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Aspectuo-Temporal Underspecification in Anindilyakwa: Descriptive, Theoretical, Typological and Quantitative Issues

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Abstract: Many so-called 'zero tense'-marked (which we define as morphologically reduced and underspecified inflections) or untensed verb forms found in tenseless languages, have been characterized as context dependent for their temporal and aspectual interpretation, with the verb's aspectual content (either as event structure or viewpoint properties) being given more or less prominent roles in their temporal anchoring. In this paper, we focus on a morpho-phonologically reduced inflectional verbal paradigm in Anindilyakwa (Groote Eylandt archipelago, NT, Australia), which is both temporally and aspectually underspecified, and constitutes an instance of zero tense as defined above. On the basis of a quantitative study of an annotated corpus of zero-inflected utterances, we establish that in the absence of independent overt or covert temporal information, the temporal anchoring of this 'zero tense' exhibits complex patterns of sensitivity to event structural parameters. Notably we establish that while dynamicity/stativity and telicity/atelicity are to some extent valuable predictors for the temporal interpretation of zero tense in Anindilyakwa, only atomicity (i.e., event punctuality) and boundedness categorically impose a past temporal anchoring—this confirms insights found in previous works, both on Anindilyakwa and on other languages, while also differing from other generalisations contained in these works. Our analysis also shows that unlike several zero tenses identified in various languages (especially in Pidgins and Creoles), Anindilyakwa zero tense-marked dynamic utterances do not correlate with a past temporal reading. Rather, we show that Anindilyakwa seems to come closest to languages possessing zero tensed-verbs (or tenseless verbs) where boundedness monotonically enforces a past temporal anchoring, such as Navajo and Mandarin Chinese. We also show that aspect-independent temporal information appears to determine the temporal anchoring of all zero tense-marked unbounded atelic utterances (both stative and dynamic) in Anindilyakwa—a fact at once conflicting with some claims made in previous works on zero tenses, while confirming results from past studies of Indigenous languages of the Americas (especially Yucatec Maya), concerning the role of temporal anaphora in the temporal interpretation of 'tenseless' verb forms.

Keywords: zero tense; temporal underspecification; aspectual underspecification; aspect; event structure; (un)boundedness; Australian languages

1. Introduction

So-called 'zero tenses' have attracted considerable theoretical attention over the past two or three decades. We will focus here on a special instance of the inflectional verb paradigm in an under-described Indigenous Australian language, namely Anindilyakwa, which Bednall (2020) analyses as an indicative 'zero tense', both formally and semantically. Contrary to e.g. the formally non-reduced, and temporally non-underspecified indicative past tense inflection (realized as a *-nə* suffix in (1)), the Anindilyakwa zero tense has (a) a

phonologically reduced form (cf. the null suffixed TAM augment Ø in (2a/b)) and (b) a very 'lightweight' TAM content, as it is underspecified for both temporal and aspectual meaning, cf. (2a) (which has a past perfective reading) vs. (2b) (which has a present imperfective reading).

We assume Anindilyakwa TAM inflections to be discontinuous morphs, combining a prefixed and a suffixed position in the verb template. Zero tense differs from other indicative inflections only w.r.t. to its suffixed TAM augment—it is morphologically non-empty for other tenses (except for the past tense in one small verb class; see below). (1) is an instance of an indicative past inflected utterance whereas (2a) is in a zero tense-marked utterance with a past interpretation, and (2b) a zero tense utterance with a present interpretation; note the identical REAL prefixed augments in the glosses, and the distinct PST vs. Ø suffixed augments—see the end of the paper for a complete list of abbreviations used in our glosses.

(1) *kembirra*   *nəm-awiyebe-nə=ma*   *mamawura.*
     then   REAL.VEG-enter-PST=SType   VEG.sun
     'Then the sun set'
     (*Mərungkurra* Text, 28–9)

(2) a. *yarrungkwa*   *n-akən*   *nenəngkwarrba*   *nəm-akbərranga-Ø=ma*
         yesterday   3M-that   3M.man   REAL.3M>VEG-find-USP=SType
         mijiyelya
         VEG.beach
         'Yesterday he found the beach'
         (JL, JRB1-018-01, 00.05.31)
     b. *ngayuwa*   *ngu-məreya-Ø*   *anhəngu=wa*
         1.PRO   REAL.1-be.hungry-USP   NEUT.food=ALL
         'I'm hungry for food'
         (JL, 2016-07-15_01_JL, 00.15.27-00.15.32)

As the only other (phonologically minimal) Anindilyakwa verb form with a null suffixed TAM augment Ø is the so-called 'zero' irrealis inflection (IRR-*V*-*Ø*) (Bednall 2020, p. 315), we will refer to the former as a 'zero tense' in what follows—even though it is not morphologically 'null' in a strict sense, it is nevertheless morphologically reduced, and its aspectuo-temporal contribution is absolutely unsaturated and context dependent, and as such, it does behave similarly to known 'zero tenses'. The indicative zero tense and the irrealis zero tense differ w.r.t. to their respective prefixed TAM morphological slots, respectively glossed REAL and IRR (in effect, morphological portmanteaus combining pronominal and TAM information). Similar discontinuous TAM morphs are extremely common among non-Pama-Nyungan languages. Although it can be tempting to treat these prefixed vs. suffixed augments as independent morphemes, such an analysis encounters a number of descriptive difficulties which we cannot address here for want of space—such as, the very clear coexistence of these seemingly 'compositional' paradigms, with clearly non-compositional paradigms. See e.g., the negative present irrealis inflection, which is evidently realized as a discontinuous morph (cf. Bednall 2020, pp. 26–29 for further discussion). It should also be highlighted that some suffixed augments seem to be modal, not aspectuo-temporal (such as the or NEG.IRR or POT suffixes)—which suggests that in the Anindilyakwa verb template, it is not the case that a tense-aspect suffix morpheme compositionally combines with a prefixed modal morpheme. TAM information therefore appears to be encoded by a single discontinuous morph in Anindilyakwa, rather than by two separate morphemes.

Of course, the above definition of zero tenses begs the question of their relationship with so-called 'tenseless' verb forms, with languages possessing optional tense marking (cf. Navajo, Smith et al. 2007), with untensed verb forms in 'tenseless' languages (Tonhauser 2011; Bertinetto 2014), and in general, with what has been referred to as the absence of material exponence in verbal morphology (Stolz and Levkovych 2019). In the case of so-called optional tense marking, what of unmarked verb forms? Could they be in fact

instances of zero tense verb forms? (For instance, one could very much claim that tense marking is in fact *not* optional in Navajo, but that this language possesses a distinct 'bare' inflectional verbal paradigm—very much like we think Anindilyakwa does). Are untensed verb forms (as in tenseless languages) completely deprived of tense-aspect inflections, or are they only endowed with some phonologically null (or reduced) 'zero tense'? Such issues are obviously non-trivial; for instance, so-called 'superficially tenseless' languages have been argued to exist, cf. Matthewson (2006, pp. 673–74), where it is claimed that although St'át'imcets seems deprived of any tense inflection, it actually possesses a morphologically null, aspectuo-temporally underspecified 'zero tense'. See also Ritter and Wiltschko (2014), where a universal INFL category is posited even for tenseless languages. It should also be noted that the tenseless nature of certain languages is hotly debated; see, e.g., Alotaibi (2020) for arguments against tenseless approaches to some varieties of Arabic, and Chen and Husband (2018) for similar observations about Chinese.

Although settling such a wide-ranging set of questions falls outside the purview of the present paper, we must stress that at least some so-called 'tenseless' or optional tense marking languages seem to be endowed with zero tenses as defined above (Smith et al. 2007 account of Navajo utterances unmarked for tense looks suspiciously similar to that of a 'zero tense', including our account of the Anindilyakwa 'zero tense' to some extent). In effect, all of these tense forms at least semantically overlap in the sense that all zero tense verb forms, and many untensed verb forms (*qua* tenselessness), involve some aspectuo-temporal underspecification or lightness ('functional deficiency' in Nash 2017), i.e., their temporal interpretation and aspectual viewpoint interpretation is unsaturated and highly context-dependent.

Given such an underspecified aspectual viewpoint and temporal meaning (i.e. in the absence of independent temporal information, and of independent aspectual marking, as found in, e.g., Arabic, Hausa, or Yucatec Maya—see below), most accounts of these phenomena observe that the temporal interpretation of both 'zero tense' and tenseless utterances is influenced by event structural properties—interpretatively speaking, all these phenomena therefore seem to form a natural semantic class: the temporal underspecification of such verb forms is often made up for by exploiting aspectual information (be it lexical or contextual). Although a divergent type of analysis of the aspectual and temporal underspecification of zero tenses is defended in some references, cf., e.g., Winford (2000) and De Wit (2016), we will not discuss them here—for instance, De Wit (2016) ascribes a modal (epistemic) and aspectuo-temporal meaning (present perfective) to the Sranan zero tense). As such an analysis does not seem to apply to the Anindilyakwa zero tense, and raises a number of fundamental theorical questions we cannot address in the confines of this paper, we will simply set it aside here.

The idea that aspectual marking (when available) and/or contextual aspectual and temporal constraints can determine the temporal interpretations of temporally underspecified verb forms is a de facto common, and well-established hypothesis. The effect of aspectual marking (and the associated aspectual meaning) on temporal anchoring was early identified for a number of well-documented so-called tenseless (but not aspectless) languages, such as, e.g., classical Arabic—cf., e.g., Cohen (1989); see Yucatec Maya (Bohnemeyer 2009, p. 108) and Hausa (Mucha 2013, pp. 389–91) for more recent observations along the same lines. In these three languages, perfective markers ('completive' in Hausa) trigger past temporal anchoring. It is a well-known fact that viewpoint aspect can sometimes constrain temporal meaning, notably in the sense that perfective viewpoints reject a present anchoring; this is the so-called 'present perfective paradox' (Malchukov 2009; De Wit 2016). However, overt aspectual viewpoint marking (as found in Hausa or Yucatec Maya) does not seem available in many tenseless/zero-tense endowed languages. In this case, event structural (rather than overt viewpoint) parameters will become endowed with somewhat similar (albeit contextually determined) temporal anchoring functions (see De Wit 2016 for an extended typological discussion of this phenomenon). Of course, aspectual parameters are not the only factors capable of influencing the temporal interpretation of

zero tense-marked utterances. Bohnemeyer (2009) thus primarily puts the stress on what he calls *temporal anaphora* as a major driving force behind temporal interpretation of tenseless utterances in Yucatec Maya—in effect, the term designates the ability of languages to temporally anchor tenseless utterances using direct (via, e.g., temporal modifiers) or indirect (via the discourse context) temporal information; it hints at Bennett and Partee's (1978) analysis of the temporal anchoring function of tenses in relation to personal pronouns. This parameter will be carefully studied in our own analysis, as it can obviously interact with the temporal effects of aspectual meaning.

We therefore believe it is legitimate to hypothesize that tenselessness/optional tense marking and 'zero tenses' are largely similar phenomena whenever they jointly exhibit (a) an absent or reduced material exponence with (b) a context-dependent, unsaturated aspectual and temporal semantics—i.e., involve at once formal and semantic lightness, if you will; we will use 'zero-tense' as a cover term for these three classes of phenomena. In the remainder of this paper, we will thus argue that tenseless languages (e.g., Mandarin Chinese), exhibit 'zero-tense' utterances—with a hyphen, to contrast this novel, broader concept with the narrower concept of 'zero tense' used in previous works.

It should be stressed that cross-linguistically, not all morpho-phonologically reduced tense forms are unsaturated for temporal and aspectual content. It has been argued in Haspelmath (2021) that they can also associate with 'lighter' types of aspectuo-temporal meanings—e.g., present or relative tense meanings (but see Becker 2022 for a divergent view, and some possible caveats). However, we will restrict our definition of 'zero-tense' to cases of absent or reduced material exponence in verbal morphology, combined with both temporal and aspectual underspecification/context dependency—i.e., to a simultaneous reduced *formal* and (aspectuo-temporal) *semantic* load in verbal morphology.

The importance of zero-tense (as here defined) for a general theory of tense is crosslinguistically conspicuous. Mentions of 'zero tenses' and/or 'tenselessness', were early made in grammars of Maya languages (cf. Craig 1977; England 1983) as well as Creoles (Bickerton 1975, 1981; Tagliamonte and Poplack 1993) and Pidgins (Ofuani 1984). Besides Maya languages (Carolan 2015), several families of American Indigenous languages were noted for exhibiting tenselessness and/or zero tenses, as early as Baker and Travis's (1997) account of Mohawk modals. Of particular note are works on Salish (e.g., Matthewson 2006), Tupian (cf. Tonhauser 2006, 2011, 2015; Pancheva and Zubizarreta 2020), and Otomanguean languages (cf. Toosarvandani 2021), as well as comparative contributions on Southern American Indigenous languages (Bertinetto 2014). Outside of the Americas, tenselessness and/or zero tenses have also been identified in Inuit languages (e.g., West Greenlandic, cf. Shaer 2003; Bittner 2005, 2008), but also Chinese (cf. Lin 2003, 2010; Smith and Erbaugh 2005), Vietnamese (cf. Duffield 2007; Bui 2019), Korean and Japanese (cf. Lee and Tonhauser 2010), Austronesian languages (Samoan, cf. Bochnak 2016; Bochnak et al. 2019; Nakanai, cf. Bybee 1990, p. 90), African languages (Ngambai, cf. Bybee 1990; Hausa, cf. Mucha 2012, 2013), etc. Similar phenomena have also been investigated in various Creoles and Pidgins (cf., e.g., Singler 1990; Denny and Belgrave 2013; Yakpo 2019; Bybee 1990, p. 90)—with Sranan and its 'zero tense' standing out as having been most extensively studied in that respect (cf. Bickerton 1975, 1981; Winford 2000; Seuren 2001; De Wit and Brisard 2014; De Wit 2016).

As we have seen above, no clear crosslinguistic generalization seems to emerge from existing works as to what aspect parameters are most influential in determining the temporal interpretation of zero-tense, given an otherwise temporally empty context, and whether these temporal effects are rigid (monotonic), or defeasible (non-monotonic). So far, dynamicity (for, e.g., Sranan, cf. De Wit 2016, pp. 121–24 and Bickerton 1975, 1981[1]) and boundedness (for Navajo and Mandarin Chinese, cf. Smith and Erbaugh 2005; Smith 2006, 2008; Smith et al. 2007) are the most frequently invoked aspectual parameters for past anchoring effects on zero-tense, with stativity defeasibly associating with a present anchoring effect. Following Smith (2008, p. 230) and Smith and Erbaugh (2005, p. 715, pp. 719–20), we define boundedness as an event structural category interacting with aspectual viewpoint types in significant ways. Bounded events are temporally limited (due to aspectual modi-

fiers, overt perfective viewpoint marking, or contextual information—especially discourse structural context) and their runtime is strictly included within the reference time interval, while unbounded events are temporally non-limited, and are selected by imperfective viewpoints; the reference time interval must be included within their runtime—see, e.g., Mucha (2013, pp. 390–91). Grammatical aspectual viewpoints, aspectual adverbials and some temporal connectives can make boundedness/unboundedness formally traceable, as they are functions over event predicates with relevant selectional restrictions. However, in the absence of such markers, it can also be determined by contextual factors at the semantics/pragmatics interface—and in particular by discourse structural parameters, i.e., discourse relations in the sense of Asher and Lascarides (2003)—see Smith et al. (2007), Smith (2006, 2008) on the importance of the semantics/pragmatics interface for determining boundedness in context. (See below for more on this important theoretical issue).

Through a detailed corpus study of Anindilyakwa data, and through additional observations about two other Australian languages, we aim to enrich the crosslinguistic picture drawn above. Our key research question will be to investigate to what extent Anindilyakwa conforms or does not conform to the generalization that the aspectual interpretation of zero tense-marked utterances constrains to a large extent their temporal interpretation in the absence of other specifically temporal information, be it overt or covert (cf. Bohnemeyer's (2009) analysis if the role of temporal anaphora in the temporal interpretation of tenseless Yucatec Maya utterances), and what type of aspectual parameters can categorically vs. non-categorically (or monotonically vs. non-monotonically) contribute to the temporal interpretation of zero tense.

The present paper will be structured as follows. In the remainder of this introduction, Section 1.1 will provide the reader with a quick overview of the Anindilyakwa tense-aspect-modality inflectional system, while Section 1.2 will discuss existing works on zero tense and related phenomena, so as to refine our research question in their context. Section 2 will present our corpus methodology, i.e., how we constituted the main corpus and secondary corpora we used (Section 2.1), and how they were annotated for various aspectuality- or temporality-related parameters (Section 2.2); we will also expose some important theoretical assumptions underpinning our annotations w.r.t. the role of discourse structural parameters (Section 2.3), and the relation between boundedness and aspectual viewpoint (Section 2.4); Section 2.5 closes this methodological discussion with some observations about the quality of our annotation procedure. Section 3 will spell out the results of several quantitative measurements we effected on our annotated corpora to ascertain the role of certain parameters in determining the aspectual and temporal reading of a zero tense-marked utterance, with special attention being paid to telicity (Section 3.2), dynamicity/stativity (Section 3.3) and boundedness (Section 3.4) as the main aspectual contenders for constraining the temporal anchoring of the Anindilyakwa zero tense-marked utterances, and whether or not their temporal anchoring effects can be overridden by overt or covert specifically temporal information (through, e.g., temporal anaphora). Section 4 focuses on assessing the limits (Section 4.1) as well as the language specific (Section 4.2) and typological/comparative (Section 4.3) possible merits of the above results; we will see that Anindilyakwa behaves at once like and unlike several other languages exhibiting zero-tense phenomena. Anindilyakwa thus radically differs from, e.g., Sranan and Tuwuli (and many Creoles and Pidgins, it seems) in that it does not treat dynamicity as a major parameter determining the temporal interpretation of its zero tense, while it converges with, e.g., Mandarin Chinese and Navajo, in that boundedness is the most influential aspectual parameter for constraining the temporal anchoring of its zero tense-marked utterances. We will also show that Bednall's (2020) hypothesis that event atomicity (or punctuality, if you will) rigidly determines a past temporal anchoring for zero tense in this language is supported—a property which until Bednall's (2020) initial observations had gone unnoticed in the literature, and one that contradicts certain generalizations about zero tense (as in Malchukov 2009 or Bybee 1990, where is its more or less clearly implied that additional temporal information can override most, if not all aspect-inferred effects

of temporal anchoring on zero-tense). We will also briefly compare Anindilyakwa to two other Australian languages, and formulate some potentially fruitful novel hypotheses for a typology of zero tenses. Finally, we will conclude our investigations with Section 5.

1.1. The Anindilyakwa Language and Its TAM System

Anindilyakwa is a non-Pama-Nyungan language, spoken by over 1400 people living on the Groote Eylandt archipelago, in the Northern Territory, Australia (see Department of Infrastructure, Transport, Regional Development and Communications, Australian Institute of Aboriginal and Torres Strait Islander Studies & Australian National University (2020), and Figure 1). In the context of Australian Aboriginal languages, it is a fairly vibrant language, and one of the few that is still being acquired by children.

Figure 1. Anindilyakwa and surrounding Top End languages (Harvey 2017).

Like many languages of northern Australia, Anindilyakwa is richly polysynthetic and morphologically complex. Its inflectional TAM verbal paradigms are thus realized as discontinuous morphs, cf. Carroll (2016). Verbal inflections are circumfix-like morphs, combining two non-adjacent exponents—a portmanteau prefixed exponent bearing TAM and pronominal information, and a separate TAM suffixed exponent, Bednall (2020, p. 26). Out of twelve potential combinations of three distinct portmanteau prefixes (REALIS; IRREALIS; IMPERATIVE.HORTATIVE) with four TAM suffixes (NON-PAST; PAST; UNDERSPECIFIED (Ø); POTENTIAL), ten effectively constitute TAM inflectional circumfixes, as shown in Table 1 (for further information see Bednall (2020), chapters 6 and 9). Following Caudal et al. (2019), we are analyzing each combination of prefix and suffix exponents as a single discontinuous TAM morph, i.e., as instance of so-called 'distributed exponence' in the sense of Carroll (2016).

Note that while there are ten discontinuous TAM morphs (portmanteau prefixes + TAM suffixes) in the verbal inflectional TAM system of Anindilyakwa (as shown in Table 1), this paper focuses principally on the temporally and aspectually underspecified REAL-V-Ø paradigm (see Bednall (2020) chapters 6 and 9 for discussion of other TAM paradigms).

Table 1. Anindilyakwa TAM circumfixal inflectional paradigms (positive polarity).

Portmanteau Prefix	TAM Suffix
REALIS	NON-PAST
	PAST
	UNDERSPECIFIED (Ø)
IRREALIS	NON-PAST
	PAST
	UNDERSPECIFIED (Ø)
	POTENTIAL
IMPERATIVE/HORTATIVE	NON-PAST
	UNDERSPECIFIED (Ø)
	POTENTIAL

In spite of its many verbal inflectional paradigms, the language is not endowed with any synthetic aspectually specific tense (e.g., perfective vs. imperfective): in addition to a general indicative present inflection, it possesses two aspectually underspecified indicative inflections, namely an aspectually underspecified past tense paradigm (REAL-V-PAST, cf. (1)), plus a temporally *and* aspectually underspecified TAM paradigm, with a phonologically null suffix exponent (REAL-V-Ø, cf. (2)). However, Anindilyakwa does have grammatical inflections with aspectually specific meaning—but they are analytic, not synthetic inflections. For instance, it possesses at least a present and a past imperfective periphrastic tense (NPST=*wiya* or PST=*wiya*), consisting in the conventionalized combination of a NPST or PST inflection with an originally quantificational clitic (=*wiya*) (see the structurally similar Jaminjung progressive, Schultze-Berndt 2012).) While initially limited to subordinate clauses (3), these imperfective periphrastic tenses are currently undergoing 'insubordination' (cf. Evans and Watanabe 2016) (i.e., are increasingly found in matrix clauses), which demonstrates their already grammaticalised nature – note that according to Bednall (2020, p. 457), the Ø suffix in (3) associates with the indicative past tense inflection for a special conjugation class of verbs (class 4), and is merely homophonous with zero tense (i.e. zero tense and past tense paradigms are formally identical for this (small) verb class).

(3)　　*ning-alburre-na=wiya*　　　　　　　　　*ni-yama-Ø*
　　　　REAL.1>NEUT-split-NPST=QUANT　　　REAL.3M-say-PST
　　　　'"I'm splitting it" he said' [i.e., I'm in the middle of splitting it]
　　　　(Yingarna-lhangwa, A3369a Side2 a3.11) (Bednall 2020, p. 276)

Moreover, verbs marked with synthetic inflections (both the indicative past and the zero inflection) can denote in-progress as well as habitual readings, which strongly suggests these tenses can have a general imperfective viewpoint meaning, with all the standard contextual variability found with so-called 'general imperfectives' (as defined in Bybee et al. 1994, p. 140); for more on the imperfective readings of the indicative past inflection, see, e.g., Bednall (2020, p. 178). Perfective meanings are also obviously attached to the Anindilyakwa tense system, as it is capable of inchoative readings of stative utterances marked with either the past (PST) or zero inflection. These two facts militate in favour of assuming that these two tenses can have both imperfective and perfective viewpoint readings, and are aspectually underspecified rather than deprived of any viewpoint function—very much as, i.e., in the case of certain Germanic past tenses; see, e.g., Caudal and Schaden (2005) for a formal, underspecified analysis of the Alemannic Perfekt along similar lines. Note that in sharp contrast with such tenses, e.g., Romance futures do not seem to semantically incorporate viewpoint functions bearing on the verb stem they mark, as they bar in-progress or inchoative readings, unless overt aspectual markers are added to that effect (e.g., the *être*

en train de 'be in the process of' progressive periphrasis in French). We conclude from this contrast that Romance futures are deprived of viewpoint functions in their denotations (or at least of viewpoint functions scoping directly over the denotation of the verb stem), while the denotation of the Anindilyakwa zero tense or indicative past must incorporate some semantically unsaturated, context-dependent viewpoint function.

Therefore, we will hypothesize that determining the viewpoint interpretation of the Anindilyakwa zero inflection—but also of its past inflection—is a contextual matter: depending on the presence of aspectuo-temporal VP modifiers, causo-temporal clitics, and in general discourse structural parameters (i.e., SDRT discourse relations, Asher and Lascarides 2003), a perfective, an imperfective, or a resultative (i.e., perfect-like) viewpoint reading will be ascribed to those aspectually underspecified tenses. We will come back to this central issue in the discussion of our annotation scheme below.

1.2. A Quick Overiew of Existing Analyses, and Some More Details on Our Research Question

The starting point for the present study is Bednall's (2020) account of the zero inflection. According to this account, the temporal anchoring of REAL-V-Ø utterances is largely determined by the event structural properties (Aktionsart) of the utterance: stative utterances seem to favor a present anchoring, utterances denoting atomic telic events (cf. Dowty 1986; i.e., achievements) impose a past interpretation, those denoting either atelic dynamic events (i.e., activities and unbounded changes-of-state events) or non-atomic telic events (i.e., accomplishments) are capable of both past and present readings, as shown in Table 2.

Table 2. Temporal properties of aspectual types of REAL-V-Ø utterances in Bednall (2020, p. 219).

Temporal Anchoring	States	Activites + Accomplishments	Achievements
Past	×	√	√
Present	√	√	×

This leads to the following principles that Bednall (2020, p. 222) posits (based on similar principles of Smith and Erbaugh (2005), Smith (2006, 2008), Smith et al. (2007), Mucha (2013)), where atomic events (in the sense of Dowty (1986), and Caudal (1999)) correspond to non-scalar/non-incremental telic events (i.e., more or less to achievements, see Caudal and Nicolas (2005)).

1. The Deictic Principle: Runtimes of events are located with respect to Speech Time, Smith et al. (2007, p. 44), Smith (2008, p. 231)
2. The Simplicity Principle of Interpretation: Choose the interpretation that requires the least information added or implied, Smith et al. (2007, p. 60);
3. The Event Structure Properties Principle:[2] Interpret zero-marked sentences according to the aspectual properties (i.e., event structure properties) of the event denoted by the sentence (Smith et al. 2007, p. 61). a. Stativity Constraint: stative events are not located in the past. b. Atomic Constraint: atomic (i.e., punctual) events are not located in the present. c. Atelic dynamic events, and non-atomic telic events can freely anchor in the past or the present (Bednall 2020, pp. 221–22).
4. The Bounded Event Constraint (or 'Deictic Principle of Temporal Interpretation', Smith 2006):[3] bounded events cannot anchor to the present (and conversely, presently anchored events must be unbounded; Smith 2008, p. 230)—this constraint is partially equivalent to the so-called *perfective present paradox*, given that perfective viewpoints select for bounded events and they too, cannot anchor to the present, by and large; see De Wit (2016).

Note that although it is mentioned in Bednall (2020, p. 221), the Bounded Event Constraint does not feature in Bednall's (2020) account of the Anindilyakwa zero tense. And even more importantly, and in contrast to our rendering of Bednall's (2020) proposal,

it must be stressed that Smith (2006, p. 97) added an important proviso to her different versions of the Event Structure Properties (principle 3): it should hold "unless there is explicit or contextual information to the contrary". In other words, it is a *defeasible* type of temporal anchoring inference for zero tenses. And logically enough, in Smith's numerous contributions, stative utterances are only located in the present *by default* (in contrast with Bednall's (2020) Stativity Constraint), cf. Smith and Erbaugh (2005, pp. 715–16) (see also De Wit 2016 for related observations in Sranan)— nothing is said of Bednall's (2020) 'Atomic Constraint'. Bybee (1990, pp. 12–13) and Malchukov (2009, p. 19) even make the stronger claim that all event structure properties only provide 'default' temporal anchoring for zero(-)tense-marked/tenseless utterances. The latter works seem to advocate a completely non-monotonic approach to the calculus of temporal anchoring for zero tenses, as according to them, overt or covert temporal information can override whatever temporal anchoring is suggested by the event structure properties of an utterance. Such a view conflicts with, e.g., Bednall's and Bickerton's/De Wit's analyses where monotonic/categorical (stativity and atomicity for Bednall, dynamicity for Bickerton/De Wit[4]) vs. non-monotonic (or at least non-categorical) temporal effects of event structure are contrasted. It also possibly conflicts with Smith's various accounts, where the Bounded Event Constraint seems monotonic/categorical, while her version of the Event Structure Properties Principle is not—it is therefore unclear what her exact stance on the matter is.

Judging from the above discussion, there are both general theoretical disagreements in the domain at stake—the monotonic vs. non-monotonic effects of some aspectual parameters is disputed—and some divergences stemming from typological diversity—it seems that not all event structure parameters are cross-linguistically equal for triggering a present vs. a past temporal anchoring for zero-tense, in the absence of overt or covert temporal information. By and large, in most languages exhibiting zero tense or zero-tense-marked utterances, the following aspectual parameters seem to (at least potentially) have temporal effects on zero tenses:

(a) the stativity vs. dynamicity parameter, with dynamic utterances (categorically) anchoring in the past, and stative utterances anchoring (by default) in the present; this is particularly clear in Sranan (Bickerton 1975, 1981); see De Wit (2016, pp. 43–44, 115–39), for a detailed study, but see also Bybee's (1990) typological account

(b) the atelicity vs. telicity parameter, with telic utterances anchoring in the past, and atelic utterances in the present, see in particular Smith and Erbaugh (2005, pp. 733–34) for the effect of telicity on zero-marked verbs in Mandarin Chinese; the role of atomicity vs. non-atomicity identified for Anindilyakwa in Bednall (2020) can be seen as deviating from (and contradicting) this earlier proposal, with utterances denoting atomic telic events (i.e., achievements) being rigidly past, vs. utterances describing non-atomic events (i.e., accomplishments) being either past or present

(c) the boundedness vs. unboundedness parameter, with bounded utterances monotonically anchoring in the past (cf. Smith and Erbaugh 2005; Smith 2006; Smith et al. 2007), and unbounded utterances anchoring by default in the present; note that while it might seem that (un)boundedness and (im)perfectivity are equivalent concepts, they should nevertheless not be equated, as (i) they resort to two distinct kinds of aspectual information (event structure vs. viewpoint aspect), and (ii) we assume that viewpoint in Anindilyakwa is a three-valued, ternary parameter (perfective, imperfective, resultative) whereas boundedness is a binary parameter (bounded, unbounded).

If Bednall's (2020) analysis is correct, then Anindilyakwa behaves neither like Mandarin Chinese or Navajo w.r.t. to its Event Structure Properties Principle: it can have presently anchored (non-atomic) telic zero tense-marked utterances, and cannot anchor stative zero tense utterances in the past. Bednall's (2020) Stativity Constraints is also at odds with, e.g., De Wit's (2016, pp. 43–44) and Bybee's (1990, pp. 12–13) claim that zero(-)tense-marked stative utterances in other languages are capable of both present and past anchoring, although their default anchoring (i.e., given a temporally empty context) is present.

To illustrate Bednall's (2020) Stativity Constraint, consider (4). According to Bednall (2020, p. 119), (4a) is the only possible interpretation—the past rendering (4b) is not possible. However, given the extreme rarity of stative verb roots in Anindilyakwa, and the natural tendency for the *be hungry* root to anchor to the present in a conversational context (arguably the default context in (4)), one might suspect that reading (4b) is merely *extremely unlikely*, not *impossible*, and that the Stativity Constraint is unfounded; this certainly calls for further examination of the matter at hand (especially given that speakers consistently reject past temporal interpretations of such examples in elicitation contexts).

(4)　　*ngayuwa*　　　　　*ngu-məreya-Ø*　　　　　*anhəngu=wa*
　　　 1.PRO　　　　　　REAL.1-be.hungry-USP　　NEUT.food=ALL
　　　 a. 'I'm hungry for food'
　　　 b. *I was hungry for food
　　　 (JL, 2016-07-15_01_JL, 00.15.27-00.15.32)

More generally, given apparent typological variations w.r.t. aspectual parameters potentially influencing the temporal anchoring of zero tense utterances (i.e., dynamicity for De Wit (2016), Bybee (1990), vs. boundedness for Smith and Erbaugh (2005), Smith (2006, 2008), Smith et al. (2007), vs. stativity and atomicity for Bednall (2020)), and given also existing divergences concerning the possibility of these effects to be monotonic or non (i.e., can their temporal effects be overridden by overt or covert/contextual temporal information?), it seems highly desirable to conduct a detailed corpus investigation of zero tense-marking as a test-bench for these multiple hypotheses. Opting for Anindilyakwa as our testing language made a lot of sense, due to the apparently peculiar profile of its zero tense. In most of the remainder of the paper, we expose a corpus study we conducted in order to investigate various parameters possibly underlying the application of the Event Structure Properties Principle and Bounded Event Principle to the Anindilyakwa zero tense, while striving to determine to what extent temporal anaphora and temporal modification can (or cannot) override the temporal effects of these aspectual parameters (i.e., whether or not said effects are monotonic or non-monotonic).

2. Materials and Methods

The present quantitative investigation was conducted on a sub-set of a corpus of roughly 100,000 words (well over 10,000 utterances, in the context of a polysynthetic language), comprising 55 hours of elicitation material. The sub-set used for this study is roughly one quarter of the total corpus: roughly 25,000 words. The three main types of material making up our corpus specifically involve the following types of data:

- Elicited utterances (particularly useful for getting at temporally empty contexts), either through traditional questionnaires (especially as translation tasks), meta-linguistic elicitation material (e.g., morphological flash cards), or experimental elicitation based on the *Event Description Elicitation Database* (EDED, cf. Mailhammer and Caudal 2019); see below, and Caudal & Mailhammer (this volume) for further details);
- Oral narratives recorded in 2016–2019, as well as a collation of legacy narrative recordings (1970s–90s);
- A (partial) translation of the Bible (Bible Society in Australia 1992): *Neningikarrawara-angwa Ayakwa*.

A precise break-down of our corpus according to the above data types is given in Table 3.

Table 3. Break-down of our corpus according to data type (genre).

Data Type	Audio Duration	Word Count	Percentage
Elicited data (translation tasks; stimuli-prompts)	15 h 16 min 25 s	19,906	81.60%
Spoken narratives	01 h 04 min 46 s	3789	15.53%
Translated text (Bible)	-	699	2.87%
TOTAL	16 h 21 min 11 s	24,394	

2.1. Constitution of Our Three Sub-Corpora

After extracting all indicative uses of the zero inflection from a collection of various sources, we proceeded to annotate the resulting corpus so as to identify the role possibly played by various aspectual parameters in determining the temporal interpretation of zero tense utterances. We also randomly extracted and annotated a number of overt past and non-past (i.e., present) marked verbs from the same collection of sources, to contrast the aspectual profile of the zero tense with two other aspectually (but not temporally) underspecified tenses. By and large, the idea behind this move is that event structure parameters help determining the viewpoint interpretation of all three aspectually underspecified tenses. As we will show below, the three Anindilyakwa indicative tenses tend to associate with different types of event structural profiles (i.e., they predominantly combine with different types of event structure parameters)—and this, we will see, is notably related to their different temporal meanings (past for past tense, present for present tense, and temporally underspecified for the zero tense). Our three annotated sub-corpora (in the zero tense, the past tense and the non-past (=present) tense) and quantitative measurements (plus some figures) are available in Supplementary Materials at the following address: https://cloud.llf-paris.fr/nextcloud/s/yHNeLig7Bnf42by (accessed on 10 December 2022). The main, zero tense-marked sub-corpus comprises exactly 214 occurrences of zero-inflected verbs; the two other sub-corpora, respectively comprise 101 occurrences of past-marked verbs, and 22 occurrences of non-past-marked (=present-marked) verbs.

Despite the highly polysynthetic nature of the Anindilyakwa verb, and therefore despite its so-called holophrastic nature in the sense of Fortescue (2016) (i.e., a single Anindilyakwa verb can very well correspond to a full clause in English), each datapoint in the annotated sub-corpora corresponds to a syntactic clause—mostly simple matrix clauses (often comprising some NPs, adverbials, clitics, particles and connectives), but some complement and adjunct clauses (especially temporal and causal subordinates) also form some of our individual datapoints.

2.2. On Temporal and Aspectual Information Incorporated in Our Annotation Scheme

The most obvious feature of our annotation scheme is temporal: it must cover various sources of temporal information at stake. Each datapoint—in effect, each (inflected) verb in our corpus—is annotated for its temporal interpretation, either present or past, and for the source of said interpretation. For elicited material, it originates in speakers' judgements (metalinguistic, and/or via the translations they offered), or contextual cues (overt temporal prompts were sometimes used in experiments or translation tasks); for narratives (e.g., the Bible), this interpretation can be identified through translations. For all material, temporal marking can be also linguistically traceable, either as overt marking (for instance through temporal adverbials, cf., e.g., *yarrungkwa* 'yesterday') or from the verb's linguistic context (for instance when a zero tense-marked verb appears within a complex clause or is coordinated with a past or present tense-marked verb). The latter configuration corresponds to what Bohnemeyer (2009) dubbed 'temporal anaphora' (i.e., how referential chains in discourse can propagate temporal information to otherwise temporally unspecified utterances). Overall, 46% of our datapoints (both in narrative texts and elicited material) presented clear temporal marking, either directly or in some connected discourse segment; most remaining datapoints (all from elicited material) were also clearly either past or present due to documented elicitation contexts.

Given the divergences noted above among existing works with respect to aspectual parameters capable of influencing the temporal anchoring of a zero tense-marked utterance across languages, it made perfect sense to adopt a very broad aspectual annotation scheme for Anindilyakwa. Our annotation scheme covers all the event structure parameters listed above as potential candidates: stativity, dynamicity, telicity and atomicity, plus (un)boundedness. For the sake of being thorough, and in case some novel generalization(s) could possibly emerge, we also annotated our corpus for a number of additional event structure parameters, including, e.g., scalarity cf., e.g., Kennedy and McNally (2005),

Kennedy (2012), Beavers (2013) (this makes perfect sense as atomicity vs. non-atomicity is essentially a matter of event scalarity) semelfactivity, pluractionality/iterativity and habituality, and even tried to distinguish various subtypes of boundedness combining, e.g., pluractionality with non-pluractionality, contextual boundedness vs. overt boundedness—see Appendix A. As it turned out that none of these extra parameters or sub-parameters had special effects on the temporal anchoring of zero tense (except in so far they can determine our key aspectual parameters, especially atomicity, telicity or stativity: we notably treated habitual utterances as being stative, and unbounded iterative utterances as atelic dynamic utterances, for which atomicity is an irrelevant feature; we also treated inchoative readings of atelic roots as denoting atomic telic events), we will simply leave them aside in the rest of the paper, and focus instead on the already identified potential culprits: stativity, dynamicity, telicity, atomicity and boundedness.

We also annotated our datapoints for viewpoint interpretation, and discourse parameters influencing it (mostly, discourse relations à la Asher and Lascarides 2003); as indicated above, we assume that the Anindilyakwa zero tense can take three distinct aspectual viewpoint readings, depending on contexts—namely perfective, imperfective, and resultative viewpoint meanings (so that again, viewpoint should not be equated with boundedness). The existence of resultative, perfect-like viewpoint readings of that tense is demonstrated by its ability to combine with aspectual adverbials (and interactional contexts) requiring a resultative, 'perfect-state' type of reading in the sense of Nishiyama and Koenig (2010), cf. *arakb(a)*, which means 'now, already' in (5). We have argued above that inchoative readings triggered by the zero tense suggests it can contribute a perfective viewpoint function, whereas in-progress readings of that same tense suggest it can denote an imperfective viewpoint function. The latter type of reading is particularly clear with, e.g., temporal subordinating markers meaning 'as, when' (cf. clitic =*manja*) in (6).

(5) *dhukwa* *arakb* *ni-yedha-Ø-m=dha*
maybe COMPL.ACT REAL.3M-arrive-USP=SType=TRM
'Maybe he [has] already arrived'
(JL, JRB1-042-01, 00:11:26-00:11:42)

(6) *nginu-maka-Ø=ma* *neniyarringka* *nungw-arrka*
REAL.3M>1-tell-PST=SType 3M.respected.old.man 3M.father-KIN.1
yirr-ambilyu=manja *Yingakumanje=ka* *ena*
REAL.1A-stay.PST=LOC place.name=EMPH NEUT.this
alhawudhawarra
NEUT.story
'My old father told me this story when we were staying at Yingakumanja'
(Dingarna-langwa akwa wurruwarda-langwa A3369a Side1 a3.5)

We also annotated our corpus for various aspectual features stemming from the interaction between viewpoint aspect and event structure aspect—such as aspectual coercion, as in cases of iterative/habitual readings of telic verbs, or inceptive/inchoative readings of stative verbs, as in (7). See De Swart (1998) for a general, foundational discussion, and Caudal & Mailhammer (this volume) for a case study of related phenomena in another Australian language. The existence of such coercion effects is an additional argument for ascribing the Anindilyakwa zero tense an underspecified viewpoint meaning, rather than no viewpoint meaning at all, as is, e.g., the case in (7), where aspectual particle *arakba* enforces a bounded reading of the event, and an inchoative reading of the stative verb 'be stuck'—which requires a perfective viewpoint reading of the zero tense inflection. It marks a temporal succession after a completed event in this non-resultative, sequence-of-events context, and seems to be a polysemous particle, of the 'now-already' vs. 'then' type, common across Australian languages; cf., e.g., Ritz and Schultze-Berndt (2015).

(7) *arakba*   *wurri-rn-dhərnd-arrngwa*   *iya*   *wurr-akəna*
    COMPL.ACT   3A.REDUP(?)-mother-3A.KIN   and   3A-that
    wurru-ngwu-ngw-arrngwa   *na-wurrak-aburiya-Ø*
    3A.REDUP(?)-father-3A.KIN   REAL.3A-many-be.stuck-USP
    arakba   *arrawu=wa*
    COMPL.ACT   underneath=ALL
    'their mothers and fathers were stuck [=became stuck] in the ground'
    (JL, A3369b Side1, a4.2 Jigagwa-langwa-langwa daburradikba
    akwulyangburarrka 'Her daughter's dream')

Note that whenever this was contextually clear, unbounded single events as well as unbounded iterated and habitual events were differentiated from bounded readings of single-event activities or states, or bounded pluractional and in general iterated events (with, e.g., semelfactive verbs, cf. English 'knock') on the basis of, e.g. sequence-of-events contexts; see (8) where an atelic ball-rolling event is effectively interpreted as bounded, as the ball hits a wall before coming to a stop.

(8) *y-aka*   *yirrburrbula*   *n-angkarra-Ø*   *m-əkəna*
    MASC-this   MASC.ball   REAL.MASC-roll-USP   VEG-that
    [nu?]ma-jama-Ø   *akəna*   *wall=a*   *akwa*
    REAL.VEG-do-PST   NEUT.that   NEUT.wall= PF   and
    [nə?]-nguwanjə-n=dha
    REAL.NEUT(?)-stop-PST=TRM
    'The ball rolled, hit the wall and stopped'
    (ST, JRB1-034-01, 00.16.53-00.17.00)

We will here consider that unbounded event structures (including some accomplishments in our zero tense sub-corpus) are selected for by imperfective viewpoint functions, whereas bounded event structures (including atelic ones, sometimes; see, e.g., (8)) are selected for by perfective or resultative viewpoint functions (this will be justified below), as well as dedicated clitics, particles or connectives (see below the discussion of rhetorical relations). (Un)boundedness (and therefore, viewpoint to a large extent) is often enforced by so-called case clitics in Anindilyakwa, especially those marking temporal subordination—cf., e.g., the *manji=kba =dha* clitic complex in (9), where the 'denizen' case marker *=kba* enforces temporal posteriority, determining a perfective or resultative viewpoint reading, and from there a bounded event reading. *Vice versa*, case marker *=manja* routinely marks 'when' temporal subordinates (Bednall 2020, pp. 263–270), and often triggers an imperfective viewpoint interpretation of the inflection, and an unbounded event reading of the verb (cf. (8) above). *BD MAX* notes in our corpus bounded events arising from a special prosodic lengthening of the final syllable of the VP or verb, associated with a (marked) temporal duration (plus an event temporal ordering), possibly combined with clitic *=wa* (see Caudal & Mailhammer (this volume)), and noted with three semi-colons (:::) in our Anindilyakwa data. This signals an (extended) bounded durative reading of a clause (P1), and its temporal anteriority to the following clause (P2), cf. (10)—i.e., it means something like 'for a long time/for a while P1, then P2'; see Bednall (2020, pp. 242-247) and Caudal & Mailhammer (this volume). In this example, the *bi:::ya* discourse connective/conjunction, especially with the 'for a long time' intonation (:::), enforces a sequence-of-events discourse structure (a *Narration* discourse relation, in the sense of Asher and Lascarides 2003). Following Caudal (2012), we claim that discourse relations can determine aspectual viewpoint information via specific aspectuo-temporal axioms, or because of their inference rules. In short, *bi:::ya* imposes a perfective viewpoint reading of the zero tense marking because it imposes the *Narration* discourse relation, so that a perfective viewpoint, and bounded, inchoative reading of the zero tense-marked 'be cooked' verb must hold; *bi:::ya nu-walyuwu-Ø-manji=kba=dha* can be paraphrased as 'then after some time it became really cooked'—see the following section for more on this important issue.

(9)　　*bi:::ya*　　　　　　　　　*nu-walyuwu-Ø=manji=kba=dha,*　　　　　　*y-akina*
　　　and.then.XTD　　　　REAL.3M-be.cooked-USP=LOC=DENIZ=TRM　　MASC-that
　　　yimarndakuwaba　　　　　　　　　*y-inumalye=ka=dangba*
　　　MASC.blue.tonged.lizard　　　　　MASC-good?=EMPH=EMPH
　　　'When at last that blue-tongued lizard was cooked to perfection, it was the fattiest, juiciest
　　　blue-tongued lizard that ever was' (Kwurrirda Kwurrirda-langwa, A3369a Side1 a3.3)

(10)　*yingi-rukwulyaka-Ø*　　　　　　　　　*ying-angkarru:::-Ø=wa,*
　　　REAL.3F-go.around-PST　　　　　　REAL.3F-fly.XTD-USP =PL
　　　ying-arjiyi-nga　　　*akuwabijina*　　　　　　　　　*awurukwa*
　　　REAL.3F-stand-CofS-Ø　beside　　　　　　　　　　NEUT.billabong
　　　'She flew down and circled round and round (until) she stood at the edge of the
　　　billabong' (GL, A3369a Side1, a3.7 Nimimba-langwa akwa nenikuwenikba-langwa
　　　'The blind man')

2.3. Some Theoretical Reflections about the Role of Discourse Structure in Our Annotation and Analysis

An important result garnered in the 1990′s and 2000′s through works about the interplay between aspectuo-temporal meanings and discourse structure, notably through DRT (Kamp and Reyle 1993; Molendijk and de Swart 1999)) or SDRT based-analyses (Asher 1993; Lascarides and Asher 1993a, 1993b; Lascarides and Oberlander (1993), De Mulder and Vetters (1999), a.o., see Caudal 2012 for an extended discussion) was the key role played by discourse structural parameters *qua* discourse relations, in the sense of the SDRT framework (Asher and Lascarides 2003): these constrain aspectual types of tenses (or their aspectual interpretation, when they are aspectually polyfunctional or underspecified), and *vice versa*. The interaction of discourse connectives and clitics/particles with both discourse relations and aspectuo-temporal meaning in context was established more recently (cf., e.g., Bras et al. 2001)—but it is central to understanding Anindilyakwa, which, like many Australian languages, makes abundant use of such markers to specify causo-temporal ordering of events in discourse (cf., e.g., Ritz and Schultze-Berndt 2015), and discourse structure in general.

In a sense, discourse structural approaches to the interpretation of tenses in context started as an attempt at capturing the gist of a well-known typological generalization about the 'backgrounding' function of imperfective tenses, vs. 'foregrounding' function of perfective tenses, as found in, e.g., Hopper (1979) – but our current understanding of the interplay between discourse relations and aspect now extends well beyond this.

We will here follow Caudal's (2012, 2023) proposal that tenses should be treated as functions over sets of discourse relations, since tenses constrain (through their viewpoint meaning) the types of discourse relations they are compatible with—and reciprocally. Indeed, aspectual viewpoint conditions must appear in inference rules for discourse relations, and in axiomatic consequences of established discourse relations (discourse relations require certain aspectual viewpoint conditions). To give an example justifying such a hypothesis, consider how aspectual viewpoint meaning differences correlate with striking discourse structural differences in the case of the French *passé simple* vs. *passé composé*. The French *passé simple* seems to be restricted to narrative discourse relations such as *Narration*, *Result* (these relations require perfective viewpoint tenses to be established), *Occasion* or *Elaboration*, while disallowing reverse causal discourse relations such as *Explanation* (or even *Background*_{Forward}) (these relations require resultative viewpoint tenses given a strict temporal ordering between events) cf. (11a) vs. (12a). A discourse segment in the *passé composé*, on the other hand, can also be introduced through *Explanation* (though not *Background*_{Forward}), as it can convey a resultative viewpoint meaning, cf. (11b) vs. (12b) (see, e.g., Molendijk and de Swart 1999, Caudal 2012 for similar empirical observations).

(11) a. Mon fils arriva en retard à l'école. L'instituteur le gronda. (*Narration/Result*)
My son come-PS.3sg in late at the.school. The teacher PRO.3sg scold-PS.3sg
  b. Mon fils est arrivé en retard à l'école. L'instituteur l'a grondé (*Narration/Result*)
My son be.PR.3sg come-PP in late at the.school. The teacher PRO.3sg-have.PR.3sg scold-PP
'My son was late at school$_{Cause}$. The teacher scolded him$_{Effect}$.'

(12) a. L'instituteur gronda mon fils. #Il arriva en retard à l'école. (*#Explanation*)
The teacher scold-PS3sg my son. He arrive-PS.3sg in late at the.school
  b. L'instituteur a grondé mon fils. ^{OK}Il est arrivé en retard à l'école. (*Explanation*)
The teacher have.PR.3sg scold-PP my son. He be.PR.3sg arrive-PP in late at the.school
'The teacher has scolded my son$_{Effect}$. He has been late at school$_{Cause}$.'

We believe equivalent associations between viewpoint meaning and discourse relations can be identified even for the Anindilyakwa zero tense. For instance (5) seems to illustrate an argumentative variant of the *Explanation* relation determined by world-knowledge and compatible with the French *passé composé* in (12b)—let us call it *Argu.Explanation*—as opposed to (7), where a discourse segment is introduced by a *Narration* discourse relation, as the second clause is in (11a/b). Although (12b) construes a (conversational) narrative discourse sequence while (5) performs an argumentative epistemic speculation (a tentative explanation) answering some overt or covert dialogical move (a question), both *Explanation* in (12b) and *Argu.Explanation* in (5) require a resultative viewpoint reading of the novel segment they introduce. This is evidenced by the impossibility of using the French *passé simple* with such a reading in (12a), and the 'already, now', interpretation of *arakba* in (5), contrasting with its 'then/afterwards' reading with the *Narration* in (7)). And just like *Narration* in (11) seamlessly associates with the perfective viewpoint meaning of the *passé simple* and *passé composé*, this discourse relation triggers a perfective reading of the zero tense in (7).

The strong connection between viewpoint aspect and rhetorical relations demonstrated by the (12a/12b) contrast, or the (5)/(7) contrast, is modelled in Caudal (2012) by incorporating viewpoint restrictions in semantic axioms attached to particular discourse relations, and/or as preconditions for establishing them. For instance, *Narration*(α,β) will require the newly introduced segment β to associate with a perfective viewpoint reading, and to be temporally and causally subsequent to its attachment segment α. It cannot be the case that e$_\alpha$ overlaps with e$_\beta$,[5] and this holds true of all sequence-of-event inducing rhetorical relations (namely *Narration, Result* and *Occasion*). This set of discourse relations was marked *Narr* in our annotated zero tense corpus. In contrast, a distinct temporal ordering holds for *Background*$_{Forward}$ (α,β) and *Background*$_{Backward}$ (α,β)—e$_\alpha$ must then overlap with e$_\beta$. (see Asher et al. (2007), Caudal (2012) for details on why this is the case).[6] With *Background*$_{Backward}$ (α,β) the newest, latest segment β is foregrounded, and must be perfectively interpreted—in other words, the background discourse segment α is introduced prior to the foreground discourse segment β. The opposite holds true with *Background*$_{Forward}$ (α,β): the backgrounded segment β is novel, and introduced after the foregrounded, perfective viewpoint bearing segment α. In our annotated corpus, we respectively noted these two discourse relations *BackFore* (with the novel discourse segment being foregrounded) and *Backgr* (with the novel discourse segment being backgrounded).

The use of such aspectual viewpoint conditions attached to semantic axioms or inference rules of rhetorical relations was central to our annotation procedure in cases where linguistic markers did not constrain the viewpoint interpretation of zero tense. Whenever causo-temporal ordering between events as well as discourse relations could be reasonably inferred from discourse structural markers and/or common-sense reasoning, we were able to identify the viewpoint reading involved, and from there whether the event at stake was bounded or unbounded—alongside with some (rare) aspectual coercion effects.[7]

Three types of discourse relations stand out as being the most common in our zero tense sub-corpus: the three 'sequence-of-event' discourse relations *Narration, Occasion* and *Result* (*Narr* in our annotation), where the novel segment receives a perfective reading, and the attachment segment can vary, aspectually, *Background*$_{Backward}$, where the (novel) attached

segment has a perfective viewpoint reading (unless it is a topic-denoting expression, like a framing adverbial) and the attachment segment generally has an imperfective viewpoint reading, and *Background*$_{Forward}$, where the opposite holds true (the attached segment has an imperfective viewpoint reading). In addition to the above, some rare non-narrative instances of argumentative discourse relations were also identified in our zero tense corpus; they helped us identify data points where the zero inflection seemed to receive a resultative, perfect-like viewpoint reading; as indicated above, we noted such relations *Argu*.

To illustrate how we were able to tease apart those various parameters and their interactions without running serious risks of circularity, consider example (13). Given the translation proposed, the presence of connective *akena* and our world knowledge about hunting, there is no doubt that the running away event interrupts (and contrasts with) the hunting event. So that the second segment must be attached to the first via a combination of *Contrast* and *Background*$_{backward}$ (*BackFore* in our annotation),[8] with the novel segment being foregrounded and perfectively viewed. In other words, the running event marks a perfective discrepancy upon the imperfective backgrounded hunting event (its imperfectivity is reflected by its English translation), and is temporally posterior to the onset of the hunting event. As *n-angkarra-Ø* must be perfectively interpreted given such a discourse structure, the (normally) atelic running event predicate fed to the perfective viewpoint contribution of zero tense (in this context) must be coerced into a change-of-state, 'start to run away / run off / run away' predicate in this context—hence, it should be annotated as a case of inchoative reading of an activity predicate (*inchoative activity/ATM INCH*).

(13)   *nu-ngurrkwa-rnə=ma*   *yiburadhu=wa*
       REAL.3M>MASC-hunt-PST=SType   MASC.wallaby=ALL
       akena   *n-angkarra-Ø*
       but   REAL.MASC-run-USP
       '[The man] was hunting the wallaby, but it ran away' (ST, JRB1-034-01, 00.06.53-00.07.01)

As we will see, our quantitative results confirm that viewpoint meaning and discourse structure closely interact in the contextual interpretation of zero tense in Anindilyakwa, and can impact its temporal interpretation to some extent (as can the related, yet distinct parameter of (un)boundedness). However, this is hardly a surprise, in light of past observations about Arabic, Yucatec Maya and Hausa, i.e., 'tenseless'—but not 'aspect-less'—languages where aspectual viewpoint information (morphologically marked in these languages) can also partly determine the temporal anchoring of verbs in context.

2.4. On the Close Association of (Un)boundedness with Viewpoint

The close association between (un)boundedness and viewpoints in our analysis first rests on the following theoretically common double assumption (see, e.g., Depraetere 1995; Smith 2006, etc.): perfective viewpoints select for bounded event predicates, whereas imperfective viewpoints select for unbounded event predicates. Additionally, we hypothesize that resultative viewpoint (perfect-like) readings of the Anindilyakwa zero tense also select for bounded event predicates. Although they have present relevance in some sense, we have nevertheless classified resultative uses of the zero tense as past, since they locate a causing event in the past, while entailing some present, contextual 'perfect state' à la Nishiyama and Koenig (2010). Furthermore, we treated them as a type of viewpoint reading selecting for bounded event structure as their past causal event is also part of their at-issue content—somewhat like the French *passé composé*, we believe; see Caudal (2015).

The triple assumption obviously relates to the well-known generalization found in numerous works (notably) inspired by De Swart (1998), that tenses are functions over aspectual types of event predicates (i.e., event structural types), and as such, possess aspectual selectional restrictions—which when they are not met, can give rise to aspectual mismatches, and possibly trigger aspectual coercion effects (which we take to be separate, conventionalized uses of tenses). Our data is clearly in line with this observation. For

instance, it reveals that perfective (and resultative) viewpoint readings of the Anindilyakwa zero tense can occur with lexically atelic verbs (or reduplicated/iterated verbs), only in case those receive a bounded reading, whether inchoative (through coerced readings of stative utterances, mostly) or durative. In a similar vein, both atelic and non-atomic telic (accomplishment) utterances appeared in our corpus with imperfective viewpoint reading, but telic utterances could not be found with prospective/proximative/futurate readings (cf. English *John was leaving = John was about to/intended to leave*)—such coerced, modal readings are unavailable to the Anindilyakwa zero tense, as they (predictably) are with other aspectually underspecified tenses (including, e.g., the English simple past). And last but not least, we observed that atomic telic (achievement) utterances with zero marking could only associate with bounded, past perfective or perfect-like, resultative interpretations.[9] All these facts suggest that the contextual viewpoint reading of the Anindilyakwa zero tense selects for certain event structure parameters structure parameters, including boundedness.

Crucially, while the bounded/unbounded distinction is relevant to the semantics of aspectual viewpoints, it should nevertheless not be equated with it. Not only is there not two, but three basic viewpoint values one can cross-linguistically distinguish, cf. Caudal (2012) (including with the Anindilyakwa zero tense), but boundedness does not correlate with the semantic complexity of viewpoint. For instance, there is much more to the sometimes distinctly modal, futurate/proximative interpretation of the English progressive with a telic (especially achievement) utterance (cf. 'I'm leaving', meaning 'I intend to/will leave soon') than what the mere notion of unboundedness can capture. Similarly, the discourse structural and contextual behavior of perfective vs. resultative viewpoints differs in ways which cannot be explained straightforwardly with simple boundedness—see, e.g., Nishiyama and Koenig's (2010) notion of 'perfect state', and how it is contextually dependent, and the discussion below of the discourse structural contrast between 'pure' perfective tenses, and tenses with resultative viewpoint meanings – cf. (11)-(12) above.

2.5. Some Reflections on the Quality and Controlled Nature of Our Annotation Procedure

As it was not possible to find additional (L1 Anindilyakwa speaker) annotators to participate, we have striven to maximize the quality of our annotation by other means. Our annotation scheme was therefore iterated and corrected in several distinct steps. Both authors annotated the zero tense sub-corpus twice (with an interval of 3 to 6 months between each pass), followed by a detailed discussion of each disagreement found in our respective annotations—this constituted our first four annotation passes. A fifth annotation pass was conducted by Author 1 to remove remaining inconsistencies and errors in the annotation. Finally, Author 2 conducted a retro-translation task in the field, associated with a metalinguistic discussion of each problematic example. This constituted the sixth and final pass on our annotation. Whenever it was impossible to ascertain which aspectual viewpoint/(un)boundedness reading should obtain, we set apart the corresponding examples from the relevant quantity measurements—this mostly concerns examples occurring in iterative/habitual contexts, plus a handful of accomplishment utterances (11 examples, in total).

Given the mutual dependence of viewpoint/boundedness and discourse structural information, one might be concerned that our annotation runs serious risks of circularity. However, (im)perfectivity and (un)boundedness are often constrained by linguistic means in our corpus. About 25% of our datapoints comprised overt aspectual adverbials or equivalent markers with various effects on viewpoint and/or boundedness, another 40% comprised discourse connectives, particles, clitics or discourse patterns enforcing specific (or easy to identify) discourse relations, themselves imposing specific viewpoints on some segments. At the end of the day, only 54 utterances were completely deprived of any overt aspectual linguistic marking or linguistically recoverable aspectual information (either directly, or through some connected discourse segment) supporting our aspectuo-temporal annotations, half of which happen to describe achievements, and have a rigid past perfective reading, as we will see. This left us with a list of roughly 25 potentially

problematic datapoints originating in elicitation tasks—about 10% of our zero tense sub-corpus—more than half of which could be semantically clarified by their prompting context (see below), and/or were clarified thanks to a retro-translation task and further discussions with Anindilyakwa language speakers. Eventually, only 11 utterances turned out to be effectively problematic, and left out from (un)boundedness-related (and (im)perfecitivty-related) quantitative measurements. This shows how limited the risk of circularity in our aspectual annotation really is.

Finally, 46% of our datapoints (both in narrative texts and elicited material) offered a linguistically observable temporal meaning, either directly through adverbials, or indirectly because zero-marked clauses were coordinated or subordinated to temporally marked clauses (with past/present tense inflections, or temporal adverbials, and in general 'temporal anaphora' à la Bohnemeyer 2009). Most other utterances could be temporally interpreted through translations and/or metalinguistic judgements cast by Anindilyakwa language speakers. Again, only a handful of utterances turned out to be temporally problematic—all among the 11 utterances already problematic for aspectual (viewpoint/boundedness) meaning.

In addition to this, the very manner in which our data points had been collected[10] offered precious information concerning their contextual or aspectuo-temporal context, and this contributed to ensuring the quality of our annotation whenever aspectuo-temporal information was scarce. Elicited material marked as 'visual stimuli' were collected using the *Event Description Elicitation Database* (EDED), which consists of roughly 250 video clips arrayed in distinct experimental protocols, so as to obtain naturally occurring descriptions of single events or complex series of events, involving various kinds of event structures, and viewpoint parameters. Aspectual interpretations for this material are very constrained, as the EDED clips were specifically construed to elicit special even structure types, with a specific temporal anchoring being prompted (mostly in the past), alongside with specific temporal ordering between events wherever multiple events are involved (e.g., an event of someone sitting down, followed by an even of someone sneezing once), as well as 'viewpoint' parameters (overlapping vs. non-overlapping events, complete vs. incomplete events). Such temporal ordering information was often precious in determining discourse relations during our annotation procedure. As a result, assigning aspectual interpretations for this type of material was generally straightforward. Prompts associated with our elicited datapoints were systematically added to our sub-corpora, whenever they were relevant—even more so given the fact that we had established classical Vendlerian tests (cf. Vendler 1957) for the relevant verbs using dedicated questionnaires, see Bednall (2021).

In translation tasks, when temporal information was not overtly marked by modifiers, we could often determine existing temporal anaphora effects on the basis of prompts offered by linguists (English to Anindilyakwa), or through metalinguistic judgements cast by native speakers (Anindilyakwa to English). For narratives, temporal anaphora effects often obtained from the surrounding context (in the case of the Bible translation, this is rather trivial: outside of reported speech, a contextual past anchoring always prevails). These judgements were obviously unproblematic for speakers, except for some utterances denoting atelic dynamic events (activities) or non-atomic telic events (accomplishments), and for perfect-like readings of zero-marked utterances (the latter types of utterances are rare in our corpus, so this was not a major concern anyway). However, whenever necessary, we checked the relevant datapoints through retro-translations and metalinguistic tasks in the field at a later stage.

3. Results of Our Quantitative Study

After annotating our zero sub-corpora as described above, we analyzed the data using two quantitative techniques: one well suited to small samples (but not so efficient with unbalanced samples), namely Fisher's exact test,[11] or FET, and a classic chi-square (though less problematic with unbalanced samples, it is also less efficient with small samples—as we will see, in most cases, it turned out not to be a valuable test).[12] Both

FET and chi-square test the independence hypothesis H0; if $p < 0.05$, then given a 2×2 matrix of categorical variables with opposite values (e.g., A: 'present' vs. B: 'past'), then the categorical variables are deemed dependent, and H0 is rejected. We used these tests to determine which binary parameters (thus construing 'opposite' categories) of our annotation scheme could possibly constrain the temporal anchoring interpretation of zero-inflected Anindilyakwa verbs. It will notably appear that so-called temporal anaphora and overt temporal marking contribute to the temporal anchoring of certain aspectual types zero tense-marked utterances in Anindilyakwa, (e.g., state and activity-denoting utterances) but not of others (e.g., atomic telic (=achievement) utterances). With accomplishment (non-atomic telic in our terminology) denoting utterances, in the absence of overt or contextual temporal anchoring, aspectual parameters seem to play a more subtle role. But as we will see, at least one almost categorical aspectual parameter can be identified, namely boundedness. However, before discussing the results of these quantitative measurements, we will briefly present some preliminary observations and empirical generalizations based on simple numeric counts and percentages, about the aspectuo-temporal profile of the Anindilyakwa zero tense, and how it differs from (or is similar to) the other two indicative synthetic inflections.

3.1. Some Preliminary Observations and Empirical Generalizations: Zero Tense vs. Other Indicative Tenses, and Event Structure Types

According to Table 2 (Section 1.2), two types of event structures can give rise to categorical temporal effects: (i) atomic event predicates contributed by REAL-V-Ø utterances should only have past temporal interpretations (see Bednall's (2020) 'Atomic Constraint') while (ii) stative event predicate should only have present temporal interpretations when conveyed by REAL-V-Ø utterances (this is Bednall's (2020) 'Stativity Constraint'). Simple occurrence counts in our corpus study are sufficient to validate (i), as 85 out of 85 instances of utterances denoting telic atomic events (i.e., achievements) are anchored in the past. They are also sufficient to invalidate (ii), as 12 out of our 23 stative utterances anchor in the past without said past events being inchoatively re-interpreted, or treated as instances of bounded states; in other words, even such past stative utterances denote *bona fide* states.

As was already mentioned above, in some cases, it was somewhat difficult to ascertain whether an accomplishment utterance was truly anchored in the present, and imperfectively viewed—three relevant utterances were therefore excluded from certain measurements. Even more tellingly, especially in cases of elicited iterative or habitual uses, it was difficult to determine whether a bounded/perfective or unbounded/imperfective of pluractional/iterated or habitual reading should prevail—this caused us to set apart an additional eight utterances for certain measurements. Thus, while the translation of (14) suggests a perfective iterative reading, that of (15) is extremely unclear as to the exact aspectual interpretation of the sequence.

(14)   *angkawura*   *angkwababərna*   *nə-lhəka-Ø*   *en=lhang=wa*   *angalya*
one.day   always   REAL.3M-go-USP   3M.PRO=POSS=ALL   NEUT.place
'he went to his house several times'
(JL, JRB1-049-01, 00.09.25-00.09.34)

(15)   *arakbəwiya*   *angkabəbərnama*   *nə-lhəka-Ø*   *en=lhang=wa*
long.ago   always   REAL.3M-go-USP   3M.PRO=POSS=ALL
angalya
NEUT.place
'like several times, many times, or several times he used to- went- walked to his house'
(JL, JRB1-049-01, 00.13.00-00.13.20)

Event structure classes are represented as indicated in Table 4, with telic atomic (i.e., achievement) event predicates utterances being by far the most common event predicate type in our zero tense corpus (with almost 40% of all zero tense-marked utterances), and telic utterances in general representing the majority of our zero tense datapoints (54%);

utterances denoting change-of-state events even reach a staggering 76% of all zero tense-marked utterances. 'Non-telic' change-of-state events incorporate semelfactives, bounded states, activities or event pluralities, and inchoative readings of stative roots—all other atelic dynamic events have an unbounded reading. Unbounded events are outnumbered by bounded events (23+16=39 vs. 48+31+85=164); note the small class (11 datapoints) of dynamic events whose boundedness could not be determined ('uncertain dynamic')—these were not included in our quantitative measurements.

Table 4. Event structure classes in our corpus of zero-inflected verbs.

Event Structure Class	Number of Verb Forms	Percentage
States (-BD)	23	10.75%
Atelic dynamic events (-BD)	16	7.48%
Uncertain dynamic (+/-BD)	11	5.14%
Non-telic change-of-state events (+BD)	48	22.43%
Non-atomic telic (Accomplishments) (+BD)	31	14.49%
Atomic telic (Achievements) (+BD)	85	39.72%
Total	214	

Figure 2 below offers a visual rendering of Table 4, revealing that telic (and change-of-state) utterances are indeed predominant in the sample.[13]
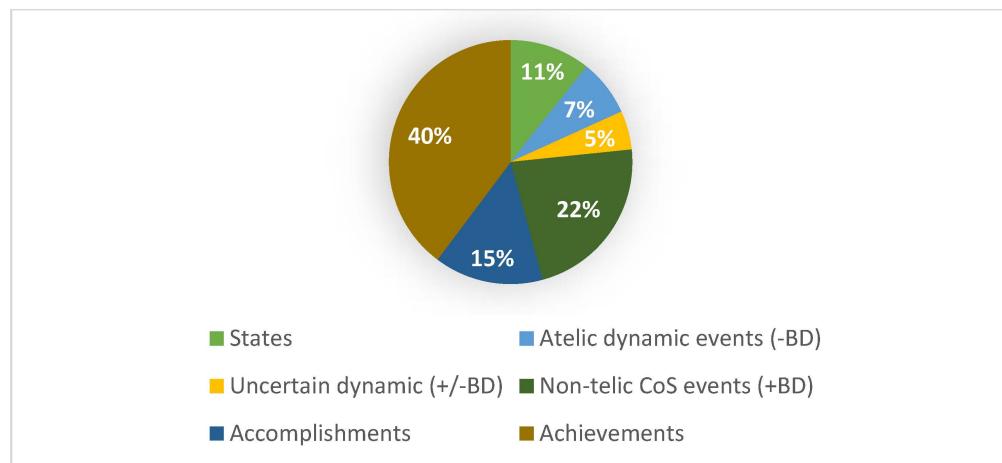
Figure 2. Event structure composition of our zero-inflected sub-corpus.

This strong bias of zero tense marking towards change-of-state meanings is not found within our non-past (=present) sub-corpus. Table 5 even reveals a categorically opposite distribution of event structure types in said sub-corpus, as it only comprises atelic verbs denoting unbounded event types, with an imperfective viewpoint meaning being contextually ascribed to the non-past tense. Verbs lexically describing telic atomic events (achievements) do appear, but must receive coerced readings, with a progressive, futurate/prospective reading (16) or hortative/volitional reading, or are coerced into scalar 'degree achievement' events (17) (in effect, these involve unbounded change-of-state predicates, i.e., as atelic dynamic event predicates)—note that such coerced readings are not found within our zero tense corpus with telic utterances.

Table 5. Event structure classes in our sub-corpus of non-past (= present)-inflected verbs.

Event Structure Class	Number of Verb Forms	Percentage
States	10	45.45%
Atelic dynamic events	12	54.55%
Non-telic change-of-state events	0	0.00%
Non-atomic telic (Accomplishments)	0	0.00%
Atomic telic (Achievements)	0	0.00%
Total	22	

(16) *ngumu-ngwanja-jə-na=ma*   *duraka*
REAL.1>VEG-stop-CAUS-NPST=SType   VEG.car
'I'm stopping the car' (progressive or prospective/futurate reading)
(JL, JRB1-018-01, 00.15.37-00.15.42)

(17) *ambaka+lhangw*   *na-mənəngka-dhə-nə=ma*   *ena*   *angalya*
slowly   REAL.NEUT-different-INCH-PST=SType   NEUT.this   NEUT.place
'slowly this place seems to get different'
(JL, JRB1-007-01, 00.01.29-00.01.34 narrative)

This generalization is not unexpected, as it is in line with well-known observations about the so-called 'present perfective paradox' (De Wit 2016); said paradox predicts that, e.g., utterances describing punctual events (which normally require a past perfective or a resultative viewpoint inflection) cannot receive a present tense marking and a present anchoring, unless their meaning undergoes some sort of semantic shift (whether aspectual, or aspectuo-modal); it already demonstrates that aspectual and temporal meaning can constrain one another to some extent in Anindilyakwa.

More unexpected is Table 6, which reveals that most utterances (roughly 75%) in our past tense sub-corpus convey atelic event predicates—with achievement event predicates being noticeably less frequent, and non-telic change-of-state event predicates much more frequent.

Table 6. Event structure classes in our sub-corpus of past-inflected verbs.

Event Structure Class	Number of Verb Forms	Percentage
States	7	6.93%
Atelic dynamic events	21	20.79%
Non-telic change-of-state events	37	36.63%
Accomplishments	6	5.94%
Achievements	30	29.70%
Total	101	

This quick comparison reveals that our main zero tense corpus vs. non-zero tense sub-corpora significantly differ in terms of event structure composition, and suggests that the three tenses exhibit substantially different aspectual selectional preferences, or restrictions in the case of the present (non-past)—the Anindilyakwa non-past seems to require unbounded, cumulative predicate types, and the past seems to predominantly involve non-telic utterances, in contrast with the Anindilyakwa zero tense.[14] This validates the importance of the Bounded Event Constraint in this language: utterances denoting bounded events cannot anchor to the present (or only with accomplishments in the zero tense, as we will see), and temporally present utterances must denote unbounded events. By itself, this sets an interesting background against which evaluating the temporal effects of aspectual meanings with the Anindilyakwa zero tense.

3.2. Telicity vs. Non-Telicity and Zero Tense

Let us now turn to the study of correlations between aspectual parameters, and the temporal interpretation (present vs. past) of zero tense in our corpus, starting with telicity. Throughout Sections 3.1–3.4, we will systematically confront counts in all temporal contexts (regardless of whether or not said contexts possess (or do not possess) independent overt or covert temporal information), with counts in temporally empty contexts (i.e., they must not offer overt/covert temporal information, besides what can be derived from aspectual meaning), so as to identify effects of temporal anaphora on the interpretation of zero tense (and determine which aspectual parameters have non-monotonic vs. monotonic temporal effects on zero tense: non-monotonic temporal effects can be overridden by contextual temporal information, whereas monotonic temporal effects cannot). Table 7 below was construed for all temporal contexts, to determine whether telicity constituted a determining parameter for past/present temporal anchoring—i.e., how strongly does telicity correlate with past readings, while barring present readings? It opposes telic and non-telic utterances, with the latter denoting either cumulative (CUM) predicates (activity/stative predicates), or non-telic change-of-state (CoS) event predicates (including through semelfactive verbs, and inchoative readings of atelic verbs).

Table 7. Temporal anchoring of telic vs. non-telic utterances in all temporal contexts.

Event Structure Opposition	Past	Present	Total
Telic	109	7	116
non-telic (CUM + CoS non telic)	67	20	87
Total	176	27	203

Figure 3 offers a visualization (via R's *mosaicplot* function) of Table 7; it makes it obvious that (i) telic events are predominant in our zero tense sample and (ii) that telic utterances tend to associate with past anchoring, while non-atelic utterances tend to favor a present anchoring, but that (iii) these are not categorical correlations.
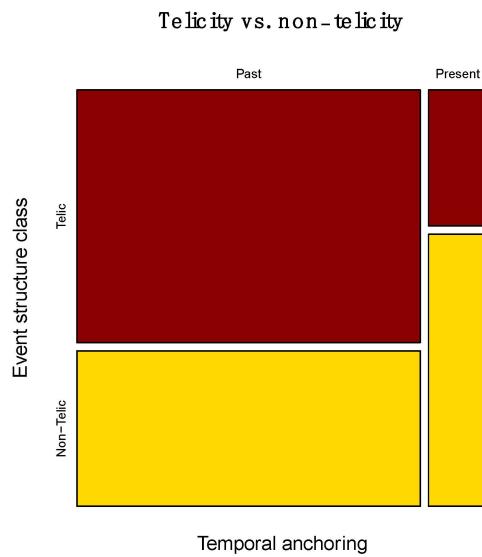
Figure 3. Vizualisation of temporal anchoring of telic vs. non-telic utterances.

Running Fischer's exact test[15,16] on Table 7, we get $p = 2.987 \times 10^{-09}$, and an odds ratio of 15.94346, with 95% confidence interval [5.575388; 51.268209]—the zero hypothesis (variables are independent) must be rejected. A chi-square test[17] yields X-squared = 10.965, df = 1, *p*-value = 0.0009283. Both tests lead us to conclude that telicity and temporal anchoring are not independent variables, i.e., are significantly correlated. There is a marked and significant, but not categorical tendency for telic verbs to pair up with a past anchoring,

and a less strong tendency for non-telic verbs to pair up with a present anchoring—this is in line with Bednall's (2020) account. Finally, Table 8 suggests that non-atomic telic (i.e., accomplishment) utterances *de facto* prevent telicity from having a categorical association with past temporal anchoring, as such utterances can receive a present temporal reading—in contrast, atomic telic (achievement utterances) are always past with zero tense; they have a monotonic, categorical (past) temporal effect.

(18) *"nə-dhədha-ngu=ma"*, that's past, *"nə-dhədhu-Ø=ma"*, that's now
  REAL.3M-shut-PST=SType *REAL.3M-shut-USP=SType*

Table 8. Temporal anchoring of telic atomic vs. telic non-atomic utterances in all temporal contexts.

Event Structure Opposition	Past	Present	Total
Telic atomic (achievement)	85	0	85
Telic non-atomic (accomplishment)	24	7	31
Total	109	7	116

3.3. Dynamic vs. Stative Utterances and Zero Tense

Let us now turn to the correlation between dynamicity vs. stativity, and temporal interpretations of zero tense-marked utterances in Anindilyakwa. The opposition between stative vs. non-stative datapoints in our main sub-corpus gives us Table 9 below.

Table 9. Temporal anchoring of dynamic vs. stative utterances in all temporal contexts.

Event Structure Opposition	Past	Present	Total
Dynamic	164	16	180
Stative	12	11	23
Total	176	27	203

Running FET on Table 9[18] yields a significant *p*-value ($p = 1.4465429919578 \times 10^{-05}$), and an odds ratio 9.2173 with a 95% confidence interval [3.1515; 27.261]; running a chi-square test on such a sample does not seem to yield a reliable result.[19] This seems to invalidate the null hypothesis, and suggests that dynamicity vs. stativity also correlates with the past vs. present opposition—though not as well as the telic vs. non-telic opposition—dynamic utterances tend to be substantially more anchored in the past than stative ones (which are about evenly past vs. present). However, what if we restrict the comparison to dynamic atelic utterances (activity utterances)? Table 10 shows that their respective spread converges a bit more. If we run FET on such a table,[20] we get a less significant $p = 0.02067$,[21] with an odds ratio of 4.026621, and a 95% confidence interval [1.168114; 14.715856]—the latter being much less satisfying than the previous confidence interval.

Table 10. Temporal anchoring of dynamic vs. stative utterances in all temporal contexts.

Event Structure Opposition	Past	Present	Total
Dynamic atelic	36	8	44
Stative	12	11	23
Total	48	19	67

Thus, it seems that if we restrict dynamic utterances to their atelic subset, the correlation between the stative/dynamic opposition and the present/past opposition becomes less clear. In fact, Table 10 might well show that Table 9 is a case of confound, in the sense that because the dynamic class incorporates change-of-state events, and change-of-state events are predominant in our corpus, this gives dynamicity more weight as a predictor of past temporal anchoring than it should be credited for; if we exclude telic events, dynamic events are less inclined to being past. Even more tellingly, it appears in our corpus that all

dynamic atelic utterances anchored in the present (i) involve a temporally empty context and (ii) are unbounded, whereas all dynamic atelic utterances anchored in the past involve (i) either an overt (through a temporal modifier) or covert (through temporal anaphora, including temporal prompts) past temporal anchoring, and (ii) can be either bounded or unbounded (in the latter case, an independent past temporal information is required). This seems to suggest that unbounded atelic dynamic events described by zero tense utterances in Anindilyakwa are only non-monotonically present (*contra* Bednall 2020, which essentially claimed that activity utterances did not have such a default temporal anchoring; this also strongly contrasts with Sranan data, De Wit 2016).

In addition, it must be noted that all twelve stative utterances with a past temporal anchoring in our corpus involve some kind of overt past temporal marking or past temporal anaphora (i.e., some past temporal modifier marks it, or some discourse segment to which it attaches is itself anchored in the past—because it has a past inflectional marking, or bears a past temporal modifier). And conversely, all stative utterances with a present temporal anchoring surfaced in a temporally empty context. We can therefore conclude that both (unbounded) activity and state-denoting utterances with zero tense-marking are non-monotonically present in Anindilyakwa, and that this default temporal anchoring is overridden by overt or covert temporal information (temporal anaphora)—this double generalization at once renders Anindilyakwa akin to, and different from unrelated languages also endowed with either 'zero tense' or 'zero-tense'.

3.4. Unbounded Events vs. CoS/Bounded Events and Zero Tense

Let us now turn to a last opposition of aspectual parameters potentially meaningful in the temporal anchoring of zero-tensed utterances in Anindilyakwa, namely the bounded vs. unbounded opposition. Bounded utterances denote definite changes-of-state, i.e., including atelic utterances with a fixed durative or inchoative reading (but exclude utterances conveying unbounded series of change-of-states); they involve either perfective viewpoint or resultative viewpoint readings of zero tense (with the latter being rare in our corpus, due to its constitution, probably—dialogue would certainly yield larger numbers of perfect-like, resultative readings), while unbounded utterances always involve imperfective viewpoint readings. Counting instances of past vs. present bounded vs. unbounded utterances in our corpus resulted in Table 11.

Table 11. Temporal anchoring of BD vs. UBD utterances in all temporal contexts.

Event Structure Opposition	Past	Present	Total
BD	157	0	157
UBD	19	27	46
Total	176	27	203

The visualization obtained with *mosaicplot* (Figure 4) already reveals a better predictor than telicity (cf. Figure 3 above)—the dotted line indicates zero occurrences of bounded utterances in the present.

This is confirmed when we run FET on Table 11[22], as we get a very significant *p* < 2.2×10^{-16} (BiostaTGV indicates $p = 1.3771954740868 \times 10^{-21}$) and an infinite odds ratio, plus a 95% confidence interval [49.30634; Inf])—i.e., FET suggests that (un)boundedness is an even better predictor than telicity or dynamicity, with one caveat—FET does less well on an unbalanced sample. Bounded utterances categorically associate with past temporal interpretations; they also are a much larger aspectual class of events than telic events, including atomic telic events, so that this result has more substance to it. In Anindilyakwa, boundedness thus appears to constitute the most reliable aspectual parameter for predicting the temporal anchoring of an utterance with zero tense marking.

However, does overt or covert temporal interpretation play a part in the observed association between (un)boundedness and temporal readings of zero tense? In particular, do unbounded utterances correlate with a present temporal anchoring in an otherwise temporally vacuous context? Such empty contexts cropped up mostly in our elicited material, when no temporal or aspectual prompt had been given to language speakers. Table 12 gives the figures for the temporal interpretation of bounded vs. unbounded utterances in empty contexts: unboundedness then has a categorical effect too, as it always associates with present temporal readings. Running FET on Table 12 is rather pointless given such a non-balanced sample, as standard FET is known to behave rather poorly in such cases—and they are very unbalanced here, given their categorical opposition. This notably yields a confidence interval with an 'infinite' value as its upper bound; see Blaker (2000) and Fay (2010) for a discussion.[23]
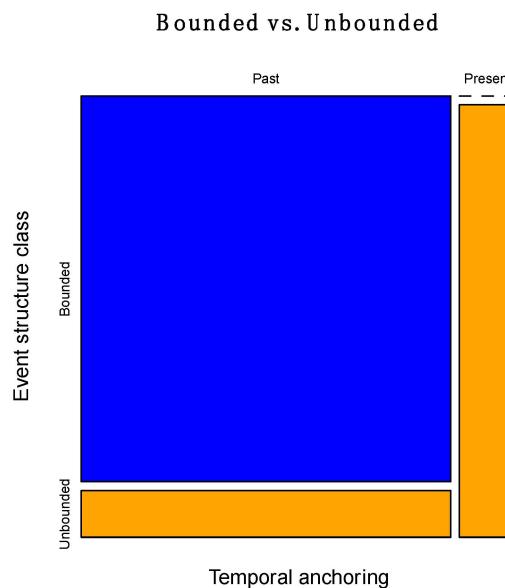
Figure 4. Vizualisation of temporal anchoring of BD vs. UBD utterances.

Table 12. Temporal anchoring of BD vs. UBD utterances in an empty context.

Event Structure in Empty Context	Past	Present	Total
BD	27	0	27
UBD	0	14	14
Total	27	14	41

This double categorical generalisation seems to vindicate the general hypothesis made above, namely that in non-temporally skewed contexts (i.e., without temporal anaphora, or overt temporal material), the significance of correlations between temporal anchoring and event structure parameters can strongly increase in some cases, to the point of becoming categorical. Unbounded activity and state-denoting utterances have (present) temporal effects on zero tense in temporally empty contexts; these are not mere temporal tendencies. This gives unambiguous support to the idea that context—including temporal information *qua* overt marking or temporal anaphora—plays a crucial role in the temporal anchoring of certain aspectual types of utterances, namely those denoting (unbounded, i.e., imperfectively viewed) states and activities. Such facts demonstrate that Bohnemeyer's (2002, 2009) observations about 'zero-tense' in Yucatec Maya carry over at least to some extent to 'zero tense' in Anindilyakwa, and further justify our hypothesis that 'tenselessness' and 'zero tense' are indeed related phenomena, semantically speaking.

Finally, it should be observed that in Table 12, bounded utterances comprise 20 achievement utterances and 7 accomplishment utterances, whereas unbounded utterances comprise 6 stative utterances, 5 activity utterances, and—surprisingly enough—3 accomplishment utterances. This event structure breakup demonstrates that accomplishments (non-atomic telic events) can have both past and present anchorings even in an empty context: however, this particular dataset is too small to conclude more as far as aspectual classes of event predicates denoted by verbs are concerned. A larger set of datapoints in an empty context would be required to draw firmer conclusions.

4. Discussion

Let us try now to determine to what extent the above results have inherent limits, or merits, when it comes to a language-specific, or crosslinguistic understanding of the role played by various aspectual parameters in the temporal interpretation of zero tense.

4.1. Possible Aspectuo-Temporal Biases Due to Discourse/Textual Genres?

Before assessing the positive contribution of our results, we need to frame their significance with respect to the nature of the data used here, so as to circumvent, or at least understand, possible biases. As was repeatedly noted throughout this paper, our corpus does not incorporate dialogical data per se, only semi-formal/conversational narratives with a limited dialogical dimension, on top of formal narratives and elicited data (mostly with prompts towards a past temporal anchoring). This might be detrimental to the representativity of present temporal anchoring, and for present temporal meanings in general.

Certain aspectual meanings (perfective, change-of-state events) are intuitively more common in narrative, than in, e.g., dialogue. Our data is probably biased to some extent against both stative and atelic dynamic atelic utterances (change-of-state events were privileged in the elicitation tasks based on films showing short sequences of events, as well as in several of our questionnaires).

The same probably holds true of temporal-succession discourse relations (rhetorical relations associated with perfective, sequence-of-events contexts are prevalent in narratives, especially 'formal' narratives (myths, legends, see, e.g., Carruthers (2005) and Caudal (2010)—the latter are clearly predominant in the narrative part of our corpus). We should ideally be able to conduct separate quantitative pilot studies on genre-specific corpora, and compare the results, to fully validate the conclusions of the present study while assessing the impact of those aspectual and temporal biases. Obviously, this must be left to future developments, including substantial additional fieldwork.

This being said, while the size and nature of our corpus de facto limits the value of some of our observations, and while settling such questions would require further investigations on a more extended data set, some of our conclusions appear to be fairly solid already. For instance, both the sharp difference between Tables 10 and 11, and the fact that independent temporal information seems to determine the temporal anchoring of all atelic dynamic utterances, suggest that dynamicity alone (i.e., if we set aside bounded/telic dynamic events) is not a good temporal anchoring predictor at all for the Anindilyakwa zero tense. Zero tense-marked activity utterances seem to be entirely unbiased for either temporal reading in Anindilyakwa—and temporal anaphora and overt temporal marking via adverbials seem to be the only real factors capable of impacting their temporal anchoring.

Categorical or near-categorical correlations—e.g., that of atomic telic or bounded events with past anchoring—are also unlikely to be greatly affected by corpus size and composition. Thus, we are confident in the ranking of parameters given below in Table 13, and our generalizations about bounded and atomic events, already constitute reasonably reliable results. It is much harder to predict whether or not having larger amounts of present readings of zero tense utterances in our data, could reveal some (possibly slight)

temporal biases with stative and atelic dynamic utterances. We will leave these speculations for further research.

Table 13. Summary of quantitative findings, and ranking of parameters for temporal anchoring.

Parameter	Significance (*p*)	Odds Ratio	Confidence INTERVAL (95%)	Ranking
BD/UBD	$1.3771954740868 \times 10^{-21}$	INF	[49.30634; Inf]	1
Telic/non-telic	2.987×10^{-09}	3.085	[5.575388; 51.268209]	2
Dynamic/stative	$1.4465429919578 \times 10^{-5}$	9.2173	[3.1515; 27.261]	3
Dynamic atelic/stative	0.02067	4.026621	[1.168114; 14.715856]	4

4.2. Some Novel Language-Specific Generalizations for the Anindilyakwa Zero Tense

Overall, our results seem to warrant some novel empirical generalizations both for Anindilyakwa, and for a general theory of zero tense. Let us begin with the former.

Table 13 shows that (a)telicity is a better predictor of temporal anchoring than dynamicity/stativity (both with and without telic events being included in dynamic events), and that (a)telicity and dynamicity are outclassed by (un)boundedness—by themselves, these are new generalizations for Anindilyakwa. Moreover, given our observations in Section 3.3 about atelic dynamic events (cf. Table 10), it is likely that dynamicity per se is not a good predictor of temporal anchoring for our zero tense—and that so-called zero tense activity utterances do not in fact differ from stative utterances w.r.t. temporal anchoring. Bednall's (2020) 'Stativity Constraint' was not supported by our results; it does not have a monotonic temporal anchoring effect – it only has a non-monotonic present anchoring in temporally empty contexts (do so-called activity utterances, in contrast with Bednall's (2020) claim that they behave like accomplishment utterances). Overt or covert contextual temporal information are the only parameter capable of influencing the temporal meaning of both (unbounded) activity-denoting and state-denoting utterances.

Equally interesting are the effects of atomic telicity and boundedness: these categorically (or almost categorically) trigger a past anchoring in all contexts, regardless of additional temporal information. While the behavior of atomic telic utterances validates Bednall's (2020) 'Atomic Constraint', the effect of boundedness is a bit more unexpected.

The lesser performance of telicity as a temporal anchoring predictor, in comparison to boundedness, should also be highlighted. As accomplishment-denoting utterances can appear with present interpretations, this contributes to weakening the correlation of telicity with pastness. In addition to this, bounded utterances such as those denoting non-telic CoSs (for instance inchoative readings of stative verbs, single-event semelfactives and INCH-derived verbs) categorically receive a past temporal anchoring, and contribute to strengthening the correlation between boundedness and pastness. This confirms that, as was done in the introduction to this paper (Section 1.2), we must add a 'Boundedness Constraint' over and above Bednall's (2020) 'Atomic Constraint', as it applies to a wider set of utterances (indeed, boundedness subsumes atomicity).[24]

To put it in a nutshell, there is a sharp asymmetry in the way aspectual constraints correlate with the temporal anchoring of zero-inflected Anindilyakwa verbs:

- Only utterances denoting bounded or atomic telic events (including inchoative meanings, and single semelfactive events) monotonically determine (past) temporal anchoring, as it cannot be overruled or modified by any additional information or overt temporal marker
- The temporal anchoring of all other event structural types of utterances (i.e., unbounded utterances) can be either present or a past in our corpus, and is sensitive to aspect-independent temporal information, even for unbounded readings of accomplishment utterances; this can be achieved by overt temporal marking of the verb at stake—through e.g. past vs. present adverbials—or through some other verb with which it forms a temporal reference chain, i.e., when the corresponding discourse referents are part of a single discourse topic; we argue that such topics are very important

discourse contextual factors in the semantics and pragmatics of tenses (see Caudal 2023 for a detailed discussion). In short, only unbounded utterances can have both past or present anchoring—and must conform to whatever contextual information sets the reference/topic interval to the past vs. present in the context, even though in temporally empty context, stative and activity utterances non-monotonically anchor to the present. This is a novel generalization in comparison to Bednall (2020).

4.3. Some Novel Cross-Linguistic Generalizations for Zero Tense (and Zero-Tense)

We believe our results also offer novel crosslinguistic insights, and raise potentially interesting questions beyond Anindilyakwa itself, at least on a methodological level.

Methodologically, our study illustrates the need for combining a detailed semantic annotation with quantitative analyzes in order to rigorously assess the impact of relevant factors in the temporal and aspectual interpretation of aspectuo-temporally underspecified tenses. Empirical generalizations based on simple counts and semantic categories such as, e.g., the Vendler-classes style aspectual characterizations, are too coarse-grained to frame the interpretative intricacies underlying such semantically underspecified forms. Context sensitivity, event complexity, and non-Vendlerian parameters such as viewpoint and (un)boundedness, are key to unravelling the mysteries lurking behind such forms.[25] We would also like to highlight the key role played by discourse structural parameters, and their interactions with viewpoint meaning in our study: the main shedding line between past vs. present anchoring as determined by aspectual content very much depends on perfective/resultative vs. imperfective viewpoint readings—as bounded readings are required by perfective and resultative viewpoint functions, while unbounded readings are required by imperfective viewpoint function. Our analysis crucially departs from existing investigation by the way it capitalizes on discourse relations as key parameters interacting with the contextual interpretation of aspectuo-temporally underspecified tenses.

Let us now turn to the theoretical, crosslinguistic significance of our results. They seem to confirm Smith and Erbaugh's (2005) hypothesis that boundedness can be a key parameter in the past temporal interpretation of zero tenses—they even possibly go beyond Smith & Erbaugh's hypothesis, as our data suggests that the past/bounded correlation is categorical. Our results also contrast with Smith and Erbaugh's (2005) analysis of 'zero tense' in Mandarin in at least one key respect: according to (Smith and Erbaugh 2005, p. 734), telicity systematically entails a bounded interpretation, and therefore a past anchoring reading zero-marked utterances in Mandarin Chinese—but if our results are correct, Anindilyakwa differentiates achievement and accomplishment utterances; only the former categorically anchor to the past. Our study additionally suggests that unbounded atelic dynamic (activity) utterances do not seem biased towards a past temporal anchoring; this observation seems to go against Bybee's (1990; Bybee et al. 1994) claim that all zero tense-marked dynamic utterances are by default anchored in the past,[26] as well as De Wit's (2016) claim that in Sranan, all zero-marked dynamic utterances must be past. As was shown by Table 9 vs. Table 10 (alongside with subsequent comments), there could be a potential confound in De Wit's and Bybee's generalizations about dynamic events; zero tense unbounded atelic dynamic utterances and telic or bounded bounded dynamic utterances might differ w.r.t. their temporal effects on zero tense in these other languages too.

Before closing this cross-linguistic discussion, we would like to stress the fact that the Anindilyakwa aspectuo-temporally underspecified zero tense is not an isolated phenomenon among Australian languages. Other morphologically reduced tenses with an underspecified temporal and aspectual meaning have been described for a number of Australian languages, and also constitute instances of zero tenses in our understanding. This is notably the case of the so-called 'non-future' inflection in Murrinh-Patha (Nordlinger and Caudal 2012), as shown in (19)–(22); note that 'non-future' is a language-specific label borrowed from Nordlinger and Caudal (2012), not a cross-linguistic category. It is highly dubious that it relates to Matthewson's (2006) category of non-future in Salish—

the two categories exhibit some clear aspectuo-temporal differences, e.g., the Salish non-future seems to license present imperfective readings with telic verbs, whereas as the Murrinh-Patha does not, and the non-future is not the sole tense morpheme in Murrinh-Patha; the two languages have extremely different TAM systems.

(19) *Jeŋkul=mani=ka*   *mam-ŋka-ʈum*   *ʈama-ja.* *Jilele* (Murrinh-Patha)
      [name]=attempt=cst   do.3sg.nfut-eye.appl-dry say.2sg.irr father
      'how about Yengkul, the one who stirs up dust in his truck, who
      you call father?' ([Mansfield 2019](), p. 5)

(20) *wurran-nintha-lili*   (Murrinh-Patha)
      they.6.PRES-du/m-walk
      3sgS.go(6).nfut-du.m-walk
      'They are walking.'
      ([Street](1996, p. 208) in [Nordlinger and Caudal](2012, p. 83))

(21) *mam-purl*   (Murrinh-Patha)
      I.8.PERF-wash
      1sgS.hands(8).nfut-wash
      'I washed it.' ([Street](1996, p. 209) in [Nordlinger and Caudal]
      (2012, p. 83))

(22) *baŋam-lele-ɖim*   *ku-we.ɻe*   *ku-puʈ-ɟkat=ʈe*   (Murrinh-Patha)
      affect.3sg.nfut-bite-sit.impf   anim-dog   anim-cat=agent
      'the cat is biting the dog' ([Mansfield 2019](), p. 4)

[Nordlinger and Caudal](2012) argue that telicity seems to determine the temporal anchoring of non-future utterances in Murrin-Patha (with telic utterances being anchored in the past, vs. atelic utterances being anchored in the present); in addition, these authors claim that stative utterances marked with the non-future tense do not seem to be capable of anchoring in the past—possibly showing that [Bednall]'s (2020) Stativity Constraint might hold for this language. If the above description is correct, then the Murrinh-Patha non-future constitutes yet another crosslinguistically different type of 'zero tense'.

In contrast, the so-called 'actual' tense in Kayardild, described in ([Evans 1995]; [Round 2013]) as the 'default', morphologically minimal tense—also a zero tense in our understanding –, seems to pattern similarly to the Anindilyakwa zero tense. The 'actual' inflection appears to be both temporally and aspectually underspecified, cf. (23)–(24), and contrasts with a non-zero aspectually underspecified past tense. Unlike in Murrinh-Patha, Evans notes that temporal modifiers are used to specify the temporal interpretation of zero tense utterances it marks. Such an observation is of course strongly reminiscent of our findings on Anindilyakwa, where overt or covert temporal information can determine the temporal anchoring of all unbounded utterances—and relates with [Bohnemeyer]'s (2009) observations about the role of temporal anaphora in Yucatec Maya.

(23) *jungarra*   *bawa-tha*   *warmgal-d*   (Kayardild)
      big(NOM)   blow-ACT   wind-NOM
      'The wind's blowing strong.' ([Evans 1995], p. 256)

(24) *jirrka-rrnga-maru-tha*   *kurrka-tha kunawuna-ya*   *barrngka-y,* (Kayardild)
      north-BOUND-VD-ACT   take-ACT child-MLOC   waterlily-MLOC
      kurndaji   *jirrkur-ung-ka*   *mirrayala-th,*   *Nalkardarrawuru*
      sandhill(NOM)   north-ALL-NOM   make-ACT   (name)
      'Nalkardarrawuru took the baby waterlilies to the beach to the north (Bentinck Island, from
      Fowler Island), and made a sandhill way to the north.' (ibid.)

We would like to stress that one important difference between Murrinh-Patha and both Anindilyakwa and Kayardild, is that contrary to the latter, the former possesses a *bona fide* past imperfective tense; this might prevent, e.g., stative utterances in the non-future from receiving a past temporal reading (due to competition between tense forms). This might result in substantial divergences in the way temporal and aspectual underspeci-

fication is managed by these two types of languages. The existence of a *bona fide* past imperfective tense in Murrinh-Patha might well cause a blocking phenomenon for the past interpretation of stative utterances in the non-future (we do not observe any such blocking in Anindilyakwa, where instances of zero-marked stative utterances can receive a past temporal anchoring, with a past temporal context, or a past modifier). Bybee (1990, pp. 12–13) makes some tentative generalizations concerning the temporal and aspectual semantics of zero tenses, which appear to be in line with this idea: zero tenses can behave differently, depending on the kind of tense-aspect system in which they appear—more specifically, the presence vs. absence of overt past imperfective viewpoint morphology in a given language can have an impact on the temporal behavior of its zero tense with atelic utterances (when unbounded, according to us). Sadly, we must leave these exciting questions open for future investigations, as it remains to be determined whether Nordlinger and Caudal's generalizations, as well as Evans's generalizations, could be maintained in the light of a detailed corpus analysis. The above data points nevertheless clearly indicate that a fruitful avenue of research lies in such a comparative Australianist direction.

5. Conclusions

As a conclusion, we would like to highlight that the main results achieved here suggests that more than just Vendlerian parameters are required in order to make sense of correlations between aspectual parameters and temporal meaning in the semantics of so-called 'zero tenses'. While telicity and dynamicity are useful to understand and predict temporal interpretation of such aspectuo-temporally underspecified tense forms, these are not the most significant parameters in that respect—rather, (un)boundedness stands out as a key parameter for the Anindilyakwa REAL-V-Ø inflectional paradigm, as was independently proposed, e.g., in Smith and Erbaugh (2005) for Chinese. We have demonstrated that some aspectual parameters (atomicity, boundedness) have monotonic temporal effects in Anindilyakwa, while others (dynamicity, stativity – when combined with unboundedness) only have non-monotonic effects—crosslinguistic differences with accounts of other zero tenses points to either typological differences, or possible descriptive issues with some generalizations made (see, e.g., the Sranan zero tense, where at least one example of dynamic utterances anchors to the present in De Wit's (2016) data, thus casting possible doubts on the alleged monotonic past anchoring effect of this aspectual parameter). We have also shown that both (unbounded) activity and state-denoting utterances non-monotonically anchor to the present, but that this can be overridden by, e.g., past temporal anaphora or past temporal modifiers (contra Bednall's (2020) 'Stativity Constraint').

We have mentioned that our results were probably influenced by the predominance of past contexts and change-of-state utterances in our corpus, but argued instead that this probably does not affect the ranking of parameters here established. Of course, future developments will be necessary to fully back, and potentially improve upon, the results of what is really a pilot study. It is highly desirable to expand our corpus towards dialogical data, so as to be able to assess the impact of textual genres in general on the quantitative results exposed above. We have also shown that the kind of simultaneous temporal and aspectual underspecification found with the Anindilyakwa zero tense is not an isolated phenomenon among Australian languages, and that comparative work is clearly required to fully understand the intricacies of aspectuo-temporal underspecification. Finally, from a crosslinguistic perspective, our study seems to confirm that not all 'zero tenses' exhibit the same type of aspectuo-temporal context dependency; we argue that this suggests that we are here dealing with somehow different semantic types of zero tenses, or even zero-tenses. E.g., the very fact that, e.g., Sranan and Anindilyakwa respective zero tenses are not temporally sensitive to the same key aspectual parameter (dynamicity for Sranan according to Bickerton 1975, 1981; De Wit 2016, etc., as opposed to boundedness for Anindilyakwa, Mandarin Chinese, etc.), demonstrates that zero(-)tenses can be aspectually different cross-linguistically, and therefore cannot be absolutely deprived of any aspectual content. How this variation in their aspectual sensitivity should be modelled is an issue we

must leave open for future research, but it is clear to us that zero-tenses do not simply lack any viewpoint content; they are endowed with potentially different kinds of unsaturated aspectual viewpoints—and even more probably, that they should be endowed with different underspecified aggregates of temporal and aspectual meanings, that is aspectuo-temporal meanings; if our language specific results are correct, and if accounts of other zero(-)tenses are correct too, there seems to exist several semantically different types of such tenses across languages. Competition with other aspectually and temporally specific tenses might also play a role in these crosslinguistic semantic variations; but clarifying such issues will require conducting similarly detailed analyses on several distinct instances of zero tenses, at the very least—that is, well beyond the limits of the present investigations.

Abbreviations

1	first person (exclusive)	MLOC	locative modal case
2	second person	NEUT	neuter nominal class
3	third person	NFUT	non-future
A	augmented	NOM	nominative
ACT	actual	NPST	non-past
ALL	allative	PF	phrase-final
ANIM	animate	PL	post-lengthening
APPL	applicative	POSS	possessive
CAUS	causative	PRES	present

CofS	change-of-state	PRO	pronoun
COMPL.ACT	completed action	PST	past
CST	constituent ending	PURP	purposive
DENIZ	denizen case	QUANT	quantitative
DU	dual	REAL	realis
EMPH	emphatic	S	subject
F	feminine gender	SG	singular
IMPF	imperfective	STYPE	sentence type
INCH	inchoative	TRM	terminative
IRR	irrealis	USP	underspecified, phonologically null TAM suffix
KIN	possessed kin	VD	verbal dative
LOC	locative	VEG	vegetable nominal class
M	masculine gender	XTD	prosodic lengthening (phonologically
MASC	masculine nominal class		extended)

Appendix A. Annotation Scheme

Each verb in our corpus was marked with the following attributes and values, arrayed in columns:

A. Verb root

B. Verb gloss

C. Aktionsart category = {state; neg(ative) state; transitory state/result state/inchoative state (CofS – a context-sensitive category found in all Australian languages endowed with so-called "inchoative" verb classes / derived verbs, cf. Caudal et al. 2012); activity; iterated activity; bounded activity; bounded iterated activity; inchoative activity; unbounded change-of-state; achievement; iterated achievement; bounded iteration of achievement; hab(itual) achievement; accomplishment; iterated accomplishment; hab(itual) accomplishment; hab(itual) achievement; semelfactive (single atomic event); iterated semelfactive}

D. Complex event structure = {CUMulative; AToMic; PLURactional; ATM TEL (telic atomic event); ATM TEL GROUP (group of atomic telic events constituting a non-scalar, complex atom); ATM PREP (atomic event with a preparatory stage); ATM SEM (single atomic semelfactive event); ATM INCH (atomic inchoative event—the underlying Aktionsart is CofS); STATE HABitual; CUM BD ACT (bounded cumulative activity event); CUM BD BD ACT MAX (bounded cumulative event quantified by some overt durative adverbial or other quantifier, or due to the ':::' durative intonation); CUM UBD ACT (unbounded reading of a cumulative, activity event); CUM UBD STATE (unbounded reading of a cumulative, stative event); INCR Q (quantity incrementality—i.e., event involves an incremental theme/patient argument, Dowty (1991)), INCR I (quality incrementality—event is telic and scalar but does not involve an incremental theme/patient argument) (Caudal and Nicolas 2005); PLUR ACT (pluractional activity); PLUR ACH (pluractional achievement); PLUR ACC (pluractional accomplishment); PLUR BD ACH (bounded pluractional achievement); PLUR BD ACC (bounded pluractional accomplishment); HAB ACH (habitual achievement); HAB ACC (habitual accomplishment); ATM SEMelfactive (single event semelfactive, i.e., semelfactive atomic event)}

E. Scalarity = {n(on scalar); b(inary scale); open scale; closed max(imal scale); dna (does not apply)}

F. Control(ling subject) = {y(es);n(o)}

G. Viewpoint aspect={IMPFV (imperfective); PFV (perfective); PERF (perfect; resultative viewpoint); PFV-Weak (weak perfective)} (where 'weak perfective' correspond to non-culminating readings of telic utterances, cf. Martin (2019))

H. Present anchoring in (complex) clause or wider context= {x = unspecified; m = present modifier; i = inflectional present marking}

I.   Past anchoring in (complex) clause or wider context = {x = unspecified; m = past modifier; t = past tense marking; t >> past tense marking of matrix clause; pctx = wider past context (narrative, or prompt)}

J.   Aspect quantifier = {x = unspecified; d = durative modifier; i = iteration marker or context; r = reduplication; l = lengthening intonation with durative meaning, especially in the sense of Mailhammer and Caudal (2019); h = habitual context or marker}

K.   Temporal succession = {c = connective; x = unspecified; it = iteration with micro succession; lli = linear lengthening (bounded on the right, with temporal succession); cons = construction imposes temporal succession; p = parataxis with sequence of events; o = (temporal) overlap; c = connective imposing temporal ordering; clit = temporal clitic; r = resultative; rep = 'once more' (repeated)}

L.   Structural context (set of discourse relations introducing the relevant utterance (V1 clause in column O) into context) = {Narration; Background; Backgr(ound) (Background$_{Forward}$, cf. Asher et al. (2007)); Fore(ground)Back(ground) (=Back ground$_{Backward}$, ibid.); Argu Epist = argumentative discourse relation with epistemic-inferential function (cf. the SDRT relation *Question/Answer Pair*); Argu Deon = argumentative jussive discourse relation (order, suggestion) with indicative antecedent utterance/clause/discourse unit; Argu Q/A-P = *Question/Answer Pair* relation; Temp-Shift = forced temporal shift – with e.g. some 'then' clitic/particle}

M.   Example temporal reading = {past; present}

N.   TA context = {SoE = sequence of events; PstMod = past modifier; AspMod = aspectual modifier; EpistMod = Epistemic Modifier; PerfMod = perfect modifier; -PST = past inflection;—∅ = zero inflection; -PR = present inflection; -IRR.PST = past irrealis inflection; Coord PST = V-Ø coordinated with V-PST; DiscCon = discourse connective; DiscCon SoE = discourse connective precedes USP segment; SoE-PST (DiscCon/parataxis) = first or previous segment of the SoE is marked in the past; Overlap = temporal overlap (with a backgrounded clause); Overlap-PST = temporal overlap in the past; TempShift = temporal shift context (e.g., discontinuous states); Metalinguistic: metalinguistic context; XTD = durative lengthening (especially linear lengthening intonation); RED = morphological reduplication; RED-echo = full (word) reduplication; Sim = simultaneous events; V = verb; Iter = iteractive predicate; Hab = habitual marker/context; Rel = relative clause; X >> Y = matrix X dominates Y; AspClit = aspectual clitic; PST prompt = past prompt; CausSub = causal subordinate clause; <<: temporal precedence relation; >>: syntactic dominance relation}

O.   Overt TA pattern = {V1-∅: relevant annotated verb (with zero inflection); V-3/-V-2/V-1/V0-: verbs preceding annotated verb; V+1/V+2+V+3+V+4 = verbs following annotated verb; IRR.PST = past irrealis; PST = past; PR = present; :::= durative lengthening}

P.   Comment on annotation

Q.   Example in Anindilyakwa

R.   Example gloss

S.   Example translation

T.   Example source

U.   Example genre (narrative or elicitation (video stimuli, translation ask, or flash card stimuli—speakers were shown flashcards with verb forms and asked to provide an utterance then comment on it)

V.   Other notes

Aktionsart is a synthetic class-based labelling; it comprises many more classes than the average neo-Vendlerian inventory. It notably opposes bounded vs. unbounded sub-classes of various type of atelic event predicates.

Complexity highlights aspectual complexity in context, with a labelling breaking down major Aktionsart classes (*ACHievements, ACComplishments, ACTivities, STATes, SEMelfactives*) into some more fine-grained subclasses and interpretative nuances, characterizing

them as combinations of aspectual parameters, such as telicity, cumulativity, stativity, atomicity, scalarity and some other aspectual or aspectuality-related parameters (it is therefore in part redundant with our *Aktionsart* labelling). These notably comprise:

- different types of incremental, non-atomic telic utterances—i.e., when an incremental, scalar reading gets projected onto the internal structure of some theme/patient argument, we annotated the data point as INCR Q (for *quantity incrementality*, cf. the object argument of English verb *eat*), when it does not, we annotated the datapoint as INCR I (for *intensity incrementality*, cf. the subject argument of English verb *ripen*);
- different sub-kinds of atomic events: *ATM SEM* signals single-event readings of normally semelfactive utterances; *ATM TEL PREP* refers to the class of atomic telic utterances implicating a so-called preparatory stage—cf. English *arrive* or *reach*; *ATM TEL GROUP* refers to atomic events involving plural entities (nominal referents or event referents) treated as a single unit, i.e., a group (such 'atomic groups', though plural at some abstract level, effectively contribute to forming a single atomic event; the term was coined after theories of nominal reference à la Link/Landman, see Landman (1989a, 1989b)); *ATM INCH* refers to inchoative readings of verbs normally ambiguous between stative and change-of-state, inchoative interpretations, due either to special derivational morphology (cf. Aktionsart class *CofS*), or to a merely contextual inchoative reading of a *bona fide* atelic (especially stative) verb;
- event plurality/pluractionality (*PLUR*), vs. habituality (*HAB*). But most crucial to our study is:
- boundedness (*BD*) vs. unboundedness (*UBD*, with *BD MAX* marking overt maximized duration; BD-marked readings stem from contextual information, e.g., through discourse connectives and discourse relations. *BD MAX* utterances only appeared with the 'for a long time' intonation (:::); no examples with limited duration adverbials were found within our zero tense corpus—but see Bednall (2020) for some examples with past tense marking.

Notes

[1] Bickerton (1981, p. 84) claims that dynamic utterances systematically trigger a past temporal anchoring for the zero tense in Sranan, while stative utterances receive a (default) present temporal anchoring.

[2] Smith (2006, p. 97) and Smith et al. (2007, p. 61) name it "the Temporal Schema Principle"—but *temporal schema* in their terminology refers to the aspectual properties of an event, and more specifically to the interaction of aspectual viewpoint with event structural information. The boundedness vs. unboundedness opposition crucially belongs to this notional domain.

[3] See also Giorgi and Pianesi's (1997, pp. 151–52) 'punctuality constraint'—where puncutality refers to perfectively viewed events (rather than non-durative events).

[4] De Wit (2016, pp. 124–25) mentions at least one example where a dynamic utterance in Sranan anchors in the present, though, so it is actually unclear how categorical this aspectual parameter is for temporally anchoring the Sranan zero tense.

[5] Where $e_\alpha/_\beta/$etc. is standard SDRT shorthand notation for *the event referent underlying segments α/β/*etc.

[6] Essentially though, this is because both types of *Background* relations involve a temporal overlap semantic axiom: $\phi_{Background}(\alpha, \beta) \Rightarrow$ overlap(e_β, e_α)

[7] Two types if inchoatively interpreted zero marked-verbs were identified in our corpus: (i) ten verbs bearing an overt morphological marking (effectively alternating between stative and change-of-state meanings, cf. Caudal et al. (2012)), and (ii) five activity verbs with a contextual inchoative reading—four instances of the 'run' (-*angkarrə-*) verb (with a clear 'run off/away' inchoative reading and one cognitive process verb (-*engkərrka-* 'listen/think')—again with a clear coerced reading.

[8] Again, in contrast with *Backgr*(*ound*), noting so-called *Background_{Forward}* relations in our corpus.

[9] (Un)doundedness obviously relates to other binary features (e.g., homogeneous vs. heterogeneous) widely used as 'central' aspectual distinctions in some theories of tense-aspect, from Dowty (1979) to De Swart (1998), including in some some early theories of the relation between aspect and temporal ordering in discourse, as they were grounded on a basic opposition between change-of-state/heterogeneous and non-change-of-state/homogeneous aspectual values, cf. e.g., Dowty (1986). See also the related ontological distinction made in DRT and early SDRT works between 'stative' and 'event' discourse referents, with imperfective tenses associating with 'stative' discourse referents, and perfective tenses with 'event' discourse referents, cf. Kamp and Reyle (1993), Asher (1993) and Lascarides and Asher (1993a, 1993b).

[10] We should also stress again that regardless of how they were collected, a large part of our datapoints comprise overt linguistic markers contributing to their aspectuo-temporal and causo-temporal/discourse structural interpretation (e.g., reduplication, linear lengthening, duration phrases, aspectuo-temporal clitics or particles, discourse connectives, and discourse particles or clitics). This is an important safeguard against circular ascriptions of aspectual properties and viewpoint readings, and one we tried to exploit to the full in the individual analysis of each datapoint.

[11] See e.g., https://www.statsdirect.com/help/Default.htm#exact_tests_on_counts/odds_ratio_ci.htm (accessed on 10 November 2021).

[12] On FET and its comparison with the chi-square test, see e.g., Bewick et al. (2004).

[13] The 11 datapoints whose (un)boundedness could not be ascertained will be left aside in the remainder of this paper.

[14] As the present paper focused on the Anindilyakwa zero tense, and the effects of aspectual parameters on its temporal interpretation, we will not discuss any further the precise semantics and pragmatics of the two other indicative tenses found in the language, leaving it to future research as an independent question.

[15] Rather than calculating FET by running the *R* platform on a personal computer, it is possible to use the online biostatistical tool *BiostaTGV* (https://biostatgv.sentiweb.fr/?module=tests/fisher, accessed on 13 November 2022) created by the Institut Pierre Louis UMR S 1136 (INSERM/U. Paris-Sorbonne Université).

[16] The corresponding *R* command is fisher.test(matrix(c(109,7,67,20),2,2, nrow=2)), and yields the same results as the BiostTGV online tool (except for a few decimals).

[17] chisq.test(matrix(c(109,7,67,20), ncol=2))

[18] In R, fisher.test(matrix(c(164,16,12,11),2,2, byrow=TRUE))

[19] chisq.test(matrix(c(164,16,12,11), ncol=2)) gives $p = 1.222 \times 10^{-06}$, with X-squared = 23.543, df = 1, but also a warning the Chi-2 approximation may be incorrect.

[20] In R, fisher.test(matrix(c(36,8,12,11),2,2, byrow=TRUE))

[21] Possibly even non-significant, if we take the value of 0.01 rather than 0.05 as the significance threshold for *p*. It hinges on how conservative we make our measurements.

[22] fisher.test(matrix(c(157,0,19,27),2,2, byrow=TRUE))

[23] fisher.test(matrix(c(27,0,0,14),2,2, byrow=TRUE)) yields $p = 2.838 \times 10^{-11}$, an infinite odds ratio, and a 95% confidence interval [46.09243, Inf]. chisq.test(matrix(c(27,0,0,14), ncol=2)) does not fare better—it also results in a warning that the X-squared approximation might be incorrect; it yields X-squared = 36.673, df = 1, *p*-value = 1.397×10^{-09}.

[24] Interestingly, Caudal et al. (2016) also demonstrated that for an unrelated aspectually (but not temporally) underspecified tense, namely the Old French *passé simple,* boundedness (associated with as definite changeof-state predicate in this work) was a much better predictor of perfective viewpoint meanings than telicity. It is hardly surprising, given that perfective viewpoint functions categorically select for bounded event predicates.

[25] While an anonymous reviewer suggested that Malchukov (2019) offered interesting insights into event structure parameters influencing the temporal interpretation of zero(-)tenses, we feel we must disagree. Malchukov (2019, p. 19) explicitly claims that "there is no direct interaction between actionality and tense here, but the interaction is mediated by the mechanism of default aspect. Indeed, there is no reason to view a combination of a dynamic event and present tense as infelicitous; accomplishments are regularly used in the present tense without restrictions, as it is most clear for languages where aspect is lacking". Malchukov's claims directly contradict some of our results, where it appears that zero tense accomplishment utterances are significantly less anchored in the present than in the past, achievement and bounded utterances always anchor in the past, etc. Although determining whether Malchulov's 'implicational hiearchy' could yield interesting generalizations for the temporal interpretation zero tenses is beyond the scope of the present paper, we would also like to point out that said hierarchy is effectively based on an extremely coarse-grained ontology of aspectual types of event predicates. Our annotation results rather seem to suggest that a larger number of aspectual parameters than those underlying Malchulov's hierarchy might play some role as well in those phenomena—which, we believe, indicates that a simple scale (i.e., a straightforward linear, one-dimensional ordering or aspectual parameters) is maybe not an option: the greater the number of aspectual parameters, the more problematic its linearization on a single dimension is likely to be. But of course, closer scrutiny of such questions must be left to further research—even for Anindilyakwa, for which a larger corpus would be very much necessary to 'zoom in' on numerically smaller aspectual classes of event predicates, and the related aspectual parameters.

[26] More specifically, she claims they are anchored to a (past) perfective reading, which she contrasts with a present (imperfective) reading—and thus intuitively appeals to something like the 'present perfective' paradox, i.e., perfective entails past. 'Perfective' and 'imperfective' tenses in Bybee (1990) are explictly connected with bounded vs. unbounded events, which they respectively select (and convey). However, one might wonder how much of the past anchoring effect of dynamicity is in fact due to *telic* dynamic events in her data, or *bounded* atelic events – it possibly does not obtain with *unbounded* atelic dynamic events.

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