DOCTORAL DISSERTATION

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

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Chapter 1

Introduction

Dᴵˢᴾᴸᴬᴄᴱᴹᴱᴺᵀ 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 ᵀᴱᴹᴾᴼᴿᴬᴸ and ᴹᴼᴅᴬᴸ 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 ᴬᴹᴾᴴᴵᴄᴴᴿᴼᴺᴵᴄ ᴾᴿᴼᴳᴿᴬᴹ — 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. 2019a; 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 semantic 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. $[\![\square\varphi]\!]^w = 1 \leftrightarrow \forall w'[w\mathcal{R}w' \to [\![\varphi]\!]^{w'}]$
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.

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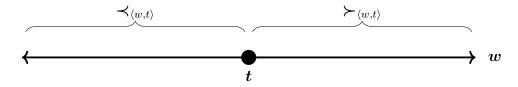
A binary relation (*e.g.*, $\prec$ over $\mathcal{T}$) is:

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

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

Figure 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 Præbestinatione* (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 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 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 — (perhaps more familiar in much of the linguistic semantics literature and) adopted in Condoravdi (2002); Kaufmann (2005); Klecha (2016) a.o., see Kaufmann, Condoravdi & Harizanov (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.)

(3)   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):

(4)   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 ($\bigcup_{b \ni i} b$). This is closely related to the notion of a **metaphysical modal base**, notated throughout as $\cap\approx_i$, which should be conceived of as comprising the set of branches that represent all the metaphysical/historical

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[8]This extensibility is also suggested by Dowty (1977) and Tedeschi (1981), who 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: $\exists b[\imath \sqsubset b \wedge \forall i, i', i'' \in b[i, i'' \in b \wedge i \prec i' \prec i'' \rightarrow i' \in \imath]]$
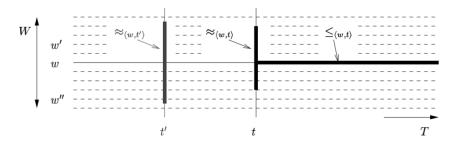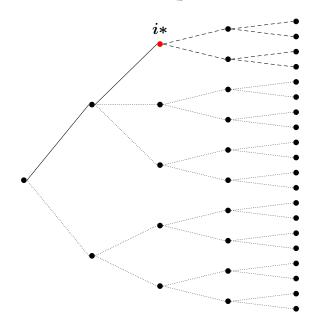
Figure 2. Two-dimensional modal logic. The thick lines represent sets of individual indices accessible from $\langle w,t\rangle$ by the modal relation $\approx$ (vertical) and the temporal relation [$\preccurlyeq$] (horizontal). For example, the worlds accessible via $\approx$ from w and t are also accessible at t', but not necessarily vice versa (diagram and caption from Kaufmann, Condoravdi & Harizanov 2006:95)

Figure 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.)

alternatives to a given index i (see (7) for further explication of this important phenomenon.)[9]

I'll sometimes also use the notation ^{b}i in quantified expressions as a shorthand restricting the domain of $\mathcal{I}$ to a specified branch — *i.e.*, that subset of $\mathcal{I}$: $\{i \in \mathcal{I} \mid i \in b\}$.[10]

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).[11] 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,[12,13]

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[9]See also Rumberg (2016b) for an discussion of the differences between logical, metaphysical and physical definitions of *possibility* (the alethic modalities.)

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

[11]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*).

[12]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.

[13]This formalism, related to the alternativeness relation ($\approx$) of Thomason (1984:149), has a similar outcome/motivation to the "Clock" invoked in Dowty (1977); Thomason (1981) and, in later

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:

(5) (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 $\qquad\qquad\qquad\quad i \succsim j \Leftrightarrow \exists j'[j' \simeq j \wedge i \succ j'])$

   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.

(6) **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 (7) which will permit for a formal definition of settledness as in (8).

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work, 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.* $\bigcirc$ — 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.* $\approx\underset{\text{def}}{=} \lambda i \lambda i'.d(i) = d(i')$.

(7) **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.
        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 (7b) 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 7b' below.)

(7) 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 (8) below.[14]

(8) **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.[15]

Further developing this notion, Condoravdi (2002:82) gives a definition of "presumed settledness" — a property of predicates (see also Kaufmann 2002, 2005).

---

[14]That is *settledness* is effectively the union of historical necessity and "historical impossibility."

[15]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.

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 (10).[16]

(10)   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, see Fagin et al. 1995; Kaufmann 2010; Stalnaker 2002.)

       $cg_c(\varphi) = \varphi \in \bigcup_{i=1}^{\infty} CB_c^i$ 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**

       $\forall w' : w' \in \cap cg, \forall w'' : w' \approx_{t_0} w'' :$
       $AT\big([t*,\_],w',P\big) \leftrightarrow AT\big([t*,\_],w'',P\big)$ (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. 16).

Once again, and drawing on the relations described above, this relation between context set and property (8) can be recast in a branching-time model as in (8′); again $i* \in \mathcal{I}$ represents the evaluation/reference index (analogous to $\langle w_0, t_0 \rangle$ above).

---

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

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.

(8′) **Settledness-at-$i*$ for P** (branching times)
$\forall b_1, b_2 \in \cap\approx_{i*} : \exists^{b_1} i' \exists^{b_2} i'' \big[i' \simeq i'' \wedge [P(i') \leftrightarrow P(i'')] \big]$
A property P is settled at an evaluation index $i*$ **iff** for any arbitrary pair branches b_1, b_2 that represent metaphysical alternatives to $i*$, there is a pair of copresent indices i', i'' such that P holds at i' iff it also holds at i'' (that is, P is identically determined at co-present alternative indices.)

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; von Prince et al. forthcoming) establishes a ~~neat~~ formal trichotomy between the ACTUAL, PO-TENTIAL 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 (11).

(11)   Given a contextually defined ACTUAL PRESENT $(i* \doteq \langle w*, t* \rangle)$, $\mathcal{I}$ 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 = $\{i \mid i \text{ is unordered by } \prec \text{ w/r/t } i*\}$
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 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 (12) below.

(12)   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 (12a-b) arise as a consequence of different **restrictions** that are made over the set of possible worlds. In effect, the deontic reading (12a) 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 (12b) 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 (13).

(13)   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 lin-

guistic 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 (14) (adapted from Kaufmann, Condoravdi & Harizanov 2006).

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

(14) 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 $m(w)$: 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 $\text{BEST}_{o(w)}$ which takes a set of worlds and returns the "best" worlds as determined by an ordering source o (*i.e.*, those worlds in m best conforming to the ideal contained in o as in (15) adapted from von Fintel & Heim 2011: 61.)[17]

(15)   The best worlds in a modal base m according to an ordering $\underset{o(w)}{\prec}$
       $$\underset{o(w)}{\text{BEST}}\big((\cap m(w))\big) = \{w \in \cap m(w) \mid \neg\exists w'[w' \underset{o(w)}{\prec} w]\}$$

(16)   *must* relativised to two conversational backgrounds (modal base f and ordering source o)
       $$[\![must]\!]^{o,m} = \lambda p \lambda w.\forall w'[w' \in \underset{o(w)}{\text{BEST}}(\cap m(w)) \to w' \in p]$$
       must p is true in w, given conversational backgrounds $\langle m, o \rangle$ if p is in true in all the worlds that are best conforming to $o(w)$ in $\cap m(w)$

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.

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[17]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).

This involves recasting conversational backgrounds — sets of propositions — as functions from indices to sets of possible branches of $\mathcal{I}$. A deontic conversational background $\textsc{deont}(i)$, 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 $\textsc{b}_i$ — i.e. a subset of those branches that run through i.

Proposals for Branching-theoretic lexical entries for the English modal auxiliaries in (13) are modified accordingly below.[18]

(13′)   Proposed modification to semantics for modal auxiliaries (13) for $\mathfrak{T}$-frames.

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

    b. $[\![can]\!]^m = \lambda p \lambda i. \exists b \ni i[b \in \cap m(i) \wedge \exists i' : i' \in b \wedge p(i')]$
       can p is true if, there is some branch running through i, which is selected by the modal base $m(i)$ 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 St̓át̓imcets (Salish: British Columbia), deontic and epistemic modal clitics are separately lexified whereas quantificational force is contextually determined (*viz. ka* 'IRR', $k^{\hspace{-1pt}^{ʔ}}a$ '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 (17).

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

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[18]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.

Building on other insight on usage of possibility modals (notably Klinedinst 2007), for Rullmann et al. (2008) the "appearance" of force variability in St̓át̓imcets modals is a result of the relative size of the subset of the modal base picked out by f_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_c seems to be actually equivalent to deploying an ordering source as described above (and 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, additional 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 2008, 2016).

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.[19] 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.

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

1.4   The linguistic ecology of Arnhem Land

The past few decades have seen mounting interest in the deployment of historical/comparative linguistic methods for uncovering linguistic and anthropological prehistory of the continent (see McConvell & Bowern 2011 for an overview.) Some three hundred Australian languages have been reconstructed to a single family, Pama-Nyungan, spoken across mainland Australia (approx. 90% of its area) except for some regions in the north of the continent (Bowern 2021; Dixon 1980). The most recent common ancestor of these languages (*sc. proto-Pama-Nyungan*) is estimated to have been spoken roughly five to seven thousand years before present (5–7Kya, during the mid-Holocene/Northgrippian age: a comparable timedepth to Indo-European), originating in the "Gulf Plains" bioregion around the Gulf of Carpentaria (Bouckaert et al. (2018), supporting earlier work, incl. Hale 1964 a.o.). Many of these languages remain underdescribed (extinct, or recorded in "salvage"-oriented documentatary work.) As a consequence, they are by and large poorly integrated into (model-)theoretic treatments of cross-linguistic semantics (as suggested in § 1 above, see also Nordlinger 2021 for an overview of the impact of theoretical treatments of Australian language data.)

Multilingualism   Arnhem land — detail provided in figure 4b — is a linguistically diverse region of Australia's "Top End." Relatively isolated (several hundred kilometers east of Darwin), the population is roughly 85% indigenous, home to a number of ethnolinguistic groups. Owing to the relative isolation of northern Australian communities, 12 of the 20 aboriginal languages judged as "strong" are spoken in the Northern Territory (Schmidt 1990:3). Language families spoken in Arnhem Land include Yolŋu (Pama-Nyungan) in the northeast, surrounded by a number of non-Pama-Nyungan isolates as well as the Iwaidjan, Maningrida/Burarran, Gunwinyguan, Rembarngic, Marran and SE Arnhem families; the constituency of these groupings and the relations between them are still uncertain (see *e.g.*, Green 2003 for the proto-Arnhem proposal.) Assessing these relations is complicated by the especially high degree of language contact and endemic "personal multilingualism" that characterise Arnhem Land speech communities, patterns reinforced by universal moiety/clan exogamy (Evans 2001; McConvell & Bowern 2011, see also Wilkinson 2012; Williams 1986:Ch. 1 for a discussion of clan exogamy in Yolŋu society). Children are raised in multilingual settings and continue acquiring new languages throughout their life.

Endangerment & displacement   As suggested above, the effects of European invasion of the Australian continent in the eighteenth century were catastrophic for Aboriginal Australia; one consequence of this being the fragmentation of traditional language ecologies. According to Schmidt (1990:1), two-thirds of Australian languages spoken at the time of contact (which she, perhaps conservatively, num-

bers as 250) are no longer spoken <mark>and estimates</mark> that only one in every ten Aboriginal people speaks their indigenous language. Westward frontier expansion had the effect of bringing Aboriginal pidgin varieties into Arnhem Land, which subsequently developed into a creole language. With varieties estimated to be spoken by more than 30,000 people across Northern Australia, Australian Kriol is understood to have first emerged as a community language in the Roper Gulf region (SE Arnhem), close to the contemporary community of Ngukurr (*e.g.*, Harris 1986, see also Phillips 2011 for an overview.) Kriol continues to be the first language of the vast majority of Ngukurr's indigenous population; with a couple of exceptions, most of the traditional Australian languages of the area are now critically endangered (see also chapter 2.)

Additional background information on the sociolinguistic context of the language varieties under investigation is provided in each chapter.

1.5 Data & glossing conventions

orthographic stuff

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 abbreviations listed on *pg.* <mark>**??**</mark>). I adopt standard orthographic conventions for Australian languages and for Yolŋu Matha (including the standardisation of other sources to Yolŋu spelling conventions.) These writing systems are derived from English orthography; digraphs and diacritics which may be unfamiliar or otherwise ambiguous to the reader and their IPA correspondences are tabulated below (see also, *e.g.*, Dixon 2002a:549 for an overview of "canonical" phoneme inventories in Australian Language and Wilkinson 2012:41,44 for the Yolŋu orthography, originally proposed by Beulah Lowe.)

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. An exception to this is the Djambarrpuyŋu and Kriol bible translations, abbreviated as DB and KB respectively and accompanied by a cross-reference to the name of the BOOK as well as the chapter and verse numbers (*e.g.* [KB *Jen.* 1:3]). Each of these texts is online at https://aboriginalbibles.org.au/, made publicly available by The Bible Society of Australia (2007, 2008).

field methods
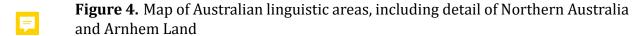
Where data is sourced from original fieldwork, the consultant's initials and date of recording are provided in square brackets — *e.g.,* [JP 20201216].

Table 1. Correspondences between [IPA], *Australianist* and *Yolŋu* orthographic conventions adopted in the dissertation
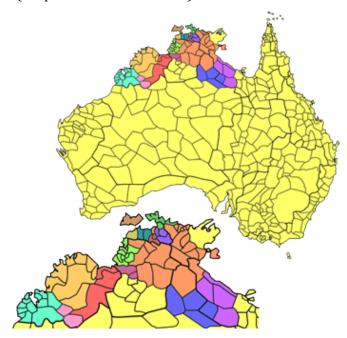
IPA	Australianist	Yolŋu
[ɭ]	*rl*	*l̠*
[ɳ]	*rn*	*n̠*
[ʈ]	*rt*	*t̠*
[ɖ]	*rd*	*d̠*
[ɻ]	*r*	*r*
[ɾ]	*rr*	*rr*
[t̪]	*th*	
[d̪]	*dh*	
[n̪]	*nh*	
[ŋ]	*ng*	*ŋ*
[ɟ]	*j/dy*	*dj*
[ʔ]		*ˀ*
[c]	*ch/ty*	*tj*
[aː]	*aa*	*ä*
[iː]	*ii*	*e*
[uː]	*uu*	*o*

Table 2. Consultants
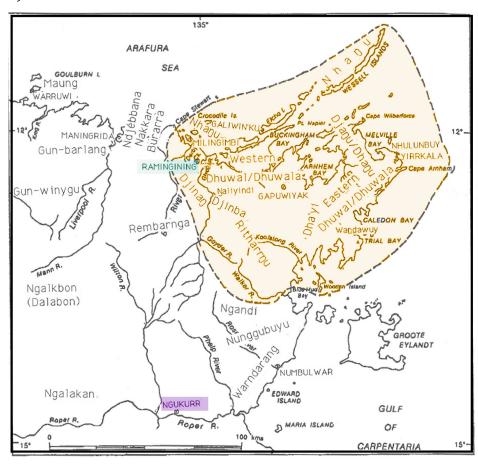
Ramingiṉiŋ		**Ngukurr**	
AW	Albert Waninymarr	AJ	Angelina Joshua
DB	Daphne Banyawarra	GT	Grant Thompson
DhG	Dhuḻumburrk Gaykamaŋu †	RŊ	Roy Ŋatilma
MG	Mätjarra Garrawurra	DW	David Wilfred

Figure 4. Map of Australian linguistic areas, including detail of Northern Australia and Arnhem Land

(a) Australian language families: Pama-Nyungan is shaded yellow, with detail of diverse Northern Australia (adapted from Dixon 2002a)

(b) Languages of Arnhem Land. *Yolŋu*-speaking area is shaded. Primary data in this dissertation was elicited in Ramingining & Ngukurr (highlighted). Map adapted from Wilkinson (2012:2).

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 (18):

(18)   **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 (18a) roughly translates to 'soon, in a minute', this reading is infelicitous in (18b), 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.

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

    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.[21,22] Clark takes this shared feature (along with other cognates) to be a retention, evincing a shared history between these varieties (see also fn 23 below.)

    As shown in 18, Australian Kriol (hereafter Kriol *simpliciter*) has retained this function: below, in (20), *bambai* serves to encode a temporal relation between the

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[20]Troy (1994) collates a corpus of n texts, predominantly from settler journals. (19a,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.

[21]*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.

[22]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'.

(20) *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 (20), *bambai* appears to have an additional, ostensibly distinct function as shown in (21) below.[23]

(21) **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 (21), 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 (20). 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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[23]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 (21'). 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.

(21') 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 epistemics' 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 conside͵r how *bambai* is interpreted in view of the relationship between these two propositions: specifically how the prejacent of *bambai* is **modally subordinate** to material accommodated in a discourse context (§3.1). In view of these facts, we develop an account of the diachronic emergence of apprehensionality and the status of the expressive component of these items' meaning.

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 negative 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,[24] Lichtenberk (1995), Angelo & Schultze-Berndt (2016, 2018) and Vuillermet (2018) represent the few attempts to describe these markers as a grammatical category).[25]

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 prejacent 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 (22), Lichtenberk distinguishes: (a) **apprehensive-epistemic** function, (b) a **fear** function and (c-d) **precautioning** functions.

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

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[24]The terms TIMITIVE and particularly EVITATIVE, a.o. are also used in these descriptive literatures.

[25]An edited collection on *Apprehensional constructions*, edited by Marine Vuillermet, Eva Schultze-Berndt and Martina Faller, is forthcoming via Language Sciences Press. The papers collected 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)** $\neg p \to$ ◆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)** $\neg p \to$ ◆$(\mathfrak{r}(q))$

   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)

(22a) 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 (22b). 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 ($\neg p \to$ ◆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 (22d), 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 (23a-b), compare To'abaita (22c-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 (24).

(23)   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)
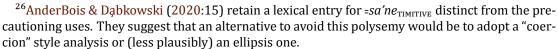
(24) AnderBois & Dąbkowski's (2020:382) semantics for A'inge apprehensional adjunct uses of =*sa'ne* (on its avertive/*lest*-like reading)

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

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 • $\neg r(w')$.[26]

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. [27]

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[26]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, 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.

[27]Beyond the adjunct uses (23) analysed in AnderBois & Dąbkowski 2020, A'inge =*sa'ne*, Dąbkowski & AnderBois (forthcoming) additionally report uses corresponding to the APPREHEN-SIVE and COMPLEMENTIZER uses described above. Examples are replicated below (23'). 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.[28] 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 (25) below are all adapted from Austin (1981), labelled for the apprehensional uses described in the previous section.

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immediately clear what alterations to the semantics in (24) 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.

(23′)   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.'

[28]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).

(25) 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 (25) 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).[29] 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.[30]

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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[29]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.

[30]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 bi-clausal structures – the **precautioning**-type uses described in the previous section (p LEST q), as well as "apprehensive" (monoclausal) ones (♦p). Data from virtually all attested languages of the Roper Gulf are shown in (26).

(26) **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!'

(Heath 1980d:86, interlinearised)

b. **Ngandi**

*a-ḏaŋgu-yuŋ   ŋaṛa-waṭi-ji,   a-waṭu-ḏu   aguṛa-**miliʔ-ŋu-yi***
NCL-meat-ABS 1s>3s-leave-NEG:FUT NCL-dog-ERG 3s>3s-APPR-eat-APPR

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

(Heath 1978:106, interlinearised)

c. **Ngalakan**

*garku buru-ye **mele-ŋun**   waṛŋʼwaṛŋʼ-yiʔ*
high   3ns-put APPR-eat.PRES crow-ERG

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

d. **Rembarrnga**

*ŋaran-**məʔ-ɲamʔ**   ŋa-na   laŋə ṛalk*
3s>1p.INCL-APPR-bite.PRES 1s>3-see.PST claw big

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

e. **Ritharrŋu**

*gurrupulu rranha nhe, **wanga** nhuna rra buɲu*
give.FUT   1s.ACC 2s   *or else* 2s.ACC 1s hit.FUT

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

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

f. **Marra**

wu-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 1981b: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 (26), there is a diversity of formal strategies deployed (or combined) in these languages to realise apprehensional meaning: suffixation inside the verbal paradigm (26a-b), prefixation to the verb stem (26b-d) and a separate apprehensional particle (26e-g).[31] While detailed work on the expression of apprehensionality in these languages (including the syntactic status of apprehensional clauses) is not currently available,[32] a number of generalisations can be made on the basis of the data in (26). 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, althuough 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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[31]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).

[32]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 3 (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 23).

Table 3. Etyma and polysemy for apprehensional modals

Language	Adverbial	Gloss[33]	Author (grammar)
Std Dutch [nld]	*straks*	soon	Boogaart (2009, 2020)
Std German [deu]	*nachher*	shortly, afterwards	A&SB (2018)
Marra [mec]	*wuniŋgi*	further	Heath (1981b)
Mangarayi [mpc]	*baḻaga*	right now/today	Merlan (1989)
Kriol [rop]	*bambai*	soon, later, then	

Compare these uses of Mangarrayi *baḻaḻaga~baḻaga* in (27) to (26g) above. In (27a), Merlan (1989:138) notes that the temporal frame uses of *baḻaḻaga*—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, *baḻaga* 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.[34]

(27) **Mangarayi**

 a. *ḏayi ŋa-yirri-wa-ya-b   gurrji, **baḻaḻaga** 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 **baḻaga** 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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[33]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.

[34]Note that *baḻaga* is glossed by Merlan as 'before' in the imperative sentences (27b-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.[35] Note additionally the apparently apprehensional use of *wuṛay* 'later' in a prohibitive context in (27e). 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 (28):

(28) **Marra *wuniŋgi***   (Heath 1981b: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 26f above)

    ŋa-naŋgu-wa,   **wuniŋgi** *ṛag-ŋiŋ-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 (28b).

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[35]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 5 represents a coarse taxonomy of the readings available to *bambai*, cross-referenced for the subsection in which each is discussed[36]

Figure 5. 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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[36]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 $\underbrace{t_1}_{\text{start-of-day}} \prec t_e \prec \underbrace{t_2}_{\text{end-of-day}}$. 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 (29).

(29) 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
> *naoʻwa   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, (29) 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 (29), 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.*, 20), the SUBSEQ-denoting function of *bambai* shown here has been retained in Kriol. This reading is shown again in the two sentences in (30). The schema in (30c) provides an informal representation of this context-dependent, "subsequential" temporal contribution.

(30) 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 (30a) 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 $t_e \in \{t'_e : t_r \prec t'_e \prec t^+\}$.[37] 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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[37]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 <mark>discouse</mark> particle *na* < 'now').[38]
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*).

(31)   **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), Lichten-
berk 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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[38]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.[39]

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 32a-b), or merely as predictions of a negative outcome for the subject (*e.g.*, 32c).

The sentence data in (32) 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.*, $\neg p(w) \rightarrow \blacklozenge q(w)$.

(32)   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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[39]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 (32a), 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 (32a), appears to have a similar function, although has no overt sentential antecedent.[40] 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. (32b) shows a similar use.

(32c) 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 (33) – repeated here from (21) 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),

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[40]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]
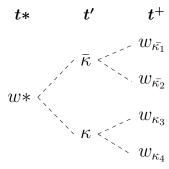
then an utterance of (33) asserts that $\exists w \in \overline{\kappa} :$ I sleep by t^+ in w.

(33) 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)**

$t*$ t' 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 (34), 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 $\neg(watch.movie) \rightarrow \blacklozenge(sleep)$.

(34) **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.[41] The occurrence of apprehensionals in these contexts is little-reported cross-linguistically (described as "rare" in Angelo & Schultze-Berndt 2018 for German *nachher*.)
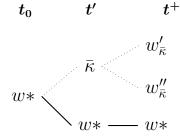
   In (35), the Speaker identifies that in some alternative world (say w') in which he behaved differently to the way in which he did in the evaluation world ($w' \not\approx_{t*} w*$)[42] — namely one in which the event described in the antecedent failed to obtain — there is a (significant) possibility that he would have slept at work. Consequently, and comparably to the example (34) above, *bambai* modalises its prejacent: it asserts that $\exists w'[w' \notin \kappa \wedge$ I sleep by t^+ in $w']$.

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

            la   wek
            LOC work

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

                                                                    [AJ 23022017]

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

$$t_0 \qquad t' \qquad t^+$$

      Here, the Speaker considers a set of worlds that historically diverge from the evaluation world $w*$, namely the set of worlds where, unlike the 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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[41]See von Fintel 2012 for a general overview of counterfactual conditionals.

[42]A definition and further discussion the $\approx$-relation ("historical alternative to") is given in (7). 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).
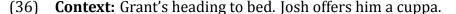
The 'indicative' and 'counterfactual' uses presented here can be unified by appealing to the notion of "settledness" presuppositions (*e.g.,* Condoravdi 2002:82, *passim*). In all sentences of the form p *bambai* q, a reference world and time are provided by some (perhaps modalised) antecedent proposition. 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).[43] 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.)[44] Consider first an elaboration of (33), provided as (36) below. Here there is no explicit linguistic antecedent for *bambai*, whereas its prejacent encodes an unfortunate future possibility.

(36)   **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*?'

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[43]The first token of *bambai* in (32a) also represents an apprehensive use like this.
[44]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 (37) 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.

(37)   **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, (38) below provides a clear example of Lichtenberk's (1995) "epistemic
downtoning" function for apprehensionals. Here, *bambai* clearly behaves as an
epistemic possibility modal (*bambai* $q = \underset{\text{EPIST}}{\blacklozenge} q$). In this case, where the speaker
doesn't *know* who's at the door, she makes a claim about how—in view of what
she *does* know and might expect to be happening—the (present-tensed) situation
described in the prejacent is a distinct possibility (and a distinctly undesirable one
at that.)

(38) **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 (39), *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.

(39) **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 (40) give examples of an indicative and subjunctive *if*-conditional, where *bambai* modifies the consequent clause (the "apodosis.")

(40)   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 (40a,b) and their *if*-less counterparts in (33a and 35a) respectively (*pp.* 43-44), 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 (40) diverge sharply from this interpretation. That is, each of the *if p, bambai q* sentences in (40) 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 mono-clausal 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 (41).

(41)   **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 4 below.[45]

---

[45]This is not intended to suggest that these operators are in any way semantic primitives, Table 4 is to be read as a non-exhaustive list of linguistic devices that appear to associate with nonfactual mood.

Table 4. 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*[46] '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'

---

[46]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 (42):

(42) **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
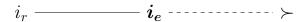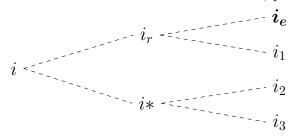
      'No, that's okay! (If I did,) I mightn't (be able to) finish my work!'
                                                                   [GT 20170316]

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 (42a-b) are provided below.

(42)   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 (42b), 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 analyses the logical structure of temporal and modal (incl. conditional) operators to other types of quantifiers (43).

(43)   The logical structure of quantificational expressions in natural language
       `[Operator, Restriction, Nuclear Scope]` following Roberts (1995:665)[47]

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

Q represents the nuclear scope of some quantificational Operator. The first
argument $\mathcal{R}$ represents a "restrictor clause" – a free variable that is fur-
nished 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 18 exhibit this property: this lexical item apparently an inten-
sional operator whose domain is restricted by entities (prima facie of different
types) in its SUBSEQUENTIAL (temporal entities?) and APPREHENSIONAL uses (even-
tive? 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 (44):

(44)   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 inter-
preted 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* (al-
beit 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 *oth-
erwise* q, where *otherwise* is analysed as a discourse anaphor that triggers modal
subordination. In the subsections below, their (our) analysis of *otherwise* as (1) in-
voking modal subordination and (2) sensitive to information structure is adapted
to account for analogous components of the behaviour of *bambai*.

---

[47]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 (44)), the notion of MODAL SUBOR-
DINATION captures the idea that a modal operator scoping over a clause has visibil-
ity of elements of the foregoing discourse.[48] Roberts's schematisation of this type
of relation is reproduced in (45) and a classic operationalisation is given in (46).

(45) 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).

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

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.

(46) 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!*

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

This schema is straightforwardly reflected in Gretel's two sentence utterance in
(46) ~~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 (46), 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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[48]Much of the content of this subsection draws on the presentation of a similar analysis for *oth-
erwise* 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 introduc-
tion 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).[49] 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.
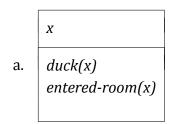
For a given DISCOURSE REPRESENTATION STRUCTURE (DRS) $\boldsymbol{K}$, K denotes a pair $\langle X_K, C_K \rangle$, where X represents a *local domain* – a finite set of variables that represent discourse objects relevant in the context (including participants, eventualities, and times etc.); and C is 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.
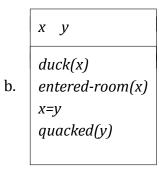
For a simple discourse as in (47), we provide a DRS below. Notice that the indefinite is treated as a variable here, and is eventually existentially closed (Heim 1982): any variable that is not locally bound by another operator is assumed to be existentially bound by a global operator that applies to 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 47 introduces a discourse referent and condition set, represented as (a), expanded in the second (b).[50]

---

[49]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.

[50]These representations are somewhat abbreviated in subsequent diagrams. See Kamp & Reyle (1993) for further detail.
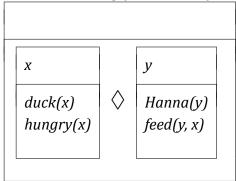
(47) A duck entered the room. It quacked.

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** ($\vDash_{\mathcal{M}}$)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.[51] (48) 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:

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

<table><tr><td>x</td></tr><tr><td>*duck(x)* *hungry(x)*</td></tr></table> $\Diamond$	<table><tr><td>y</td></tr><tr><td>*Hanna(y)* *feed(y, x)*</td></tr></table>

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.

(49) 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)

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[51]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.
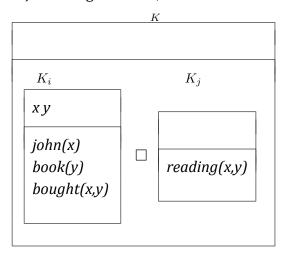
local domain.

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

In (48), 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 (49), 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 (50) 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 (49), 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.

(50)   *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 (50), 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, (51) enumerates some key properties of these uses.

(51) **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.)[52]

    c The speaker asserts K_1.

For clarity, the three sentences in (52) 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 (45), the modal subordination schema from Roberts (2020).

(52) **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'
      $\approx$ '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'

---

[52]Operationalised in the discussion of (52) below, where some sentence K_1 is of the form $\text{OP}_1\varphi$ (*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 (52b-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*:

(53)   *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.[53]

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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[53]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 (54):[54,55]

(54) *Satisfaction conditions for Roberts' possibility operator $\lozenge$ as an existential quantifier, given a world w:*
$$K_i \underset{m,o}{\lozenge} K_j \Longleftrightarrow \exists w' \big[w' \in \underset{o(w)}{\text{BEST}} \big(\bigcap [m(w) \cup \{w'' \vDash K_i\}] \big) \wedge w' \vDash K_j \big]$$

<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 (52b) is interpreted as *modally subordinate* to antecedent material. Following the discussion of the previous subsection, its discourse representation structure can be diagrammed as in (55). In (a), K_1 is asserted. In (b), the content <u>in the scope of OP_1</u> (*viz. $K_{1_{\text{sub}}}$*) is accommodated; its negation restricts the domain of the possibility modal encoded in *bambai*.
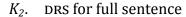
(55) Discourse representation structure for (52b)
  [$_{K_1}$*airra dringgi kofi*] *bambai mi gurrumuk*

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

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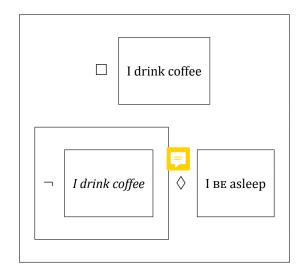
[54]See Chapter 1 for a definition of BEST and a brief overview of ordering semantics.

[55]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 (52a) 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 (56) below: the first clause (coffee-drinking) is asserted as actual, the second a nonrealised possible outcome had the coffee-drinking not obtained.
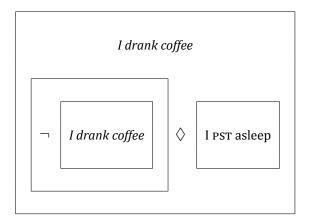
(56)   Discourse representation structure for (52a)
       [$_{K_1}$ *aibin dringgi kofi*] *bambai aibina silip*

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

K_1. DRS first clause K_2. DRS full sentence

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 (57); 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 (57b) *cf.* Kruijff-Korbayová & Webber 2001; Phillips & Kotek; Webber et al. 2003.)[56] A DRS for (57a) is additionally provided in (58).

(57) *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]
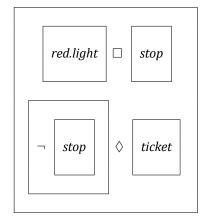
In both Red Light sentences, the *bambai*-clause is modally subordinate to a conditional imperative 'If the light's red, stop!' As with the other precautioning uses analysed above, the "simple" satisfaction conditions (*i.e.*, the conditions of K_i stripped of its own modal restrictions (*viz.* the conditional modality) are accommodated as the restrictor to *bambai*.

(58) DRS for (57a) $K_i \ominus K_j \Leftrightarrow K_i \wedge K_{i_{\mathrm{sub}}} \lozenge K_j$

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[56]These judgments have only been tested on a single speaker and bear confirmation of a negative judgment/further investigation. Of course the felicity of (57b) 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.*, $[_{S_2}$ MOD$_2$ . . . Y . . .$]$), an antecedent (X) that determines the modal domain must be found among accessible discourse referents (*i.e.*, $[_{S_1}$ OP$_1$ . . . X . . .$]$).

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).[57] 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.[58,59]

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

[58]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).

[59]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 $\mathcal{D}$.

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

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

    b.   A totally ordered set of discourse moves $m \in \mathbf{M}$, partitioned into questions (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 participants are mutually committed to resolving at a given point in time. It is often modeled as a stack, consisting of ordered subsets of accepted question moves, the answers to which are not entailed by the cg (*i.e.*, 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.

(60)   *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 (61). Crucially, this treatment takes the role of *bambai* to be the "introduction of a question" into the discourse (61-m_j): an approach that converges with observations of formal and conceptual links between conditionals, interrogatives and "topichood." That is: an utterance $\boldsymbol{q}$ *if* $\boldsymbol{p}$ 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).[60]

The information-structural analysis of *p **bambai** q* in (61) provides a heuristic to capture some of these insights on functional similarities between conditionals and questions.

(61)   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.*, $\underset{tel(w)}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(w)}\big)$

$$\forall w'\big[w' \in \underset{tel(w)}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(w)}\big) \rightarrow \text{HAVE.COFFEE}(w')\big]$$

   m_j Per (60) 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:[61]

       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.)[62] 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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[60]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 2013, 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 2013:200). These observations are picked up again in § 3.2

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

[62]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 5), again by appealing to pragmatic notions.

In describing her notion of relevance – introduced in (61-m_k) & fn 62 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 $\blacklozenge q$.[63] Consider again, for example, (37) from § 2.3.2.2, repeated here as (62).

(62)   **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'

---

[63]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 (62), 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.

(63) **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 (63) 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 63).

Similarly, the uses of *bambai* are interpretable in (62) in view of pragmatic calculations on the basis of the development of each speakers' information state through this dispute ($\mathcal{D}_{(62)}$). In this context, the DQ is ⟨ Should C accompany A & B on their hunting trip? ⟩. 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 (64).

(64) INFORMATIONSTRUCTURE$_{\mathcal{D}_{(62)}}$ 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.

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

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 — ♦*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 (65) below for example, where the contrast between a subsequential (a) and apprehensional (b) reading is apparent.

(65) **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 59, Corblin (2002:256-258) additionally notes the possibility of *negative accommodation* in coordinate sentence

(66) **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 (66a-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$_2$.[64]

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[64]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 (67) below.

(67) **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 (66-67), consider the discourses in (68-70) below.

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

    A. *gita   la   jeya!*   [compare (32a)]

        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]

(69) **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]

(70) **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 (68-69) and of the slithering/ frightening-time for (70).

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 (70), 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 (68), 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 & König (1991):

(71) 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 [71a] When one clause refers to a non- past event or to a state, the reading is typically causal, as in [71c] and [71d], but the causal reading is not required, as [71b] indicates. The contrastive readings in [71b] signal polysemy, i.e. **conventionalized meanings, not just conversational**.   (Traugott & König 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 (72).

(72)   **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).)[65] 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.)[66]

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 (72).

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 (73) and resembles the epistemic constraints identified in Kaufmann (2002), to be further discussed in Ch. 4.

(73)   **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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[65]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.

[66]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.[67]

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[68] 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 (74), where the utterance in (b) is not "expressively correct" (*cf.* Kaplan 1999) because the conditions on speaker

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[67]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*.

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

attitude are not satisfied — that is, *bambai* is felicitous in negative-purposive (apprehensional) contexts, not positive purposive ones.

(74) **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. 68-70 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.'[69] What's more, tracking the facts for *bambai* presented above, these TFAs appear to have encroached

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[69]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).

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 other members of these semantic domains.)[70]

As with *straks* (*e.g.*, 65), *nachher* appears to have a similar distribution to *bambai*,[71] shown by its felicity in the discourse in (75) where it represents an alternative to *vielleicht* 'perhaps.' In these contexts, *nachher* asserts negative speaker attitude with respect to its prejacent.[72]

(75) **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?

A₂ *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!'

B₂ *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 75**B′₂**) illustrates that, while the use of *nachher* in **A₂** does commit

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[70]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]

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

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

the speaker to the proposition 'I am negatively disposed to the possibility of rain to-day', this commitment has the status of a conventional implicatum (not-at-issue).[73]

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 (75B$_2'$)'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 (88) 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.[74]

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 (70) – this is given in (76).

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

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

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

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*

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[73]*I.e.,* "there is no simple way to indicate just the rejection of something that is conventionally implicated (Karttunen & Peters 1979:14).

[74]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).

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 (77).[75]

(77)   **A use-condition for *bambai***
    $[\![bambai \; q]\!]^u = \{c : c_s \text{ is negatively disposed to } q \text{ in } c_W\}$
    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 (77).

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 (78-79) below show the perseverance of apprehensional expressive content in these syntactic frames. In (78a), 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.

(78)   **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' $\rightsquigarrow$ 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' $\not\rightsquigarrow$ 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]

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

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 can-
celling her holiday to tend to her sick pet, an inference that isn't invited by neu-
tral epistemic counterpart *marri* provides strong evidence of the semanticisation
of *bambai*'s expressive content (similar to 'sincerity'- or 'use-conditions' for a given
lexical item.) The extent of this process is further evinced in (79) below, where the
selection of *marri* instead of *bambai* gives rise to a conventional implicature that
the Speaker's utterance of (79) ought not be interpreted as the expression of a de-
sire to prevent her daughter's participation in the football game.

(79)   **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' $\not\rightsquigarrow$ [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.

(80)   **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 interpreta-
tion 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. Where q isn't presumed settled in a discourse context $\mathcal{D}$, an utterance of the form *bambai* q 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.
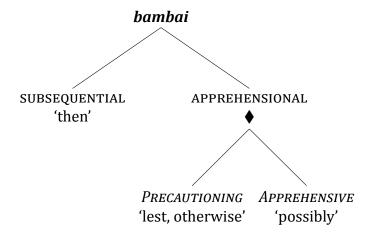
Chapter 4

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 5 is repeated here for reference.

Figure 6. 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.*, an overview provided in § 1.2 above.) 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 (81).

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

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

today holds of some property of times $P \in \mathcal{D}_{\langle \imath, t \rangle}$ 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 utter-
ance time ($t*$) is located.)

A frame adverbial, then, takes a predicate and says that its instantiation is con-
tained within a given temporal interval.[76] 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 ref-
erence time. (82) represents a proposal to capture this relation.

(82)   **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 (83-84).[77]

(83)   a.   The birth of Cain succeeded Eve's pregnancy by some contextually inap-
              propriate 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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[76]The term "temporal frame adverbial" due to Bennett & Partee 2004, and equivalent to Kamp &
Reyle's "locating adverbial" (1993:613).

[77]Given that $\mathcal{T}$ is isomorphic with $\mathbb{R}$, formally $\boldsymbol{\mu} : \mathcal{T}^2 \to \mathbb{R}$ represents a Lebesgue measure func-
tion 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 (84) below).[78]

(84)   **CONTEXT.** Glurmo is leading the Planet Express Crew on a tour of the Slurm (a popular beverage) factory. Fry is thirsty and inquires about when he'll be able to get a drink.

    Fry.   When will that be?

    Glurmo. Soon enough.

    Fry.   That's not soon enough.

<div align="right">('Fry and the Slurm Factory', Futurama 1e13)</div>

In (84), Fry's utterance is compatible with a situation in which he and Glurmo agree on the event time (*e.g.*, $t_e =$ THAT EVENING AT 8PM, at which the party with Slurms McKenzie will begin). The source of their disagreement appears to be the value of the contextual standard (s_c) that each of them retrieves, and whether the distance between utterance time and t_e gets to count as 'soon'.

In its capacity as a TFA then, *bambai* can be thought of as realising a subsequential instantiation relation, as shown in (85) below.

(85)   **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.

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[78]The term *faultless disagreement* due to Kölbel (2004:53-4), where the nature of the disagreement does not concern a matter of fact. That is, two participants A,B are in a situation where A believes (judges) p and B believes $\neg p$ yet neither has made a mistake (is "at fault".)

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 (86) and, on the basis of this, a formal definition of settledness is given as (87).

(86) **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 SETTLEDNESS/DECIDEDNESS repeated here as (87). 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 10a). 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.)

(87) **Presumption of settledness for *P*.**
      $\forall w' : w' \in \cap cg, \forall w'' : w' \approx_{t*} w'' :$
      $\text{AT}\big([t*, \_], w', P \big) \leftrightarrow \text{AT}\big([t*, \_], w'', P \big)$ (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 diachronically-conventionalised implicature where **a claim that SUBSEQ holds of a predicate** encodes a **prediction** when that predicate is interpreted as nonfactual (compare § 4.5.4). 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 (88) gives an intensionalised (modal) semantics for *bambai*.

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

With the entry in (88), 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 — subsequential 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 $\{i' \mid i' \not\preccurlyeq i*\}$.[79] 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 4 (*p.* 50 above.)

The *omniscience restriction*, also described in (73) is a pragmatic principle implementing the ACTUAL/NONACTUAL distinction to explain the distribution of SUBSEQUENTIAL vs. APPREHENSIONAL *bambai*.

(89)   **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 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[80] 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 (90) with the SUBSEQ relation spelled out. The entry in (90) is translated into a branching-times formalism in order to draw the parallel treatment

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[79]See also the Rumberg/von Prince partition in (11).

[80]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):

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

Table 5. *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	$i_r \prec i' \preccurlyeq i*$	'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	$i_r \begin{array}{l} \not\prec i' \\ \prec i* \end{array}$	'I had coffee$_{i_r}$ **otherwise** may've fallen asleep'$_{i' \not\prec i*}$

of "indicative" and "subjunctive" uses of *bambai*. The relevant modelling assumptions were introduced in § 1.2.1.

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

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.[81]

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 5, 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* (6) — 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$_{i_{n-1}}$)[82]

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

    a.   *Undividedness-at-i*   (Müller 2014; Rumberg 2016b)

        $b \equiv_i b' \triangleq \exists i'[i' \succ i \wedge i' \in b \cap b']$

        <u>That is</u>: two branches are undivided at some index i iff they both run

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[81] ~~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.

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

[margin notes:]
something's up here ght, r can't really be a branchmate of i', it's just some salient anterior index

worth giving a version of (86) recast for BTs ere? A version is given in ch.1

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.
$$\forall i, j\left[i \succcurlyeq j \rightarrow \forall b, b'[b \underset{i}{\approx} b' \rightarrow b \underset{j}{\equiv} b']\right] \qquad \text{(compare 7/86b)}$$
That is: metaphysically-accessible branches are undivided at any evaluation index i and at all indices preceding that evaluation index.

Shown above (*e.g.*, table 5), subsequential readings of *bambai* are limited to contexts where instantiation time is taken to precede utterance time. Against a metaphysical modal base then, the instantiation of the prejacent is presumed settled at utterance time (92).

(92) Assuming that the past morphology restricts instantiation of *P* (*e.g.*, that property described in *bambai*'s prejacent) to $\{i' \mid i' \prec i*\}$:
$$\forall b \in \cap cg_{i*}\left[i' \in b \wedge P(i')\right] \rightarrow \forall b'\left[b' \underset{i*}{\approx} b \rightarrow [i' \in b' \wedge P(i')]\right]$$
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.*, (92) 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.

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

a. *A metaphysical modal base* $\underset{\text{meta}}{m} / \approx$
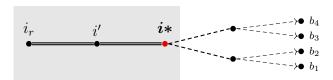
A metaphysical modal base $\approx$ is a function from indices to a set of propositions that are **consistent** with metaphysical assumptions about the state of the world at a given index i.

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 (86), 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. 7.

Figure 7. 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 (94) below (the sentence simplified from (20) above). The derivation is further explicated below.

(94) **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**

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

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

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.

$$[\![\textit{main dedi bin go la det shop}]\!]^c = \exists j[j \prec i* \wedge \textsc{dad.go.shopping}(j)]$$

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

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

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.)

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

d.   **Meaning of the second clause (*bambai*'s prejacent)**
$$[\![\textit{imin gugum dina}]\!]^c = \lambda i.i' \prec i* \wedge \textsc{dad.make.lunch}(i')$$

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

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

$$= \exists b\big[b \in \underset{\varnothing}{\textsc{best}}(\cap\approx_{i*}) \wedge \exists i'_b[i' \succ i_r \wedge \textsc{subseq}\big(\lambda i.i' \prec i* \wedge \textsc{dad.make.lunch}(i'), j\big)\big]$$

In (b-c)], the mechanism responsible for establishing the interclausal anaphoric relation 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 conversational background. That is, given that the prejacent is predicated of a preceding index $i' \prec i*$, all branches in the metaphysical modal base are undivided at $\{i \mid i \preceq i*\}$ (fig. 7). Because the subseq predication involves branchmates of $i*$, it is interpreted as factual.
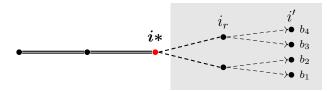
4.5 Deriving the apprehensional reading

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

Figure 8. A possible representation of $\cap \approx i*$: a "subtree" of $\mathfrak{T}$.
shaded portion. Multiple accessible branches (metaphysically "possible futures") succeeding $i*$.

(95) **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. $\mathfrak{s}(i) = \{p \mid p$ 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:

$$\forall b', b'' \in \cap \approx_i: b' \leqslant_{\mathfrak{s}(i)} b'' \longleftrightarrow$$
$$\{p' \mid p' \in \mathfrak{s}(i) \wedge i'[i' \in b' \wedge p'(i')]\}$$
$$\curvearrowright \quad \boxed{\square}$$
$$\{p'' \mid p'' \in \mathfrak{s}(i) \wedge i''[i'' \in b'' \wedge p''(i'')]\}$$

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. $\textbf{BEST}_{\mathfrak{s}(i)}(\cap \approx_i)$ 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 (21), repeated here as (96).

(96) **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.[83]

$$\llbracket garra \rrbracket = \lambda P \lambda i \forall b \big[b \in \underset{o(i)}{\text{BEST}} \big(\cap m(i) \big) \to \exists^b i' [i \succ i \land P(i')] \big)$$

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 94a)

$$\llbracket garra \rrbracket^c (\llbracket ai\ dringgi\ kofi \rrbracket^c) = \lambda P \lambda i. \forall b' \big[b' \in \underset{o(i)}{\text{BEST}} \big(\cap m(i) \big)$$
$$\to \exists i' [i' \in b' \land i' \succ i \land P(i')] \big] \ \big(\lambda i'. \text{I.DRINK.COFFEE}(i') \big)$$

$$\text{NPST}(\llbracket airra\ dringgi\ kofi \rrbracket^c) = \lambda P \lambda i. i = i* \land P(i)$$
$$\big(\lambda i. \forall b' \big[\underset{o(i)}{\text{BEST}} \big(\cap m(i) \big) \to \exists i' [i' \in b' \land i' \succ i \land \text{I.DRINK.COFFEE}(i')] \big] \big)$$

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

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.

c. **Meaning of *bambai* & substitution of (96b-i' ($= i_\kappa$) for i_r**

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

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

As in (94c), the "reference time" i_r is assigned to the existentially-bound index i' from (b) — here notated as i_κ (coffee-drinking time).

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[83]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.

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

d. **Meaning of the second clause**

$\llbracket mi\ gurrumuk \rrbracket^c = \lambda i.\text{PASS.OUT}(i)$

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**

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

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

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

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

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 (96), $i* \prec i_\kappa \prec i'$. 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: $\text{SUBSEQ}\big([\lambda i'.\text{PASS.OUT}(i')], t_\kappa\big)$ is **not presumed settled at $i*$** (compare fig. 8.)

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 $c_{(94)}$ holds at i'. Conversely, in (96), the context ($c_{(96)}$) **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):

(97) **Diversity of the common ground at $i*$ w/r/t prejacent in (96)**

$$\exists b \in \cap cg \wedge \exists b', b''[b, b'' \in \underset{\mathfrak{s}(^b i*)}{\text{BEST}}(\cap \approx^+_{b i*})$$

$$\wedge\ \text{SUBSEQ}\big(\text{I.PASS.OUT}(^{b'}i'), {}^{b'}i_\kappa\big) \wedge \neg\text{SUBSEQ}\big(\text{PASS.OUT}(^{b''}i''), {}^{b''}i_\kappa\big)]$$

There are metaphysical alternatives branching from i where the event described by the prejacent to *bambai* in (96) 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.

(96)   f.   **Modal subordination**

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

> 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 (96), then, is the conjunction of (96b) and (96f). 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. (35) or table 5) 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.[84] A complete derivation is not provided, although truth conditions can be composed for (35, repeated below as 98) 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 (98), 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 com-

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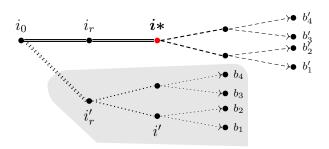
[84] A precondition for diversity to be satsfied is that "the common ground must be compatible with their being some past time at which [the truth of the prejacent is unsettled]" (Condoravdi 2002:85).

mon ground is nonveridical/**diverse** with respect to *bambai*'s prejacent. *Bambai*'s diverse quantificational domain is represented by the shaded region in Figure 9.

Figure 9. 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'.)

(98) *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.]'

[AJ 23022017]

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*.)[85] Compare with the present (NPST) perspective reading derived in (96b).
Let *s* stands for the predicate 'I BE SLEEPING (AT WORK).'

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

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 successor of i'.

c. **Application to *bambai***

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[85]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).

Here, $\underset{i'}{\Box}\, s(i'')$ will be used to abbreviate the truth translation of the prejacent given in (b) above.

$$[\![bambai\ ai\ bina\ silipsilipbat]\!]^c = \exists b\big[b \in \underset{\mathfrak{s}(i_0)}{\text{BEST}}(\cap\{\approx_{i_0} \cup\{b' \mid \kappa(i_\kappa) \notin b\}\})$$

$$\wedge\ \exists^b i'[i' \succsim i_\kappa \wedge \text{SUBSEQ}\big(\underset{i'}{\Box}\, s(i'), i_\kappa\big)\big]$$

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.

serious composition problems here. probably subseq can harmlessly be changed to specify that $i' \succsim i_r$ rather than $\succ$ though.

4.5.2   The "epistemic apprehensive" use

The discussion above has shown how the core meaning of *bambai* involves a predication of a SUBSEQ relation between a predicate and a reference interval, where predictive force/apprehensionality emerge iff the predicate's instantiation is presumed unsettled. From this standpoint, apparently epistemic uses like (38, *p. 47*), repeated here as (99) are perhaps surprising.

(99)   **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]

This type of use is not reported elsewhere and ~~these is~~ their acceptability status remains to be confirmed, however the emergence of an apprehensive reading even in a context where the predicate (*i.e.,* the speaker's boss's arrival at the door) is *presumed settled* is perhaps compatible with approaches to future meaning suggested by Bennett & Partee (2004:100/1978), *sc.* that it could be(come) known (in the future) that AJ's boss is at the door (now.)

This proposal, which represents a plausible way of extending the analysis presented here, to ostensibly epistemic uses of *bambai* is not further examined here.

4.5.3   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. 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.)

4.5.4 Apprehensionalisation and the synchronic system

In this chapter, I have claimed that the emergence of APPREHENSIONAL readings of *bambai* is predictable in context: *i.e*, apprehensionality "emerges" when *bambai*'s prejacent is not presumed settled.

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.[86] 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 (65). Negative judgments in (52b) 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).

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[86]Recalling the mention of TFA *baimbai*'s grammaticalisation in Tok Pisin, Romaine (1995) distinguishes clause-initial/connectiv4e uses of *baimbai* from preverbal *bai* 'FUT' (see also Bybee et al. 1994:271).

(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]

Above, apprehensionality is effectively understood as an epiphenomenon of a implicature that subsequential predications have predictive force iff they represent an unsettled property. Whereas this implicature is short-circuited ($\doteq$ conventionalised) in the case of *bambai*, it is suspended in the context of other (less frequent) subsequential TFAs (compare the similar, well-documented phenomenon in the (indirect) speech act literature, *e.g.*, Horn 1984:29-31 and Morgan 1978.)

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 contradis-

tinction to branching future and counterfactual possibilities. Reasoning about set-tledness – 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

Introduction

YOLŊU MATHA is a Pama-Nyungan language family spoken in northeast Arnhem Land, in northern Australia. Varieties exhibit a range of significant functional and formal variation in verbal inflectional paradigms, notably with respect to temporal phenomena (notably "cyclic" tense) and interactions between the semantic domains of temporality, modality, aspect and polarity which point to a history of contact-induced change. This essay (part **III** of the present dissertation) addresses the semantics of the inflectional paradigm and the expression of temporality and modality, particularly in the Western Dhuwal-Dhuwala (WD) language — a Yolŋu Matha dialect cluster. Temporomodal expression in WD is characterised by a number of phenomena that, as we will see, have significant import for semantic and pragmatic theory, touching on the meaning contribution of tense, modality, aspect and negation. The WD verbal paradigm consists of four inflectional classes, a semantic treatment of which is eschewed in existing descriptions (*i.e.*, Lowe 1996; van der Wal 1992; Wilkinson 2012, *see also* Waters 1989.) Of particular interest are **CYCLIC TENSE** and **ASYMMETRIC NEGATION**, each of which receives a treatment here. Data that exemplify these basic phenomenal patterns in Djambarrpuyŋu [djr] — a Western Dhuwal variety as spoken in the community of Ramingining — are given below.

In (101), the FIRST (**I**) inflection (shown in *b* & *d*) is compatible with present and pre-today past reference. It is, however, incompatible with same-day past temporal reference, which is categorically associated with the THIRD (**III**) inflection. That is, the time spans/temporal frames that are compatible with **I** (and **III**) will be shown to be *discontinuous*. This is taken to represent an instantiation of CYCLIC TENSE.

(101) **Temporal reference and verbal inflection in Western Dhuwal (`djr`)**

    a. *goḏarr*   *ŋarra dhu nhä-**ŋu** mukulnha*   [FUTURE]
        tomorrow 1s   FUT see-**II** aunt.ACC

        'I'll see my aunt tomorrow.'

    b. *ŋarra ga*   *nhä-**ma** mukulnha (dhiyaŋ bala)*   [PRESENT]
        1s   IPFV.**I** see-**I**   aunt-ACC   now

        'I see/am looking my aunt (right now).'

    c. *ŋarra nhä-**ŋal** mukulnha gäthur*   [SAME DAY PAST]
        1s   see-**III** aunt-ACC   today

        'I saw my aunt this morning.'

    d. *ŋarra nhä-**ma** mukulnha barpuru*   [PRE-TODAY PAST]
        1s   see-**I**   aunt-ACC   yesterday

        'I saw my aunt yesterday.'

(102) shows the effects of sentential negation (*bäyŋu* 'NEG') on the licensing conditions for each of the inflections: that is, in negative contexts **II** (available in positive future contexts, *e.g.*, 101*a*) and **IV** (available in positive modalised utterances — *e.g.*, counterfactual predications — not shown in 101) correspond to **I** and **III** respectively. In most situations, **I** and **III** are **incompatible** with negative polarity. This is taken to reflect an ASYMMETRY in the marking of reality status with respect to negation ("asymmetric negation", following Miestamo 2005).

(102) **Negation interacting with temporal reference in Western Dhuwal (**`djr`**)**

    a.   *bäyŋu ŋarra dhu nhä-**ŋu** mukulnha (goḏarr)*   [FUTURE]
        NEG   1s   FUT see.**II** aunt.ACC tomorrow

        'I won't see my aunt (tomorrow).'

    b.   *bäyŋu ŋarra gi   nhä-**ŋu** mukulnha dhiyaŋ bala*   [PRESENT]
        NEG   1s   IPFV.**II** see.**II** aunt.ACC now

        'I don't see my aunt (right now).'

    c.   *bäyŋu ŋarra nhä-**nha** mukulnha gäthur*   [SAME-DAY PAST]
        NEG   1s   see-**IV** aunt.ACC today

        'I didn't see my aunt this morning.'

    d.   *bäyŋu ŋarra nhä-**ŋu** mukulnha barpuru*   [PRE-TODAY PAST]
        NEG   1s   see-**II** aunt.ACC yesterday

        'I saw my aunt yesterday.'

Figure 10 comprises a (colourised) reproduction of Wilkinson's schematisation of the functional domain (and collocation features) of each Djambarrpuyŋu inflection (2012:326). This diagram bespeaks the nontriviality of the distribution (and, therefore, the semantic value) of each inflectional category. Discussion of the phenomena characterising the WD verbal paradigm (*viz.* asymmetric negation and (particularly) "cyclic" tense) are all-but-absent from the linguistics literature: as mentioned, the inflections have eluded anything resembling a unified (compositional) analysis. This essay, then, seeks to marshal relevant data in view of developing a proper treatment of these phenomena and enriching theories of temporal and modal displacement in natural language.

Chapter 1 provides background on Yolŋu Matha and the morphology of these languages' verbal paradigms, orienting the discussion around connections between temporal and modal concepts (particularly intention, prediction and futurity) and notions of relative grammatical "prominence" of tense, mood and aspect (*cf.* Bhat 1999).
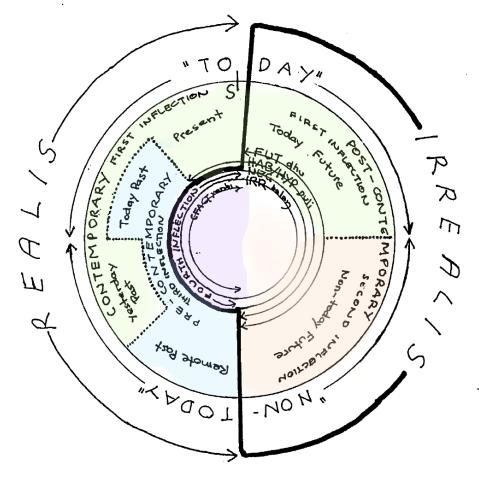
Subsequently, data further demonstrating the expression of temporomodal distinctions and the interpretive intricacies of WD's paradigm semantics, focussing on

a number of morphosemantic phenomena in Western Dhuwal(a) are provided in chapters 2 and 3 below.

In light of these data, in chapter ??, I propose a formal treatment of the paradigm on the basis of two semantic features: a temporal one – *NON-FINAL INSTANTIATION* – and a modal one – *METAPHYSICAL NONVERIDICALITY*. As we will see, the notion of **branching times** —introduced in chapter 1 and deployed in the analysis of *bambai* (ch. 4) — permits for a motivated, unified account of the ostensibly disparate sets of usage contexts that license each of WD's four inflectional categories. The essay concludes by considering the landscape of semantic variation across varieties of Yolŋu Matha, suggesting that the WD system has arisen as a consequence of reanalysis and contact-induced meaning change.

Figure 10. Melanie Wilkinson's (2012:326) schematisation of the complex semantic space associated with each of the four inflectional categories in Djambarrpuyŋu. My colourisation.

Corresponding to the discussion above, I and III represent subintervals covering the past domain, instantiating CYCLIC AND METRICAL TENSE whereas the set of inflections available to negative (NEG) clauses is a subset of that for positive clauses (NEGATIVE ASYMMETRY.)

Chapter 1

Background

1.1 Grammars of TMA: the notion of "prominence"

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 grammatical prominence, notions belonging to the other two categories tend to be "viewed in terms of [$\mathcal{C}$]" (1999:7).

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 suggests, for example, that the well-attested alternative grammaticalisation trajectories described by Bybee et al. (1994) (among others) and represented in Figure 11 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.*, a perfect marker in $\mathcal{L}$ developing into to perfective marking in $\mathcal{L}_1$ versus into a past-tense marking in $\mathcal{L}_2$?

1.1.1 Futurity and mood-prominence

Bhat marshalls data from Tibeto-Burman to show that "mood-prominent" languages have a tendency to grammaticalise a FUTURE/NONFUTURE distinction. He points in

Figure 11. Two examples of attested meaning change between the aspectual and temporal domains

PERF → PFV
PERF → PST

PROG → IPFV
PROG → PRES

(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)

particular to Manipuri ([mni] Tibeto-Burman: Manipur), where this tense distinction appears to have "developed from an earlier realis-irrealis modal distinction" (1999:19). Semantic connections between modal and future concepts are further suggested by frequently-attested semantic change pathways between, for example, expressions of intention and obligation (*sc.* bouletic/deontic necessity) and futurity (and then to epistemic modality, *e.g.*, Bybee & Pagliuca 1978; Bybee et al. 1991, 1994; Kuteva et al. 2019b).[87] In her account of the diachrony (and "instability") of future expression in Romance, for example, Fleischman (1982:31, 75, 106) claims that as future markers become "more temporalized" (which she connects to their agglutination), functional pressure to recruit novel modal constructions emerges — an early conceptualisation of a grammaticalisation cycle/"spiral."[88]

As suggested in § 1.2.1, going back to Aristotle, it is well understood that the future has a dually temporal and modal character. That is, 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, utterances about the future are often associated with predictive illocutionary force (this was a major theme guiding the analysis in Part **I**).

Consequently, 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.[89] Modal accounts of future, then, often tend to take

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[87]Bybee, Pagliuca & Perkins (1991) hypothesise that the "age" of a future marker (FUTAGE) can be assessed in view of its semantic domain. In effect this amounts to a "pathway": DEONTIC → CIRCUMSTANTIAL → FUTURE → EPISTEMIC *etc.*

[88]The notions of "constant renewal" (in addition to "unidirectionality" & "irreverability" that underpins cyclic change was discussed in relation to the "Negative Existential Cycle" (NƎC) in Part II. Some authors have reformulated cycles as "spirals" in order to more accurately conceptualise the recruitment of new lexical material often via periphrastic constructions, to explicitly mark conceptual categories "vacated" in the process of meaning change (Haspelmath (2000) attributes this metaphor to von Gabalentz 1901.)

[89]Of course, as discussed in § 1.2.1, Arthur Prior was crucially concerned about this asymmetry between the future and the past, over the course of his career he departing from an earlier belief in

future-oriented morphology to universally quantify over a modal base. Thomason (1970:274) proposes a "supervaluation"-based semantics for future-tensed predication as follows:[90]

$$
(103) \quad [\![\text{FUT } p]\!]^{w,t} = \begin{cases} 1 \leftrightarrow & \forall w'[w' \approx_t w \rightarrow \exists t'[t \prec t' \wedge p(w')(t')]] \\ 0 \leftrightarrow & \forall w'[w' \approx_t w \rightarrow \nexists t'[t \prec t' \wedge p(w')(t')]] \\ & \text{undefined otherwise} \end{cases}
$$

> 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. (That is, it presupposes that the truth or falsity of a future utterance is uniformly determined at all metaphysical alternatives to w at t.)

As described earlier in this dissertation (*e.g.*, § 1.2.1, *p.* 10*ff*), $\cap\approx_t w$ represents all "historical alternatives to w at t" (an equivalence class of worlds with identical histories to w up to t) — in effect equivalent to a *metaphysical conversational background* (see § 1.2.1.)

Given how central this metaphysical assumption will be to the analysis, the approach taken by this chapter recasts this possible worlds formalism in terms of branching futures/times models. As in chapter 4's treatment of the distribution of *bambai*, this will hopefully allow us to perspicaciously cash out the distinctions between the domains of REAL and NONREAL eventualities. That is, a metaphysical conversational background $\cap\approx_i$ will be representable by an equivalence class of branches, undivided until i, that represent metaphysically possible developments of the world from i.

1.1.2   Negation and mood

Developing a broad cross-linguistic typology of sentential negation, Miestamo (2005: 208) proposes a class of languages (A/NONREAL) which have 'grammaticalized the fact that negation belongs to the realm of the non-realized' — that is, negative and modal operators are shown to interact formally in a number of ways. According to Miestamo, "asymmetric negation" phenomena are notably overrepresented in

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determinism and developing 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 ("possible candidates for the (preordained) future as far as I'm concerned", *cf.* Giannakidou & Mari 2018), whereas on non-deterministic views they quantify over a metaphysical modal base ("possible futures consistent with assumptions about metaphysical facts governing the world.")

[90]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. See also §1.2.1 and (Stojanović 2014) for discussion and an overview of different semantic approaches to the "future contingents" problem.

the languages of Australia (and, to a lesser extent, New Guinea, driving him to describe A/NONREAL as a "circumpacific phenomenon" (192, 411)).[91] Phillips (2021: §2.2) provides an overview of a number of mood-based asymmetry phenomena in Australian languages.

In many of these languages, A/NONREAL is manifested as the **neutralisation** of a grammatical distinction between REALIS and IRREALIS modalities in negative clauses. That is, ±REALISED is associated with a a morphosyntactic distinction in positive clauses that is not available in negative ones. Shown in the Gurrgoni (gge, Maningrida: Arnhem) data in (104), a reality status distinction is morphologically realised in positive clauses (a-b) which is not available to its negative counterpart (104c), which is obligatorily irrealis-marked and ambiguous between a modal and non-modal reading. As we will see below, a similar phenomenon is exhibited in some varieties of Yolŋu Matha (notably those varieties closer to Maningrida.)

(104) **Interactions between negation and mood marking in Gurrgoni**

    a. Past-tensed (nonmodal)

      *nji-weki-**ni***
      2s-talk-PRECONTEMP

      'You talked.'

    b. Past-tensed (modalised)

      *nji-weki-**yarni***
      2s-talk-**IRR1**

      'You might have talked.'

    c. Negative past-tensed

      *galu nji-weki-**yarni***
      NEG   2s-talk-**IRR1**

      'You didn't/mightn't have talked.'   (adapted from Green 1995:307)

Irrealis markers are broadly taken to realise semantic operators which displace the instantiation of a given eventuality into the realm of the nonrealised. That is, in uttering an *irrealis* proposition, a Speaker does *not* assert (*i.e.*, commit themself) to the truth of a (basic) proposition in the "actual world." Relatedly, the basic contribuition of negative operators is deny the truth of a given proposition, that is, they commit the speaker to the NONREALISED status of some predicate. For this reason, sentential negtion is described as an ANTIVERIDICAL operation — roughly, φ and $\neg\varphi$ denote disjoint situations.

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[91]That is, Miestamo's "restricted sample" [of world languages] turns up these phenomena in Australia, New Guinea and a number of other places on Pacific coasts (192).
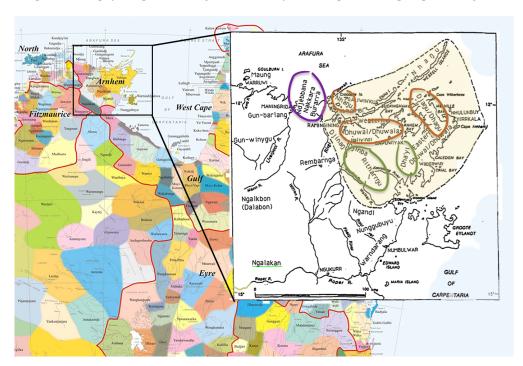
Consequently, for languages exhibiting A/NONREAL, irrealis and negative operators can be thought of as performing conceptually-related functions — *viz.* indicating that a given proposition is *not* being asserted (see Miestamo 2005:208 and also Givón (1978); Horn (2001) a.o.) This property is explored in further detail in Ch. 3 below under the label of **nonveridicality**.

It is on these functional grounds that negation and mood interact; predicting parametric variation across languages.

1.2 Yolŋu Matha
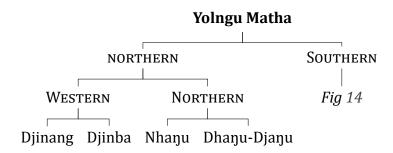
Yolŋu Matha is a small language (sub)family spoken in North-Eastern Arnhem Land, in the Northern Territory of Australia (map provided in 12, see also discussion in § 1.4). It is a subgroup of the larger Pama-Nyungan family, representing something of an enclave in Northern Australia; surrounded by a diversity of unrelated languages.

Figure 12. 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.
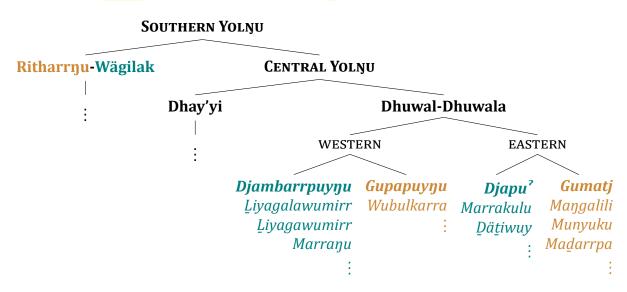
Most Yolŋu linguistic phylogenies posit a high-level split between into three subgroups (see Bowern (ed., forthcoming: x) for an overview of different classifications.) This is schematised in Figure 13. Yolŋu society is traditionally organised according to a moiety system — that is, the Yolŋu universe is organised into two

Figure 13. A broad phylogenetic classification of Yolŋu subgroups, following Schebeck 2001; Waters 1989; Wilkinson 2012 a.o. with some adaptation following Bowern (ed.) treats "WESTERN" as belonging to a NORTHERN clade (forthcoming: x).

Yolngu Matha
- NORTHERN
  - WESTERN
    - Djinang
    - Djinba
  - NORTHERN
    - Nhaŋu
    - Dhaŋu-Djaŋu
- SOUTHERN
  - *Fig 14*

wide-ranging subdomains, *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 corresponding language variety, households are necessarily multidialectal, one member of a couple speaking a *Yirritja* lect, the other speaking a *Dhuwa* lect. Children inherit their father's moiety (and language), and marry into their mother's moiety (see also Williams 1986:62*ff*). This chapter focuses primarily on a number of Southern Yolŋu varieties (see Fig 14).

Figure 14. Varieties ('clanlects'/dialects) of Dhuwal-Dhuwala in the context of the Southern Yolŋu languages (following Wilkinson 2012:13) with some adaptation following Schebeck (2001:15) and Bowern (ed.) who does not claim that SOUTHERN and CENTRAL forma single clade (forthcoming: x).

SOUTHERN YOLŊU
- Ritharrŋu-Wägilak
  - ⋮
- **CENTRAL YOLŊU**
  - **Dhay'yi**
    - ⋮
  - **Dhuwal-Dhuwala**
    - WESTERN
      - *Djambarrpuyŋu*
        Ḻiyagalawumirr
        Ḻiyagawumirr
        Marraŋu
        ⋮
      - *Gupapuyŋu*
        Wubulkarra
        ⋮
    - EASTERN
      - *Djapuˀ*
        Marrakulu
        Ḏäṯiwuy
        ⋮
      - *Gumatj*
        Maŋgalili
        Munyuku
        Maḏarrpa
        ⋮

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 (WD: those va-

rieties spoken around Milingimbi and Ramingining) are more closely related to one another than either is to Eastern Dhuwal and Dhuwala (*Miwatj*: those varieties spoken around Yirrkala/Nhulunbuy and Gapuwiyak. I assume that this fact is representable phylogenetically and has been represented in Figure 14. A (the?) primary distinction between Dhuwal and Dhuwala varieties cross-cutting the language area results from a productive apocope rule (investigated in Morphy 1977, see also Wilkinson 2012:94*ff* for further details.). Examples of the formal consequences of Dhuwal apocope on the verbal paradigm are indicated in parentheses in Table 7 (*p.* 116) below. The table gives examples of the verb paradigm for each of the major Djambarrpuyŋu conjugation classes as described by Wilkinson (2012: 306*ff*) (parentheses give the corresponding verb group number assigned by Lowe 1996 for Gupapuyŋu.)

1.3 The Yolŋu verb: Typology & morphosemantics

With the exception of the Western Yolŋu varieties (*i.e.*, Djinaŋ & Djinba, see Schebeck 2001; Waters 1989), Yolŋu varieties are largely mutually intelligible (Heath 1981a; Morphy 1983). Yolŋu languages have verbal paradigms which are at least partially cognate and likely reconstructable to a proto-system (Schebeck 2001, see comparative reconstruction pilot work by Bowern 2009.) All varieties have between three and six different inflectional classes; each inflection is responsible for encoding (combinations of) temporal (tense/aspect) and modal information — as described above, it is the semantics of these inflections with which we will be primarily concerned in this dissertation. The forms of each inflection additionally varies depending on the conjugation class associated with a given verb stem (or derivational suffix) — authors of descriptions of various Yolŋu varieties having identified between three (*e.g.*, Waters 1989 on Djinba & Djinba) and nine (*e.g.*, Lowe 1996 on Gupapuyŋu) distinct conjugation classes.

In view of demonstrating the structure of a Yolŋu verbal paradigm, in this section, I present a brief overview of the morphosemantics of the range of inflectional classes in Wägilak — the southernmost variety of Yolŋu Matha and a close relative of Dhuwal — on the basis of new data elicited in the field, in addition to Heath's (1980a) description of Ritharrŋu.[92]

1.3.1 The Ritharrŋu-Wägilak paradigm

According to Heath (1980a:60–75), the Ritharrŋu (Wägilak) verbal paradigm distinguishes six main conjugation classes, each of which marks four inflectional categories. These inflections establish a three-way tense distinction between the PAST,

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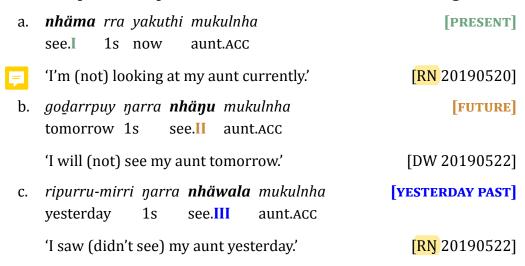
[92]Many thanks to Salome Harris for collecting questionnaire-data from Wägilak and Ritharrŋu in Ngukurr, mid-2019.

PRESENT and FUTURE. He describes the fourth category as the PAST POTENTIAL, supplying data of the latter's use in counterfactual situations. The paradigm is represented by table 6, while the data in (105) demonstrates the ~~(straightforward)~~ temporal semantics of each of these inflectional categories.

Table 6. Examples of conjugation patterns for the Ritharrŋu-Wägilak verbal paradigm (adapted from Heath 1980a:63–6)

CLASS	STEM	*PRES*	*FUT*	*PST*[93]	*CFACT*
1	'GO'	*wäni*	*wäni*	*wäni-**na**/**-nya***	*wäni-**ya***
2	'EAT'	*ḻuka*	*ḻuk-**I***	*ḻuka-**nha***	*ḻuk-**iya***
3	'CHASE'	*ŋupa*	*ŋupa-**ru***	*ŋupa-**na***	*ŋupa-**ra***
4	'HOLD'	*gatha-**ŋ***	*gaṯu-**lu***	*gatha-**(la)ra***	*gatha-**la***
5	'PUSH'	*djaranydju-**n***	*djaranydju-**ru***	*djaranydju-**na***	*djaranydju-**ra***
6B	'PROTECT'	*gunga-**ma***	*gungu-**ŋu***	*gunga-**wala**/**-nha***	*gunga-**wa***

(105) **The temporal interpretation of each inflectional class in Wägilak**

    a.   ***nhäma*** *rra yakuthi mukulnha*   **[PRESENT]**
           see.**I**   1s   now   aunt.ACC

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

    b.   *goḏarrpuy ŋarra **nhäŋu** mukulnha*   **[FUTURE]**
           tomorrow 1s   see.**II**   aunt.ACC

         'I will (not) see my aunt tomorrow.'   [DW 20190522]

    c.   *ripurru-mirri ŋarra **nhäwala** mukulnha*   **[YESTERDAY PAST]**
           yesterday   1s   see.**III**   aunt.ACC

         'I saw (didn't see) my aunt yesterday.'   [RN 20190522]

Further, (106) shows the modal uses of FUT and CFACT inflections. In (106a-b), **II** is compatible with a number of modal (*e.g.*, deontic, conditional) readings, including in imperative utterances. Similarly, CFACT is compatible with a range of "modal-for-the-past"/counterfactual readings, as shown by Heath's translation in (106c).

(106) **The FUTURE and PAST POTENTIAL/COUNTERFACTUAL in modalised contexts in Ritharrŋu-Wägilak**

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[93]Where there are two forms given for the PST marker, Heath (1980a) is ambivalent about the semantic characteristics of each form — i.e., whether they are synonymous or whether they represent a defective distinction. We will provide further evidence for the latter persepctive in §4.2.

a. *blijiman ŋay waŋa-na: "gulu-**rru** nhe yiŋ'-ŋiri=dhi wäŋa-ya.*
   policeman 3s say-**III** stay-**II** 2s DIST-LOC=FOC home-PROM

   *Yakaŋu nhe **wäni**-'may garra nhe git lokdap-**urru***"
   NEG   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*** *nhe*
   go.**II** 2s

   'You can/should/will go.' (or 'Go!')   (Heath 1980a:104)

c. *wäni-**ya** nhe*
   go-**V**   2s

   'You could/should/would/were about to go.'   (Heath 1980a:104)

This distribution can be straightforwardly represented by appealing to the "modal trichtomy" (that is, modelling branching time as composed of an *actual, potential* and *counterfactual* domain, *cf.* von Prince (2019); von Prince et al. (forthcoming) — introduced in §1.2.1, compare (11), *p.* 13.) Effectively, Ritharrŋu-Wägilak's four inflections can be thought of as a partition of a branching-time. This is shown in (107) and schematised in Figure 15.

(107) **Domains of the four inflections in Ritharrŋu-Wägilak, given a branching time frame $\mathfrak{U} = \langle \mathcal{I}, \prec \rangle$ and an evaluation index $i*$**

$\llbracket \text{PRES} \rrbracket^{i*}$: **actual present** $\{i \mid i = i*\}$
$\llbracket \text{FUT} \rrbracket^{i*}$: **potential** $\{i \mid i \succ i*\}$
$\llbracket \text{PST} \rrbracket^{i*}$: **actual past** $\{i \mid i \prec i*\}$
$\llbracket \text{CFACT} \rrbracket^{i*}$: **counterfactual** $\{i \mid \langle i, i* \rangle \text{ is unordered by } \prec\}$

As an example then, the contribution of PRES (following standard assumptions about tense) is taken to be the restriction of the instantiation time of a given predicate (P)'s to (actual) indices that overlap with the present: *i.e.*, PRES(P) is true iff P holds at $i*$.
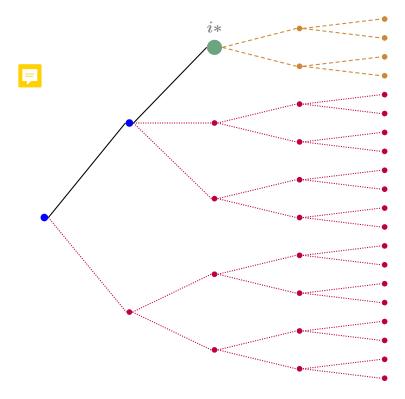
1.3.2 The central Arnhem linguistic area

This section has so far sought to familiarise the reader with the basic structure of a Yolŋu Matha verbal paradigm, taking the example of the Ritharrŋu-Wägilak (Southern Yolŋu) variety (itself to be revisited in § 4.2.)

In the sections that follow, we turn to a description of the distribution of the inflectional categories in Western Dhuwal-Dhuwala (WD). As we will see (and as shown in the introduction to this part of the dissertation), there are a number of

Figure 15. Ritharrŋu-Wägilak's verbal paradigm partitions the branching frame/modal domain (modelled as a set of partially-ordered indices.) Solid, dashed and dotted branches correspond to the ***actual, potential and counterfactual*** domains respectively. Colour-coding indicates which `rit` inflection each index is associated with (compare 107).

phenomena that complicate a unified treatment of the semantics of the WD paradigm. Introduced above, these phenomena include a CYCLIC TENSE system and ASYMMETRIC NEGATION.

Importantly, these phenomena are not exhibited in most Yolŋu lanuages, including those varieties phyletically closest to WD, *viz.* Ritharrŋu-Wägilak as well as the Eastern (*"Miwatj"*) varieties of Dhuwal-Dhuwala centered around Yirrkala (compare figures 13 & 14.) Similar patterns are, however, characteristic of the non-Pama-Nyungan languages of Maningrida — Burarra, Gurrgoni, Nakkara and Ndjébanna. Varieties of Djinaŋ (a Western Yolŋu outlier) are spoken in the Maningrida community and its outstations. The Ramingining community — traditionally the land of the Ganalbingu tribe (a *Yirritja* Djinba moiety) — is approximately 100km east of Maningrida. Djinaŋ, Djinba and WD (the westernmost varieties of Dhuwal-Dhuwala) all exhibit the cyclicity and asymmetric negation that is characteristic of the grammars of the Maningrida languages.

In view of the sustained contact between the non-Pama-Nyungan Maningrida languages and the (geographically) western varieties of Yolŋu Matha, it is assumed here that these two properties are examples of areal phenomena that characterise

the languages of central Arnhem Land (see appendix 2 of Waters 1989 for a short investigation of this perspective.)

<div align="center">※</div>

I will argue that these two phenomena — *cyclic tense* and *asymmetric negation* (w/r/t reality status marking) — are undergirded by the grammaticalisation of two semantical properties: **NON-FINAL INSTANTIATION** and **NONVERIDICALITY** respectively. The remainder of this chapter provides a description of the distribution of WD's four inflectional categories and how they appear to relate to the marking of temporal and modal ("reality status") information.

Cyclic tense and asymmetric negation will be further precised, and couched in a more detailed discussion of the expression of temporal and modal categories in WD (chh. 2 and 3 respectively.) A formal proposal (in terms of branching times) for the semantics of the WD verbal paradigm is then presented in chapter 4.

1.4   Verbal inflection in Western Dhuwal(a)

TMA distinctions in Western 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). Unlike for Ritharrŋu-Wägilak, summarised above (§ 1.3), work on Dhuwal-Dhuwala varieties—most notably Beulah Lowe's notes and lessons on Gupapuyŋu (first published in 1960) and Melanie Wilkinson's 1991 Djambarrpuyŋu reference grammar [republished & cited here as Lowe 1996; Wilkinson 2012 respectively]—has tended to eschew a metalinguistic gloss for these inflections, given the ostensible non-unifiability of their semantics:[94] the distribution of each of these inflectional categories is discussed in greater detail in this section. In addition to these inflections, the labour of encoding temporal and modal relations in WD is shared by a (closed) class of auxiliaries, which appear to interact with the verbal paradigm.

Further complicating the exposition of this (and a feature across Yolŋu Matha varieties, see § 1.3), is the fact that there are a number of *conjugation (sub)classes*: Lowe (1996) enumerates 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,[95] in addition to

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[94]Relatedly, in his treatment of Djinaŋ and Djinba, Waters (1980, 1989) glosses the function-in-context of each inflection, perhaps implying a polysemy treatment of each inflection in these languages: "[In Djinaŋ, t]here are twelve semantic categories for every verb, which are coded by seven suffixal forms. Consequently, five of the forms each code two different semantic categories..." 1980: 142

[95]Wilkinson identifies 14 distinct inflectional patterns in addition to a "non-inflecting" class (2012:307).

"non-inflecting" and (semi-)irregular categories (Wilkinson 2012). The paradigm for six WD verbs, taken to be representative of distinct different conjugation patterns is given in Table 7.

Table 7. 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).

Class	*Example*	I	II	III	IV
$\emptyset_i$ (2)	*marrtji* 'go'	*marrtji*	*marrtji*	*marrtjin(a)*	*marrtjinya*
$\emptyset_a$ (3)	*ḻuka* 'consume'	*ḻuka*	*ḻuki*	*ḻukan(a)*	*ḻukanha*
$\emptyset_{rr}$ (4)	*waṉdirr(i)* 'run'	*waṉdirr(i)*	*waṉdi*	*waṉdin(a)*	*waṉdinya*
N (5)	*ḻupthun* 'wash'	*ḻupthun*	*ḻupthurr(u)*	*ḻupthurr(una)*	*ḻupthuna*
N$_L$ (6)	*gurrupan* 'give'	*gurrupan*	*gurrupul(u)*	*gurrupara*	*gurrupana*
Ŋ (7)	*nhäma* 'see'	*nhäma*	*nhäŋu*	*nhäŋal(a)*	*nhänha*

Above, I alluded to Beulah Lowe's eschewal of a "semantic description" for each of the four inflectional classes, also followed by Melanie Wilkinson. Throughout, these categories will be glossed with bold-faced Roman numerals, following the conventions established by Lowe (see also Table 8, which adapts Wilkinson's summary of glossing decisions made by other grammarians.)

Table 8. 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).

		I	II	III	IV
Wilkinson 2012	djr	FIRST	SECOND	THIRD	FOURTH
Lowe 1996[96]	guf	Primary	Secondary	Tertiary	Quarternary
Tchekhoff & Zorc 1983	djr	BASE	FUTURE	Past$_1$	Past$_2$
Heath 1980c	dwu	Pres/Fut	Fut/Imp	Past	Past Remote
Morphy 1983	Djapuʔ	Unmarked	Potential	Perfective	Past Non-indicative

In the following subsections, I provide examples of the functional domains of each of the four inflections in Western Dhuwal-Dhuwala and other lexical material relevant to encoding TMA relations in this language.

1.4.1 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 that are interpreted with any of PRESENT, PAST or FUTURE reference. Here I provide examples of **I**-inflected clauses receiving each of these temporal interpretations.

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[96]Van der Wal 1992 adopts the same labelling scheme as Lowe (1996) although her analysis of the distribution of each of Gupapuyŋu's inflectional classes seems to diverge somewhat from Lowe's.

(108)   ***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   **ḻuka**   gapu (dhiyaŋu bala)*
1s   IPFV.**I** consume.**I** water ENDO.ERG then

'I'm drinking water at the moment.'   [DhG 20190405]

The sentences given in (108) 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**' — is understood as contemporaneous with speech time. In each sentence, imperfective marking (*ga* 'IPFV') is obligatory in order to establish present reference (see §2).

In addition to those present-referring sentences in (108), the data in (109) show compatibility between **I** and past time reference. In each of these examples, the events described by the predicates—*e.g.*, the arrival event described by *ŋay-atham* in (109b)—*precede* speech time. Similarly, the two past events in (c) both receive **I** inflection. The instantiation times of both of these events are further restricted (to the recent past) by temporal frame adverbs *barpuru* ≈ 'yesterday'.

(109)   **Past-reference encoded with I**

a.   *bäru-yi-**rri**   **barpuru**   nhuma-laŋgu rra ŋunhi-li-yi   ga*
crocodile-INCH-**I** **yesterday** 2p-DAT   1s ENDO-LOC-ANA and

*ŋänḏi-w ŋarra **barpuru**   ḻarr-**uma**   ga   nhuma rraku*
MO-DAT   1s   **yesterday** search.for-**I** and 2p   1s.DAT

*ḻakara-**ma***
tell-**I**

'Yesterday, I (appeared) to you as a crocodile there. And I was looking for my mum and you told me (where she was.)'

                                              (van der Wal 1992:107)

b.   *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)

    c.   *ḏirramu-wal* *yothu-wal* *bäpa-'mirriŋu-y*   *rrupiya* ***barpuru***
         man-OBL   kid-OBL   father-PROP-ERG money **yesterday**

        *djuy'yu-**n*** *märr*   ***barpuru*** *ga* ***barpuru*** ***buna**-ny*
        send-**I**   **somewhat** **yesterday** and **yesterday** arrive.**I**-PROM

        dhiyal-nydja
        PROX.ERG-PROM

        'The father sent money to the boy recently and it arrived here yester-
        day'   (Wilkinson 2012:343)

Finally, the examples in (110) below, show the compatibility of **I**-inflected verb forms and FUTURE temporal reference. In these contexts, the presence of *dhu* — the FUTURE marker (to receive a modal semantics) — is obligatory in order to establish future reference.

(110)   ***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**

        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 each of these three 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, to be described in the next subsection.)

    What we have seen here, then, is that **I** is compatible with temporal reference at, prior to, and subsequent to the moment of speech: on the basis of this evidence, we might conjecture that it has no temporal semantics.

1.4.2   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>.

(111) *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; neg. judg. – DhG 20190405)

    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]

    c. ***dhu*+I implies same-day future**

       walal #*(dhu)* ***buna***   *yalala*
       3p   #(FUT) arrive.**I** later

       'They'll arrive later.'
       SPEAKER COMMENT: You're talking about *yalala*; not tomorrow, some-
       time today.

The two sentences in (111) show how **II** is used in concert with the particle *dhu* to establish future temporal reference. A notable contrast between (110a) and (111a) is the apparently obligatory retrieval of a TODAY-reference time for **I**-inflected futures, as against a BEYOND-TODAY-reference time for **II**-inflected futures.[97] 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).[98]

    (112) 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.

(112) **Future possibilities marked with II**

    a. *Ŋarra* *ŋuli* ***bäynha*** *dhiŋgu-**ŋ*** *ŋawulul-yu*
       1s   HYP   MOD   die-**II**   smoke-ERG

       'I might die from the smoke.'   (Buchanan 1978:164)

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[97]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.

[98]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.)

b. *ŋayi bala* **balaŋu** *bukthu-**rru***
3s MVTAWY MOD break-**II**

'It (the recorder) might break.' [DhG 20190417]

II is additionally used to encode imperative clauses (113). Shown in (113b), negative imperatives (probibitives) are treated identically.[99]

(113) ***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]

Here, **II**-marked predicates have been shown to be compatible with **future** temporal reference. They co-occur with *dhu* (which we analyse as a FUTURE particle) to establish instantiation of the predicate subsequently to the day of utterance. **II** also occurs in imperative utterances and in (future-oriented) modal constructions with present perspective (112).

1.4.3 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 (114) below show the compatibility between **III** and a reference time that is 'earlier today. In (114d-e), apparent complementary distribution between I and **III** provides evidence of the categoricity of this distribuitional constraint.

(114) **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)

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[99]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" directive convention.

b. *Bili* *ŋayi* **marrtjin** *dhipuŋur* *natha-ŋur* *nyan'thuna-ŋur*
   COMPL 3s go.**III** PROX.ABL food-ABL eat.**IV**-ABL

   'He's already gone from having lunch here.'   (Buchanan 1978:150)

c. *dhiyaŋu bili* *goḏarr'mirri* *ga-**na*** *dhärra-**na*** *märrma'*
   PROX.ERG CPLV morning.PROP IPFV-**III** stand-**III** two

   malwan, *bala* *ŋayi* *Ŋarritjnydja* *wurrth-**urruna**.*
   sp. Malvaceae MVTAWY 3s *MÄLK*.PROM pull-**III**

   'Earlier this morning, there were two trees standing [there], then Ŋar-
   ritj pulled them up.'   [DB 20190405]

d. **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]

e. **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]

(114a) shows the compatibility between temporal frame adverbial (TFA) *gäthur(a)*
'today' and **III** in `djr`, which leads to an temporal interpretation of 'earlier today.'[100]
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 (115) show, a description of **III** as 'hodiernal/same-day
past' tense marker is inadequate.

(115) **REMOTE PAST and the III inflection**

   a. CONTEXT. A dreamtime myth.

   bäru *ga-**na*** *marrtji-**na*** *beŋuru* *Ḏulkarri'garri-ŋuru*
   crocodile IPFV-**III** go-**III** INDEF.ABL PLACE-ABL

   'The crocodiles came from Ḏulkarri'garri.'   (Van der Wal 1992:111)

   b. *(Ŋathili)* *ŋarra* *marrtji-**na*** *Sydney-lili*
   before   1s go-**III**   Sydney-ALL

   'I went to Sydney long ago.'   [DhG 20190504]

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[100]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.

c.   CONTEXT. The speaker is describing a locality as it was in her youth.

märrma'	*ga-**n***	*malwan-dja*	*dhärra-**n***	*yindi*	*maṉḍa-ny*
two	IPFV-**III**	hibiscus-PROM	stand-**III**	big	3d-PROM

'Two big hibiscus flowers were (growing).'   (Wilkinson 2012:339)

Unlike the HODIERNAL temporal interpretations that the sentences in (114) receive, the sentences in (115) involve reference to the 'REMOTE PAST.' In (115a-b),the instantiation time of the predicate is restricted by frame adverbials: *ŋäthil(i)*, which picks out a time 'in the distant past; prior to/earlier than (some other time)' (Wilkinson 2012:158), in addition to and *rarrandharryu* 'dry season':[101] The cooccurrence of these expressions restricts the predicate being questioned to *a prior dry season*. Conversely, the declarative sentence in (115c) requires no adverbial specification. A REMOTE PAST interpretation arises as a result of the **III** inflection alone, which is precised pragmatically by the discourse context (*sc.* a narrative that the speaker is telling about her childhood.) (c) 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). These, in effect, amount to categorical interpretive interactions between morphological marking and sets of contexts. The interaction between these can be understood as giving rise to a reference interval. This style of 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 9.

Table 9. 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.)

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

Additionally, there exists a set of psychological predicates that are frequently

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[101]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.

translated into English as present-tensed stative verbs which also (obligatorily) appear with **III**. Examples are given in (116).

(116) **Apparent present reference with III**

    a. *ŋarra dhuwal/dhika djawaryu-**rr**/rerrikthu-**rr**/djanŋarrthi-**n***
       1s   PROX/INDEFP be.tired-**III**/be.sick-**III**/be.hungry-**III**

       'I'm (a bit) tired/sick/hungry'   (Wilkinson 2012:278)

    b. *bili   djawar'yu-**rr**-a*
       CPLV be.tired-**III**

       'They're already tired'   (Wilkinson 2012:365)

    c. *ŋarra dhu dhuwal lakara-m ŋunhi nhä ŋarra nhä-**ŋal** dhiyaŋ*
       1s   FUT PROX tell-**I**   ENDO what 1s   see-**III** PROX.ERG

       bala
       MVTAWY

       'I'll tell you what I see right now.'   (Wilkinson 2012:366)

Wilkinson (2012:365–6) observes that the use of **III** here "appears to invoke a general temporariness to the state", noting that the state is ""achieved" and current relative to the moment of speech." That is, the (ostensibly stative) predicates themselves in fact denote state *changes.* This observation is cashed out in § 2.1.

1.4.4   The Quaternary inflection

The Quaternary 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 (117) and hypothetical/counterfactual descriptions as in (118).

(117) **IV in PAST HABITUAL predications**

    a. *Ŋayi **ŋuli** märra-**nha** ŋunhi meṉḏuŋ-nha*
       3s   HAB get-**IV**   ENDO snail-ACC

       'She would (used to) get (collect) snails'   (Buchanan 1978:147)

b. *…ŋorra-**nha** walal **ŋuli** marrtji-**nya** ŋunhi-li-yi,*
lie-**IV** 3p HAB go-**IV** TEXD-LOC-ANA

   *galku-**na** walal **ŋuli** ga-**nha** gapuw wirwiryu-**na**+ra-w*
   wait-**IV** 3p 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 MOD eat-**IV** chocolate

'The dog could've/must've eaten the chocolate.' [DhG 20190413]

(118) **Past modal (counterfactual) predications with IV marking**

a. CONTEXT. Speaker had a toothache.

*barpuru balaŋ ŋarra bala dentist-kal marrtji-**nya** dhiyak*
yesterday MOD 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 MOD 2s go-**IV** Darwin-ALL

'You should not go to Darwin.' (Buchanan 1978:164)

c. *Walanydja balaŋ ŋarraku ḻukuny gulk'mara-**nha**…*
3p.PROM MOD 1s.DAT foot.PROM cut.CAUS-**IV**

'They were going to/would have cut off his foot..' [AW 20190422]

These data demonstrate the relationship between the **IV** inflection and combinations of past temporal reference and various modal/aspectual operators which encode varieties of "non-actual" reality status.[102]

In this section, we have only considered "positive" clauses. Below—in Ch. 3—we see how the picture of WD inflection we have developed here complexifies significantly under negation (data showing these effects was also presented in the introduction to this part of the dissertation.)

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[102]NB: in addition to these inflectional functions, **IV** (and related forms) are additionally used in to derive nominals from verbal predicates (*i.e.*, 'NMLZR'.) Throughout this part of the dissertation, both inflectional and nominaliser functions of this suffix will be invariably glossed as **IV** (this does not imply any commitment at this stage to a monosemy account of *these* distributions; a semantics for the derivational uses of **IV** is not further considered here.)

1.4.5 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 is due to the data's apparent resistance to an analysis where each marker realises some unified semantic category (*i.e.*, PAST, PRESENT etc.) It is a contention of the current work that: • this difficulty is due to the interplay of CYCLIC TENSE and the NEGATIVE ASYMMETRY in reality status marking, and • each inflection class can be understood as encoding the status of a predicate with respect to two semantic properties. More detail about these phenomena and their implications for WD verbal semantics are provided below — § 2 describing temporal expression and § 3 describing modal expression.

Wilkinson's diagramatic representation (2012:326) of the relevant distributional features and how they are partitioned by the inflectional system is reproduced as Figure 10 (*p. 104* above). A compositional analysis for the inflectional classes is proposed in Ch. **??**.

Chapter 2

Temporal interpretation & CYCLIC TENSE

DISTINGUISHING I FROM III

In § 1.4, I provided a description of the distributional facts of the four 'inflectional classes' of Dhuwal(a). As we saw, these inflections are in a paradigmatic relation; all finite verbs receive exactly one inflection.[103] In the Western Dhuwal(a) varieties (as in other Yolŋu languages) verbal inflections play a central role in temporal expression. This chapter will be primarily concerned with understanding the expression of temporal categories in WD, and in particular the semantic properties that distinguish between the licensing of **I** and **III**.

The basic function of inflections **I** and **III** in determining the temporal location of a predicate, for example, is shown in (119).

(119) **Temporal contributions of I and III**

    a.   PRESENT TEMPORAL REFERENCE with **I**

        *gäthura ŋarra **ga** nhina-∅ wäŋaŋura*
        today   1s   IPFV-**I** sit.**I**   home.LOC

        'I am staying at home today.'

    b.   PAST TEMPORAL REFERENCE with **III**

        *gäthura ŋarra ga-**na** nhina-**na** wäŋaŋura*
        today   1s   IPFV-**III** sit-**III**   home.LOC

        'I was sitting at home (earlier) today.'

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[103]The formal identity of some inflections in particular conjugation classes notwithstanding. *marrtji* for example is taken to be formally ambiguous between 'go.**I**' and 'go.**II**'. Similarly, the "non-inflecting" class consisting of 15 borrowed items (*e.g. djäma* 'work', *riŋimap* 'ring up', see Wilkinson 2012:308) will be taken to be defective verb stems, ambiguous between all four inflected forms.

The data in (119) suggest *prima facie* a PRESENT-PAST distinction encoded by I and III respectively (which, as we saw in the discussion of Ritharrŋu-Wägilak in § 1.3, is a reasonable analysis for the cognate paradigm in Yolŋu varieties.) However, as discussed in § 1.4, data of the type shown in (120) quickly throw up problems for a straightforward account of these inflections as tense markers.

(120)   **Temporal contributions of I and III (non-today frame)**

    a.   RECENT PAST with I

    *Ŋarra ḻuk-**a***   *mänha barpuru*
    1s   drink-I water yesterday

    'I drank water yesterday.'   [BM 20190405]

    b.   REMOTE PAST with III

    *Ŋunhi ŋarra yothu yäna, ŋarra marrtji-**na** Sydney-lili*
    ENDO 1s   child only, 1s   go-III   Sydney-ALL

    'When I was a kid, I went to Sydney.'   [BM 20190405]
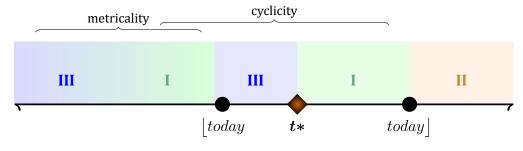
The data in (120) show that a *temporal remoteness* (or a *"metrical/graded tense"*) distinction is manifested in WD.[104] Inflection of predicates with III encodes some notion of "remoteness", grammatically partitioning the past domain by locating the relevant eventuality at some point in the (subjectively) distant/remote past.

When integrating the data in (119) and (120), and on the (natural) assumption of a model where moments/intervals of time are linearly ordered (*cf.* § 1.2), the intervals to which I- and III-inflected predicates can refer are DISCONTINUOUS. Figure 16 schematises this discontinuity.

Figure 16. 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.

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[104]See Comrie (1985:Ch. 4) for an overview of temporal remoteness systems. Cross-linguistic data on temporal remoteness mechanisms are the subject of recent work including Bohnemeyer 2018; Cable 2013; Hayashi & Oshima 2015; Klecha & Bochnak 2016; Martin 2010 a.o.

As described in §1.4.3, previous accounts of this phenomenon have described the data in terms of the oppositions between two binary categories: **(a)** "contemporary" (**I**) vs. "precontemporary" (**III**) *tense* marking and **(b)** a contextually-provided TODAY" and NON-TODAY reference frame. This inflection-reference frame interaction was shown in Table 9 (*p.* 122); each cell of which is represented by one of the datapoints in (119–120). This schema—originally due to Glasgow (1964) for Burarra data [bvr]—has been adopted and adapted by numerous other authors for describing the distribution of verbal inflections in Maningrida languages (see (Eather 2011; Green 1987, 1995) for Nakkara [nck], Burarra [bvr] and Gurrgoni [gge] respectively.)

While Comrie (1985:89) recommends 'appeal to its rarity as an excuse for according it [cyclic tense] marginal status in the theory', the current work contends that we should be desirous of a "unified" semantics for each of the verbal inflections.

The following sections consider the status of the WD verbal inflections and the relation that they bear to temporal expression. In § 2.1, I consider the expression of present reference and imperfectivity in WD and how these properties interact with a number of features of the lexical semantics of WD verbal predicates (*Aktionsart*). In § 2.2, we discuss past predication as it relates to temporal remoteness. Both of these sections provide details relevant to motivating a cyclic tense analysis of the WD verbal paradigm.

§ 2.3 comprises a discussion of cyclic tense and proposes the relevance of NON-FINAL INSTANTIATION in establishing temporal reference in WD.

2.1   Aspectuality & the WD verb stem

> [T]he present is like the window of a railway carriage in which we are sitting. If it were an infinitesimal slit we could not see out properly, and we could not see the countryside laid out with its features in their proper relations; but since it has a width light can enter and we can see each thing in relation to the next and so form for ourselves a picture of the whole...   (Hamblin 1972:325)

The obligatory occurrence of *ga* 'IPFV.**I**' with present-tensed event descriptions has led some authors (*e.g.*, Heath 1980c:46) to describe this item as a present-tense marker.[105]   As we will see here, this is not the most parsimonious analysis of the

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[105]Compare with Table 8. Note that Heath suggests that 'the [temporal] value of [**I** and **II**] depends on context, including the presence of particles. He does not attempt a compositional analysis of the verbal inflections (1980c:38,46). Additionally, in various texts *ga* (similarly to *gan*) is glossed as a DURative marker. He does, however, suggest that in various dialects of Dhuwal (particularly Djapu', the variety that seems to diverge more from the Western Dhuwal(a)) that marking this category is uncommon (and in fact the auxiliary may be inflection-invariant.)

While in this Dhuwal sketch, Heath reports working with Djambarrpuyŋu and Djapu' speakers, he also indicates having conducted this work in communities including Ngukurr and Numbulwar (the far south-eastern extent of *Yolŋu wäŋa*.)   Consequently, it is plausible that his description is more representative of Eastern Dhuwal (*Miwatj*) varieties than of WD.

Dhuwal-Dhuwala inflectional system. The categorical appearance of *ga* (or, in fact, other aspect morphology) is, I will argue, an epiphenomenon of ~~to~~ the well-understood incompatibility between PRESENT and PERFECTIVE (*e.g.*, Comrie 1976:66*ff*, Smith 1997:110, Malchukov 2009; Schaden 2011; de Wit 2016 a.o.) in concert with a LEXICAL CONSTRAINT on the situation aspect (*Aktionsart*) of verbal predicates in W Dhuwal(a).

2.1.1 The WD verb as a property of events

An analysis that treats *ga* as encoding present tense~~,~~ can be promptly dismissed by data such as those in (121) where the reference time for each sentence is clearly located in the past of utterance time (hence compatibility with past-referring temporal frame adverbials.)

(121)   *ga* '**IPFV.I**' in past-referring sentences

     a.   **barpuru**   ŋali   **ga**   waŋanha-mi-**rr**
          yesterday   1d.INCL   IPFV.I   speak.IV-RECIP-I

          'We were speaking to each other yesterday.'   [AW 20190426]

     b.   *nhä*   *nhe*   **ga**   *djäma*   **barpuru?**
          what   2s   IPFV.I   work   **yesterday**

          'What were you doing yesterday?'   [DhG 20190413]

     c.   **ŋäthili**   **dhuŋgarra-y** *djäma* ŋarra **ga**   *shopŋura*
          previous year-ERG   work   1s   IPFV.I   shop.LOC

          'Last year I was working at the shop.'   [DB 20190416]

In fact, there is significant evidence that all verbal predicates in WD (or at least those varieties spoken in Ramingining) are lexically event-denoting. This has already been suggested by the data in (116), where stative concepts like BE SICK and BE TIRED appear to in fact be *implicated* by (de-nominal) **III**-inflected verb forms (*rirrikthurruna* literally 'I became sick' ⤳ 'I am (currently) sick'). This phenomenon is shown again in (122a). Explicit predications about current states may require periphrasis (*e.g.*, the nominal predication in 122b). Meanwhile, the *ga*-marked **I** form (c) results in a state-change reading.

(122)   *rirrikthun* 'sick': state or state-change denoting?

     a.   *Ŋarra*   *rirrik-thu-**rruna***
          1s   sick-VBLZR-**III**

          'I'm sick.'   [DB 20190405]

b. *Ŋarra dhäkay-ŋänha-mirri   rirrikthu-**n***
   1s   feeling.ERG-hear.IV-PROP sick-INCH-I

   'I'm feeling sick.'   [DB 20190405]

c. *Dhuwala ŋarra ga   rirrikthu-**n***
   PROX   1s   IPFV.I sick-INCH-I

   'I'm getting sick.'   [DB 20190405]

Relatedly, in (123), *gutharra* is understood to be in the process of asking for food in view of her current 'hunger' state. That her hunger holds in the present is an implicature of a past-tensed eventuality (state-change) of 'becoming hungry.'

(123) ***djaṉ̱ŋarrthin* 'hungry': post-state & present-predication**

*Gutharra-y **ga**   waŋ-**a** märi-nha   ŋatha-wa bili   ŋayi*
DACH-ERG   IPFV.I speak.I MoMo-ACC food-DAT because 3s
    *djaṉ̱ŋarr-**thi-na***
    hunger-INCH-**III**

'*Gutharra* asks *märi* for food because she's hungry.'   [WG 20171208][106]

   As well as derived (de-nominal) verbs, simplex verbal stems with psychological/perception semantics — *e.g.*, *nhäma* 'see', *dharaŋan* 'understand', *guyaŋa* 'think' — seem to lexically encode *events*. When predicating of a presently-holding eventuality/state, these verbs require imperfective marking. Otherwise, a **III**-inflected form appears to implicate that the post-state of the event described by the predicate still holds. This is shown for *nhäma* 'see' in (124) below. In these cases an (eventive) predicate denotes a bounded, telic type of situation: an ACHIEVEMENT in the sense of Vendler (1957) or HAPPENING per Bach (1986).

(124) ***nhäma* 'see': perception as a telic event**

a. *Ŋarra nhä-**ŋala** wuŋgan*
   1s   see-**III** dog

   'I see the dog.'   [DB 20190405]

b. *Ŋarra* #*(ga)*   *nhä-**ma** wuŋgan dhiyaŋu   bala*
   1s   #(IPFV.I) see-I   dog   ENDO.ERG MVTAWY

   Intended. 'I'm watching the dog currently.'   [DB 20190405]

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[106]This example is the title of Waymamba Gaykamaṉu's [WG] Gupapuyŋu translation of a Djambarrpuyŋu text composed by Galathi Dhurrkay (15 Oct. 2014) for CDU's Yolŋu Studies program.

(125) **Performative reading of *wäwungum* 'promise' requires imperfective marking**

(dhiyaŋ	*bala)*	*ŋarra*	**(ga)*	*wäwun-gum*	*(ŋunhi*	*napurr*	*dhu*
PROX.ERG	MVTAWY	1s	IPFV.**I**	promise-CAUS.**I**	ENDO	1p.EXCL	FUT

yaka'yurr	*CDP)*
NEG.VBLZR.**II**	CDP

'(Right now,) I promise (that we will eliminate [the Community Development Program].)' [AW 20190428]

Relatedly, Wilkinson (2012:557) describes a 'minor' lexical category that she refers to as "adjectival"-predicates. This is a closed class of three commonly occurring predicates which all denote stative properties (translating as lexical statives whose semantics correspond to a species of *psych verb* cross-linguistically): *djäl* 'want, like', *marŋgi* 'know' and *dhuŋa* 'not.know.'[107] Morphosyntactically, each takes an intransitive frame (selecting for a NOM experiencer and DAT theme) and resists aspect marking. As with other nominal elements, productive suffixation (notably -*thirr(i)* 'INCH.**I**', -*kum(a)* 'CAUS.**I**' and -*thun/-'yun* VBLZR.**I**) is available to derive verbal forms (intransitive and transitive, respectively.) The contrast between the two continuations in (126) below shows the incompatibility between stative predicate *djäl* 'like' and aspect marking (a), which, conversely, is obligatory for the derived verbal predicate in (b), corresponding to the observations made above about state change predicates.

A similar effect is shown for the predicate *marŋgi* 'know' (127), where the eventive ("change of state") semantics of the verbal predicate *marŋgithirr(i)* 'learn ≈ come to know' are transparent.

(126) **Stative *djäl* 'like, want': incompatible with *ga* 'IPFV' marking**

Ŋäthili	*ŋarra*	*bäyŋu*	*djäl*	*ḻatjin'-gu...*
previously	1s	NEGQ	like	mangrove.worm-DAT

'I didn't used to like *ḻatjin*...

a.

...	*dhiyaŋunydja bala*	*ŋarra*	*(*ga)*	*djäl*	*ḻatjin'-gu*
	now	1s	(*IPFV)	like	*ḻatjin*-DAT

b.

...	*dhiyaŋunydja bala*	*ŋarra*	**(ga)*	*djäl-thi-rri*	*ḻatjin'-gu.*
	now	1s	*(IPFV)	like-INCH-**I**	*ḻatjin*-DAT

'...now I do like them.' [DhG 20190417]

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[107]These verbs also have a range of circumstantial modal readings (ability, bouletic, preferential), perhaps predictable given their propositional attitude-type semantics. Examples of these readings are given in (128), and additionally in Wilkinson (2012:648).

(127) **Stative *marŋgi* 'know': incompatible with *ga* 'IPFV' marking**

    a. *Ŋarritjan (*ga)*   **marŋgi** *Baŋaḏi-wa*
        MÄLK   (*IPFV.**I**) know MÄLK-DAT

        '*Ŋarritjan* knows *Baŋaḏi*.'   [DhG 20190417]

    b. *Dhiyaŋu bala Wamuttjan* **ga**   **marŋgi-thi-rri** *Bäŋaḏi-wa*
        now   MÄLK   IPFV.**I** know-INCH-**I** MÄLK-DAT

        '*Wamuttjan* is getting to know (learning about) *Baŋaḏi*.'
                                                 [DhG 20190417]

Similarly, the stative predicate *dhuŋa* resists aspectual marking. (128a) shows the establishment of a (remote past) reference time with a subordinate temporal clause while (b) shows how the corresponding verb form (as with its counterparts in the examples above) requires explicit imperfective marking for a present stative predication.

(128) **Stative *dhuŋa* 'ignorant'**

    a. *Ŋunhi ŋarra yothu yän, ŋarra **dhuŋa**   ḻupḻupthunara-w*
        ENDO 1s   child only, 1s   ignorant swim.**IV**-DAT

        'When I was a kid, I couldn't swim.'   [AW 20190429]

    b. **CONTEXT.** I decline an invitation to dance at a forthcoming ceremony.

        i.   — *Ŋarra **dhuŋa**   girritjinara-w*
                1s   ignorant dance.**IV**-DAT

        ii. — *Bili   nhe ***(ga)**   **dhumbal'yu-n*** for the step/the beat.
                because 2s *(IPFV.**I**) not.know-**I**   DAT

           — 'I don't know how to dance (at the *buŋguḻ*).'
           — 'Because you don't know the steps, the beat.'
                                            [AW 20190429]

The behaviour of these nonverbal predicates (*i.e.*, their resistance to explicit aspect marking) is consistent with cross-linguistic behaviour of stative predicates.[108]

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[108]By way of examples (of incompatibilities between stative predicates and explicit marking of viewpoint aspect distinctions):

- The infelicity on progressive-marking of stative verbs in English (e.g. Dowty 1979:55, Taylor 1977:205 a.o.)

- Whereas dynamic verbs in Russian all appear with imperfective and (inflected) perfective stems, the latter is unavailable for stative verbs (Smith 1997:227).

- In Navajo, 'overt viewpoint [aspectual] marking' only occurs in non-stative sentences (Smith 1997:297).

  See also Bohnemeyer & Swift (2004) for a typological consideration of the relation between viewpoint aspect and the inherent aspectual properties of verbs (or, the "sensitivity" of aspect marking to verb class.)

So far in this section, we have seen evidence of an organising principle in W. Dhuwal(a) where all verbal (inflecting) predicates lexically encode eventive (dynamic) situations which are temporally bound (*i.e.*, have endpoints). This principle is formulated in (129).

(129)   **VERBAL STEMS AS INHERENTLY EVENTIVE IN W. DHUWAL(A)**
        W. Dhuwal(a) verbal predicates denote properties of events.

As mentioned above (compare the Hamblin quote, *p.* 128 above), situations that obtain in the present 'must be open and unbounded, without endpoints... ongoing events; particular states and general states' Smith (2008:230). This is formulated as a basic pragmatic principle as the constraint in (130).

(130)   **THE *BOUNDED EVENT* CONSTRAINT**
        Bounded situations may not be located in the present.   (Smith 2008:231)

A consequence of the interaction of the two contraints in (129) and (130) is that **unmodified verbal stems** (which, in WD, obligatorily denote bounded, eventive situations) **are infelicitous with present temporal reference**. As we have seen in the above examples, W. Dhuwal(a) encodes stative eventualities/situation types by way of three strategies:

(131)   a.   nominal predications,

        b.   post-state implicatures (through both derived and simplex past-denoting predicates) or

        c.   the explicit marking of imperfectivity (normally with inflecting auxiliary *GA* 'IPFV' (or stance/motion verbs, see Wilkinson 2012:369) or with the habitual marker *ŋuli* 'HAB'.)

In fact, Dowty (1979, 1986) — along with Taylor (1977) — defines criteria for progressive marking and stative sentences which theorise that "no matter what the aspectual class of the lexical verb", any progressive-marked sentence will be stative. These conditions, laid out in Dowty (1986:42-4), are recapitulated in (132) below:

(132)   a.   **STATIVE CRITERION (the 'subinterval property')**
             $\text{STATIVE}(\varphi) \leftrightarrow \varphi(i) \rightarrow \forall i' \big(i' \sqsubseteq i \rightarrow \varphi(i') \big)$
             A sentence φ is stative iff it follows from the truth of φ at i that φ is true at all of i's possible subintervals i'

        b.   **A SEMANTICS FOR THE PROGRESSIVE**
             $\text{PROG}(\varphi)(i) \leftrightarrow \exists i' \big(i' \sqsupset i \wedge \varphi(i') \big)$ The progressive form of $\varphi(i)$ is true iff there is some proper superinterval i' at which φ is tue.

That progressive-marked sentences necessarily meet the stative criterion is deduced in (132c) below.

(132)   c..   ***Theorem.*** *Progressive-marked sentences entail stativity (the subinterval property holds.)*

i.	$\textsc{prog}\varphi(i)$	*PREMISE*
ii.	$\exists i' \sqsupset i \wedge \textsc{prog}\varphi(i')$	(132b), i.
iii.	$\forall i''(i'' \sqsubseteq i \rightarrow i'' \sqsubseteq i')$	def. $\sqsubseteq$, ii.
iv.	$\textsc{prog}\varphi(i'')$	(132b), i,ii i.
v.	$\textsc{prog}\varphi(i) \rightarrow \forall i''\big(i'' \sqsubseteq i \rightarrow \textsc{prog}\varphi(i'')\big)$	i,iii,iv
vi.	$\textsc{stat}\big(\textsc{prog}\varphi(i)\big)$	(132a) $\square$

All this is to suggest that all W. Dhuwal(a) verbal predicates denote properties of bounded events, a class of situations that are incompatible with present temporal reference. Nominal predication (including the adjectival and locative predicates) and sentences with imperfective marking denote states. Consequently, in WD, all verbal predicates obligatorily cooccur with *ga* 'IPFV.I' when referring to a presently-holding state.

2.1.2   Modelling predication in WD

Consequently, our ontology will contain a *domain of eventualities* D_ε partitioned into stative and eventive subtypes. Variables over events will be notated e, over states s, summarised in (133).

(133) $\mathfrak{D}_\varepsilon \begin{cases} \mathcal{E}_\epsilon & \text{eventive situations} & e, e', e'', e''' \\ \mathcal{E}_s & \text{stative situations} & s, s', s'', s'''... \end{cases}$

Verb stems are then understood to denote sets of events $\langle \varepsilon_e, t \rangle$. These obligatorily combine with an aspectual operator (*e.g.*, *GA* 'IPFV' or $\varnothing$ 'PFV') to yield a property of intervals $\langle \iota, t \rangle$. Following the neo-davidsonian approach assumed in Deo (2015a), these operators "map properties of [events] to sets of intervals relative to which these predicates are instantiated via existential quantification over the Davidsonian event variable" (11).

Above, we saw examples of derived (de-nominal) verbs with change-of-state semantics. Whereas we have seen that nominal predicates are often used to encode stative situation types, productive suffixation — *-'THu-* 'VBLZR', *-THi-* 'INCH', *-ku-/-THa-* 'TR' and *-mara-* 'CAUS'[109] — derives inflecting verbal predicates with accordingly eventive semantics.[110] Wilkinson (2012) demonstrates the paradigmatic

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[109]The forms of these suffixes are subject to significant allomorphy. I generalise over each category following the proposals of Wilkinson (2012:§ 7.5).

[110]According to Dowty (1972, 1979), statives are in fact the "basic" predicate type which composes with a finite number of [situation] aspectual operators/connectives to yield predicates of events.

relation between these predicates. A number of examples of these verbal deriva-
tions are given in Table 10 below (predominantly from Wilkinson's description)
and formal proposals for the contributions of a number of these operators are given
in (134) below.[111]

Table 10. Morphological derivation of inflecting eventive predicates

STATIVE PREDICATE		*-THi* 'INCH'	
baṉḏany	'shallow'	*baṉḏany-dhin*	'dry up.I'
gorrmur	'hot'	*gorrmur-'yin*	'get hot, have fever.I'
buthalak	yellow	*buthalak-thin*	'be(come).yellow.I'
biyaṉi	'fear'	*biyaṉi-thin*	'be.frightened.I'
STATIVE PREDICATE		***-THu* 'VBLZR'**	
warwu	'sorrow'	*warwu-'yun*	'worry, feel.upset.I'
bilma	clapstick	*bilma-'yun*	'use.clapstick.I'
ŋaḏi	'discontent'	*ŋaḏi-'yun*	'sulk.I'
STATIVE PREDICATE		***-ku/-THa* 'TR'**	
baṉḏany	'shallow'	*baṉḏany-kuma*	'dry.I'
dhunupa	'straight'	*dhunupa-kuma*	'put.right.I'
galki	'close'	*galki-kuma*	'bring.close.I'

(134)   **The functions of verbal derivation**

    a.   **A semantics for *-THi* 'INCHoative'**

        i. $\text{BECOME}\ \varphi(i) \underset{\text{def}}{=} \exists j[j \underset{\text{init}}{\sqsubseteq} i \land \neg\varphi(i)] \land \exists k[k \underset{\text{fin}}{\sqsubseteq} i \land \varphi(i)]$

           A formula BECOME φ is true at i if φ is both: true at a final subin-
terval k and false at an initial subinterval(j).   (Adapting liberally
from Dowty 1979)

           This is diagrammatised in Figure 17. [112]

        ii. $[\![\,\text{-}\textit{THi}\,]\!]_{\langle\langle\varepsilon_s,t\rangle,\langle\varepsilon_\epsilon,t\rangle\rangle} = \lambda P^s.\lambda e[\text{BECOME}(P^s)(e)]$

           -THi 'INCH' is a situation operator which takes a property of states
$P^s \subseteq \mathcal{E}$ and returns the set of events BECOME $P^s \subseteq \mathcal{E}_\epsilon$.

    b.   **A semantics for *-ku~-THa* 'TRansitiviser'**

        $[\![\text{-THu}]\!]_{\langle\langle\varepsilon_s,t\rangle,\langle e,\langle\varepsilon_e,t\rangle\rangle\rangle} = \lambda y\lambda P^s.\exists e[\text{CAUSE}(y,\text{BECOME}(P^s)(e))]$

---
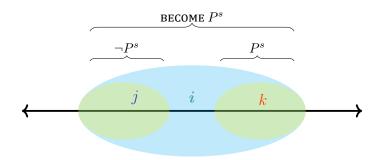
[111]The semantics for *-'THu* 'VBLZR' is less transparent. Discussed in Wilkinson (2012:375–9), this
less productive suffix involves deriving "delocutive" uses in addition to a number of other apparently
metonymic denominal constructions. Wilkinson also describes -MARA- as a CAUSATIVE suffix (383–
7). In this respect, how its semantics differ to *-ku~-THa* 'TR' is unclear.

[112]This predicate, labelled COME ABOUT in Dowty's 1972:45ff dissertation appeals to a dense series
of moments in time before being updated to an interval semantics in 1979:139ff, following Bennett
& Partee (2004). Where Dowty appeals to an initial/final overlap relation (∘), here I replace that
with notions of initial/final subintervals which seems to partially avoid some of the problems he
discusses (140-2). Nevertheless, as formulated here the definition is still too weak and does permit
for i's theoretically unbounded length. Dowty partially solves this by stipulating that i is the largest
interval for which these properties hold.

> *-THu* 'TR' is a situation operator which takes a property of states P^s and returns a function from individuals (agents/causers) to events ($\lambda y.y \text{ CAUSE BECOME } P^s \subseteq A \times \mathcal{E}_\epsilon$)

Relevantly for current purposes, the nominal predicates in the first column of table 10 are all state-denoting and, consequently, are incompatible with verbal inflections and imperfective marking (sc. GA). As (134) shows, on a neo-Dowtian treatment, when verbs are derived from these stative predicates, an eventive interpretation is generated. This captures the intuition that **predicates of events, in effect, denote changes in state over time** ("dynamicity").

Figure 17. Truth conditions for state change operator BECOME (adapted from Dowty 1979)

This treatment further evinces the infelicity of present-tensed eventive predication with which we have been concerned so far in this section. Given that eventive predicates of the BECOME-type assert the achievement of a **state-change** over time, reference to an entire, bounded eventuality of this type must be located within an extended interval in which both P and $\neg P$ hold.

In this section, then, so far we've made the following observations:

  i. Dhuwal(a) verbal predicates denote properties of events;

 ii. Eventive predication is incompatible with present-reference;

iii. Stative predications (which are present-tense compatible and resist aspectual modification) involve one of the three strategies given in (131), spelled out in Table 11 below.

Table 11. Strategies for achieving present temporal reference in W Dhuwal(a)
J denotes *djawar-* 'tiredness', b denotes the individual *Baŋaḏi*.
Note that the ordering relation between speech time and event time is taken to be encoded by the inflection. This is not completely represented in this table.

TYPE	EXAMPLE	*SCHEMA*
nominal	*baŋaḏi djawar-mirr* MÄLK tired-PROP $\lambda s.Jb(s)$	
post-state	*baŋaḏi djawar-yu-rr(una)* MÄLK tired-VBLZR-**III** $\lambda s.\exists e[\text{BECOME}(Jb)(e)$ $\wedge$ $\tau(e) \prec \textbf{now}](s)$	
imperfective	*baŋaḏi ga djawar-yu-n* MÄLK IPFV.**I** tired-VBLZR-**I** $\lambda s.\exists e[\text{BECOME}(Jb)(e)$ $\wedge$ $\tau(e) \sqsupset \textbf{now}](s)$	

2.2   Talking about the past

Perhaps the most important distinction between **I** and **III** is that events that are predicated as **including the time of speech** ($t*$) are felicitious only with **I**, modulo the caveats about post-state predication discussed in the section above.)

Conversely, in this chapter we've also seen that *past* temporal reference for eventive predicates in WD is compatible with *either* **I** or **III** inflection. This is clearly demonstrated again by the conjoined, past-referring sentences in (136a–b) below.

(136)   **Past reference with I and III (conjunction)**

a.   [*ŋarra ḻuk-**a**   mänha barpuru*] *ga* [*ŋarra ḻuk-**ana** mänha*
1s   drink-**I** water yesterday   and   1s   drink-**III** water

dhiyaŋu   bili]
PROX.ERG CPLV

'I drank water yesterday and I drank water just before (earlier today).'
[DB 20190405]

b. *ŋarra barpuru   munhagu   ŋarra **ḻuka** djinydjalma' ga*
   1s   yesterday night   1s   eat.**I** crab   and

   *roŋanmara-**ŋala** bäpawa   märr ŋayi dhu **ḻuka** dhiyaŋu*
   return.CAUS-**III**   father-DAT so   3s   FUT   eat.**I**   PROX.ERG

   bala   goḏarrmirri
   MVTAWY morning

   'I ate some crab last night and this morning brought some back for Dad
   so that he can eat (some).'   [DB 20190416]

Ultimately, we can think of the temporal interval (*i.e.,* range of possible times)
that are made available by each inflection ~~can be described~~ as follows (this is un-
packed in greater detail in the following subsection & including schematically in
Figure 18, *pg.* 142 below.)

(137) **Reference intervals compatible with I and III**

   I $\tau(e)\circ$ **[**RECENT PAST **,** END.day-of-speech**)**
        I is compatible with event descriptions temporal reference from the
        RECENT PAST through the end of the day of utterance

   III $\tau(e)\circ$ **(**REMOTE PAST **,** time-of speech**]** **III** is compatible with event de-
        scriptions with past temporal reference (up until, but not including
        speech-time.)

Below, we consider various options for theorising the distributional differences
between (and meaning contribution of) **I** and **III**.

2.2.1   An attempt at an aspect-based analysis

I is most clearly distinguished from **III** by its compatibility with present temporal
reference. Additionally, as shown in the discussion of Wägilak in §1.3, cognates of
I in closely related Yolŋu varieties clearly realise present tense. In view of these
facts, a possible model of the distribution of **I** and **III**, might take the basic meaning
of **I** to be that of a present tense marker.

Shown throughout, an "off-the-shelf" lexical entry, where the semantic contri-
bution of **I** is to restrict the instantiation time of the event to *intervals overlapping
with speech-time* is untenable in view of **I**'s compatibility with past-reference. Con-
sequently, an analysis of **I**-as-PRESENT would need to invoke some notion akin to
the EXTENDED NOW (XNOW, *sc.* "a time interval reaching back from the time of ut-
terance" Cover 2010:49).[113]

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[113]Note that this definition of XNOW differs somewhat from (is a subset of) the XNOW formalised
in Stump 1985:225, for whom it is taken to be a relation between *any* arbitary interval i such that
$\text{XNOW}(i) = \{i' \mid i' \sqsupseteq_{\text{final}} i\}$.

A consequence of an analysis of this type would be that, past-referring utterances with **I**-morphology must be understood "not [as locating] a situation at some definite point in the past, but only to offer it as <u>relevant to the current situation</u>", a semantic domain traditionally associated with the ANTERIOR or PERFECT aspect (Bybee et al. 1994:62, underlining added).

Appeal to the notion XNOW has been deployed in a number of influential accounts of the English present perfect (notably McCoard 1978; Portner 2003 a.o.) to explain both: • intuitions about the 'current relevance' of present perfect predications and, importantly • "the present perfect puzzle" (see Klein 1992; Schaden 2009), *sc.* the incompatibility of the present perfect with TFAs for the past (*e.g.*, **I have eaten a few hours ago*.)

Of course, as we have seen, this account struggles with the WD data. **I** frequently co-occurs with TFAs-for-the-past. *E.g.*, *barpuru/yawungu* 'yesterday.') YESTERDAY-reference, meanwhile does *not* cooccur with **III** in the varieties under investigation. This is shown again in (138):

(138) **Interactions between I and III and recent past-denoting TFA *barpuru***

a. *ḏirramuwal yothuwal bäpa'mirriŋuy   rrupiya barpuru   **djuy'yu-n**,*
   man.OBL   child.OBL father.PROP.ERG money   yesterday send-**I**

   märr barpuru
   kinda yesterday

   *ga **barpuru buna**-ny   dhiyal-nydja.*
   and yesterday arrive.**I**-PROM PROX.LOC-PROM

   'The father sent money to the boy recently and it arrived here yesterday.'   (Wilkinson 2012:343)

b. **ŋarra ga-na **ḻuka-na**   barpuru*
   1s   IPFV-**III** consume-**III** yesterday

   INTENDED. 'I was drinking water yesterday.'   [DhG 20190405]

Given that TFAs for the past ought to be compatible with past-tense marking and incompatible with present-tense marking, the PRES/PST analysis of these inflectional categories makes counterfactual predictions (infelicity with **I** and felicity with **III**, *cf. 138a–b).*

On the basis of this data we can dismiss a treatment that treats **I** as PRES-denoting and accounts for the *recent past* uses as emerging out of a PERFECT/ANTERIOR reading of the present.

On the other hand, the compatibility of **III** with SAME-DAY PAST reference and with the change-of-state readings described above are evocative of the "recent past" and "persistent situation" readings that are often taken to characterise perfect constructions (Comrie 1976:Ch. 3). Given that **III**'s cognates in other Yolŋu varieties

are associated with past tense, it is worth briefly contemplating whether **III**'s current distribution might have arisen due to some variety of a PERFECT-TO-PERFECTIVE/PAST type grammaticalisation trajectory.[114] For example, the data are evocative of the distribution of (erstwhile) perfect constructions in varieties of Peninsular Spanish apparently undergoing the "aoristic drift" — where the perfect is compatible with certain recent past (*e.g.*, SAME DAY) contexts and competes with the older preterite form in these contexts (*e.g.*, (Howe 2006) and (Curell i Gotor 1990:115*ff*) for Catalan.)

This phenomenon and its relevance for an analysis of the Yolŋu data presented here is further considered in the subsection below (§ 2.2.2).

2.2.2 A disjunctive semantics

A consequence of these data for theories of tense is that, if we assume an "off-the-shelf" account of tense marking as encoding a restricted indefinite (or alternatively a temporal pronoun/presupposition regarding the relation between a contextually-provided reference time and the time of speech), we are left with disjunctive lexical entries for each of **I** and **III**, suggested below in (139).

(139) **A polysemy treatment of the temporal contribution of I and III**

a. $[\![\text{ I }]\!]^c = \lambda t : \begin{cases} t \in \textbf{\textit{today}}' \leftrightarrow t \circ t_0 & . t \quad \text{[NONPAST]} \\ t \notin \textbf{\textit{today}}' \leftrightarrow t \prec t_0 \wedge \mu(t, t_0) < s_c & . t \quad \text{[RECENT PAST]} \end{cases}$

I enforces a presupposition that: the reference time t coincides with speechtime t_0, **OR**

if t does NOT fall within the interval *today*, then the temporal distance by which t precedes t_0 is ***below** some contextually provided standard s_c*

b. $[\![\textbf{III}]\!]^c = \lambda t : \begin{cases} t \in \textbf{\textit{today}}' \leftrightarrow t \prec t_0 & . t \quad \text{[TODAY PAST]} \\ t \notin \textbf{\textit{today}}' \leftrightarrow t \prec t_0 \wedge \mu(t, t_0) > s_c & . t \quad \text{[REMOTE PAST]} \end{cases}$

III enforces a presupposition that: for a reference time t that falls within the interval '$today$', then it precedes speechtime t_0, **OR**

if t does NOT fall within the interval '$today$', then the temporal distance by which t precedes t_0 is ***above** some contextually provided standard s_c*

In effect, the "disjunctive presupposition" account captures the descriptive facts of the "cyclic" tense systems that characterise western Arnhem languages and the TENSE-FRAME interactions of Glasgow 1964 *et seq.* (see Table 9, *pg.* 122). It treats each of **I** and **III** as having two possible denotations which are adjudicated by the contextual retrieval of a topic time t and a process of "checking" whether t falls within a privileged interval, *viz. today* (DAY-OF-SPEECH).

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[114]The "pathway" PERF $\rightarrow$ PFV has been referred to as the "Aoristic drift" (Schaden 2009, 2012). See (Schwenter 1994) for the Alicante variety of Peninsular Spanish, (Condoravdi & Deo 2015) for the instantiation of this pathway in Indo-Aryan.

In favour of an approach that directly references the day-of-utterance, typologically, there appears to be some evidence in favour of a DAY-OF-SPEECH interval with linguistic consequences. In a well-known example, for a number of Romance languages, "present perfect" constructions have generalised into simple PERFECTIVE or PAST tense markers (the so-called "Aoristic drift" see Schaden 2009, 2012). In an ostensible transition stage, the use of the present perfect with past temporal reference is restricted to the day of speech (*HODIERNAL* temporal reference (< Lat. *hōc diē* 'this day'); Comrie 1985; Dahl 1985). This phenomenon is shown for Alicante Spanish in (140) below where, according to Schwenter (1994), there are very few recorded utterances of the type given in (140b), particularly among younger speakers.[115] That is, the *perfect construction* (140a) competes with/blocks the simple past in predications about the same-day past. Schwenter's data points to the loss of a grammaticalised PERFECT, the two past tenses now rather encoding differential temporal remoteness (*sc.* metricality.)

(140) **In Alicante Spanish, the (erstwhile) present perfect assumes a PFV reading (restricted to same day utterances)**

    a. (Erstwhile) *Perfect* construction functioning as same-day past-perfective

       Hoy   me he levantado   a las siete
       today me have.1s arisen at the seven

       'Today I have got up at 7 o'clock.'

    b. Preterite/simple past is degraded in same-day past predications for Alicante speakers.

      *% Hoy   me levanté a las siete
       today me arose.3s at the seven

       'Today I got up at 7 o'clock.'   (Schwenter 1994:91)

Specific HODIERNAL forms are cross-linguistically reasonably robust; additionally attested in African, American and Australian languages according to Comrie (1985:87), TODAY/BEFORE TODAY (daily cycles) representing the most common "cut-off point" for grammaticalised "degrees of remoteness", along with a (more vague) subjective distinction between 'RECENT' and 'NON-RECENT' (see also Botne 2012). Both of these thresholds appear to be grammaticalised in WD.

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[115]As suggested above, a similar distinction appears to be drawn in Catalan, where the majority of *perfect* uses establish hodiernal reference ('narrate[s] events if they have taken place within the last twenty-four hours') according to Curell i Gotor (1990:236–7). While Curell i Gotor claims that *perfect*s are obligatory if making past reference to the day of speech, she points out that (presumably older) non-hodiernal uses signal current relevance/resultative/persistent situation readings, as would be expected (198*ff*).
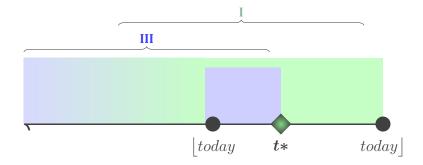
   This may point to an areal diffusion of the innovation/grammaticalisation of perfective/hodiernal past readings of the perfect construction through the *Països Catalans.*

The translation of the Glaswegian semantics for tense systems of this type given in (139), then, appears to be descriptively sound. It is, however, undermotivated and inadequate insofar as it makes no claims or predictions about, *e.g.*, the emergence of these phenomena in WD and offers no explanation of the ostensibly implausible fact that a number of abstract morphological categories (*e.g.*, I), which are spelled out in a number of different ways across multiple conjugation classes, are consistently ambiguous between two different readings. (Proposing) a denotation that unifies these uses I therefore take to be a desideratum; this is the goal of the remainder of this chapter.

2.3 Proposal: A cyclic tense system

The beginning of this chapter (see also figure 16, *pg.* 127) identified two major issues for an analysis of temporal reference in this language: METRICALITY — the encoding of ~~a~~ the temporal distance/remoteness of the runtime of an eventuality from speech time — and CYCLICITY — the discontinuity of available reference intervals. These will be treated in turn.

Figure 18. W. Dhuwal(a) predicates inflected with I and III make overlapping reference intervals available. They are both felicitous with past predications.

2.3.1 Metricality (temporal remoteness) in the past

In the past number of years, formal semanticists have paid attention to the tense systems of languages that appear to grammaticalise multiple PAST and FUTURE tenses according to (subjective/perceived) remoteness of reference time from speech time (*e.g.*, Cable 2013; Hayashi & Oshima 2015; Klecha & Bochnak 2016.)[116] That is, grammars that pay attention to temporal distinctions that are *more fine-grained*.

Grammaticalised remoteness distinctions, attested across a wide sample of world languages, are particularly well represented in Bantu (Botne 2012; Dahl 1983). As an example, Gĩkũyũ ([kik] Bantu: Central Kenya) is described as having a system of

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[116]Also Bohnemeyer 2018 investigates temporal remoteness marking in Yucatec Maya [yua], which he nonetheless takes to represent a "tenseless" language.

'temporal remoteness morphemes' (TRMs): four for the past and two for the future. For Cable (2013), a TRM is taken to constrain the instantiation time of the predicate that it modifies. Cable's TRMs are analysed as identity functions over sets of events that enforce a presupposition of temporal remoteness (141).

(141) **Gikũyũ *CURRENT* TRM according to Cable (2013)**
$[\![\text{CUR}]\!]^{g,t*} = \lambda e : \tau(e) \infty$ day surrounding $t*.e$
CUR denotes an identity function on events, one whose domain is restricted to events whose runtime $\tau(e)$ overlaps (∞) with the day surrounding the utterance time $t*$ (Cable 2013:253)

Similarly, Cable's IMM 'immediate past' and NRPST 'near past' make presuppositions that the runtime of the described event overlaps with intervals that are related to utterance time $(t*)$ in some lexically-specified way (IMPST and REC respectively, both modelled as functions from $t*$ to some interval in the past of $t*$.)

As is now clear (see also § 1.4.3), there WD varieties draw a distinction between the REMOTE and RECENT past that appears to be at least partially subjective and context-sensitive. The use of **I** and **III** to encde a remoteness distinction is shown in the discourse in (142). *Wämut*'s recent sighting of a *latjin* 'teredo, mangrove worm' predictably is encoded with **I**, whereas in (142b), an earlier sighting is encoded with **III** (which additionally contrasts with the past-habitual reading in (c) which receives **IV**-marking; this is further discussed in Ch. 3.)

(142) **CONTEXT.** Wämut has been living in Sydney for a long time. Visiting Ramingining, he's speaking to his *gathu* about *latjin*.

a. last week, *baman'nha ŋarra nhä-**ma** latjin bili   ŋarra ga-**n***
               prior-SEQ   1s   see-**I**   *teredo* because 1s   IPFV-**III**

   *barrku nhina-**n**.*
   far   sit-**III**

   'Last week I saw *latjin*, I had been living far away.'

b. *ŋäthil/baman' ŋarra ga-**n**   nhä-**ŋal***
   previously   1s   IPFV-**III** see-**III**

   'I saw one long ago.'

c. *nhä-**nha** yan ŋarra li   ga-**nha** ŋunhi ŋarra yothu yan*
   see-**IV**   just 1s   HAB IPFV-**IV** ENDO 1s   child just

   'I used to see them when I was a kid.'   [AW 20190422]

Wilkinson (2012:343) points out that "the "switch-over" point [from **I** 'RECENT' to **III** 'REMOTE'] is not associated with an absolute time." She provides the examples

reproduced here in (143). Notable is the fact that, while both discourses are making reference to events that happened last year, the father-dying event in (143a) receives **I**-marking, whereas the brother-working one (b) receives **III**.

(143)   **LAST YEAR temporal frames licensing I and III**

a.   *way   marŋgi   nhe   ŋarra-kalaŋa-w   bäpa-ʼmirriŋu-w-nydja   ŋunhi   ŋayi*
     hey   know   2s   1s-OBL-DAT   father-PROP-DAT-PROM   ENDO   3s

     *dhiŋga-**ma**-ny   ŋuriŋi   bala   dhuŋgarra-y*
     die-**I**-PROM   ENDO.ERG   MVTAWY   year-ERG

     'Hey, did you know my father who died last year?'

b.   *nhä   nhokiyin-gal   wäwa-ʼmirriŋu-y   warkthu-**rr**   ŋäthil*
     what   2s.EMPH-OBL   brother-PROP-ERG   work-**III**   before

     rarranhdharr-yu
     summer-ERG

     'What did your brother do last summer?'   (Wilkinson 2012:343)

This subsection has considered how WD handles predication about events instantiated **before the day of utterance**. We have seen evidence that a subjective measure of temporal remoteness adjudicates between **I** and **III** inflections, where the latter tends to make reference to more temporally distant/remote past predications. This type of distinction is generally thought to be couched in human experience, indexing "restrictions of human memory, lifespan, or cultural elements such as myths" (Botne 2012:544).

While this explanation is compatible with **III**'s remote past functions, as described, this inflection is also felicitous with hodiernal (including immediate) past reference.

2.3.2   Cyclicity — discontinuous temporal reference

A more significant problem for the description of WD temporal reference is apparent "discontinuity" of the intervals with which **I** and **III** are licensed.

The philosophical literature has interrogated a number of metaphoric conceits of the nature of time: perhaps most relevantly for current purposes LINEAR (unidirectional temporal flow from past into future) and CYCLIC metaphors. "Cyclic" temporal phenomena are exemplified illustrated by the predictable recurrence of natural situations, including circadian (day-night) and annual/seasonal cycles (*e.g.*, discussion in Whitrow 1980 and Fraser 1987). The previous section, for example, included a discussion of the apparent relevance of the DAY OF UTTERANCE in the metrical tense systems of a selection of natural languages. Having observed that these natural cyclic phenomena provide the basis for remoteness distinctions

cross-linguistically, Comrie (1985:88) hypothesises the existence of grammars that "recycle" remoteness distinctions.[117]

Data in § 2.3.1 showed that, in PREHODIERNAL predication, **III** indicates a greater degree of remoteness from the utterance context than **I**. Conversely, in HODIERNAL (same-day) predications, **I** indicates overlap with speech-time, whereas **III** indicates temporal displacement to the past of utterance time. This provides the seeds of an explanation of the categorical infelicity of **I** with SAME DAY PAST reference (and the epiphenomenal discontinuity in the temporal reference range of **I**.) Data demonstrating this pattern has been presented above (*e.g.*, 136), an additional minimal pair given as (144) below.

(144)   **Temporal discontinuity: Reference times felicitous with III do not strictly precede those felicitous with I.**

  a.   Degraded **I** with HODIERNAL PAST reference

  ḻuk-a(**na**)   ŋarra   gapu   (gäthura)*
  drink-***I**/**III**   1s   drink   (today)

  'I drank some water (ten minutes ago).'

  b.   Degraded **III** with YESTERDAY PAST reference

  *ŋarra   ḻuk-**a**(*na)   gapu   barpuru*
  1s   eat-**I**/***III**   water   yesterday

  'I drank water yesterday.'   [DhG 20190405]

Comrie (1985) consequently terms this phenomenon *CYCLICITY*, given that it emerges as a result of the recapitulation of a similar correspondence between form and function (the range of **III** precedes the range of **I**) in both HODIERNAL and PREHODIERNAL discourse contexts.

2.3.2.1   Property instantiation — modelling assumptions

Previous descriptions have seized on the demonstrably broad distribution of **I** to assign it metalinguistic labels including BASE and NEUTRAL (these were summarised in Table 8). Here I propose a lexical entry for the meaning contribution of **I** and **III**, which draws on principles of pragmatic blocking in order to derive the distribution exhibited in WD.

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[117]Comrie (1985) points to Burarra (`bvr` Maningrida) the language analysed in Glasgow (1964) that resembles the WD system under investigation here, compare § 2.4) in addition to Kiksht [`wac`], a Chinook variety with a significantly different tense system (see Botne (2012:§ 7) for an overview of apparent reflexes of cyclic tense in the Kiksht system and similar systems in Mituku (`zmq` Bantu D: E. DRC)) and Bolia (`bli` Bantu C: W. DRC). Bybee et al. (1994:104) point to the example of Palantla Chinantec (`cpa` Oto-Mangue: Oaxaca) where the range of one past tense marker *ka-* is felicitous with IMMEDIATE and PRE-TODAY past reference, where *na-* is felicitous only with (earlier) TODAY temporal reference (according to Merrifield 1968:25).

In § 2.1, I motivated a treatment of WD verbal predicates (stems) as properties of events — that is, they'll be taken to denote expressions of type $\langle \varepsilon, \langle s, t \rangle \rangle$. These are then taken to be the input of aspectual operators, which existentially bind the event variable, outputting a proposition (a characteristic function of indices.) Denotations for aspect operators, including inflecting aspectual auxiliary GA 'IPFV' and a covert neutral/PFV operator are given below in (145).[118]

(145)   **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. $[\![\underset{\text{PFV}}{\varnothing}]\!] = \lambda P_{\langle \varepsilon, st \rangle} \lambda i . \exists e [P(e) \wedge \tau(e) \sqsubseteq i]$

WD aspect morphology then takes a property of events and maps it to a property of indices. GA 'IPFV' asserts that the reference index (i) is contained within the event's runtime $\tau(e)$. Conversely, the absence of an aspect auxiliary in a verbal predication is associated with the inverse relation: that is, 'PFV' asserts that $\tau(e)$ is contained within i.[119]

A maximally underspecified lexical entry for **I** is given in (146) below. On this treatment, **I** is taken to be semantically vacuous.[120] Effectively, it is an identity function that "passes" a reference index i that provided by context (c) up the derivation. The contextual parameter c is assumed to be a tuple containing relevant contextual information. On this approach, temporal reference is provided by a pronoun-like object which "anchors" the proposition (the hallmarks of a "referential" theory of tense semantics, *e.g.,* Kratzer (1998) *et seq.*)

(146) notably makes no restrictions on the nature of the relation between i' (the instantiation index) and utterance time $i*$. This is motivated by the data shown above, where **I** is felicitous with PAST, PRESENT and FUTURE reference (modulo a number of distributional restrictions to be discussed below.)

(146)   **A general denotation for the FIRST inflection**

$$[\![\, \mathbf{I} \,]\!]^c = \lambda i \, . \, i$$
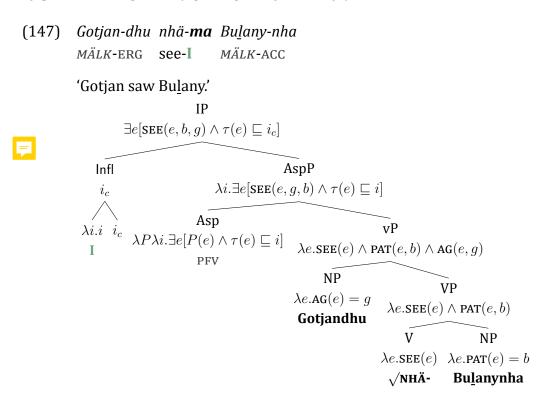
A derivation for a transitive **I**-sentence is given in (147). This sentence is incompatible with present reference given the constraints described in the previous

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[118]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).

[119]On Bohnemeyer & Swift 2004's (2004:277) account of "default aspect", the perfective reading of dynamic predicates (*i.e.,* all WD verbs) emerges as a pragmatic (Q-based) implicature.

[120]See Sauerland (2002) for a related proposal for the English PRESENT.

section: namely that *NHÄ*- 'see' denotes a property of events. Seeing as eventive properties (and perfective event descriptions) are inherently bounded, they are incompatible with (inherently non-bounded) present reference (this fact shown in 2.1). Future reference is also ruled out for pragmatic reasons to be discussed in the following chapters. The possible range of event times can be further constrained by past-denoting TFAs (*e.g.*, *barpuru* 'yesterday.')

(147)   *Gotjan-dhu nhä-**ma** Bulany-nha*
       MÄLK-ERG   see-**I**   MÄLK-ACC

'Gotjan saw Bulany.'

IP
$\exists e[\text{SEE}(e,b,g) \wedge \tau(e) \sqsubseteq i_c]$

Infl
i_c

$\lambda i.i \quad i_c$
I

AspP
$\lambda i.\exists e[\text{SEE}(e,g,b) \wedge \tau(e) \sqsubseteq i]$

Asp
$\lambda P \lambda i.\exists e[P(e) \wedge \tau(e) \sqsubseteq i]$
PFV

vP
$\lambda e.\text{SEE}(e) \wedge \text{PAT}(e,b) \wedge \text{AG}(e,g)$

NP
$\lambda e.\text{AG}(e) = g$
Gotjandhu

VP
$\lambda e.\text{SEE}(e) \wedge \text{PAT}(e,b)$

V
$\lambda e.\text{SEE}(e)$
$\sqrt{}$**NHÄ-**

NP
$\lambda e.\text{PAT}(e) = b$
Bulanynha

In effect, here I have proposed a trivial semantics for **I**: the contribution of **I** being to "pass up" a reference index that is assigned by context i_c. Below, we account for its competition with **III** within the past domain.

2.3.2.2   Non-final instantiation

Of course, as shown at length above, **I** does not appear with either TODAY PAST or REMOTE PAST situations. I model this incompatibility as emerging from a blocking effect associated with the relative assertoric strength of **III** (which, unlike **I** has *bona fide* past temporal semantics albeit with additional use restrictions.)

Above, the verb inflection (**I**) in effect denotes an INSTANTIATION RELATION between a contextually-supplied reference time and a property of indices (*i.e.*, the output of an aspectual operator.)[121]
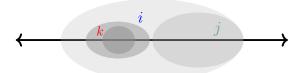
NONFINAL INSTANTIATION is a subcase of the PROPERTY INSTANTIATION relation which holds only if the P-event **does not overlap** with the end of the reference

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[121]The PROPERTY INSTANTIATION relation is used by Condoravdi & Deo (2015); Deo (2006) in part to model the divergent behaviours of different types of predicates (eventive *vs.* stative *vs.* temporal) with aspect operators. Given that the data with which we are concerned here involves the output of aspectual operators (that is, only with *temporal* properties), INST$(P,i) = P(i)$.

interval i. This relation is defined in (148) and schematised in figure 19.

(148) **Non-final instantiation** (Condoravdi & Deo 2015:279)

Defined iff $j \underset{\text{FINAL}}{\sqsubseteq} i$;

$$\text{NFINST}(P, i, j) \leftrightarrow \exists k(\text{INST}(P, k) \land k \sqsubseteq i \land k \prec j)$$

Figure 19. NFINST holds between a property P, some interval i and one of its **final subintervals** j iff P is INSTANTIATED at some other subinterval k that wholly precedes the final subinterval j.

Having stipulated that the interval corresponding to i in the above definition is saturated by either *today* or *before today*, a discourse context makes salient two reference intervals (frames, F) which correspond to the CONTEMPORARY/PRECONTEMPORARY distinction described for the inflectional systems of the Maningrida languages (Eather 2011; Glasgow 1964; Green 1995). CONTEMPORARY eventualities are those that are situated in a FINAL subinterval of the reference frame $\{j \mid j \underset{\text{FINAL}}{\sqsubseteq} F_c\}$. PRECONTEMPORARY eventualies are situated in a NONFINAL subinterval of i_c, i.e. $\{k \mid k \underset{\text{NONFIN}}{\sqsubset} F_c\}$. These intervals are summarised in Table 12 below.

Table 12. Instantiation intervals j, k made available by different flavours of i_c

INTERVAL TYPE		TODAY frame	FORE-TODAY frame
frame	F_c	$\{i \mid i \sqsubseteq today'\}$	$\{i \mid i \prec today'\}$
CONTEMPORARY	$j \underset{\text{FINAL}}{\sqsubseteq} F_c$	*dhiyaŋ bala* 'now'	*barpuru* 'recently'
PRECONTEMPORARY	$k \underset{\text{NONFIN}}{\sqsubset} F_c$	*dhiyaŋ bili* 'now'	*baman'* 'previously'

The contemporary interval, then, is associated with speech-time in hodiernal contexts (*i.e.*, when the discourse provides a F within the day-of-utterance) and with relative/subjective recency in prehodiernal contexts (when the discourse context provides values F prior to day-of-utterance). These "contemporary" intervals are relevant to WD temporal grammar: 'overlapping with speechtime' and 'recently' corresponding to TODAY and BEFORE TODAY respectively:

The TODAY frame Any arbitrary final subinterval j of $(today, i*)$ necessarily overlaps with speech time.[122] From this, we can simply derive the incompatibility of **III** with PRESENT-referring event descriptions: all non-final subintervals of $(today, i*]$ forcibly exclude $i*$. As a result, NFINST$(P, [today, i*), j)$ yields the TODAY PAST distribution for **III**.

The NONTODAY frame Further, the "subjective" nature of the RECENT v. REMOTE distinction (shown in §2.3.1) also falls out of this treatment. In principle, given that the BEFORE-TODAY frame has no left boundary, NFINST makes available any subinterval of i_c that does not include its right edge. As a result, the duration of final subinterval j is contextually determined, presumably adjudicated by what the Speaker considers to count as CONTEMPORARY in a given discourse context.

Strong judgments of infelicity for **III** with a class of temporal frame adverbials—most clearly *barpuru/yawungu* 'yesterday', *e.g.*, (b) —points to a conventionalised principle of "minimum duration" for j in these contexts. While these adverbials are glossed as 'yesterday', it can be demonstrated that they are compatible with a wider range of RECENT PAST interpretations. See also the variable interpretations of *barpuru* (and its composition with *märr* 'somewhat' in ex. 138 above.)

Adapting Condoravdi & Deo's NFINST, and armed with two pairs of possible reference frame/final-subinterval, we can then define a PRECONTEMPORANEITY relation which — *cf.* the entry for **I** in (146) — holds of an index i at a fixed set of contextual parameters c. A definition of this relation is provided in 149 along with a proposal of the semantic contribution of **III**. In view of this relation, the division of the (nonfuture) temporal domain between **I** and **III** (again, at a fixed context) is schematised in Figure 20.

(149) **III as encoding precontemporaneity**

    a. **Precontemporaneity**

    PRECONTEMP$_c(P) \stackrel{\text{def}}{=} i \sqsubseteq F_c \wedge i \prec j_F$

    Given a fixed utterance context (c), a given reference index i is *precontemporaneous* iff i precedes j_F — a final subinterval of the utterance's reference frame F_{i_c}.
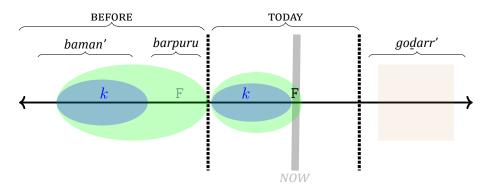
    b. **A denotation for the THIRD inflection**

$$[\![\mathbf{III}]\!]^c = \lambda i : \text{PRECONTEMP}_c(i) \, . \, i$$

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[122] $j \sqsubseteq_{\text{FINAL}} (today, i*] \leftrightarrow j \circ i*$

Simply, all final subintervals of the interval $(today, i*]$ contain $i*$ (by def. $\sqsubseteq_{\text{FINAL}}$)

Figure 20. Appealing to 'precontemporary instantiation' to provide a unified entry for the temporal reference of **III**. **III** is licensed iff the index at which P holds is contained within either of the intervals labelled k.

References to the interval j_F in this section correspond to $\{\text{F} - k\}$

2.3.2.3   A MAXIMIZE PRESUPPOSITION (pragmatic blocking) account

In view of the lexical entry for **III** proposed above, the infelicity of **I**-inflected predicates with REMOTE and TODAY PAST instantiation times then emerges as a result of pragmatic blocking. It is well demonstrated that oppositions between specific and general meanings give rise to a division of pragmatic labour in which the general form is conventionally restricted to the complement of the domain of the specific form (Deo 2015a, citing Horn 1984 & Horn & Abbott 2012). A related principle, MAXIMIZE PRESUPPOSITION (due to Heim 1991, implemented in Ippolito 2003; Sauerland 2009 a.o.) expands this reasoning into the presupposition domain. A formulation of MAXPRESUPP is given in (150) below.

(150)   **MAXIMIZE PRESUPPOSITION** (the notion of "implicated presuppositions" as formulated in Sauerland 2002, 2004)

   Presuppose as much as possible in your contribution to the conversation

   (2004:19)

   If a scalar alternative *Y* of *X* has more, or stronger, presuppositions than *X*, *X* presupposes that the inherent presuppositions of *Y* aren't satisfied.

   (2002:13)

Given that $[\![\textbf{I}]\!] \supsetneq [\![\textbf{III}]\!]$,[123] a scale $\langle \textbf{I}, \textbf{III}\rangle$ obtains between these two inflections. That is, a sentence of the form $\textbf{I}(\varphi)$ (Q-)implicates that the presuppositions of $\neg\big(\textbf{III}(\varphi)\big)$ cannot be satisfied. As a consequence, while the lexical entry for **I** provided in (146) provides for the instantiation of the predicate at any contextually-

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[123]Given that **I** makes no presuppositions on the contextually-supplied temporal value of the evaluation index i. **III**, however, preupposes *precontemporaneity* (i.e. restricts the location of i relative to some super interval F.) That is to say, that the presuppositions of **I** are weaker than those of **III** **or** the range of indices available to **I** are a proper superset or those available to **III**.

specified index i_c; in competition with the presuppositionally stronger **III**, **I** is felicitous only with indices located in a FINAL SUBINTERVAL of F (*i.e.*, those green areas $(\text{F} - k)$, posterior to k, in Figure 20 above). The blocking of **I**'s realisation of the PRECONTEMPORARY INSTANTIATION relation by **III** (that is, a precontemporaneity **antipresupposition** that **I** makes on i) is derived in (151) below.

(151)   **Pragmatic strengthening of I**

$$[\![\mathbf{I}]\!]^c(P) \rightsquigarrow \text{INST}(P, i_c) \setminus [\![\mathbf{III}]\!]^c(P) \tag{i}$$

$$\rightsquigarrow \text{INST}(P, i_c) \setminus \text{INST}(P, i_c) \wedge i \sqsubseteq \text{F} \wedge i_c \prec j_{\text{F}_c} \tag{ii}$$

$$\rightsquigarrow \text{INST}(P, i_c) \wedge \neg(\text{INST}(P, i_c) \wedge i \sqsubseteq \text{F}_c \wedge i \prec j_{\text{F}}) \tag{iii}$$

$$\rightsquigarrow \text{INST}(P, i_c) \wedge \neg(i \sqsubseteq \text{F} \wedge i_c \prec j_{\text{F}}) \tag{iv}$$

$$\rightsquigarrow \text{INST}(P, i_c) \wedge i_c \nprec j_{\text{F}} \tag{v}$$

I realises property instantiation but, via competition with the more specific (informative) form–**III**–its use is pragmatically restricted to the relative complement of **III**'s domain *(i)*. That is, the relative complement of PRECONTEMPORARY INSTANTIATION *(ii)*. Therefore **I** is felicitously used **only when** the reference interval provided by context **does not** precede j_{F} (a contextually-supplied final subinterval of the reference frame, as described above.) P is therefore instantiated at some subinterval of j_{F} *(v)*.

Negation of the other conditions of **III** would lead to contradiction (premise, *iii*; def. F, *iv*).

Given the blocking and strengthening effects described here, **I** and **III** are in complementary distribution. Where **III** requires PRECONTEMPORARY instantiation of i (relative to F), the use of **I** is taken to implicate a presupposition of FINAL/CONTEMPORARY INSTANTIATION (compare the domains of the (pre)Contemporary tenses in Table 12, *p. 148* above.)

2.4   Theorising cyclic tense & the status of F_c

The sections above have proposed a semantic analysis of temporal operators in WD, including an eventive semantics for verbal stems and a treatment of the (actual) nonfuture domain (that is, reference to the PRESENT and PAST) as partitioned by the FIRST and THIRD inflectional categories in the verbal paradigm (**I** and **III**.)

The temporal discontinuity of the reference intervals licensed by each of these inflections (schematised in Figures 16/18/20) is understood in terms of a notion of a (PRE)CONTEMPORARY distinction which operates over either a hodiernal or pre-hodiernal "reference frame" (an observation initially due to Glasgow's treatment of Burarra and subsequent work on the non-Pama-Nyungan languages of Maningrida/West Arnhem.)

The linguistic relevance of a *day-of-speech*/HODIERNAL interval (operationalised here as a reference "frame" – F – in which the reference index i is located) finds cross-linguistic support in the literature on temporal remoteness/metric tense (examples given in § 2.3.1). Digging deeper, the "cut-off" between hodiernal and pre-hodiernal frames can be shown not to fully align with natural temporal phenomena (that is a moment of switchover — sunset/midnight/sunrise — from **III**-marked pasts to **I**-marked pasts can be shown to not be crisply identifiable.)

(152) **III is licensed given an event description whose runtime extends beyond the "natural" span of the DAY OF UTTERANCE**

   a. *mukul* *ga-**na*** *warkth-**urruna*** *yäna* *beŋuru* *bili* ***barpuru***
   aunt IPFV-**III** work-**III**   EMPH INDEF.ABL CPLV yesterday

   ga *dhiyaŋgu* *bala* *ŋayi* *ŋorra-**na**-nha*
   and PROX.ERG MVTAWY 3s lie-**III**-SEQ

   'Aunty was working from yesterday right through until now and she's (just) gone to sleep.'   [DB 20190405]

   b. *walu* *gärri-**na**;* *ŋarra* *ga-**na*** *warkth-**urruna*** *yäna*
   sun enter-**III** 1s   IPFV-**III** work-**III**   only

   'After the sun set, I was working all night.'   [DB 20190405]

   c. *märi'mu* *ga* *ŋorr-a* *yän* *bili* *ŋayi* *djaḏaw'-mara-**ŋal**.*
   FaFa   IPFV.**I** lie-**I** EMPH CPLV 3s dawn-CAUS-**III**

   ŋayi *ga-**n*** *marrtji-**n*** […] *beŋur* *dabala'ŋur*
   3s IPFV-**III** go-**III**   INDEF.ABL gamble.ABL

   'Grandpa is still asleep because he was up past dawn. He was walking back (because his car had broken) from playing cards.'
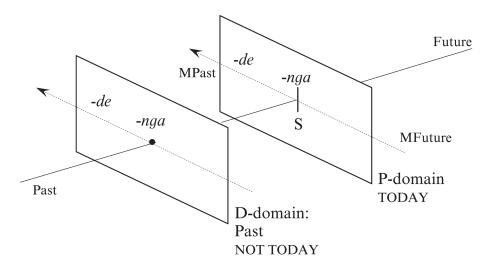
   [AW 20190410]

How and why would a tense system like that analysed in this chapter emerge? Of the Palantla Chinantec system (see fn 117, *p.* 145), Bybee et al. (1994:104) suggest that competition between a "hodiernal past [-*na*] and an anterior [-*ka*] (with current relevance)" for control of the same-day past domain may have led to the discontinuity in the span of reference times available to -*ka*. Given the compatibility of **I** with NONPAST reference, as well as the fact that the reference intervals with which both **I** and **III** are compatible are temporally discontinuous, an explanation along these lines is untenable for WD. Below we consider two possible (and perhaps relatable) approaches to this question.

2.4.1 "Cognitive domains"

Botne & Kershner (2008:154, *passim*) argue that the complex temporal remoteness

Figure 21. Burarra's [bvr] tense system as understood in the "cognitive domain" approach of Botne & Kershner 2008 (209). "MPast/MFuture" refer to the authors' proposed "tenor" relations (the P-domain's corollary of tense.) *-de* and *-na* correspond respectively to **III** and **I** in WD.

systems exhibited in a number of Bantu languages are reflexes of multidimensional, nonlinear conceptions of the temporal domain. They model this by positing multiple "cognitive domains" that differ in terms of the inclusion of exclusion of a DEICTIC CENTRE (*i.e.*, P-domain *v.* D-domain, mnemonics for "primary" and "dissociated" respectively.) For them, English unmarked verb forms locate an event within the P-domain (accounting for futurate and historical present uses, where Ø-inflection is apparently compatible with non-present time.) That all Ø-marked predicates involve reference to events that occur "within the timespan of the cognitive world [that includes the deicitc center]" (152). English tense marker -ED conversely is taken to displace an event into the past, to a cognitive domain excluding the DEICTIC CENTRE. They use this "cognitive domains" model in order to supply a motivation for (apparent) temporal remoteness distinctions drawn in Bantu and to explain a number of related effects.

The "cognitive domains" approach converges with the one described here insofar as "seemingly discontinuous tenses are continuous within their domains." Taking up the example of Burarra (bvr, that Maningrida language on which the system described by Glasgow 1964 was based with *-ŋa* 'CONTEMPORARY' and *-de* 'PRECONTEMPORARY' distinction), Botne & Kershner effectively recast the TODAY/NON-TODAY "frames" as corresponding to their P- and D-domains respectively (2008: 209, see also Figure 21.) Presumably they'd make a similar claim WD's **I** and **III**.

2.4.2 *Énonciation*, diachrony & functional unity

For all the talk of reference frames and cognitive domains, how much closer are we to understanding the motivations for ~~a~~ the encoding of complex temporal remoteness systems of a grammaticalised cyclic tense system?

A number of linguists working on temporal/aspectual distinctions made in Indo-European languages have drawn Benveniste's distinction between "narrative" (*récit/histoire*) and *discours* modes (*plans d'énonciation*).[124] To take one example, Duchet & Përnaska's (2016) study of the usage domains of the Albanian [sqi] AORIST and PERFECT,[125] suggests the possible utility of this broad *"énonciative"* dichotomy in understanding the distibution of these forms. While past-referring event descriptions in narrative contexts are the *locus classicus* of the *Aorist*, Duchet & Përnaska show that, in discourse contexts, using this form is also possible in a number of other apparent uses — including the description of present-holding result states and "immediate future" accomplishments. The *Perfect*, traditionally encoding "presently relevant result states" (co-occurring frequently with TFAs that include speech time ('today/this week/this year') and in narratives to encode "hot news", also has a range of anterior-type uses: describing states (possibly) occurring prior to (AORIST-)marked past events.

Relatedly, in a survey of remoteness distinctions, Dahl (1983:116*ff*) identifies a number of languages that appear to treat past differently in "narrative contexts," going on to propose a number of cross-linguistic generalisations that seek to motivate a "tendency to neutralize distance distinctions in narrative contexts." Drawing on a proposed distinction between narrative and discursive contexts, it is conceivable the two reference frames (TODAY/PRE-TODAY) featuring into our analysis of WD temporal reference, in some sense, correspond respectively to **conversational** and **narrative** modes.

That is, in **conversational** contexts, described events are likely to bear a more immediate relation to the present. Here, a discourse is likely to be concerned with a distinction between PAST and NONPAST. Conversely, in **narrative** contexts (accounts of exclusively past events), the distinction between events that held in a REMOTE, inaccessible past versus those that held in a relatively RECENT one that more closely resembles the here-and now.[126] This usage evokes the phenomenon of the

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[124]Where "***l'énonciation historique** […] s'agit de la présentation des faits survenus à un certain moment de temps, sans aucune intervention du locuteur dans le récit*" and ***discours*** constitutes "*toute énonciation supposant un locuteur et un auditeur, et chez le premier l'intention d'influencer l'autre en quelque manière*"

  ("**Narrative** comprises the presentation of facts already having occurred at a given moment in time, without any intervention on the part of the speaker" whereas **discourse** is understood as "any utterance that presupposes a speaker and a hearer, where the former intends on influencing their interlocutor in some way.")   (Benveniste 1966:238–42; translation and emphasis mine.)

[125]That is, the synthetic 'AORIST' (*e kryer e thjeshtë*) and the periphrastic 'PERFECT' *(e kryer)* form 'HAVE+past participle' respectively.

[126]Compare Waters's observation (in his description of Djinaŋ's TODAY/REMOTE PAST) that "few stories are set in the time context of the same day as the speech event" (1989:188).

"narrative/historic present" — a commonly attested use cross-linguistically (see Carruthers 2012 for an overview).[127] A similar usage of the PRES (or NONFUTURE) is also pointed out by Stirling (2012), who shows its extensive use in Kalaw Lagaw Ya [mwp], where it functions as a past perfective in narrative contexts.[128]

On this account, the emergence of *cyclic tense* of the type exhibited in the languages of Maningrida and the westernmost Yolŋu varieties (*viz.* Djinaŋ, Djinba and WD) can be explained in terms of a categoricalisation of these two "reference frames" that are closely associated with different modes of language use. This corresponds to a hypothetical analysis where:

- Language is used for conversation (pertaining to the eventualities that relate to the here-and-now) and for storytelling (pertaining to events completed prior to the here-and-now)

- The function of a PAST-tense is to signal the settledness and completeness of an event vis-à-vis utterance time. The function of PRESENT tenses indicates that the runtime of an event overlaps with utterance time.

- The PAST/PRESENT distinction gets reanalysed as PRECONTEMPORARY-CONTEMPORARY: that is PAST/PRESENT relative to a given reference frame (as determined by context (functions) of the utterance.)

2.4.3   Aspect & temporal interpreation

As shown in § 2.1, WD verb stems have a strictly dynamic (state change) semantics, a fact that seems to correspond with the recruitment of new strategies for encoding aspectual and modal information (primarily through preverbal auxiliaries and particles.)[129] The development of this analytic TMA marking system in Dhuwal-Dhuwala is likely to be related to the emergence of a "cyclic tense" system where I (the erstwhile 'PRES') now obligatorily co-occurs with *ga* 'IPFV' in order to encode present reference. Compare this fact to the incompatibility between present reference and achievement predicates, where a sentence of the type exemplified in (153) is only available with either a historic present or immediate future reading (an observation following Vendler 1957:147).

(153)   *Now they find the treasure/win the race/reach the summit*

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[127]Cited by Carruthers (2012:312), Facques claims that the historic present "permet de maintenir l'illusion d'une perspective simultanée du récit, déjà induite par l'emploi du present" (" allows the illusion to be maintained that the events and the narrative are simultaneous, an illusion already created by use of the present") (2007:250–1, Carruthers' translation.)

[128]This type of usage is apparently widespread in Arnhem Land languages (Bednall *e.g.*, 2019 for Anindilyakwa [aoi])

[129]Whereas an explicit aspectual (±IPFV) distinction is actually grammaticalised in the Djinaŋ verbal paradigm, a feature not shared by other Yolŋu languages

(154) a. *ŋarra* *(ga)* **ḻuka** *mänha* *(dhiyaŋu bala)*
           1s   IPFV.**I** drink.**I** water now

         'I'm drinking water (now).'   [DB 20190405]

    b. *ŋarra* *(dhu)* **ḻuka** *mänha* *(dhiyaŋu bala)*
           1s   FUT   drink.**I** water now

         'I'm going to drink water (now).'   [DB 20190405]

    c. *ŋarra* **ḻuka** *mänha* *(barpuru)*
           1s   IPFV.**I** drink.**I** water

         'I drank water yesterday.'   [DB 20190405]

This resembles the situation in WD (154), where **I** necessarily co-occurs with *ga* 'IPFV.**I**' or *dhu* 'FUT' to encode present (progressive) or immediate future reference. In the absence of either of these markers, only the RECENT (NON-TODAY) PAST reading is felicitous.

The relationship between the emergence of cyclic tense in WD and evidence for a wholesale restructuring of the language's aspectual system remain a subject for considerable further work and analysis.

<div align="center">※</div>

In view of the semantics for **I** and **III** above, this section has considered possible candidates for functional motivations for the notion of the "reference frame" and the "recycling" or "temporal discontinuity" of tense markers that characterise cyclic tense. On the basis of these considerations, (155) formulates a hypothesis for the emergence of a cyclic tense system of the type described here.

(155) **DIACHRONIC HYPOTHESIS.**
      Cyclicity as the grammaticalisation of text type
      The cyclic tense phenomena exhibited in WD and related languages are a result of the reanalysis of PRESENT- and PAST-tense markers' apparently divergent usage in conversational versus narrative contexts

2.5 Conclusion

This chapter has provided analyses for a number of phenomena related to the temporal interpretation of WD predicates. Of particular importance for developing an analysis of the WD paradigm and WD's tense system is the notion of PRECONTEMPORARY INSTANTIATION, a motivation for which was the primary focus of § 2.3.

Drawing on descriptions from Glasgow (1964) and subsequent treatments of the languages of western and central Arnhem Land (Eather 2011; Green 1987, 1995; Waters 1989; Wilkinson 2012), we proposed a formal treatment of the notion of the "reference frame" — effectively a HODIERNAL/PREHODIERNAL dichotomy in the NONFUTURE ("REALIS/ACTUAL") domain which corresponds to a superinterval of the reference time.

It was argued that the contribution of **III** (the PRECONTEMPORARY) is to constrain reference time to a NON-FINAL subinterval of the contextually-supplied reference frame. Via blocking, instantiation of predicates inflected with **I** are felicitous only within the complement of **III**'s range within the realis domain. That is, **I** — an inflection compatible with present, past and future reference — is an unmarked form, temporally neutral in its semantics (compare to treatments of the present, *e.g.*, Carruthers 2012; Fleischman 1990.[130])

The following chapter extends the account to **II** and **IV** — the irrealis categories.

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[130]Also Dahl's generalisation that "[i]t is almost always possible to use the least marked indicative verb form in a narrative past context" (1983:117, *apud* Dahl 1980 *n.v.*)

Chapter 3

Modal interpretation & NEGATIVE ASYMMETRY

DISTINGUISHING ⟨I, III⟩ FROM ⟨II, IV⟩

The basic distributional facts for **II** and **IV** were described in § 1.4. As shown there, verb stems receive **II**-marking in future-oriented predications (including imperatives), whereas **IV**-marking is associated most clearly with counterfactual predications and other modal claims with past temporal reference. On the basis of these data, these two inflectional categories appear to be associated with *non-realised* events; and it is this property that distinguishes them from the **I**- and **III**-marked verbs described in the previous chapter (ch. 2).

In this chapter, we interrogate the nature of this apparent "reality status" distinction drawn in WD (as it is in other Yolŋu Matha varieties) and the expression of mood, modality and modal operators in WD more broadly. The distinction between ⟨I, III⟩ and ⟨II, IV⟩ is ultimately to be understood as one of VERBAL MOOD. One phenomenon of particular interest is that of an apparent kinship between negative operators (sentential negators) and modal operators as they are realised in WD. It is this kinship that looks to undergird *asymmetric negation* in WD with respect to the marking of reality status; a description of this phenomenon is the goal of § 3.1.

3.1   Sentential negation and paradigm neutralisation

As shown in our discussion of the Negative Existential Cycle in Yolŋu Matha (§ **??**, see *p.* **??**), Djambarrpuyŋu has two particles—*yaka* and *bäyŋu*—which both realise standard negation (*i.e.*, that operator 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 (`[bayŋu-negq]`–`[yaka]`). Of interest for current purposes however, is the fact that both of these sentential negators can be shown to directly interact with verbal inflection.

Descriptively, as shown in the data in (156–157), negation appears to trigger a "switch" from the 'realis-aligned inflections' (**I** and **III**) to their 'irrealis counterparts' (respectively **II** and **IV**). As shown, these latter categories otherwise turn up predominantly in *hypothetical* or *counterfactual* contexts. As we will see, this points to an analysis where the Western Dhuwal(a) inflectional system encodes a *reality status*-based distinction that is neutralised in negated sentences (see also discussion in Wilkinson 2012:356). This effect — which we term a "negative asymmetry" (specifically A/NONREAL, following Miestamo 2005) — was introduced above (§ 1.1.2, compare the Gurr-goni gge data in 104) and is summarised below in Table 13. Here, we develop a theory of the negative asymmetry as an epiphenomenon of a kinship between NEGATIVE and (other) IRREALIS operators.

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

Table 13. Neutralisation of **I** and **III** inflections under negation.

The following examples in (156) show how sentences that receive **I**-marking in positive sentences — encoding temporal reference to the present or recent past (Ch. 2) — instead receive **II**-marking under the scope of negation. Each example contains a predication about the present or about the recent past (normally the domain of **I**, as described in the previous chapter.) In thje presence of a negative operator, however, the verb receives **II**-marking.

(156a-b), for example, presents a near-minimal pair, where the inflection received by a predicate with present reference "switches" from **I** to **II** under negation.

(156) **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)' is also an available reading.
   [AW 2018030]

d. *Ŋarra* **gi** *bäyŋu maḻŋ'mara-***ŋu** *waṯu (ŋarraku).*
   1s IPFV.II NEG appear.CAUS-**II** dog 1s.DAT

   Bili ŋayi **ga** *nhin-***a** *wäŋaŋura*
   CPLV 3s IPFV.**I** sit.**I** house.LOC

   'I can't find my dog. It lives in the house.' [DhG 20190417]

e. *Ŋarra ga djäl-thi-***rri** *giritjirrinyara-wu,*
   1s IPFV.**I** want-VBLZR-**I** dance.NMLZR-DAT

   yurru ŋarra bäyŋu-nha **girritji**
   but 1s NEG-SEQ dance-**II**

   'I was wanting to dance (at the *buŋguḻ* yesterday) but I didn't dance
   (because I'd hurt my leg yesterday.)' [DhG 20190417]

Similarly, in contexts where the temporal reference of the event description
predicts that the verb will receive **III**-inflection — following our description from
Ch. 2, when referring to the same-day (HODIERNAL) or the remote past — when
co-occurring with a negative particle (*yaka/bäyŋu*), the verb instead receives **IV**-
inflection. This is shown by the data in (157).

Again, (157a-b) represents a minimal pair where negative marking triggers a
"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 em-
bedded 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.

(157) **Exponence of TODAY PAST and REMOTE PAST reference as IV under nega-
tion**

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***
> 1s.DAT wife anger-INCH-**III** CPLV 3s IPFV.**I** think.**I**[132]
>
> *ŋarra ga-**nha** bäyŋu djäma*
> 1s IPFV-**IV** NEG work
>
> 'My wife got angry because she thought I wasn't working today.'
>   [DhG 20190417]
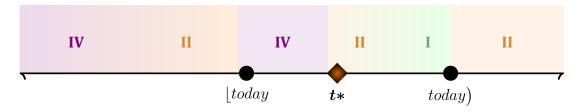
e. **CONTEXT.** The speaker grew up in the desert.

> ***bäyŋu** ŋarra ŋuli ga-**nha** nhä-**nha** (waltjaṉ) ŋunhi ŋarra yothu*
> NEG 1s HAB IPFV.**IV** 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 (156–157) evince a species of NEGATIVE ASYMMETRY that is manifested in WD. That is, from the four inflections which are availble for encoding temporal and modal information in WD, only two (*viz.* **II** and **IV**) are felicitous in sentences that are negated by *yaka* or *bäyŋu*. Figure 22 schematises the relationship between temporal reference and inflection selection in **negative clauses** (*cf.* Fig. 16, *p.* 127.)

Figure 22. Apparent interactions between temporal relations and reality status in Djambarrpuyŋu: cyclicty and metricality under negation.

Further complicating things, while **III** is categorically ruled out in negative sentences, **I** "survives" when (and only when) the predicate refers to the SAME-DAY FUTURE. That is, the **I**/**II** distinction is *not* neutralised in negative sentences with reference to events happening later on the day of utterance (whereas the distinction *is* neutralised in all NONFUTURE contexts.) Examples are provided in (158-159).

(158) **Future marking is unaffected by polarity/the presence or absence of sentential negation**

    a.   **I** with SAME-DAY FUTURE reference "survives" negation

        *ŋarra (yaka) ŋunha **dhu** ḻuk-**a** dhiyaŋ bala*
        1s   (NEG)   FUT   DIST eat-**I** now

        'I will (not) eat them [*ḻatjin*] right now.'   [AW 20190422]

    b.   POST-HODIERNAL referring predicates receive **II**-inflection

        *(bäyŋu) ŋarra **dhu** buḻ'yu-**rr** barpuru*
        NEG   1s   FUT play-**II**   tomorrow

        'I will (not) play [football] tomorrow.'   [AW 20190429]

(159) **A minimal pair: I changes to II in present-referring negative sentences**

    a.   Negative present predication with **II**

        *(dhiyaŋ bala) **bäyŋu** ŋarra **gi** nhä-**ŋu** mukulnha*
        now   **NEG**   1s   IPFV.**II** see-**II** aunt.ACC

        'I don't/can't see my aunt (right now).'   [AW 20190501]

    b.   Positive present predication with **I**

        *(dhiyaŋ bala) ŋarra **ga** nhä-**ma** mukulnha*
        now   1s   IPFV.**I** see-**I** aunt.ACC

        'I'm watching my aunt (right now).'

3.2   The meaning of the modal particles

In § 1.4, we saw that predicates which receive **II**- and **IV**-inflection co-occur with some operator that encodes some flavour of irrealis-associated meaning — suggesting what Palmer (2001:145) labels a "joint marking system" (*i.e.*, that reality is multiply indicated, in this case by suffixation in addition to a preverbal particle.)

    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'.[133] Importantly, and as we will see, these expressions all ap-

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[133]I adopt the (metalinguistic) labels FUT for *dhu* (following Wilkinson 2012) and MOD for *balaŋ(u)*. As we will see, these descriptions aren't necessarily completely semantically adequate, but will be sufficient for current purposes. Wilkinson (2012) glosses *ŋuli* as 'HAB' or 'HYP' depending on its apparent function in the clause (as a marker of HABITUALITY or of a conditional antecedent ("HYPOTHETICALITY").)

pear to lexicalise strictly **root** (circumstantial/non-epistemic) modalities (*contra claims in* van der Wal 1992:123).

This section seeks to model the irrealis domain using the "branching time framework" introduced in § 1.2 in order to propose a semantics for WD modal particles. This will permit for forming a set of generalisations over the distribution of **II** and **IV**.

3.2.1 *dhu*: irreality and the FUTURE

Shown above (predominantly in § 1.4.2), *dhu* 'FUT' occurs in sentences with future temporal reference – with either **I** or **II** marking, depending on whether the reference time of the proposition is the same as the day of speech or beyond. This is shown again by the data in 160.

Relatedly, the data in (161) show that *dhu* appears to also be compatible with other circumstantial modalities; for example, with (a) deontic, (b) bouletic and (c) teleological readings. In all these contexts, we can model *dhu* as universally quantifying over a (subset of) a circumstantial modal base.

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

 a. *barpuru goḏarr ŋarra **dhu** nhä-**ŋu***
   funeral tomorrow 1s FUT see-**II**

   'I'll watch the funeral tomorrow.'

 b. *mukul **dhu** **gi**   nhin-**i** raŋi-ŋur goḏarr*
   aunt FUT IPFV.**II** sit-**II** beach-LOC tomorrow

   'Aunty will be sitting on the beach tomorrow.'   [AW 20190409]

 c. *limurru **dhu** ḻuk-**a**   maypal yalala milmitjpa*
   1d.EXCL FUT consume-**I** shellfish later evening

   'We're having shellfish this evening.'   [DhG 20190417]

(161) ***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!'   [DhG 20190405]

 b. *djamarrkuḻi **dhu** yaka wurraŋatjarra'**y-irr***
   children   FUT NEG cruel.INCH-**I**

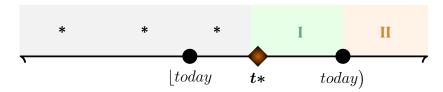   'The children mustn't be disobedient.'   [AW 20190429]

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]

Suggested in § 1.4.2, *dhu* appears exclusively in *future-oriented* predications, apparently *with present perspective* (that is, in predications about the future as calculated at speechtime, see Condoravdi 2002.) The relation between temporal reference and inflection in *dhu*-marked sentences is schematised in figure 23.

Figure 23. (In)compatibility of modal particle *dhu* 'FUT' with temporal reference & inflectional category.

On the basis of this range of usage, we have reason to treat *dhu* as a modal expression. Here we adopt the quantificational (pragmatic domain restriction) approach to modal semantics introduced in § 1.2.2 and adapt an analysis in the style of Condoravdi's (2002; 2003 a.o.) unified treatment of *WOLL* on its 'future auxiliary' and modal uses. This is reproduced in (162) below (see also Abusch 1998 a.o.)

(162) **Denotation of English necessity modal *WOLL***   (Condoravdi 2002:71)

$$[\![WOLL]\!]^{\text{MB}} = \lambda P \lambda w \lambda t \,.\, \forall w' \big[w' \in \text{MB}(w,t) \to \text{AT}\big([t,\_),w',P\big)\big]$$

WOLL asserts that, in all worlds w' accessible from w (those in the modal base MB, evaluated at t), P holds **at or after** t in w'.

In (162), we assume that *WOLL*-claims involve asserting that P obtains AT some interval $[t,\_]$ whose left-bound is the evaluation time. In the *Branching Times* treatment ~~predication~~ that is being deployed here, so far an **index** i has been taken as possibly referring to an **interval** which encloses the temporal trace of the event (as in perfective claims — $i \sqsupset \tau(e)$) or which are enclosed within a temporal trace (as in imperfective claims — $i \sqsubset \tau(e)$.) Intervals are modelled as a chain which is related to the runtime of the predicate (compare fn 8, *p.* 8 above.) The function ɛ (mnemonic for *earliest*) will be taken to relate an interval to its **left boundary** — this is represented in (163).

(163) **The left-boundary function**   (compare Beaver & Condoravdi 2003)
   $\mathfrak{e}(\iota) = i \in \iota$ s.t. $\forall i' \big[i' \in \iota \to i \preccurlyeq i' \big]$
   Given an interval ι — formally, a totally ordered set of indices — $\mathfrak{e}(\iota)$ picks out the "left boundary" or $\prec$-minimal ("earliest") element of that set.

The different "flavours" of *dhu* can be modelled using a standard ordering semantics (introduced above, *p.* 15.) The contextual parameter *c* makes available a number of conversational backgrounds against which *dhu* is interpreted — namely a circumstantial modal base $\underset{\text{CIRC}}{m}$ and some type of ordering source o.

The function BEST selects the "best" worlds in a circumstantial modal base, according to how well they conform with whatever set of propositions is returned by o. Depending on which ordering source is provided by context, these conversational backgrounds can be thought of as sets of:

- speaker expectations (STEREOTYPICAL ordering sources, in the case of FUTURE/prediction uses),

- relevant rules & regulations (in the case of *deontic* uses),

- relevant desires (in the case of *bouletic* uses),

- relevant goals/ends (in the case of *teleological* uses)   *etc.*

Ultimately, then, *dhu* is "pragmatically ambiguous" between (at least) the types of readings described here and depends for its interpretation on the successful retrieval of an ordering source. This is a desirable consequence given, for example, the availability of a future/prediction reading of (161c) as well as the teleological reading provided in the translation above.

Despite the range of modal flavours available to *dhu*, it does exhibit an apparent incompatibility between WD modal particles and **epistemic** conversational backgrounds. Consequently we claim that *dhu* is lexically specified for non-epistemic modal bases (compare Kratzer (1981b); this is modelled by assuming that *dhu* presupposes that context c makes available an appropriate ordering source in addition to some relevant set of circumstances see also Matthewson 2016; Peterson 2010; Rullmann et al. 2008 a.o.)

(164) **Lexical entry for *dhu* 'FUT'**
      dhu is only defined if context makes available a circumstantial modal base m
      $$\llbracket dhu \rrbracket^c = \lambda P \lambda i : \forall b \big[b \in \underset{o}{\text{BEST}} \big(\cap m(\mathfrak{c}(i)) \big) \rightarrow \exists^b i' [i' \succcurlyeq i \wedge P(i')] \big]$$
      dhu P asserts that – in the best branches of the modal base (according to some ordering source o) – there will be some index i' — a successor to i — at which the property P holds.

3.2.2   *balaŋ(u)* & modal claims

In addition to *dhu*, WD deploys a number of other modal particles: *balaŋ/balaŋu* 'MOD' the most frequently occurring among them. *balaŋ(u)* occurs with verbal predicates categorically inflected for either **II** (shown in 165) or **IV** (shown in 166).

The distinction in interpretation between these two sets of data is the *temporal interpretation* of the modal. In all cases, *balaŋ(u)*, appears to receive a root possibility reading. Similarly to *dhu*, then, we model *balaŋ(u)* as a quantifier over a (subset of a) circumstantial modal base. Whereas **II**-marking induces a future possibility reading, co-occurrence with **IV**-marking tends to encode varieties of past possibility (including counterfactual) readings.

A number of examples of predications about possible (future) events are shown in (165). These examples show that a range of predictive/modal "strengths" are available to *balaŋ*-sentences (the speaker's apparent confidence in the instantiation of the predicate.) Modal particles can also co-occur ("stack"): in (165c–d), in both cases, the presence of multiple modals appears to decrease the force of the claim.[134]

(165) ***balaŋ(u)* 'MOD' and II-inflection**

    a. *ŋarra **balaŋu** ḻuk-**i**/(*-a)   gapu, ŋanydja monuk ŋayi gapu*
          1s   MOD   consume-**II**/***I** water but   saline 3s   water

        'I would drink some water but this water's salty.'   [DhG 20190405]

    b. *ŋarra ŋuli ga   bitjan bili   warguyun ŋunhi recorder **balaŋu***
          1s   HAB IPFV.**I** thus.**I** CPLV worry.**I**   ENDO recorder **MOD**

        *bakthu-**rru***
        break-**II**

        'I'm always worried that the recorder will/could break.'

                                                   [DhG 20190417]

    c. *ŋarra **balaŋu** (bäynha) dhiŋ-**uŋu** ŋawalul'yu*
          1s   MOD   (MOD)   die-**II**   smoke.ERG

        'I could die from the smoke.'   [DhG 20190405]

    d. *ŋayi **balaŋ** **dhu** djaṉṉar-**thi***
          3s   MOD   FUT   hunger-INCH.**II**

        'It (the cat) might get hungry.'   [AW 20190429]

Predications about "past possibilities" are indicated by the co-occurrence of *balaŋ(u)* and **IV** as seen in (166). A counterfactual reading is available to each of the three sentences. In conditionals (i.e., those counterfactual predications with an explicit antecedent) both clauses are inflected with **IV** – an example is given in (167c).

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[134]The meaning of *bäynha* (glossed here also as MOD) is unclear. Wilkinson (2012:670) analyses this item as *bäy-nha* 'until-SEQ', although my consultant treats it as virtually synonymous with *balaŋu*.

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

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

       'You should/would have gone with (him).'   [DhG 20190413]

    b. *ŋarra gana*   *guyaŋa-na waṯuy* **balaŋu** *ḻuka-**nha** chocolate*
       1s   IPFV.**III** think-**III**   dog.ERG MOD   eat-**IV**   chocolate

       'I'd thought the dog might/would eat the chocolate.'

                                                  [DhG 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.'

                                                  [DhG 20190417]

In explicit conditional statements, both antecedent and consequent are marked with a modal particle. *Ŋuli* (glossed here as HYP, see fn 133) normally seems to mark antecedent clauses, although as shown in b, the co-ordination of two *balaŋ(u)*-clauses also seems to give rise conditional interpretation (compare the discussion of *modal subordination* phenomena in Part I (§ 3.1.))

(167) **Conditional constructions licensing II and IV inflection (in indicative and counterfactual contexts respectively)**

    a. *ŋarra* **dhu** *wargu-**yurr**,*   **ŋuli** *ŋarra* **dhu** *bäyŋu gurrup-**ulu***
       1s   FUT   worry-VBLZR.**II** HYP 1s   FUT   NEG   give-**II**

       ŋatha butjigitnha. ŋayi **dhu/balaŋ** *djaṉṉar-**thi**.*
       food   cat.ACC   3s   FUT/MOD   hunger-INCH.**II**

       'I'd be worried if I didn't feed the cat. It would/could get hungry (if I didn't.)'   [AW 20190429]

    b. *ŋarra* **balaŋu** *ḻuk-**i**, ŋarra* **balaŋu** *rirrikth-**urru***
       1s   MOD   eat-**II** 1s   MOD   get.sick-**II**

       'If I eat (it), I might be sick.'   (Lowe 1996:L96)

c. CONTEXT. Despite Mum's imprecations to feed the cat, I maintained a poor feeding ethic. The cat is now emaciated and Mum suggests:

Ŋuli balaŋu nhe ŋatha gurrupa-nha butjigit-nha, ŋayi balaŋu
HYP MOD 2s food give-**IV** cat-ACC 3s MOD

   ŋutha-nha
   grow-**IV**
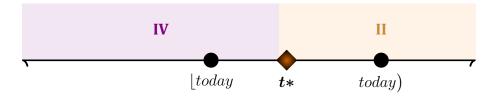
'Had you fed the cat, it would have grown.'   [DhG 20190405]

Unlike *dhu* 'FUT', then, *balaŋ* sentences appear to compatible with past temporal reference, which is always indicated by **IV** marking. That is, temporal remoteness distinctions of the type described in chapter 2 — which, as shown in § 3.1 were preserved in negative clauses — are neutralised in these modal contexts. A clear example is given in (168), where a predicate describing same non-realised event (going out yesterday to collect *maypal*) receives **II** inflection when occurring with a negative marker (*bäyŋu*) but **IV** when occurring with a modal particle (*balaŋ*). Figure 24 gives another schematic representation of the relations between temporal reference and inflectional suffix, this time in contexts with the root possibility modal *balaŋ(u)*.

(168)   **Temporal remoteness phenomena are not exhibited in modal contexts**
    barpuru ŋarra guyaŋ-a balaŋ limurr bu-nha maypal…
    yesterday 1s think-**I** MOD 1p.INCL hit-**IV** shellfish

     yurru bäyŋu napurru bu-ŋu maypal
     but NEG 1p.EXCL hit-**II** shellfish

    'Yesterday, I thought we would collect shellfish, but we didn't collect shellfish.'   [AW 20190429]

Figure 24. Compatibility of modal particle *balaŋ* 'MOD' with temporal reference & inflectional category.

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 (166c), for example, is taken to communicate that 'we are now located in a world whose past included the (unactualized) possibility of

a foot amputation. In Condoravdi's terms then, *balaŋ* in the scope of **IV** realises a "modal for the past" or a "modal for the present present" under the scope of **II**.

On the basis of these data then, (169) represents a proposal for a lexical entry that captures the contribution of *balaŋ(u)* '*MOD*'. *balaŋ(u)* is taken to differ from *dhu* '*FUT*' in terms of the "force" of the modal quantification it realises.[135]

(169) **Lexical entry for *balaŋ* 'MOD'**

balaŋ is only defined if context makes available a circumstantial modal base m

$$\llbracket balaŋ \rrbracket^c = \lambda P \lambda i : \exists b \big[b \in \underset{o}{\text{BEST}} \big(\cap m(\underset{\text{CIRC}}{\mathfrak{e}(i)}) \big) \to \exists^b i' [i' \succcurlyeq i \wedge P(i')] \big]$$

balaŋ P asserts that – in the best branches of a modal base calculated at $\mathfrak{e}(i)$ (according to some ordering source o) – there will be some index i' — a successor to i — at which the property P holds.

Unlike *dhu*, *balaŋu* ~~is~~ functions as a modal with respect to both present *and* past temporal perspectives (corresponding to "indicative" and "subjunctive" readings respectively.) Modelling *balaŋ*'s semantic contribution as that of an existential quantifier over a modal base evaluated at a reference time i captures this lability (Condoravdi 2002, 2003 a.o.) As we will see in the forthcoming section, **IV** and **II** then guarantee that i is either past or nonpast relative to utterance time. On this account, the truth conditions for (166c) are given in (170).

(170) ***balaŋu* on a counterfactual reading (past temporal perspective contributed by IV)** **(166c, repeated)**

ŋarra-nha ***balaŋu*** *luku walala mitthu-**na***
1s-ACC **IRR** foot 3p cut-**IV**

'They would have amputated my foot.' [DhG 20190417]

$\llbracket (166c) \rrbracket^c$ is defined iff the presuppositions of **IV** are met (these entail that c assign i ~~a~~ to a predecessor of evaluation time (that is, utterance time: $i \prec i*$). c must also provide a circumstantial modal base $\underset{\text{CIRC}}{m}$. If defined, (166c) is true iff:

$$\exists b \big[b \in \underset{o}{\text{BEST}} \big(\cap m(\underset{\text{CIRC}}{\mathfrak{e}(i)}) \big) \wedge \exists^b i' [i' \succcurlyeq i \wedge \text{They amputate Speaker's foot at } i'] \big]$$

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[135]It is likely that the modal force associated with *balaŋ* is actually somewhat variable (it is with *balaŋ*, for example, that counterfactual necessity is expected to be marked.) There are multiple proposals for how to deal with variable-force modal expressions, treating them as universal quantifiers over modal bases that have been further restricted by either a contextually-retrieved choice function or some additional ordering source(s). While some further discussion of these analyses is given in <mark>§ 192,</mark> a proper description and treatment of these intricacies of *balaŋ*'s semantics will turn out to be inconsequential for our proposal of WD's inflectional semantics.

That is: iff, given some past index i (in this case, guaranteed by **IV**, context has provided one before now) along one of the most salient branching futures from that time (as determined by conversational backgrounds *m, o*), there is a successor index (i') at which the speaker had his foot amputated.

※

In this section we have proposed a semantics for WD modal particles in terms of branching times semantics (including a modal semantics for the future marker *dhu*.) Crucial are the following observations about their interpretation:

- Modal particles select for a CIRCUMSTANTIAL (therefore **realistic**) conversational background (a variety of metaphysical modal base.)[136,137]

- Following treatments of English modals (*e.g.*, WOLL and *may*, compare Condoravdi 2002, 2003), WD modals are treated as quantifiers over contextually supplied conversational backgrounds that "uniformly expand the time of evaluation [i'] forward" (2003:12).

Armed with a semantics for the modal particles with which the "irrealis-aligned" **II** and **IV** co-occur, we now turn to a treatment of the meaning of these inflectional categories.

3.3   Semantics of "NONREALISED" inflections

Wilkinson suggests that "[v]ery generally, one can describe [**II** and **IV**] as essentially IRREALIS, while [**I** and **III**] are essentially REALIS" (2012:345, emphasis added.) In this section, we consider this claim, interrogate the opposition between REALIS and IRREALIS and survey the literature on *verbal mood* before proposing a treatment that distinguishes these categories in WD.

3.3.1   On the status of "reality status"

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

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[136]A modal base $m : \mathcal{I} \to \wp(\mathcal{I})$ is realistic iff $\forall i : i \in \cap m(i)$ (following Kratzer 1981b:295).
[137]See Ch. 4 for a discussion of epistemic modal expressions.

that correspond with observed/observable reality versus a description of a hypo-
thetical, imagined, non-actualised eventuality. Consequently, for its defenders, IR-
REALIS can be conceived of as whatever semantical concept might be taken to col-
lect: 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; von Prince et al. under revision).

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 ac-
tual 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 Ro-
mance 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 IRRE-
ALIS category — suggesting that the "multifunctionality" for a given form ought to
be attributable to "contextual inference" or "generalization" rather than furnish-
ing evidence of the semantic import a dichotomous reality status category.[138] In
an analytic decision perhaps emblematic of this difficulty, Portner & Rubinstein
(2012:467) appeal to a 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 seman-
tically inert.

3.3.2 Verbal mood

Despite the apparent definitional difficulties with REALITY STATUS, the co-occurrence
constraints between the "irrealis-aligned inflections" **II** and **IV** and modal expres-
sions described above (*e.g.*, *dhu* and *balaŋ(u)*) suggest a semantic treatment of
these inflections that aligns with current analyses of verbal mood. In investigating
verbal mood, semanticist have primarily investigated the "subjunctive" paradigms

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[138]Further, Cristofaro explicitly takes issue with what she has identified as an inference that lin-
guists have made where the notion of irreality "plays some role in [the use of irrealis-denoting
forms]" (2012:132), 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
explanatory generalizations about these patterns, including generalizations about particular gram-
matical categories" (2012:145).

of various European languages; where subjunctivity is taken to be "obligatory and redundant" : that is, dependent on a range of irrealis-aligned (modal) operators, predominantly propositional attitudes (Palmer 2001).[139]

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. These analyses hinge on either 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.[140] On the basis of this generalisation, Giannakidou (*e.g.*, 2016; Giannakidou & Mari 2021 *i.a.*) takes 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 (a modal base, *M*) in which that proposition is not true (171).[141]

(171)   *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.

In effect, I will take **II** and **IV** to realise the temporal contribution of **I** and **III** respectively (as proposed in Ch. 2), while also enforcing a presupposition of **nonveridicality** with respect to the instantiation of an event introduced by a given predicate. This hypothesis is summarised in (172) and spelled out in the section

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[139]Chung & Timberlake (1985:238) explicitly suggest an equivalence between REALIS and the IN-DICATIVE. See also Matthewson 2010 on the St'át'imcets (lil Salish: British Columbia) "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.)

[140]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.

[141]Although (Wiltschko 2016:*cf.*).

below.

(172) **Licensing conditions for the IRR inflections** [to be further refined]

    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 (a species of) **nonveridicality** with respect to the modal frame of the local clause.[142]

3.3.3   An IRREALIS mood

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) European languages.[143]

In his comparison of IRREALIS and SUBJUNCTIVE as putative grammatical categories, Palmer (2001:185) in part attributes these distinct metalinguistic conventions to ~~different~~ "different traditions": claiming that at their core, they encode "non-assertion" (*passim*). Palmer (2001) does note an apparent difference between these terms are uses; namely that, "[SBJV] is generally redundant only in subordinate clauses, where the subordinating [predicate] clearly indicates the notional feature" (*sc. faut* 'be.necessary' in 173a). Conversely, IRR is frequently found in matrix clauses, co-occurring with other modal ("notionally irrealis") expressions (*ka-* 'OBLIG' in 173b).

(173) **On one treatment of the distinction, SUBJUNCTIVE mood is generally licensed by an <u>embedding predicate</u> where IRREALIS mood can be licensed by a <u>modal operator</u> in a matrix clause**

    a. SUBJUNCTIVE marking in dependent clause [French `fra`]

        Il *<u>faut</u>*   *qu'*[*=il*   *se*   ***taise***]
         3s   be.necessary.INDIC   COMP=3s   R/R   be.quiet.**SBJV**

         'It's necessary that he be quiet.'

    b. IRREALIS marking in matrix clause [Caddo `cad`]

         *kas-**sa**-náyʔaw*
         OBLIG-3AG.**IRR**-sing

         'He should/is supposed to sing.'

                            (Chafe 1995:356, also cited in Palmer 2001:186)

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[142]See also the "locality of binding" principle (Percus 2000:201, Hacquard 2010:99.)

[143]Although, as mentioned Matthewson (2010) argues that mood morphology in St̓át̓imcets [`lil`] is a realisation of a SBJV category (mentioned also fn 139).

Crucially, the (irrealis) semantics of an embedding predicate *does not* license the IRREALIS categories in WD. Attitude predicates with canonically subjunctive-licensing semantics like 'want' *djal(thirr(i))* do not in themselves license an IRR-aligned inflection (whereas the presence of a modal particle *dhu/balaŋ* in the same clause does.

(174) **Desiderative embedding predicate doesn't license mood shift in WD**

a. *walal   ga   djälthi-rr* [*walala-ny   dhu   **gäma**   hunting-lil*
    3p   IPFV.**I** want-**I**   3p-PROM   FUT   take.**I**   hunting-ALL

    wämut-thu]
    MÄLK-ERG

    'They want that Wämut take them hunting.'   (Wilkinson *ms.*:23)

b. *ŋurik   ŋarra   djäl   guya-w* [*ŋunhi* [*(ŋayi)   ḏarrkthu-**rr***
    ENDO.DAT   1s   want   fish-DAT   ENDO   (3s)   bite-**III**

    wämut-nha]]
    MÄLK-ACC

    'I want (am desirous) of that fish that (it) bit Wämut.'
    (Wilkinson *ms.*:22)

Similarly, the IRREALIS categories don't appear to be licensed by other propositional attitudes (*bäyŋu märr-yuwalkthin* 'not believe') or in speech reports (FID) where the embedding predicate entails the falsity of its complement (175b-c)

(175) **Other embedding predicates don't license mood shift**

a. *Ŋayi **bäyŋu** ŋarranha   märr-yuwalkthi-nha* [*ŋunhi* [*ŋarra   ga-**na***
    3s   NEG   1s.ACC   faith-true.INCH-**IV**   ENDO   1s   IPFV-**III**

    *warkth-**urruna***]]
    work.VBLZR-**III**

    'She (my *galay* 'wife') doesn't believe me that I was working.'
    [DhG 20190417]

b. *ministay   nyäḻ'yu-rruna* [*ŋunhi* [*gapmandhu   dhu*
    minister.ERG   lie-**III**   ENDO   government.ERG   FUT

    *limurrunha   **gunga'yun***]]
    1pINCL.ACC   help-**I**

    'The minister lied that the government would help us.'
    [DhG 20190417]

    c.   *ministay*   *nyäl'yu-rruna* [*ŋunhi* [*gapmandhu*   *limurrunha*

        minister.**ERG** lie-**III**   ENDO   government.**ERG** 1p**INCL.ACC**

        *gunga'yu-**rruna***]]

        help-**III**

'The minister lied that the government had helped us.'

[DhG 20190417]

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), diverging from the canonical distribution of subjunctive morphology in European languages, we have reason (following Palmer 2001) to treat the mood category inflected on WD verbs as IRREALIS. The nature of the irrealis mood and its relation to modal operators is further developed in the remainder of this chapter; the question of syntactic subordination is investigated in additional detail in chapter 4.

3.4   Metaphysical nonveridicality

The WD (root) modal expressions described in § 3.2 above (*e.g.*, *dhu* and *balaŋu*) both have the following properties:

i They take a predicate *P* in their scope,

ii They retrieve a "restriction" from context (the modal base — a subset of the metaphysically possible branching futures relative to the evaluation index i),

iii They assert that *P* holds at a successor index to the i.

That is, clauses that contain (at least) one of these modal particles represent quantificational propositions over a **subset** of metaphysical alternatives to an evaluation index.
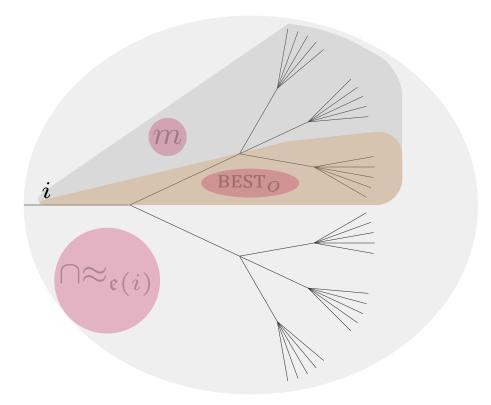
The *Branching Times* models as introduced in § 1.2 capture the "right-branching" property of metaphysical possibility. That is, for any given index, there is a settled past (a single branch) and an unsettled future (multiple metaphysical alternatives.)

Property iii of the modals described above requires that the contribution of *dhu* and *balaŋu* includes the forward displacement of the *P* relative to i. It follows from this that the modals quantify over (nonsingular) sets of branches.

Further, per property ii, *dhu* and *balaŋ* both quantify into **subsets** of those branching futures (metaphysical modal bases.) They assert instantiation of *P* in all/some of the branches in those subsets (for example, in the case of a deontic reading, those that best conform with the law at determined by $i*$ [the utterance index] —$\{i' \mid i' \in \underset{deontic}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m(i*)}\big)\}$.)

On this analysis, clauses with modal particles — both *dhu* and *balaŋ* — make a claim about a **proper subset** of the metaphysical alternatives to i. Consequently,

Figure 25. Given an index i, modal particles quantify into a subset of its metaphysical alternative branching futures $\cap\approx_i$. The subset is determined by conversational backgrounds m, o — depicted here in **ochre**. *balaŋ* '*IRR*' (*dhu* '*FUT*') claim that there is some (all) successor index/indices to i along one of the ochre-shaded branches at which the prejacent (P) holds.

these clauses are compatible with (and indeed **implicate**) that this claim (*viz.* that their prejacent holds at some posterior index) is **false** at some of i's metaphysical alternatives.

This "upper-bounding implicatum — namely that if S asserts P of the subset, then it was not assertable at the superset (because otherwise S would have done so) — follows naturally from basic Gricean principles (see Horn 1984 a.o.)

3.4.1 A nonveridical semantics for IRREALIS

In § 3.3.2 above, following Giannakidou (1995; 1998 *et seq.*) we introduced a definition (171) for **nonveridicality** as a relation that holds between a modal base (a set of branches) and a proposition. Additionally, following (Condoravdi 2002; Kaufmann 2005; Kaufmann, Condoravdi & Harizanov 2006 a.o.), in §1.2 and Part I, the related notions of *settledness* and the *presumption of settledness* — ways of understanding the asymmetry of past and future — were introduced. A branching times translation of *settledness* was given in (8′), repeated below.

(176) **Settledness-at-$i*$ for P** (branching times)   [repeated from 8′]
$$\forall b_1, b_2 \in \cap\approx_{i*} : \exists^{b_1} i' \exists^{b_2} i'' \big[i' \simeq i'' \wedge [P(i') \leftrightarrow P(i'')] \big]$$

As with the proposed entries for **I** and **III** (146 and 149 above) respectively, the IRREALIS inflections will be taken to impose a presupposition on the "index pronoun" which is supplied by context. In view of the discussion above, (177) contains a proposal for a definition of the notional category of IRREALIS (at least as far as it relates to apparent WD conceptions/grammaticalisations.)

(177) **A relation between an evaluation index and a predicate: The contribution of IRREALIS mood as nonveridicality**

$$\textbf{IRR} \overset{\text{df}}{=} \exists b \in \cap\approx_{\mathfrak{c}(i)} \wedge \exists^b i'[i \preccurlyeq i' \wedge \neg P(i')]$$

IRR, a relation between an evaluation index i and a predicate P, is satisfied if there exists some i' along one of i's metaphysical alternatives (as calculated at the left boundary of i) at which P doesn't hold.
That is, IRR holds iff P is not positively settled/historically necessary at i.

Crucially, as described above, *dhu* and *balaŋ*, both of which make a claim about a proper subset of $\cap\approx_i$ are therefore both compatible with (and indeed implicate) that there is some $i' \in \cap\approx_i$ at which their prejacent doesn't hold (that is, the modal particles can be described as NONVERIDICAL operators.)[144]

Given that **II** and **IV** are only felicitous in the presence of one of these nonveridical operators, their distribution is apparently restricted to irrealis claims. On the basis of its distributional facts in addition to this definition (177), a lexical entry for **II** is proposed in (178), where the inflection enforces a nonveridicality presupposition on the (contextually assigned) reference index with respect to P.[145]

(178) **A denotation for the SECONDARY inflection as encoding nonveridicality**

$$[\![\textbf{II}]\!]^c = \lambda i : \exists b \in \cap\approx_{\mathfrak{c}(i)} \wedge \exists^b i'[i \preccurlyeq i' \wedge \neg P(i')] \,.\, i$$

II enforces a presupposition on the evaluation index, whose metaphysical alternatives must be nonveridical with respect to P.

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[144]This description is somewhat sloppy for the sake of exposition; more precisely, what I mean by "there is some $i' \in \cap\approx_{\mathfrak{c}(i)}$" here is that there is some $i' \in \bigcup\limits_{b \in \cap\approx_{\mathfrak{c}(i)}} b$.

[145]Further discussion about the presuppositional status of these felicity conditions is provided below (esp. §3.5.)

(179)   *dhu* **satisfies the *irrealis* presupposition**

ŋuriŋi	bala	waltjan̲'dhu,	ŋarra	dhu	**roŋiyi**
ENDO.ERG	MVTAWY	rain.ERG	1s	FUT	return.**II**

'I'll come back next rainy season.'   [MG 20180802]

a. $[\![\text{ŋarra RONIYI-}]\!]^c = \lambda i.\exists e(\text{I.RETURN}(e) \wedge \tau(e) \sqsubset i)$

b. $[\![dhu]\!]^c(\mathbf{a}) = \lambda P \lambda i : \forall b \big[b \in \underset{o}{\text{BEST}}\big(\cap m(\underset{\text{CIRC}}{\mathfrak{c}}(i)) \big) \to \exists^b i'[i' \succeq i \wedge P(i')] \big](\mathbf{a})$

c. $[\![\text{ŋarra dhu RONIYI-}]\!]^c =$
     $\lambda i. \forall b \big[b \in \underset{o}{\text{BEST}}\big(\cap m(\underset{\text{CIRC}}{\mathfrak{c}}(i)) \big) \to \exists^b i'[i' \succcurlyeq i \wedge \exists e(\text{I.RETURN}(e) \wedge \tau(e) \sqsubset i')] \big]$

d. $[\![\text{ŋarra dhu } \textbf{\textit{roŋiyi}}]\!]^c =$
     $\quad\quad : \exists b \in \cap\approx_{\mathfrak{c}(i)} \wedge \exists^b i'[i \preccurlyeq i' \wedge \neg\text{I.RETURN}(i')]$

     $\quad\cdot \forall b \big[b \in \underset{o}{\text{BEST}}\big(\cap m(\underset{\text{CIRC}}{\mathfrak{c}}(i)) \big) \to \exists^b i'[i \preccurlyeq i' \wedge \exists e(\text{I.RETURN}(e) \wedge \tau(e) \sqsubset i')] \big]$

     <u>In words:</u> *ŋarra dhu roŋiyi* 'I will return' is true if all the **best** branching futures (as evaluated at i_c) contain a successor index i' in which the speaker returns.

     It is only defined if context supplies an index i_c for which there is a metaphysical alternative *b* at which the speaker *doesn't* return at some successor index.

As explained above, the fact that *dhu*-clauses make an assertion that some predicate (the speaker's return next wet season)[146] holds of in a *subset* of branches in the metaphysical modal base $\cap\approx_{i_c}$ Q-implicates that, indeed, this predicate *does not* hold at all branches. That is to say that *dhu* claims satisfy IRR.

Below we propose a semantics for WD negative operators in view of explaining the "negative asymmetry" described in § 3.1 — *i.e.*, why is it that **I** and **III** are (generally) disallowed in all negated clauses, modalised or otherwise? As we will see, this is the payoff of describing a class of *nonveridical* operators.

3.4.2   Negation & irrealis

In light of the proposal introduced above, we model clausal negators *bäyŋu* and *yaka* as scoping under inflection. 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.

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[146]Note here that the temporal frame specified by *ŋuriŋi bala waltjan̲'dhu* $\fallingdotseq$ 'next wet season' must be taken to **directly** restrict the event time i' — while modals are modelled as indefinite advancements instantiation/event time, it is still assumed that the range of possible times must be contextually restricted (an instantiation of the *ParteeProblem*™, see also Ogihara (*e.g.,* 1996, 2007) *et seq.* for treatments of this issue.)

(180)   **CONTEXT.** Speaker has broken his leg.

bäyŋu	*ŋarra*	*dhu*	*marrtji*	*diskolili,*	*bili*	*bäyŋu*	*ŋarra*	***gi***	*marrtji*
NEG	1s	FUT	go	disco.ALL	CPLV	NEG	1sd	IPFV.**II**	go.**II**

'I'm not going to the disco because I can't walk (at the moment.)'
(lit. 'I'm not walking) [MG 20180802]

Given the distributional similarities between (root) modals and *yaka/bäyŋu* in WD — being that they both license IRR — in this section, I propose a semantics that unifies WD NEGATIVE and MODAL expressions (*sc.* a class of **NONVERIDICAL operators**.) Recalling the discussion in Part II, this style of analysis highlights the similar effects of negative and modal operators, construing of all nonveridical operators as quantifiers over metaphysical alternatives.

Bäyŋu P asserts that no totally realistic metaphysical alternative to i is such that P is instantiated at i.)[147] This is shown in (181).

(181)   **A lexical entry for WD negation**

a. $[\![b\ddot{a}y\eta u]\!]^c = \lambda P_{\langle s,t\rangle}\lambda i.\nexists b[b \in \underset{\{b*\}}{\text{BEST}}(\cap\approx_i) \wedge \exists^b i'[i' \simeq i \wedge P(i')]$

Given a property P and reference time i, 'NEG' (WD: *bäyŋu/yaka*) asserts that there is no index i' which completely consistent and co-present with i at which P holds.

Note that this quantification is trivial; NEG is taken to quantify over a conversational background that contains propositions that are the case at/properly describe i (the "totally realistic" conversational background of Kratzer (1981b:295) — $\cap f(w) = \{w\}$.) Consequently, given the modal domain established by these conversational backgrounds, $\forall i'[i' \simeq i* \rightarrow i' = i*]$. As a result of this the lexical entry given above ought to ~~have~~ be truth conditionally equivalent to (181):

(181)   b. $[\![b\ddot{a}y\eta u]\!]^c = \lambda P\lambda i.\neg P(i)$

The entry for NEG given in (181a) aligns with those for the other modals both in terms of ~~both~~:

- its type (that is, the shape of the lexical entry), as well as

- the fact that, like the other modal particles, NEG indicates that the speaker/attitude holder fails to assert that P is instantiated at all metaphysical alternatives to i — satisfying the shared presupposition of the irrealis moods **II** and **IV**.

Shown above in § 3.1, the relative distribution of **II** and **IV** appears to mirror the temporal ranges of **I** and **III** respectively. Consequently, we model **IV** as containing

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

BOTH the NONVERIDICALITY and the PRECONTEMPORARY presuppositions (181). A semantic derivation for a simple negative past sentence is then given in (182).

(181) **A denotation for the QUARTERNARY inflection as enforcing both *precontemporaneity* and *irrealis* presuppositions**

$$[\![\mathbf{IV}]\!]^c = \lambda i : i \sqsubseteq \mathrm{F_c} \wedge i \prec j_\mathrm{F} \wedge \exists b \in \cap\approx_{\mathfrak{e}(i)} \wedge \exists^b i'[i \preccurlyeq i' \wedge \neg P(i')] \,.\, i$$

IV presupposes that the reference index i is non-final with respect to the reference frame $\mathrm{F_c}$ **and** its metaphysical alternatives are nonveridical with respect to P.

(182) ***bäyŋu* satisfies the *irrealis* presupposition**

bäyŋu *ŋarra* ***nhänha*** *mukulnha (goḏarr'mirr)*
NEG   1s   see.**IV**   aunt.ACC (morning.PROP)

'I didn't see aunty (this morning).'   [AW 20190501]

a. $[\![\textit{ŋarra} \text{ NHÄ-} \textit{ mukulnha}]\!]^c = \lambda i \,.\, \exists e(\text{I.SEE.AUNTY}(e) \wedge \tau(e) \sqsubset i)$

b. $[\![\textit{bäyŋu}]\!]^c(\mathbf{a}) = \lambda P \lambda i \,.\, \neg P(i)$

c. $[\![\textit{bäyŋu ŋarra} \text{ NHÄ-} \textit{ mukulnha}]\!]^c = \lambda i.\nexists e(\text{I.SEE.AUNTY}(e) \wedge \tau(e) \sqsubset i)$

d. $\mathbf{c}\left([\![\mathbf{IV}]\!]^c\right) = \mathbf{c}\left(\lambda i : \text{PRECONTEMP}_c(i) \wedge \exists b \in \cap\approx_{\mathfrak{e}(i)} \wedge \exists^b i'[i \preccurlyeq i' \wedge \neg P(i')]\right).i$

e. $[\![\textit{bäyŋu ŋarra nhänha mukulnha}]\!]^c =$
$$: \text{PRECONTEMP}_c(i_c) \wedge \exists b \in \cap\approx_{\mathfrak{e}(i_c)} \wedge \exists^b i'[\mathfrak{e}(i) \preccurlyeq i'$$
$$\wedge \neg\nexists e[\text{I.SEE.AUNTY}(e) \wedge \tau(e) \sqsubset i']$$
$$. \nexists e[\text{I.SEE.AUNTY}(e) \wedge \tau(e) \sqsubset i_c]$$

That is: given a context c, an utterance of **(182)** is true iff there is no event of the speaker seeing *mukul* included in i_c.

Further, (182) presupposes (*i.e.*, it is defined iff) i_c (the reference index assigned by context) satisfies **precontemporaneity and** for which the speaker's not seeing *mukul* is **not** a historic necessity of the beginning of that reference interval ($\mathfrak{e}(i)$).
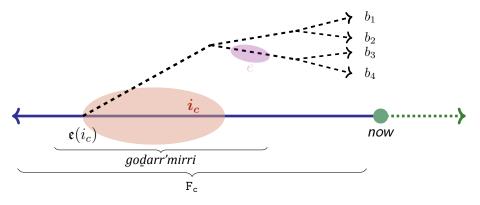
Not derived here, goḏarr'mirri 'this morning' provides a temporal frame, restricting the event time to non-final intervals of the day of speech. Assuming i_c overlaps with the morning of the day of speech, (182) satisfies PRECONTEMP) (as well as the truth conditions of the TFA).

The irrealis presupposition included in **IV** is satisfied iff ~~there~~ the discourse context supports an alternative at which the corresponding affirmation (*viz.* that

the Speaker saw *mukul*) held (perhaps made salient by a prior expectation that the Speaker was in fact meant to see his Aunty this morning.) This idea — *viz.* 'asymmetric" constraints on the felicity of a given negative sentence in discourse as against its corresponding affirmation — is further elaborated below.

Assuming that this presupposition is satified, the sentence will be true iff there was no event on the morning of the day of speech in which the speaker saw *mukul.*

A diagramatic representation of this is given in Fig. 26.

Figure 26. The contribution and licensing of **IV** in negative contexts: a branching times schema of (182)

This figure is a (partial) representation of $\cap \approx_{\mathfrak{e}(i_c)}$ in (182): the sentence is true only if there is **no** event of the speaker seeing *mukul* in the morning, within i_c. Further, the inflection — **IV** — presupposes that whatever value is assigned to i_c satisfy:

PRECONTEMPORANEITY. i_c is located non-finally within F_c (that is before speech-time on the day of utterance.)

IRREALIS. There is some metaphysical alternative to $\mathfrak{e}(i_c)$ (here, an index within $\cup\{b_1, b_2, b_3, b_4\}$) at which the speaker *does* see *mukul* — *i.e.*, an active possibility at the beginning of i_c.

In this figure, the presupposition is satisfied given that an event of *mukul-seeing* (e) obtained at some $i' : i' \succcurlyeq \mathfrak{e}(i_c)$

What does a negative sentence presuppose? : Polarity "asymmetrism"

As described in considerable detail in Horn 2001 (esp. § 1.2), the idea of some "asymmetry" between positive and negative sentences, and debate over this topic, has a centuries-long history. The claim at issue essentially boils down to what is referred to as the Paradox of Negative Judgment: whereas an affirmative statement concerns some fact about the world, a negative one "declares what it is not, and how can this express what it is?" (Horn 2001:49, citing Joseph 1916:171).

Horn refers to those theorists who have defended a view of negative judgments as "second-order affirmations" (relative to their corresponding positive judgments)

as *"asymmetricalists."* One way that this asymmetry has been theorised is by way of a claim that "negative speech acts are presuppositionally more marked than their corresponding affirmatives" (Givón 1978:70), specifically insofar as "every negative statement presupposes an affirmative, but not vice versa" (Horn 2001:64).

Theories of linguistic negation as inducing some presuppositional content derive from the intuition that, given the uninformativity of a negative predication (in view of the fact that there is an infinity of properties that *do not* hold of a given individual), negative sentences' canonical function is that of *denial* in a given discourse context. As such, an utterance of $\neg\varphi$ generally seems to reflect a belief on the part of the speaker that their interlocutor is familiar with and may be entertaining the possibility that φ (see Givón 1978:70,109).[148]

In this chapter, we have seen data which shows how negative operators appear to satisfy the same set of conditions as modal operators in WD in terms of licensing the use of the **II** and **IV** inflections. I have argued that **II** and **IV** are licensed whenever the IRREALIS presupposition is satisfied, *sc.* whenever there is some metaphysical alternative to the evaluation index at which the prejacent to the inflection *does not hold.*

As shown above (182 and Fig. 26), on the analysis proposed here, the IRR presupposition triggered in **IV** makes salient the fact that, at the beginning of the reference interval, there existed active metaphysical alternatives at which **IV**'s prejacent *was* instantiated. That is, IRR is satisfied in **bäyŋu ŋarra nhänha** *mukulnha goḏarr'mirr* 'I did**n't see** aunty this morning' given the apparent availability in the discourse context of the possibility of the speaker seeing their aunty in the future of i_c.

In this sense, the linguistic *phenomenon* of asymmetric negation with respect to reality status marking (Miestamo's A/NONREAL), which is exhibited in WD, can be thought to correspond to the *theoretical* perspective of an asymmetry between negative propositions and (corresponding) affirmative ones, chronicled in Horn (2001) — that is, that negative propositions are formally and functionally "marked" with respect to positive ones; particularly insofar as the former make salient a corresponding affirmation.[149]

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In terms of the branching times framework, then, the function of NEGATIVE operators can in a sense be assimilated with modals. As an example, in the case of negated predications about the past, indices at which the basic proposition holds

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[148]Horn (2001:60–4) traces this idea — *viz.* that "negation presupposes an affirmation against which it is directed and cannot be understood except through affirmation" — back at least as far as the ancients, into the thought of philosophers from backgrounds as diverse as Parmenides, Śaṇkara, Ibn Sina & Aquina.

[149]Thanks to Ashwini for an especially productive discussion about this distinction.

are not ones that are consistent with, or $\prec$-accessible to speech time ($i*$), but involve predicating into branches that are taken to have been $\approx$-accessible at the beginning of a contextually-assigned reference time ($i_c \prec i*$). That is, the NEGATIVE PAST can be assimilated into the COUNTERFACTUAL domain (as defined by von Prince et al. a.o.)

3.4.3   A temporomodal interaction

The analysis described above emphasises the distributional similarities between negative operators in WD and the modal particles *dhu* and *balaŋ(u)*, in view of assimilating these classes into a category of "nonveridical operators", it is also worth considering distributional differences between them, demonstrated in (183) below, repeated from 168 above (compare also Figs 22/24 above).

(183)   **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 we might/would collect shellfish, but we didn't collect shellfish.'   [AW 20190429]

The three predicates in (183) — 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.

A proper treatment of this effect is outside the scope of the current work. However, it is possible that this is a reflex of a greater degree of temporal vagueness in modal predications (which possibly also constitutes an example typological generalisations that fewer temporal distinctions are grammaticalised in irrealis-aligned paradigms (*e.g.*, the Romance subjunctive) than in realis-aligned ones, see Horn 2001; Miestamo 2005:156.) Givón (1978) in fact gives examples of a number of Bantu langauges whose temporal remoteness systems are flattened in negative clauses (compare the ChiBemba example in 184 below.)

(184)   **Loss of temporal remoteness distinctions under negation in ChiBemba**
([bem] Bantu: NE Zambia)

a.   *N-kà-boomba*

'I will work tomorrow.'

b.   *N-ká-boomba*

'I will work after tomorrow.'

c. *Nshi-kà-boomba*   d. **Nshi-ká-boomba*

'I will not work.'

This temporal vagueness is also reflected the denotations assumed here for modal expressions (which involve the 'forward expansion of the time of evaluation' (and are dependent on further contextual information for the identification of the timespan of an eventuality (Condoravdi 2003:12)).

3.5 MAXIMIZE PRESUPPOSITION returns: The same-day future

The "same-day future", both in positive and negative clauses systematically receives **I**-inflection — this is the only time in which **I** co-occurs with a negative operator (compare Fig 22.) This phenomenon is illustrated by the data in (185–186).

(185) **Negated same-day future predications fail to license irrealis-mood shift (unlike negated present predications)** [AW 20190501]

a. *ŋarra (**yaka**) **dhu** nhä-**ma** mukulnha*   [(NEG) SDF]
    1s (NEG) FUT see-**I** aunt.ACC

'I will (won't) see aunty (tonight).'

b. *(goḏarr) ŋarra (**yaka**) **dhu** nhä-**ŋu** mukulnha*   [(NEG) FUT]
    tomorrow 1s (NEG) FUT see-**II** aunt.ACC

'Tomorrow I will (won't) see aunty.'

c. *(dhiyaŋ bala) **bäyŋu** ŋarra **gi** nhä-**ŋu** mukulnha* [(NEG) PRES]
    now 1s (NEG) IPFV.**II** see-**II** aunt.ACC

'At the moment, I'm not looking at aunty.'

(186) **No effect of negation on verbal inflection in same-day futures**

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]

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."[150] While the WD same-day future construction is not technically a morphosyntactic futurate,[151] analysis of these devices may shed potential insight on the (functional) motivation for this phenomenon.

The surprising contrast between a **I**-inflected later-today future (185a) and an IRR-inflected present (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**. *Dhu* retrieves an evaluation index ($i*$) and obligatorily advances the instantiation time of the eventuality into the future of $i*$; 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; both positive and negative claims about the same-day future are treated as metaphysically "actual" and therefore assertable.

Antipresuppositional: *realis* as an epiphenomenon.   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 nonveridical operators) in view of general pragmatic principles (*viz.* MAXIMIZE PRESUPPOSITION) — that same notion that was invoked in accounting for the blocking of **I** by the "stronger" **III** in assertions about precontemporary events.)[152]

That is, whenever an expressed proposition is *nonveridical* — that is, presumed unsettled in the context of evaluation, the IRREALIS presupposition is satisfied. By virtue of MAXPRESUPP, **I** and **III** **antipresuppose** nonveridicality; their infelicity in unsettled contexts is explained by virtue of blocking by "parallel (or *Alt*-familial) structures" — **II** and **IV** both of which that presuppose nonveridicality.[153]

The analysis of the same-day future, then, is based on the hypothesis that predications about the same-day future — even if these are, *sensu stricto*, claims about properties of future ('POTENTIAL') indices — receive a "NON-IRREALIS" inflection (**I**) in view of their plannability and "presumed settledness." For this reason, we might

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

[151]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.

[152]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. See also § 2.3.2.3.

[153]What appears to be an early implementation of a notion of *antipresupposition* apparently due to Percus (2006), who credits Kai von Fintel with introducing the term (fn. 12).

model IRR (*viz.*, the proposition that there be a metaphysical alternative at which *P* does not hold) as presuppositional (that is non-asserted/non-truth-conditional.)

We return to this component of the analysis in chapter 4 below.

3.6   Conclusion: motivating NONVERIDICALITY and IR-REALIS MOOD

This chapter has proposed that **II** and **IV** (to the exclusion of **I** and **III**) encode the IRREALIS — treated here as a verbal mood.

At its core, the IRREALIS is taken to be associated with a class of NONVERIDICAL OPERATORS — modelled here as a set of predicate modifiers that indicate that the question of whether a given property (their prejacent) has been resolved as true (and is therefore assertable) has (or had) not been established in the discourse context.

As such, WD's category of NONVERIDICAL OPERATORS — namely FUT, MOD and NEG — were given a semantics that was consistent with the falsity of their prejacent in some metaphysical alternative to the evaluation index.[154] The distinctive contribution of the IRREALIS inflections, then, is that they impose a **presuppostion** on the (contextually-supplied) index of evaluation: namely that there exists some conceivable, metaphysically consistent alternative "branch" at which their prejacent is false.

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[154]Note that this chapter has not considered the occurrence of past habitual predications (marked with *ŋuli* 'HAB.') I leave a proper treatment of habituals to future work. Properties shared between habitual predications and IRREALIS/SUBJUNCTIVE moods is cross-linguistically well-attested and is discussed in existing literature (*e.g.*, Boneh & Doron 2008; Ferreira 2016; Giannakidou 1995; von Prince et al. 2019b).
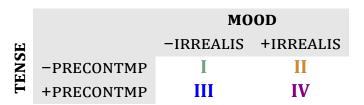
Chapter 4

An analysis of the WD paradigm

The previous two chapters have proposed a semantics for WD's four inflectional categories in terms of a *Branching Times* framework. Each inflection is taken to represent information about **tense** and **verbal mood**, which has been modelled as a partial (identity) function, imposing presuppositions on a reference index. As described in chapters 2 and 3 respectively, the content of these presuppositions is *precontemporaneity* and *nonveridicality*.

Table 14 summarises the (2×2) semantic features that are encoded by each inflection.

Table 14. The contributions of WD's four inflectional categories

		MOOD	
		−IRREALIS	+IRREALIS
TENSE	−PRECONTMP	I	II
	+PRECONTMP	III	IV

Shown above, each of WD's four inflectional categories lexicalises a binary tense and binary mood feature — described above, these features are modelled as the presence or absence of an associated presupposition (PRECONTEMPORARY and IR-REALIS respectively.)
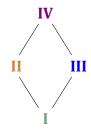
The inflections are then modelled as partial (identity) functions $(\mathcal{I} \rightarrow \mathcal{I})$, each of whose domain is a subset of $\mathcal{I}$ (*i.e.*, $\mathfrak{D}_s$: the domain of (evaluation) indices.) The subsets of $\mathcal{I}$ that constitute the domains of each inflection are spelled out in (187). Note, of course, that each is relativised to a context c — a tuple that is assumed contains relevant information about (at least) the utterance parameters and the reference time.

(187) **Domains of the four inflections in WD, given a branching time frame $\mathfrak{T} = \langle \mathcal{I}, \prec \rangle$ and an evaluation context c**

$[\![\, \text{I} \,]\!]^c$:	**general**	$\mathcal{I}$
$[\![\, \text{II} \,]\!]^c$:	**irrealis**	$\{i \mid \text{IRR}_c(i)\}$
$[\![\text{III}]\!]^c$:	**precontemporary**	$\{i \mid \text{PRECONTEMP}_c(i)\}$
$[\![\text{IV}]\!]^c$:	**precontemporary irrealis**	$\{i \mid \text{IRR}_c(i) \wedge \text{PRECONTEMP}_c(i)\}$

Described in the previous chapters (esp. §§ 2.3.2.3 and 3.5), the synchronic distribution of the four inflectional categories is then accounted for on the basis of (anti)presuppositions and competition between the four categories.

On this analysis, then, **I** presupposes the least/imposes the fewest constraints on the reference index supplied by context (i_c), whereas **IV** is the presuppositionally "strongest" inflection. Consequently, the four inflections represent a set ("family") of alternatives to one another that can be partially ordered by unilateral entailment (effectively, a two-dimensional Horn scale.) This is also represented as a Hasse diagram below (Fig. 27): α **blocks** β iff α unilaterally entails β.

Figure 27. MAXPRESUPPOSET $\langle \text{INFL}, \Rightarrow \rangle$: Blocking relations between the inflectional categories. Given a reference index i_c, speakers select the form with the most specific presuppositions that can be satisfied in context.

The domain of each inflection can be represented in terms of a branching time model (188); schematised in Fig. 28.[155] (compare this to the analysis of Ritharrŋu-Wägilak in § 6 — *i.e.*, (107) – *p. 113 above.* Figure 28 is a diagrammatic representation of a branching time frame $(\mathfrak{T})$ over which the domain of each inflection is superimposed.[156] Note the general domain of **I**; due to MAXPRESUPP, where domains intersect, that which "presupposes the most" (fig. 27) is felicitous.
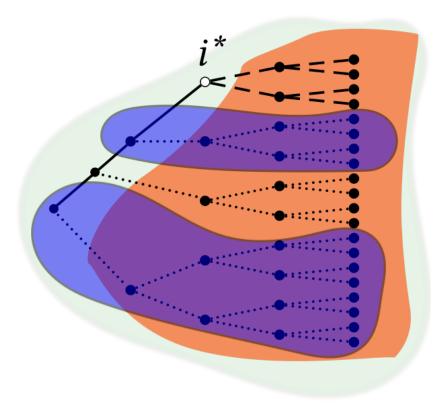
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In § 3.2, it was suggested that WD modal particles select for varieties of *circumstantial* modal bases (and receive "root" modal readings.) That is, they appear to be incompatible with epistemic readings. Relatedly, epistemic modal expressions

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[155]Compare this diagrammatisation to von Prince et al. (2019b), von Prince et al. (forthcoming) *etc.*

[156]Thanks to Kilu von Prince for the png template, see also von Prince (2019) *i.a.*.

Figure 28. The WD inflectional categories are modelled as partial identity functions over $\mathcal{I}$. The (approximate) domains of each are projected over a Branching Times frame, where $i*$ is the evaluation index.

Due to competition between the four inflections, the less specific items are taken to be degraded/blocked (*i.e.* they antipresuppose) subsets of $\mathcal{I}$ in which their domain intersects with a more specific competitor.

(notably *mak(u)* 'maybe, perhaps') *do not* license the appearance of IRREALIS inflections.

The remainder of the present chapter picks up on a few additonal phenomena, laying tentative hypotheses (subject to futher investigation) before concluding this (sub)part of the dissertation.

In § 4.1, we briefly consider data with apparent epistemic modal expressions and complement clauses in view of fine-tuning our notion of NONVERIDICALITY and considering how well the above-mentioned characterisation of *irrealis* as nonassertoric fits the WD data.

In § 4.2, we return to an explicit discussion of the contrasts between WD temporomodal expression, the primary focus of Part III, and the (largely cognate) system of Ritharrŋu-Wägilak (introduced in § 1.3.1.)

4.1 Assertoric force

A lot of the scholarship on verbal mood has concentrated on the generalisation that distinctions in this domain appear to correlate with illocutionary force: that is *realis*-aligned categories are the province of ASSERTIONS, whereas *irrealis* mood is associated with (various flavours of) *non-assertion* (*e.g.*, Bybee & Fleischman 1995; Palmer 2001) and evaluations of the "information value" contained in a given utterance (*e.g.*, Lunn 1995).[157]   That is, previous analyses have suggested that, for example, SUBJUNCTIVE inflection on *P* is taken to indicate that the speaker is not asserting/willing to commit themselves to *P*.

4.1.1 Epistemic modality in WD

The data in (188) show uses of WD epistemic *mak(u)* in a context that supports a a necessity and (c) possibility reading. Note in (188c) that the root modal *balaŋ* 'MOD' is judged as infelicitous in an epistemic-supporting context.

(188)   ***Mak* 'EPIST' encoding various strengths of epistemic modality**

    a.   **CONTEXT.** It's the middle of the schoolday, I ask Albert where *yapa* is.

        bäyŋu ŋarra nhänha nanya; ***mak*** *ŋayi ŋunha golŋurnha*
        NEG   1s   see.**IV** 3s.ACC EPIST 3s   DIST   school.LOC.SEQ

        'I haven't seen her; but [it's 2, so] she must be at school.'

                                        [AW 20190429]

    b.   **CONTEXT.** The lights in Grace's window are on.

        mak *ŋayi ŋunhiyi*
        EPIST 3s   ENDO.LOC

        'She must be at home.'   [MG 20180802]

    c.   **CONTEXT.** I'm trying to find mum.

        Wanha balaŋ ŋäma'?
        where MOD Mo

           mak*/#** *balaŋ goḻŋur,* ***mak *wäŋaŋur...*
           EPIST/~~MOD~~   school.LOC EPIST home.LOC

        'Whereabouts could mum be?'
        'Maybe at school, maybe at home...'   [AW 20190429]

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[157]This relationship with illocutionary force is the common property that unites "verbal" (*(ir)realis*) and "sentential" mood (*interrogative, imperative, declarative, performative...*) — for Portner: "MOOD is [that] aspect of linguistic form which indicates how a proposition is used in the expression of modal meaning" (2018:4).

In addition, unlike the modal particles *dhu, balaŋ*, *mak* is completely invisible to the inflectional paradigm, similarly to the embedding predicates described above, but diverging from the class of modal particles. Wilkinson (2012:685) describes a class of "propositional particles" which includes *mak* (as well as *yanbi/yanapi* 'erroneously' and *warray* 'indeed.') These particles each apparently serve a variety of modal functions, although none *per se* triggers irrealis mood marking.[158] Examples are given in (188).

(189) **Epistemic *mak(u)* doesn't license mood shift in WD**

    a. <u>*maku*</u> ***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]

    b. *Dhuwali-yiny*   *ŋayi* <u>*mak*</u> *bitja-**rr**-yiny*   *waŋ-**an**, bili*
        MED-ANA.PROM 3s   EPIST do.thusly-**III**-ANA.PROM speak-**III** CPLV

       limurr *bäyŋu* *ŋula* *ŋatha* *märra-nha.*
       1p.INCL NEG   INDEF food   take-**IV**

       'Maybe he said that because we didn't bring any food.'

                                         [DB:Mathyu 16:7]

4.1.2   *mak(u)* as an force modifier

An influential approach to the question of what an assertion *is* or *does* frames them in terms of "speaker commitment." That is, in performing an assertoric (more broadly, "constative", in Searle's terminology) speech act, a speaker "makes [them]self responsible for [the proposition's] truth" (Peirce 1934, cited in MacFarlane 2011; see also Brandom (1983); Williamson (1996) a.o.)[159] This perspective ~~is~~ has been formulated as a communicative convention, *e.g.* (190), following Lauer (2013:105), Condoravdi & Lauer (2011:157):[160]

(190) **Declarative convention**

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[158]According to Wilkinson (2012:686), *yanbi* "occurs only with [**II**] and [**IV**]…" whereas repeated elicitations with consultants in Ramingining failed to reproduce this. This is likely to represent a dialectal difference within WD varieties (or otherwise a reanalysis of *yanbi/yanapi*.) It was suggested to me by consultants that *yanapi* and *warray* are "*Miwatj* word[s]"; *sc.*, is less frequent use in the speech of Ramingining WD speakers [*e.g.*, MG 20180802]. The Dhuwal(a) spoken at Galiwin'ku, the source of the bulk of Wilkinson's data, seems to be at the boundary of western and *miwatj* varieties, which may suggest an explanation to this variation.

[159]These ideas have roots in the *Begriffsschift* (Frege 1879): Krifka (2019:83) recalling that an assertion is composed of a thought (proposition) ($-\varphi$) and a **judgment** of the truth of that thought ($|$) — whence the sequent notation $\vdash \varphi$.

[160]Other commitment theorists have advocated for a wholesale removal of "speaker belief" from models of assertion — Krifka (2019:78), *e.g.*,cites Moore's paradox in support of this perspective.

> A speaker who utters a declarative φ in a context c, publicly commits themself to behave as though they believe $[\![\varphi]\!]^c$

In recent work, Krifka has pointed to evidence that "[some] epistemic adverbials and discourse particles are not part of the proposition to be communicated, but rather are tools to manage to commitment of the speaker" (2019:84). Given an apparent need to distinguish between syntactically-represented linguistic items that modify propositions versus (the illocutionary force of) speech acts, several authors have argued for representing these items in the "left periphery" (CP layer) of the clause.[161]

On these types of accounts, the LF of a simple (unembedded) clause is essentially taken to be headed by a silent operator (ASSERT or $\vdash$) which takes a (fully-inflected) proposition as its sister.[162] Ideas about the illocutionary force and norms of assertion are formalised by modelling $\vdash$ as comprising a covert doxastic modal anchored by the actual world ($\sim_\alpha$) (Kaufmann 2005) or an update function on a speaker's public commitments/beliefs and (ultimately) the common ground (Krifka 2015; Lauer 2013).

A precise formulation of this operator's (these operators') semantics is not necessary for current purposes; what follows (191) represents a rough proposal in view of clarifying the nature of the METAPHYSICAL/OBJECTIVE NONVERIDICALITY property described above.

(191) **An assertability relation**

$[\![\text{ASSERT}]\!]^c = \lambda p \lambda i. \cap \sim_{\text{S}} i \subseteq p$

$\sim$ is an accessibility relation that, given a speech index i returns all the propositions that the Speaker S of the utterance will publicly commit to at that index.

ASSERT states that p follows from this set.

The force of this modal can additionally be weakened by epistemic possibility adverb *mak(u)*. For Krifka, epistemic adverbs modify the level to which a given judge is certain about/willing to commit to the truth of a given proposition (2021: 12).[163] Given its apparent variable modal force, *maku* takes an accessibility relation (*e.g.*, ASSERT) as its sister and returns a subset of the modal base it picks out. Following Matthewson 2010; Rullmann et al. 2008 a.o., force-variable modality is modelled as universal quantification over a a (contextually-determined) sub-

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[161]In a number of ways, these and related proposals represent a revival of the *Performative Hypothesis* of Ross (1970).

[162]Compare, for example, to the assumptions made in Alonso-Ovalle & Menéndez-Benito 2003; Hacquard 2010; Kaufmann 2005, A similar strategy (in the spirit of update semantics) is adopted by Krifka (2016:570), where ASSERT is taken to perform an operation on a common ground. See also references in Hacquard (2010:102).

[163]Krifka (2021) decomposes the C-layer of the clause into an Act-, Commitment- and Judgment-Phrase, each of which "hosts different kinds of modifiers and heads, and have different interpretations" (30).

set of the modal base (as determined by a "contextually given" choice function f_c.) The size of the output of f_c is proportional to the strength of the assertion. *maku*-modified assertions are therefore also compatible "with cases that introduce a proposition and its negation" (Krifka 2021:13, compare (189a) above.)

(192)   ***maku* 'EPIST' as a judgment modifier** (syncategoramatic)
$[\![maku \text{ ASSERT}]\!]^c = \lambda p \lambda i. f_c(\cap \sim_\alpha i) \subseteq p$

4.1.3   Embedding predicates

§ 3.3.3 presented data that emphasised differences between the IRREALIS mood as realised in WD and the SUBJUNCTIVE as it's realised in a number of Indo-European languages. IE subjunctives are predominantly licensed in *complement clauses*, where an embedding predicate entails that its complement is nonfactual or otherwise non-asserted (see discussion in Palmer 2001). Most accounts of IE subjunctives treat mood morphology as having no semantics of its own; the modal readings of subjunctive-marked complement clauses being specified by the lexical semantics of a matrix predicate which governs/selects for either a SUBJUNCTVE or INDICATIVE complement (see also Portner 2018: ch. 2).

For current purposes, the crucial observation is that IRREALIS morphology in WD never appears to be licensed by the lexical semantics an embedding predicate, including those whose meaning is equivalent to those of prototypical subjunctive governors (*e.g.*, *djälthirri* 'want') and antifactives (predicates that entail the falsity of their complement, *e.g. nyal'yun* 'lie') — see (193). In these cases, the properties of NONVERIDICALITY discussed in ch. 3 — roughly, settled truth in the discourse context — are ostensibly met, although IRR is not licensed.[164]

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[164]Perhaps relatedly, Wilkinson (*ms.*) identifies a small class of predicates that participate in apparent serial verb constructions. In the example below *baḏatjun* 'miss' entails the nonrealisation of *wuthun* 'hit.'

(i)   *ŋunhi wämut-thu baḏatj-urr wuthu-**rr** warrakan'-nha*
      ENDO *MÄLK*-ERG miss-**III** hit-**III** animal-ACC

      'Wämut failed to hit the animal.'   (Wilkinson *ms.*: 30)

(193) **Matrix predicates which entail nonveridical complements do not license the irrealis**

a.

ŋurik	*ŋarra*	*djäl*	*guya-w*	[*ŋunhi* [	*(ŋayi)*	*ḏarrkthu-rr*
ENDO.DAT	1s	want	fish-DAT	ENDO	(3s)	bite-**III**

    wämut-nha]]
    MÄLK-ACC

'I want that that fish bit Wämut/I want(ed) the fish to have bitten Wämut.'   (Wilkinson *ms.*:22)

b.

ministay	*nyäḻ'yurr*	[*ŋunhi* [	*gapman'dhu*	*ga-n*
minister.ERG	lie.INCL.**III**	ENDO	government.ERG	IPFV-**III**

    gurrupa-r *djäma*
    give-**III**   work

'The minister lied that the government had been creating jobs.'
          [AW 20190428]

Below, we consider the properties of *maku*-type propositional modifiers and these embedding predicates—both of which appear to induce nonveridicality in their complement—in view of unifying these data with the analysis of irrealis mood proposed above.

4.1.4 Revisiting *nonveridicality*

Here, IRREALIS has been formalised as a presupposition that there is some branch within the set of metaphysical alternatives (as calculated at a contextually-assigned reference time) along which inflection's prejacent (*P*) doesn't hold. That is, the presuppositions of IRREALIS inflections are satisfied when a metaphysical modal base is **nonveridical** with respect to *P*.

In Ch. 3, we saw that this presupposition is satisfied when *P* has been modified by some local (clausemate) nonveridical operator, particularly NEG, MOD or FUT. Of course, as formulated, epistemic modal adverbs and nonveridical attitude predicates, speech verbs *etc.* also give rise to a proposition that is not asserted by the speaker as a settled truth.

4.1.4.1 Locality

In § 4.1.2, I proposed that *mak* — the particle that encodes (various strengths of) epistemic modality — explicitly modifies the illocutionary force of an utterance (Krifka 2021's "judgment" modifier.) Well-established cross-linguistic generalisations about the syntactic behaviours and interpretive conventions that distinguish epistemic from root modals have suggested that epistemic operators take high scope over other inflectional categories whereas other modal (*i.e.*, flavours

of circumstantial modality) take low scope (*e.g.*, Hacquard 2010 and references therein.) That is, INFL c-commands MOD/FUT/NEG to the exclusion of EPIST.

The relevance of locality in the licensing of IRR is also supported by the fact that the nonveridical semantics of various nonfactive embedding predicates is invisible to INFL. § 4.1.3 (and 3.3.3) provided data showing that, even when inflecting a clause that is the complement of one of these predicates (and consequently the embedded proposition is neither asserted nor a historical necessity at evaluation time), IRR is still licensed only if it c-commands one of the modal particles.

An emergent syntactic generalisation, then, is that the IRR categories require that an irrealis-licensing element (nonveridical operator) be in the c-command domain of INFL.

4.1.4.2 *Objective nonveridicality*

The class of modal particles that we have considered here are all taken to displace an event description into the "realm of the unrealized." Branching Times models — deployed extensively in this dissertation to model metaphysical possibility (*sc.* historic necessity/the observation that the actual past, as opposed to the future, is settled) — have provided a tool with which to understand this claim.

Broadly speaking, given an utterance index, *dhu* 'FUT' displaces a predicate into the *potential* domain, *bäyŋu/yaka* into the *counterfactual domain* and *balaŋ* into either of these (the "*irrealis* domain" more broadly, following von Prince et al. forthcoming.)

In all of these cases, the common ground in a given discourse context is compatible with metaphysical alternatives at which P does not hold. That is, in context, P is not positively determined/settled/is not a historic necessity. The **nonveridicality** of P (which, I have argued, is presupposed by IRR) is a **metaphysical fact** at $i*$ — that is, "it cannot be known which way [the issue] will be settled" (Condoravdi 2002:79; note that the analysis of IRR licensing relies on the same principles as the disambiguation of *bambai* in Part I.)

The function of *mak*, meanwhile, is to signal the nonveridicality of an **epistemic** state with respect to a given proposition. That is, it is taken to indicate a property of the speaker's attitude (their level of commitment) with respect to the truth of a proposition (which may or may not be true at $i*$ and may or may not be settled at $i*$.) In all the examples in (189), for example, the truth value of the embedded proposition in the actual world ($i*$) is settled, even if the speaker's belief state is diverse with respect to its truth (see also Condoravdi 2002:79).

The invisibility of judgment modification to INFL suggests that "subjective nonveridicality" is inconsequential from the standpoint of IRR semantics. That is (perhaps *contra* claims of verbal mood distinctions being reflexes of an assertion/non-assertion dichotomy), IRR is only licensed when the truth of a given proposition is **objectively nonverifiable** ("*presupposed* to be settled") in view of the nature of

(and our understanding of) metaphysical possibility.

The irrelevance of epistemic/judgment modification to IRR is in fact compatible with the definition given in (177) above, which features in the denotations for the IRR mood inflections, realised as **II** and **IV**. As shown there, IRR mood is concerned with the availability of some *metaphysical alternative* ($b \in \cap\approx_{i'}$) along which $\neg P$. When making a predication about some index *preceding* the utterance ($i' \in \cap\preccurlyeq i*$), it is presupposed that the facts about any given P are settled/uniform across metaphysical alternatives ("the fixity of the past".) Conversely, when making a predication about some $i' \notin \cap\preccurlyeq i*$: *i.e.*, the *irrealis* domain (von Prince et al. forthcoming), the common ground does not presuppose the settledness of P. Following Condoravdi (2002: § 4), this is because, given a fixed utterance index $i*$:

- In potential cases $i* \prec i_e$: there are branches along which P holds and branches along which it doesn't. That is $\cap\approx_{i_c}$ (where the time of evaluation $i_c \succcurlyeq i*$) is (necessarily) **diverse** with respect to P.

- In counterfactual cases, P is asserted to hold in a branching future of a preceding index. That is $\cap\approx_{i_c}$ where $i_c \prec i*$. Again, this modal base is diverse — P is asserted to hold along some (*non-actual*) branch in $\cap\approx_{i_c}$ and it is implicated that P doesn't hold along any metaphysical alternative to utterance index $\cap\approx_{i*}$ (Condoravdi 2002:86).

Consequently, **"objective"** nonveridicality requires an "anchor" at which metaphysical alternatives to the *actual present* ($i*$) are considered (this is implied by von Prince's trichotomy §1.2.1, see also fig 28.) IRR is licensed if, relative to $i*$, P **is not** a historic necessity.

4.1.4.3   Indexicality & indexical shift

In this section, we've additionally seen evidence that embedded clauses can describe nonrealised events without receiving IRR marking, a point of contrast to the licensing conditions of Indo-European subjunctives. Crucially, oftentimes a speaker doesn't assert (*i.e.*, commit themself to the truth-in-$i*$ of) a proposition denoted by an embedded clause (a property shared by irrealis clauses, as discussed above.) In neither example in (193), for example, does the speaker commit themself to the truth-in-$i*$ of the subordinate clause.

A proper treatment of subordination is a matter for future work, although the effects (or lack thereof) of nonfactive predicates on mood inflection in complement clauses ought to be unifiable with the current analysis. Theories of reference generally assume a rule that matrix clauses are evaluated with respect to the parameters of a given utterance. *I.e.*, the time, world, location, discourse participants *etc.* are **automatically** set by/identified with the utterance context.

The ASSERT operator described above (§4.1.2) is assumed to apply by way of some type of commitment closure rule that applies to matrix clauses. That is, in ma-

trix clauses, components of the utterance context saturate veriables in the clause's LF and it is the speaker of the utterance who commits themself to the truth of the proposition (*cf.* Krifka 2021). The idea in Krifka (2021: § 4) is that embedding predicates host subordinate clauses which contribute information about evaluation parameters that are distinct from "the speaker's commitment slate." For example, the subordinate clause in (193a) is evaluated with respect to "the speaker's ideal worlds" and the subordinate clause (193b) is evaluated with respect to "the minister's commitment worlds." In these cases then, *nonveridicality* is taken to be evaluated with respect to an evaluation index which is shifted by some operator which scopes over INFL.

<div align="center">※</div>

A proper treatment of the relation between the REALIS-IRREALIS distinction and judgment modification, complex clause phenomena & indexical shifting is a topic remaining for future work. What I have sought to show, however, is that IRR is licensed iff INFL **takes scope over** (c-commands) a nonveridical operator — that is, an operator that introduces metaphysical alternatives that are diverse with respect to the instantiation of the predicate — *i.e.*, the basic proposition (that some property of intervals holds at i_c) is not a historic necessity, given the utterance context.

4.2 Semantic change in Southern Yolŋu

The two key phenomena exhibited in WD which are described in this work are not manifested in most other Southern Yolŋu (SY) varieties (including, for example, Ritharrŋu-Wägilak, compare § 1.3.1.)

As suggested by the glossing decisions summarised in Table 8 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.[165] Additionally, Melanie Wilkinson observes that these effects appear to be variable in the Djambarrpuyŋu varieties spoken further east in Galiwin'ku (Elcho Island) and aren't manifested in *Miwatj* varieties more generally (2012:359*ff*, 431; *pers. comm.*) These phenomena *are*, however, robustly 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.

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[165]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.

4.2.1 Semantics of the Ritharrŋu-Wägilak verbal paradigm

Ritharrŋu-Wägilak (data provided in in § 1.3.1 – *p.* 111) do not show any evidence of cyclic tense phenomena or a relationship between verbal mood and negation.

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. These facts (examples of which are repeated below) are polarity independent (negation generally marked by verbal enclitic =*'ma'*).

(194) **Cognate of I as 'PRES'**   (105a rpt'd)

nhäma(=*'ma'*) *rra yakuthi   mukulnha*
see(=NEG)   1s PROX.ERG aunt.ACC

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

Additionally, Ritharrŋu imperatives are formally identical to corresponding future predications/predictions (1980a:76) — this is shown in ([wag-fut]).

(195) **Cognate of II as FUT with IMP uses**   (105b rpt'd)

  a. *goḏarrpuy ŋarra* **nhäŋu(=*'ma'*)** *mukulnha*
     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)

(196) **Cognate of III as a general PAST tense**   (105c rpt'd)

  a. *gätha ŋarra* **nhäwala(-*'ma'*)** *mukulnha*   **[TODAY]**
     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]**
     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 PO-TENTIAL. Heath's PAST POTENTIAL, is <u>not cognate</u> with WD's **IV** inflection (the "pre-contemporary irrealis.") Conversely, Heath identifies an alternation in the past paradigm that is made in a number of Ritharrŋu conjugation classes (compare table 6, *p.* 112). 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 provides a number of examples which suggest tentative evidence of a semantic distinction between these:

> *wäni-na* is usual for 'went', but *wäni-nya* can be used to indicate ha-bitual 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 re-marks 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 past forms (PST$_{\text{III}}$ & PST$_{\text{IV}}$) documented by Heath — glossed here according to each inflection's cognacy with WD, *i.e.*, **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.

(197)   **Interspeaker variation in the grammaticalisation of habituality in the RW past domain**

    a.   Past habituals with **IV**-cognate marking

       *ŋarra yothu-ganyaŋ', nhä-**nha**(-'ma') ŋarra ŋuli mukul-ŋ'nha-ya*
       1s   child   see-**PST$_{\text{IV}}$**-(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$_{\text{III}}$** 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, glossed here as **V**)[166] categories appear to be variable in terms of modal force. This is indicated by (Heath's translations in) the examples

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[166]For Bowern (2009), the Ritharrŋu PSTPOT is retained from a distinct inflectional category, re-constructable to Proto-Yolŋu. Relatedly, implied in Heath (1980a:20,23,104), the PSTPOT may be (historically) derived from **II** and an additional suffix. The compatibility of these reconstructions is not further considered in this dissertation.

in (198) below. Note that the equivalent sentences in WD would require a modal particle in order to be well-formed.

(198) **FUTURE and PAST POTENTIAL in modalised contexts in Ritharrŋu**

    a.   ***wäni*** *nhe*   (106b rpt'd)
        go.**II**   2s

        'You can/should/will go.' (or 'Go!')

    b.   *wäni-**ya*** *nhe*   (106c rpt'd)
        go-**V**   2s

        'You could/should/would/were about to go.'

                                 (adapted from Heath 1980a:104)

This same disparity between WD and Wägilak is demonstrated in the data in (199). Here, **II** 'FUT' is shown to be compatible with a number of root modalities and different shades of modal strength. In all cases, displacement into to the POTENTIAL domain is exclusively conveyed by the inflection (unlike in WD where this is primarily the responsibility of a modal particle.)

(199) **Wägilak FUTURE (II) with variable modal flavour/force**

    a.   *blijiman*   *ŋay* *waŋa-na:*   (106a rpt'd)
        policeman 3s   say-**III**

         *"gulu-**rru*** *nhe* *yiŋ'-ŋiri=dhi*   *wäŋa-ya.*   *Yakaŋu* *nhe* ***wäni-'may***
         stay-**II**   2s   DIST-LOC=FOC home-PROM NEG   2s   go.**II**-NEG

         garra *nhe* *git* *lokdap-**urru**"*
         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**   1p.INCL PLACE-ALL-PROM food 1p.INCL get-**II**   or

         djuḻ-kurru?
         road-PERG

        'Should we go to Numbulwar to 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, then, is the absence of dedicated lexical material (particles and auxiliaries) encoding modal and aspectual meaning in the latter. Consequently, the verbal paradigm itself is the primary grammatical device that RW deploys to encode relevant temporal and modal distinctions (it is unclear

what, if any, conventional devices for encoding viewpoint aspect are available in RW morphosyntax.)

A distinctive difference is the observation that sentential negation has no effect on the tense-mood inflection of a given clause in RW. So the variety of "counterfactuality" introduced by a negative operator — key to the analysis of the WD irrealis laid out above — is apparently invisible to RW inflection.

Recalling the discussion (§ 3.3.2) of the cross-linguistic heterogeneity of *irrealis* as a category (exemplified by the fact that not all languages with a described realis-irrealis distinction treat negation the same way.)

This difference might be modelled as a contrast in the scope-taking behaviour of RW *-'may'* as against WD *bäyŋu/yaka* — Mithun (1995) makes a similar suggestion in her discussion of the different relationships between "reality status" marking and negation in Central Pomo [`poo`] as against Caddo [`cad`].

4.2.2 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.

The role of contact. 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).[167]

Similarly, with the exception of the Maningrida family (Burarra, Gun-narpta Gurr-goni, Nakkara, Ndjebanna), I am not aware of any languages other than the (geographically) western varieties of Yolŋu Matha (*e.g.*, Djinaŋ, Djinba, WD and Yan-nhaŋu) that exhibit (their own versions of) the distinctive cyclic tense phenomenon analysed for WD in Ch. 2.[168] What's more, (geographically) intermediate Dhuwal-Dhuwala varieties, particularly the Galiwin'ku Djambarrpuyŋu varieties described in Wilkinson (2012) (and perhaps the Djapu' (Eastern Dhuwal vari-

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[167]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.

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

ety) spoken in Yirrkala and described in Morphy (1983)) exhibit possible transition phenomena.

In particular, the absence of these features in other Pama-Nyungan (*i.e.,* in genetically related Australian languages) languages suggests that this paraidgm reorganisation in the western varieties is a function of this stable contact with their Maningrida/Burarran neighbours.[169],[170]

Lexical reorganisation.   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 ~~im~~perfective 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. Described above, no root modals are reported in Ritarrŋu-Wägilak, whereas modal particles *dhu, balaŋ(u)* etc. are largely responsible for specifying modal meaning in contemporary WD. 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, as I have argued in this dissertation, II and IV come to mark the (objective) **nonveridicality** — *i.e.*, the unsettledness and *unknowability* — of a proposition (their prejacent) in a given discourse 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 $\neg p(i)$ requires that p not be a realised (let alone known) fact of i), negative operators also satisfy nonveridicality.

Further, in § 3.4.2, this is linked to a related observation that 'negative sentences (in some sense) presuppose the discourse-salient possibility of the corresponding affirmative' which is then denied in the actual world.

The current analysis of nonveridicality, in concert with an "asymmetricalist" treatment of negative sentences, may then explain the apparent reanalysis of negative operators as predicate modifiers of a class with other modal operators which

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

[170]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.

satisfy the presuppositions of irrealis mood inflections.

As above, a proper understanding of these phenomena and their development is likely to require a deeper understanding of the variation in strategies of encoding of TAMP categories and in the morphosemantic intricacies in the verbal paradigms domains of Yolŋu languages.

4.3   Conclusion

In a nutshell, the proposal laid out at the beginning of the current chapter (developed on the basis of argumentation in the previous two) proposes a 2×2 paradigm whereby WD's four inflections encode (colexify) a tense distinction (±NONFINAL INSTANTIATION, capturing *cyclicity*) and a mood one (±IRREALIS.) The inflections themselves are analysed as abstract semantic operators that denote (partial) identity functions, effectively encoding a presupposition that a contextually-supplied reference index has one or both of these tense/mood properties. This semantics in tandem with a general pragmatic principle (MAXPRESUPP, itself an implementation of Gricean reasoning about cooperation in communication.)

The current chapter has advanced a number of hypotheses to be precised in future work:

1. 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 distinctive morphosemantic phenomena including *cyclic tense* and a paradigmatic *negative asymmetry* with respect to mood (or "reality status") marking.

2. I've claimed that IRREALIS inflections are licensed when there is a nonveridical operator **in their c-command domain** (that is, over which they take scope.) This itself is taken to be a syntactic reflex of the "objectivity" of a nonveridicval claim — *i.e.*, these operators in the scope of INFL indicate that their prejacent is not a *settled* fact (that is a *"historic necessity"* vis-à-vis the evaluation index; its negation is a metaphysical possibility.

In view 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[171] and the development of a future/nonfuture tense distinction:[172] features exhibited (to varying degrees) in WD.

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[171]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).

[172]While WD doesn't have an 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

Ch. 2 comprised a formal treatment of the expression of temporal categories in WD, drawing on theories of tense and lexical and grammatical aspect. Included here is a proposal for a motivated formal analysis of typologically uncommon CYCLIC TENSE phenomena — that is, the contribution of apparent tense markers whose domain is discontinuous with respect to a totally-ordered set of times. This proposal (§ 2.3) effectively represents an attempt to specify the CONTEMPORARY VS. PRECONTEMPORARY distinction due to Glasgow (1964) and subsequent Burraranists.

As discussed in § 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 (see also von Prince et al. (forthcoming) for a recent defense of IRREALIS as a "comparative concept.")

This dissertation, then, has provided one of the first formal proposals for a compositional semantics for an apparent IRREALIS MOOD, joining previous accounts (*e.g.*, Krifka 2016, Matthewson 2010,[173] von Prince et al. 2019a). 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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shown to be broadly compatible with NONFUTURE reference.

[173]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.) NB. Matthewson explicitly excludes "obligatory and redundant" occurences of the subjunctive from her analysis (2010:26).

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 compo-

sitional 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 developing a systematic and precise understanding the meaning contributions of cross-linguistic phenomena as well as "grammaticalisation" trajectories and synchronic variation.

Particularly crucial from the perspective of the empirical phenomena treated here is the insight that temporal and modal logics are intimately related, a fact that predicts visible interactions between linguistic tense and modal operators.

2 The importance and utility of rigorous investigation of understudied (and particularly threatened) language varieties and typological phenomena in developing a nuanced and complete theory of natural language semantics.

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