DOCTORAL DISSERTATION

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

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Chapter 1

Introduction

DISPLACEMENT 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 MODAL 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 AMPHICHRONIC 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. 2019; Tonhauser 2007, among many others.) Furthermore, it is a general contention throughout this work formal perspectives hold exceptional promise in terms of better understanding this diversity and developing typologies of the expression of functional categories across these languages.

1.1 Overview

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

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

[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 **??** 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 **??**, *cf.* Phillips & Kotek forthcoming).

On the basis of this, Ch. **??** 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 PRIVATIVE—a grammatical category described in many Australian languages (*e.g.*, Dixon 2002; 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 $\Box$ or $\mathbf{L} \div$ 'it is necessary that' and $\Diamond$ or $\mathbf{M} \div$ '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 $\Box$ (necessity) and $\Diamond$ (possibility) (*e.g.*, Hughes & Cresswell 1996:39)

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

   b. $[\![\Diamond\varphi]\!]^w = 1 \leftrightarrow \exists w'[w\mathcal{R}w' \wedge [\![\varphi]\!]^{w'}]$
   Where φ is some well-formed formula, $\Diamond\varphi$ 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) $[\![\mathbf{PAST}\varphi]\!]^{w,t} = 1 \leftrightarrow \exists \langle w, t' \rangle \left[\langle w, t' \rangle \prec \langle w, t \rangle \wedge [\![\varphi]\!]^{w,t'} \right]$
   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'.

[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.

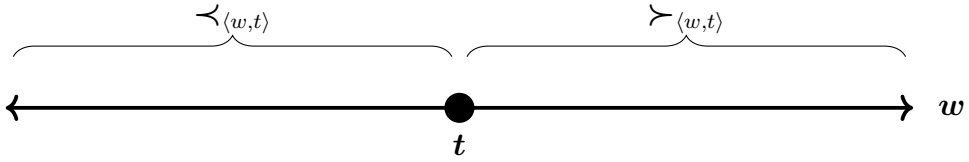
[3] For completeness:

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.*, $\forall t, t'' \left[[t \prec t''] \rightarrow \exists t' [t' \neq t \neq t'' \wedge t \prec t' \prec t''] \right]$)

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

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

to come apart.

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

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

The mechanics A branching-time/tree frame $\mathfrak{T}$ is a partially-ordered set (*i.e.*, a pair $\langle \mathcal{I}, \prec \rangle$). That is, we assume a set of semantical indices (referred to elsewhere as *moments*) that is partially-ordered by the transitive precedence relation 'PRECEDES' $\prec$. 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 $\mathcal{W} \times \mathcal{T}$:

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

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

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

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

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

(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, $\mathtt{B}_i$ will be taken to represent the set of all possible branches b that run through (that is, contain) a given index i ($\cup\ni i$ or $b, b', b'', \ldots \ni i$). 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 alternatives to a given index i (see 7 for further discussion of this

[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 $\mathfrak{i}$ as a connected proper subset ($\sqsubset$) of a history (1977:64) — *i.e.*, a "sub-branch." Formally:
An interval $\mathfrak{i}$ is a subset of $\mathcal{I}$ such that: $\exists b\big[\mathfrak{i} \sqsubset b \wedge \forall i, i', i'' \in b[i, i'' \in \mathfrak{i} \wedge i \prec i' \prec i'' \rightarrow i' \in \mathfrak{i}]\big]$

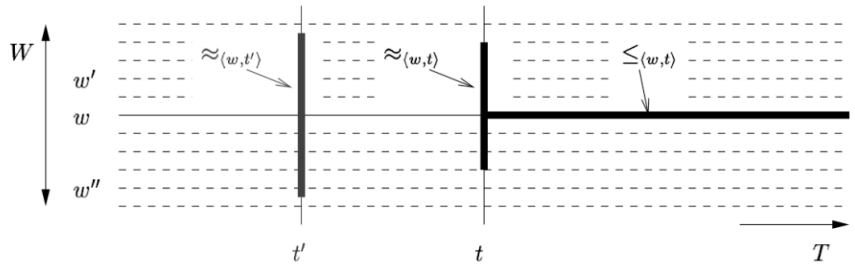
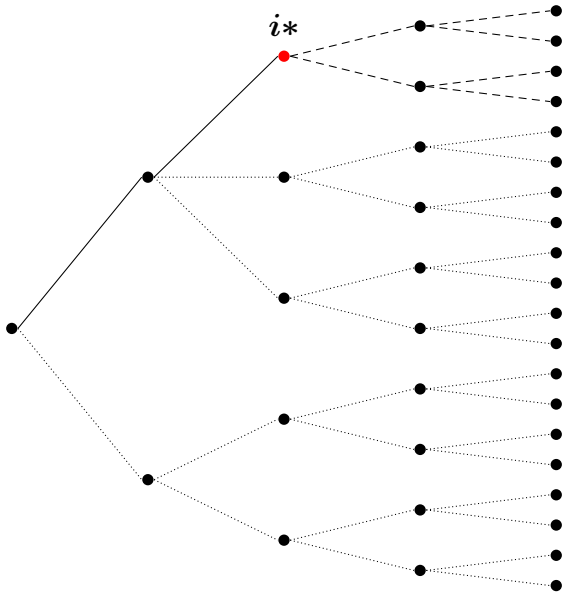


Figure 2. Two-dimensional modal logic. The thick lines represent sets of individual indices accessible from $\langle w, t\rangle$ by the modal relation $\approx$ (vertical) and the temporal relation [$\preccurlyeq$] (horizontal). For example, the worlds accessible via $\approx$ from w and t are also 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.)



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]

[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 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 "instant" or "time (value) function" of Rumberg (2016b:27), Belnap

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 $\quad i \succsim j \Leftrightarrow \exists j'[j' \simeq j \wedge i \succcurlyeq j'])$

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).

(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

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 $d : \mathcal{I} \rightarrow \mathbb{N}$ that returns the how many "nodes" a given index is from $\mathfrak{T}$'s defined "origin" node (*viz.* ◯ — 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.* $\approx \underset{\text{def}}{=} \lambda i \lambda i'.d(i) = d(i')$.

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). In effect, P is presumed settled in a given discourse context iff 'the instantiation

[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.

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).
$\textit{CB}_c(\varphi) \underset{\texttt{def}}{=} \varphi \in \bigcap_{\alpha \in c} \textsc{dox}_\alpha(w*)$
The common ground $\textit{cg}_c$, then, is the transitive closure of the common belief relation (that is, an ancestral relation that) (see Fagin et al. 1995; Kaufmann 2010; Stalnaker 2002).
$\textit{cg}_c(\varphi) = \varphi \in \bigcup_{i=1}^{\infty} \textit{CB}_c^i$ where $\textit{CB}_c^{i+1}\varphi = \textit{CB}_c\textit{CB}_c^i\varphi$ 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).

(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

[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 $\underset{\sim\alpha}{\Box}(\varphi \rightarrow \underset{\approx}{\Box}\varphi)$ 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.

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) establishes a neat formal trichotomy between the ACTUAL, POTENTIAL and COUNTERFACTUAL domains by appealing to this framework (see also Rumberg 2016b:41, 2019). This is modelled as having $\prec$ induce a partition of $\mathcal{I}$: that is, all $i \in \mathcal{I}$ can be sorted into (exactly) one of these three sets. This partition is reproduced in (11).

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

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

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

c. The COUNTERFACTUAL = $\{i \mid i$ **is unordered by** $\prec$ **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; 1981; 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. $[\![\textit{must}]\!] = \lambda f \lambda p \lambda w . \forall w' [w' \in \cap f(w) \rightarrow w' \in p]$
must p is true given a modal base $f(w)$ if p follows from $f(w)$

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

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

ground 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 $\underset{o(w)}{\text{BEST}}$ which takes a set of worlds and returns the "best" worlds as determined by an ordering source o (*i.e.*, those worlds in 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 $\underset{\boldsymbol{o(w)}}{\prec}$
$\underset{o(w)}{\text{BEST}}\big((\cap m(w)\big) = \{w \in \cap m(w) \mid \neg\exists w'[w' \underset{o(w)}{\prec} w]\}$

(16) *must* relativised to two conversational backgrounds (modal base f and ordering source o)
$[\![\textit{must}]\!]^{o,m} = \lambda p \lambda w.\forall w'[w' \in \underset{o(w)}{\text{BEST}}(\cap m(w)) \rightarrow w' \in p]$
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.

This involves recasting conversational backgrounds — sets of propositions — as functions from indices to sets of possible branches of $\mathcal{I}$. A deontic conversational background $\text{DEONT}(i)$, for example, is a set of propositions which represent

[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).

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 $\mathtt{B}_i$ — 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. $[\![\textit{must}]\!]^m = \lambda p \lambda i. \forall b \ni i[b \in \cap m(i) \rightarrow \exists i' : i' \in b \wedge p(i')]$
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. $[\![\textit{can}]\!]^m = \lambda p \lambda i. \exists b \ni i[b \in \cap m(i) \wedge \exists i' : i' \in b \wedge p(i')]$
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 Sḵáẗimcets (Salish: British Columbia), deontic and epistemic modal clitics are separately lexified whereas quantificational force is contextually determined (*viz. ka* 'IRR', *k̓a* 'EPIST' and *kelh* FUT') (see also Matthewson 2010; Peterson 2010). They model this with a choice function f_c, pragmatically provided that restricts the size of the set (*sc.* modal base) which is being universally quantified over (17).

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

Building on other insight on usage of possibility modals (notably Klinedinst 2007), for Rullmann et al. (2008) the "appearance" of force variability in Sḵáẗimcets modals is a result of the relative size of the subset of the modal base picked out by f_c

[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.

(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, additionial elaborations and assumptions will permit us to capture facts about the grammars of these Australian languages.

1.3 A note on the "amphichronic program"

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

further elaboration; explanation of "diachronic level of explanation"

In the semantic domain, for Kiparsky, "[grammaticalisation] reveals the language faculty at work. Formal renewal engenders new categories that conform to cross-linguistic generalisations regardless of their source" (Kiparsky 2015:73). Over past decades, research on meaning change has led to the discovery of regular grammaticalisation "clines/pathways/trajectories": that is, a given lexical expression with meaning α comes to denote β, then γ *etc.* as an independent development across languages separated in space and time (see Deo 2015a; Eckardt 2011). In view of these robust cross-linguistic tendencies emerges the question of what is driving this change and ***why***. In this dissertation, I apply a methodology where the precise synchronic meaning of particular linguistic expressions is analysed while simultaneously attending to changes in the interpretive conventions associated with these expressions.[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.

[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 and estimates 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 **??**.)

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

1.5 Data & glossing conventions

Each subpart of this dissertation makes use of (novel and published) data from different sources. Example sentences are glossed following (modified) Leipzig conventions (all adopted abbreviations listed on *pg.* **??**). 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 2002:549 for an overview of "canonical" phoneme inventories in Australian Language and Wilkinson 2012:41,44 for the Yolŋu orthography, originally proposed by Beulah Lowe.)

orthographic stuff

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).

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

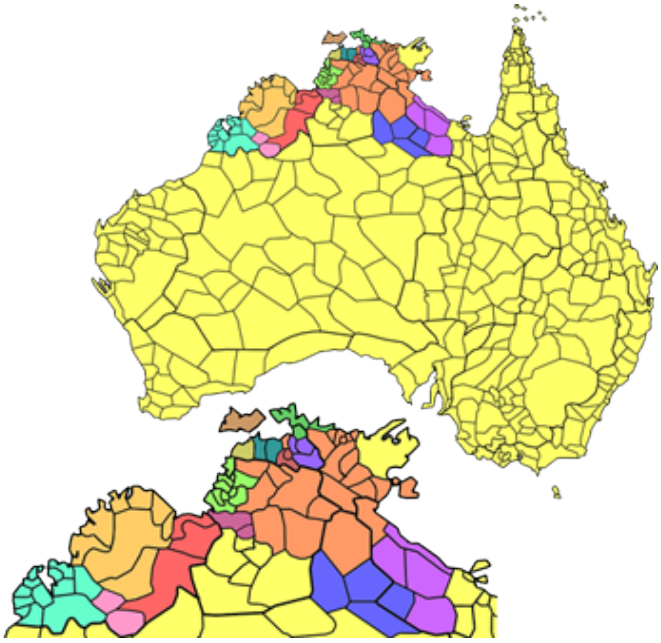
field methods

Table 1. Correspondences between `[IPA]`, ***Australianist*** and ***Yolŋu*** orthographic conventions adopted in the dissertation

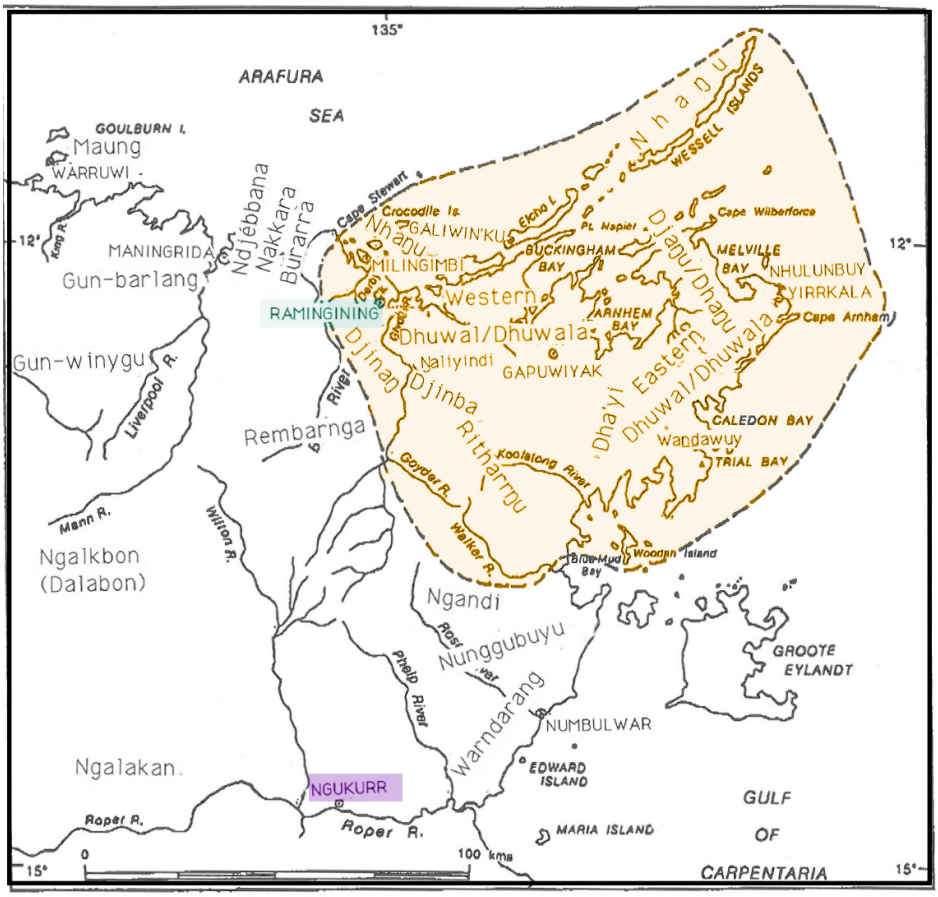
[l]	*rl*	*l̲*
[ɲ]	*rn*	*n̲*
[ʈ]	*rt*	*t̲*
[ɖ]	*rd*	*d̲*
[ɻ]	*r*	*r*
[ɾ]	*rr*	*rr*
[t̪]	*th*	
[d̪]	*dh*	
[n̪]	*nh*	
[ŋ]	*ng*	*ŋ*
[ɟ]	*j/dy*	*dj*
[ʔ]		*ʔ*
[c]	*ch/ty*	*tj*
[aː]	*aa*	*ä*
[iː]	*ii*	*e*
[uː]	*uu*	*o*

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 2002)



(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

Part II

Semantics of the Negative Existential Cycle

Part III

Reality status & the Yolŋu verbal paradigm

Introduction

perhaps to move this section laterally to §1.0

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 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 (18), 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) are *discontinuous*. This is taken to represent an instantiation of cyclic tense.

(18) **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 didn't see my aunt yesterday.'

(19) 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.*, 18*a*) and **IV** (available in positive modalised utterances — *e.g.*, counterfactual predications — not shown in 18) 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).

(19) **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 5 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).

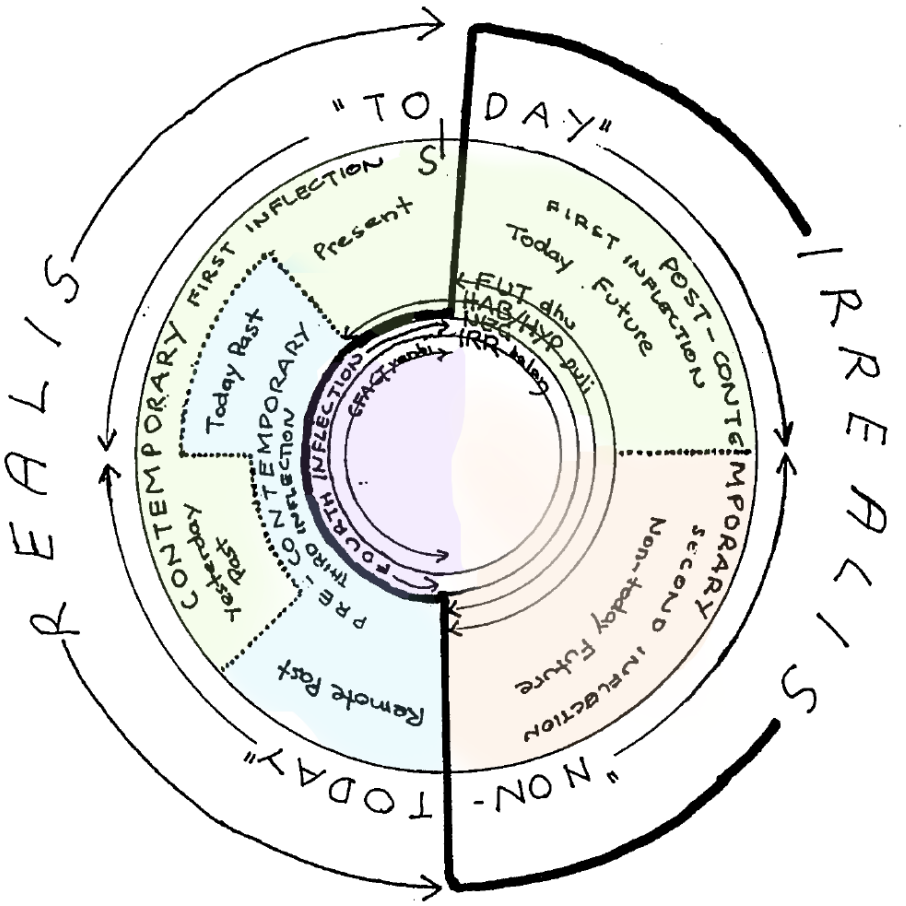
Subsequently, data further demonstrating the the expression of temporomodal distinctions and the interpretive intricacies of WD's paradigm semantics, focussing

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 *bam-bai* (ch. **??**) — 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 5. 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"

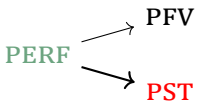
In a 1999 monograph, Bhat posits a typological parameter along which languages variably assign prominence to TENSE, ASPECT or MOOD. For Bhat, determining which of these grammatical macrocategories a given language appears to assign "prominence" gives rise to a number of generalisations about characteristics 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 $\mathcal{C}$" (7).

An important consequence of this typology, in which languages can be classified and differentiated on the basis of these three broad types, is the implication that languages can "move between them" — that is observable, synchronic variation across this parameter points to a history of reanalysis of, for example, temporal categories as modal ones. While Bhat does not explore this consequence of his typology in detail, he does point to observations in the grammaticalisation literature that have demonstrated "cross-categorial change" — that is, situations where lexical material denoting some temporal, modal or aspectual category come to be reanalysed conveying meaning about a category in another semantic domain. Bhat suggest, for example, that the well-attested alternative grammaticalisation trajectories described by Bybee et al. (1994) (among others) and represented in Figure 6 are determined by the "prominence" that a given language accords to either temporal or aspectual distinctions (1999:182). Of course, this treatment to some degree begs the question. In a given pair of related languages, what is it that underpins the change from, *e.g.*, perfect marking to perfective marking for $\mathcal{L}_1$ versus past-tense marking in $\mathcal{L}_2$?

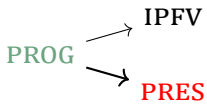
1.1.1 Futurity and mood-prominence

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



(a) PERF grams develop into PFV markers (e.g. Condoravdi & Deo 2015 for Indo-Aryan) or PST markers (e.g. Schaden 2012 a.o.)



(b) PROG grams develop into IPFV markers (see Deo 2015b) or PRES markers (e.g. Heinrichs 2002 for Neo-Aramaic)

particularly 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. 2019).[20] 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."

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

[20] 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.*

[21] 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 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 ununderstood to universally quantify over an epistemic modal base ("possible candidates for the (preordained)

future-oriented morphology to universally quantify over a modal base. Thomason (1970:274) proposes a "supervaluation"-based semantics for future-tensed predication as follows:[22]

(20) $$[\![\textsc{fut}\ p]\!]^{w,t} = \begin{cases} 1 \leftrightarrow \ \forall w' \big[w' \approx_t w \rightarrow \exists t' [t \prec t' \wedge p(w')(t')]\big] \\ 0 \leftrightarrow \ \forall w' \big[w' \approx_t w \rightarrow \nexists t' [t \prec t' \wedge p(w')(t')]\big] \\ \qquad\qquad \text{undefined otherwise} \end{cases}$$

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.

As described earlier in this dissertation, $\cap\approx_t w$ represents the "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 **??**'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 the languages of Australia (and to a lesser extinct New Guinea, driving him to describe A/NONREAL as a "circumpacific phenomenon" (192, 411)). Phillips (2021:§2.2) provides an overview of a number of mood-based asymmetry phenomena in Australian languages.

For many 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

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.")

[22] 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.

clauses that is not available in negative ones. Shown in the Gurrgoni (gge, Maningrida: Arnhem) data in (21), a reality status distinction is morphologically realised in positive clauses (a-b) which is not available to its negative counterpart (21c), 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.)

(21) **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. Relatedly, negative operators indicate the NONREALISED status of some predicate.

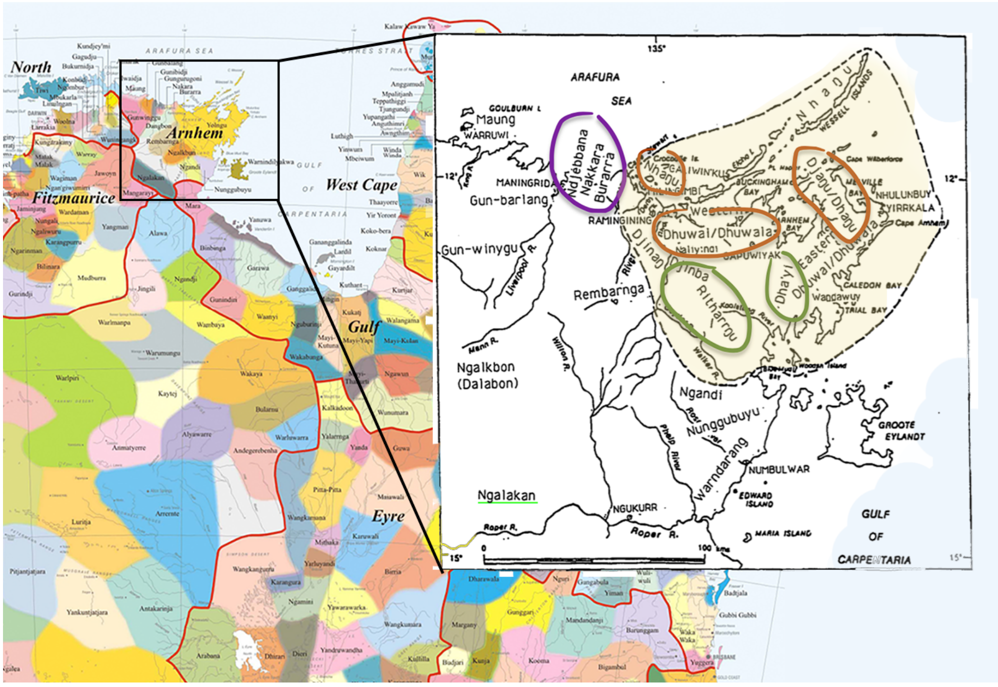
Consequently, for languages exhibiting A/NONREAL, irrealis and negative operators can be thought of as performing conceptually-related functions. (see also Miestamo 2005:208).

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 family spoken in North-Eastern Arnhem Land, in the Northern Territory of Australia (map provided in 7, see also discussion in § 1.4). The family is a subgroup of the larger Pama-Nyungan family, representing something of an enclave in Northern Australia; surrounded by a diversity of unrelated languages.

Figure 7. 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 Western, Northern and Southern subgroups. This is schematised in Figure 8. Yolŋu society is traditionally organised according to a moiety system — that is, the Yolŋu universe is organised into two ranging sets, *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 9).

right this is the lassification in Wilk 91 which follows Dixon 80 presumably? Claire's hylogeny is different in number of ways. how to handle?

As indicated in the diagram, the *Dhuwal* and *Dhuwala* groupings effectively represent the distinct clan-lects of a single speech community — associated with *Dhuwa* and *Yirritja* moieties respectively. Incidentally, Wilkinson (2012) points out that the degree of similarity between Western Dhuwal and Dhuwala are more closely related to one another than either is to Eastern Dhuwal and Dhuwala (I assume that this fact is representable phylogenetically and has been represented in Figure 9). A (the?) primary distinction between Dhuwal and Dhuwala varieties cross-cutting the language area results from a productive apocope rule (investigated in Morphy

Figure 8. A broad phylogenetic classification of Yolŋu subgroups, following Schebeck 2001; Waters 1989; Wilkinson 2012 a.o.

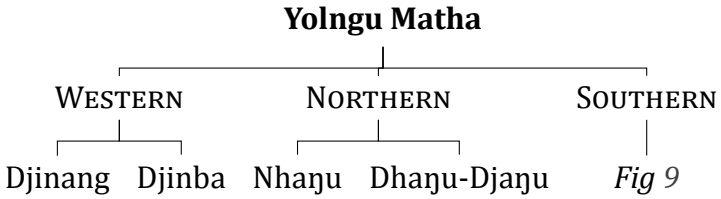
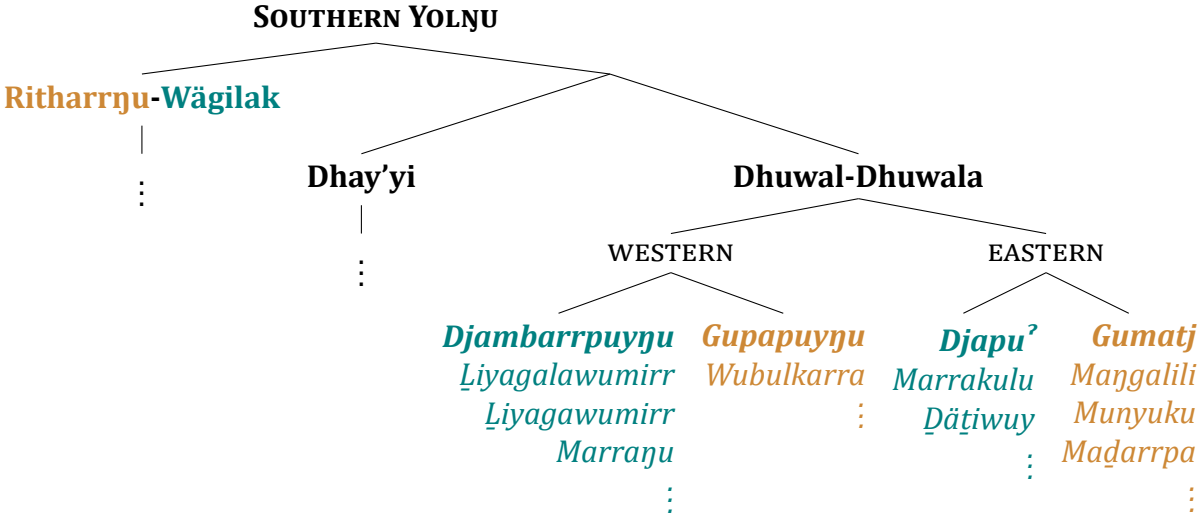


Figure 9. Varieties ('clanlects'/dialects) of Dhuwal-Dhuwala in the context of the Southern Yolŋu languages (following Wilkinson 2012:13) with some adaptation following Schebeck (2001:15).



1977, see also Wilkinson 2012:94*ff* for further details.). The formal consequences of Dhuwal apocope on the verbal paradigm are partially indicated in parentheses in Table 3 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 1981; Morphy 1983). Yolŋu languages have a 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.[23]

1.3.1 The Ritharrŋu-Wägilak paradigm

According to Heath (1980a:60–75), the Ritharrŋu (Wägilak) verbal paradigm distinguishes six main conjugation classes which, each of which marks four inflectional categories. These inflections establish a three-way tense distinction between the PAST, 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 2, while the data in (22) demonstrates the (straightforward) temporal semantics of each of these inflectional categories.

Table 2. Examples of conjugation patterns for the Ritharrŋu-Wägilak verbal paradigm (adapted from Heath 1980a:63–6)

CLASS	STEM	*PRES*	*FUT*	*PST*[24]	*CFACT*
1	'GO'	*wäni*	*wäni*	*wäni-**na**/-**nya***	*wäni-**ya***
2	'EAT'	*l̲uka*	*l̲uk-**I***	*l̲uka-**nha***	*l̲uk-**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***

(22) **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]

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

[24] Where there are two forms given for the PST marker, Heath 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.

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.' [RŊ 20190522]

Further, (23) shows the modal uses of FUT and CFACT inflections. In (23a-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 (23c).

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

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)

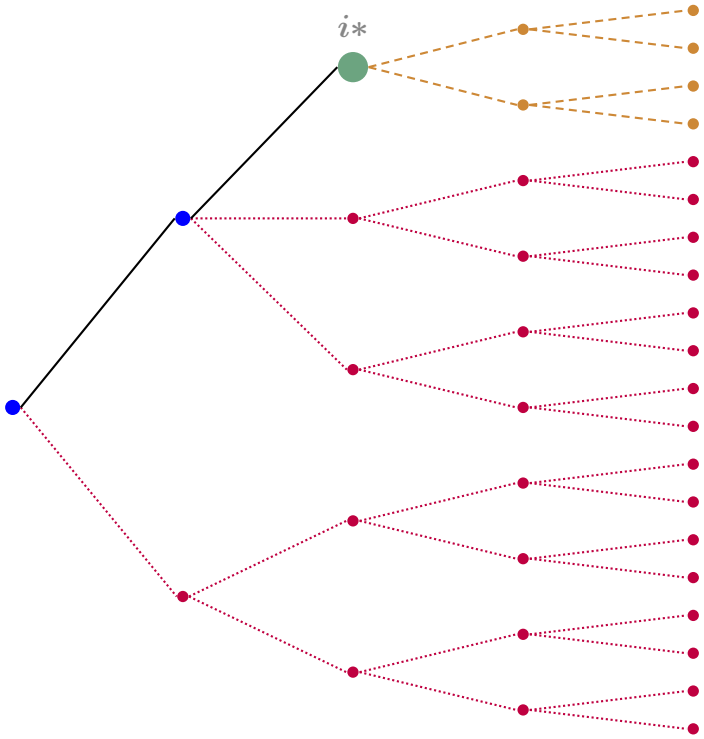
c. *wäni-**ya** nhe*
go-V 2s

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

This distribution can be straightforwardly represented by appealing to the "modal trichtomy" (*cf.* von Prince (2019); von Prince et al. — 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 (24) and schematised in Figure 10.

(24) **Domains of the four inflections in Ritharrŋu-Wägilak, given a branching time frame $\mathfrak{U} = \langle \mathcal{I}, \prec \rangle$ and an evaluation index $i*$**
$[\![\text{PRES}]\!]^{i*}$: ACTUAL PRESENT $\{i \mid i = i*\}$
$[\![\text{FUT}]\!]^{i*}$: POTENTIAL $\{i \mid i \succ i*\}$
$[\![\text{PST}]\!]^{i*}$: ACTUAL PAST $\{i \mid i \prec i*\}$
$[\![\text{CFACT}]\!]^{i*}$: COUNTERFACTUAL $\{i \mid \langle i, i* \rangle$ is unordered by $\prec\}$

Figure 10. Ritharrŋu-Wägilak's verbal paradigm partitions the branching frame/modal domain (modelled as a set of partially-ordered indices.)



As an example then, the contribution of PRES (following standard assumptions about tense) is taken to be the restriction of a given predicate (P)'s instantiation to actual indices that overlap with the present: *i.e.*, PRES(P) is true iff P is instantiated 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.

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 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 8 & 9.) Similar patterns are, however, characteristic of the 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.)

※

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. These properties will be further precised and couched in a more detailed discussion of the expression of temporal and modal categories in WD (chh. 2–3). A formal proposal (in terms of branching times) for the semantics of the WD verbal paradigm is presented in chapter **??**.

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:[25] 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.

[25]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

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,[26] in addition to "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 3.

Table 3. 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**
Ø$_i$ (2)	*marrtji* 'go'	*marrtji*	*marrtji*	*marrtji**n(a)***	*marrtji**nya***
Ø$_a$ (3)	*l̲uka* 'consume'	*l̲uk**a***	*l̲uk**i***	*l̲uka**n(a)***	*l̲uka**nha***
Ø$_{rr}$ (4)	*waṉd̲irr(i)* 'run'	*waṉd̲i**rr(i)***	*waṉd̲i*	*waṉd̲i**n(a)***	*waṉd̲i**nya***
N (5)	*l̲upthun* 'wash'	*l̲uphtu**n***	*l̲upthu**rr(u)***	*l̲upthu**rr(una)***	*l̲upthu**na***
N$_L$ (6)	*gurrupan* 'give'	*gurrup**an***	*gurrupu**l(u)***	*gurrupa**ra***	*gurrupa**na***
Ŋ (7)	*nhäma* 'see'	*nhä**ma***	*nhä**ŋu***	*nhä**ŋal(a)***	*nhä**nha***

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 4, which adapts Wilkinson's summary of glossing decisions made by other grammarians.)

Table 4. 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[27]	guf	Primary	Secondary	Tertiary	Quartenary
Tchekhoff & Zorc 1983	djr	Base	Future	Past$_1$	Past$_2$
Heath 1980c	dwu	Pres/Fut	Fut/Imp	Past	Past Remote
Morphy 1983	Djapu'	Unmarked	Potential	Perfective	Past Non-indicative

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.

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

[27] 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.

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.

(25) ***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* ***l̲uka*** *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 (25) 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 (25), the data in (26) 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 *ŋayatham* in (26b)—*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'.

(26) **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
ŋäṉḏi-w ŋarra ***barpuru*** *l̲arr-**uma** ga nhuma rraku*
MO-DAT 1s **yesterday** search.for-I and 2p 1s.DAT
*l̲akara-**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. *d̠irramu-wal yothu-wal bäpa-'mirriŋu-y rrupiya* ***barpuru***
man-OBL kid-OBL father-PROP-ERG money **yesterday**
*djuy'yu-**n** märr* ***barpuru** ga **barpuru** **buna**-ny*
send-I **somewhat** **yesterday** and **yesterday** arrive.I-PROM
dhiyal-nydja
PROX.ERG-PROM

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

Finally, the examples in (27) 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.

(27) ***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 future 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 beyond the current day and is the main strategy for forming imperative sentences.

(28) ***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, sometime today.

The two sentences in (28) show how II is used in concert with the particle *dhu* to establish future temporal reference. A notable contrast between (27a) and (28a) 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.[28] 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).[29]

(29) 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.

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

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

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

[28] 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.

[29] 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 (30). Shown in (30b), negative imperatives (probibitives) are treated identically.[30]

(30) ***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 (29).

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 (31) below show the compatibility between III and a reference time that is 'earlier today. In (31d-e), apparent complementary distribution between I and III provides evidence of the categoricity of this distribuitional constraint.

(31) **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)

[30] 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 ṉyan'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 Ṇarritjnydja wurrth-**urruna**.*
sp. Malvaceae MVTAWY 3s *MÄLK*.PROM pull-**III**

'Earlier this morning, there were two trees standing [there], then Ṇarritj 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]

(31a) shows the compatibility between temporal frame adverbial (TFA) *gäthur(a)* 'today' and **III** in `djr`, which leads to an temporal interpretation of 'earlier today.'[31] 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 (32) show, a description of **III** as 'hodiernal/same-day past' tense marker is inadequate.

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

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

[31]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 (31) receive, the sentences in (32) involve reference to the 'REMOTE PAST.' In (32a-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':[32] The cooccurrence of these expressions restricts the predicate being questioned to *a prior dry season*. Conversely, the declarative sentence in (32c) 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 5.

Table 5. 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

[32]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 (33).

(33) **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 djawarʼyu-**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 (34) and hypothetical/counterfactual descriptions as in (35).

(34) **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** l̪uka-**nha** chocolate*
dog.ERG MOD eat-**IV** chocolate

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

(35) **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 l̪ukuny 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.[33]

So far, we have only considered "positive" clauses. Below—in §3—we see how the picture of WD inflection we have developed here complexifies significantly under negation.

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

[33] *N.b.* that, 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** (although I am not necessarily committed at this stage to a monosemy account of *these* distributions and a precise semantics for derivational uses of **IV** is not further considered here.)

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 5 (*p. 27* 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.[34] 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 (36).

(36) **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.'

[34] 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 (36) 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 (37) quickly throw up problems for a straightforward account of these inflections as tense markers.

(37) **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

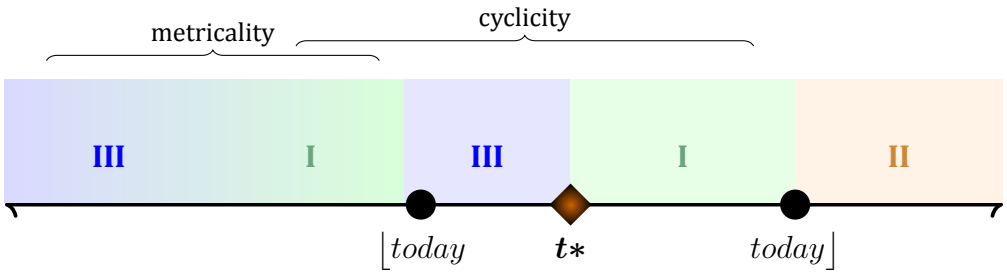
*Ŋunhi ŋarra yothu yäna, ŋarra marrtji-**na** Sydney-lili*
ENDO 1s child only, 1s go-III Sydney-ALL

'When I was a kid, I went to Sydney.' [BM 20190405]

The data in (37) show that a *temporal remoteness* (or a *"metrical/graded tense"*) distinction is manifested in WD.[35] 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 (36) and (37), 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 11 schematises this discontinuity.

Figure 11. 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.



[35] 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 5 (*p.* 44); each cell of which is represented by one of the datapoints in (36–37). 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.[36] As we will see here, this is not the most parsimonious analysis of the

[36]Compare with Table 4. 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 (38) where the reference time for each sentence is clearly located in the past of utterance time (hence compatibility with past-referring temporal frame adverbials.)

(38) ***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 (33), 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 (39a). Explicit predications about current states may require periphrasis (*e.g.*, the nominal predication in 39b). Meanwhile, the *ga*-marked **I** form (c) results in a state-change reading.

(39) ***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 (40), *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.'

(40) ***djaṉŋarrthin* '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
*djaṉŋarr-**thi-na***
hunger-INCH-**III**

'*Gutharra* asks *märi* for food because she's hungry.' [WG 20171208][37]

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 (41) 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).

(41) ***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]

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

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.'[38] 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 (42) 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' (43), where the eventive ("change of state") semantics of the verbal predicate *marŋgithirr(i)* 'learn ≈ come to know' are transparent.

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

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

'I didn't used to like *l̪atjin*...

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

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

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

(43) **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]

[38] 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 (44), and additionally in Wilkinson (2012:648).

Similarly, the stative predicate *dhuŋa* resists aspectual marking. (44a) 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.

(44) **Stative *dhuŋa* 'ignorant'**

a. *Ŋunhi ŋarra yothu yän, ŋarra* ***dhuŋa*** *l̲upl̲upthunara-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 *buŋgul̲*).'
— '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.[39]

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 (45).

(45) **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.* 50 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 (46).

[39] 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.)

(46) **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 (45) and (46) 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:

(47) 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 (48) below:

(48) a. **STATIVE CRITERION (the 'subinterval property')**
$\textsc{stative}(\varphi) \leftrightarrow \varphi(i) \rightarrow \forall i'\big(i' \sqsubseteq i \rightarrow \varphi(i')\big)$
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**
$\textsc{prog}(\varphi)(i) \leftrightarrow \exists i'\big(i' \sqsupset i \wedge \varphi(i')\big)$ 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 (48c) below.

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

i.	$\textsc{prog}\varphi(i)$	*PREMISE*
ii.	$\exists i' \sqsupset i \wedge \textsc{prog}\varphi(i')$	(48b), i.
iii.	$\forall i''(i'' \sqsubseteq i \rightarrow i'' \sqsubseteq i')$	def. $\sqsubseteq$, ii.
iv.	$\textsc{prog}\varphi(i'')$	(48b), 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.	$\textsc{stat}\big(\textsc{prog}\varphi(i)\big)$	(48a) $\square$

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 (49).

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

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 ∅ 'PFV') to yield a property of intervals $\langle \imath, t \rangle$. 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'[40] — derives inflecting verbal predicates with accordingly eventive semantics.[41] Wilkinson (2012) demonstrates the paradigmatic relation between these predicates. A number of examples of these verbal derivations are given in Table 6 below (predominantly from Wilkinson's description) and formal proposals for the contributions of a number of these operators are given in (50) below.[42]

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

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

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

A formula BECOME φ is true at i if φ is both: true at a final subinterval

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

[41] 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.

[42] 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.

Table 6. 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'

k and false at an initial subinterval(j). (Adapting liberally from Dowty 1979)

This is diagrammatised in Figure 12. [43]

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

-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'**

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

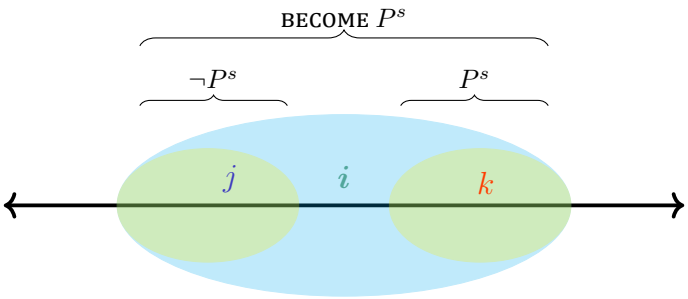
-THu 'TR' is a situation operator which takes a property of states P^s and returns a function from individuals (agents/causers) to events $(\lambda y.y$ CAUSE BECOME $P^s \subseteq A \times \mathcal{E}_\epsilon)$

Relevantly for current purposes, the nominal predicates in the first column of table 6 are all state-denoting and, consequently, are incompatible with verbal inflections and imperfective marking (sc. *GA*). As (50) 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").

This treatment further evinces the infelicity of present-tensed eventive predica-

[43] 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 ($\circ$), 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.

Figure 12. Truth conditions for state change operator BECOME (adapted from Dowty 1979)



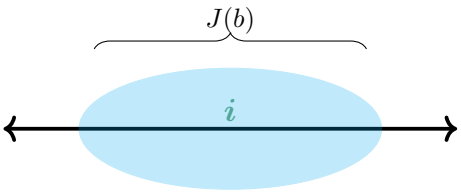
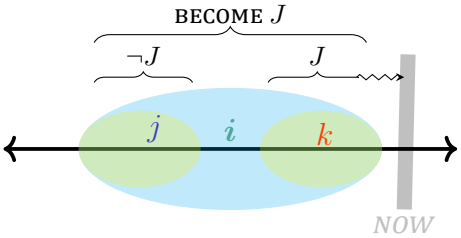
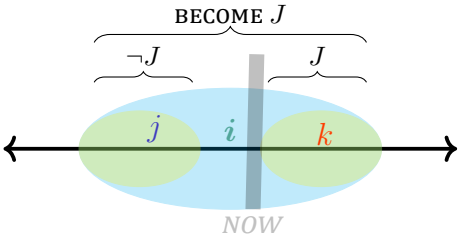
tion with which we have been concerned so far in this section. Given that eventive predicates of the BECOME-type assert the achievement of a **state-change** over time, reference to an entire, bounded eventuality of this type must be located within an extended interval in which both P and $\neg P$ hold.
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 (47), spelled out in Table 7 below.

Table 7. 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** $\lambda s.\exists e[\textsc{become}(Jb)(e) \wedge \tau(e) \prec \textbf{now}](s)$	
imperfective	*baŋaḏi ga djawar-yu-n* *MÄLK* IPFV.I tired-VBLZR-I $\lambda s.\exists e[\textsc{become}(Jb)(e) \wedge \tau(e) \sqsupset \textbf{now}](s)$	

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 (52a–b) below.

(52) **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* ***l̪uka*** *djinydjalma'* *ga*
1s yesterday night 1s eat.I crab and
*roŋanmara-**ŋala*** *bäpawa* *märr* *ŋayi* *dhu* ***l̪uka*** *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 unpacked in greater detail in the following subsection & including schematically in Figure 13, *pg.* 64 below.)

(53) **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 descriptions 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 contribution 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. Consequently, 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 utterance" Cover 2010:49).[44]

[44]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 $\text{XNOW}(i) = \{i' \mid i' \underset{\text{final}}{\sqsupseteq} i\}$.

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 relevant to the current situation", 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 (54):

(54) **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* ***l̪uka-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. 54a–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.[45] 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 (55).

(55) **A polysemy treatment of the temporal contribution of I and III**
(TO BE REJECTED)

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

I asserts that P holds at t where:
EITHER the reference time t doesn't precede speech time $t*$,
OR if t PRECEDES *today*′, then the temporal distance by which t precedes $t*$ is ***below*** *some contextually provided standard* s_c

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

III asserts that P holds at t where:
EITHER the reference time t falls within *today*′, in which case it precedes speechtime $t*$,
OR if t PRECEDES $today$, the temporal distance by which t precedes $t*$ is ***above*** *some contextually provided standard* s_c

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 5, *pg.* 44). It treats each of **I** and **III** as having two possible denotations which are adjudicated by the

[45] The "pathway" PERF → 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.

contextual retrieval of a topic time t and a process of "checking" whether t falls within a privileged interval, *viz. today* (DAY-OF-SPEECH).

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 (56) below where, according to Schwenter (1994), there are very few recorded utterances of the type given in (56b), particularly among younger speakers.[46] That is, the *perfect construction* (56a) 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.)

(56) **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)

[46] 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 *perfects* 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.*

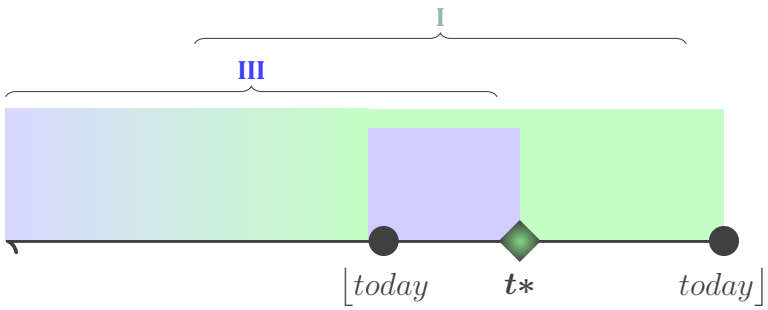
subjective distinction between 'RECENT' and 'NON-RECENT' (see also Botne 2012). Both of these thresholds appear to be grammaticalised in WD.

The translation of the Glaswegian semantics for tense systems of this type given in (55), 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 11, *pg.* 49) 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 13. 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.)[47] 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

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

an example, Gikũyũ ([kik] Bantu: Central Kenya) is described as having a system of '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 (57).

(57) **Gikũyũ *CURRENT* TRM according to Cable (2013)**
$[\![\text{CUR}]\!]^{g,t*} = \lambda e : \tau(e) \propto$ day surrounding $t* .e$
CUR denotes an identity function on events, one whose domain is restricted to events whose runtime $\tau(e)$ overlaps $(\propto)$ 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 (58). *Wämut*'s recent sighting of a *l̪atjin* 'teredo, mangrove worm' predictably is encoded with **I**, whereas in (58b), 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.)

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

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

'Last week I saw *l̪atjin*, 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 (59). Notable is the fact that, while both discourses are making reference to events that happened last year, the father-dying event in (59a) receives I-marking, whereas the brother-working one (b) receives III.

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

a. *way marŋgi nhe ŋarra-kalaŋa-w bäpa-'mirriŋu-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-'mirriŋu-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.[48]

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.*, 52), an additional minimal pair given as (60) below.

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

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

l̪uk-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	*l̪uk-**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 4). 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.

[48] 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 (61).[49]

(61) **Denotations for WD aspectual operators**

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

b. $\textsc{pfv} \underset{\text{df}}{=} \lambda P_{\langle \varepsilon, st \rangle} \lambda i . \exists e [P(e) \wedge \tau(e) \sqsubseteq i]$

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.[50]

A maximally underspecified lexical entry for **I** is given in (62) below. Here, **I** is taken simply to realise an INSTANTIATION relation between its prejacent — a set of indices related to the event's runtime — and a contextually provided reference index (i): note that the interpretation function $[\![\bullet]\!]$ is relativised to a contextual parameter c — assumed to be an n-tuple comprising relevant contextual information (including the reference index i).

(62) 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.)

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

$[\![\textbf{I}]\!]^c = \lambda i \, . \, i$

A derivation for a transitive **I**-sentence is given in (63). This sentence is incompatible with present reference given the constraints described in the previous section: namely that *nhäma* 'see' denotes an 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

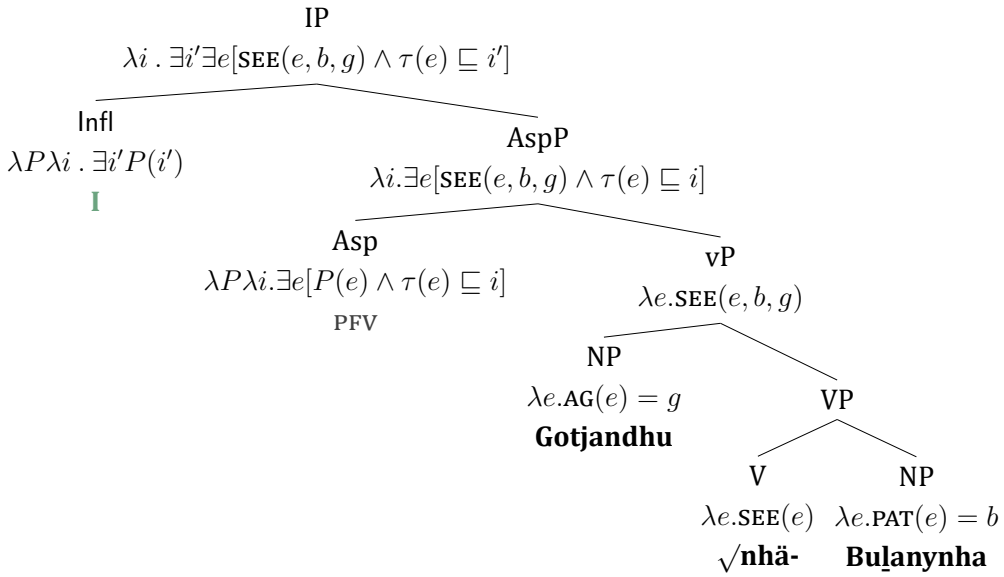
[49] Of course there are considerably more sophisticated treatments of aspect in the semantics literature (e.g., Deo 2009; Dowty 1979 a.o.) Nothing in the forthcoming analysis is reliant on the one provided here, which is similar to that described in Taylor (1977).

[50] 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.

in 2.1). Future reference is also ruled out for pragmatic reasons to be discussed in the following chapters. The event time can be further constrained by past-denoting TFAs (*e.g.*, *barpuru* 'yesterday.')

(63) *Gotjan-dhu nhä-**ma** Bu̲lany-nha*
MÄLK-ERG see-I *MÄLK*-ACC

'Gotjan saw Bu̲lany.'



In effect, here I have proposed a trivial semantics for I: the contribution of I being to assert the instantiation of its prejacent at a some reference index i'. 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.)

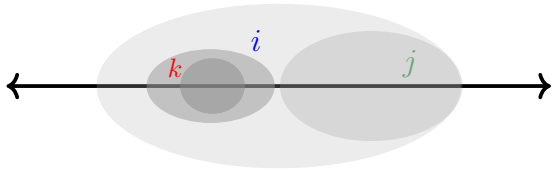
Above, the verb inflection (I) in effect denotes an INSTANTIATION RELATION between a contextually-supplied reference time and a property of indices (*i.e.*, the output of an aspectual operator.)[51]

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 interval i. This relation is defined in (64) and schematised in figure 14.

[51]The PROPERTY INSTANTIATION relation is used by Condoravdi & Deo (2015); Deo (2006) in part to model the divergent behaviours of eventive/stative/temporal properties with temporal operators. Given the data we are concerned with here involves the output of aspectual operators (their temporal properties), INST(P, i) holds iff P holds of i.

(64) **Non-final instantiation** (Condoravdi & Deo 2015:279)
Defined iff $j \underset{\text{FINAL}}{\sqsubset} i$;
$$\text{NFINST}(P, i, j) \leftrightarrow \exists k(\text{INST}(P, k) \wedge k \sqsubseteq i \wedge k \prec j)$$

Figure 14. 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 $\{j \mid j \underset{\text{FINAL}}{\sqsubseteq} \text{F}_c\}$. PRECONTEMPORARY eventualies are situated in a NONFINAL subinterval of i_c, i.e. $\{k \mid k \underset{\text{NONFIN}}{\sqsubset} \text{F}_c\}$. These intervals are summarised in Table 8 below.

Table 8. Instantiation intervals j, k made available by different flavours of i_c

INTERVAL TYPE		TODAY frame	FORE-TODAY frame
frame	$\mathbf{F_c}$	$\{i \mid i \sqsubseteq \textit{today}'\}$	$\{i \mid i \prec \textit{today}'\}$
CONTEMPORARY	$\boldsymbol{j} \underset{\text{FINAL}}{\sqsubseteq} \text{F}_c$	*dhiyaŋ bala* 'now'	*barpuru* 'recently'
PRECONTEMPORARY	$\boldsymbol{k} \underset{\text{NONFIN}}{\sqsubset} \text{F}_c$	*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 $(\textit{today}, i*)$ necessarily overlaps with speech time.[52] From this, we can simply derive the incompatibility of **III**

[52] $j \underset{\text{FINAL}}{\sqsubseteq} (\textit{today}, i*] \leftrightarrow j \circ i*$
Simply, all final subintervals of the interval $(\textit{today}, i*]$ contain $i*$ (by def. $\underset{\text{FINAL}}{\sqsubseteq}$)

with PRESENT-referring event descriptions: all non-final subintervals of $(\textit{today}, i*]$ forcibly exclude $i*$. As a result, NFINST$(P, [\textit{today}, i*), j)$ 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. 54 above.)

Adapting Condoravdi & Deo's NFINST, and armed with two pairs of possible reference frame/final-subinterval, we can then define a PRECONTEMPORARY INSTANTIATION relation which — *cf.* the entry for **I** in (62) — holds between a property of indices and a reference index in order to propose a lexical entry for **III**. This is presented in (65) along with a proposal for the semantic contribution of **III**. The division of the (nonfuture) temporal domain between **I** and **III** is schematised in Figure 15.

(65) **III as encoding precontemporary instantiation**

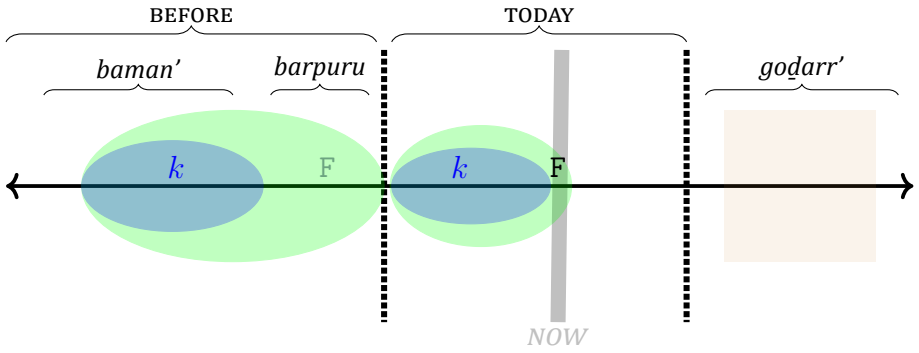
a. **Precontemporary instantiation**
$\textsc{precontemp}_c(P, i) \overset{\text{def}}{=} P(i) \wedge i \sqsubseteq \mathtt{F_c} \wedge i \prec j_{\mathtt{F}}$
Given a fixed utterance context (c), PRECONTEMPORARY INSTANTIATION holds of a reference index i and property of indices P iff • i precedes $j_{\mathtt{F}}$ — a final subinterval of the utterance's reference frame $\mathtt{F}_{\mathtt{i_c}}$ and • P holds of i.

b. **A denotation for the THIRD inflection**
$[\![\textbf{III}]\!]^c = \lambda i : \textsc{precontemp}_c(i) \,.\, i$

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

Figure 15. 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 $\{\text{F} - k\}$



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 Sauerland 2009) expands this reasoning into the presupposition domain.

Given that $[\![\textbf{I}]\!] \supsetneq [\![\textbf{III}]\!]$,[53] 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 (62) provides for the instantiation of the predicate at any contextually-specified index i_c; in competition with the presuppositionally stronger **III**, **I**'s 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 15 above). The blocking of **I**'s realisation of the PRECONTEMPORARY INSTANTIATION relation by **III** (that is a precontemporary antipresupposition that **I** makes on i) is derived in (66) below.

(66) **Pragmatic strengthening of I**

$$
\begin{aligned}
[\![\textbf{I}]\!]^c(P) &\rightsquigarrow \textsc{Inst}(P, i_c) \setminus [\![\textbf{III}]\!]^c(P) && \text{(i)}\\
&\rightsquigarrow \textsc{Inst}(P, i_c) \setminus \textsc{Inst}(P, i_c) \wedge i \sqsubseteq \text{F} \wedge i_c \prec j_{\text{F}_c} && \text{(ii)}\\
&\rightsquigarrow \textsc{Inst}(P, i_c) \wedge \neg(\textsc{inst}(P, i_c) \wedge i \sqsubseteq \text{F}_c \wedge i \prec j_{\text{F}}) && \text{(iii)}\\
&\rightsquigarrow \textsc{Inst}(P, i_c) \wedge \neg(i \sqsubseteq \text{F} \wedge i_c \prec j_{\text{F}}) && \text{(iv)}\\
&\rightsquigarrow \textsc{Inst}(P, i_c) \wedge i_c \not\prec j_{\text{F}} && \text{(v)}
\end{aligned}
$$

I realises property instantiation but, via competition with the more specific (informative) form–**III**–its use is pragmatically restricted to the relative complement of

[53] **I** denotes a relation (INST) between a property P and index i, whereas **III** (PRECONTEMP) places additional restriction on the temporal location of i relative to some superinterval $\texttt{f}$. Therefore $\subsetneq$ INST.

III's domain ***(i)***. That is, the relative complement of PRECONTEMPORARY INSTANTIATION ***(ii)***. Therefore I is felicitously only if 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 8, *p. 70* above.)

2.4 Theorising cyclic tense & the status of $\mathrm{F_c}$

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 11/13/15) is understood in terms of a notion of a (PRE)CONTEMPORARY distinction which operates over either a hodiernal or prehodiernal "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 prehodiernal 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.)

(67) **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*** *ga*
aunt IPFV-III work-III EMPH INDEF.ABL CPLV yesterday and
dhiyaŋgu *bala* *ŋayi* *ŋorra-**na**-nha*
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. *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 was up past dawn. He was walking back (because his car had broken) from playing cards.' [AW 20190410]

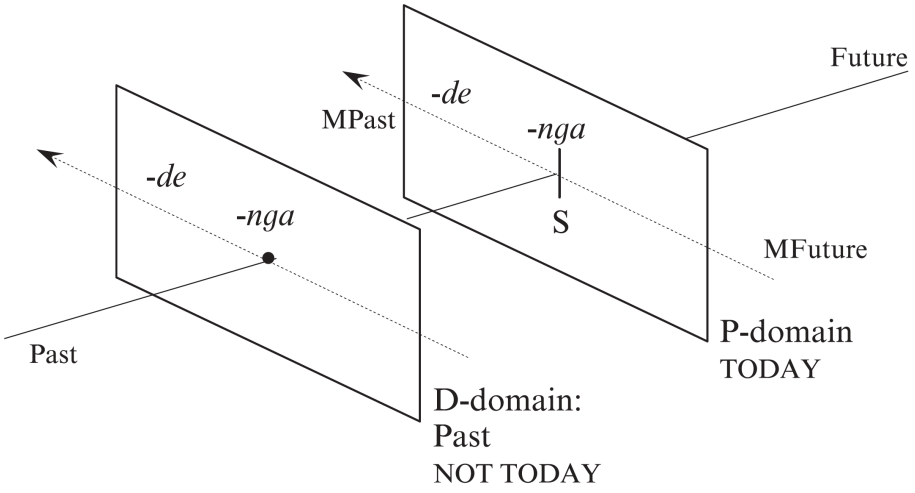
How and why would a tense system like that analysed in this chapter emerge? Of the Palantla Chinantec system (see fn 48, *p.* 67), Bybee et al. (1994:104) suggest that competition between a "hodiernal past [-*na*] an an anterior [-*ka*] (with current relevance)" for control of the same-day past domain 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 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 16.) Presumably they'd make a similar claim WD's I and III.

Figure 16. 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.



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*).[54] To take one example, Duchet & Përnaska's (2016) study of the usage domains of the Albanian [sqi] *AORIST* and *PERFECT*, [55] 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

[54]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.)

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

('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.[56] This usage evokes the phenomenon of the "narrative/historic present" — a commonly attested use cross-linguistically (see Carruthers 2012 for an overview).[57] 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.[58]

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

[56] 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).

[57] 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.)

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

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.)[59] 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 (68) is only available with either a historic present or immediate future reading (an observation following Vendler 1957:147).

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

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

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

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

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

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

'I drank water yesterday.' [DB 20190405]

This resembles the situation in WD (69), 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.

※

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

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, (70) formulates a hypothesis for the emergence of a cyclic tense system of the type described here.

(70) **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.[60])

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

[60] 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 (71–72), 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 21) and is summarised below in Table 9. 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 9. Neutralisation of I and III inflections under negation.

The following examples in (71) 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.

(71a-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.

(71) **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 (72).

Again, (72a-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 embedded under a propositional attitude predicate to encode a false belief, and (e) an example of a negated description of the remote past receives **IV** inflection.

(72) **Exponence of TODAY PAST and REMOTE PAST reference as IV under negation**

a. *gathur* *munhagumirr* *ŋarra* *nhä-**ŋal*** *warrakan*
today morning 1s see-III bird

'I saw a bird this morning' [FW 20180802]

b. *gathur* *munhagumirr* ***bäyŋu*** *ŋarra* *nhä-**nha*** *warrakan*
today morning NEGQ 1s see-IV bird

'I didn't see a bird this morning' [FW 20180802]

c. **CONTEXT**. Speaker has dropped a coin.

Way! ***Bäyŋu*** *ŋarra nhä-**nha**?*
Hey! NEGQ 1s see-**IV**

'Ah! Did you see (it)?' [AW 20180830]

d. **CONTEXT.** I'm at work explaining to my coworker why my *galay* is angry at me.

*Ŋarraku miyalk maḏakarritj-thi-**na** bili ŋayi ga* ***guyaŋa*** *ŋarra*
1s.DAT wife anger-INCH-**III** CPLV 3s IPFV.**I** think.**I**[62] 1s
*ga-**nha** bäyŋu djäma*
IPFV-**IV** NEG work

'My wife got angry because she thought I wasn't working today.'
[DhG 20190417]

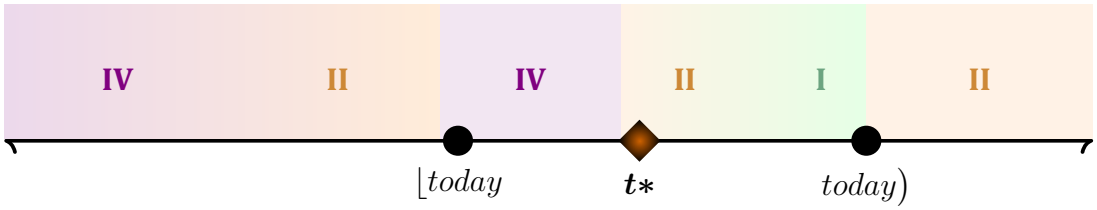
e. **CONTEXT.** The speaker grew up in the desert.

bäyŋu *ŋarra ŋuli ga-**nha** nhä-**nha** (waltjaŋ) 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 (71–72) 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 17 schematises the relationship between temporal reference and inflection selection in **negative clauses** (*cf.* Fig. 11, *p.* 49.)

Figure 17. 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 (73-74).

(73) **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** l̪uk-**a** dhiyaŋ bala*
1s (NEG) FUT DIST eat-I now

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

b. POST-HODIERNAL referring predicates receive II-inflection

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

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

(74) **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'.[63] Importantly, and as we will see, these expressions all ap-

[63] 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 75.

Relatedly, the data in (76) 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.

(75) ***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*** *l̪uk-**a** maypal yalala milmitjpa*
1d.EXCL FUT consume-**I** shellfish later evening

'We're having shellfish this evening.' [DhG 20190417]

(76) ***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. *djamarrkul̪i* ***dhu*** *yaka wurraŋatjarra'**y-irr***
children FUT NEG cruel.INCH-**I**

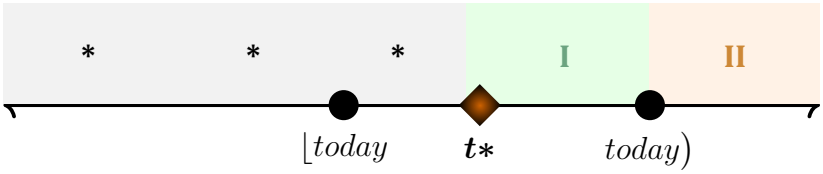
'The children mustn't be disobedient.' [AW 20190429]

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 18.

Figure 18. (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 *will* on its 'future auxiliary' and modal uses .

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 (76c) 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 (1981); 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.)

(77) **Lexical entry for *dhu* 'FUT'**
dhu is only defined if context makes available a circumstantial modal base m
$[\![dhu]\!]^c = \lambda P \lambda i : \forall b\big[b \in \underset{o}{\text{BEST}}\big(\underset{\text{CIRC}}{\cap} m(i)\big) \rightarrow \exists^b i'[i' \succeq i \wedge P(i')]\big]$
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 78) or **IV** (shown in 79).

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 (78). 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 (78c–d), in both cases, the presence of multiple modals appears to decrease the force of the claim.[64]

(78) ***balaŋ(u)* 'MOD' and II-inflection**

a. *ŋarra* ***balaŋu*** *l̪uk-**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]

[64]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*.

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) dhiŋg-**uŋu** ŋawalul'yu*
1s **MOD** (MOD) die-II smoke.ERG

'I could die from the smoke.' [DhG 20190405]

d. *ŋayi **balaŋ dhu** djaṉŋar-**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 (79). 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 (80c).

(79) ***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** l̪uka-**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** l̪uku 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 63) 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 (§ **??**.))

(80) **Conditional constructions licensing II and IV inflection (in indicative and counterfactual contexts respectively)**

a. *ŋarra* ***dhu*** *wargu-**yurr**,* ***ŋuli*** *ŋarra* ***dhu*** *bäyŋu gurrup-**ulu*** *ŋatha*
1s **FUT** worry-VBLZR.II HYP 1s **FUT** NEG give-II food
butjigitnha. *ŋayi* ***dhu/balaŋ*** *djaŋ̱ŋar-**thi**.*
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*** *l̪uk-**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

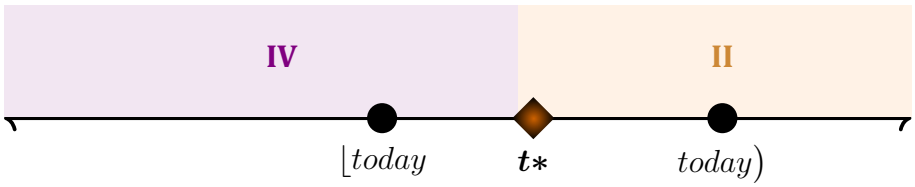
'Had you fed the cat, it would have grown.' [DhG 20190405]

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 (81), 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 19 gives another schematic representation of the relations between temporal reference and inflectional suffix, this time in contexts with the root possibility modal *balaŋ(u)*.

(81) **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 19. 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 (79c), 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, (82) 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.[65]

(82) **Lexical entry for *balaŋ* 'MOD'**
balaŋ is only defined if context makes available a circumstantial modal base m
$[\![\textit{balaŋ}]\!]^c = \lambda P \lambda i : \exists b\big[b \in \underset{o}{\textsc{best}}\big(\underset{\textsc{circ}}{\cap} m(i) \big) \rightarrow \exists^b i'[i' \succcurlyeq i \wedge P(i')]\big]$
balaŋ P asserts that – in the best branches of a modal base calculated at 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 (79c) are given in (83).

[65] 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 § 101b, 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.

(83) ***balaŋu* on a counterfactual reading (past temporal perspective contributed by IV)** **(79c, repeated)**

ŋarra-nha ***balaŋu*** *l̪uku walala mitthu-**na***
1s-ACC **IRR** foot 3p cut-**IV**

'They would have amputated my foot.' [DhG 20190417]

$[\![(79c)]\!]^c$ 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, (79c) is true iff:

$$\exists b\big[b \in \underset{o}{\text{BEST}}\big(\cap \underset{\text{CIRC}}{m}(i)\big) \wedge \exists^b i'[i' \succcurlyeq i \wedge \text{They amputate Speaker's foot at } i']\big]$$

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.)[66]
- 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).

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.

[66] A modal base $m : \mathcal{I} \to \wp(\mathcal{I})$ is realistic iff $\forall i : i \in \cap m(i)$ (following Kratzer 1981:295).

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 1990.) For these authors, significant utility is to be found in drawing a broad dichotomy between REALIS and IRREALIS: that is, propositions can be taken as either a description of eventualities that correspond with observed/observable reality versus a description of a hypothetical, imagined, non-actualised eventuality. Consequently, for its defenders, IRREALIS can be conceived of as whatever semantical concept might be taken to collect: future, modalised and conditional predications and imperatives, in addition (for some languages) to negative and habitual predications and interrogatives (see also Givón 1994; Palmer 2001; Plungian 2005; 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 actual semantic contribution of any given class of marker can vary radically across languages, whence the difficulty in providing a unified semantics for, *e.g.*, the Romance subjunctive.

On the basis of cross-linguistic data, Cristofaro (2012:138*ff*) argues that there languages crucially tend to draw a distinction between 'as-yet unrealized' and 'non-realized (in the past)' – *i.e.*, these domains are grammaticalized separately. She deploys this observation to argue against an empirical basis for a unified IRREALIS category — suggesting that the "multifunctionality" for a given form ought to be attributable to "contextual inference" or "generalization" rather than furnishing evidence of the semantic import a dichotomous reality status category.[67] 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 semantically inert.

[67] Further, Cristofaro explicitly takes issue with what she has identified as an inference that linguists 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 grammatical categories" (2012:145).

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 expressions 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 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).[68]

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.[69] 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 (84).[70]

(84) *M* is **nonveridical** w/r/t p iff
$\exists w'[w' \in M \wedge w' \in \neg p]$ (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

[68] Chung & Timberlake (1985:238) explicitly suggest an equivalence between REALIS and the INDICATIVE. See also Matthewson 2010 on the Sʧáʧimcets (`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.)

[69] 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.

[70] Although (Wiltschko 2016:*cf.*).

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 (85) and spelled out in the section below.

(85) **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.[71]

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.[72]

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 86a). Conversely, IRR is frequently found in matrix clauses, co-occurring with other modal ("notionally irrealis") expressions (*ka-* 'OBLIG' in 86b).

(86) **On one treatment of the distinction, SUBJUNCTIVE mood is generally licensed by an embedding predicate where IRREALIS mood can be licensed by a modal operator in a matrix clause**

a. SUBJUNCTIVE marking in dependent clause [French fra]

Il *faut* *qu'*[*=il* *se* ***taise***]
3s be.necessary.INDIC COMP=3s R/R be.quiet.**SBJV**

'It's necessary that he be quiet.'

[71] See also the "locality of binding" principle (Percus 2000:201, Hacquard 2010:99.)

[72] Although, as mentioned Matthewson (2010) argues that mood morphology in Sťát'imcets [lil] is a realisation of a SBJV category (mentioned also fn 68).

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)

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.)

(87) **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)* *d̲arrkthu-**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 (88b-c)

(88) **Other embedding predicates don't license mood shift**

a. *Ŋayi* *bäyŋu* *ŋarranha* *märr-yuwalkthi-na* [*ŋunhi* [*ŋarra* *ga-**na***
3s NEG 1s.ACC faith-true.INCH-**III** 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* *nyäl̲'yu-rruna* [*ŋunhi* [*gapmandhu* *dhu* *limurrunha*
minister.ERG lie-**III** ENDO government.ERG FUT 1pINCL.ACC
gunga'yun]]
help-**I**

'The minister lied that the government would help us.'
[DhG 20190417]

c. *ministay* *nyäl̲'yu-rruna* [*ŋunhi* [*gapmandhu* *limurrunha*
minister.ERG lie-**III** ENDO government.ERG 1pINCL.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.

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.

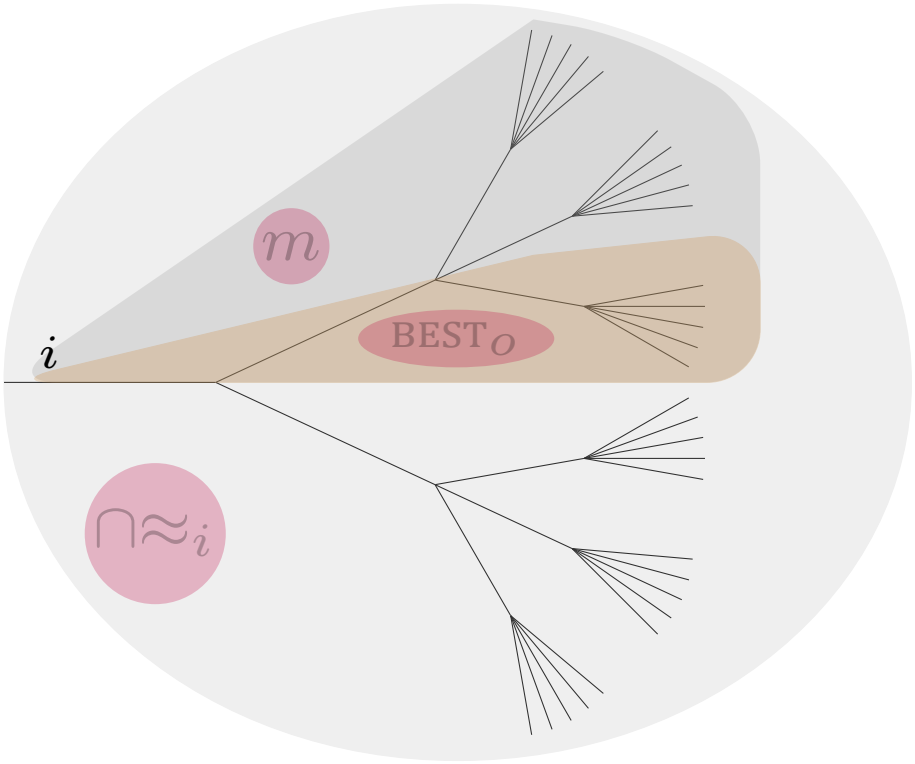
The *Branching Times* models as introduced in § 1.2 capture the "right-branching" property of metaphysical possibility. That is, for any given index, there is a settled past (a single branch) and an unsettled future (multiple metaphysical alternatives.)

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] —$\{i' \mid i' \in \underset{\textit{deontic}}{\text{BEST}}\big(\underset{\text{CIRC}}{\cap} m(i*)\big)\}$.)

Figure 20. 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.



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, 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 (84) 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.

(89) **Settledness-at-$i*$ for *P*** (branching times) [repeated from 8′]
$\forall b_1, b_2 \in \cap\approx_{i*} : \exists^{b_1} i' \exists^{b_2} i'' \big[i' \simeq i'' \wedge [P(i') \leftrightarrow P(i'')] \big]$

In view of these relations, (90) contains a proposal for a definition of the notional category of IRREALIS (at least as far as it relates to apparent WD conceptions/grammaticalisations.)

(90) **A relation between an evaluation index and a predicate: The contribution of IRREALIS mood as nonveridicality**

$$\textbf{IRR} \stackrel{\text{df}}{=} \exists b \in \cap\approx_i \wedge \exists^b i' [i \simeq i' \wedge \neg P(i')]$$

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 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.)

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 (90), a lexical entry for II is proposed in (91), where the inflection enforces a nonveridicality presupposition on the (contextually assigned) reference index with respect to *P*.[73]

(91) **A denotation for the SECONDARY inflection as encoding nonveridicality**
$[\![\text{II}]\!]^c = \lambda i : \exists b \in \cap\approx_i \wedge \exists^b i' [i \simeq i' \wedge \neg P(i')] \,.\, i$
II enforces a presupposition on the evaluation index, whose metaphysical alternatives must be nonveridical with respect to *P*.

3.4.2 The negators: *yaka* & *bäyŋu*

In light of the proposal introduced above, we model clausal negators *bäyŋu* and *yaka* as scoping under inflection. Stated above, the "irrealis" categories, II and IV

[73] Further discussion about the presuppositional status of these felicity conditions is provided below (esp. §3.5.)

presuppose that the instantiation of some event is *unsettled* — that is, the metaphysical alternatives to the evaluation index i are **nonveridical** with respect to INFL's prejacent.

Given the distributional similarities between (root) modals and *yaka/bäyŋu* in WD (in addition to the independent support for such a treatment outlined in Part II) to 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.)[74] This is shown in (92).

(92) **A lexical entry for WD negation**

$[\![\textit{bäyŋu}]\!]^c = \lambda P_{\langle s,t\rangle}\lambda i.\nexists b[b \in \underset{\{b*\}}{\textsc{best}}(\cap\approx_i) \wedge \exists^b i'[i' \simeq i \wedge P(i')]$

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 (1981:295) — $\cap f(w) = \{w\}$.) Consequently, given the modal domain established by these conversational backgrounds, $\forall i'[i' \simeq i* \rightarrow i' = i*]$. The lexical entry given above ought to have the same truth conditions as: $[\![\textit{bäyŋu}]\!]^c = \lambda P\lambda i.\neg P(i)$

The entry for NEG given in (92) aligns with those for the other modals both in terms of • its type (that is, the shape of the lex entry) as well as • in terms of the fact that like the other modal particles, NEG indicates that the speaker/attitude holder fails to assert that P is instantiated at all metaphysical alternatives to i — satisfying the shared presupposition of the irrealis moods **II** and **IV**.

Shown 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 BOTH the NONVERIDICALITY and the PRECONTEMPORARY presuppositions (93). A semantic derivation for a simple negative past sentence is then given in (94).

(93) **A denotation for the QUARTERNARY inflection as enforcing both *precontemporaneity* and *irrealis* presuppositions**

$$[\![\textbf{IV}]\!]^c = \lambda i : i \sqsubseteq \mathtt{F_c} \wedge i \prec j_{\mathtt{F}} \wedge \exists i' \in \cap \approx_i \wedge \neg P(i') \,.\, i$$

[74] 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]."

IV presupposes that the reference index i is non-final with respect to the reference frame $\mathtt{F}_c$ **and** its metaphysical alternatives are nonveridical with respect to *P*.

(94) ***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. $[\![\textit{ŋarra NHÄ- mukulnha}]\!]^c = \lambda i\ .\ \exists e(\textsc{i.see.aunty}(e) \wedge \tau(e) \sqsubset i)$

b. $[\![\textit{bäyŋu}]\!]^c(\mathbf{a}) = \lambda P \lambda i\ .\ \nexists i'[i' \in \cap \approx_i \wedge P(i')]\big(\mathbf{a}\big)$

c. $[\![\textit{bäyŋu ŋarra NHÄ- mukulnha}]\!]^c = \lambda i\ .\ \nexists i'[i' \in \cap \approx_i \wedge \exists e[\textsc{i.see.aunty}(e) \wedge e \sqsubset i]]$

d. $\mathbf{c}\left([\![\textbf{IV}]\!]^c\right) = \mathbf{c}\left(\lambda i : \textsc{precontemp}_c(i) \wedge \exists i' \in \cap \approx_i \wedge \neg P(i')\right).i$

e. $[\![\textit{bäyŋu ŋarra nhänha mukulnha}]\!]^c = \lambda i : \textsc{precontemp}_c(i) \wedge \exists i' \in \cap \approx_i \wedge \neg P(i')\ .\ \nexists i'[i' \in \cap \approx_i \wedge \exists e[\textsc{i.see.aunty}(e) \wedge e \sqsubset i]]$

That is: given a context c, an utterance of **(94)** is true iff there is are no branches of metaphysical alternatives to i that include an event of the speaker seeing *mukul*.
Further, (94) presupposes (*i.e.*, it is defined iff) context assigns a reference index to i that satisfies **precontemporaneity** and for which *P* is **not** a historic necessity.

In terms of the branching times framework, then, negative operators can be interpreted as situating the reference index in the COUNTERFACTUAL domain.

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 (95) below, repeated from 81 above (compare also Figs 17/19 above).

(95) **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 (95) — 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 out of 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 pins typological generalisations that fewer temporal distinctions are grammaticalised in irrealis-aligned paradigms (*e.g.*, the Romance subjunctive) than in realis-aligned ones.) This temporal vagueness is also reflected the denotations assumed here for modal expressions (which involve the 'forward expansion of the time of evaluation' Condoravdi (2003:12).)

3.5 MAXIMIZE PRESUPPOSITION again: 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.

(96) Negated same-day future predications fail to license irrealis-mood shift (unlike negated present predications) [AW 20190501]

a. *ŋarra* *(yaka)* *dhu* *nhä-**ma*** *mukulnha*
1s (NEG) FUT see-I aunt.ACC

'I will (won't) see aunty (tonight).'

b. *(goḏarr)* *ŋarra* *(yaka)* *dhu* *nhä-**ŋu*** *mukulnha*
toomorrow 1s (NEG) FUT see-II aunt.ACC

'Tomorrow I will (won't) see aunty.'

c. *(dhiyaŋ bala) bäyŋu ŋarra gi nhä-**ŋu** mukulnha*
now 1s (NEG) FUT see-II aunt.ACC

'At the moment, I'm not looking at aunty.'

(97) a. *Ŋunhi ŋarra dhu bäyŋu l̪uk-**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 l̪uplupthu-**n** bili bäru ŋuli ga l̪uk-**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."[75] While the WD same-day future construction is not technically a morphosyntactic futurate,[76] analysis of these devices can shed potential insight on the (functional) motivation for this phenomenon.

The surprising contrast between a I-inflected later-today future (96a) 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 speech time as the evaluation index amd obligatorily advances the instantiation time of the eventuality into the future of evaluation time; 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.

Above, we have modelled irrealis mood as a presupposition of unsettledness built into the semantics for II and IV. These inflections are generally obligatory in irrealis contexts (as triggered by modal (incl. negative) operators) in view of general pragmatic principles (*viz.* MAXIMIZE PRESUPPOSITION.)[77] The analysis of

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

[76] 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.

[77] 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 PRE-

the same-day future, then, is based on the hypothesis that the same-day future — even if it's taken to inflect a property of future (POTENTIAL) indices — receives a NON-IRREALIS inflection (**I**) in view of its plannability and "presumed settledness" — that is, the IRR presupposition (*viz.* that there be an alternative metaphysical at which *P* does not hold) does not have the status of a truth condition.

3.6 Conclusion: motivating NONVERIDICALITY and IRREALIS 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 not been established.

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 at the evaluation index. The distinctive contribution of the IRREALIS inflections, then, is that imposes a **presuppostion** on the (contextually-supplied) index of evaluation: namely that there exists some metaphysical alternative at which the prejacent is false.

SUPPOSITION 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.

Chapter 4

The WD paradigm

The previous two chapters have proposed a semantics for WD's four inflectional categories in terms of a *Branching Times* framework.

4.1 Epistemic modality in WD

(98) 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.** I'm trying to find mum.

Wanha balaŋ ŋäma'?
where MOD MO

(balaŋ/)mak golŋur, mak wäŋaŋur...
EPIST school.LOC EPIST home.LOC

'Whereabouts could mum be? Maybe at school, maybe at home...'

In addition, *mak(u)* 'EPIST, maybe, perhaps', a commonly occurring particle that is responsible for encoding shades of epistemic modality is also 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 function, although none *per se* trigger irrealis mood marking.[78]

[78] 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*.)

Examples are given in (99).

(99) **Epistemic *mak(u)* doesn't license mood shift in WD**

a. *maku* ***ga*** ***nhina*** *raŋiŋura* *maku* *bäyŋu.* *Yaka* *marŋgi.*
EPIST IPFV.I sit.I beach-LOC EPIST NEG NEG know

'Maybe she's at the beach, maybe not. Dunno.' [DB 20191416]

b. *Dhuwali-yiny* *ŋayi* *mak* *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 food take-IV

'Maybe he said that because we didn't bring any food.'
[DB:Mathyu 16:7]

Additionally, The LF of a simple (unembedded) clause is taken to be headed by a silent ASSERT operator (compare to the assumptions made in Alonso-Ovalle & Menéndez-Benito 2003; Hacquard 2010; Kaufmann 2005) which takes an inflected proposition as its sister.[79] This approach effectively formalises (some) ideas about the illocutionary force and sets of norms that apply to assertoric speech acts (e.g. Brandom 1983; Williamson 1996 a.o.) by postulating a covert doxastic modal which is anchored by the actual world $i*$. $\sim_\alpha$ is a doxastic accessibility relation anchored to some individual $\cap\alpha$.

(100) **An assertability relation**
$[\![\text{ASSERT}]\!]_{\langle s,\langle s,t\rangle\rangle} = \lambda i.\cap \sim_\alpha i$
ASSERT is an accessibility relation that, given a speech index i returns all the propositions that are believed/"assertable" by a given judge α at that index.

The force of this model can additionally be weakened by epistemic possibility adverb *mak(u)*. Given its apparent variable modal force, *maku* takes an accessibility relation (*e.g.*, ASSERT) as its sister and returns a subset of the modal base it picks out. Following Matthewson 2010; Rullmann et al. 2008 a.o., force-variable modality is modelled as universal quantification over a a (contextually-determined) subset of the modal base (as determined by a "contextually given" choice function f_c.) Modal strength, then, is proportional to the proportion of the modal base that is understood to be quantified over.

(101) **Epistemic possibility**

[79] 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).

a. $[\![\textit{mak(u)}]\!]_{\langle\langle s,\langle s,t\rangle\rangle,\langle s,\langle s,t\rangle\rangle} = \lambda r_{\langle s,\langle s,t\rangle\rangle}.f_c(r)$

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

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

4.1.0.1 The proposal in action

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

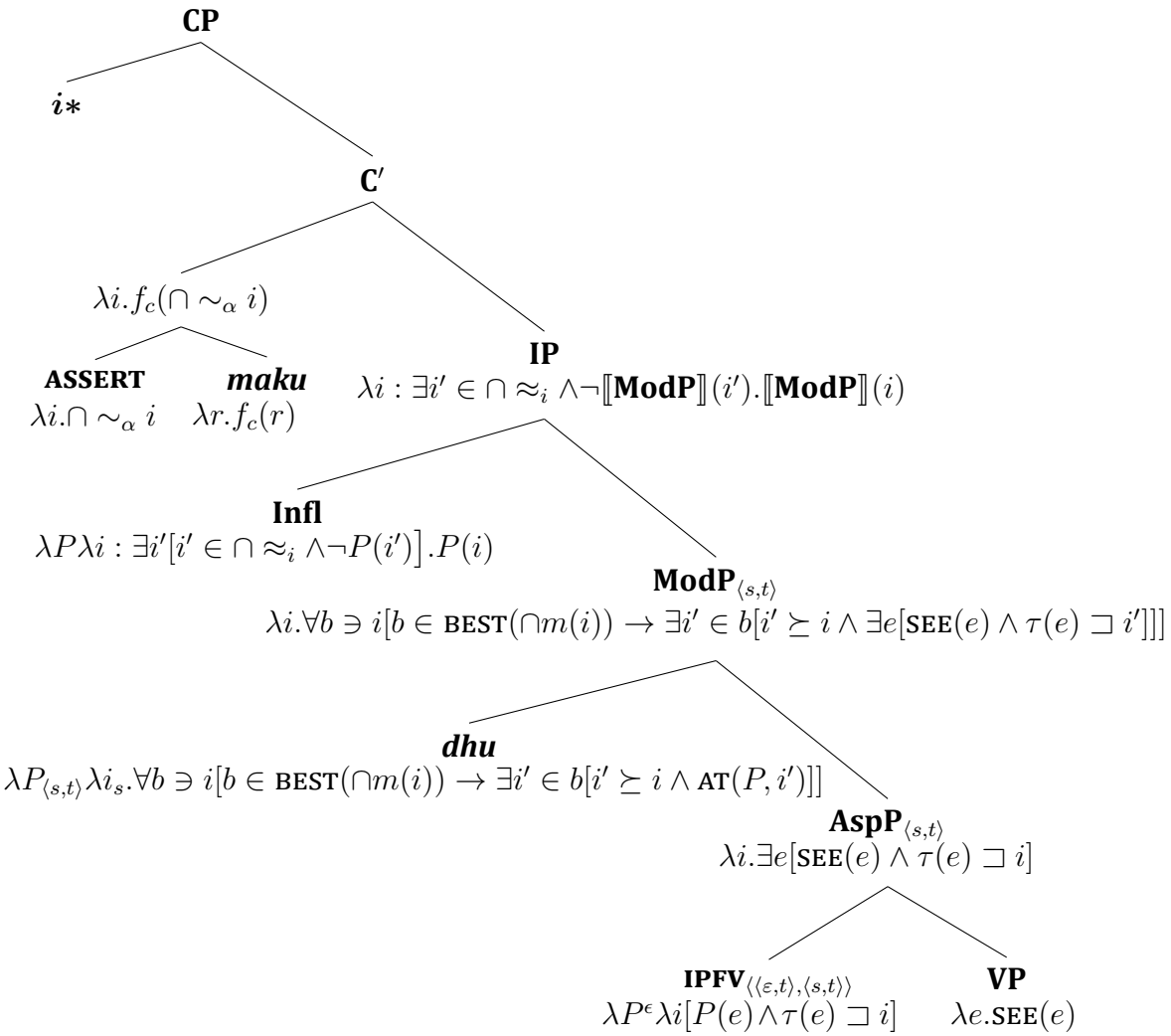
'Maybe I'll be seeing aunty'

$\pi : \exists i' \in \cap \approx_{i*} \wedge \neg\forall b \ni i' \Big[b \in \underset{o}{\textsc{best}}\big(\cap \textsc{circ}(i)\big) \rightarrow \exists i'' \in b\big[i'' \succeq i' \wedge \exists e[\textsc{see}(e) \wedge \tau(e) \sqsupset i'']\big]\Big]$

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

$f_c(\cap \sim_{Spkr} i*) \vDash \forall b \ni i* \Big[b \in \underset{o}{\textsc{best}}\big(\cap \textsc{circ}(i)\big) \rightarrow \exists i' \in b\big[i' \succeq i* \wedge \exists e[\textsc{see}(e) \wedge \tau(e) \sqsupset i']\big]\Big]$

Some subset (as defined by f_c) of the speaker's doxastic alternatives at the speech index $i*$ verify the (modal) claim: 'For all of the best branches (according to m, o) that pass through $i*$, there is some successor index i' which is contained by the run time of an event of my seeing my aunt.



Infl maybe needs to introduce variable that wants an acc. relation in order to introduce the assertability stuff in the C-layer. Kaufmann does this with ∅ much lower down in the derivation.

4.2 Semantic change in Southern Yolŋu

The negative asymmetry described above, exhibited in WD varieties, is not manifested in most other Southern Yolŋu (SY) varieties. As suggested by the glossing decisions summarised in Table 4 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.[80] Additionally, Melanie Wilkinson observes that these effects appear to be variable in the Djambarrpuyŋu varieties spoken further east in Galiwin'ku (Elcho Island) and aren't manifested in *Miwatj* varieties more generally (2012:431, 359*ff*; *pers. comm.*) These phenomena *are*, however, exhibited in the westernmost Yolŋu varieties (Djinaŋ and Djinba, see Waters 1989:192) — strongly evidence of an areal effect. Here we briefly survey the synchronic variation between WD and some neighbouring varieties in view of forming a diachronic account of the Yolŋu Matha inflectional

[80] 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.

paradigm.

4.2.1 Semantics of the Ritharrŋu-Wägilak verbal paradigm

Ritharrŋu and Wägilak, the southernmost SY varieties also provide examples of the absence of sensitivity to negation in the inflectional paradigm. The data below demonstrate how, in keeping with the glossing conventions adopted by Heath (1980a), inflections cognate with WD **I**, **II** and **III** are robustly associated with present, future and past reference respectively, a fact that survives under negation (generally marked by verbal enclitic =*'ma'*). Examples of these are given in (22-22). Heath notes that the Ritharrŋu imperatives are formally identical to corresponding future predications (1980a:76) — this is shown in (22).

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

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

(104) a. *goḏarrpuy ŋarra* ***nhäŋu(-'ma')*** *mukulnha* **[FUTURE]**
tomorrow 1s see.**II**-**NEG** aunt.ACC

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

b. ***l̲uki*** *nhe!*
eat.**II** 2s

'Eat it!' (OR 'you'll eat it') (Heath 1980a:76)

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

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

(105) a. *gätha ŋarra* ***nhäwala(-'ma')*** *mukulnha* **[TODAY PAST]**
today 1s see.**III**-**NEG** aunt.ACC

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

b. *ripurru-mirri ŋarra* ***nhäwala(-'ma')*** *mukulnha* **[YESTERDAY PAST]**
yesterday 1s see.**III**-**NEG** aunt.ACC

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

Heath (1980a:74-5) glosses Ritharrŋu's fourth inflectional category as PAST POTENTIAL. Heath's PAST POTENTIAL, is not cognate with the "irrealis past" marker **IV** in WD. Conversely, Heath identifies an alternation in the past paradigm that is made

in a number of Ritharrŋu conjugation classes. That is, the Ritharrŋu PAST is cognate with either **III** or **IV**, depending on the conjugation class. Further, within this category, when two forms are available (one apparently cognate with **III** and the other with **IV**), he suggests tentative evidence of a semantic distinction between these Providing a number of examples, he suggests that:

> *wäni-na* is usual for 'went', but *wäni-nya* can be used to indicate habitual or substantially prolonged activity, especially in the distant past ... [but] these semantic distinctions [are limited to a minority of verb stems,] are not rigorous and not all textual examples fit with my remarks above. (Heath 1980a:75)

Perhaps lending further tentative support to Heath's analysis, in predications about the ***remote past*** (for verbs that maintain a split), speakers split between the two forms documented by Heath — PAST$_{\textbf{III}}$/PAST$_{\textbf{IV}}$ (*i.e.*, those inflections cognate with WD **III** and **IV** respectively.) That is, in elicitation, a distinction between **III** and **IV** appears for speaker RN but *not* for AL, pointing to a near-complete merger of **III** and **IV** in Ritharrŋu-Wägilak.

(106) a. Past habituals with **IV**-cognate marking

ŋarra	*yothu-ganyaŋ'*	*nhä-**nha**(-'ma')*	*ŋarra*	*ŋuli*	*mukul-ŋ'nha-ya*
1s	child	see-**PST$_{\textbf{IV}}$**-(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$_{\textbf{III}}$**	1s	child-TEMP-PROM	aunt-ACC-PROM

'When I was young I saw/would see my aunt.' [AL 20190522]

Heath also indicates that that Ritharrŋu's FUTURE (cognate with **II**) and PAST POTENTIAL (no WD cognate: **V**)[81] categories appear to be variable in terms of modal force. This is indicated by the examples in (Heath's translations, 107) and (23) below.

(107) FUTURE and PAST POTENTIAL in modalised contexts in Ritharrŋu (adapted from Heath 1980a:104)

a. ***wäni*** *nhe*
go.**II** 2s

'You can/should/will go.' (or 'Go!')

[81] For Bowern (2009), the Ritharrŋu PSTPOT is retained from a distinct inflectional category, reconstructable to Proto-Yolŋu. Relatedly, implied in Heath (1980a:20,23,104), the PSTPOT may be (historically) derived from **II** and an additional suffix. The compatibility of these reconstructions is not further considered in this dissertation.

b. *wäni-**ya*** *nhe*
go-V 2s

'You could/should/would/were about to go.'

(108) Wägilak FUTURE (II) with variable modal flavour

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** lima Numbulwar-li'-ya ŋatha lima märra-**wu**,*
go-II PLACE-ALL-PROM food 1p.INCL food get-II
wo djuḻ-kurru?
or road-PERG

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

An important difference between the WD varieties described above and the Ritharrŋu-Wägilak data presented here is the absence of TMA particles in the latter. Consequently, the verbal paradigm itself is the primary grammatical device that R-W deploys to encode relevant temporal, modal and aspectual distinctions. Von Prince's branching-time trichotomy provides a neat way of describing the domain of each inflection (described in 11, *p.* [vP–bt] above). This is summarised in (109): the four inflections draw a clear distinction between the present and past, in addition to the 'as-yet-unrealised' and 'nonrealized' (cf. Cristofaro 2012), discussed above.

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

A distinctive difference, of course, central to this chapter, is the observation that sentential negation has no effect on the tense-mood inflection of a given clause in R-W; the type of "counterfactuality" introduced by a negative operator — key to the analysis of the WD irrealis laid out above — is apparently invisible to mood selection. Recall that the cross-linguistic heterogeneity of *irrealis* as a category (exemplified by the fact that for some (nall) languages, the category is said to be licensed by negation.)

This difference might be modelled as a contrast in the scope-taking behaviour of R-W *-'may'* as against WD *bäyŋu/yaka* — Mithun (1995) makes a similar suggestion in her discussion of the relationship between "reality status" marking and negation in Central Pomo as against Caddo.

4.2.2 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. 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).[82] 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 (Djinaŋ, Djinba and WD) that exhibit the distinctive cyclic tense phenomenon briefly described earlier.[83] The absence of these features in other Pama-Nyungan (genetically related) languages suggests that this paraidgm reorganisation in the western varieties is a function of this stable contact with their Maningrida/Burarran neighbours.[84,85]

A potential hypothesis underpinning this change is that, with the advent of cyclic temporal reference, **I** — the erstwhile PRESENT tense — comes to fail to reliably encode a distinction between past and present temporal reference. Consequently, there is a greater reliance on other lexical material (particularly *ga* 'IPFV') to disambiguate past and present events (given the well-understood incompatiblity between present reference and perfectivity.) Note the vivid contrast with Ritharrŋu-Wägilak where it's not clear that there is any grammatical device that distinguishes imperfective from imperfective descriptions in the past.

[82] 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.

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

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

[85] 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.

This shift in the division of TMA labour in favour of free preverbal elements results in a decreasing semantical burden for the inflectional paradigm in general. While no root modals are reported in Ritarrŋu-Wägilak, in contemporary WD, *dhu, balaŋ(u)* etc. are responsible for encoding modality. This (partial) redundancy of the inflectional paradigm then leads to an analysis of the irrealis-aligned inflections (**II** and **IV**) as containing an irreality presupposition (which is satisfiable by a root modal operator.) In effect, they **II** and **IV** come to mark the **nonveridicality**, *sc.* the *unknowability* of their prejacent in a given context.

The distinctive negative asymmetry, then, emerges as a consequence of this semantic reorganisation. Given that negation can be taken to encode a species of *counterfactuality* (insofar as the truth of an assertion of the type $\neg p(w)$ requires that p not be a realised (let alone known) fact of w), negative operators also satisfy nonveridicality. In view of these facts of the language, then, sentential negators (*viz. yaka, bäyŋu*) are reanalysed as predicate modifiers of the same type as (other) modal operators which license the irrealis mood inflections.

4.3 Conclusion

In this chapter, I have proposed a semantics for the four inflectional categories that are obligatorily marked on Western Dhuwal(a) verbs. These are given in (110).

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

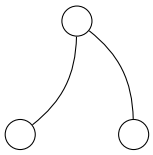
a. $[\![\textbf{I}]\!]^{i*} = \lambda P \lambda i.P(i)$
$[\![\textbf{II}]\!]^{i*} = \lambda P \lambda i : \exists i'[i' \in \cap \approx_i \wedge \neg P(i')].P(i)$
$[\![\textbf{III}]\!]^{i*} = \lambda P \lambda i : \exists j[j \underset{\text{FINAL}}{\sqsubseteq} i.\textsc{NfInst}(P,i,j)]$
$[\![\textbf{IV}]\!]^{i*}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

b.

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

In a nutshell, the proposal laid out in (110) proposes a 2×2 paradigm where WD's four inflections encode ±NONFINAL INSTANTIATION (capturing *cyclicity*) and ±IRREALIS. I have proposed that the robustly tense-prominent systems of other Yolŋu languages (conserved in, *e.g.*, Ritharrŋu-Wägilak) have been radically restructured under the influence of Western Arnhem languages which also exhibit cyclic tense and asymmetric negation phenomena. The bulk of the chapter has been devoted to showing that the IRREALIS inflections are licensed when there is a modal operator in their c-command domain (*i.e.*, an operator that indicates that its prejacent is not a settled fact of the evaluation world.)

As a result of these phenomena, the synchronic distribution of verbal inflections in WD seems to suggest that its paradigm expresses modal and reality status distinctions "more systematically" than it does temporal ones — Bhat's **mood-prominence** (1999:136). Bhat (1999:183) makes a number of generalisations which he takes to be "correlatable" with mood prominence, including the grammaticalisation of temporal remoteness[86] and the development of a future/nonfuture tense distinction:[87] features exhibited (to varying degrees) in WD.



- Djapu (E Dhuwal) could be like a midpoint bw Wag and the West.
- modal particles pick up the slack as mood/inflections do less of the lifting (matthewson's comparisons of salish and european)

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.

This chapter, then, has provided one of the first formal treatments of an apparent IRREALIS MOOD, joining previous accounts (*e.g.*, Krifka 2016,Matthewson 2010,[88] von Prince et al. 2019). It also represents the first formal treatment of mood in an Australian language. As we have seen, the distribution and licensing conditions of mood morphology in WD (as with the Vanuatuan languages described by those authors mentioned above) diverge sharply from the more familiar indicative-subjunctive distinctions of European languages; the locus of virtually all existing work on verbal mood.

[86] 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).

[87] While certainly WD has no obvious 1-to-1 FUT vs. NFUT contrast, we have seen how predications at ACTUAL indices are systematically inflected differently to POTENTIAL ones. Relatedly I has been shown to be broadly compatible with NONFUTURE reference.

[88] Though as stated above Matthewson (2010:13) argues that the relevant mood morphology in Sḵáẗimcets ought to be treated as a SUBJUNCTIVE (As distinct from REALIS.) *N.b.* also that Matthewson explicitly excludes "obligatory and redundant" occurences of the subjunctive from her analysis (26).

General conclusion

The four essays that constitute this dissertation have sought to provide new data, analysis and insights of how the conceptual domains of modality, temporality and negation interact. In particular, each represents an investigation of some dimension of irreality.

Part I showed how an Australian Kriol future-oriented temporal frame expression has developed APPREHENSIONAL meaning. From advancing the temporal reference of its prejacent (SUBSEQUENTIALITY-marking), *bambai* has come to encode possibility and negative speaker affect. Further, it is a discourse anaphor that appears to, by default, restrict its modal base to (a subset of) the negation of some foregoing proposition.

Relatedly, chapter **??** develops a "dynamic" account for the interpretation of *otherwise* on the basis of contemporary theories of **modal subordination** (Roberts 1989, 1995, 2020) and **information structure** (e.g. Roberts 2012). Building on existing treatments of *discourse anaphora* (Kruijff-Korbayová & Webber (2001); Webber et al. (2001)), we propose to treat a sentence of the form ***p otherwise q*** as asserting both p and *if not* p', $\Box q$. The second conjunct has the form of a conditional — i.e. q is *modally subordinate* to the negation of some proposition related to p, calculated from discourse context. Chapter **??**, then, constituted an exploration of a lexical item that encodes negative conditionality and requires a pragmatic/discourse structure-sensitive modal restriction (one of several available readings to *bambai*.)

Part II proposed a formal semantic treatment of the Negative Existential Cycle — a grammaticalisation cycle described in the typological literature where nominal negators develop into sentential negators. I showed that the generalisation of PRIVATIVE case morphology in a number of Australian languages instantiates this cycle. By analysing PRIV as a (negative) generalised quantifier, the NƎC can be conceived of as a stemming from the generalisation in the quantificational domain of this operator. A consequence of this unified treatment of PRIV and NEG is a modal semantics for sentential negation.

Finally, Part III comprised an account of verbal mood semantics in the Western Dhuwal(a) language, including a type of "asymmetric negation" where the ±IRREALIS mood distinction drawn on WD verbal predicates is neutralised in negative predications. By assuming the "branching time" framework familiar from work on intensional logic and appealing to other notions from the formal literature, a 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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