1 Introduction

Lexical categoryhood is among the most important and vexed issues in linguistics (Givón 1984; Croft 1991; Hengeveld 1992; Bhat 1994; Wetzer 1996; Croft 2001; Beck 2002; Baker 2003).

The division of words into distinct categories . . . is one of the oldest linguistic discoveries, with a continuous tradition going back at least to the Téchnē grammatikē of Dionysius Thrax (c. 100 BC) (Robins 1989: 39) . . . often when students enter their first linguistics class, one of the few things they know about grammar is that some words are nouns, others are verbs, and others are adjectives. Linguistics classes teach them many fascinating things that go far beyond these basic category distinctions. But when those classes are all over, students often know little more about what it means to be a noun, verb, or adjective than they did at first, or indeed than Dionysius did. (Baker 2003:1–2)

Traditional question: Do syntactic categories correspond to universal semantic ones?

Traditional answer: Major parts of speech correspond to notional categories:

- Verbs (prototypically) name (transient) actions, nouns (time-stable) things, etc. (see e.g., Givón 1984, Croft 2001:89)

Such ideas are often criticized (e.g., Newmeyer 1998; Baker 2003) for lack of formal articulation of key notions, and the ready availability of counterexamples (stative verbs don’t predicate actions, some nouns name actions, etc.)

Generally, generative skepticism about a universal semantic characterization of POSs:

Our question . . . is whether semantics can predict which predicates will end up in which lexical category (N, V or A) cross-linguistically. The answer to the question appears to be “no”. . . (von Fintel and Matthewson 2008:152-153)

Main idea: Shift attention away from the search for a universal semantics underlying the categories. Search instead for systematic constraints on denotation induced by category membership.

Main goal: Exemplify such a constraint from the domain of so-called property concepts.

- There are two kinds of denotations that property concept lexemes can have
- Both are available to nouns, whereas only one is available for adjectives.
- The restriction on the denotation of adjectives follows from the assumption that adjectives have to be potentially informative adnominal modifiers.

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ROADMAP

- The empirical domain: possessive and predicative property concept sentences.
- The basic hypothesis: two kinds of property concept lexeme.
- The observation: nouns can belong to either type, adjectives not.
- Derivation of the restriction on adjectives.

2 The empirical domain

Property concept sentences: translational equivalents of sentences with predicative adjectives, as in (1).

(1) Krishna is wise.

Property concept lexemes: the simplest, basic lexemes contributing the ‘adjectival’ content in a property concept sentence.

(2) Generalization intra- and crosslinguistically (FKG 2010; 2015; In prep):
Sentences encoding such propositions can be either predicative or possessive.

a. Krishna is wise.
b. Krishna has wisdom.

Languages showing exclusive or predominant use of possession include: Ulwa (Misumalpan, Koontz-Garboden and Francez 2010; Francez and Koontz-Garboden 2015, In press) Hausa (Chadic, Newman 2000), Basaaá (Bantu, Cameroon; Hyman 2003; Jenks et al. 2013), Bisa (Mande; Naden 1982), Huave (isolates; Kim and Koontz-Garboden 2013), Huitoto (Huitotoan; Minor et al. 1982), Quechua (Myler 2014); Wolof (Niger-Congo; Baglini In prep).

QUESTION: What determines whether a property concept proposition is expressed with a possessive strategy or not?

OUR ANSWER: The meaning of the property concept lexeme involved.

3 Hypothesis: two kinds of property concept lexeme

Basic idea: Possessive morphosyntax reflects possessive semantics, predicative morphosyntax reflects predicative semantics.

— Choice of strategy is determined by the lexical semantics of property concept lexemes

(3) Lexical Semantic Variation Hypothesis:
Property concept lexemes come in two kinds of meaning:

a. Quality characterizing (predicates of portions of mass entities called qualities)
b. Individual characterizing (predicates of individuals)

— Informal intuition:

- Wisdom: characterizes the set of portions of the quality wisdom (as specified below).
- Wise: characterizes the set of wise individuals (in whatever is your favorite way from the literature on adjectives, Cresswell 1977; Klein 1980; von Stechow 1984; Kennedy 1997; Barker 2002, etc.).

PROPOSAL: Quality characterizing lexemes give rise to possessive property concept sentences. Informally:
• Predicating a quality of an individual does not yield a property concept proposition:

(4) Kim is wisdom ≠ Kim is wise.

• Quality characterizing lexemes can therefore not yield the relevant meaning through direct predication.

• But possessively relating individuals to qualities yields a proposition that is true whenever the relevant property concept proposition is true:

(5) Kim is wise. ⇒ Kim has wisdom.

note: the reverse direction does not always hold, at least for English.

• What we need is a semantics modeling quality possession.

4 The semantics of quality possession

(6) Qualities: sets of “portions”, structured like masses are in Link (1983) (see Francez and Koontz-Garboden 2015 for how these relate to Moltmann’s 2009 tropes).

   a. The domain of entities $D_u$ is sorted into a domain $D_e$ of individuals and a domain $D_p$ of portions. $D_u = D_e \cup D_p$.
   b. Qualities are mutually disjoint subsets of $D_p$.
   c. Each quality forms a join semi-lattice under the mereological part-of relation $\sqsubseteq$.

Qualities are related to ordinary individuals by a relation $\pi$, expressed crosslinguistically with possessive morphosyntax.

(7) Quality possession:
For any individual $a$ and quality $Q$, $a$ has $Q$ iff $\exists p[p \in Q \& \pi(a, p)]$

Gradability is modeled using a pre-ordering on qualities.

• Any $Q \subseteq D_p$ is ordered by a total preorder $\preceq$, intuitively ‘smaller or equal to’.

• The preorder $\preceq$ preserves the mereological partial order $\sqsubseteq$

(8) Given a quality $S$, and two portions $p, q \in D_p$,

   $p \sqsubseteq q \rightarrow p \preceq q$

Thus, what is gradable is the “size” of quality-portions possessed by individuals.

This setup makes compositional sense of possessive-predicating PC constructions.

(9) Krishna has wisdom.

(10) a. $[[\text{wisdom}]] = \lambda p.\text{wisdom}'(p)$
   b. $[[\text{have}]] = \lambda P(p)\lambda x \exists p[P(p) \& \pi(x, p)]$
   c. $\exists p[[\text{wisdom}](p) \& \pi(\text{Krishna, } p)]$

(The context sensitivity of possessive predications like (9) is a consequence of contextual domain restriction of the existential quantification. See Francez and Koontz-Garboden 2015 for details.)
5 The observation: Categories and denotations

5.1 Nouns can be quality or individual characterizing

Quality characterizing nouns are common (e.g. Romance, Germanic...). Are there also individual characterizing property concept nouns?

While such nouns are apparently rare, they certainly exist in Basaá, a Bantu language spoken in Cameroon.

Basaá has two classes of property concept lexemes (see Jenks et al. 2013 for arguments):

- A class of possessive predicating property concept nominals like those observed above.
- A class of property concept words —what Hyman et al. (2012) call nominal adjectives (nAs)—that is demonstrably nominal but canonically predicating, hence individual-characterizing (observations from mass/count behavior and pronominal anaphora also support this conclusion).

\( lì-múg\,\text{\`{l}i} \, \text{d}ì-nùní \, \text{línì} \, /\, *\text{tínì} \\
5\text{-quiet} \, 5\text{.PRT} \, 19\text{-bird} \, 5\text{.this} \, 19\text{.this} \\
\) ‘this quiet bird’

Arguments that PC lexemes like \( lì-múg\) ‘quiet’ are nouns:

- They have inherent noun class (and can be found in a wide range of noun classes).
- They head NPs and control agreement on higher modifiers.
- In modification, by contrast with the few genuine adjectives in the language, they subordinate the noun they modify with a connective particle.

Nouns can have either of the two denotations posited for property concept lexemes.

5.2 Adjectives can be individual but not quality characterizing

That there are individual characterizing adjectives is uncontroversial (modulo the possible derivation of the ‘positive form’). Whether there are quality characterizing ones has never been asked.

How would quality characterizing adjectives behave?

\( lì-múg\) Quality characterizing adjectives should:

\( a. \) predicate substance-membership in predicate position.
\( b. \) express intersection with a quality in modifier position.
\( c. \) form the basis for change of state verbs that express change into a substance.

None of these expectations are met by adjectives in any language we are familiar with.

PREDICATION

- In canonical predication with ordinary individuals, we expect the same pragmatically odd meaning we get with \( (pt) \) nominals:

\( lì-múg\) Krishna is wisdom.
Predicative adjective do not give rise to this kind of meaning in English or in any language we are aware of:

(14) Krishna is wise. ≠ Krishna is wisdom.

<table>
<thead>
<tr>
<th>(15) Hebrew</th>
<th>(16) Spanish</th>
</tr>
</thead>
</table>
| a. Krishna navon. ≠ Krishna wise
b. Krishna tvuna.
Krishna wisdom
Krishna is wisdom. | a. Juan está celoso. ≠
Juan is jealous.
‘Juan is jealousy.’

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— While it is difficult to demonstrate non-existence, it seems to be a generalization that:

> Whenever there are noun/adjective minimal pairs, if one member of the pair gives rise to pragmatically odd meanings in canonical predication, it is always the noun.

**ADNOMINAL MODIFICATION**

Similarly, adjectives should contribute a substance denotation in adnominal position, but they do not seem to do so in any language.

(17) A heavy book = a book that is heavy ≠ a book that is a portion of heaviness.

**BEHAVIOR OF DEADJECTIVAL VERBS**

Deadjectival change-of-state verbs based on quality characterizing adjectives should express roughly the notion of changing into a portion of a quality.

A verb like *widen* should mean become width, just like *redden* means become red. We know of no language where this is the case.

(18) a. The river widened. ≠
b. #The river became width.

(19) a. #The river’s length widened. ≠
b. The river’s length became width.

(20) a. ha-nahar hitraxev. (Hebrew) ≠
the-river widened.
‘The river widened.’
b. #ha-nahar nihiyah roxav
the-river became width #‘The river became width.’

(21) a. #orko šel ha-nahar hitraxev. (Hebrew) ≠
length.cs.3ms of the-river widened
#‘The length of the river widened.’
b. orko šel ha-nahar nihiyah roxav.
length.cs.3ms of the-river became width
‘The length of the river became width.’

**Interim conclusion:** While more work is needed to satisfactorily substantiate this claim, the emerging empirical observation is that there are no quality characterizing adjectives.

Adjectives, unlike nouns, never denote in $D_p$, always in the broader domain $D_u$.  

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1This construal of the meaning of change-of-state verbs is in fact a gross oversimplification. See Deo et al. (2013).
6 What explains the gap?

QUESTION: Can the apparent absence of quality characterizing adjectives be derived from some basic assumptions about the nature of adjectivehood?

PROPOSAL: The absence of \( \langle pt \rangle \) adjectives can be derived from the assumption that the essence of adjectivehood is capacity for adnominal modification (Hengeveld 1992; Bhat 1994; Beck 2002; Schachter and Shopen 2007).

Specifically, we argue that:

1. The essential grammatical role of adjectives is to adnominally modify nouns.
2. Adjectives must be able to affect non-trivial subsective strengthening of the meaning of the noun.
3. Adjectives with a \( \langle pt \rangle \) denotation cannot affect non-trivial subsective strengthening. They are therefore not lexicalized in any language.

6.1 The semantics of adjectival modification

PROPOSAL: The semantic effect of adjectival modification is always non-trivial subsective strengthening of the denotation of the noun.

(22) Non-trivial subsective strengthening constraint:

\[
[\text{AP } \text{N}] \text{ is a potentially non-empty proper subset of the } [\text{N}]
\]

Cf. Landman (2001) for a similar claim regarding subsectivity.

A key property of adjectival modification, given the above constraint, is that it is potentially non-trivial. Modifying a noun with an adjective must:

1. potentially yield a non-empty set
2. potentially yield a proper subset of the denotation of the noun

In the basic cases, it is an empirical observation that adjectival modification yields a potentially non-empty subset. In a model in which there are brown dogs:

(23) \( \{x : \text{very brown dog}(x)\} \subseteq \{x : \text{brown}(x)\} \cap \{x : \text{dog}(x)\} \)

NB: Potential non-triviality seems to hold of adjectives, but not of modifiers generally:

(24) speech act modifiers
   a. Kim is going to see Manchester United tomorrow.
   b. Indeed, Kim is going to see Manchester United tomorrow.

(25) intensifiers
   a. Kim is going to the match tomorrow.
   b. Kim is totally going to the match tomorrow.

(26) expletives (none of which have exclusively adjectival distribution, many of which also have a use as a gradable modifier)
   a. The senator from Mississippi voted the wrong way.
   b. The senator from Mississippi fucking voted the wrong way.
For this constraint to be generally viable it must be the case that all adjectival/noun modification is subsec-
tive. This is controversial.

We turn to the issue of subsectivity below, after discussing how potential non-trivial strengthening rules out
quality characterizing adjectives.

6.2 Deriving the gap

PROPOSAL: Substance characterizing adjectives are incapable of achieving non-trivial subsective
strengthening.

Suppose there were a ∫pt adjective wisde, which characterizes the set of portions of wisdom.

- A set-denoting adjective composes with a noun in modification through a rule of predicate modifica-
tion (or a type-shift that mimics it).
- For any ∫et N, modification with wisde will yield an empty extensional domain for [A N] by defini-
tion. Trivial strengthening.
- It will also map any ∫pt noun other than wisdom to the empty set, since qualities are by definition
disjoint. Trivial strengthening again.
- It will map the denotation of wisdom to itself, not to a proper subset. Trivial strengthening yet again.
- Thus, a ∫pt modifier would never achieve non-trivial strengthening.
- A ∫pt adjective would therefore be incapable of carrying out the essential grammatical role of adjec-
tives: adnominal modification.

7 Adjectival modification is subsective

We claim that all alleged cases of non-subsective adjectives are either not really adjectives, or else really are
subsective, given a proper understanding.

There are three main classes of potential exception:

- So called privative adjectives (fake gun)  Claim: intersective (hence, subsective)
- Modal adjectives (alleged communist) Claim: subsective
- Aspectual adjectives (former dancer) Claim: subsective, but adjectives?

7.1 Privative adjectives

The intuition that some adjectives are privative:

(27) fake-gun(x) ⇒ ¬gun(x)

The main motivation is sentences like (28):

(28) A fake gun is not a gun.

CLAIM: The privative intuition does not show that the relevant adjectives are privative.

— There are well known data that are difficult to reconcile with the privative intuition.
(29) Is this gun real or fake? (Partee 2010)

This is perhaps easier to see with other nouns:

(30) a. I tried to pay with a fake coin $\Rightarrow$ I tried to pay with a coin.
    b. Please sort these coins into fake ones and the real ones.

— There is a pragmatic explanation of the privative intuition. Sentences like (28) are felt to be true because the locution ‘is not an N’ has an idiomatic use to mean ‘is a defective N’.

(31) a. A man without a mustache is not a man.
    b. Any man who doesn’t like to cook is not a man, but a little boy. (attested)

**without a mustache** and **who doesn’t like to cook** are not plausibly privative modifiers.

**PRIVATIVE ADJECTIVES AS INTERSECTIVE**

We propose that privative adjectives are intersective in a way similar to other context-dependent adjectives.

(32) a fake coin

(33) $[\text{fake}] = \lambda x. \neg F_c(x)$

(where $F_c$ is a contextually determined property)

— The choice of $F_c$ is partly determined by the following noun, as is generally the case for contextual parameters relevant for the evaluation of adjectives (e.g. comparison classes).

— For example, a fake coin is just a coin that lacks some contextually relevant property, such as being minted by a legitimate authority, or being made of a certain material, etc.

— Given this, privative adjectives are essentially similar to other context sensitive adjectives. Once the relevant contextual parameters are set, they are intersective.

**7.2 Modal adjectives**

(34) a. alleged communist
    b. possible murderer

These can be viewed as subsective when world-times are taken into account.

— Let nouns denote relations between individuals and worlds (for simplicity, ignoring times here)

(35) $[\text{communist}] = \lambda x . \lambda w . \text{communist}(x)(w)$

— Every noun has an *extensional domain*, which is a set of individuals, and an (intensional) range, a set of worlds:

(36) Extensional domain: $\lambda x . \exists w [\text{communist}(x)(w)]$

(Individuals who are communists in some world)

the extensional domain of *communist* is the set of communists across all worlds.

— Modal adjectives map the extensional domain of the noun to a subset thereof, by restricting the set of worlds in the range of the noun.
(37)  
a. \[\text{alleged} = \lambda P_{e,s1} \lambda x \lambda w. \forall w' \text{consistent with allegations in } w : P(x)(w')\]
   
b. \[\text{alleged communist} = \lambda x \lambda w. \forall w' \text{consistent with allegations in } w : \text{communist}(x)(w')\]
   
c. \text{Extensional domain: } \lambda x \exists w [\forall w' \text{consistent with allegations in } w : \text{communist}(x)(w')]

   (Individuals who are communists in the worlds consistent with allegations in some world)

Modal adjectives are thus \textbf{subsective} on the extensional domain of the noun.

(38) \textbf{Non-trivial subsective strengthening constraint:}
The extensional domain of \([\text{AP N}]\) is a potentially non-empty proper subset of the extensional domain of \([N]\)


7.3 \textbf{Aspectual adjectives}

(39)  
a. former president
   
b. future king

Like modal adjectives, these are subsective, and restrict the extensional domain, in this case, by restricting
the times in the range of the denotation of the noun.

The extensional domain of \textit{former president}—those individuals who were presidents at some past time—is
clearly a subset of the extensional domain of \textit{president}—the set of presidents across all world/time pairs.

But, we concur with Szabó (2014:22) that these seem like functional elements rather than adjectives:

- Not in Dixon’s classes, and are not lexicalized as adjectives in many languages.
- Realizable as affixes, unlike adjectives but very much like functional material.

(40)  
ex-president, ex-teacher

(41)  
\textit{Juan peteẽ pa’ì-kue.} \hspace{1cm} \textit{Juan mbo’e-ha-ra-kue.}

Juan one priest-FORMER Juan teach-NOM-AG-FORMER

‘Juan is a former priest.’ \hspace{1cm} ‘Juan is a former teacher.’ (Guaraní; Tonhauser 2006:177)

(43)  
a. \textit{Kuehe a-hecha peteẽ abogado-rá-me.}
   yesterday 1SG-see one lawyer-FUTURE-PE
   ‘Yeseterday I saw a future lawyer.’ \hspace{1cm} (Guaraní; Tonhauser 2006:203)
   
b. \textit{A-mbo’e-ta pe óga-apo-ha-rá-me.}
   A1SG-teach-TA that house-do-NOM-FUTURE-PE
   ‘I will teach this future builder.’ \hspace{1cm} (Guaraní; Tonhauser 2006:204)

- Distribution gaps: no predication, change of state verb formation, or resultatives\(^2\)

(44)  
a. *Nixon is former.
   
   
c. *Nixon was impeached former.

\(^2\)Though known constraints on resultative formation Wechsler 2005; Beavers 2008 weaken this argument.
• In Polish, they cannot participate in adjective splitting (Partee 2010, equally true of modal adjectives, see Nowak 2000)

(45) a. *Do rozległej wszliśmy doliny.
    to large-GEN entered.1pl valley-GEN
    ‘We entered a large VALLEY.’

b. *Do doliny wszliśmy rozległej.
    to valley-GEN entered.1pl large-GEN
    ‘We entered a LARGE valley.’

    with former-INST talked.3fs president.INST
    ‘She talked with the former PRESIDENT.’

b. *Z prezydentem rozmawiała byłym.
    with president.INST talked.3fs former-INST
    ‘She talked with the former PRESIDENT.’

• They cannot be modified with adjective modifying adverbs:

(47) a. Joseph is a surprisingly good violinist.

b. #Joseph is a surprisingly former violinist.

Conclusion: Adjectival modification of nouns is always consistent with Non-trivial subsective strengthening.

8 Concluding remarks
What happened?

We started with the idea that we might learn more about lexical categories by looking for category-induced restrictions on denotations rather than universal semantic correlates of categories.

We zoomed in on property concepts, and saw the following:

• Property concept lexemes can have two kinds of denotation, sets of individuals and qualities.

• Across languages, nouns can have either kind of denotation.

• Adjectives, however, seem to be restricted to sets of individuals, and cannot denote qualities.

We argued that this restriction on adjectives can be derived from the assumption that the essence of adjectivity is adnominal modification.

• Adjectival modification is constrained by Non-trivial subsective strengthening.

• Quality-denoting adjectives would never be able to bring about such strengthening.

• Hence, languages never lexicalize qualities as adjectives.

The hopeful broader message is that model-theoretic techniques can be productively deployed to make genuinely falsifiable claims about the relation between meaning and lexical categories, and that there is much yet to learn about the nature of lexical categories.
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