The status of degrees in Warlpiri

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I Introduction[1]

Recent work in semantics has shown that languages can vary in whether or not they include degrees (that is, elements of type $< d >$) in their semantic ontology. Several authors have argued that their languages of study lack degrees, including Bochnak (2013) for Washo (isolate, USA), Pearson (2009) for Fijian (Austronesian, Fiji), and Beck, et al. (2009) for Motu (Austronesian, Papua New Guinea). In this paper, I follow the tests proposed in Beck, et al. (2009) to assess the status of degrees in Warlpiri (Pama-Nyungan, Australia).

I use Warlpiri data collected following the Beck, et al. survey to argue that Warlpiri gradable predicates do not combine with a degree argument. (Like many other Australian languages, adjectival concepts like *big* and *small* are expressed using nouns in Warlpiri (Dixon 1982, Bittner & Hale 1995, among others). I refer to these lexical items as "gradable predicates" in this paper.) This paper represents a first pass at assessing the status of degrees in an Australian language, which have otherwise been unexamined from the point of view of degree semantics.

II Treatments of gradable adjectives with and without degrees

Degree semantics is concerned with data such as measure phrases, comparatives, and gradable predicates more generally. Degree arguments are employed to specify degrees along a lexically supplied scale. In an utterance like *John is taller than Mary*, the scale is one of tallness; in an utterance like *The cat is bigger than the dog*, the scale is one of bigness, and so on (Bartsch & Vennemann 1972, Cresswell 1976, Heim 2001, among others).
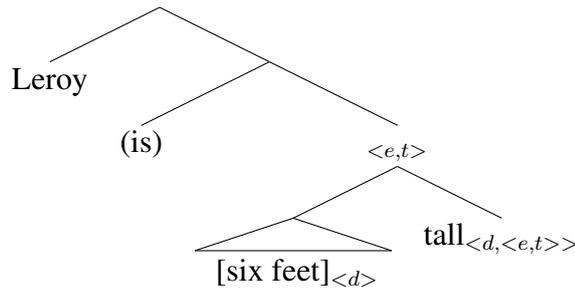
Treatments of adjectives under degree semantics propose that gradable adjectives like *big*, *tall*, and so on combine with a degree argument at some point in the derivation, as in the denotation in (1). This degree argument can be overt, as in (2):

(1) ⟦tall⟧ = $\lambda d \lambda x.$ tall(x,d)

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(2) Leroy is six feet tall.

```
              Leroy
                 \
                (is)
                      <e,t>
                     /    \
              [six feet]<d>   tall<d,<e,t>>
```

Alternately, the degree argument that the adjective combines with can be covert, as in a positive (i.e., unmarked) utterance like *Leroy is tall*. This covert morpheme is motivated by the observation that in such a positive utterance, the individual that the gradable adjective combines with must "stand out" in some way with respect to the relevant property. That is, given an utterance like *Leroy is tall*, Leroy's height must be such that he "stands out" as tall in the context (Cresswell 1976, Kennedy 1999, among others). This morpheme therefore functions conceptually to ensure that the value of *tall* meets or exceeds some contextually determined standard of tallness. Proposals for this covert morpheme include Kennedy (1999)'s POS and Rett (2008)'s EVAL, among others; however, I would like to remain agnostic as to the precise denotation of this morpheme, since this issue is outside the scope of this paper:

(3) Leroy is tall.

```
              Leroy
                 \
                (is)
                      <e,t>
                     /    \
              POS/EVAL      tall<d,<e,t>>
     λG<d,<e,t>>λx. ∃d[G(d)(x) & d ≥ stnd]
```
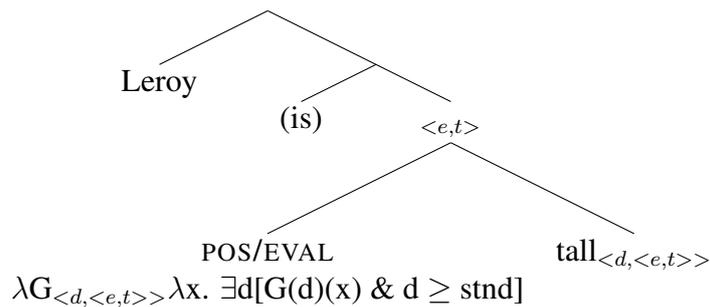
If the semantic ontology of a language lacks degrees, gradable adjectives in that language cannot combine with degree arguments of type $<d>$, as in (2). Furthermore, gradable adjectives that occur in positive utterances, as in (3), cannot combine with a covert degree morpheme to ensure that their degree meets or exceeds some contextual standard.

Assuming a semantic ontology without degrees, the interpretations of gradable adjectives in positive utterances like (3) are typically proposed to arise contextually, following e.g. Klein (1980)'s proposal for English positive gradable adjectives (as in Beck, et al. 2009, Bochnak 2013, among others). This occurs without the addition of any covert degree morphology. In (5) below, the meaning of *tall* is interpreted relative to the context *c*:

(4) $[\![tall]\!]^c = \lambda x.\ tall(x)$

(5) Leroy is tall.

```
                     <t>
                    /   \
              Leroy<e>    \
                       (is)  tall<e,t>
```
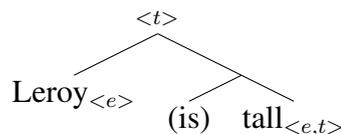
I follow other authors in proposing a treatment of Warlpiri gradable predicates in the spirit of Klein (1980). Klein proposes that gradable adjectives are of type $<e,t>$ and denote partial functions from entities in the universe of discourse to {0,1}. A central part of Klein's proposal

involves the concept of an extension gap. That is, a gradable adjective like *tall* partitions its domain into three sets: the set of individuals that are definitely tall (its positive extension), the set of individuals that are definitely not tall (its negative extension), and the set of individuals that can't be categorized into either its positive or its negative extensions. Klein refers to this latter set as constituting the extension gap. More formally, given a gradable adjective G:

(6) Positive extension of G: $\{x: [\![G(x)]\!] = 1\}$

(7) Negative extension of G: $\{x: [\![G(x)]\!] = 0\}$

(8) Extension gap of G: $\{x: [\![G(x)]\!]$ is undefined$\}$

Furthermore, this partial function is relativized to the context of utterance. That is, every context determines a comparison class of objects that supplies the domain of the adjective. Given any context c and comparison class $C(c)$:

(9) $[\![\text{tall(Leroy)}]\!]^c = 1$ iff Leroy $\in \{x: x$ is definitely tall in c$\}$

(10) $[\![\text{tall(Leroy)}]\!]^c = 0$ iff Leroy $\in \{x: x$ is definitely not tall in c$\}$

(11) $[\![\text{tall(Leroy)}]\!]^c$ is undefined otherwise

Manipulating the set of individuals within the comparison class can affect whether an individual x does or does not qualify as "definitely tall." For instance:

(12) Leroy is tall.
   a. $C(c_1) = \{x: x$ is an elementary school student$\}$
      $[\![\text{tall(Leroy)}]\!]^{c1} = 1$
   b. $C(c_2) = \{x: x$ is a professional basketball player$\}$
      $[\![\text{tall(Leroy)}]\!]^{c2} = 0$

I propose that Warlpiri utterances take the form of (5), with the truth conditions for (5) given in (9). As discussed by Beck, et al. (2009), this lack of a degree argument makes predictions about the availability and unavailability of certain utterances, which I will discuss in the following section. As I will show, Warlpiri speakers manipulate comparison classes, as discussed in (12), to express some utterances that are often expressed using degree modifiers in languages with degrees.

III   Warlpiri data

The contact language used in my elicitations was English. However, as I will show, Warlpiri lacks many degree constructions that exist in English. I will therefore provide both the target utterance given in English ('Nyirrpi is smaller than Yuendumu') and a literal gloss of the response given in Warlpiri (e.g. 'Nyirrpi is small, Yuendumu is big'). See section V for a discussion of my fieldwork methodology.

III.I   Measure phrases and measure expressions

Warlpiri does not have measure phrases, as in *John is 6 feet tall*. This unavailability of measure phrases is predicted if there is no place for a degree argument in the syntax, as shown in the tree in (5) above.

When prompted with an English sentence containing a measure phrase, Warlpiri speakers often omit the measure phrase and provide an utterance simply containing the unmarked form of the gradable predicate. The choice of predicate is based on context:

(13) *Context:* We are discussing the height of the speaker's son, who is in the third grade.

    Ngaju-nyangu kaji-nyanu wita.
    1SG-POSS   son-POSS small.
    Prompt: 'My son is 3 feet tall.'
    Literally: 'My son is short.'[2]

Alternately, speakers can code-switch to English to express the measure phrase. The same context is maintained as above; note that in (14), the speaker switches to describing their son as *kirrirdimpayi* 'tall':

(14) *Ngaju-nyangu kaji-nyanu kirrirdimpayi,* 5 feet tall.
     1SG-POSS   son-POSS tall,   5 feet tall
     Prompt: 'My son is 5 feet tall.'
     Literally: 'My son is tall, 5 feet tall.'

These instances of code-switching almost always place the English measure phrase clause-finally, and precede it with a distinct intonational break. This peripheral placement and atypical prosody suggests to me that the English measure phrase is not in fact occupying a degree slot in the Warlpiri semantics, and therefore is not problematic for a degree-free treatment of Warlpiri. However, I will return to this data point later in the paper.[3]

III.II Comparatives

Warlpiri speakers can express comparatives using implicit comparison constructions (ICs), as described by Kennedy (2009). That is, comparison in Warlpiri is not achieved through specialized comparative morphology used to express ordering relations (e.g. English *-er*). Instead, speakers use the inherent context sensitivity of the positive, unmarked form of gradable predicates to indicate comparison.

Warlpiri ICs can take two different forms. In one form, the speaker asserts that a predicate like *small* holds of one individual, and that an antonymic predicate like *big* holds of another individual:

(15) *Nyirrpi=ji   nguru yukanti. Yurntumu=ju   wiri-jarlu.*
     Nyirrpi=TOP country small   Yuendumu=TOP big-AUG
     Prompt: 'Nyirrpi is smaller than Yuendumu.'
     Literally: 'Nyirrpi is small. Yuendumu is big.'

(16) *Japanangka-rlu ka   marda-rni wirrkardu marlu=ju.   Jangala-rlu ngula=ju*
     Japanangka-ERG AUX have-NPST few   kangaroo=TOP Jangala-ERG that=TOP
     ka   marda-rni panu.
     AUX have-NPST many
     Prompt: 'Japanangka has fewer kangaroos than Jangala.'
     Literally 'Japanangka has few kangaroos. That Jangala has many.'

In another form, the speaker states that a predicate is true of one item, and false of another:

(17) *Napaljarri=ji   kirrirdimpayi, Nakamarra lawa.*
Napaljarri=TOP tall   Nakamarra no
Prompt: 'Napaljarri is taller than Nakamarra.'
Literally: 'Napaljarri is tall, Nakamarra is not.'

(18) *Jupurrurla-rlu ka   marda-rni yakajirri   panu. Jangala lawa.*
Jupurrurla-ERG AUX have-NPST bush.raisin many Jangala no
Prompt: 'Jupurrurla has more bush raisins than Jangala.'
Literally: 'Jupurrurla has many bush raisins. Jangala does not.'

ICs are the primary comparative strategy in several other languages that are also argued to lack degrees, including Washo (Bochnak 2013) and Motu (Beck, et al. 2009). Stassen (1985) counts 20 languages in his typological survey that utilize this comparative strategy as their primary means of comparison, including the Australian languages Gumbaynggirr and Mangarayi (Stassen 1985: 183-185).

Finally, Warlpiri speakers can also use the dative case marker to express comparison, a construction that I return to in section IV:[4]

(19) *Napaljarri=ji   ngula=ju kirrirdi=jiki, Nakamarra-ku=ju.*
Napaljarri=TOP that=TOP tall=JUKU   Nakamarra-DAT=TOP
Prompt: 'Napaljarri is taller than Nakamarra.'
Literally: 'That Napaljarri is tall for/to Nakamarra.'

III.III   Differential comparative constructions

In differential comparative constructions, the degree of difference between the compared items is explicitly specified, as in *John is one year older than Mary*. These constructions are unavailable in Warlpiri. Instead, speakers omit the degree phrase and use either an IC or some other periphrastic utterance:

(20) *Japangardi=ji   ka   nyina kamparru-warnu Jakamarra-ku=ju.*
Japangardi=TOP AUX be   before-LOC   Jakamarra-DAT=TOP
Prompt: 'Japangardi is three years older than Jakamarra.'
Literally: 'Japangardi is before Jakamarra.'[5]

III.IV   Comparison with measure phrases

Warlpiri does not have standardized constructions to express comparison with measure phrases, as in *John is older than five years*. Instead, speakers omit the measure phrase and give the unmarked form of the predicate, as appropriate for the context:

(21) *Jakamarra=ju   ngula=ju kirrirdimpayi.*
Jakamarra=TOP that=TOP tall
Prompt: 'Jakamarra is taller than one meter.'
Literally: 'That Jakamarra is tall.'

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[4]The data in (19) does not involve morphology that uniquely makes reference to degrees (like the English comparative suffix *-er*). That is, the Warlpiri dative case marker *-ku* is a fully productive, canonical dative case suffix that also occurs in other constructions.

[5]Like English *before*, the Warlpiri lexical item *kamparru* 'before' has a spatial usage as well as a temporal usage.

(22) *Nangala-rlu ka panu marda-rni maliki.*
Nangala-ERG AUX many have-NPST dog
Prompt: 'Nangala has more than five dogs.'
Literally: 'Nangala has many dogs.'

III.V   Subcomparative constructions

Warlpiri does not have subcomparative constructions like the English utterance *The drawer is wider than it is long*. My consultants reacted very negatively to attempts to elicit these constructions; one consultant commented explicitly that you could only compare two individuals, not the properties of one individual:

(23) *Kurdiji=ji kirrirdi-karrikarri, manu wantiki.*
shield=TOP tall-somewhat   and   wide
Prompt: 'The shield is longer than it is wide.'
Literally: 'The shield is somewhat long, and wide.'

III.VI   Superlatives

Warlpiri has no dedicated superlative morphology or construction used to express superlatives like *John is the tallest child*. Instead, speakers make an assertion that is either unmarked, or combined with an intensifier like the nominal suffix *-nyayirni* (I discuss this intensifier in section IV.IV.I.I):

(24) *Jangala=ju wirijarlu-nyayirni.*
Jangala=TOP big-AUG
Prompt: 'Jangala is the biggest child.'
Literally: 'Jangala is very big.'

(25) *Nakamarra-rlu ka marda-rni panu jarntu.*
Nakamarra-ERG AUX have-NPST many dog
Prompt: 'Nakamarra has the most dogs.'
Literally: 'Nakamarra has many dogs.'

This observation is in accordance with typological work showing that there appear to be no languages with dedicated superlative morphology that lack comparative morphology (Bobaljik 2012, Stassen 1985). Given this typological observation, it would be unexpected if Warlpiri had superlative morphology despite its absence of dedicated comparative morphology.

III.VII   Equatives

Warlpiri has no equative construction that targets particular scales of similarity like the English *John is as tall as Mary*. Instead, Warlpiri equatives can be expressed using the nominal suffix *-piya* 'similar to' (which I discuss in section IV.IV.I.III):

(26) *Japaljarri=ji rdangkarlpa, Jakamarra-piya.*
Japaljarri=TOP short   Jakamarra-similar.to
Prompt: 'Japaljarri is as short as Jakamarra.'
Literally: 'Japaljarri is short, like Jakamarra.'

This suffix does not target the particular scale on which the compared individuals are similar (tallness, shortness, etc.). Instead, the nominal suffix *-piya* 'similar to' refers to a general similarity between the two individuals. This suffix frequently occurs in Warlpiri responses to prompts including English similatives, e.g. *The boy barked like a dog*.

Another strategy for expressing equatives in Warlpiri involves stating that the predicate holds of both individuals. This construction does not specify that both individuals instantiate the predicate to (at least) the same degree, as the English equative does. Instead, the speaker simply asserts that both individuals can be described with the same gradable predicate in the same context. The following utterance would be felicitous in a context in which Jungarrayi was running at 8 km/h and Japangardi was running at 10 km/h, as long as both individuals were running at a speed that could be considered *wakurturdu* 'fast':

(27) *Wakurturdu ka=pala   nyina-mi, Jungarrayi manu Japangardi.*
      fast   AUX=3DU.SUBJ be-NPST Jungarrayi and   Japangardi
      Prompt: 'Jungarrayi is as fast as Japangardi."
      Literally: 'They (two) are fast, Jungarrayi and Japangardi."

Like the lack of superlatives in III.VI, this lack of equatives is also in accordance with the typological observation that there appear to be no languages with dedicated equative morphology that lack comparative morphology (Bobaljik 2012, Stassen 1985).

III.VIII   Degree questions

Warlpiri has no dedicated construction used to ask degree questions, as in *How tall is your son?* Speakers instead use polar questions or non-degree Wh-questions:

(28) *Tarnnga-mayi=npa   nyina-ja?*
      long.time-Q=2SG.SUBJ be-PST
      Prompt: 'How long were you in Western Australia?'
      Literally: 'Were you (there) a long time?'

(29) *Nyiya-piya   ka   kaja-nyanu nyina-mi?*
      what-similar.to AUX son-POSS   be-NPST
      Prompt: 'How old is your son?'
      Literally: 'What is your son like?'

III.IX   Summary of Warlpiri data evaluated with respect to Beck, et al. (2009)'s criteria

Beck, et al. (2009) survey degree constructions in 14 different languages across a range of language families. This survey provides a set of core data for comparison of the languages. In particular, Beck, et al. are interested in whether the language of study shares properties with the better-understood degree constructions in English. The following table summarizes how Warlpiri is evaluated relative to this questionnaire:

Degree construction	Available in Warlpiri?
Explicit comparatives	no
Differential comparatives	no
Comparison with degrees	no
Degree questions	no
Measure phrases	no
Subcomparatives	no
Explicit equatives	no
Superlatives	no

In order to account for the descriptive coverage of this survey, Beck, et al. (2009) propose a set of degree parameters that can be active or inactive in any given language. The settings of these parameters determine the availability of the degree constructions that they discuss. These parameters are as follows:

(30) **Degree Semantics Parameter:**
A language {does/does not} have lexical items that introduce degree arguments (e.g. gradable predicates of type $< d, < e, t >>$)

(31) **Degree Abstraction Parameter:** (previously discussed in Beck, Oda & Sugisaki 2004)
A language {does/does not} have lambda-binding of degree variables

(32) **Degree Phrase Parameter:**
The degree argument position of a gradable predicate {may/may not} be overtly filled

Negative settings of these parameters preclude the availability of certain degree constructions. For instance, if a language has a negative setting of the DAP, then any constructions involving binding a degree variable (e.g. English-type comparatives, subcomparatives, measure phrases, and so on) should be unavailable in the language.

Furthermore, Beck, et al. note that there are certain entailment relationships between these parameters. For instance, if a language has a negative setting of the DSP, then it must also have a negative setting for the DAP and DPP. They describe only one language in their sample, Motu, as having negative settings of all three parameters. I propose that Warlpiri, like Motu, also has negative settings for all three of Beck, et al.'s degree parameters. That is, Warlpiri predicates that are glossed with gradable predicates in English in fact have degree-less denotations like in (4). This falls out from a negative setting of the DSP, which in turn leads to negative settings of the DAP and DPP.

IV   Potentially problematic data

Warlpiri has several lexical items that appear as if they could be argued to invoke degrees, stemming in part from the fact that their English glosses include degree modifiers like *slightly* and *very*. In section IV.I, I will address each of these lexical items in turn, and show that an

understanding of them does not require degrees.

Warlpiri	English gloss
-nyayirni	'real,' 'very,' 'prototypical'
-piya	'similar to'
-karrikarri	'a little bit,' 'slightly,' 'somewhat'
-katu	'only'(?)[6]
-ku	'DAT'

In section IV.II, I address a context in which it seems as if a degree-less analysis might be problematic, and similarly show that it is not.

IV.I   Potentially problematic data: lexical items

I group my discussion of these lexical items thematically. First I discuss *-nyayirni* and *-karrikarri*, which each take a single individual argument and manipulate the truth value of the predicate applied to this individual across contexts. Then I discuss *-piya* and *-ku*, which take two individual arguments and manipulate comparison class membership.

IV.IV.I.I   *-nyayirni* 'real,' 'very,' 'prototypical'

The nominal suffix *-nyayirni* supplies an intensificational reading of the lexical item it combines with. Its English glosses are lexical items that have been proposed to modify degrees, e.g. *very*. This suffix can combine with Warlpiri gradable predicates, as in (33)-(34), and also with more canonically nominal lexical items like (35)-(36). In the latter case, *-nyayirni* supplies a reading that the noun it combines with is "prototypical" or "canonical":

(33)   *wiri-nyayirni* 'very big'

(34)   *wita-nyayirni* 'very small'

(35)   *ngapa-nyayirni* 'fresh water'

(36)   *jarntu-nyayirni* 'real dog' (i.e, not a dingo)

Interestingly, *-nyayirni* patterns identically in its distribution and interpretation to the Washo suffix *-šemu*, described by Bochnak (2013).[7] Following Bochnak (2013), I propose that the denotation of *-nyayirni* is as follows:

(37) $[\![$*-nyayirni*$]\!]^c$ = λPλx. $\forall$c[P(x) = 1 in c]

That is, given a predicate P and an individual x, *-nyayirni* indicates that $P(x)$ is true in all contexts. This works in the following way:

(38)   *Jarntu wiri-nyayirni.*
        dog   big-INTENSE
        'The dog is very big.'

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[6]I set aside a discussion of *-katu* for the moment, since I don't have enough data on it.

[7]Beltrama & Bochnak (2015), in addition to discussing *-šemu*, also discuss a similar proposal for the Italian suffix *-issimo*. However, this includes an additional expressive component that is not relevant for the Warlpiri data.

For a Warlpiri speaker to felicitously assert (38), the size of the dog must be such that the dog could felicitously be described as 'big' in all contexts. This includes contexts in which the size of the dog is evaluated relative to a comparison class that includes extremely large dogs, for instance, mastiffs and great danes (similar to a proposal for English *very* by Wheeler (1972)). This leads to an intensified reading of 'big.'

Assuming a denotation of *-nyayirni* as in (37), the ability of this suffix to combine with "canonical" referential nominals like *ngapa* 'water' suggests that all nominals in Warlpiri, not just gradable predicates, have a denotation similar to (4) and are evaluated relative to a contextually determined comparison class. That is:

(39) $[\![water]\!]^c = \lambda x.\ water(x)$

(40) *Nyampu=ju ngapa-nyayirni.*
      this=TOP   water-INTENSE
      'This is real water.'

(41) $[\![water\text{-}nyayirni]\!]^c = \lambda x.\ \forall c[water(x) = 1\ in\ c]$

Interpreting (41) requires some cultural knowledge about the most important properties of water in Warlpiri country; among other things, this includes that it can be safely drunk. (40) asserts that in all contexts, the item being considered counts as water, i.e., it always instantiates the most important properties of water.

IV.IV.I.II *-karrikarri* 'a little bit,' 'slightly,' 'somewhat'

The nominal suffix *-karrikarri* supplies an attenuative reading of the lexical item it combines with. That is, while *-nyayirni* marks something like category centrality, *-karrikarri* marks something like category marginality.[8] This leads to an attenuative reading that my Warlpiri consultants often gloss with an English degree modifier like *slightly*. Like *-nyayirni*, *-karrikarri* can combine with gradable predicates, as in (42)-(43). This suffix can also combine with more canonically nominal lexical items, as in (44)-(45); however, my consultants noted that you would need to have particular contexts for these utterances to be felicitous:

(42) *wita-karrikarri* 'slightly small'

(43) *wiri-karrikarri* 'slightly big'

(44) ?*tija-karrikarri* 'somewhat of a teacher'

(45) ?*yuwarli-karrikarri* 'somewhat of a house'

I refer to Klein (1980)'s extension gaps to give a denotation of *-karrikarri*:

(46) $[\![\text{-}karrikarri]\!]^c = \lambda P \lambda x.\ P(x)$ is undefined in c

The denotation in (46) states that the value of the predicate P applied to an individual falls within the extension gap of P. That is, $P(x)$ is neither true nor false in the context. For instance, in (47) below, the context makes stick A the most salient member of the comparison class for evaluating the length of stick B:

(47) *Context:* We are discussing the lengths of two sticks. One stick is slightly shorter than the other (stick A = 12cm long; stick B = 10cm long). The consultant is describing the length of stick B:

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[8]*-nyayirni* and *-karrikarri* cannot co-occur on the same lexical item.

Nyampu=ju wita-karrikarri.
this=TOP   small-DIM
Consultant's gloss: "This one is a little bit small."

Given this comparison class, it would be infelicitous to describe stick B as *kirrirdi* 'long,' since it is markedly shorter than stick A. However, since there is only a relatively small difference in length between stick A and stick B, this consultant felt that it would also be inappropriate to describe stick B as *wita* 'small.' (That is, for this consultant, stick B $\notin$ {x: x is definitely small in c}.)[9] Since the speaker does not judge stick B as falling into the extension of either things that are definitely small in c or things that are definitely not small in c, they use *-karrikarri* to assert that stick B is included within the extension gap of *wita* 'small' in this context.

IV.IV.I.III   *-piya* 'similar to'

The nominal suffix *-piya* takes two individual arguments and one property argument. By using *-piya*, a Warlpiri speaker asserts that the predicate P is true of both individuals, and that both individuals are members of the same comparison class. That is: both individuals are members of the same set of entities against which the meaning of the gradable predicate is evaluated. While Klein (1980)'s comparison classes are picked out by context, I propose that in Warlpiri, functional morphemes, in addition to context, can alter the membership of the comparison class.

Given this assumption, I repeat an example from section III.VII:[10]

(48)   *Japaljarri=ji   rdangkarlpa, Jakamarra-piya.*
       Japaljarri=TOP short   Jakamarra-similar.to
       Prompt: 'Japaljarri is as short as Jakamarra.'
       Literally: 'Japaljarri is short, like Jakamarra.'

I assume the following denotation for *-piya*. I use the notation $C(c)$ to refer to the comparison class picked out in a given context c:

(49) $\llbracket\textit{-piya}\rrbracket^c = \lambda y \lambda P \lambda x.\ P(y)\ \&\ P(x)\ \&\ x,y \in C(c)\ \&\ x \neq y$

Given a denotation for *-piya* as in (49), the truth conditions for (48) are as follows:

(50) $\llbracket\textit{Japaljarri rdangkarlpa Jakamarra-piya}\rrbracket^c$
       = 1 iff short(Japaljarri) & short(Jakamarra) & Japaljarri,Jakamarra $\in$ C(c)
         & Japaljarri $\neq$ Jakamarra

If Japaljarri and Jakamarra can both be felicitously described as *rdangkarlpa* 'short' in the same context, then it follows that the two individuals have similar heights.[11] That is, the heights of each individual are such that they both fall within the extension of "definitely short" in the context. This expresses a similar meaning to the English equative prompt in (48).

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[9]Other consultants found it felicitous to simply describe stick B as *wita* 'small' in this context, without any modification by *-karrikarri*. These speakers evaluated the length of stick B to be such that it fell within the extension of {x: x is definitely small in c}. Since this category boundary is somewhat fuzzy, I don't find it problematic that speaker judgments involving this boundary are subject to variation. I discuss crisp judgment contexts like (47) further in section IV.II.

[10]I ignore the topicalization clitic =*ji/=ju* in the truth conditions for (50) and (53). I have no reason to believe that its presence or absence affects the truth conditions for either of these utterances. The exact contribution of this clitic is still not well understood.

[11]Klein (1980: 14) discusses how, given a gradable predicate G, $G(x)$ is considered undefined if x greatly

IV.IV.I.IV *-ku* 'DAT'

The nominal suffix *-ku* takes two individual arguments and one property argument. Like *-piya*, *-ku* also manipulates comparison class membership. By using *-ku*, a Warlpiri speaker asserts that the predicate P is true of one of the individuals, and that the comparison class contains only the two individuals. This follows the spirit of Pearson's (2009) proposal for the Fijian directional particle *mai*.[12] I repeat (19) from section III.II:

(51) *Napaljarri=ji   ngula=ju kirrirdi=jiki, Nakamarra-ku=ju.*
      Napaljarri=TOP that=TOP tall=JUKU   Nakamarra-DAT=TOP
      Prompt: 'Napaljarri is taller than Nakamarra.'
      Literally: 'That Napaljarri is tall for/to Nakamarra.'

   As described above, I propose the following denotation for *-ku*:

(52) $[\![\text{-}ku]\!]^c = \lambda y \lambda P \lambda x.\ P(x) = 1\ \&\ C(c) = \{x, y\}\ \&\ x \neq y\ \&\ \neg\exists z: z \in C(c)$

   Given the denotation in (52), I give truth conditions in (53) for a simplified version of the utterance in (51) (I omit topicalization morphemes, a demonstrative, and the enclitic *=jiki/=juku*, which I discuss briefly in section VI):

(53) $[\![\textit{Napaljarri kirrirdi Nakamarra-ku}]\!]^c$
      = 1 iff tall(Napaljarri) = 1 & C(c) = {Napaljarri, Nakamarra}
       & Napaljarri $\neq$ Nakamarra & $\neg\exists z: z \in C(c)$

   These truth conditions require that Napaljarri be considered "definitely tall." Crucially, the set of entities against which the height of Napaljarri is evaluated contains only Napaljarri and Nakamarra. Assuming Klein's comparison class proposal, the requirement in (53) that Napaljarri count as "definitely tall" similarly requires that the height of Nakamarra be such that, when the height of Napaljarri is considered with respect to tallness, Napaljarri can count as "definitely tall." Since $C(c)$ contains only these two individuals, and Nakamarra is not described as "definitely tall," this in turns leads to Nakamarra's height being less than Napaljarri's height.

IV.II Potentially problematic data: crisp judgment contexts

Kennedy (2009) observes that ICs, unlike explicit comparatives (ECs), should be infelicitous in what he terms "crisp judgment" contexts. These contexts involve comparison between two items that differ only very slightly on the relevant scale:

(54) *Context:* Leroy is 6'3", and Howard is 6'3½".
      a. ✓ Howard is taller than Leroy.   *(IC)*
      b. # Howard is tall. Leroy is short.   *(EC)*

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exceeds the range of values typically associated with the positive or negative extension of G. That is, if Japaljarri is 5'0" and Jakamarra is only 2'0", the theory predicts that uttering (48) should be infelicitous in this context. This is because the height of Jakamarra is so far beyond the typical positive extension of *rdangkarlpa* 'short' that *rdangkarlpa(Jakamarra)* is considered undefined. Future fieldwork will show if this prediction holds.

[12]Pearson's (2009) proposal for *mai* differs in that she analyses it as presupposing that the domain of discourse includes only the two relevant individuals as well as any other individuals mentioned in P. However, this additional provision is motivated by data which I do not have for Warlpiri. This includes Fijian data on sentences like *Of Peter and Mary, John only likes Peter* (Pearson 2009: 360).

This problem arises since ICs like (54b), by Kennedy's definition, involve positive (i.e., un-modified) uses of the relevant predicates. Positive uses of gradable predicates typically require that the individual "stand out" in some way with respect to the relevant property. Since the height of Howard (6'3½") is judged as *tall* in (54), the height of Leroy (6'3") should therefore be described as *tall* as well. This leads to the infelicity of (54b), which involves the assertion *Leroy is short*.

However, contrary to Kennedy (2009)'s prediction, Warlpiri ICs are felicitous in crisp judgment contexts:

(55) *Context:* We are comparing the sizes of two bush oranges. The bush oranges are almost the same size.

    Watakiyi   nyampu=ju yukanti, nyampu=ju wirijarlu.
    bush.orange this=TOP   small   this=TOP   big
    Prompt: 'This bush orange is bigger than that one.'
    Literally: 'This bush orange is small, this one is big.'

In general, Warlpiri ICs are felicitous in contexts in which one predicate is true of both compared items:

(56) *Context:* We are comparing the sizes of Melbourne and Sydney, which are both very big cities.

    Melbourne=ju   yukanti, Sydney=ji   wirijarlu.
    Melbourne=TOP small   Sydney=TOP big
    Prompt: 'Melbourne is smaller than Sydney.'
    Literally: 'Melbourne is small, Sydney is big.'

(57) *Context:* We are comparing the sizes of flies and ants, which are both small insects.

    Yimangi=ji wirijarlu, nama=ju lawa.
    fly=TOP   big   ant=TOP no
    Prompt: 'Flies are bigger than ants.'
    Literally: 'Flies are big, ants are not.'

I propose that the IC data in (55)-(57) is unproblematic, despite Kennedy's observation. First, Kennedy's account for why ICs should be infelicitous in crisp judgment contexts is predicated on the assumption that, in the language being studied, positive forms of adjectives combine with something along the lines of his POS morpheme, which causes the individual to "stand out" with respect to the relevant property (Kennedy 1999). Only if we assume the use of POS (or another covert morpheme with a similar function) does this issue arise. However, I propose that Warlpiri gradable predicates do not combine with a morpheme like POS; instead, manipulation of the comparison class can cause an individual to "stand out." I note that this account follows Pearson's (2009: 368-369) proposal for Fijian, which similarly permits ICs in crisp judgment contexts.[13]

In fact, the data in (55)-(57) can be accounted for with a comparison class approach. In (55), we construct the context such that the only two individuals in the comparison classes for *yukanti* 'small' and *wirijarlu* 'big' are the two bush oranges we are discussing. Given this

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[13]Interestingly, ICs are infelicitous in crisp judgment contexts in Washo (Bochnak 2013). This suggests that there is variation in the comparative strategies between degree-less languages.

restricted context, the size of the smaller bush orange can be judged as "definitely small" and the use of the positive utterance is licensed. This parallels the following English example:

(58) *Context:* Leroy and Howard are professional basketball players. Leroy is 6'3" and Howard is 6'4". A coach is picking players for their team. The coach can utter:

    a. ✓ Leroy is short.

The utterance in (58a) is felicitous only given the context in (58). If the speaker were discussing the average height of all adult men across the world, (58a) would be infelicitous, since in that context, a height of 6'3" would not be considered *short*. Similarly, although Melbourne is not generally considered *yukanti* 'small,' it can be felicitously described as such when compared to Sydney, as in (56).

V   A note on data collection

Linguists often face problems when trying to elicit constructions that do not exist in their fieldwork language. It can be challenging to assess whether the construction does not exist in the language, if it is available but uncommonly used, if the consultant is unfamiliar with the construction, or if the consultant simply does not understand the prompt and is therefore failing to produce the target utterance.

Fortunately, the target sentences proposed in Beck, et al. (2009), and degree constructions more generally, lend themselves well to using visual stimuli to elicit responses. The use of multiple modalities in elicitations (i.e., visual stimuli as well as verbal prompts given in the contact language) decreases the chance of misunderstandings between linguist and consultant. This technique also provides consultants with more cues to help them arrive at the target sentence. I elicited the data in this paper in part by using visual stimuli created using Pixton for Fun (pixton.com). Visual stimuli took the form of images like the following:

Napaljarri is taller than Nakamarra.
Nakamarra is shorter than Napaljarri.

Data was also elicited using objects collected in the field and brought to the elicitation session (e.g. bush oranges, sticks, leaves, and so on). This use of multiple modalities in elicitation, and "hands on" discussion of tangible objects, gives me a high degree of confidence in the data I have presented.

VI   Conclusion

In this paper, I evaluated the status of degrees in Warlpiri using the questionnaire presented in Beck, et al. (2009). I concluded that it is possible to account for all of the Warlpiri data given in

section III, as well as the challenging data given in section IV, using a degree-free comparison class analysis in the spirit of Klein (1980). I therefore concluded that (according to the Beck, et al. diagnostics) Warlpiri gradable predicates do not combine with any degree morphology, and the language has negative settings for all three degree parameters given in Beck, et al. (2009).

I view the next step in a study of degree semantics in Warlpiri as investigating the behavior of degree achievement verbs like *walyka-jarrimi* 'to cool' (lit. 'cool-become'), *munga-jarrimi* 'to darken' (lit. 'night-become'), and so on. Several authors have proposed that degree achievement verbs, like gradable adjectives, also include degrees in their denotations. For instance, Kennedy & Levin (2008) treat degree achievement verbs as encoding measure of change functions derived from the measure functions of the corresponding gradable adjectives. That is, a verb like *cool* measures the difference in the degree of coolness of an individual x between the beginning and the end of an event. Given this theoretical proposal, it's unclear what the semantics of degree achievement verbs should look like in a language like Warlpiri.

The inclusion of the inchoative *jarrimi* 'to become' in the morphologically complex degree achievement verbs *walyka-jarrimi* 'to cool' and *munga-jarrimi* 'to darken' suggests that an appropriate approach may be along the lines of Bochnak's (2015) analysis of these verbs in Washo. Bochnak gives a semantics for (similarly morphologically complex) Washo degree achievement verbs using a degree-free BECOME operator adapted from Dowty (1979) and Abusch (1986). However, future fieldwork is necessary to see if Warlpiri patterns like Washo with respect to the degree achievement data.

Other Warlpiri data suggests that a comprehensive treatment of gradability may still present challenges. For instance, the (typically temporal) modifier =*jiki/juku* 'still' optionally surfaces in Warlpiri translations of degree construction prompts, as in (19). This suggests that Warlpiri speakers may optionally borrow some sort of scale from the verbal, into the nominal domain.[14] Furthermore, Warlpiri permits temporal modifiers like English *in a day/for a day*, which seem analogous to measure phrases in the nominal modifier domain:

(59) *Ya-nu=rnalu   Darwin-kurra jinta-ku, ngula-jangka nguna-ja=rnalu.*
     go-PST=1PL.EXCL Darwin-ALL   one-DAT that-from   sleep-PST=1PL.EXCL
     'We drove towards Darwin for a day, and then we slept.'

(60) *Yujuku=rnalu   ngarnturnu wanta jinta-ngka.*
     humpy=1PL.EXCL build.PST   sun   one-LOC
     'We built the shelter in one day.'[15]

Today, Warlpiri speakers in Yuendumu learn English alongside Warlpiri. While Warlpiri is the main language spoken at home, lessons at school are taught largely in English and there are many native English speakers providing services in the community. It is possible that, as contact with English (a +DSP language) has increased, the semantics of Warlpiri is changing. This could account for the ability of some speakers to use code-switched English measure phrases, as in (14). Determining the availability of this construction relative to speaker age could shed light on whether this is a recent innovation that has arisen through increased contact with English.

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[14]I note that a similar expression is possible in English, in which a non-temporal modifier use of *still* occurs in a comparative construction:

(1)   Mary is tall, but Susan is still taller.

My consultants sometimes use expressions like (1) to gloss their Warlpiri utterances.

[15]My Warlpiri consultants report that the only unit of time that can be used in these constructions is *parra* or *wanta* 'day,' since Warlpiri historically did not use any other unit to measure time. I have not yet done tests to check the telicity of the sentences in (59)-(60).

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