$\mathbf{IPFV}_{\langle\langle \varepsilon,t\rangle,\langle s,t\rangle\rangle}$
$\lambda P^\epsilon \lambda i[P(e) \wedge \tau(e) \sqsupset i]$

VP
$\lambda e.\textsc{see}(e)$

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 Ø much lower down in the derivation.

5.3.4   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 II) to propose a modal semantics for these negative particles.

As in Ch. II, 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.)[109] This is shown in (136)

(136) $[\![\textsc{neg}]\!]^c = \lambda P_{\langle s,t\rangle}\lambda i.\nexists w'[w' \in \cap\mathbb{C}(w) \rightarrow \textsc{at}(P,i)]$

The entry for NEG given in (136) 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

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[109]Note that this diverges from Krifka (2015, 2016) where Daakie's REALIS NEGATION and POTEN-TIALIS NEGATION (*ne* and *(te)re*) are both treated as "modalit[ies] in [their] own right[s]."

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 (137) below (compare also Figs 5.8/5.11 above).

(137)   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]

   The three predicates in (137) — 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.

5.3.5   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.

(138)   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"[110] While the WD same-day future construction is not technically a morphosyntactic futurate,[111] analysis of these devices can shed potential insight on the (functional) motivation for this phenomenon.

The surprising contrast between (138a) 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.[112]) 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."

5.4   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 5.2 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.[113] Additionally, Melanie Wilkinson observes that these effects appear to be variable in the Djambarrpuyŋu varieties spoken further east in Gali-

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[110]Kaufmann (2002) cites commentary including Comrie (1985); Dowty (1979) among numerous others on this distinction. See also Copley (2008:note 1)

[111]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.

[112]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.

[113]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.

win'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.

5.4.1 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 (139-141). Heath notes that the Ritharrŋu imperatives are formally identical to corresponding future predications (1980a:76) — this is shown in (140).

(139)   ***nhäma(-'ma')*** *rra yakuthi mukulnha*   **[PRESENT]**
       see.**I**-**NEG**   1s   now   aunt.ACC

       'I'm (not) looking at my aunt currently.'   [RN 20190520]

(140)   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)

       c.   *yaka nhe baŋguḻ'-yu***rru***
           NEG   2s   return-VBLZR.**II**

           'Don't come/go back!'   (Heath 1980a:76)

(141)   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.

(142) 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**)[114] categories appear to be variable in terms of modal force. This is indicated by the examples in (Heath's translations, 143) and (144) below.

(143) 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.'

---

[114]For Bowern (2009), the Ritharrŋu PstPot is retained from a distinct inflectional category, reconstructable 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.

(144) 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

       djul̲-kurru?
       road-PERG

       'Should we go to Numbulwar and (should we) get food or (continue) along the road?'   [PW 20190520 25']

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 117, *p.*117 above). This is summarised in (145): 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.

(145) **Domains of the four inflections in Ritharrŋu-Wägilak**
    $[\![\mathbf{I}]\!]^{i*}$ 'PRES' : ACTUAL PRESENT $\{i \mid i = i*\}$
    $[\![\mathbf{II}]\!]^{i*}$ 'FUT' : POTENTIAL $\{i \mid i \succ i*\}$
    $[\![\mathbf{III}]\!]^{i*}$ 'PST' : ACTUAL PAST $\{i \mid i \prec i*\}$
    $[\![\mathbf{V}]\!]^{i*}$ '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.

5.4.2 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).[115] Similarly, with the exception of the Maningrida family (Burarra, Gun-narpta Gurrgoni, Nakkara Ndjebanna), I am not aware of any languages other than the (geographically) western varieties of Yolŋu Matha (Djinaŋ, Djinba and WD) that exhibit the distinctive cyclic tense phenomenon briefly described earlier.[116] 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.[117,118]

A potential hypothesis underpinning this change is that, with the advent of cyclic temporal reference, I — the erstwhile PRESENT tense — comes to fail to reliably encode a distinction 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 perfectivity.) 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 responsible 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 irreality 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

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[115]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 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.

[116]Comrie (1985:75) refers to the description of Burarra tense marking (Glasgow 1964) as his sole example of "cyclic tense."

[117]Green (2003) shows that these languages represent a single subgrouping within a larger "Arnhem" family.

[118]An alternative hypothesis — "western Yolŋu as a relic area" — would be that an ancestral form of Yolŋu Matha developed these features as a contact phenomenon that were subsequently/gradually lost in varieties spoken in Eastern *Yolŋuw wäŋa*. Further work is required to satisfactorily distinguish between these alternatives.

facts of the language, then, sentential negators (*viz. yaka, bäyŋu*) are reanalysed as predicate modifiers of the same type as (other) modal operators which license the irrealis mood inflections.

5.5   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 (146).

(146)   **Semantics for the inflectional paradigm of WD**

a. $[\![\text{I}]\!]^{i*} = \lambda P \lambda i.P(i)$
$[\![\text{II}]\!]^{i*} = \lambda P \lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')].P(i)$
$[\![\text{III}]\!]^{i*} = \lambda P \lambda i : \exists j[j \sqsubseteq_{\text{FINAL}} i.\text{NFINST}(P, i, j)]$
$[\![\text{IV}]\!]^{i*} = \lambda P \lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')] \wedge \exists j[j \sqsubseteq_{\text{FINAL}} i.\text{NFINST}(P, i, j)]$

b.

	−IRR	+IRR
−NFINST	I	II
+NFINST	III	IV

In a nutshell, the proposal laid out in (146) 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[119] and the development of a future/nonfuture tense distinction:[120] 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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[119]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).

[120]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 § 5.3.3, 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,[121] 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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[121]Though as stated above Matthewson (2010:13) argues that the relevant mood morphology in St̓át̓imcets 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.

Part I 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 **??** 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 & 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 **??**, 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*.)

Part II 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, Part III 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 distribution of each of WD's four inflectional categories is proposed. As in Part II, 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 de-

veloping 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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