Descriptions with Adverbs of Quantification

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In "Descriptions as Predicates" (Graff 2001) I argued that definite and indefinite descriptions should be given a uniform semantic treatment as predicates rather than as quantifier phrases. The aim of the current paper is to clarify and elaborate one of the arguments for the descriptions-as-predicates view, one that concerns the interaction of descriptions with adverbs of quantification.

I. First Preface: The Semantics of Descriptions as Predicates

- The semantic value of a predicate is a function of type $\langle e, t\rangle$, that is, a function from entities to truth values.
- The *extension* of such a function is the set of entities the function assigns the value *true* to, and the *extension of a predicate* (denoted by putting double brackets around it) to be the extension of the function that is that predicate's semantic value.
- Assuming that there are only two truth values, and that the semantic value of a predicate is defined for every entity, we can indicate what semantic value a predicate has by saying what the extension of that predicate is.

Indefinite Descriptions

(1) $[\![\text{`a } G\text{'}]\!] = [\![G]\!]$.[1]

Definite Descriptions

- Russell: $C(\text{the } F)$ "means" $\exists x(Fx \wedge \forall y(Fy \rightarrow y = x) \wedge C(x))$;
  Predicate version: $[\![\text{`the } F\text{'}]\!] = \{x \in [\![F]\!] : \forall y \in [\![F]\!](y = x)\}$.
- Sharvy (1980): $C(\text{the } F)$ means $\exists x(Fx \wedge \forall y(Fy \rightarrow y \leq x) \wedge C(x))$;
  Predicate version: $[\![\text{`the } F\text{'}]\!] = \{x \in [\![F]\!] : \forall y \in [\![F]\!](y \leq x)\}$.

(2) $[\![\text{`the } F\text{'}]\!] = \{x \in [\![F]\!] : \forall y \in [\![F]\!](y \leq x)\}$.

- A singular count noun such as 'woman' will have in its extension each individual woman.
- Its pluralization 'women' has in its extension every plurality of women.
- Numeral words are predicate-modifiers.[2]

The semantic proposals above for plurals, numerals words and the definite article yield the following desirable results, assuming that there are just three women, Ana, Bea and Carlita:[3]

(3) $[\![\text{'woman'}]\!] = [\![\text{'a woman'}]\!] = \{A, B, C\}$,

(4) $[\![\text{'the woman'}]\!] = \emptyset$,

(5) $[\![\text{'women'}]\!] = \{A + B, A + C, B + C, A + B + C\}$,

(6) $[\![\text{'the women'}]\!] = \{A + B + C\}$,

(7) $[\![\text{'two women'}]\!] = \{A + B, A + C, B + C\}$,

[1] Throughout, I'll use single quotes for both name-forming quotation and quasi-quotation, and will drop the quotes in some cases for the sake of readability.

[2] For this proposal, see for example Ladusaw (1982), Link (1987), and Krifka (1999).

[3] For definite–numeral combinations I assume the syntactic structure '[the [num F]]' rather than '[[the num] F]'.

(8) ⟦'the two women'⟧ = ∅,

(9) ⟦'three women'⟧ = $\{A + B + C\}$,

(10) ⟦'the three women'⟧ = $\{A + B + C\}$.

- When F is a mass noun, the relation expressed by '$\leq$' can be understood as the relation of *being a sub-portion of*.
- With Sharvy, I'll take a mass noun such as 'water' to be a predicate true of every portion of water, and a modified mass noun such as 'water in my bathtub' to be a predicate true of every portion of water in my bathtub.
- The definite descriptions 'the water' and 'the water in my bathtub' then each have singleton extensions (assuming that my bathtub has some water in it), containing, respectively, all the water there is, and all the water in my bathtub.

II. Second Preface: The Logical Form of Descriptions as Predicates

Descriptions in Predicative Positiion

(11) Hillary is a woman,

(12) Hilary is not a woman,

(13) Ana is the woman I met yesterday,

(14) Max is not the owner,

(15) Ana and Bea are the two women I met yesterday.

- I assume that the the 'to be' verbs here are the 'be' of predication and have no semantic value.
- For negative sentences such as (12) and (14) I assume that the 'not' appearing after 'be' is semantically an operator on the entire sentence.
  - (12), for example, has a logical form like '[not [Hilary [a woman]]]', and is assigned the truth-conditions represented by its standard predicate-calculus paraphrase, '$\neg Wh$'.
  - The Russellian in contrast takes 'be' here to be the 'be' of identity and, in the absence of supplemental syntactic principles, assigns two logical forms to (12), corresponding to the predicate-calculus paraphrases '$\neg\exists x(Wx \wedge h = x)$' and '$\exists x(Wx \wedge \neg h = x)$'.
  - Only the first of these, which is equivalent to the simple '$\neg Wh$', represents appropriate truth conditions for (12).
- Conjoined names, such as 'Ana and Bea' in (15), denote a plurality—represented here as the sum Ana+Bea.

Descriptions in argument position

(16) The singer smokes.

The Syntax and Semantics of Quantification

- The logical forms of sentences containing quantifier phrases will be represented using restricted quantifiers and complex predicates formed by abstraction, following the model of Barwise & Cooper (1981).
- Restricted quantifiers: [some : man].
- Complex Predicates: $\hat{x}$ x smokes.
- A restricted quantifier combines with a one-place predicate to form a sentence.[4]

(17) Juan loves every man,

[every : man] $\hat{x}$ Juan loves x,

Every man is an x such that Juan loves x;

(18) Some man smokes,

[some : man] $\hat{x}$ x smokes.

- This contrasts with Stephen Neale's (1990) restricted quantifier notation:

(19) [every x : man x] Juan loves x,

(20) [some x : man x] x smokes.

- Given our notation, the semantic value of a quantifier phrase can be a function of type $\langle\langle e,t\rangle,t\rangle$.
  - The semantic value of 'every F' is that type $\langle\langle e,t\rangle,t\rangle$ function that assigns the value *true* to a type $\langle e,t\rangle$ function just in case its extension contains *everything* in $[\![F]\!]$.
  - the semantic value of a quantifier phrase of the form 'some F' is that type $\langle\langle e,t\rangle,t\rangle$ function that assigns the value *true* to a type $\langle e,t\rangle$ function just in case its extension contains *something* in $[\![F]\!]$.
  - A predicate abstract such as '$\hat{x}$ Juan loves x' has a predicate-type semantic value. The truth values of (17) and (18) can now be computed compositionally from their logical forms, obtained by quantifier-raising.

The logical forms of sentences containing descriptions in argument position.

- Like other determiner phrases, descriptions undergo a process of raising, leaving behind a variable that gets bound in the process by a predicate-abstraction operator.
- But descriptions slot into the predicative portion of a restricted quantifier:

(21) $[\ldots[\text{a/the } F]\ldots] \Longrightarrow [DET : \text{a/the } F]\,\hat{x}\,[\ldots x\ldots]$.

DET is either an unpronounced determiner with either existential or generic force or an adverb of quantification occurring explicitly in the sentence.

(22) A runner hardly ever smokes.

(23) $[\emptyset_{\exists} : \text{a runner}]\,\hat{x}\,x$ hardly ever smokes,

Something in the extension of [a runner] is such that it hardly ever smokes,

Some runner hardly ever smokes;

[4] The syntax is reminiscent of that for Robert Stalnaker's (1977) language $\hat{L}$, in which a logical formula such as $\forall\hat{x}Fx$ is parsed as consisting of the quantifier $\forall$ and the complex predicate $\hat{x}Fx$ formed by predicate abstraction. It extends the syntax of $\hat{L}$ in allowing restricted as well as unrestricted quantifiers.

(24) $[\emptyset_{GEN}$: a runner$]\,\hat{x}\,x$ hardly ever smokes,
It's generally true of a runner that it is such that it hardly every smokes,
In general, runners hardly ever smoke;

(25) [Hardly ever : a runner$]\,\hat{x}\,x$ smokes,
Hardly anything in the extension of ⟦a runner⟧ is such that it smokes,
Hardly any runners smoke.

(26) The owner of an espresso machine rarely goes to bed early.

(27) $[\emptyset_{\exists}$: the owner of an espresso machine$]\,\hat{x}\,x$ rarely goes to bed early,
Some (unique) owner of an espresso machine rarely goes to bed early;

(28) $[\emptyset_{GEN}$: the owner of an espresso machine$]\,\hat{x}\,x$ rarely goes to bed early,
In general, espresso-machine owners rarely go to bed early;

(29) [Rarely : the owner of an espresso machine$]\,\hat{x}\,x$ goes to bed early,
Rare is the owner of an espresso-machine who goes to bed early.

(30) $[DET : \hat{x}\,[\emptyset_{\exists}$: an espresso machine$]\,\hat{y}\ x$ (is) the owner of $y]$.
(A multiply-applicable definite description.)

So far, genericity has been treated as resulting from a description's restricting an unpronounced determiner $\emptyset_{GEN}$ that has generic quantificational force. But this treatment will not work for those cases when a definite description is *semantically* required to have either a singleton or an empty extension but which is nonetheless used generically:

(31) The tiger is an animal that breeds well in captivity.

The two logical forms assigned to this sentence (only two because it does not contain an explicit adverb of quantification) are:

(32) $[\emptyset_{\exists}$: the tiger$]\,\hat{x}\,x$ is an animal that breeds well in captivity,

(33) $[\emptyset_{GEN}$: the tiger$]\,\hat{x}\,x$ is an animal that breeds well in captivity.

Individual Versus Taxonomic Interpretations for Common Nouns:

(34) There are three tigers in this room; I hope they're not hungry;

(35) Three tigers went extinct in the last century: the Caspian, the Balinese, and the Javan.

Kind-Level (Taxonomic) versus Individual-Level Generic Definites:

(36) The mystery novel is popular,
$[\emptyset_{\exists}$: the mystery novel$]\,\hat{x}\,x$ is popular,
(Taxonomic interpretation for 'mystery novel');

(37) The author of a mystery novel is (generally) popular,
$[\emptyset_{GEN}$: the author of a mystery novel$]\,\hat{x}\,x$ is popular,[5]
(Individual interpretation for both 'author' and 'mystery novel').

[5]Here I suppress the internal logical form of the definite description inside the restricted quantifier for the sake of readability. Spelled out, the whole thing becomes: $[\emptyset_{GEN} : \hat{y}([\emptyset_{\exists}$: a mystery novel$]\,\hat{z}\,(y$ (is) the author of $z))]\,\hat{x}\,x$ is popular; which is worth emphasizing so that it is clear that this a multiply-applicable definite description.

(38) Generic Bare Plurals: $[\emptyset_{GEN}$: tigers$]\,\hat{x}\,x$ have stripes.

(39) Tigers are extinct,

- Generic quantification over tiger-pluralities,
- Generic quantification over tiger-kind–pluralities;

(40) A tiger is extinct,

- Existential quantification over tiger-kinds.

Main points: Definite and indefinite descriptions invariably have predicate-type semantic values.

- When one occurs in an argument position of a predicate, it undergoes a process that's like quantifier-raising except that it slots into the predicative (restrictor) portion of the restricted quantifier.
- The quantifier portion of this restricted quantifier is either an unpronounced quantificational determiner with either existential or generic force, or an adverb of quantification explicitly occurring in the sentence.
- Definite descriptions, however, except in those special cases where they are multiply-applicable (for example because they contain an embedded indefinite), can restrict only an existential quantifier, the other quantifiers being ruled out on pragmatic grounds.
- Generic readings for singly-applicable definite descriptions result not from generic quantification but from a taxonomic reading for the predicative complement of the definite article.

III. Descriptions with Adverbs of Quantification

(41) a. The owner of an espresso machine rarely prefers tea to coffee,
b. Most owners of an espresso machine rarely prefer tea to coffee,
c. Joe rarely prefers tea to coffee,
d. Joe prefers tea to coffee.

- Some one espresso-machine owner has the "frequency of episode" property attributed to Joe by (41c), represented as: '$[\emptyset_{\exists}$: the owner of an espresso machine$]\,\hat{x}\,x$ rarely prefers tea to coffee';
- Espresso-machine owners *in general* have the frequency-of-episode property attributed to Joe by (41c), represented as: '$[\emptyset_{GEN}$: the owner of an espresso machine$]\,\hat{x}\,x$ rarely prefers tea to coffee;'
- *Few* owners of an espresso machine have the "habitual" property attributed to Joe in (41d), represented as: '[rarely : the owner of an espresso machine$]\,\hat{x}\,x$ (habitually) prefers tea to coffee'.

(42) a. A Scandinavian rarely has brown eyes,
b. Every Scandinavian rarely has brown eyes,
c. Joe rarely has brown eyes,
d. Joe has brown eyes;

(43) a. Philosophers sometimes smoke,
b. Both philosophers sometimes smoke,
c. Joe sometimes smokes,
d. Joe smokes;

(44) a. The parents of a toddler usually have little time for relaxation,
b. Many parents of a toddler usually have little time for relaxation,

c. Joe usually has little time for relaxation,

d. Joe has little time for relaxation.

- The confirmation *for* the descriptions-as-predicates view stems from the fact that it smoothly accounts for the "quantificational variability effects" of descriptions (definite and indefinite, singular and plural) displayed in the a-sentences in (41–44).
- The argument *against* Russell's theory of descriptions stems from the fact that however its proponents may ultimately explain the quantificational variability effects that look troubling for it, the *difference* between the a- and b-sentences in (41–44) with respect to the existence of quantificational variability effects points to an important disanalogy between descriptions and quantifier phrases. Call this *the quantificational-variability argument* against Russellianism.

Extra Readings—Quantification over Situations:

(45) Some of the espresso-machine owners occasionally prefer tea to coffee.

(46) All of the Scandinavians rarely have brown eyes.

(47) Both of the philosophers sometimes smoke.[6]

(41) a. The owner of an espresso machine rarely prefers tea to coffee.

On the one hand, for each way of interpreting a sentence with a *quantifier phrase* in the argument position of a predicate—whether an adverb of quantification explicitly occurs in the sentence or not, there is an *exactly analogous* way of interpreting the corresponding sentence with a description in the place of the quantifier phrase.

On the other hand, there are ways of interpreting a sentence with a *description* in the argument position of a predicate that have no analogous interpretation when the description is replaced with a genuine quantifier phrase.

⇒ This fact suggests that however the Russellian might account for the interpretations we've accounted for here as an adverb being restricted by a description *qua* predicate, that account will inevitably predict that other quantifier phrases interact with adverbs of quantification in a way that they just don't seem to. A particularly striking minimal pair is the following:

(48) A Scandinavian usually has blue eyes,

- Intuitively involves quantification over individual Scandinavians.

(49) Some Scandinavian usually has blue eyes.

- No quantification-over-individuals reading.

- How might a Russellian capture the quantification-over-individuals interpretation for the sentence with the indefinite description?

  ⇒ One sort of proposal involves adverbial quantification over "minimal" situations. (Heim 1990) and (von Fintel 1994, von Fintel 2004)

  ⇒ 'Adv: Φ' gets the following truth-conditions:
  Adv-many minimal Ψ-situations are a part of a minimal $(\Phi \wedge \Psi)$-situation,
  where Ψ is a restriction provided by the conversational context. (von Fintel 2004)

[6] Partitives aren't *required* in order to get a quantification-over-situations reading for quantifier phrases with adverbs of quantification.

- All philosophers in the department sometimes attend an APA meeting;
- Some student who procrastinates usually fails.

Now the paraphrase of the analysis of (48) is:

(50) Most minimal situations in which there's a Scandinavian are part of a minimal situation in which: a Scandinavian has blue eyes.[7]

- The pressing question for the Russellian: why is it that (49) does not allow a quantification-over-individuals reading while (48) does?

  (48) A Scandinavian usually has blue eyes.

  (49) Some Scandinavian usually has blue eyes.

- Von Fintel: 'some', unlike 'a', is "inherently partitive" and so that the situations being quantified over by the adverb each contain all relevant Scandinavians. The quantifier variability effect "will not arise," he writes, "because it is a side-effect of quantifying over very small situations containing only one [Scandinavian] each" (2004, p. 163).

⇒ Reply 1: It's not true that 'some' is always inherently partitive. It's perfectly acceptable to initiate a conversation with an out-of-the-blue use of a 'some'-phrase. Compare the following.

(51) Guess what I just heard. One of the Scandinavians occasionally has purple eyes. (Appropriate response: *which* Scandinavians are you talking about?)

(52) Guess what I just heard. Some Scandinavian occasionally has purple eyes. (Appropriate response: Do you mean to say that he or she doesn't *always* have purple eyes?)

⇒ Reply 2: the problem is not to be accounted for by attributing special properties to 'some'; the problem is much more widespread than that. Consider the following:

(53) Few Scandinavians usually have blue eyes.

(54) Hardly any Scandinavians usually have blue eyes.

Remaining Question: how on the descriptions-as-predicates view are we to handle those uses of adverbs of quantification that *do* intuitively involve quantification over situations?

The question is more sharply focused by considering a singly-applicable definite description with an adverb of quantification. The following example is discussed by Jason Stanley (2002):

(55) The customer is always right.

⇒ This is a singly-applicable definite description. So we cannot account for the natural reading of this sentence by assigning it the logical form: '[always : the customer] $\hat{x}\, x$ is right'.

Stanley's proposal—binding into a nominal restriction:

(56) Always$_i$: the customer$_{f(i)}$ is right.

- Here 'f' occurs as a variable that in the context gets assigned a function from objects to sets of individuals.
- The extension of 'customer$_{f(i)}$', for a particular value of 'i', is the intersection of the extension of 'customer' with the set $f(i)$.
- Since the resulting intersection is supposed to be a singleton set, the Russellian analysis of descriptions can be maintained in face of this example.
- A Difficulty: if 'Always$_i$' ranges over *everything there is*, then $f(i)$ will either be undefined for most values of 'i', in which case I'd think that the sentence would be truth-valueless, or it will yield, for many values of i, sets that don't have any customers in them at all or even any things that could be right or wrong, in which case I'd think that the sentence would be false.

[7] Since Φ in this case entails Ψ, we can just re-write $(\Phi \wedge \Psi)$ as Φ.

The descriptions-as-predicates view can make use of this form of nominal restriction in order to capture situation-readings for adverbs of quantification.

Suppose i gets assigned as value the value of a description such as 'a dispute between customer and employee'—'a dispute' for short.

(57) a. The $\text{customer}_{\text{in(a dispute)}}$ is always right,

b. $[\text{Always} : \text{a dispute}]\, \hat{i}$ the $\text{customer}_{\text{in}(i)}$ is right,

c. $[\text{Always} : \text{a dispute}]\, \hat{i}\, [\emptyset_{\exists} : \text{the customer}_{\text{in}(i)}]\, \hat{x}\, x$ is right.

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