Similarity statements, privative adjectives, and generics: a unified view.

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Abstract

In this paper, I argue for a tight relation between three semantic phenomena: similarity statements, privative adjectives, and bare plural and indefinite singular generics. I capture all of these phenomena as arising from compositional operations on rich lexical meanings. In the spirit of Del Pinal's Dual Content Semantics, these lexical meanings are divided into a category-membership determining and truth-conditionally relevant component (E-structure) and a bundle of traits associated with the lexical item (C-structure). This unified treatment solves a number of empirical issues related to these three phenomena.

(i) The treatment of generics given here explains a long-standing problem in the generic literature, namely why generic sentences can embed gender-specific traits ("ducks lay eggs"). I observe different felicity patterns concerning these sentences between bare plural generics and singular indefinite generics, and show that the theory given here, unlike alternative accounts, handles them well.

(ii) I give a semantic account of similarity verbs. This account derives naturally the seemingly problematic features of some uses of similarity, e.g. non-distributivity (someone who looks like a British judge needn't look neither like a Brit nor like a judge). I do so by observing that this behavior is rooted in genericity, and by extending the treatment of indefinite singular generics to similarity.

(iii) I give a semantic account of problematic adjectives, including privatives like "fake" or subsectives like "typical". I remark on structural problems with recursivity in Del Pinal's DCS. I argue that for the system to be fully recursive, the cluster of associated properties (C-structure) must be newly computed any time the truth-conditional content changes. Once we incorporate this principle, we can deliver specific and right predictions on the meaning of expressions like "fake fake agent", "fake typical gun" or "typical typical wolf".

I then discuss ways in which the compositional mechanisms given here can be justified by psychological theories of concepts. More specifically, I argue that psychological essentialism provides a useful platform to understand the difference between category-

membership and associated properties. Psychologically, diagnostic traits are ways to infer the presence of an unobservable quintessence of, e.g., leoninity. Compositionally, these diagnostic traits enter the truth conditions when the subject matter is not membership, but resemblance or typicality.

Then, I discuss in what ways psychologists have proposed to cash out the notion of diagnosticity, and what effects these proposals would have on the compositional operations I proposed.

Finally, I show how the present unified account fares better than alternative accounts of the single phenomena. Explanatorily, it is both more unifying and more easily connectable to psychological theories of conceptual representations so that there are non-underspecified predictions. Empirically, it naturally solves empirical puzzles faced by other accounts.

Contents

1 Generics, privatives, and similarity statements: three related phenomena

1.1 Generics and privatives

In this paper, I argue for a tight relation between three semantic phenomena: similarity statements, privative adjectives, and some forms of genericity. Generics and privatives have fazed semanticists for decades, in different though related ways. Generic sentences, for one, connect their truth conditions and the world, at least apparently, in a very lax way: a sentence like (1) is true even though very few mosquitoes carry, or can carry, malaria; a sentence like (2) is true even though only male lions have a mane; and a sentence like (3) is true even though penguins don't fly.

(1) Mosquitoes carry malaria.
(2) A lion has a mane.
(3) Birds fly.

The generic forbearance for exceptional occurrences of categories has long challenged the aim of accounting for all lexical items with simple extensional frameworks (i.e., "lion" denotes the set of all lions), or intensional frameworks (i.e., "lion" denotes a function from worlds to sets of lions). These treatments have been seen as the most direct way in which lexical semantics could be compositional in the Fregean sense, and understandably so: extensions provided many important results, including successful treatments of quantification, anaphora, and plurals to only mention some. There are philosophical reasons, too, that have pushed theorists to look at meaning as extensional and atomic: as Putnam famously argued, no precise set of traits is either necessary or sufficient for something to be a lion. Something may have most traits of a lion and not be one; or be a lion, but a very atypical one. Therefore, most treatments of genericity have captured the phenomenon as hidden quantification, and have attempted to specify the semantics of the operator GEN in intensional terms.

(4) GEN(*mosquitoes*)(*carry-malaria*)

More recently, the validity of these approaches has been put into question. Leslie (2008) provided robust empirical evidence that at least for bare plural generics ("lions have a mane") the hypothesis of covert quantification is unlikely. Cohen (1999) argued for a probabilistic, alternative-based treatment of genericity. Van Rooij & Schulz (2020) proposed that genericity is linked to key notions in the psychology of concepts, such as representativeness and prototypicality. A more extensive discussion of this literature is given in sections 4.1 and 5.1.

Some hold that bare plural generics talk specifically about kinds. Kinds are generally seen as identifying regularities that occur in nature. Chierchia (1998) proposes that bare plurals standardly embed kinds, and can be type-shifted into object-level only as a result of a rescuing principle. Liebesman (2011) proposes that genericity is less complex than traditionally thought, and that bare plurals are simple predications of kinds. In psychology, Cimpian et al. (2010) showed experimentally that generic sentences are sensitive to the psychological *internal* structure of kinds. In the present account, I put these insights together. The rich lexical meanings I assume can be seen as a way of cashing out the internal structure of kinds to which the grammar is sensitive.

The complexities of privative modification have proven equally challenging. For most adjectives the compositionality-preserving entailment pattern *Adjective(Noun)* $\subseteq$ *Noun* holds inasmuch as they are functions from sets of individuals to subsets of individuals. For instance, we know that the expressions "French lawyer" and "excellent lawyer" pick out two particular subsets of lawyers whose members still are lawyers. However, this very entailment is not respected by privative adjectives like "fake", since *Fake(Noun)* $\nsubseteq$ *Noun*.

The general hope is that these adjectives will end up being captured as intensional, i.e. operating on functions from worlds to extensions (Morzycki, 2016). Or even better, on simple extensions: Partee (2010), for instance, has given a pragmatic analysis of privative adjectives in terms of lexical modulation of extensional meanings: she proposes that "fake" is actually subsective, and that when we say "fake gun" we extend the denotation of "gun" to include both real and fake guns.

At some point, theorists started to argue that we can uncover the internal semantic structure of common Ns by investigating compositions involving privative adjectives (Franks 1995, Coulson & Fauconnier 1999). This created a highly fragmented theoretical landscape. For instance, Pustejovsky's generative lexicon has been put to work to capture these inferences: Oliver (2014) puts forward an optimal-theoretic framework with constraints based on Pustejovsky's *qualia*-based internal structure of lexical items to account for the different entailment patterns privative modification creates.

Many of these attempts are rooted in prototype theory: the view that human concepts are represented by a single, abstract, prototypical individual (Rosch, 1973; 1975) or by a set of traits that determine typicality (Smith et al., 1988). Kamp and Partee (1995) tried to cash out a supervaluationist framework in which "prototype theory and classical logic can peacefully coexist". Franks (1995) implemented a framework in which "fake" negates essential features of concepts, but leaves prototypical features unchanged. This last idea has resurfaced time and again: most recently, Del Pinal's Dual Content Semantics (DCS) has imported ideas from prototype theory and Pustejovsky's generative lexicon to capture the fact that fake Xs are *perceived* as Xs but *are not* Xs. The difference between Franks' account and Del Pinal's account is that instead of essential features, Del Pinal's framework has "fake" negate an extension-determining dimension of the noun. DCS operates a bipartition of lexical meaning into extension-determining meaning and stereotype-dependent, non-extension-determining meaning. This prevents it from falling prey to Putnam's argument against definitionalist theories while giving the grammar access to the complex structure of psychological representations.

In sum, both genericity and privativity have been argued on several occasions to motivate a grammaticalization of conceptual structure, but the jury is still very much out.

1.2 Similarity statements

I will not define here what I mean by "similarity statement", but only delimit the phenomenon by giving some examples.

(5) b. John looks like Mary.
c. John looks like a lawyer.
d. The fish I ate yesterday tasted like a steak.
e. The last five bars of this song sound like a Mozart.
f. My dog sounds like a wolf.
g. This t-shirt feels like a silk cloth.
h. This room is like a palace.

All these verbs support a copular/subject complementing structure. Some are modality-specific: if my dog sounds like a wolf, physically he may not be similar to a wolf at all.

1.2.1 Similarity and shared features

In semantics, similarity has not enjoyed as much attention as generics and privativity. When it has been attended to, theorists have focused mainly on faultless disagreement (Rudolph, 2019) or on specific syntactic constructions like "can't seem to" (Homer, 2012). Psychology, on the other hand, has been traditionally concerned with similarity.

The first psychological model of similarity was the geometrical one (see, e.g., Carnap, 1967; Torgerson, 1965). On the geometrical model of similarity, similarity relations can be represented by means of a so-called metric similarity space: the farther two objects are apart in this space, the more dissimilar they are.

Goodman famously critiqued this absolute account on grounds of the highly contextual nature of similarity. Judgments of similarity are not only about the selection of relevant properties, but also about 'a weigthing of their relative importance':

> Consider baggage at an airport checking station. The spectator may notice shape, size, color, material, and even make of luggage; the pilot is more concerned with weight, and the passenger with destination and ownership. Which pieces are more alike than others depends not only upon what properties they share, but upon who makes the comparison, and when. . . . Circumstances alter similarities. (Goodman, 1972)

Tversky (1977) put forward a set-theoretic, feature-based approach which proved immune to these problems. On this account, all objects in the domain are characterized by a set of features. For instance, a specific lion may be represented by a set of features:

Simba = {*lion-shaped, mane, yellow, lion-sized, carnivorous, sharp teeth*}

Similarity, then, is defined in terms of shared features, i.e. whether certain set-theoretical relations hold of pairs of object-denoting sets of features. In a given context, typically only a subset of the features of an object is relevant for similarity. This allows to deal with the context-dependence of similarity: the selection of the features depends on certain interests and purposes. The more features of interest Simba shares with Aslan, the more similar he is to Aslan.

The present, linguistic account is in the spirit of Tversky's psychological account of similarity: I posit that concepts have a dimension akin to Tversky's bundles of features. Similarity is about a contextually salient subset of these features.

1.2.2 Similarity and genericity

But similarity talk also recruits some other mechanisms. In this paper, I show that both generics and privatives are related to similarity statements, and that similarity statements should inform the treatment of both.

To begin, I observe that similarity statements can have two different readings: a specific and a general one.[1]

(6) John looks like a lawyer.
  a. John looks like a specific person who is a lawyer.
  b. John has the general appearance of a lawyer.

The general reading is non-distributive: for instance, while if someone is a British judge they are both British and a judge, if someone *looks* like a British judge they do not neccessarily look like a Brit, nor like a judge.
Imagine for instance someone who wears a white, powdered wig:

- they do not look like a Brit;
- they do not look like a judge;
- but they do look like a British judge.

This behavior is again strikingly similar to that of generics: just like sentence (7)a. does not imply (7)b. and c., (8)a. does not imply (8)b. and c.

(7) a. John looks like a British judge.
  b. # John looks like a Brit.
  c. # John looks like a judge.

(8) a. A british judge wears a wig.
  b. # A Brit wears a wig.
  c. # A judge wears a wig.

Non-distributivity is found in intensional verbs - wanting a French croissant does not amount to wanting something French and wanting a croissant. However, it is very unusual of copular constructions that allow subject complementation like "be", "become", or "remain".

Similarity statements also tolerate exceptions, just like genericity. It is infelicitous to contradict a similarity statement by bringing up an exceptional occurrence:

[1]To truly get the specific reading, it is useful to domain-restrict. For instance, (I) does not have the general reading:
(I) John looks like a lawyer I know.

(9) - John looks like a penguin.
- # No, he doesn't look like *that* penguin!

(10) - Penguins swim well.
- # No, *that one* doesn't!

Relatedly, the general reading of similarity verbs is both up- and downward non-monotonic. (11)a. does not imply (11)b, and (12)a. does not imply (12)b.

(11) a. John looks like a penguin.
b. $\nvDash$ John looks like a bird.

(12) a. John looks like a bird.
b. $\nvDash$ John looks like a penguin.

Genericity, as well, is both upward and downward non-monotonic.

(13) a. A penguin doesn't fly.
b. $\nvDash$ A bird doesn't fly.

(14) a. A bird flies.
b. $\nvDash$ A penguin flies.

Adding restrictors like "typical" to a sentence and checking whether the meaning changes radically is a well-established test for genericity (Krifka et al 1995).[2] For instance, consider (15)a. and b.:

(15) a. A bird is flying.
b. $\not\approx$ A typical bird is flying.

(16) a. A bird flies.
b. $\approx$ A typical bird flies.

Adding "typical" to (15)a. radically changes the meaning of the sentence: while in (15)a. for all we know the bird flying could have had seven legs, sentence (15)b. has to refer to a bird with two legs. Instead, the meaning of (16)a. is roughly equivalent to the meaning of (16)b.: if I say that a bird flies, I am not thinking about seven-feeted birds.

Adding "typical" to a similarity statement radically changes the meaning of the specific reading: in (17), the restriction "I know" is added to force the specific reading. In (17)a. John looks like a lawyer I know, who may or may not wear a suit. In (17)b., John looks like a *typical* lawyer I know: the person he looks like *has* to be someone who wears a suit.

(17) a. John looks like a lawyer I know.
b. $\not\approx$ John looks like a typical lawyer I know.

Instead, if we zoom in on the general reading of similarity statements, we find that adding "typical" next to the embedded NP yields a sentence which is almost equivalent to the original one:

[2]The meaning may change slightly even for generic sentences. For a discussion of why this test is not always accurate, see section 3.5.3

(18) a. John looks like a lawyer.
b. ≈ John looks like a typical lawyer.

Consequently, some form of genericity should be involved in readings like (18)b., which consequently should be paraphrasable via a characterizing sentence along the lines (19)a. or (19)b. below.[3]

(19) a. A lawyer is such that John looks like it.
b. Lawyers are such that John looks like them.

Similarity statements infiltrate many parts of language, notably adjectival predication. *Look-alike* is an adjective that embeds some form of similarity predication. "Fake" is also paraphrasable via a similarity statement: a fake lawyer is certainly attempting to look like a lawyer. One may wonder, then, if both readings of similarity come up in adjectival predication. To begin, notice that the general reading as in (6)b. can participates in the truth conditions of adjectives like "fake" and "counterfeit".

(20) A fake lawyer.
a. Someone who intends to have the general appearance of a lawyer but isn't a lawyer.

However, the specific reading does not seem to be welcome in adjectival environments. One is not a fake lawyer in virtue of attempting to resemble a specific, atypical lawyer.

(21) a. **Context** John has a friend, Bob. People are routinely surprised by the fact that Bob is a lawyer, as he does not look like one at all. John does not know that Bob is a lawyer. John intends to look like Bob, and in fact successfully looks like Bob.
b. OK John looks like a lawyer he knows.
c. * John is a fake lawyer.

It looks like the meaning of privative adjectives can *only* be captured in terms of the general reading of similarity.

This suggests that the three phenomena have a hierarchy of embedding: some readings of similarity statements embed a generic expression, and these readings play a role in privative adjectives like "fake".

1.2.3 The linguistic significance of similarity

But what do similarity statements add to the discussion of genericity and privativity? They certainly do provide us with a new realm to test our theories of items sensitive to the structure of psychological representations. But in some respects they are more informative than generics and privatives.

Generics and privatives have been repeatedly claimed to be sensitive to the components of the internal structure of conceptual representations. Similarity statements have something beyond this: they give us a glimpse into the *nature* of these components. In

[3] Of course, these sentences are only truthconditionally equivalent. The information structure is radically different - the former sentence is about John, the latter is about lawyers.

particular, similarity is sensitive to the type of properties that two entities share. For instance, relativizing similarity statements to specific traits, we can specify why (22) is not contradictory.

(22) Bananas look like lemons, but they also don't look like lemons.

(23) With respect to color, bananas look like lemons. With respect to shape, bananas don't look like lemons.

In other words, we can overtly select what subsets of features serve as a criterion for our similarity judgment. Similarity is sensitive not only to features, but to the internal structure of features: features are pairs of attributes (e.g. `color`) and values (`yellow`). Unstructured features would be inadequate to capture similarity statements. The property "being yellow" alone cannot account for sentence (23). How do we unpack the correspondent similarity respect?

To this point, note that an analysis of similarity in terms of unstructured features would predict that whenever we compare the color of two objects, we know of what color the two objects are. However, one need not know of what specific color two things are to say that they resemble each other with respect to color.

(24) a. **Context**: John is visiting a new planet. He has been told by the manager of the mission that schmions and schmigers are of the same color. Then, although he does not know of what color precisely they are, he can say:
b. With respect to color, schmions look like schmigers.

In this paper, I capture this behavior via attribute-value pairs, e.g. `color:blue`. I posit that Ns include a dimension that encodes a bundle of attribute-value pairs, and show that theories capturing these phenomena in terms of more traditional tools do not predict the full behavior of generics, privatives, and similarity statements.

1.3 Category membership and diagnosticity

Genericity, similarity, and privativity all have intuitive meanings that involve a combination of category membership and diagnostic traits.

Similarity statements talk about the diagnostic features but are agnostic as to category membership. In other words, someone who looks like a lawyer has many traits diagnostic of lawyers, but he may or may not be one.

Privative adjectives talk about diagnostic features and negate category membership (Franks, Del Pinal). A fake lawyer endeavours (successfully or not) to have the diagnostic features of a lawyer, but isn't to be categorized as one.

Generics talk about the diagnostic and the category-determining features of the NP, and characterizing sentences that embed them usually lay out essential or diagnostic properties linked to the NP (Krifka). Consider (25):

(25) A lion has a bushy tail.

I propose to paraphrase this sentence as follows: an individual that *is* a lion (category membership) and has leonine diagnostic traits has, as an essential or diagnostic feature, that it has a bushy tail.[4]

1.4 Summary

In this paper, I argue that both for purely empirical reasons and for unificatory purposes, we must move to a view of lexical items as richer than traditionally thought. Specifically, we must view lexical items as complex semantic objects containing both (i) information relevant for the determination of set membership and (ii) traits that we typically associate with a concept.

- The so far most empirically adequate accounts of privatives (e.g., Del Pinal's Dual Content Semantics) have done so.
- Similarity is sensitive not only to the traits of category, but gives us a glimpse into the logical nature of these traits (features with the structure `attribute:value`) because we can determine the sort of trait that serves as a basis for our similarity judgment ("with respect to" constructions).
- Genericity has often been proposed to motivate an analysis in terms of conceptual structure, stereotypes, or prototype theory; I here give empirical arguments in favor of this kind of proposal.

I put forward an analysis of lexical items as rich, structured bundles of attribute-value pairs. I posit that the faculty of language has compositional access to this fine-grained information. I improve on Del Pinal's DCS framework, assuming that all lexical items have two dimensions. The E-structure is truthconditionally relevant; the C-structure contains rich conceptual information about the item and can be recovered by specific linguistic operators to make it enter the truth conditions. I give a full account of similarity, privativity, and of some generic constructions. I improve on problems of recursivity faced by DCS. I show that this account deals well with a number of theoretical puzzles faced by extant proposals of the single phenomena.

The choice of such an uncustomary framework may cause some eye-rolling. After all, one should not be postulating that the grammar has access to rich lexical meanings if simpler accounts weren't ruled out. However, other accounts are indeed to be ruled out, and it is not clear that they are simpler. I show that other contenders on the market are inferior to the present account both from an empirical and from an explanatory perspective.

Privatives With the exception of Partee, there are no "minimal" accounts of privatives on the market. I improve on the Dual Content Semantics treatment of privatives to make it fully recursive.

Similarity To the best of my knowledge, there are no theories of similarity on

[4] The subject of the characterizing sentence needs to have both category membership and leonine diagnostic traits: an individual that only has leonine diagnostic traits may very well not be a lion. Generic sentences do not talk about these entities: they do not refer to individuals who have diagnostic traits of a category they don't belong to.

the market in semantics. I give some possible intensional theories, as well as structural arguments as to why a modal treatment of similarity is inadequate.

Genericity I discuss some reasons why this account is superior to accounts such as Cohen's (1999) and Van Rooij and Schulz's (2020) that do incorporate rich psychological information into the meaning of generic sentences.
Concerning kind-based treatments of bare plural generics, I discuss why my proposal is essentially in line with these views once we acknowledge the fact that concepts are specifications of the mental representation of kinds.
From an empirical perspective, modal accounts of genericity are the most complete theories that have been articulated so far. However, they face some issues that this account resolves naturally. More specifically, modal accounts are forced to posit (i) ad-hoc orderings on worlds and (ii) ad-hoc restrictions on individuals.
As to (i), modal accounts cannot explain why both sentences like "turtles die upon hatching of the eggs" and "turtles are long-lived" are acceptable. Worlds have to be ordered in terms of adherence to biological laws. Modal accounts would have to postulate that there are orderings in terms of adherence to biological laws *for individual organisms* and orderings in terms of adherence to biological laws *for complex systems*.
As to (ii), modal accounts cannot explain why both sentences pertaining to males and sentences pertaining to females of a natural kind are acceptable. For instance, both "lions have a mane" and "lions suckle their young" are acceptable. Even positing ad-hoc restrictions on individuals fails to deliver some important predictions: sentences like "lions have a mane *and* suckle their young" are acceptable. It seems implausible that domain restriction can deliver the right treatment for these sentences.

From an explanatory perspective, there are several reasons why we should assume that the faculty of language has direct access to the internal structure of lexical items.

1. Intra-disciplinary unification: a single account explains the behavior of generics, similarity statements, and recalcitrant adjectives. Extant theories only deal with these phenomena separately. Modal accounts of genericity do not explain privatives or similarity.
2. Inter-disciplinary unification: my account assumes an ontology of lexical items that easily maps into psychology, making it easy to integrate psychological findings to deliver non-underspecified truth conditions for the three phenomena at hand. Modal accounts, for instance, assume normalcy orderings on worlds that hide psychological information, but it is not clear how this information could be incorporated in the theory.

In other words, black boxes are managed more tidily in this account. The explanatory burdens that my account places on psychology are clear. Much work is being done in cognitive psychology to formally characterize notions such as typicality and diagnosticity. This type of work assumes representations whose structure is isomorphics to the structure of lexical items posited here. The same does not hold for the specification of orderings on worlds based on normalcy, stereotypicality, and so on. Instead, even supposing that psychology *were* to deliver a formal characterization of the notion of, say, normalcy, one still would not know how to integrate it with the modal framework.

2 Introducing concepts: Del Pinal's Dual Content Semantics

There have been three approaches to the challenges of privative modification: some have suggested that the recalcitrant behavior of adjectives like "fake" forces us to accept rich lexical meanings and, in fact, to abandon the principle of compositionality as traditionally intended (Lakoff & Johnson 1980, Coulson & Fauconnier 1999). Others have refused to give up compositionality and to move away from atomic lexical meaning. This is the case of Partee's (2010) contextualist account. A third solution is to accept to enrich lexical meanings, but specify compositional operations that derive the right, fine-grained predictions of lexical meanings. One of the first full-fledged and completely compositional accounts of this sort was Franks's (1995) Sense Generation. Franks posits that lexical items are bundles of attribute-value pairs, some of which are essential while others merely diagnostic. An adjective like "fake" only modifies the central features while leaving the diagnostic features unchanged: a fake gun does not shoot (central) but looks like a gun (diagnostic).

A more recent account that adopted the third solution is Del Pinal's (2015; 2018) Dual Content Semantics (DCS). DCS is an account of privatives and of lexical modulation that gives a fixed sets of *qualia* that constrain flexibility. The choice of such a regimented internal structure addresses specific problems faced by contextualist accounts. Contextualists try to account for semantic flexibility by radically liberalizing and loosening the compositional operations of language (Pagin and Pelletier, 2007; Recanati, 2010; Szabo, 2010; Lasersohn, 2012). Critics have pointed out that this account overgenerates possible readings that are actually not observed (Asher, 2011). For instance, we cannot say sentence (26)b. in order to convey the meaning of sentence (26)a., although the meaning in (26)a. should be the most relevant reading of (26)b.

(26) a. Mary stopped eating the apple.
b. Mary stopped the apple.

In DCS, meaning is determined along two lines: the E-structure of nouns determines their extension, while the C-structure incorporates the related "core facts", a set of beliefs about the extension, in the form of *qualia* similar to Pustejovsky's. DCS proceeds by addressing two opposing constraints: on the one hand, it seeks a compositional solution for puzzles related to lexical flexibility by recruiting the conceptual structure associated with nouns. On the other hand, it does so while seeking to not free-up the semantics so much as to incur in the overgeneration problems that have affected free modulation in the contextualist framework. The result is a set of non-atomic lexical representations and of combinatorial operations that compositionally derive cases of lexical flexibility without generating unobserved meanings.

In this section, I explore the extent to which DCS can be used to capture genericity and similarity. A dual theory of lexical meanings seems to be needed to unify these phenomena, and the expressive power of DCS holds many promises, including accounts of farther phenomena. However, I raise some serious issues with this specific implementation of DCS. First, the lexical meaning should be made more fine-grained than it is in DCS in order to account for the attribute sensitivity of similarity statements. This can be fixed with an extension of the theory. A more serious issue concerns recursivity: DCS makes wrong predictions for multiple applications of modifiers such as "fake" and "typical", and there is no easy fix to recover the compositionality of the system. I discuss some examples and show that the so far proposed solutions to this problem are not fully general.

2.1 The theory

Consider a lexical entry for *gun* in this framework:

(27) $[\![\text{gun}]\!]^{c}_{M}$ =
E-structure:
$\lambda x.\text{GUN}(x)$
C-structure:
C: $\lambda x.$ $\text{PARTS\_GUN}(x)$
P: $\lambda x.$ $\text{PERCEPTUAL\_GUN}(x)$
T: $\lambda x.$ GEN $e\big[\text{SHOOTING}(e) \wedge \text{INSTRUMENT}(e,x)\big]$
A: $\lambda x.\exists e_1\big[\text{MAKING } (e_1) \wedge \text{GOAL}(e_1, \text{GEN } e(\text{ SHOOTING}(e) \wedge \text{INSTRUMENT } (e,x))\big]$

The C-structure encodes information about how entities in the class are typically perceived ('p' for 'perceptual'), what matter they are made of ('c' for 'constitutive'), how they came to being or for what purpose they were created ('a' for 'agentive'), and what their intended and typical function is, if any ('t' for 'telic'). Importantly, whether or not an individual has these features does not determine whether it falls under the concept; that is only determined by the E-structure (cf. Pustejovsky, 1995; Moravcsik, 1998; Del Pinal, 2015).

Other information that is included in the C-structure includes (i) the weight of dimensions as a function of their importance, and (ii) dependency relations between the dimensions and the correspondent relative centrality.[5]

The central point of DCS is that meanings are much richer than traditionally thought. Compositionally, the fundamental insight is that certain expressions carry over contents of the C-structure to the E-structure. To do this, two types of tools are needed: (i) functions that take full meanings and return the value of a particular dimension, and (ii) functions that take full meanings and return combinations of the E-structure with one or more dimensions of the C-structure.

- **Dimensional operators**: partial functions from the full meaning of a term to its fine-grained C-structure denotations, as for instance Q_T, which takes a lexical item as input and returns the value of the TELIC *quale*.

[5] A feature *d* is central in a concept if other dimensions depend on *d* more than *d* depends on the other features. There are several accounts in philosophy (Keil 1989), linguistics (Guerrini & Mascarenhas, 2019), and psychology (Hampton, 2006; Smith et al., 1988) that accept this notion or make use of it.

- **Core enrichment operators**: partial functions from full meanings to combinations of their E-structure and C-structure. For instance, a core enrichment operator A may return the conjunction of the E-structure and the value of the AGENTIVE *quale* in the C-structure. The core enrichment operator E takes a full expression and returns only its E-structure.

Some expressions only add descriptive content to the E- and C-structure of their argument. Others upload parts of the C-structure to the E-structure. An example of the former kind is "steel":

(28) $[\![\text{steel}]\!]^c_M$ =
E-structure:
$\lambda P.\lambda x.P(x) \wedge \text{STEEL}(x)$
C-structure:
C: $\lambda P.\lambda x.P(x) \wedge \text{STEEL}(x)$
P: $\lambda P.\lambda x.P(x) \wedge \text{STEEL\_PERCEPTUAL}(x)$
T: $\lambda P.P$
A: $\lambda P.P$

Applied to *gun*, *steel* yields:

(29) $[\![\text{steel gun}]\!]^c_M$ =
E-structure:
$\lambda x.\text{GUN}(x) \wedge \text{STEEL}(x)$
C-structure:
C: $\lambda x.\text{PARTS\_GUN}(x) \wedge \text{STEEL}(x)$
P: $\lambda x.\text{PERCEPTUAL\_GUN}(x) \wedge \text{STEEL\_PERCEPTUAL}(x)$
T: $\lambda x.\text{GEN}e\big[\text{SHOOTING}(e) \wedge \text{INSTRUMENT}(e,x)\big]$
A: $\lambda x.\exists e_1\big[\text{MAKING}(e_1) \wedge \text{GOAL}(e_1, \text{GEN}e(\text{SHOOTING}(e) \wedge \text{INSTRUMENT}(e,x))\big]$

The latter kind of modifiers use the C-structure of their argument. We will call these modifiers *C-sensitive*. This is the case of "fake" and "typical". "Typical" uploads a variable portion of the content of the C-structure of its argument to the E-structure of the output. Call T a function that takes as input an individual x and a concept G and returns the cardinality of the set of G-attributes whose G-value holds of x. Then in DCS, a typical **G** is something of which the E-structure of **G** holds, along with a big enough number of dimensions of the C-structure of **G**:

(30) $[\![\text{typical}]\!]^c_M$ =
E-structure:
$\lambda \mathbf{G}.\lambda x.E(\mathbf{G})(x) \wedge T(\mathbf{G},x) > s$
C-structure:
C: $\lambda \mathbf{G}.\lambda x.Q_C(\mathbf{G})(x)$
P: $\lambda \mathbf{G}.\lambda x.Q_P(\mathbf{G})(x)$
T: $\lambda \mathbf{G}.\lambda x.Q_T(\mathbf{G})(x)$
A: $\lambda \mathbf{G}.\lambda x.Q_A(\mathbf{G})(x)$

Del Pinal suggests that because DCS includes dimension weights and dependency relations, T can easily be made to count only amongst the most salient or central features.

Moreover, the function T accounts for the fact that "typical" has all the features of a gradable adjective: we can say that an object is more of a typical gun than another object, or that an object is a very typical gun. Del Pinal also observes that while dimensions of the C-structure are not relevant to determine category membership, they are important for typicality. Concretely, if someone says that Alex is a lion, we cannot object to this judgment by saying that it doesn't have a mane. By contrast, if someone says that Alex is a typical lion, it seems befitting to protest that he does not even have a mane.

(31) $[\![\text{typical lion}]\!]^c_M =$
E-structure:
$\lambda\mathbf{G}.\lambda x.E\big([\![\text{typical lion}]\!]^c_M\big)(x) \wedge T([\![\text{typical lion}]\!]^c_M, x) > s$
C-structure:
C: $\lambda\mathbf{G}.\lambda x.Q_C([\![\text{typical lion}]\!]^c_M)(x)$
P: $\lambda\mathbf{G}.\lambda x.Q_P([\![\text{typical lion}]\!]^c_M)(x)$
T: $\lambda\mathbf{G}.\lambda x.Q_T([\![\text{typical lion}]\!]^c_M)(x)$
A: $\lambda\mathbf{G}.\lambda x.Q_A([\![\text{typical lion}]\!]^c_M)(x)$

Besides uploading part of the content of the C-structure of its argument to the E-structure like "typical" does, "fake" negates the E-structure of its argument:

(32) $[\![\text{fake}]\!]^c_M =$
E-structure:
$\lambda\mathbf{G}.\lambda x.\neg E(\mathbf{G}(x) \wedge$
$\neg Q_A(\mathbf{G})(x) \wedge$
$\exists e_2\big[\text{MAKING}(e_2) \wedge \text{GOAL}\big(e_2, Q_P(\mathbf{G})(x)\big)\big]$
C-structure:
C: $\lambda\mathbf{G}.\lambda x.Q_C(\mathbf{G})(x)$
P: $\lambda\mathbf{G}.\lambda x.Q_P(\mathbf{G})(x)$
T: $\lambda\mathbf{G}.\lambda x.\neg Q_T(\mathbf{G})(x) \wedge Q_P(\mathbf{G})(x)$
A: $\lambda\mathbf{G}.\lambda x.\exists e_2\big[\text{MAKING}(e_2) \wedge \text{GOAL}\big(e_2, Q_P(\mathbf{G})(x)\big)\big]$

What happens if we apply this entry to the entry for "gun"? In words, the E-structure of $[\![\text{fake}]\!]^c_M$ is satisfied by entities that:

- are not guns
- were not made to be guns
- were made to have the perceptual features of guns.

The C-structure gives more fine-grained information about what fake guns *typically* are: their *telos*, what corresponds to the TELIC dimension, is to not serve as a gun, but as something that looks like a gun:

(33) $[\![\text{fake gun}]\!]^c_M =$
E-structure:
$\lambda x.\neg E\big([\![\text{ gun }]\!]^c_M\big)(x) \wedge$
$\neg Q_A([\![\text{ gun }]\!]^c_M)(x) \wedge$
$\exists e_2\big[\text{MAKING}(e_2) \wedge \text{GOAL}\big(e_2, Q_P([\![\ gun\ ]\!]^c_M)(x)\big)\big]$
C-structure:
C: $\lambda x.Q_C([\![\ gun\ ]\!]^c_M)(x)$

P: $\lambda x.Q_P(\llbracket\, gun \,\rrbracket^c_M)(x)$
T: $\lambda x.\lambda x.\neg Q_T(\llbracket\, gun \,\rrbracket^c_M)(x) \wedge Q_P(\llbracket\, gun \,\rrbracket^c_M)(x))$
A: $\lambda x.\exists e_2\big[\text{MAKING}(e_2) \wedge \text{GOAL}\big(e_2, Q_P(\llbracket\, gun \,\rrbracket^c_M)(x)\big)\big]$

2.2 An extension of DCS to generics and similarity

In what follows, I try to give a DCS account of genericity and similarity. The framework looks like it has the degrees of freedom to unify the three phenomena along the lines drawn in the previous section:

- There is already an account of privatives, although we will discuss some problems of recursivity it faces.
- Generics can be accounted for along the lines of "typical". To wit, "Lions have a mane" would be reduced to "Typical lions have a mane", and we can apply the DCS analysis of "typical".
- Similarity statements will remove the content of the E-structure of their argument and fill the E-structure with part of the C-structure of their argument. Concretely, a gun is a gun (E-structure), and may or may not have the appearance of a gun (C-structure); conversely, something that looks like a gun may or may not be a gun (the content of the E-structure of the argument is removed), but has the appearance of a gun (the E-structure is filled with content from the C-structure of the argument).

However, I raise some serious issues with the treatment of recursive application of C-sensitive adjectives, and identify the components of the account that give rise to these issues.

2.2.1 Genericity in DCS

Sentences like (34) add constraints on predication: not any lion, but typical lions have a mane.

(34) Lions have a mane.

DCS gives us the tools to specify the truth conditions (E-structure level interpretation) for the generic quantifier:

(35) $\llbracket \text{GEN} \rrbracket_E = \lambda P_1.\lambda P_2.\forall x.\big(E(P_1)(x) \wedge T(x, P_1) > s\big) \rightarrow P_2$

In other words, (34) states that entities that *are* lions (E-structure) and have sufficiently many leonine traits have a mane.

2.2.2 Generic similarity

Consider (36):

(36) John looks like a lawyer.

Sentences of this type are agnostic as to whether John is a lawyer or not. Moreover, it looks like generic similarity sentences will have different constraints on predication than genericity: in plain generic sentences we talk about individuals that E-structurally have both the E-structure and the C-structure of **lawyer**; in (36) we say that John E-structurally has the perceptual part of the C-structure of **lawyer**, the FORMAL *quale*, but crucially we know nothing about whether he has the E-structure of **lawyer**. The constraints placed on predication by similarity verbs only concern the C-structure of the term they embed.

(37) a. $[\![$ John looks like a lawyer $]\!] = Q_{\mathrm{P}}(lawyer)(j)$

2.2.3 Privativity

We have already seen how privatives are accounted for: "fake", for instance, negates the E-structure of its argument and then operates on its C-structure. Some parts of the C-structure, instead, are passed through from the input to the output. In other words, the appearance of a fake gun is the same as that of a gun. While this may seem reasonable, it proves problematic in situations involving multiple applications of C-sensitive adjectives.

2.3 Problems with DCS and extended DCS

2.3.1 Problems with similarity

Similarity verbs are clearly C-sensitive. For instance, abstracting away from the genericity of the sentence, it would seem reasonable to capture the meaning of (38)a. below as in the formula in (38)b.

(38) a. As to shape and substance, oranges are like grapefruits.
b. $Q_F([\![\text{orange}]\!]) = Q_F([\![\text{grapefruit}]\!]) \wedge Q_C([\![\text{orange}]\!]) = Q_C([\![\text{grapefruit}]\!])$

However, this is not fine-grained enough: we need to be able to zero in on the *specific attributes* for which the two items share a value. To wit, PERCEPTUAL_ORANGE, denoting the set of all things that have the perceptual appearance of an orange, is predicted to be coextensional to PERCEPTUAL_GRAPEFRUIT, denoting the set of all things that have the perceptual appearance of a grapefruit. This would be very problematic, as it would predict that similarity be transitive: if now grapefruits looked like apples as to shape, their formal *qualia* would be co-extensional. Consequently, oranges would also look like apples.

Instead, we want there to be attributes for specific shape-relevant traits: contour-shape attributes, silhouette-shape attributes, surface-shape attributes, and so on. In other words, we need to decompose PERCEPTUAL. Then, for instance, both oranges and grapefruits could have `shape-of-surface`: $\lambda x.\text{spherical}(x)$. Meaning: they would be both spherical objects. In sum, the structure of the C-structure needs to be liberalized significantly so that it can have the sensitivity to attributes suitable to capture the meaning of similarity verbs.

2.3.2 Problems with recursion in adjectives

Martin (2018) pointed out that if we apply "fake" twice, we get a contradiction in the E-structure. Let us look at the case of *fake fake gun*.

The E-structure of *fake gun* reads as follows. A fake gun

- is not a gun
- does not have the origin of a gun
- does not have the purpose of a gun
- is an object x that has a building event that had as a goal that PERCEPTUAL_GUN(x), i.e. that x look like an gun.

Let us look at the complete entry for "fake gun" again:

(39) $[\![\text{fake gun}]\!]^c_M$ =
E-structure:
$\lambda x.\neg E\big([\![\text{ gun }]\!]^c_M\big)(x)\wedge$
$\neg Q_A([\![\text{ gun }]\!]^c_M)(x)\wedge$
$\exists e_2\big[\text{MAKING}(e_2)\wedge\text{GOAL}\big(e_2, Q_P([\![\text{ gun }]\!]^c_M)(x)\big)\big]$
C-structure:
C: $\lambda x.Q_C([\![\textit{ gun }]\!]^c_M)(x)$
P: $\lambda x.Q_P([\![\textit{ gun }]\!]^c_M)(x)$
T: $\lambda x.\lambda x.\neg Q_T([\![\textit{ gun }]\!]^c_M)(x)\wedge Q_P([\![\textit{ gun }]\!]^c_M)(x))$
A: $\lambda x.\exists e_2\big[\text{MAKING}(e_2)\wedge\text{GOAL}\big(e_2, Q_P([\![\textit{ gun }]\!]^c_M)(x)\big)\big]$

Applying "fake" again, we get a contradiction.

(40) $[\![\text{fake fake gun}]\!]^c_M$ =
E-structure:
$\lambda x.\neg E(\mathbf{G})([\![\text{fake gun}]\!]^c_M)(x)\wedge\quad\neg Q_A([\![\text{ fake gun}]\!]^c_M)(x)\wedge$
$\exists e_3\big[\text{MAKING}(e_3)\wedge\text{GOAL}\big(e_3, Q_P([\![\text{ fake gun}]\!]^c_M)(x)\big)\big]$
C-structure:
C: $\lambda x.Q_C([\![\text{ fake gun }]\!]^c_M)(x)$
P: $\lambda x.Q_P([\![\text{ fake gun }]\!]^c_M)(x)$
T: $\lambda x.\neg Q_T([\![\text{ fake gun }]\!]^c_M)(x)$
A: $\lambda x.\exists e_3\big[\text{MAKING}(e_3)\wedge\text{GOAL}\big(e_3, Q_P([\![\text{ fake gun }]\!]^c_M)(x)\big)\big]$

Computing in the right places, we get something more legible:

(41) $[\![\text{fake fake gun}]\!]^c_M$ =
E-structure:
$\lambda x.\neg E(\mathbf{G})([\![\text{ fake gun}]\!]^c_M)(x)\wedge$
$\neg\exists e_2\big[\text{MAKING}(e_2)\wedge\text{GOAL}\big(e_2, Q_P([\![\text{gun}]\!]^c_M)\big)\big]\wedge$
$\exists e_3\big[\text{MAKING}(e_3)\wedge\text{GOAL}\big(e_3, Q_P([\![\text{gun}]\!]^c_M)(x)\big)\big]$
C-structure:
C: $\lambda x.Q_C([\![\text{ gun }]\!]^c_M)(x)$
P: $\lambda x.Q_P([\![\text{ gun }]\!]^c_M)(x)$
T: $\lambda x.\neg Q_T([\![\text{ fake gun }]\!]^c_M)(x)$
A: $\lambda x.\exists e_3\big[\text{MAKING}(e_3)\wedge\text{GOAL}\big(e_3, Q_P([\![\text{ fake gun }]\!]^c_M)(x)\big)\big]$

In other words, there both was and was not an event in which x was made to look like a gun. Why do we get this paradoxical result? Three parts of the E-structure of "fake" interact to yield this undesired contradiction:

1. "Fake" negates the AGENTIVE of its input: a fake gun does not have the origin of a gun.
2. "Fake" manipulates the AGENTIVE *quale* of its input as follows: it states that there was a making event that had the goal that the denoted object have the formal *quale* of the input. For instance, a fake gun had a making event that had the goal of it having the appearance (formal *quale*) of a gun.
3. "Fake" passess through the FORMAL and CONSTITUTIVE *qualia* of the C-structure of its input. In other words, a fake gun should have the shape and the material of a gun.

Because of 2. and 3., the second application of "fake" yields that there was a making event with the goal of the object looking like a gun. But because of 1., the second application of "fake" negates the AGENTIVE of *fake gun*, which is that there was an event that had the goal of the object looking like a gun.

Martin (2018) proposes a fix for this problem. He proposes that a fake X, instead of having the formal *quale* of an X, has the formal *quale* of *something that has the* TELIC quale *of an* X. For instance, a fake gun has the appearance of something that has the function of a gun. Then, a fake fake gun has the shape of something that has the telos of a fake gun, i.e. it has the shape of something that has the goal of having the shape of a gun.

(42) $[\![\text{fake fake gun}]\!]^c_M =$

E-structure:

$\lambda x.\neg Q_E([\![fakegun]\!]^c_M)(x) \wedge$
$\neg\exists e_2\big[\text{MAKING}(e_e) \wedge \text{GOAL}\big(e_2, \text{PERCEPTUAL-Q}_T([\![\text{gun}]\!]^c_M)(x)\big)\big] \wedge$
$\exists e_3\big[\text{MAKING}(e_3) \wedge \text{GOAL}\big(e_3, \text{PERCEPTUAL-Q}_T([\![\text{fake gun}]\!]^c_M)(x)\big)\big]$

C-structure:

P: $\text{PERCEPTUAL-Q}_T([\![\text{fake gun}]\!]^c_M)$
T: $\neg Q_T([\![\text{fake gun}]\!]^c_M)$
A: $\lambda x.\exists e_3\big[\text{MAKING}(e_3) \wedge \text{GOAL}\big(e_3, \text{PERCEPTUAL-Q}_T([\![\text{fake gun}]\!]^c_M)(x)\big)\big]$

While this fix works for the specific case of "fake", the problem is deeper. The introduction of PERCEPTUAL-Q_T gives us something that has the appearance of having the telos of Q. However, this move is not completely transparent. To begin, notice that the content of the specific *qualia* is a pure extension. Then, although not defined as a function, *de facto* PERCEPTUAL works as a function. It takes as an input a set of individuals (e.g., the entities that have the telos of a gun) and returns all the individuals that have the appearance of that set of individuals. Ultimately, it presupposes a notion of similarity.

Regardless of whether presupposing similarity (under the form of PERCEPTUAL) is explanatorily adequate or not, it does not deliver the right predictions for a generalized recursive applicability of C-sensitive adjectives.

Indeed, take the example of "fake" embedding another C-sensitive expression like "typical". Recall that "typical" uploads a variable portion of C-structure to the E-structure. A typical gun is a gun that has enough gun-like traits:

(43) $[\![\text{typical}]\!]^c_M =$

E-structure:

$\lambda \mathbf{G}.\lambda x.E(\mathbf{G})(x) \wedge T(\mathbf{G},x) > s$

C-structure:

C: $\lambda \mathbf{G}.\lambda x.Q_C(\mathbf{G})(x)$
P: $\lambda \mathbf{G}.\lambda x.Q_P(\mathbf{G})(x)$
T: $\lambda \mathbf{G}.\lambda x.Q_T(\mathbf{G})(x)$
A: $\lambda \mathbf{G}.\lambda x.Q_A(\mathbf{G})(x)$

Again, the C-structure is passed along from the input expression to the output expression. We get that the E-structure of a fake typical gun:

(i) does not make true a sufficient number of prototypical gun traits.
(ii) crucially, **there is no making event that had the goal that the denoted object function like a typical gun, thus like a gun.** This is at the root at the problem, as we are about to see.
(iii) there is a making event with the goal that it resemble a gun.

Here's a computation of the E-structure of "fake typical gun" following Del Pinal's lexical entries. For brevity, I leave out the C-structure (which is again the same as the C-structure of "gun").

(44) $[\![\text{ fake typical gun }]\!]^c_M =$

E-structure:

(i) $\lambda x.\neg|T(\text{GUN}_c,x) > s \wedge$

(ii) $\neg\exists e_1[\text{MAKING}(e_1) \wedge \text{GOAL}(e_1, \text{GEN}_e\big(\text{SHOOTING}(e) \wedge \text{INSTRUMENT}(e,x)\big)] \wedge$

(iii) $\exists e_2[\text{MAKING}(e_2) \wedge \text{GOAL}\big(e_2, \text{PERCEPTUAL\_GUN}(x)\big)]$

To restate these three points in simpler words, an object that should qualify as a fake typical gun:

(i) does not have a certain number of traits typical of guns
(ii) is not built to function like a gun;
(iii) is intended to be perceived as a gun.

Take a gun that was built to function like a gun, i.e. to shoot. It was intentionally built in such a way that from a certain perspective it looks like an ordinary, unremarkable Colt, but from another angle it becomes clear it has all sorts of exotic features, e.g. it has ten barrels. The account incorrectly predicts this object to not qualify as a fake typical gun, because it is built to function like a gun.

This example illustrates how a fake typical gun should not merely be made to resemble a gun. It should be made to resemble a *typical gun*.

Martin's fix does not help here. Taking Del Pinal's entry for "typical", Martin's analysis of "fake" would tell us that a fake typical gun was made to look like it has the telos of a gun, since the telos of a typical gun is the same as that of a gun. This seems just as unwarranted. Take an object that is intended to look like it shoots, and moreover is intended to look like it has all sorts of exotic features, e.g. it has ten barrels. This object is incorrectly predicted to qualify as a fake typical gun.

What we really want is that a fake typical gun have those traits that are diagnostic of *typical guns*. These traits may not be the same as those that are diagnostic of guns (cf. sections 3.5.3, 4.2). Two insights emerge from this discussion:

i. For the system to be fully recursive, we need the C-structure to be updated after any manipulation of the E-structure. A promising direction is the following criterion: any time the E-structure is modified, there is some C-structure byproduct. New diagnostic information can be computed on the fly. I will pursue this idea in the positive account.
ii. Similarity is a central concept in diagnosticity. Reasonably, it should not be postulated as a primitive.

2.3.3 Summary of DCS and extended-DCS

In sum, it looks like DCS holds the promise of unifying a number of phenomena. It postulates an enriched lexical meaning, whose structure is psychologically motivated. Movements of content from the C- to the E-structure seem to provide the right expressive power to capture the phenomena at hand. However, the theory in its current implementation poses several problems.

Similarity is not a specific *explanandum* of DCS, and it seems that DCS should be slightly extended to have the expressive power to capture similarity verbs. Specifically, to be sensitive to attributes, the C-structure needs to be refined.

Zooming in on its specific *explananda*, privatives and C-sensitive adjectives, DCS poses more serious problems. The theory is not recursive and there are no quick fixes to this problem. It seems like the C-structure can *never* remain the same when the E-structure changes, or else a fake typical gun will be the same as a fake gun.

The take-away is two-fold: we need to posit that diagnostic traits are computed newly any time an operator manipulates the E-structure; and we need to make the C-structure very fine-grained, although still constrained, to capture the meaning of similarity verbs.

3 The proposal

An analysis that captures these facts must answer two questions:

(i) What are the basic components of the representations of lexical items?
(ii) How should we specify the compositional operations so that key functional items sensitive to C-structure operate adequately?

The question of the sensitivity of similarity statements to attributes is more closely related to (i), while the question of recursivity concerns (ii). I will now present a framework that addresses these two problems. It is closely related to Del Pinal's dual content, but integrates it with an important feature, namely its view of lexical item C-structures as bundles of attribute-value pairs.

With respect to DCS, the present proposal should be seen as an *extension* that makes it sensitive to single attributes. Here's the basic idea: similarity verbs should be sensitive to specific attributes like *color*. To do this, the organization of the C-structure *qualia* needs to be sensitive to attributes, and not only to the four dimensions of DCS.

Moreover, the present proposal should be seen as a *fix* of DCS with respect to the problems of recursivity. New pairs of attribute-value pairs should be generated any time the E-structure gets modified. To wit: "gun" has some diagnostic traits in its C-structure. If we apply "typical", these gun-diagnostic traits are uploaded to the E-structure, and the C-structure is left empty. What will fill the C-structure of "typical gun" will be the diagnostic traits of typical guns. These need not be very different, but as we will see the diagnostic traits of "typical NP" can diverge quite significantly from the diagnostic traits of the NP.

3.1 Basics

3.1.1 Concepts

As a first approximation, concepts are sets of attribute-value pairs. For G a concept, we have the following:

(45) $G = \{\langle \mathtt{a_i}, v_n \rangle, ..., \langle \mathtt{a_j}, v_m \rangle\}$

For instance, for the N *lion* we have:

(46) **lion**

$\mathtt{color}$: $\mathtt{yellow}$
$\mathtt{a_i}$: v_n
...
$\mathtt{a_j}$: v_m

Values are properties, and attributes are sets of properties. For G a concept, we have the following:

(47) $G = \{\langle \mathtt{a_i}, \lambda x.v_n(x) \rangle, ..., \langle \mathtt{a_j}, \lambda x.v_m(x) \rangle\}$

For ease of notation, I will leave the lambda-abstraction out of the attributes. Thus, for "lion", we have:

(48) **lion**

$\mathtt{color}$: $\lambda x.yellow(x)$
$\mathtt{a_i}$: $\lambda x.v_n(x)$
...

$\mathtt{a_j}$: $\lambda x.v_m(x)$

The features listed in (46) are the *core* traits associated with the concept of a lion. But recall, again, the problem with definitional theories of meaning such as Franks' Sense Generation that Del Pinal's DCS takes care of. There is no single set of features that captures necessary or sufficient conditions for membership. Consequently, a concept must contain a token that univocally attributes category membership: we introduce the DCS E-structure, a simple $\langle e,t \rangle$ term. All of the non-qualifying attributes correspond to the C-structure in the terms of DCS.

(49) $[\![$**lion**$]\!]$ =
E-structure:
$\lambda x.lion(x)$
C-structure:
`color`: $\lambda x.yellow(x)$
$\mathtt{a_i}$: $\lambda x.v_n(x)$
...
$\mathtt{a_j}$: $\lambda x.v_m(x)$

Lexical items are rooted in mental representations: they are "ready-to-use", linguistic versions of them. For instance, the mental representation of a feature may be `color:yellow`. To be readily applicable in the grammar, the mental representation-level `yellow` becomes the linguistic $\lambda x.yellow(x)$. Then, concepts are *pairs* of $\langle e,t \rangle$ type expressions and sets of attribute-value pairs:

(50) $G = \Big\langle \lambda x.G(x), \big\{ \langle \lambda P.\mathtt{a_i}(P), \lambda x.v_n(x) \rangle, ..., \langle \lambda P.\mathtt{a_j}(P), \lambda x.v_m(x) \rangle \big\} \Big\rangle$

We can think of the E-structure, e.g. $\lambda x.lion(x)$, in two terms. As a *categorization test*: for any individual, this function tells us if it is a lion on the basis of a non-linguistic categorization recipe. *Extensionally*: as the set of all lions.

One may wonder whether there are coextensional attributes, i.e. attributes that contain the same values. I will assume that this does not happen. For instance, at the level of mental representations, the attribute `color` and the attribute `eye-color` may have the same set of values. But at the level of lexical items they will have different values, because the set of yellow-eyed entities is distinct from the set of yellow entities. Thus for instance, while at the level of mental representations we may have that lion has `color:yellow` and `eye-color: amber`, at the level of lexical items we will have `color`: $\lambda x.yellow(x)$ and `eye-color`: $\lambda x.amber\text{-}eyes(x)$.

(51) $[\![$**G**$]\!]$ =
E-structure:
$\lambda x.G(x)$
C-structure:
$\mathtt{a_i}$: $\lambda x.v_n(x)$
...
$\mathtt{a_j}$: $\lambda x.v_m(x)$

The C-structure of a concept is constituted by two macro-dimensions: the *diagnostic* traits and the *normative* ideals. The diagnostic traits are usually the grounds for categorizing an individual: if you see that an animal has a mane, roars, hunts, these are grounds to categorize it as a lion. The normative traits are expressions of a normative ideal, e.g. fairness is a trait related to the concept **judge** insofar as the normative ideal for judges includes fairness. I justify the need for a normative dimension of concepts in section 4.1. Some concepts will have both dimensions, others will have an empty normative layer. For G a concept, I will write $\Delta_{\mathbf{G}}$ to denote its diagnostic traits, and $N_{\mathbf{G}}$ to denote its normative ideals.

(52) $[\![\mathbf{G}]\!] =$
E-structure:
$\lambda x.G(x)$
C-structure:
$\Delta_{\mathbf{G}}$
$N_{\mathbf{G}}$

A number of operations can be applied to concepts.

- **Extracting the E-structure**. For instance:

$$E(\mathbf{lion}) := \lambda x.lion(x)$$

- **Inspection of the value of an attribute:** We can inspect what value the C-structure of a concept takes for a given attribute. Then, for instance:

$$V(\mathbf{G}, \mathtt{a_i}) := \iota v.\langle \mathtt{a_i}, \lambda x.v(x)\rangle \in \mathbf{G}$$

  For instance, the eye color of lions is amber, thus the concept lion will have `amber` as its value for the attribute `eye-color`:

$$V(\mathtt{eye\text{-}color}, \mathbf{lion}) = \lambda x.amber\text{-}eyes(x)$$

- **Inspection of the value that an individual takes for an attribute**:

$$\textsc{val}(x, \mathtt{a}) := \iota v.v \in \mathtt{a} \wedge v(x)$$

  We can think of attributes as partitions on the universe of individuals. For instance, `eye-color` divides the universe in blue-eyed individuals, green-eyed, and so on. When we inspect the value for `eye-color` for John, we are retrieving in what cell of the `eye-color` partition on individuals John is situated.

- **The set of attributes for which a concept has defined values**

$$\textsc{att}(\mathbf{G}) := \{a : \exists v.\langle a, v\rangle \in \mathbf{G}\}$$

This is what DCS in Del Pinal's implementation is not sensitive to: DCS *qualia* are less sensitive. We can only access the whole PERCEPTUAL dimension of a concept. Thus it seems difficult to account for "with respect to" constructions.

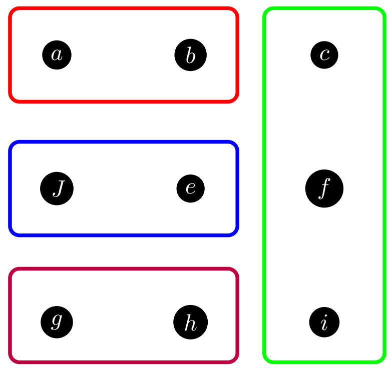


Figure 1: $\text{VAL}(J, \texttt{eye-color}) = \lambda x.blue\text{-}eyes(x)$ *The attribute* `eye-color` *divides the universe in blue-eyed individuals, green-eyed, and so on. When we inspect the value for* `eye-color` *for John (J), we are retrieving in what cell of the* `eye-color` *partition John is situated, and find he is in the set of blue-eyed individuals,* $\lambda x.blue\text{-}eyes(x)$.

On the other hand, one important feature of DCS was that it had a well-regimented structure to the C-structure. One may wonder what constrains the attributes that a concept contains in the present proposal.

To this point, notice that similarity respects are not always felicitous:

(53) a. With respect to its head-of-state, monarchy is like dictatorship. (It only has one)
b. # With respect to color, monarchy is like dictatorship. (It has none.)

I propose this as a weak test:

(54) With respect to A, B is like C.
(55) **Weak attribute test**: any A that cannot go into a sentence of the form in (54) cannot be a feature of B or cannot be a feature of C.

I call it a weak test because it is only negative: if something cannot go in the position of A, it is not an attribute of B, or it is not an attribute of C.[6] But if something *can* replace A, matters are less clear. At this stage we cannot yet commit to a specific form of attribute-value pairs: while it would seem natural to suppose that some things have `color` as an attribute with specific colors as possible values, it seems unreasonable that the concept of democracy has an attribute like `head-of-state`. However, it should still contain something related, since we are able to talk about it and compare its content to other concepts. Attributes are *psychological* entities, so they need not be effable; many of them, however, can definitely be gestured at. This is the case of "easy" similarity respects like "with respect to color": this string of words identifies a subset of the attributes that are psychologically relevant to color categorization.

[6] We need this disjunctive formulation of the test because these sentences are infelicitous even if an attribute does not belong to *one* of the two concepts. For instance, `color` belongs to **banana**, but the sentence "With respect to color, bananas look like dictatorship" is infelicitous.

Relatedly, are the attributes organized along some dimensions like those of DCS? First, nothing prevents the framework from organizing attributes around the Constitutive, Formal, Telic, and Agentive *qualia*, as DCS does. In fact, as mentioned, we will see that while the four *qualia* discussed above will not be relevant, a specific normative dimension of concepts is needed to account for genericity.
Second, the spirit of DCS is retained in the present proposal: DCS attempts to constrain modulation so as to not incur in overgeneration issues. The present account is similarly restrictive: C-sensitive operators should *only* be able to operate on on the attributes a lexical item has defined values for. Besides weak tests like the one given in (55), psychological theories should inform constraints on what can or cannot be an attribute of a given item. I discuss some relevant literature on this in section 4.2.

3.1.2 Simple predication

Different operators will target, as in DCS, different combinations of E-structure and specific C-attributes. Let us begin with basic predication.

(56) Aslan is a lion.

Sentence (56) states that Aslan is to be categorized as a lion, but we are not told anything about what features he has. For all we know, he may be so atypical to be hardly recognisable as a lion. Still, inferentially and defeasably, we form for ourselves a picture of Aslan having a mane, being capable of roaring, and so on.

(57) $E(\mathbf{lion})((Aslan'))$

This is the view of predication in the present account: *be* relates an individual and the E-structure of a concept.

$$[\![\text{be}]\!] : \lambda \mathbf{G}.\lambda x.E(\mathbf{G})(x)$$

3.2 Genericity

Del Pinal (2018) observes that the C-sensitive adjective “typical” uploads traits of the C-structure to the E-structure. This is the spirit of this treatment of generics: genericity makes the C-structure at-issue and then manipulates it. However, different morphosyntactic markers (including null markers) do this in different ways.

characterizing sentences concerning only one gender of a biological kind like (58)a. and (58)b. have been a helpful empirical test for theories of genericity.

(58) a. Lions suckle their young.
b. Lions have a mane.

While theorists have observed that both are acceptable (Krifka et al., 1995), the behavior of these sentences both embedded in the same matrix sentence has not been discussed.

First, I observe that characterizing sentences with bare plural generics can talk about both genders in the same matrix sentence:

(59) a. Lions have a mane and suckle their young.
b. Ducks lay eggs and have colorful feathers. [only males have colorful feathers]

This is a surprising fact, which differentiates bare plurals from singular indefinites. Similar sentences with singular indefinites are indeed infelicitous:

(60) a. # A lion has a mane and suckles its young.
b. # A duck lays eggs and has colorful feathers.

With its appeal both to individuals and to concepts, the present proposal can capture this pattern. Here is the basic idea of the treatment of generics: singular indefinite sentences like (60) talk about a typical individual constructed from the concept. An individual cannot be of both genders at once. Instead, plural sentences like those in (59) manipulate directly the concept. To wit, the concept **lion**, inasmuch as it is genderless, can have both traits typical of the males and traits typical of the females without contradiction. Concept-embedding bare plurals echoe Chierchia's (1998) proposal that bare plurals embed kinds as a default. In the present account, one can view concepts as cashing out what kinds are with independent psychological tools.

(59)a. states that the concept *lion* has `mane` and `suckle` as values for the relevant attributes (e.g., `hair` and `young-nutrition` respectively).[7] The concept is genderless, and thus the characterizing sentence can embed attribute-value pairs that pertain both to female and male individual lions. Consider for instance the entry for `duck` below:

(61) $[\![$ duck $]\!]$ =
E-structure
`duck:yes`
C-structure
`shape: duck-shape`
`feet-shape: webbed`
...
Δ_{duck}
N_{duck}

Then, the characterizing sentence in (59)b. can be captured as follows:

(62) $V(\texttt{reproduction}, \text{duck}) = \texttt{egg-laying} \wedge V(\texttt{feathers}, \text{duck}) = \texttt{colorful}$

In other words, a bare plural generics seeks to set the value of some attribute. Then, a bare plural of the form "**G**s P" is true iff a salient attribute of the concept **G** has P as its

[7] As mentioned already, there is not enough work on the internal structure of concepts to know whether, for instance, the attribute-value pair is `mane: yes` or `hair:mane`. The point here is that bare plural generic sentences involve some value-setting for the concept that corresponds to the subject of the sentence. Again, work identifying the specific structure of attributes should involve (i) linguistic tests like the weak attribute test and considerations on information structure and (ii) work in formal psychology. As to the weak attribute test, notice that it seems better to utter (I) than (II):
(I) With respect to hair, lions are like horses (*they have a mane*).
(II) With respect to mane, lions are like horses.

value:

(63) $[\![\mathbf{G}\text{s P}]\!] = 1$ iff $V(\mathbf{G}, \mathtt{a}) = P$

This proposal is thus essentially in line with the consensus that bare plurals are kind-/concept-referring. Of course, not all bare plurals refer to concepts. It is well known that bare plural sentences can denote both genericity and existential quantification. Episodic/stage-level predicates force the existential interpretation, while individual-level predicates force generic interpretations (Chierchia, 1995).

(64) Lions are in the garden. EXISTENTIAL

(65) Lions have a mane. GENERIC

Chierchia (1998) proposes that by default BP sentences are interpreted as kind-referring, and that a type-shifting mechanism intervenes to coerce kinds into instances of a kind when the VP only takes individuals as an input, as for instance episodic VPs do. He proposes that there is a correspondence between kinds and properties: DOG is the property of being a dog, $^{\cap}$DOG is the corresponding kind. Conversely, if d is the dog-kind, then $^{\cup}$d is the property of being a dog. Now, if an object-level argument slot in an episodic predicate is filled by a kind, the type of the predicate is automatically adjusted by introducing an existential quantification over instances of the kind. This is the Derived Kind Predication:

(66) DKP: If P applies to objects and K denotes a kind, then:
$P(k) = \exists x.{}^{\cup}k(x) \wedge P(x)$

One can see how we can introduce a completely parallel adaptation of this mechanism, Derived Concept Predication (DCP), to cash out the double life of BP sentences in the present account. For instance, stage-level predicates will not be able to set the value of a given attribute. Because they only embed object-level arguments, they trigger DCP.[8]

(67) DCP: If P applies to objects and **G** denotes a concept, then:
$P(\mathbf{G}) := \exists x.E(\mathbf{G})(x) \wedge P(x)$

And in fact, two-gender matrix sentences appear to be a good test to understand whether a bare plural is kind-/concept-referring or not. Consider sentences (68) and (69) below: "typical" is taken to approximate the truth conditions of generic sentences, but it looks like it type-shifts its argument into an object-level type:

[8] One may wonder just what predicates can or cannot set values for a concept. In section 4.1, I discuss how psychological essentialism can inform lexical semantics. One of the important results in the acquisition of concepts is the following. When they learn something new about an object that has received a certain category label (say, about a specific lizard), children *selectively* generalize the piece of information to other entities that share that category label (to other lizards). Concretely, children only generalize traits that are enduring and causally linked to the category, and not contingent or temporal traits. This seems to provide a good explanation of why stage-level predicates only have object-level slots. After all, why could we not say that it so happens that kind-members have a certain property at a certain moment in time? Why can't we utter a sentence like (I) with a generic flavour?
(I) * Lions are currently being endangered by hunting.
It seems that the relation between essences and diagnosticity can inform linguistics here. Cf. section 4.1 for discussion.

(68) a. Ducks lay eggs.
b. ≈ Typical ducks lay eggs.

(69) a. Ducks lay eggs and have colorful feathers.
b. $\not\approx$ * Typical ducks lay eggs and have colorful feathers.

One possible analysis of the asymmetry between (68) and (69) is the follwing: "typical lions" talks about *those individuals that are typical*, while "lions" talks about the **lion** kind/concept.[9]

What about singular indefinites like (70)?

(70) A duck swims.

Mascarenhas (2012) proposes that when they participate in a generic reading, indefinites end up in the antecedent of a conditional and bind dynamically into the consequent. This makes it possible to keep existential quantification, which is more transparent to the meaning of indefinites. I import this analysis, and propose that the singular indefinite involves a covert restriction: (70), for instance, says that an individual which *is* a duck *and* has the same values for the attributes as the concept **duck** (in other words, is a typical duck) swims. In other words: "if a duck has traits typical of a duck, it swims".[10]

(71) $\big(\exists x.E(\mathbf{duck})(x) \wedge \forall \mathtt{a} \in \textsc{att}\big(\Delta_{\text{duck}}\big).\textsc{val}(x, \mathtt{a}) = V(\textsc{duck}, \mathtt{a})\big) \rightarrow \textit{swim}(x)$

[9]Cohen (1999) proposes that generics impose a homogeneity condition: exceptions to the generic must not be concentrated in a salient "chunk" of the domain. It may be that "typical" has salient-chunk exceptions, while other restrictors have the bare plural still respect the homogeneity condition. To this point, consider the following contrast:
(I) * Typical lions have a mane and suckle their young.
(II) OK African lions have a mane and suckle their young.
The two-gender matrix sentence may then be taken as a test to distinguish between two cases:
- those restricted expressions that denote a natural kind and for which we have a stored or storable concept ("African lions").
- those restricted expressions that are type-shifted into individuals because they identify a non-homogeneous group of individuals ("typical lions").

[10]There is independent evidence that restrictions license generic readings. Carlson (1981) observed that generic readings of indefinite pronouns are *only* licensed when there is a restriction:

(I) a. * Someone should be punctual.
b. Someone who respects others should be punctual.

This contrasts with the behavior of *a NP* indefinites, which do not display the same asimmetry:
(II)a. A person should be punctual.
b. A person who respects others should be punctual.

Mascarenhas (2012) argued that unrestricted indefinite pronouns lack alternatives on which the generic quantifier GEN may range. More specifically, GEN cannot apply because the alternatives supplied by the indefinite cannot be parametrized to a situation. *A* NP indefinites, instead, supply sufficiently fine-grained alternatives that can be parametrized to a situation, and thus GEN can range over them. A different way to cash out this view is that unrestricted indefinites, be they indefinite pronouns or *a NP*, can never be read generically. On this view, *a NP* indefinites can be read generically because the concept related to the NP provides the conceptual material for a covert restriction with diagnostic traits. This covert restriction is not available to the plain indefinite, as it has not conceptual material. Consequently, it cannot be read generically unless it overtly provides this material embedding a restrictive relative clause.

In words:

- if an individual
  i. is to be categorized as a duck and
  ii. has the same values for the diagnostic attributes of the concept **duck** as the concept **duck**
- it swims.

Moving on, it seems that strictly speaking no individual corresponds to the entry in (71): recall that the concept contains information pertaining both to male and to female exemplars. Consequently, no individual has *all* of the **duck**-values for the attributes of *duck*. For instance, any individual either has colorful feathers or lays eggs. We can weaken the semantics and posit that the individual needs to have the a sufficiently high score in a typicality score. Define τ_Δ as the function that given an individual and a concept, returns a typicality score. This typicality score may be approximated by simply counting the traits shared between an individual and a concept, as does Del Pinal (2018). I prefer to write this as a manageable black box, so that independent work in semantics and psychology can cash out this function. The typicality score will be determined by at least three elements:

- the number of diagnostic traits the individual shares with the concept, i.e. the number of attributes for which it has the same value as the concept.
- the relative weights of the attributes
- the dependency relations among the attributes, i.e. their relative centrality
- the salience in a given context of specific attributes

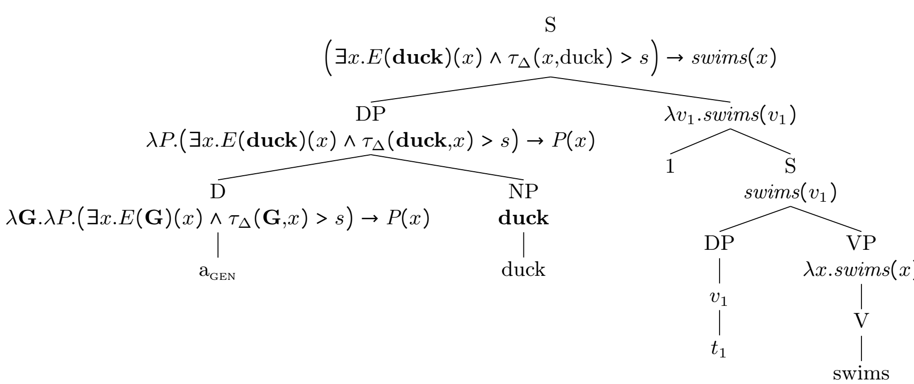
The entry for (70) is:

(72) $\big(\exists x.E(\mathbf{duck})(x) \wedge \tau_\Delta(\mathbf{duck},x) > s\big) \rightarrow swim(x)$

And we can give an entry with the generic quantifier that gives rise to generic readings of singular indefinites:

$$[\![\text{GEN}]\!] := \lambda \mathbf{G}.\lambda P.\big(\exists x.E(\mathbf{G})(x) \wedge \tau_\Delta(\mathbf{duck},x) > s\big) \rightarrow P(x)$$

Then, (70) has a derivation as follows:



This accounts for (i) the intuition of lawfulness that singular indefinite generics give, and (ii) the fact that generics intuitively look so close to universal quantification. Moreover, it explains why sentences (73)a. and b. are both good, while the two-gendered matrix sentence in (73)c. is not.

(73) a. OK A duck lays eggs. FEMALE-PERTAINING
b. OK A duck has colorful feathers. MALE-PERTAINING
c. # A duck lays eggs and has colorful feathers. TWO-GENDERED

To be typical enough, the individuals the donkey-bound existential quantifies over may lack male-specific traits and only have female-specific traits as in (73)a. or the converse as in (73)b. But the same individuals cannot have both male- and female-specific traits; this accounts for the infelicity of (143)c.

3.2.1 Deontologically flavored generics

Consider (74):

(74) A judge does not accept bribes.

This sentence is generic, but does not talk about an individual that displays traits *diagnostic* of a judge. Rather, it talks about the normative *ideal* of a judge.

The present account can capture these sentences by integrating some facts from cognitive psychology. Knobe et al. (2013) showed that there are concepts that are associated to two distinct sets of features: diagnostic on the one hand, and normative on the other. One consequence of this is that one can bring two different kinds of reasons to state that an individual belongs to a category. Remember that the C-structure, while not extension-determining, contains all the psychological information that *inductively* pushes people to make categorization judgments. This does not mean that something cannot belong category without missing many, and in fact the overwhelming majority of these traits; it only means that the C-structure contains (fallible) strategies to identify an invisible, category membership determining essence (cf. discussion on essentialism, 4.1). Consider the following sentences:

(75) a. There is a sense in which she is clearly a scientist...
b. (she conducts experiments, analyzes data, develops theories, writes papers)

(76) a. ... but ultimately, if you think about what it really means to be a scientist, you would have to say that she is not a scientist at all.
b. (she isn't engaged in an impartial quest for empirical truth)

Del Pinal proposes that adjectives like "true" target a NORMATIVE dimension of the C-structure, and make the normative dimension at-issue. A true judge, then, is someone who is to be categorised as a judge and, moreover, has all the virtues associated with an ideal judge: impartiality, honesty, and so on. We can thus posit that the C-structure is divided in at least two parts, as in the lexical entry for "judge" below:

(77) $[\![\text{judge}]\!]$ =

E-structure

$\texttt{judge:}\ \lambda x.judge(x)$

C-structure

Δ_{judge}

N_{judge}

Because some concepts like **scientist** and **judge** provide two bases for evaluating category members and two different criteria for category membership, we expect generic sentences to be ambiguous between these two. To capture (74), we can have a function τ_N, analogous to τ_Δ, which tells us to what extent an individual corresponds to the normative ideal of a category.

(78) $\big(\exists x.E(\mathbf{judge})(x) \wedge \tau_N(\mathbf{judge},x) > s\big) \rightarrow \neg accept\text{-}bribes(x)$

3.3 Similarity

When capturing similarity, we are faced with two seemingly contradictory constraints: on the one hand, similarity verbs are sensitive to attributes, as in (79).

(79) With respect to eye color, lions are like cats.

Attributes are peculiar of non-atomic items. If we suppose that individuals are atomic, then they should not be sensitive to attributes. But similarity statements can precisely relate atomic individuals:

(80)
a. John looks like Mary.
b. John looks like that lawyer.
c. John looks like every student.

I posit that for any atomic individual we can access a concept. This concept may be recovered from memory if it connects to a known individual, or constructed on the fly, to record information on the newly introduced discourse referent. The concept for *John*, for instance, contains all the information we stored about John. We will call such concepts individual concepts. The function FILE takes an atomic individual and returns the individual concept for that individual:

(81) $\text{FILE}(x) =$
E-structure
x
C-structure
$\mathtt{a}_1 = \text{VAL}(\mathtt{a}_1, x)$
...
$\mathtt{a}_n = \text{VAL}(\mathtt{a}_n, x)$

The expression $\mathtt{a}_1 = \text{VAL}(\mathtt{a}_1, x)$ may look circular, but it is not: the value of the individual **concept** for x for attribute $\mathtt{a}_1$ is the value that the **individual** x takes for $\mathtt{a}_1$, i.e. the cell of the $\mathtt{a}_1$-partition that contains x. Notice that the E-structure of individual concepts is of type e. For instance, suppose John has blue eyes and black hair. Then `eye-color`= $\textsc{val}$(`eye-color`,John)= λx.blue-eyes(x), and similarly for `hair-color`:

(82) $\textsc{file}(\text{John}')$ =
E-structure
John
C-structure
`eye-color`= λx.blue-eyes(x)
`hair-color`= λx.brown-hair(x)

Equipped with this tool, we can capture the fact that similarity statements are sensitive to attributes but have two object-level slots. I propose the following analysis. *x* looks like *y* iff:

- for a salient set of attributes among the attributes of the individual file derived from *y*,
- *x* and *y* have the same value.

Formally:

(83) $[\![\text{ seem like }]\!]_E = \lambda y.\lambda x.D \subseteq \textsc{att}(\textsc{file}(y)) \wedge \forall \mathtt{a} \in D.\textsc{val}(\mathtt{a},x) = \textsc{val}(\mathtt{a},y)$

D is a non-empty set of attributes, contextually provided: this accounts for the context-sensitivity of similarity. Consider for instance Goodman's example of the context-sensitivity of similarity:

(84) **Context** We are at the airport, watching luggage pieces go through the conveyor belt.

As Goodman says, different people will be concerned with different attributes.[11]

(85) a. "The spectator may notice shape, size, color, material, and even make of luggage; the pilot is more concerned with weight, and the passenger with destination and ownership"
b. $D_{\text{spectator}} = \{\mathtt{shape},\mathtt{size},\mathtt{color},\mathtt{material},\mathtt{make}\}$
c. $D_{\text{pilot}} = \{\mathtt{weight}\}$
d. $D_{\text{passenger}} = \{\mathtt{destination},\mathtt{ownership}\}$

Now take the sentence below:

(86) This piece of luggage looks like that piece of luggage.

If uttered by the spectator, this sentence will be true if the two pieces of luggage have the same shape,size,color,material, and make. If uttered by the pilot, they must have the same weight. And so on.

[11] Notice that similarity verbs also have a judge argument: "To me, John looks like Mary". Strictly speaking, then, this entry should be embedded in belief: a contextually provided judge believes that for a salient set of attributes among the attributes of the individual file derived from Mary, John and Mary have the same value. We will leave this point aside because it is not relevant for the unification of the three phenomena at hand. For further discussion, see Rudolph (2019).

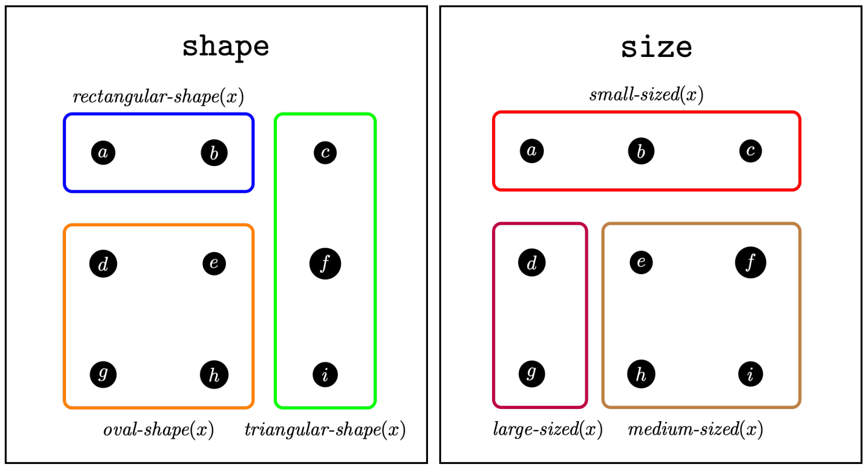


Figure 2: "With respect to shape and size, piece of luggage *a* looks like piece of luggage *b*." *Then, the set D of similarity respects is* $D = \{\texttt{shape}, \texttt{size}\}$. *The two pieces of luggage are in the same cell of the* `shape`*-induced partition, as well as in the same cell of the* `color` *induced partition. Formally:* $\{\texttt{shape}, \texttt{size}\} \subseteq \text{ATT}(\text{FILE}(b)) \wedge \forall \texttt{a} \in \{\texttt{shape}, \texttt{size}\}.\text{VAL}(\texttt{a}, a) = \text{VAL}(\texttt{a}, b)$.

What kind of attributes are admissible in *D* is also determined by what similarity verb is used. If an attribute is specific of one modality, a similarity verb of a different modality cannot embed it as a similarity respect.[12]

(87) # With respect to color, Fido sounds like Pluto.

"Look like" will require visual attributes, "sound like" acoustic, and so on. Reasonably, "be like" will be liberal with what attributes can populate *D*.

What generics can be embedded in similarity verbs? The present account answers this question naturally. Similarity verbs have an object-level argument slot. If the analysis given in the previous section is right, they should not be able to embed bare plural generics, which denote a concept, but only singular indefinite generics, which denote an individual. This seems right:

(88) a. John looks like a lion.
b. * John looks like lions.

One may object that a sentence like (89) does in fact embed a bare plural:

(89) a. They look like lions.

However, this bare plural is plausibly the plural of "a lion". Italian is very telling in this respect. Italian marks genericity either with the singular indefinite, or with the singular and plural definite:

[12]Note also that the free-variable can interact non-trivially with the judge and embedded belief (cf. previous footnote): if I say "To John, this animal seems like a cow" and we know that John is blind, the attributes filling D will not be visual.

(90) a. Un leone ha bisogno di una preda a settimana.
A lion has need of one prey per week.

b. * Dei leoni hanno bisogno di una preda a settimana.
of-PARTITIVE *lions have need of one prey per week.*

c. * Leoni hanno bisogno di una preda a settimana.
Lions have need of one prey per week.

d. Il leone ha bisogno di una preda a settimana.
The lion has need of one prey per week.

e. I leoni hanno bisogno di una preda a settimana.
The lions have need of one prey per week.

The translation of (88) in Italian is as follows:

(91) John sembra un leone.
John seems a lion.

Now, the translation of a sentence with a plural subject like (89) is very telling in this respect, as it employs no other form of genericity. Instead, it only turns the singular indefinite into an indefinite plural, plausibly for mere concord purposes.

(92) a. Sembrano dei leoni.
b. Sembrano leoni.
c. * Sembrano i leoni.

Let us summarize the situation:

Recall from section 3.2 that the singular indefinite does not support predication pertaining to two genders, as in (93).

(93) a. # A lion has a mane and suckles its young.
b. # A duck lays eggs and has colorful feathers.

Therefore, we hypothesized that the singular indefinite generic constructs a typical individual for a concept using the C-structure of that concept. A dynamic existential is donkey-bound by a covert restriction, and sentences of the form "an A is a B" come to mean something like "any A that has typical characteristics of the concept A is a B".

Similarity verbs have an object-level argument slot, as one can utter sentences like (80), reported below in (94).

(94) a. John looks like Mary.
b. John looks like that lawyer.
c. John looks like every student.

Consequently, we can characterize generic-flavored similarity statements as embedding a singular indefinite generic. Consider (95):

(95) John looks like a duck.

This sentence is roughly equivalent to (96):

(96) John looks like a typical duck.

We can paraphrase this sentence as follows: if x is a typical duck, then for a salient set of attributes of the individual concept of x, John has the same value as x. Then, there is a characterizing sentence that we can construct which, although not very natural, has an intuitive meaning very similar to (95).

(97) If a duck has traits typical/diagnostic of a duck, John looks like it.

Therefore, we can capture this sentence as in (98):

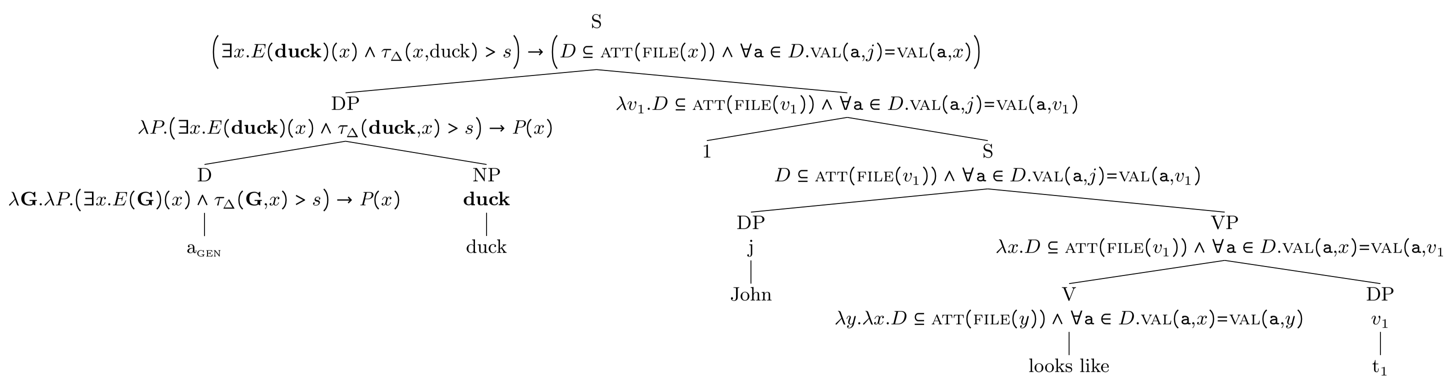
(98) $\left(\exists x.E(\mathbf{duck})(x) \wedge \tau_{\Delta}(x, \mathbf{duck}) > s\right) \rightarrow \left(D \subseteq \text{ATT}(\text{FILE}(x)) \wedge \forall \mathsf{a} \in D.\text{VAL}(\mathsf{a}, \text{John}) = \text{VAL}(a, x)\right)$

This accounts for the three features of similarity statements we identified in section 1.2.2: non-distributivity, tolerance to exceptions, and non-monotonicity.

Concerning the non-distributivity of similarity statements, the most salient traits for "British judge" will be different from those that are salient for "judge", because the relative weights of the traits are determined by their diagnosticity, and having a wig is diagnostic of British judges while it is not of judges (cf. the discussion of what counts as diagnostic in section 4.2). Then, someone who looks like a British judge need not look like a Brit, nor like a judge.

This also accounts for the tolerance for exceptions: if John looks like a *typical* duck, he doesn't necessarily look like *any duck*.

Finally, this accounts for the non-monotonicity of these sentences: a typical duck may not share many traits with a typical bird. For instance, its beak is very different from other birds' beaks. Consequently, the fact that John looks like a duck does not inform us about whether he looks like a bird as well. Here is the complete derivation of (95):


S
$\big(\exists x.E(\mathbf{duck})(x) \wedge \tau_\Delta(x,\text{duck}) > s\big) \rightarrow \big(D \subseteq \textsc{att}(\textsc{file}(x)) \wedge \forall \mathsf{a} \in D.\textsc{val}(\mathsf{a},j)=\textsc{val}(\mathsf{a},x)\big)$
DP
$\lambda P.\big(\exists x.E(\mathbf{duck})(x) \wedge \tau_\Delta(\mathbf{duck},x) > s\big) \rightarrow P(x)$
$\lambda v_1.D \subseteq \textsc{att}(\textsc{file}(v_1)) \wedge \forall \mathsf{a} \in D.\textsc{val}(\mathsf{a},j)=\textsc{val}(\mathsf{a},v_1)$
D
$\lambda \mathbf{G}.\lambda P.\big(\exists x.E(\mathbf{G})(x) \wedge \tau_\Delta(\mathbf{G},x) > s\big) \rightarrow P(x)$
$\mathrm{a}_{\textsc{gen}}$
NP
duck
duck
1
S
$D \subseteq \textsc{att}(\textsc{file}(v_1)) \wedge \forall \mathsf{a} \in D.\textsc{val}(\mathsf{a},j)=\textsc{val}(\mathsf{a},v_1)$
DP
j
John
VP
$\lambda x.D \subseteq \textsc{att}(\textsc{file}(v_1)) \wedge \forall \mathsf{a} \in D.\textsc{val}(\mathsf{a},x)=\textsc{val}(\mathsf{a},v_1)$
V
$\lambda y.\lambda x.D \subseteq \textsc{att}(\textsc{file}(y)) \wedge \forall \mathsf{a} \in D.\textsc{val}(\mathsf{a},x)=\textsc{val}(\mathsf{a},y)$
looks like
DP
v_1
t_1

There is a counterintuitive feature of this account:

1. it first constructs an individual from a concept: the generic "a duck";
2. it then constructs a concept from that individual.

Point 1. is needed to capture the behavior of singular indefinite generics. As seen in section 3.2, "a duck" does not support two-gender sentences, and must therefore talk about individuals.
Point 2. is needed in order for similarity verbs to meet two apparently contradictory constraints:

- Similarity verbs can only range over attributes for which a token has defined values, as per the Weak Attribute Test in section 3.1.1: we cannot say that "as to color, jazz is like rock".
  - Consequently, similarity verbs need to access the attributes of the token.
  - Only concepts have attributes; individuals are atomic.
- Pretheoretically, similarity statements appear to take both individuals and full concepts: we can both say "John looks like Mary" and "John looks like a lion". But there are independent reasons to treat "a lion" as an entity. As mentioned, singular indefinite generics do not support two-gendered matrix sentences.

Consequently, the behavior of similarity statements can be unified as follows:

(i) by positing that similarity verbs only have an object-level slot,
(ii) assuming that singular indefinite generics are objects,
(iii) introducing the concept-building function FILE that given an individual returns its individual concept,
(iv) positing that similarity statements embed this function.

This account makes the right predictions and preserves the modularity of the two phenomena: similarity constributes the focus on a subset of the attributes of the individual; genericity contributes the typicality of that individual in general readings. To summarize:

- Similarity statements only embed individuals.
- Moreover, similarity statements are sensitive to attributes. Consequently, they must be able to construct concepts from the individuals they take as an input.
- Singular indefinite generics do not support two-gender predication and must therefore construct an individual.
- Bare plural generics support two-gender predication and therefore, plausibly, pertain directly to concepts.
- Similarity statements embed singular indefinite generics. This accounts for the non-distributivity, tolerance for exceptions, and non-monotonic behavior of these sentences.
- Similarity statements, as expected, only embed singular indefinite generics, and not bare plural generics, because they have an object-level slot, not a concept-level slot.

3.4 Privatives and C-sensitive adjectives

I propose a meaning of "fake" that is based on similarity. A fake intends/is intended to look like an X but isn't one. Because "fake" modifies the E-structure, it prompts a novel generation of C-structure. Here is an informal sketch of the compositionality of recursive applications of C-sensitive modifiers in the present proposal.

- *Fake gun* will have as its C-structure the traits that are diagnostic of things that are not guns but are intended to look like guns.
  - For instance, it is made of any appropriate material, e.g. plastic, and it mimics the shape of a gun.
- Then, a fake fake gun will (i) not be a fake gun, besides (ii) being intended to look like a fake gun, i.e. being intended to share a relevant set of traits with a fake gun.
  - In yet other words, being intended to look like a fake gun amounts to being intended to share traits with a non-gun that is intended to share traits with a gun.
- This manipulation of the E-structure prompts a further generation of novel C-structure, which will contain information about the diagnostic traits of fake fake guns.
- These diagnostic traits of fake fake guns will enter the E-structure of fake fake fake guns (three iterations). And so on.

But first, let us give an analysis of "fake". I propose that x is a fake **G** iff
(i) it is not to be categorized as a **G**
(ii) but it intends/is intended to look like a **G**.

"Fake" thus embeds similarity, and because it is similarity to a typical individual, it embeds genericity. For simplicity, I first give a semi-formal analysis with three placeholders:

- AGENT-WANTS stands simply for the fact that an agent has the intention of something looking like a **G**; the agent is the builder in case of an artifact like "gun", the agent himself in case of expressions denoting animated entities like "lawyer".
- SEEM-LIKE and GENERIC-**G** will be developed shortly. I write $[\![\text{fake}]\!]_E$ with the subscript E to indicate that this is just the E-structure/truth-conditional import of "fake".

(99) $[\![\text{fake}]\!]_E :=$
$\lambda \mathbf{G}.\lambda x.\neg E(\mathbf{G})(x) \wedge$
$\text{AGENT-WANTS}(\text{SEEM-LIKE}(x, \text{GENERIC-}\mathbf{G}))$

First let us develop the SEEM-LIKE part: x is a fake **G** iff it is not to be categorized as a **G** but it intends/is intended to have the same value as a typical instance of **G** for a salient set of attributes.

(100) $[\![\mathbf{fake}]\!]_E :=$

$\lambda \mathbf{G}.\lambda x.\neg E(\mathbf{G})(x) \wedge$

$$
\begin{aligned}
&\textsc{agent-wants}\Big(\\
&\quad D \subseteq \textsc{att}\big(\textsc{file}(\textsc{generic-}\mathbf{G})\big) \wedge\\
&\quad \forall \mathtt{a} \in D.\textsc{val}(x, \mathtt{a}) = \textsc{val}(\textsc{generic-}\mathbf{G}, \mathtt{a})\big)\\
&\quad \Big)
\end{aligned}
$$

If we now develop the GENERIC-**G** as well, we get the following: x is a fake **G** iff it is not to be categorized as a **G** but has the goal/is made with the goal of the following situation to obtain: for any sufficiently typical **G**-instance y, x has the same value as y for a salient set of attributes.[13] Here is the full analysis:

(101) $[\![\mathbf{fake}]\!]_E =$

$$
\begin{aligned}
&\lambda \mathbf{G}.\lambda x.\neg E(\mathbf{G})(x) \wedge\\
&\textsc{agent-wants}\Big(\\
&\quad \big(\exists y.E(\mathbf{G})(x) \wedge \tau_\Delta(y, \mathrm{G}) > s\big) \rightarrow\\
&\qquad \big(D \subseteq \textsc{att}\big(\textsc{file}(y)\big) \wedge\\
&\qquad \forall \mathtt{a} \in D.\textsc{val}(x, \mathtt{a}) = \textsc{val}(y, \mathtt{a})\big)\\
&\qquad \Big)
\end{aligned}
$$

3.5 Recursivity and the C-structure of C-sensitive adjectives

It is vital that for each newly computed E-structure, an updated C-structure be generated on the fly. I will write this as a black box, e.g. $\Delta_{\textbf{fake gun}}$. There is no possible direct compositional treatment of diagnosticity. To see this, take the example of a fake gun. In the present day, a fake gun is typically made of plastic. But this is completely contingent. The world could change in such a way that guns are still made exactly in the same way and of the same materials as they actually are; but fake guns are made of other materials. What a fake gun is typically made of is unpredictable on the basis of what a gun is made of.

To say that there is no directly compositional way of calculating diagnostic traits does not amount to saying that the system is not compositional. In fact, we may think about the computation of diagnostic traits as a free variable, whose filling we can

[13] One may wonder if it is really necessary to root the semantics of "fake" in similarity, and think that it is rather about causing-to-believe. To wit, a fake lawyer may not be intending to look like a lawyer to someone; rather, they may intend to *have someone believe* that they are a lawyer. However, this theory predicts the following use of "fake" to be felicitous.

(I) John is not a lawyer. He has no appearance whatsoever of a lawyer, nor is he trying to have the appearance of a lawyer. In fact, one would never think he is a lawyer when crossing him on the street. John decides to go on a TV talk show and claim: "As a lawyer, I don't agree with this view."
(II) # John is a fake lawyer.

In such a context, one is rather tempted to say that John is a self-proclaimed lawyer.

deterministically predict. The empirical study of concepts is a mature field of psychology, and many proposals have been advanced as to what counts as diagnostic/prototypical (cf. section 4.2). Giving an explicit theory of C-structure compositionality (i.e., prototype compositionality) is beyond the scopes of this proposal, but I do discuss some promising avenues in section 4.2. But given the ontology of this framework, psychological theories of concepts can be integrated with the present compositionality to deliver a fully testable model.

In this section, I show that with the assumption of a novel computation of the C-structure the system becomes fully recursive. Let us call this assumption the Diagnosticity Update Principle:

(102) **Diagnosticity Update Principle** (DUP): After a modifier manipulates the E-structure of a head, the C-structure of the complex expression must be newly computed.

To show how on-the-fly generation of new diagnostic traits enters the compositionality via the C-structure, I work through an example. To begin, here is the E-structure of "fake gun", obtained by applying the entry in (101) to the entry of **gun**:

(103) $[\![\textbf{fake gun}]\!]_E =$

$$\lambda x.\neg E(\textbf{gun})(x)\wedge$$
$$\textsc{agent-wants}\Big($$
$$\big(\exists y.E(\textbf{gun})(y) \wedge \tau_\Delta(\textbf{gun}, y) > s\big) \rightarrow$$
$$\big(D \subseteq \textsc{att}\big(\textsc{file}(y)\big)\wedge$$
$$\forall \mathtt{a} \in D.\textsc{cat}(x, \mathtt{a}) = \textsc{cat}(x, \mathtt{a})\big)$$
$$\Big)$$

By DUP, this new E-structure prompts a novel computation of diagnostic traits that will fill the C-structure of "fake gun". For instance, a fake gun is usually made of plastic, typically has the shape of a gun, and so on.

(104) $[\![\text{fake gun}]\!]_C = \Delta_{\textbf{fake gun}}$

Here is the full concept of a fake gun, then. For simplicity, I will henceforth drop the development of the SEEM-LIKE and of the GENERIC-C parts.

(105) $[\![\text{fake gun}]\!] =$

E-structure

$\mathtt{gun}: \lambda x.\neg gun(x)$

$\textsc{agent-wants}(\textsc{seem-like}(x, \textsc{generic}\text{-}\textbf{gun}))$

C-structure

$\Delta_{\textbf{fake gun}}$

$N_{\textbf{fake gun}}$

3.5.1 *fake fake NP*

A second application of "fake" will give us an object that is not a fake gun, and is intended to look like a fake gun, i.e. to share values with any sufficiently typical instance of a **fake gun** for a salient set of attributes.

(106) $[\![\text{fake fake gun}]\!]_E =$

$$\lambda x.\neg E(\textbf{fake gun})(x) \wedge$$
$$\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{fake gun})\big)$$

If we develop (106), we get:

(107) $[\![\text{fake fake gun}]\!]_E =$

$$\neg\Big(\neg E(\textbf{gun})(x) \wedge \textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{gun})\big)\Big) \wedge$$
$$\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{fake gun})\big)$$

which means:

(108) $[\![\text{fake fake gun}]\!]_E =$

$$E(\textbf{gun})(x) \vee \neg\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{gun})\big) \wedge$$
$$\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{fake gun})\big)$$

In words, something is a fake fake gun iff

- it is a gun, or wasn't made to look like a gun, or both
- and, moreover, it was made to look like a fake gun

Consequently, the account predicts that three classes of objects should count as fake fake guns:

	$\mathscr{G}_1$	$\mathscr{G}_2$	$\mathscr{G}_3$
$E(\textbf{gun})(x)$	1	0	1
$\neg\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{gun})\big)$	0	1	1
$\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{fake gun})\big)$	1	1	1

$\mathscr{G}_1$

An object in this class is:

- a gun
- intended to look like a gun
- intended to look like a fake gun

In other words, the object is intended to look like a gun precisely because *successful* fake guns look like guns. However, it turns out it actually is a gun, thus not a fake gun.

For instance, imagine an airsoft gun that was made to shoot actual bullets and murder someone during a military simulation game played with airsoft weapons.

- This gun is intended to look like a gun, because airsoft guns are almost indistinguishable from real guns.
- Moreover, it was made to look like a fake gun: airsoft guns are fake guns, and this object was made to look like an airsoft gun.
- Finally, it is a gun.

Consequently, the account correctly predicts this to be a fake fake gun.

$\mathscr{G}_2$

An object in this class is:

- not a gun;
- not intended to look like a gun;
- intended to look like a fake gun;

Imagine a visual illusion that appears to have the shape of a colorful toy gun from a certain angle, but when contemplated from a different perspective it becomes clear that it is only a bunch of superposed parts far apart from each other. It is:

- not a gun;
- not intended to look like a gun, as it is intended to look like something that is not a gun, a toy gun;
- intended to look like a fake gun, a toy gun;

A further, more concrete example of this class of individuals is that of a fake fake secret agent.

(109) a. **Context**: The CIA has placed an agent inside the KGB, a precious source of information. The Russians come to know this, and are on the hunt. John, an old CIA sleeper agent decides to sacrifice himself to save the American spy. He decides to start behaving like an American who tries to infiltrate the KGB: he gives excessive detail on his Russian origins, and when manipulating weapons he is very theatrical about having had a Russian weapon training.

b. John is a fake fake KGB agent.

The account correctly predicts that John may qualify as a fake fake KGB agent, as he:

- is not a KGB agent;
- is not intending to look like a KGB agent (otherwise he would be more discreet);
- intends to look like a fake KGB agent.

$\mathscr{G}_3$

An object in this class is:

- a gun;
- not intended to look like a gun;

- intended to look like a fake gun;

Imagine terrorists who want to board a flight with a gun, and to this effect produce a real gun that looks like a toy gun. The account correctly predicts this object to qualify as a fake fake gun, as it is a gun, but not intended to look like one - it is intended to resemble a toy gun. Moreover, it is intended to look like something that qualifies as a fake gun, a toy gun.

3.5.2 *fake typical NP*

Let us use Del Pinal's entry for "typical", but slightly adapted:

- Instead of T, which only counts diagnostic traits shared between an individual and a concept, I use τ_Δ, which may take into account relative weights and saliency.
- I assume that after any change to the E-structure via a C-sensitive operator, an updated C-structure is computed on the fly. "Typical" does not just pass through the C-structure of its argument.

(110) $[\![\text{ typical gun}]\!]_E = \lambda x.E(\mathbf{gun})(x) \wedge \tau_\Delta(x, \mathbf{gun}) > s$

Again, by DUP the diagnostic traits are newly computed and fill the C-structure. Here is the full concept of *fake typical gun*, then.

(111) $[\![\text{ typical gun}]\!]$ =

E-structure

$\lambda x.E(\mathbf{gun})(x)$

$\tau_\Delta(x, \mathbf{gun}) > s$

C-structure

$\Delta_{\textbf{typical gun}}$

$N_{\textbf{typical gun}}$

What happens if we apply "fake"? We will, again, negate the conjunction present in the E-structure of *typical gun*, and add a clause:

(112) $[\![\text{fake typical gun}]\!]_E$ =

$$\lambda x.\neg\Big(E(\mathbf{gun})(x) \wedge \tau_\Delta(x, \mathbf{gun}) > s\Big) \wedge$$

$$\text{AGENT-WANTS}\big(\text{SEEM-LIKE}(x, \text{GENERIC-}\mathbf{typical\ gun})\big)$$

which means:

(113) $[\![\text{fake typical gun}]\!]_E$ =

$$\lambda x.\neg E(\mathbf{gun})(x) \vee \tau_\Delta(x, \mathbf{gun}) \leq s \wedge$$

$$\text{AGENT-WANTS}\big(\text{SEEM-LIKE}(x, \text{GENERIC-}\mathbf{typical\ gun})\big)$$

Notice that $\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{typical gun})\big)$ is a shorthand for: x has the same value for a salient set of attributes as a sufficiently typical instance of a *typical* gun. A sufficiently typical instance of a *typical* gun is any individual that has the same value as the diagnostic part of the C-structure of **typical gun** for a sufficient number of attributes. We again end up with three classes of objects satisfying the truth conditions of this entry:

	$\mathscr{G}_1$	$\mathscr{G}_2$	$\mathscr{G}_3$
$\neg E(\textbf{gun})(x)$	1	0	1
$\tau_\Delta(x, \textbf{gun}) \leq s$	0	1	1
$\textsc{agent-wants}\big(\textsc{seem-like}(x, \textsc{generic-}\textbf{typical gun})\big)$	1	1	1

$\mathscr{G}_1$

An object in this class is:

- not a gun
- has a certain number of traits typical of guns
- is intended to look like a typical gun

For instance, a replica of a Colt (*qua* typical gun) falls within this class, and is correctly predicted to qualify as a fake typical gun.

$\mathscr{G}_2$

An object in this class is:

- a gun
- does not have a certain number of traits typical of guns
- is intended to look like a typical gun

Take a gun that was built in such a way that from a certain perspective it looks like an ordinary, unremarkable Colt, but from another angle it becomes clear it has all sorts of exotic features, e.g. it has ten barrels. This is a gun, it does not have enough typical traits of a gun, and is intended to look like a typical gun, and the account correctly predicts it to qualify as a fake typical gun.

$\mathscr{G}_3$

An object in this class is:

- not a gun
- does not have a certain number of traits typical of guns
- is intended to look like a typical gun

take a toy gun that, just like above, was built in such a way that from a certain perspective it looks like an ordinary, unremarkable Colt, but from another angle it becomes clear it has all sorts of exotic features, e.g. it has ten barrels. The account correctly predicts this object to qualify as a fake typical gun.

3.5.3 *typical typical NP*

A second application of "typical" gives us the following truth conditions:

(114) $[\![\text{typical typical gun}]\!]_E = \lambda x.E(\textbf{typical gun})(x) \wedge \tau_\Delta(x, \textbf{typical gun}) > s$

Developing (115), we get:

(115) $[\![\text{typical typical gun}]\!]_E = \lambda x.E(\textbf{gun})(x) \wedge$
$\tau_\Delta(x, \textbf{gun}) > s \wedge$
$\tau_\Delta(x, \textbf{typical gun}) > s$

In words, a typical typical gun:

- is a gun;
- has a certain number of traits diagnostic of guns;
- has a certain number of traits diagnostic of typical guns;

One may wonder if the second application of "typical" isn't redundant. How are the diagnostic traits of typical guns different from the diagnostic traits of guns? The second application of "typical" seems redundant a fortiori given that typical guns have all of the diagnostic traits of guns. However, there are cases in which a typical typical gun does not simply amount to a typical gun, nor, for that matter, to a *very* typical gun.

The idea is the following: there may be specific traits that are diagnostic of *typical* instances of a category X, but not of instances of X. Thus, typical typical Xs may be different from mere typical Xs. To see this clearly, consider the following context:

(116) **Context**: The surroundings of a small American town, Springfield, are populated by an indigenous and almost extinct species of wolves. To escape human presence, some of the Springfield wolves have modified their behavior so much as to be hardly recognisable as Springfield wolves. Other Springfield wolves, instead, retain their characterizing behavior: they howl Springfieldly, hunt Springfieldly, etc.
Still, even these Springfield wolves had a small reaction to human presence. Most of them started jumping back and forth between two rocks on Tuesday nights.

To sum up the situation, we have:

- a group of atypical wolfs, who modified their behavior dramatically
- a group of typical wolfs
- the typical wolfs jump back and forth between two rocks on Tuesday nights.

One first insight brought about by this example is that adding restrictors like "typical" to test for genericity is nothing but a *test*. The truth conditions are not exactly equivalent. Consider (117) below:

(117) a. # Springfield wolves jump back and forth between two rocks on Tuesday nights.
b. Typical Springfield wolves jump back and forth between two rocks on Tuesday nights.

In other words, *usually* adding restrictors like "typical" does not change the meaning of a sentence by much, because *usually* typical exemplars of a category are not identifiable by other means than the diagnostic traits of that category. However, (118) illustrates how this is not a logical necessity.

Consequently, a Springfield wolf that does not jump back and forth between two rocks on Tuesday nights is not an atypical instance of a Springfield wolf, for he preserves the overwhelming majority of traits typical of Springfield wolves. By contrast, he absolutely is an atypical instance of a *typical* Springfield wolf, for he does not have traits that are typical of typical Springfield wolves:

(118) a. **Context** . . . Amarok is one of the wolves who retained their characterizing behavior, but he does not jump back and forth between the two rocks on Tuesday nights.
b. # Amarok is not a typical Springfield wolf.
c. # Amarok is not a very typical Springfield wolf.
d. OK Amarok is not a typical typical Springfield wolf.

This example illustrates very clearly the need for a novel computation of diagnosticity when a category is manipulated: there are traits diagnostic of the individuals who display traits diagnostic of wolves. These traits need not be coextensional with the traits that are barely diagnostic of wolves.

The account of genericity presented here predicts this asymmetry. Consider the two different concepts of "Springfield wolf" and "typical Springfield wolf":

(119) $[\![$ Springfield wolf$]\!]$ =

E-structure

$\lambda x.$Springfield-wolf(x)

C-structure

`howl:` $\lambda x.$Springfield-howler(x)

`hunt:` $\lambda x.$Springfield-hunter(x)

...

$\Delta_{\textbf{Springfield wolf}}$

Notice that for typical Springfield wolves, ""`howl:` $\lambda x.$Springfield-howler(x)" and "`hunt:` $\lambda x.$Springfield-hunter(x)" are no longer diagnostic traits, because they were uploaded to the E-structure.

(120) $[\![$ typical Springfield wolf$]\!]$ =

E-structure

$\lambda x.$Springfield-wolf(x)

$\lambda x.\tau_{\Delta}(x, \textbf{Springfield wolf}) > s$

C-structure

`behavior`: λx.jumps-rocks-Tuesdays(x)

...

Δ **typical Springfield wolf**

Thus only (121)b. will come out as true:

(121) a. V(Springfield wolf, `behavior`) $\neq$
λx.back-and-forth-from-a-rock-on-Tuesday-nights-jumper(x)
b. V(typical Springfield wolf, `behavior`) = λx.jumps-rocks-Tuesdays(x)

3.6 The account lives below the DP

One may wonder what happens with the C-structure at compositional stages that live above the DP. I posit that after the DP, all C-structure is dropped. Thus while "seems" has *access* to the C-structure becomes it embeds NPs or DPs, it drops all of the content that it hasn't included in the truth conditions (in the E-structure) for later compositional stages (cf. the tree of "John looks like a duck"). This allows the account to completely integrate into the rest of the grammar: above the DP, expressions become classical.

4 Discussion: psychology

4.1 Essences

Psychological essentialism is the view that people assume that certain categories have an underlying true nature that cannot be directly observed, and sometimes cannot be grasped (Gelman, 2004). Medin and Ortony (1989) suggest that psychological essences are *placeholders*: people believe that categories have an essence even when they do not know what that essence amounts to.

In the present account, the E-structure should be seen as a linguistic, ready-to-use version of the mental-representation-level essence. That is, the essence of the concept **lion**, at the level of mental representation, may be represented by an underspecified placeholder, say, `underlying-nature:lion`. At the level of lexical items, this becomes a function *lion*(x) ready to be applied to entities/discourse referents. The diagnostic part of the C-structure contains all of the traits that are good causal cues for the essence (cf. the discussion of diagnosticity, 4.2).

What do essences contribute to the expectations people hold of categories? Essence placeholders imply that categories capture an underlying substructure with clear, steadfast boundaries. One nice illustration of this is given by Chomsky (2012):

> Take children's stories; they're based on these principles [of the distinctively human properties of human concepts]. [. . .] One story [. . .] is about a donkey that somebody has turned into a rock. The rest of the story is about

> the little donkey trying to tell its parents that it's a baby donkey, although it's obviously a rock. Something or another happens at the end, and it's a baby donkey again. But every kid, no matter how young, knows that that rock is a donkey, that it's not a rock. It's a donkey because it's got psychic continuity, and so on. That can't be just developed from language, or from experience."

These insights are extensively confirmed experimentally. From the stability of concepts derives a certain inductive potential. For instance, consider the following experiment run by Gelman and Markman (1987): children were given a representation of three entities and asked to draw inferences on the three entities. Children extended information on the basis of the category label rather than of overall similarity. In other words, children generalize information to other members of the category even when these look substantially different.

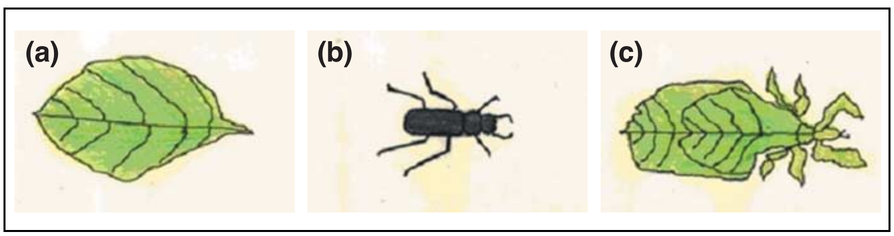


Figure 3: *3- and 4-year-old children heard labels for these items: respectively 'leaf', 'bug', and 'bug'. They were more likely to extend new information based on labels than on similarity. To wit, **(c)** was extended bug-information, rather than leaf-information.*

Moreover, by 4 years of age children have learned to not extend just *any* diagnostic trait of an entity to label-sharing entities. Instead, children only extend properties that are relatively enduring and causally linked to the label, rather than temporal or contingent (Gelman, 2003).

There is independent evidence that language is sensitive to essences. There seem to be language-specific devices to track essence-linked information: young Spanish-speaking children make inferences about the stability of a category based on which form of the verb "to be" is used to express it (Heyman & Diesendruck, 2002). The two forms of "to be" are "ser" and "estar": "estar" is generally used with temporary properties, both psychological and nonpsychological, while "ser" is used with permanent properties.

Genericity is sensitive to essences, too. Cimpian et al. (2010) showed that generics have extremely strong implications but require little evidence to be accepted as true. People generalize a sentence like "Gs f" to all category members, but if the prevalence of f among Gs turns out to be as low as 30% the sentence is still accepted. This flexibility contrasts strikingly with the behavior of "most"-quantifier sentences, which are compatible with a much more restricted range of possible prevalences of f.

In the present account, I proposed that dual concepts/lexical items cash out the internal structure of what has traditionally been referred to as kinds. More specifically, I proposed that bare plural generics, standardly assumed to pertain to kinds, embed concepts. Cimpian et al. (2010) provides independent evidence that "the truth conditions of generic sentences reflect the internal structure of kind representations". Diagnostic/distinctive information is likely to be given more weight in the representation of a kind. And indeed, generic predications of properties that were described as distinctive were accepted more often than generic predications of other, similar, properties.

In this connection, it is worth mentioning here some proposals in semantics that cash out genericity in terms of kind reference. Chierchia (1998) accounts for the double life of bare plurals as both generics and existentials (cf. section 3.2) arguing that as a default, bare plurals embed generics, and are type-shifted into object-level arguments only when the predicate does not provide a kind-level slot. Liebesman's (2011) theory of "simple generics" reduces bare plural generics to predication of a kind akin to predication of individuals: "Lions have a mane" is akin to "John wears a hat". To be clear, these proposals differ from the present one in one important aspect: they take kinds to be atomic. But insofar as concepts are fine-grained, internally structured versions of kinds, my account aligns with kind-based accounts of bare plural generics.

Psychological essentialism also lends credibility to the idea that the same essence (compositionally, the E-structure) is linked to a diagnostic and a normative dimension (respectively, the Δ and the N dimensions of the C-structure). As mentioned in section 3.2.1, Knobe et al. (2013) have shown that for certain categories there seemed to be two types of inductive grounds: normative or diagnostic. People accept sentences like the following:

(122) a. There is a sense in which she is clearly a scientist…
b. (she conducts experiments, analyzes data, develops theories, writes papers)

(123) a. … but ultimately, if you think about what it really means to be a scientist, you would have to say that she is not a scientist at all.
b. (she isn't engaged in an impartial quest for empirical truth)

Newman and Knobe (2019) draw on a variety of findings to argue that normative traits and diagnostic traits are two instances of the same psychological phenomenon. Namely, they are both instances of the tendency to try and explain observable traits through a unifying principle. This is relevant for diagnostic features (having a mane is an expression of the leonine essence) but also for value-laden concepts (acting fairly may be the expression of the "essence" of being a judge).

The fact that many concepts seem to support both descriptive and deontological genericity lends credibility to this view. For instance, beliefs about gender categories can typically have both flavors. People are convinced that there is a biological difference responsible for gender differences (LaFrance, Paluck & Brescoll, 2004; Martin & Parker, 1995; Morton et al., 2009). But they also seem to hold normative beliefs, e.g. the fact that "true men" or "true women" have such-and-such properties (Eagly & Karau, 2002; Heilman & Eagly, 2008; Rudman, Moss-Racusin, Phelan & Nauts, 2012)..

Newman and Knobe propose that people do not have a single, fixed, and explicit view of whether an underlying nature is normative or descriptive. Indeed, normative claims about categories are often grounded in naturalistic claims: men should be such-and-such because their biological nature is such-and-such (cf. the naturalistic fallacy, e.g. Frankena, 1939; Brinkmann, 2009).[14]

Newman and Knobe's view supports the choice made in the present account to ascribe both a normative and a diagnostic dimension to C-structures. This explains a variety of linguistic phenomena, notably the existence of adjectives targeting a normative dimension like "true" (cf. Del Pinal,2018) and the ambiguity of generic sentences between a descriptive and a normative sense.

4.2 Diagnosticity

Section 3.5 has shown the importance of the Diagnosticity Update Principle for the system to be fully recursive. This article is about the compositional operations that account for genericity, similarity, and C-sensitivity among adjectives in language. An explicit proposal on what can and cannot go into a C-structure is beyond the scope of this paper. However, there are insights from work in mathematical psychology that are worth discussing, because they show very clearly that there is a possible integration of the purely grammatical compositionality with the psychological processes that give rise to rich conceptual structure. There are two distinct sub-questions: (i) what kinds of features populate simple concepts? (ii) how is the diagnostic part of the C-structure of complex expressions calculated from their constituents?

Starting from simple concepts, as argued by Del Pinal (2018), dual theories of meaning like DCS or the present proposal can be promptly integrated with predictive psychological variables to be fully testable. There are, for instance, standard methods to elicit prototypical features of a category (McRae et al, 2005; Hampton, 2006).[15]

There are two paths for the determination of the traits of categories. One is frequency-based, and can only serve for categories whose frequencies are available to the speaker. The other is productive and can be used to determine the C-structure of any complex expression, provided the constituents have non-empty C-structures.

[14] For some other categories, it is not even clear that the two dimensions can be clearly teased apart. On this note, notice how close of meaning the three sentences in (I) are:
(I) a. Bishops move diagonally. (Cohen, 1999)
b. Typical bishops move diagonally.
c. True bishops move diagonally.

Of course, we could construct a context that teases these apart. But notice, by contrast, how strikingly different between each other the three sentences in (II) sound:

(II) a. Judges are fair.
b. Typical judges are fair.
c. True judges are fair.

[15] See also Chomsky (2012):
'While a science of concepts/Modes of Presentation expressed in terms of semantic features is in its early stages, it does appear to be a reasonable project. And there has been some progress.(...) [Features are] descriptive terms, efforts to capture differences in 'readings' of words and sentences."

Frequency-based mechanisms First of all, recall from the discussion on essentialism that diagnostic traits of a category are seen by people as *caused* by a single, unique underlying essence. However, not all of the traits caused by the essence are diagnostic, because not all of these traits are helpful to reverse-engineer the causal process and infer the presence of the underlying essence. For instance, certainly some part of the essence of lions causes them to be subject to the laws of gravity, but many other categories have essences that cause their members to be subject to the laws of gravity. In other words, this trait is not very informative: the conditional probability $P(\text{category}|\text{feature})$, i.e. $P(\text{lion}|\text{subject-to-laws-of-gravity})$ is not high enough, as it is not significantly different from the prior probability $P(\text{category})$, i.e. $P(\text{lion})$.

On the other hand, informativity alone is not enough. Take for instance the category "American". The only human to have ever been on the moon is an American; of course if ever you come across someone who's been to the moon, you're sure they're an American. However, this is not a very useful test: how many Americans have been to the moon? This trait may well have been caused by the underlying essence of Americanness, but its application is not frequent enough for it to be actually helpful in everyday induction. The inverse probability $P(\text{feature}|\text{category})$ is too low. A trait needs to be prevalent enough in a category to be a viable test to infer the essence of the category.[16]

This means that to be diagnostic, a trait needs to meet at least two constraints:

(i) **Informativity**: A trait must rule out many alternatives. For instance, as soon as you learn that an animal has feathers, you can rule out its being a mammal, an insect, etc.

(ii) **Prevalence**: A trait must be frequent enough among instances of the category. For instance, having feathers is frequent enough among birds that it can serve as an everyday induction test. In other words, if an organism does **not** have feathers, this must lower the probability that it is a bird significantly. Notice that this is not the case for the case of Americans having been to the moon. If you learn that an individual has not been to the moon, you learn close to nothing about how likely this individual is to be an American as opposed to other nationalities.

Because the diagnosticity of these traits derives from real world frequencies, there may be contingent, non-compositional traits in complex categories. Consider the example of a British judge. Not many Brits wear wigs, nor many judges wear wigs (low posterior probabilities). Moreover, not many wig wearers are Brits, nor are many wig wearers judges (low inverse probabilities). However, it so happens that all British judges wear a wig.

In the example of Springfield wolves given above in section 3.5.3 a similar process occurred. Jumping back and forth between two rocks on Tuesdays happens to be a

[16] Note that similar constraints seem to hold for normative traits as well: normative traits need to be specific enough of the normative ideal of the category. For instance, sentence (I) lays out a normative trait that is specifically associated with judges. Sentence (II), instead, lays out a trait that is associated with the normative ideals of many other categories.
(I) A judge doesn't accept bribes.
(II) A judge gets vaccinated.

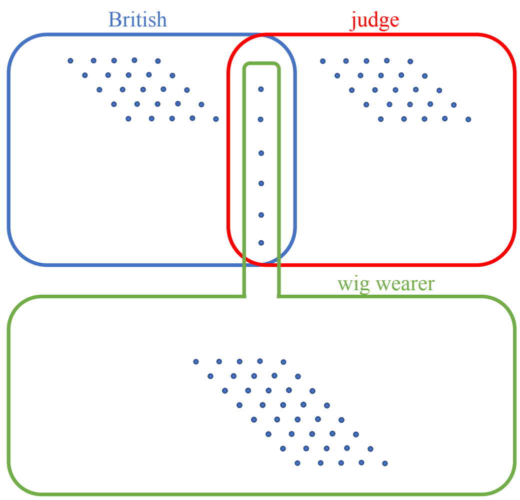


Figure 4: *(i) All British judges wear wigs, (ii) not many Brits nor many judges wear wigs, (iii) not many wig wearers are British nor many wig wearers are judges.*

trait of high frequency among typical Springfield wolves, but is not compositionally predictable.

Variants of this balance have been proposed by many as a useful heuristic to quantify the diagnosticity of a feature relative to a category. Drawing from Minsky's (1975) classical work, Smith et al. (1988) were the first to propose that a prototype is a frame, a structured set of features rather than an abstract individual, as proposed in the original formulations of prototype theory (Rosch, 1973). Frames decompose properties into attributes-value pairs. In addition, each attribute-value pair is coupled with a score, which in turn is determined exactly by the frequency of the feature (i) among instances of the category, (ii) among instances of 'sibling' categories.

This duality also echoes some accounts of genericity. Cohen (1999) proposes that generic sentences are ambiguous between an absolute and a relative reading:

- An absolute generic "*G*s are f" is true iff $P(f|G)$ is high with respect to the alternatives of f. The alternatives of f are, in the terms of the present account, other values for the same attribute. The alternatives of "yellow" are other values for the attribute `color`, i.e. other colors. This reading elicits Prevalence/high inverse probability.
- A relative generic "*G*s are f" is true iff $P(f|G)$ is high in the probability space determined by the alternatives of G. A natural alternative to "Brazilian" are other nationalities. The sentence "Brazilians are good football players" cannot be absolutely true because playing football well is not a prevalent trait among Brazilians. But if we know that someone plays football well, they are more likely to be Brazilian than of any of the other nationalities. This reading corresponds to

Informativity/high posterior probability.

Productive mechanisms In some cases, we have never seen an instance of a complex category, but are able to come up with diagnostic traits we link to it. For instance, it is not difficult to process the diagnostic traits of "pink elephant", although we do not have access to the frequency of specific traits among pink elephants. For instance, a pink elephant still has tusks. This suggests that novel computations of diagnostic traits pass through some attributes. On the other hand, when we compute the meaning of "stone lion", we throw out some traits: a stone lion does not have the same origin as a lion (being born from a mother lion) and the same biological substrate as a lion. Several accounts of conceptual combination derive these predictions, including among those who propose that concepts and linguistic meanings should include something like DCS C-structures (e.g., Gärdenfors, 2004; 2014). Franks (1995) was the first to propose a structured compositionality. Lexical entries are sets of attribute-value pairs, some of which are *essential* while others are merely *diagnostic*. He proposed the operation of *priority union* as a way to resolve information conflicts between the modifier and the head. Both for central and diagnostic properties, the more diagnostic property wins; if they are equally diagnostic, it is the modifier that takes over. For the attribute `texture`, `soft` and `hard`, the values of "stone" and "lion" are in contradiction with each other, as they are respectively `hard` wins over `soft`. The modifier takes over. The same goes for "toy gun": the shape is central in the head and cannot be thrown out, but the modifier takes over all of the diagnostic properties, e.g. we have `material:plastic`. The same goes for central features: `inanimate` of "stone" wins over `animate` of lion. The fact that the resolution of conflicts follows a pattern according to attribute importance reflects Hampton's (1987;2006) findings: the more central a feature or dimension in a concept, the more likely it is to survive into compositions and sub-categorisations that involve that concept. However, relative weightings of attributes can change contextually. Thus for instance Guerrini & Mascarenhas (2019) integrate Frank's perspective with a *shifting* center, which can be seen as a reconfiguration of the relative weighting of the traits on the basis of contextual information. Centers gravitate around a default, but given a rich enough context any diagnostic feature can become central. Centers are never contradictory because they are deliberately chosen by the speaker. Conflicts between central and non-central features in the compositionality are resolved via a version of Frank's primacy of the modifier and priority union:

Different center selections will account for additional readings of "stone lion" which, although far less frequent, are productively available.

	HEAD: Default center	HEAD: Shifted center
MODIFIER: Default center	Feature clash: unavailable	Statue of a lion
MODIFIER: Shifted center	Very thick-skinned <u>real</u> lion	Very thick-skinned macho-man

To conclude, similar mechanisms seem to be at work in the determination of the normative dimension of C-structures. It does not seem a normatively central trait of a judge to be attached to secularism. But it does seem a central normative trait of a French

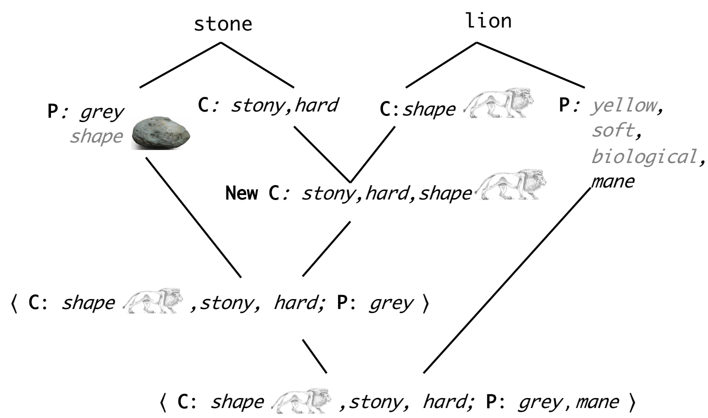


Figure 5: *The mechanism of noun-noun composition in Guerrini & Mascarenhas (2019): first there is plain union of central features (*{stony, hard } ∪ {shape of a lion}*). Then, there is selective union with the modifiers' peripheral features: the stone shape is discarded because it conflicts with the lion shape. The resulting meaning undergoes selective union with the head-peripheral features. There is already "grey" in the entry, which conflicts with "yellow" in lion, which gets discarded.*

judge. Recall that "true" targets the normative dimension. Unlike (124)a., sentence (124)b. is acceptable.

(124) a. # John doesn't care about secularism. He's not a true judge.
b. John doesn't care about secularism. He's not a true French judge.

This analysis would take "French" to be more than a normal intersective modifier, adding content to the C-structure in non-trivial ways. Plausibly, the modifier contributes this normative trait in this case. However, there is another alternative: this could be a non-compositional, contingent property coming out of normal intersective modification via world knowledge, similarly to what happens with "British judge". In this case, the modifier wouldn't be contributing anything about secularism.

Summary Although offering a complete theory of the determination of the diangostic variables for newly manipulated E-structures is beyond the scope of this paper, I presented two dimensions along which an integrated theory could be offered: (i) real-world frequencies and probabilities, with a balance between conditional probabilities and inverse probabilities, and (ii) productive, compositional mechanisms of concept composition. Already Del Pinal proposes that weights and centrality relations be involved in a ranking of the traits in the C-structure. A full theory will articulate this insight with probabilistic computations of diagnosticity as specified in (i).

5 Discussion: linguistics

5.1 Generics

5.1.1 Modal accounts

The present proposal is superior to modal accounts of genericity for three reasons.

First, it does not face the empirical issues modal accounts face. I discuss this in the subsections below. The empirical problems with modal accounts concern ad-hoc restrictions on worlds and individuals that the account has to perform to derive certain modal flavors of generic sentences and single-gendered generic sentences. Moreover, this account does not derive the fact that bare plurals support two-gendered characterizing sentences, while singular indefinites don't.

Second, the present proposal is the only theory on the market that unifies genericity with another phenomenon like similarity and with the long-standing problem of privatives and C-sensitive adjectives.

Third, my account is more explanatorily adequate. The modal account takes normality to model conventions used in human communication and knowledge organization (Van Rooij & Schulz, 2020). This has pushed some to doubt the usefulness of the notion of normalcy altogether (Pearl, 1988 cited by Van Rooij & Schulz, 2020). Relatedly, it is fair to point out that the normality ordering hides psychological facts about how we organize and generalize knowledge of the world. Thus already Krifka (1995) points out that for sentences that need a stereotypical ordering base, the closer the worlds are to the ideal, the more stereotypical properties hold in them. After all, if genericity expresses some default way of generalizing (Pellettier & Asher, 1997; Leslie, 2008), one expects features specific of psychological representations to pop up someplace or another. And it is in that place that the explanatory burden may (or may not) fall on psychology.

But if an account of genericity is to produce non-underspecified truth conditions at all, one needs to know just *how* facts about conceptual organization should intervene in the semantics. Imagine that psychology had figured out what normality/typicality amounts to: how could this inform normality orderings? The true explanatory problem does not seem to be, *per se*, that facts about our knowledge organization are taken for granted in the compositionality. Rather, the issue seems to be that if we were to recover these psychological facts, we still would not know how to define a non-underspecified normality ordering based on them.[17]

[17] An interesting attempt to integrate the content of psychological representations into a modal framework is Greenberg's (2012). She makes use of the notion of "associated property". Associated properties are a cluster of properties we link up with a given predicate. Thus for instance, being a boy is associated with some properties that hold of all boys (being male), and some that instead only hold in a very precise set of worlds. For instance, being between three and seventeen years of age will hold only in the worlds where western standards about boyhood hold. And similarly for properties that pertain to social norms.
In other words, what properties are associated to a predicate is not determined by how the world works, but by the way our knowledge and belief are organized. She then goes on to characterize singular indefinite generic sentences as embedding a covert associated property in virtue of which the generic statement holds. For instance, "A lion is aggressive" is paraphraseable as "In virtue of being a predator, a lion is aggressive".
There are some problems with this account. Consider (I):

The present account, instead, uses a formalization of lexical items that is extremely close to psychological views of concepts. As mentioned in section 4.2, insights from the empirical study of concepts can be readily integrated into the C-structure of concepts to deliver specific, testable predictions. Much research energy is being put into establishing what kinds of features are diagnostic; the same does not count for normalcy orderings on worlds. Moreover, the richness of lexical items in the present account does not come at the cost of a difficult integration into the grammar. I proposed that in compositionality, non-classical meanings live below the DP, losing fine-grained information above the DP. This makes for a straightforward integration with the rest of the grammar.

In sum, the present account postulates some black boxes, but they are well-placed explanatory burdens. It is clear just *where* psychology ought to kick in. The same does not hold for the modal framework.

The basic modal framework Krifka et al (1995) propose that the characterizing sentence in (125)a. is true (under the limit assumption) iff the condition in (125)b. holds.

(125) a. A lion has a bushy tail.
b. $\forall x.\forall w \in B.\text{lion}(x)(w) \rightarrow \forall w' \in M_{\leq}.\text{bushy-tail}(x)(w')$

In words, sentence (125)a. is true iff every individual that is a lion in the modal base B has a bushy tail in all the most normal worlds with respect to the ordering source.

This account has a number of advantages. One among all: it allows to account for different modal flavors of characterizing sentences like (126) as ambiguities in the selection of the modal base and of the ordering source (Krifka et all, 1995; Papafragou, 1996).

(126) a. A lion has a bushy tail. (Naturalistic-stereotypical flavor)
b. A bishop moves diagnonally. ("Analytic rule-like" flavor)
c. A gentleman doesn't peel bananas in company of a lady. (Deontological flavor)
d. A squeezer crushes oranges. ("Artifact design" flavor)

Moreover, precisely because of this feature, the semantics of generics can be fully integrated with the semantics of conditionals. In other words, the point of the account is to reduce the core of the normalcy involved in genericity to the normalcy conditions of worlds in conditionals, and to capture the differences between genericity and conditionals as additional restrictions on individuals and on worlds.

The features that make the elegance of this account, though, also cause a number of its predictive problems.

First, as pointed out already by Krifka et al (1995), the modal framework imposes problematic or ad-hoc ordering sources. The sentences in (127), for instance, show that

(I) (In virtue of being an honest and responsible civil servant,) A judge does not accept bribes.
It seems that this very same associate property forces us to accept (II), which does not seem felicitous:
(II) a. A judge gets vaccinated.
b. In virtue of being an honest and responsible civil servant, a judge gets vaccinated.

there isn't a single naturalistic ordering, since the laws that apply to a single organism are at odds with those that apply to an ecosystem:

(127) a. Turtles are long-lived.
b. Turtles die upon hatching of the eggs, before reaching the sea.

Moreover, as pointed out by Papafragou (1996), no non-ad-hoc feature of the account prevents characterizing sentences from having an epistemic flavor. We do not, however, observe such epistemic genericity. We cannot interpret (128)a. as paraphrased in (128)b.

(128) a. Lions are dangerous.
b. In view of what I know/For all I know, lions are dangerous.

Second, the framework imposes restrictions on individuals. Consider the already discussed single-gender characterizing sentences in (129) a. and b.:

(129) a. A lion has a mane.
b. A lion suckles its young.

One may attempt to account for these sentences by performing a restriction on individuals, a move that can come in several variants.

First, one may argue that the adequate restriction comes as a result of local accomodation. Presuppositions of the consequent of the conditional percolate to the antecedent. For instance, having a mane presupposes that a lion is male, and this yields the appropriate restriction. However, I observe that this account predicts that we should be able to accomodate sentence (130):

(130) # A fish attacks swimmers.

The infelicity of this sentence, then, comes as a surprise: attacking swimmers has conditions such as aggressive predatory behavior that should be accomodated by restricting, e.g., to sharks.

Asher & Mourreau's account follows a different strategy: instead of attempting to get to the right truth conditions through restrictions on individuals and worlds, it tries to achieve the desired constraints by specifying the generic operator as a weak conditional. However, they face exactly the same domain restriction problems as the basic modal account. To fix the problem, they propose that a restriction on individuals should be acceptable as long as these individuals form a subkind of the kind in the characterizing sentence. Thus in (129)b. we can restrict "lion" to "female lion" because it forms a subkind of lion. However, "shark" is in all likelihood a subkind of "fish", too, making it puzzling why (130) is infelicitous.

The present account does not face this problem: the concept of **lion** is genderless, and features both male- and female-specific attributes. The concept for **fish** does not include any traits that would push us to think that an individual with those traits could attack swimmers.

Finally, these accounts have a hard time deriving two-gendered generic matrix sentences, such as the one reported below:

(131) Lions have a mane and suckle their young.

Even if one could find an adequate domain restriction, it would be difficult to explain why two apparently different domain restrictions appear in the same matrix sentence. Relatedly, this account has nothing to say on why singular indefinites are not good in this environment, but bare plurals are.

5.1.2 Semantics-psychology interface accounts

The acquisition of generics has delivered some insightful puzzles. Hollander, Gelman, and Star (2002) compared children's understanding of generic sentences with the understanding of existentially or universally quantified sentences. The 3 year olds grasped the generics better than the quantified sentences. This should come as a surprise if genericity is marked as a quantifier in language. Other experiments showed that 2-year-olds already understand generics; the acquisition of quantifiers comes at some point between 3 and 4 years and a half.

It is worthy of note that Hollander et al. only used bare plural sentences in their stimuli. This is in line with the theory presented in this article that bare plurals access directly concepts. Empirical studies on singular indefinite genericity should reveal if it is in fact adequate to treat this kind of genericity as arising from a specific kind of quantification as in the present proposal.

Leslie (2008) proposes that the meaning of GEN should not be specified in the semantics, insofar as GEN reflects the default mode of humans' generalizations. While GEN is truthconditionally thornier than vanilla quantifiers, it is cognitively simpler.

There are explanatory problems with Leslie's (2008) proposal: if we do not reduce GEN to black boxes that are more manageable, how are we to account for the relation between genericity and other linguistic phenomena? For instance, if GEN should be left underspecified, how come generic sentences are truthconditionally close to sentences embedding C-sensitive adjective like "typical"? Certainly we do not want to leave the meaning of "typical" underspecified as well.

Other theorists take the opposite road, and include squarely psychological material irrelevant to the compositional operations in the the truth-conditions. This is the case of Cohen's (1999) proposal and later elaborations. For instance, Van Rooij & Schulz (2020) cash out genericity in terms of Kahneman and Tversky's (1973) representativeness heuristic. Van Rooij and Schulz give a specific implementation of representativeness and argue that a generic sentence of the form "*G*s are *f*" is true iff *f* is accordingly representative of *G*.

There is an essential difference between these proposals and the present one. Here, I essentially claimed that bare plural generics of the form "*G*s are *f*" iff *f* is diagnostic of *G*. Now an independent theory can determine what counts as diagnostic or not. Let us assume there is a necessary and sufficient condition **S** for a feature to be diagnostic. Now, although "Gs are f" will come out as true iff **S** holds of *f*, this does not mean that S should be part of the *meaning* of generic sentences. If **S** does not enter compositionality, there is no reason to assume that it should be part of our semantic competence. The meaning of generics should just appeal to the structure of people's representations; *explanations* of why generics have the meaning they have may appeal to the conditions of diagnosticity/typicality.

5.2 Privative adjectives

Partee (2010) provided an analysis of privative adjectives like "fake" and "counterfeit" and privative constructions like "stone lion" in terms of pragmatic coercion of the NP. In brief, she proposed that privatives are actually subsective adjectives, but that pragmatic principles operate a coerced expansion of the denotation of the noun to which privative adjectives apply. Put in intuitive terms, these principles work as follows: a MODIFIER-HEAD should be a HEAD. For instance, a police car is a car. But sometimes there are no HEADs such that they are a MODIFIER. For instance, a stone lion is not a lion, since there are no lions made of stone. Then, we should extend the HEAD to include individuals that are a MODIFIER, viz. we should extend the denotation of *lion* to include lion-related individuals made of stone, such as statues of a lion. It is important to flag that pragmatic relevance has an important place in this account, to determine *what* specifically the lion-related individuals are. On the other hand the individuals added to the denotation of the noun are not just any individuals, since they are loosely related to it.

Partee's account of privative constructions proposes that a principle requires speakers always try to interpret predicates so that neither their positive nor their negative extensions are empty:

Non-vacuity principle (NVP): try to interpret any predicate so that both its positive and negative extension are non-empty.

Another principle requires speakers to interpret a compound expression as relative to the head.

The Head primacy principle (HPP): in a modifier-head structure, the modifier is the restrictor and the head the restrictee.

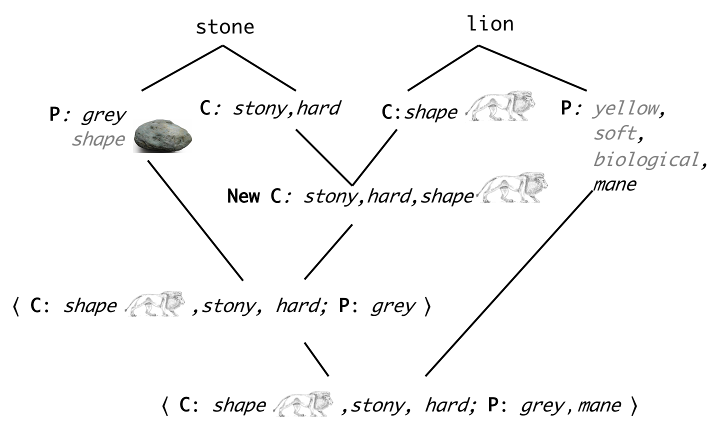
However, some expressions prevent speakers from applying both principles. *Stone lion*, for example, violates the non-vacuity principle if speakers hold on to the head primacy principle: if a stone lion is an actual lion, then it denotes an empty set, since there are no actual lions made of stone. Conversely, if speakers hold on to the non-vacuity principle, the head primacy principle gets violated: to keep a non-empty extension of the denotation, *stone lion* gets interpreted relative to the modifier, and the denotation of *lion* is coercively expanded. Partee argues for this latter possibility: the non-vacuity principle is in fact higher-ranked. If there is no reasonable way to obey the Non-Vacuity Principle without shifting the noun beyond its normal bounds, then it may be shifted in such a way as to make the compound predicate obey the Non-Vacuity Principle:

- *Stone lion*
  - Try to interpret the expression as $\{\text{stone lion}\} \subseteq \{\text{lion}\}$, get empty extension $\Rightarrow$ " the NVP fails.
  - Give up HPP: a stone lion is now a stone. The extension of *lion* is broadened.

This account was not meant to give a full semantics of "fake", and indeed as such it would be explanatorily inadequate, because we would not know to *what* lions precisely to extend the denotation of "lion". There is work to be done to have specific predictions as to *how* the denotation of "lion" is extended. Del Pinal (2015; 2018) has detailed several cricitisms, and I will not review them at length here.

It is worth mentioning that something like Partee's pragmatic principles seems to be needed to track processes of modulation and concept composition in DCS, as shown in Martin (2021). He observes that DCS derives expressions such as "stone lion" as follows: the E-structures of "stone" and "lion" have an empty intersection, and thus the E-structure of "lion" is replaced by a salient *quale* such as PERCEPTUAL. Then, a stone lion is in the extension of stoney things, but not in the extension of lions; rather, it is in the extension of lion-appearing things. It seems that DCS needs Non-Vacuity in order for the same process not to occur in cases where the same empty E-structure intersection does not happen. For instance, a stone statue is both a stoney thing and a statue.

The present account, with its liberalized C-structure, is instead compatible with more fine-grained views of this kind of "contingent" privative modification. The two C-structures can be composed in such a way that there are no incompatibilities between the respective traits, even in cases where the most salient interpretation is "privative" like in "stone lion". For instance, consider again Guerrini&Mascarenhas' (2019) model of concept composition.



The features of the two centers (**C**) are gathered via plain union. Peripheral properties are integrated via priority union: the modifiers' peripheral properties (**P**) only insofar as they do not clash with the centers' properties, and the heads' peripheral properties only insofar as they do not clash with the center and modifiers' peripheral properties.

Then, different readings of the expression are not only triggered when non-vacuity is violated, but also when there are different combinations of centering on the features. This enables the account to predict the full range of possible meanings of the expression. For instance, the reading of "stone lion" as in "strong lion" resolves non-vacuity by loosening the modifier instead of the head. This is not predicted in Partee's account, because NON-VACUITY can only be resolved by loosening the head.

	HEAD: Default center	HEAD: Shifted center
MODIFIER: Default center	Feature clash	Statue of a lion
MODIFIER: Shifted center	Very thick-skinned real lion	Very thick-skinned macho-man

There are readings that arise from unexpected compatibilities: if the two E-structures are taken to be compatible, one can view a stone lion as a fitcitious being that has biological features (breathing, heartbeating, psychological continuity) while being made of stone.[18] Then, in the MODIFIER DEFAULT CENTER×HEAD DEFAULT CENTER we could put a reading of "stone lion" such as "stoney and living stone lion".

5.3 Similarity

There is preciously little work on the semantics of similarity in semantic theory. Scholars have focused mostly on specific syntactic constructions such as "can't seem to" ((Homer, 2012)) and on the subjective character of these verbs (Rudolph, 2019). In this section, I compare my view to possible, more conservative accounts.

5.3.1 Contextual similarity measure?

First, I want to address a potential worry. The present account posits that the similarity respects come in the form of a free variable. But if we allow for such appeal to pragmatics, why do we have to posit rich conceptual meanings in the first place? Couldn't one employ a very simple notion of (contextual) resemblance threshold without building much into the lexical meaning? These ideas are misguided, and the reasons are simple:

(i) We could not predict what similarity respects are felicitous and what are not: why can't we say "With respect to color, monarchy is like dictatorship"? The present account is explicit about this: attributes that are not part of a concept cannot serve as similarity respects in a similarity statement that embeds it.

(ii) We could not articulate the deep connection that intercurs between similarity and genericity: how would we capture non-distributivity, exception tolerance, and non-monotonicity? To see this, consider the following:

- Assume that "John looks like a bird" means that, in a given context, the contextual similarity of John to *all* birds is greater than a contextually provided standard d. Then it would follow that he looks like penguins as well, which is wrong.
- Alternatively, assume that "John looks like a British judge" means that, in a given context, the contextual similarity of John to *some* British judges is greater than d. Then it would follow that he looks like a judge as well, which is wrong.

[18]There are many literary examples of such readings. For one, consider Pushkin's 'Bronze Horseman'. The story is centred on the bronze statue of Peter the Great in Petersburg coming to life.

- Alternative, one has to assume that the contextual similarity of John to a *normal* bird, or British judge is greater than d. In this case, the criticisms of the notion of normality articulated in section 5.1.1 apply. Moreover, this theory would make use of a notion of normality without explaining *why* similarity, just like genericity, recruits this notion.

5.3.2 Possible intensional accounts

Simple modal accounts of similarity are non-starters. For instance, let us suppose that similarity verbs evoke an accessibility relation that takes us from an evaluation worlds to some "impression"-worlds. We may develop a Hintikka-style semantics that says that x looks like y iff at all impression-worlds x *is* a y. This, however, violates standard assumptions of counterpart theory: Suppose that John looks like Mary at w. Thus John *is* Mary at all impression-worlds. Now suppose that others look like Mary: Bob, Carl, and not forgetting that Mary, too, looks like herself. Then w-Mary, w-John, w-Bob, w-Carl, all *are* impression-worlds Mary.

The crucial problem is that even if we adopt an ordering source and a modal base, change the quantification over worlds, we will have to capture "looking like x" at a world as "being x" at some other worlds, which creates trouble.

Other options are equally non-starters. We may want to explore an option that incorporates an ordering and existentially quantifies over the world on top of the ordering. For instance, it may seem reasonable to think that if John seems like Mary, then there is a world among the most similar to the actual world in which John is Mary. However, this account fails to predict cases of distant similarity:

(132) The Earth looks like a tennis ball.

Surely in none of the worlds most similar to the actual one Earth *is* a tennis ball. Lastly, it is worth thinking about a last instructive non-starter, which is to existentially quantify on *epistemically* best worlds. TO see why this does not work, consider (133):

(133) a. **Context**: Two friends are in a courthouse. One points at a person in civilian clothes, whose appearance has nothing in common with the appearance of a lawyer, and says:

b. That might be a lawyer.
c. * That seems like a lawyer.

In other words, there can be general reasons that, while not pertaining to similarity, still make it epistemically reasonable to assert that an individual may have a property.

Moreover, all of these three accounts fall prey to distributivity failures: distributivity will be predicted in any upward entailing closure on worlds. If there is a world at which John is a British lawyer, there is both a world at which he is British and one at which he is a lawyer. Thus looking like a British judge will imply looking like a Brit and looking like a judge. And similarly for the universal closure on impression worlds.

5.3.3 Partee-style account

Recall from section 5.2 that Partee captures privative adjectives like "fake" as subsectives that, following the application of pragmatic principles, apply to the broadened denotation of their argument. Can a denotation be Partee-expanded to capture the meaning of similarity statements? It needs to include all things that look like the NP and are not the NP.

(134) $[\![\text{seems like a}]\!] = \lambda Q.\lambda x.x \in Q \cup A$

Here, A is the set of non-Qs that resemble Q. For the lexical entry in (134) to work correctly, the head primacy principle needs to be adapted to be able to operate at the sentence level.

(135) Head primacy principle for sentences: When interpreting sentences of the form "A is a B", try to interpret B in its literal extension.

The non-vacuity principle for sentences becomes a very general rescuing principle, which requires speakers to interpret the denotations of predicates so that the sentence is true.

(136) Head primacy principle for sentences: When interpreting sentences of the form "A is a B", try to interpret B such that $A \subseteq B$.

When a predicate does not apply to an individual, the predicate is coercively expanded. For example, in (137) John cannot be interpreted to be a lion narrowly intended, and the denotation of *lion* is therefore expanded to include strong, aggressive humans.

(137) a. John is a lion.
b. John $\in$ lion$'\cup$ S

On this view, similarity statements may correspond to a grammaticalization of loose predication: "seem" tolerates violations of the head primacy principle for sentences on the *semantic level*, rather than pragmatically like "be"-predication. There is no need for Head Primacy to threaten Non-Vacuity for the NP to be expanded. To see this, consider (138) and (139). Simba is in fact a lion strictly intended, and in (138) the denotation of *lion* is not expanded. By contrast, under *seem* the denotation of lion is still expanded to include lion-looking non-lions.

(138) a. Simba is a lion.
b. Simba $\in$ lion$'$

(139) a. Simba looks like a lion.
b. Simba $\in$ lion$'\cup$ S

While the assumption of A is evidently question-begging, it is not enough to get the right predictions. One problem of such an extension of Partee's account would be that it predicts lions to always look like lions. Sentences like (140) should be contradictory.

(140) This lion does not look like a lion.

Consequently, besides adding things that look like a lion, to get the right denotation for *lion* we need to remove the lions which do not look like lions.

$[\![\text{seems like a}]\!] = \lambda Q.\lambda x.x \in (Q \cup A) - B$

Here, B is the set of atypical lions. This version correctly predicts failures of distributivity:

(141) $[\![\text{looks like a British judge}]\!] = \lambda x.x \in ((\text{British}' \cap \text{judge}') \cup A) - B$

(142) $[\![\text{looks like a judge}]\!] = \lambda x.x \in (\text{judge}' \cup A') - B'$

In order for distributivity to fail, it is enough that $A \neq A'$ or $B \neq B'$. However, this comes at the cost of the two very powerful free variables in the lexical entry. While already for *stone lion* there is no deterministic recipe to hand-pick the right lions to include in the extension, this move is evidently question-begging for similarity statements: it is not enough to merely state that we add lion-looking things and take away exceptional lions.

But again, such a proposal seems to track some fine-grained operations at the conceptual level. In dual content theories such as Del Pinal's or the present one, loose talk can be cashed out by replacing the E-structure with some dimensions of the C-structure. Of course, there must be a rich enough context for this to occur. Take the word "lion". In the present proposal, to understand it as metaphorically picking out an aggressive individual, speakers have to replace $\lambda x.lion(x)$ in the E-structure with one of the diagnostic traits of lions, something like $\lambda x.aggressive(x)$. But this cannot occur out of the blue. "Seem", instead, *grammatically* replaces the E-structure with the C-structure.

Here is the correspondence. In the extension of Partee's account presented in this section, the entities that seem like lions correspond to the following extension. Take the extension ($\lambda x.lion(x)$), and then:

(i) unite it with the non-lions that look like lions (A);
(ii) strip it of the atypical lions (B).

In my account, something that looks like a lion is:

(i) something that has diagnostic properties of lions (includes lion-looking non-lions);
(ii) not necessarily a lion (excludes, together with (i), atypical lions).

In other words, similarity:

(i) uploads lion-diagnostic properties to the E-structure;
(ii) removes the original E-structure of **lion**.

In sum, purely extensional, pragmatic based accounts like Partee's can extensionally simulate, in part or fully, the workings of a fine-grained theory of C-sensitivity. This, however, comes at the cost of not being able to explain how precisely extensions are broadened and narrowed.

6 Conclusion

I have presented an account that unifies three linguistic phenomena that are sensitive to the structure of our psychological representations: generics, similarity verbs, and some problematic (C-sensitive) adjectives.

I have argued that genericity is sensitive to the diagnostic properties of the categories related to the generic NP.
More specifically, I have posited that bare plurals embed directly the concept related to a lexical item. I have argued that this is in line with kind-based treatments of bare plural generics insofar as concepts are fine-grained, internalistic variants of kinds; concepts are representations of kinds. I have shown that this solves a number of puzzles. Most notably, it explains why bare plural generics can embed two-gendered predication: "Lions have a mane and suckle their young". The concept is genderless, and can embed diagnostic properties of the category regardless of what gender they pertain to.
Singular indefinite generics, instead, existentially quantify over "typical enough" individuals. The existential ends up in the antecedent of the conditional, and donkey-binds into the consequent. A sentence like "A lion has a mane", then, means something like "If a lion is typical, it has a mane", "A lion that is typical has a mane". This accounts for (i) the intuition of lawfulness that singular indefinite generics give, and (ii) the fact that the generic quantifier is so close to universal quantification. Moreover, it explains why sentences (143)a. and b. are both good, while the two-gendered matrix sentence in (143)c. is not.

(143) a. OK A duck lays eggs. FEMALE-PERTAINING
b. OK A duck has colorful feathers. MALE-PERTAINING
c. # A duck lays eggs and has colorful feathers. TWO-GENDERED

To be typical enough, the individuals the donkey-bound existential quantifies over may lack male-specific traits and only have female-specific traits as in (143)a. or the converse as in (143)b. But the same individuals cannot have both male- and female-specific traits; this accounts for the infelicity of (143)c.

I claimed that similarity statements compare two individuals based on a salient, context-sensitive set of traits. I accounted for general readings of similarity statements as similarity statements that embed an indefinite singular generic. This accounts for the exception tolerance, non-distributivity, and non-monotonicity of general similarity statements.

I gave an analysis of C-sensitive adjectives, zeroing in on "fake" and "typical". I argued that for these adjectives to work in a fully recursive way, one needs to incorporate the Diagnosticity Update Principle: the diagnostic traits that make up the C-structure change after any update in the E-structure. To wit, the diagnostic traits of guns must be different from the diagnostic traits of fake guns for the system to make adequate predictions on what *fake fake* guns are.

I then discussed ways in which psychology can fill in the variables used compositionally in this system, discussing relevant findings in the literature on psychological essentialism and on diagnosticity/prototypicality.

Essentialism provides a good theory of the interdependence between the E-structure and the C-structure. C-structure properties "explain" the unobservable quintessence of the category of which the E-structure makes a linguistic, "labeling" use. This also explains why some categories seem to be linked to normative traits, e.g. "Judges don't accept bribes" (cf. Newman and Knobe, 2019).
Psychological accounts of diagnosticity/distinctiveness/prototypicality provide testable theories to populate the C-structure. I proposed that at this effect there are both frequency-based and productive, compositional mechanisms at work.

Finally, I compared my account to other accounts of the single phenomena. The theory presented here is more adequate than alternative accounts both explanatorily and empirically. Explanatorily, the integration with psychological models of conceptual representation is easier in the present account than in alternatives. Empirically, many data points are only explained by this theory: the behavior of generics with two-gendered sentences, the problematic features of similarity, and the entailment patterns of recursive application of privatives.

There are many promising directions for this kind of work. One important question is if the C-structure lives indeed under the DP as proposed here, or if similar mechanisms can be extended to, e.g., adverbial modification ("fakely walk"). More generally, extensions of this work may investigate how the event-structure, aspect, and tense of verbs interacts with C-structures.
Another important avenue is to come up with models of diagnosticity and of conceptual combination for simple NPs and Noun-Noun compounds. Once the compositional or frequency-based emergence of new diagnostic features is well predicted, one can plug in psychological variables into compositional accounts such as the present one. A complete account of diagnosticity would enable the theory to fully predict, e.g., what specific traits should push people to accept or not a generic sentence, or when specifically the diagnostic traits of lions diverge from those of typical lions.

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