Linguist and Philos (2017) 40:595–619
DOI 10.1007/s10988-017-9212-0

ORIGINAL RESEARCH

On being called something

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Published online: 6 June 2017

Abstract Building on recent work by Delia Graff Fara and Ora Matushansky on appellative constructions like ‘Mirka called Roger handsome’, I argue that if Millianism about proper names is true, then the quantifier ‘something’ in ‘Mirka called Roger something’ is best understood as a kind of substitutional quantifier. Any adequate semantics for such quantifiers must explain both the logical behavior of ‘Mirka called Roger something’ and the acceptability of ‘so’-anaphora in ‘Mirka called Roger something, and everyone so called is handsome’. Millianism about proper names is inconsistent with such quantifiers being standard non-substitutional second-order quantifiers. But this is not the only option for Millianism: I provide two different propositional semantics for substitutional quantification, each of which is adequate in the sense above, given Millianism. One of these is based on Tobias Rosefeldt’s work on non-nominal quantification, and I identify in what way Rosefeldt’s semantics is substitutional.

Keywords Substitutional quantification · So-anaphora · Fara · Quine · Kripke · Appellative ‘called’

1 Introduction

Suppose that Roger’s wife Mirka calls him handsome. Then she has called him something. (2) is a trivial consequence of (1):

(1) Mirka called Roger handsome.
(2) Mirka called Roger something.

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I will call quantifiers like the quantifier ‘something’ in (2) *appellative* quantifiers. Appellative quantifiers are those quantifiers that occur in what Fara (2011) calls the *appellation* position of appellative-‘called’ constructions like (1) and (2). Other examples of appellative quantifiers include

Mirka called Roger every complementary thing she could think of,

and

Mirka called Roger several things.

I will focus on ‘something’ as it occurs in (2) and other sentences below. This is primarily for simplicity.

This paper is about the proper semantic treatment of appellative quantifiers in English. But one of the central arguments below concerns the logic of so-anaphora. Quine (1953, 1960) observed that typically, quantifiers cannot be antecedents for the anaphoric ‘so-called’:

(3) Giorgione was so-called because of his size.
(4) ?Someone was so-called because of his size.

Whereas (3) is both acceptable and true, Quine calls (4) “nonsense” (Quine 1960, p. 153).[1] At best, (4) has a reading according to which someone was called ‘someone’ because of his size. The absurdity of such a claim more than justifies Quine’s judgment.[2]

Quine’s philosophical point is that the inference from (3) to (4) is not a valid instance of an introduction rule for ‘someone’ (such as existential generalization). For Quine (1953, 1960), this is related to the opacity of the position occupied by ‘Giorgione’ in (3). I discuss this inference further in Sect. 4.3, but (4), and the inference from (3) to (4), also raise a philosophical and linguistic puzzle that Quine does not address. In light of Quine’s observation about (4), it is notable that appellative quantifiers can be antecedents for anaphoric ‘so’:

(5) Mirka called Roger something, and someone so called is handsome.

The occurrence of ‘so’ in (5) may be interpreted as anaphorically linked to the occurrence of ‘something’ in (5). Perhaps even more surprising is that this reading of (5) intuitively follows via a simple introduction rule from the reading of (6) according to which the occurrence of ‘so’ in (6) is anaphorically linked to the leftmost occurrence of ‘handsome’ in (6):

(6) Mirka called Roger handsome, and someone so called is handsome.

[1] In ‘Reference and Modality’, a trivial variant of (4) is dismissed as “meaningless” (Quine 1953, p. 145).

[2] We might make sense of such a reading as follows. Suppose there is some cult whose members believe the leader to be a god, or to be divine in some way. Among their beliefs is the belief that the names of gods should rarely if ever be used. So instead they use ‘Someone’ to speak indirectly about the leader, always intending to use it quantificationally. Perhaps the belief about the names of gods has to do in part with the sizes of gods. In this cult, someone might be called ‘someone’ because of his size. Even if this case is coherent, it does not undermine either Quine’s philosophical point in introducing (3) and (4), nor does it undermine the argument of this paper.

In other words, the relevant reading of (5) (according to which 'so' is anaphorically linked to 'something') follows from the relevant reading of (6) (according to which 'so' is anaphorically linked to the leftmost occurrence of 'handsome') via the same introduction rule that generates the invalid inference from (3) to (4).[3] This is a puzzle: what explains the validity of the inference from (6) to (5), given the breakdown of existential introduction and 'so'-anaphora in the inference from (3) to (4)?

I consider two answers in this paper. One is that at least some appellative quantifiers, including 'something' in (2) and (5), are substitutional quantifiers. The other is that appellative quantifiers are non-substitutional second-order quantifiers over properties. For the second answer to be adequate to all the data, we must further assume that proper names are semantically predicates [a view recently defended by Fara (2015)]. Thus the thesis of this paper is conditional: if proper names contribute only objects or individuals to the propositions expressed (relative to contexts) by sentences in which they occur [the view I hereafter call *Millianism*, after Mill (1882, Book I, Ch. 2) and Kripke (1979)], then at least some appellative quantifiers are substitutional quantifiers. To clarify both this thesis and its import, we must first clarify what it means for a quantifier to be substitutional. This is the task of the remainder of the introduction.

Substitutional quantification in Kripke's (1976) canonical defense satisfies two distinct conditions:

PLACEHOLDER: Substitutional variables of a language are semantically associated with sets of strings or expressions of the basic vocabulary of that language.

NO ASSIGNMENT: Substitutional quantification requires no alternative assignments of values to positions of variables in sentences.

PLACEHOLDER requires only a brief comment. Kripke's semantics for substitutional quantification invokes restricted metalinguistic quantification in the metalanguage, where the restriction is to a set of strings or expressions called a substitution class. Substitutional variables serve as placeholders in sentences, to be replaced by members of their associated substitution classes. Members of a substitution class might be restricted to well-formed formulas or singular terms, but might include any sequence of symbols of a language (Kripke 1976, p. 329).

NO ASSIGNMENT requires more explanation. A position in a sentence is a location in the structure of the sentence. When we distinguish between occurrences of a variable (or other expression) within a sentence (or other expression), we do so on the basis of the positions that the variable occupies within the sentence. More generally, an

[3] The point does not turn on the use of the quantifier 'someone' in (5) and (6). The inference from

Mirka called Roger handsome, and everyone so-called is handsome,

to

Mirka called Roger something, and everyone so-called is handsome,

is equally valid. Similarly, the inference from (6) to (5) is valid on the specific reading of 'someone' (taking it, for example, to refer to Roger). Thanks to a referee for discussion.

expression e occurs within another expression E if and only if e occupies some position in the structure of E.[4]

The classical Tarskian semantics for objectual quantification assigns values to variables; both open and closed sentences are true or false only relative to such assignments (though a closed sentence is true relative to all if and only if true relative to any). A sentence (open or closed) of the form

$$\exists x \phi$$

is true relative to an assignment f of values to variables if and only if

$$\phi$$

is true relative to some assignment f' that differs from f at most in what it assigns to 'x'. Thus evaluating a sentence (open or closed) containing a quantifier relative to an assignment of values to variables requires evaluating another (open) sentence relative to some alternative assignment.

But any variable that occurs in a sentence in such a way that it is assigned a value by these variable assignments occupies some position in that sentence, so an assignment of values to variables determines an assignment of values to the positions occupied by variables in sentences. The variables of first-order quantification occupy argument positions—the positions available to singular terms or logically proper names. Thus an assignment of values to first-order variables determines an assignment of objects or individuals to argument positions in sentences.[5] But the Tarskian approach to quantification may be generalized to variables of any syntactic type. We require only assignments of the appropriate kinds of values to variables of various types. We might, for example, introduce variables that occur in predicate positions in sentences, and assignments of values to such variables. Assuming in this paper that the appropriate values for such variables are properties, Tarskian quantifiers that bind variables in predicate positions require assignments of properties to predicate positions in sentences.[6]

Kripkean substitutional quantification, on the other hand, requires no such alternative assignments of values to positions in sentences. A sentence (open or closed) of the form

$$\Sigma \mathrm{x} \phi$$

where 'Σ' is the particular Kripkean substitutional quantifier, is true if and only if

[4] The occurrences in question here are what Kaplan (1968, p. 178) calls *vulgar*.

[5] King (2007, pp. 41–42 and the Appendix) offers a semantics that dispenses with assignments to variables altogether, in favor of equivalence relations over argument positions in sentences. King does not require explicit assignments of values to argument positions, but his semantics makes use of a similar device. See the Appendix to King (2007), and page 221 in particular.

[6] I take the values of such variables to be properties because the semantics we will develop for appellation quantifiers is neo-Russellian. This is largely for convenience and to flesh out details of the various proposals we will consider. I leave it open what properties are, as long as an account of what they are explains their role in predication and quantification. On the standard satisfaction semantics for second-order logic [as in Boolos (1975), for example], second-order variables in predicate positions range over subsets of (or, for predicates with more than one argument-place, relations over) the domain of quantification. See also Williamson (2013).

$\phi[t/\text{'x'}]$

is true, where t is some term in the substitution class associated with 'x', and $\phi[t/\text{'x'}]$ is the result of substituting t for 'x' wherever the latter has a free occurrence in ϕ.[7] The truth of such sentences requires no alternative assignments. This is the point of Kripke's observation about 'semantical roles':

> Note that free [objectual] variables play a genuine semantical role, but the free [substitutional] variables do not: formulae with free [substitutional] variables are assigned no interpretation. (Kripke 1976, p. 355—see also p. 330)

The 'genuine semantical role' for objectual variables is to be assigned values. Substitutional variables in Kripke's semantics are not assigned values. Thus Kripke's semantics for substitutional quantification does not determine any assignment of values to positions in sentences.[8]

It is because Kripkean substitutional quantification satisfies NO ASSIGNMENT that any expression or fragment of an expression (as long as it can be built out of primitive vocabulary of one's language) may be a member of a substitution class. Kripkean substitutional quantification was designed in part so that examples like (7) come out true given a substitution class that includes the right parenthesis:

(7) $\Sigma \mathrm{x} \exists x(x$ is a dog $\supset$ x is a mammal$\mathrm{x}$.

In such cases, (7) is true if (8) is true:

(8) $\exists x(x$ is a dog $\supset$ x is a mammal$)$.

But parentheses receive no interpretation. They are assigned no value, so the occurrence of 'Σ' in (7) cannot semantically require an assignment of values to the position of the right parenthesis in (7).[9]

This flexibility has led some philosophers to question the coherence of Kripkean substitutional quantification. Lycan (1979, p. 215), for example, calls the substitutional quantifier in (7) "semantically mute". Lycan objects in part that there is no evidence in natural language for quantification as illustrated in (7). I return to this objection in Sect. 5.[10]

Kripkean substitutional quantification satisfies both PLACEHOLDER and NO ASSIGNMENT. Matters are more subtle, however, than the quote from Kripke above suggests. It is possible for a semantics to determine an assignment of values to positions in sentences without invoking assignments of values to variables, or without either variables or formulas containing free variables receiving any interpretation or taking any

7 The occurrences here may be either vulgar (see note 4) or what Kaplan (1968, p. 178) calls *accidential*. It is in precisely this sense that Kripke's semantics satisfies PLACEHOLDER.

8 Cf. Dunn and Belnap (1968, p. 184): 'On the substitution interpretation [of quantifiers] there is no domain and variables do not "take values" at all.'

9 The goal of having (7) come out true was not imposed arbitrarily by Kripke. It was a running assumption in the theory of substitutional quantification from its origins. Quine (1969, pp. 104–106) offers some history of substitutional quantification, as does Williamson (2013).

10 Lycan may also agree with van Inwagen's (1981) objection that no one has specified what proposition is expressed by sentences containing a Kripkean substitutional quantifier. See Lycan's discussion of a "pedagogical phenomenon" (Lycan 1979, p. 215). Section 5 directly addresses van Inwagen's objection.

values. An example of such a semantics is Mates's (1965) semantics for first-order quantifiers.[11] On Mates's semantics, a sentence of the form

$$\exists x \phi$$

in a language L is true relative to an interpretation I of L if and only if

$$\phi[\alpha/\text{`}x\text{'}]$$

is true relative to an interpretation I' that differs from I at most in what it assigns to α, where α is some expression—other than a variable—that does not occur in ϕ. Mates's semantics offers alternative interpretations in place of alternative assignments of values to variables. Thus variables take no values on Mates's semantics. Yet Mates's interpretations determine assignments of values to the positions occupied by variables. The positions of α in $\phi[\alpha/\text{`}x\text{'}]$ and of '$x$' (where '$x$' is free) in $\phi$ are the same: any position of $\alpha$ in $\phi[\alpha/\text{`}x\text{'}]$ is a position of (a free occurrence of) 'x' in ϕ, and vice-versa (by the definition of $\phi[\alpha/\text{`}x\text{'}]$). The alternative interpretations of $L$ determine different values for $\alpha$. Thus the alternative interpretations of $L$ determine different values for the positions of $\alpha$ in $\phi[\alpha/\text{`}x\text{'}]$, and hence of '$x$' in ϕ.[12]

Mates's theory shows that quantifiers may satisfy PLACEHOLDER without satisfying NO ASSIGNMENT. The variables of Mates's semantics are associated with constants of the language, for which the variables serve merely as placeholders. Call a quantifier that satisfies PLACEHOLDER *substitutional*. Quantifiers, like the substitutional quantifiers of Kripke (1976), that satisfy both PLACEHOLDER and NO ASSIGNMENT are *strongly* substitutional. Quantifiers that satisfy PLACEHOLDER but do not satisfy NO ASSIGNMENT, like the quantifiers of Mates (1965), are *weakly* substitutional.[13] Quantifiers that satisfy neither, like Tarski's, are non-substitutional.

We can now state the primary thesis of this paper more precisely: if Millianism is true, then appellative quantifiers, like 'something' in (2) and (5), are at least weakly substitutional. While conditional, this thesis is significant as it stands. It is perhaps surprising to find Millianism implicated in issues over the semantics of appellative quantifiers. (Perhaps it is not so surprising—see Sect. 3.) For those skeptical of substitutional quantification of any kind, this thesis offers reason for skepticism about Millianism. For those sympathetic to Millianism, this thesis offers a reason to look favorably at least on weakly substitutional quantification.

In defense of this thesis, I first argue against an alternative semantic treatment of appellative quantifiers as first-order metalinguistic quantifiers. I then compare two second-order theories of appellative quantifiers: as non-substitutional second-order quantifiers and as weakly substitutional second-order quantifiers. The argument over second-order quantification turns on issues in the semantics for 'so' in phrases like 'so called', and on whether Quine was correct about the invalidity of the inference from (3)

[11] See Lavine (2000) for a recent discussion and defense. See also Footnote 5.

[12] It in this sense that Lavine (2000, p. 9) calls this semantics 'Tarskian'. Lavine's use of 'Tarskian' is broader than mine.

[13] Are there quantifiers that satisfy NO ASSIGNMENT without satisfying PLACEHOLDER? I am not sure what such quantifiers would look like, because I am not sure what other options remain for the treatment of variables.

to (4). I argue that Quine was correct, and that a plausible semantics for 'so', together with a view of names as predicates, explains all of the data above given a semantics for appellative quantifiers as non-substitutional second-order quantifiers. This theory is inconsistent with Millianism, and I argue that any theory that attempts to preserve a non-substitutional second-order semantics for appellative quantifiers is similarly inconsistent with Millianism. Finally, I compare the second-order accounts with a strongly substitutional semantics for appellative quantifiers [based on Georgi (2015a)]. This theory is also adequate to the data above, but it is subject to Lycan's objection.

2 Methodological preliminaries

Before we proceed, I wish to clarify a few details in my treatment of quantification and 'so'-anaphora. These two phenomena are central to the arguments that follow.

2.1 Propositional functions

I follow Russell (1905) in analyzing quantification in terms of propositional functions, and I follow Salmon (2006) in taking a propositional function to be the content of a bound *occurrence* of a formula ϕ containing a free variable v, but I depart from Russell, and presumably from Salmon, in adopting a more flexible view of propositional functions. On my view, different species of quantification require different kinds of propositional functions. In particular, I analyze strongly substitutional quantification in terms of functions from expressions to propositions. The value of such a function, for a given expression, need not contain that expression as a constituent. This is a departure from one of Russell's basic requirements on propositional functions (Russell 1937, p. 510). One advantage to this more flexible approach to propositional functions is that there is no semantic difference between the traditional objectual existential quantifier '$\exists$' and the strongly substitutional particular quantifier 'Σ'. Strictly speaking, they are synonymous [see Georgi (2015a) and Sect. 5]. Any difference between objectual and strongly substitutional quantification is due to a difference in the kinds of variables bound by a quantifier, and in particular to the different kinds of propositional functions generated by the different kinds of variables. In this paper, I show how this advantage extends to second order quantifiers and to weakly substitutional quantifiers.

Though I restrict my attention to 'something' for simplicity, this treatment of quantification extends naturally to generalized quantifiers, which are analyzed as relations between propositional functions. I discuss propositional functions further in Sect. 4.1.

2.2 'So' and 'so-called'

In his original examples, Quine uses the hyphenated construction 'so-called'. Examples like (9) and (10) demonstrate that this hyphenated construction differs from the unhyphenated 'so called':

(9) 'Jerk' is pejorative. A person so-called is offended.
(10) 'Jerk' is pejorative. A person so called is offended.

The hyphenated ‘so-called’ in (9) seems to force the reading that a person called a person (or called ‘a person’) is offended. This conflicts with what is clearly intended: that a person called ‘jerk’ is offended. More generally, the hyphenated ‘so-called’ seems to restrict the antecedent of ‘so’ to the noun or phrase it modifies, in both copular constructions like (3) and noun phrases like

my so-called life.

I’ll call this a *locality* constraint. In contrast, (10) may be interpreted to entail that a person called ‘jerk’ is offended. The occurrence of ‘so’ in (10) allows more freedom or flexibility in selecting an antecedent than does the occurrence of ‘so’ in (9).[14] The central examples of the paper, (5) and (6), require a similar degree of flexibility in the interpretation of ‘so’. We will return to ‘so’ and ‘so-called’ in Sects. 4.2 and 4.3.

The locality constraint imposed by the hyphenated ‘so-called’ is not an essential feature of Quine’s examples. The examples may be restated without a hyphen:

Giorgione is so called because of his size.

Someone is so called because of his size.

Doing so clarifies some of the points at issue in the puzzle motivating this paper. To my ear, the interpretation according to which someone is called ‘someone’ because of his size is easier to hear in the unhyphenated variant of (4). Out of deference to Quine, I use his original hyphenated examples in the argument that follows. I defend this choice at the end of Sect. 4.3.

3 Metalinguistic quantification

A natural first pass at a semantics for appellative quantifiers builds on Fara’s (2011, p. 497) analysis of sentences like (1). Fara takes the semantic value $|\alpha|$ of α to be the extension of α:

MA (1) is true if and only if Mirka did or said something that entails that Roger $\in$ |‘handsome’|.[15]

According to MA, (1) is true if and only if Mirka in some way commits herself to the claim that Roger is in the extension of ‘handsome’. She may do this, for example, by

[14] A referee for Linguistics and Philosophy called my attention to the difference, and Matthew Talbert, Jennifer Head, and the members of the WVU Philosophy Club offered valuable insight into the data, and supplied the current examples. Thanks to all of them. Noun phrase constructions may impose a locality constraint even without hyphenation: I find it hard to interpret ‘my so called life’ in such a way that ‘so’ therein is not anaphoric on ‘life’ therein.

[15] One puzzling feature of Fara’s formulation here is that it allows for actions (things one does) to have entailments. If this is correct, then among other things, it seems to follow that if I kill Roger, then I have done something that entails that he is dead (or in the extension of ‘dead’). But then given Fara’s analysis of appellative ‘called’ constructions like (1), it follows that if I have killed Roger, then I have called Roger dead. In response, we may suppose that the actions under consideration are restricted to linguistic actions. In what follows, I will set this worry aside. I thank a referee for discussion.

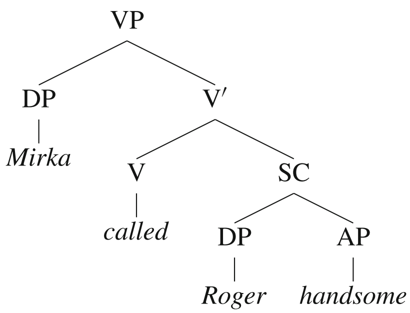
uttering 'you are handsome' to Roger, or 'Did you see that handsome guy?' intending to talk about Roger, or perhaps in other ways.[16]

Building on Fara's suggestion, we might propose the following analysis of (2):

MQ (2) is true if and only if $\exists F$ such that Mirka did or said something that entails that Roger $\in |\ F\ |$.

On this analysis, '$\exists F$' is a *metalinguistic quantifier*—an objectual first-order quantifier ranging over expressions of English—and so is 'something' as it occurs in (2). MQ seems to get something deeply right about 'something' as it occurs in (2): what Mirka did was to use some expression to describe Roger, and so what Mirka did or said entails that Roger is as she described him. To be called something requires that someone perform an act of calling, and calling is a linguistic act.

MQ offers a theory of the truth conditions of (2), but truth conditions are not enough for semantics (King et al. 2014; Soames 1987, 2008, 2010). MQ does not specify what proposition is expressed by sentences like (2). To approach this question, let us return again to (1). Ora Matushansky (2008) has argued that appellative constructions like (1) have the following structure (suppressing many details, including the tense of 'called'):



In this structure, SC is a *small clause*: a minimal subject-predicate construction without tense inflection. Other examples of sentences containing small clauses are

I saw the dean drunk.

Mirka considers the dog dirty.

The examples above are adjectival—the predicate in the small clause is an adjective. Some linguists [e.g. Basilico (2003)] distinguish between these and verbal small clauses, such as

I saw the dean drink.

[16] The latter example may be significant for the debate over whether the nominal of a complex demonstrative like 'that handsome guy' contributes to the truth conditions of declarative sentences in which it occurs (relative to a context). If Mirka, in uttering 'that handsome guy bought me popcorn' called Roger handsome, then she said or did something that entails that Roger is handsome (or called him a handsome guy). But this is to do or say something that represents the world as being such that Roger is handsome, so it is to have the truth conditions that Roger is handsome.

For this paper, the significance of Matushansky's analysis of appellative constructions is that small clauses (i) are constituents that (ii) have a basic predicative structure.[17]

If this is correct, then appellative-'called' constructions like (1) predicate a relation—*calling*—of a caller and something that is a lot like a proposition. To sidestep concerns about the relationship between propositions and what is expressed by small clauses, I will call what is expressed by a small clause a proposition*, though I will refer to propositions* using 'that'-clauses.[18] That appellative-'called' constructions encode a relation between a subject and a proposition is in fact suggested by Fara's truth-conditional analysis of (1), though the suggestion is obscured by her use of the set-theoretic notation in MA.[19] We can clarify the suggestion by restating MA as follows:

MA′ (1) is true if and only if Mirka did or said something that entails that Roger is handsome.

Here the role of the proposition* that Roger is handsome is clear.

I will adopt the practice of using ordered n-tuples to represent propositions.[20] We may then represent the proposition expressed by (1) (relative to a context c, but I will suppress this henceforward) as (11):

(11) ⟨CALL, ⟨Mirka, ⟨Roger, being handsome⟩⟩⟩

In this proposition, CALL is the relation ___ *saying or doing something that entails* ___. Thus the proposition (11) is true if and only if Mirka bears the CALL relation to the proposition* that Roger is handsome. The truth conditions for (11), and hence for (1), are then just as those given by MA′.

This analysis of (1) presents a challenge for MQ. Recall that MQ treats the quantifier 'something' in (2) as an objectual quantifier whose domain is restricted in the relevant

17 See Stowell (1981). Higginbotham (1983) calls small clauses *unsupported clauses* (though he would reject the treatment of them as propositional). The small clauses of appellative-'called' constructions appear to be adjectival. One of the tests that Basilico (2003) considers is whether the subject of a small clause can raise to the subject position of the matrix verb when the matrix verb is passivized. This is permitted with adjectival small clauses, but not with verbal small clauses:

(a) I saw the dean drunk. (adjectival)
(b) The dean was seen drunk.
(c) I saw the dean drink. (verbal)
(d) *The dean was seen drink.

This is clearly permitted with sentences like (1):

(e) Roger was called handsome.

Basilico argues that adjectival small clauses are instances of categorical predication. This is consistent with the propositional analysis of (1) below.

18 Small clauses may be good candidates for temporal propositions (Brogaard 2012). MA′ below may be restated in terms of entailment at a time if this turns out to be the best account of the semantics of small clauses.

19 This is *not* a criticism of Fara. She presents the semantic analysis in this way in order to draw attention to interesting generalizations that would otherwise be difficult to state clearly.

20 I take propositions to have structure of some kind that encodes at least predication. This does not mean that I take propositions to be n-tuples. I do not. But to worry about what propositions really are would take us too far afield. See King et al. (2014).

context to some set of expressions of English (setting aside questions about how the domain is determined). To analyze quantification within the above framework of structured propositions, we introduce propositional functions—functions from objects of various kinds to structured propositions. The rule PO illustrates this treatment of objectual quantification:

PO The proposition expressed by $\ulcorner(\exists v)\ \phi\urcorner$ relative to c and f is $\langle$SOME, $g\rangle$, where SOME is the property of being a function that maps at least one thing to a true proposition (or, what I will take to be equivalent, the property of being *true of* at least one object), and g is the function that maps each object o to the proposition expressed by ϕ relative to c and f_v^o (where f_v^o is the assignment assignment of values to variables that differs from f at most insofar as it assigns o to v).[21]

On this approach to quantification, the propositional function g is the content of the bound *occurrence* of ϕ in $\ulcorner(\exists v)\ \phi\urcorner$ (relative to c and f) (Salmon 2006). The proposition expressed by $\ulcorner(\exists v)\ \phi\urcorner$, on this view, is true if and only if g has the property SOME—i.e., if and only if g maps at least one object to a true proposition.

We can illustrate the rule PO, and the role of propositional functions, by applying the rule to the metalinguistic analysis of appellative quantifiers MQ. On the resulting view, (2) expresses (12):

(2) Mirka called Roger something.

(12) $\langle$SOME, $g\rangle$

where SOME, again, is the property of being true of at least one object, and g is a propositional function such that for any object o, $g(o)$ is the proposition expressed by

Mirka called Roger x

relative to an assignment of o to 'x'. Thus for any o, $g(o)$ will contain o as a constituent. In particular, then, g('handsome') is the proposition (13):

(13) $\langle$CALL, $\langle$Mirka, $\langle$Roger, 'handsome'$\rangle\rangle\rangle$

This is the complete metalinguistic analysis of the appellative quantifier 'something'.

On this analysis, (12) is true if and only if for some expression o in the contextually salient domain, $g(o)$ is true. Yet for any o, $g(o)$ will contain o as a constituent. It is at this point that the challenge for the metalinguistic analysis of appellative quantifiers arises: the analysis cannot explain how the truth of (2) follows from the truth of (1). For suppose that (1) is true. Then (11) is true, because it is the proposition expressed by (1). But it does not follow from the truth of (11) that the propositional function g of (12) is true of any expression in the contextually salient domain of 'something', because (11) contains no expression as a constituent. (11) contains the property of being handsome where (13) contains the word 'handsome'. Thus it does not follow that g has the property SOME, and hence it does not follow that (12)—the proposition expressed by (2)—is true.

A further problem for the metalinguistic analysis is Fara's (2011, pp. 497–499) claim [see also Matushansky (2008)] that the appellation position of an appellative-'called' construction must be occupied by a predicate. Her main argument for this

[21] Corner quotes in this paper are used for Quinean quasi-quotation (Quine 1951, §6).

claim is that to suppose otherwise requires positing an ambiguity in 'called'. To see this, compare (1) and (14):

(1) Mirka called Roger handsome.

(14) Mirka called Roger 'handsome'.

Both (1) and (14) are well-formed. Yet whereas (1) contains the predicate 'handsome', (14) contains the quote name "handsome" of the predicate 'handsome'. One way to account for this is to suppose that 'called' is ambiguous: on one reading, it expresses a two-place relation between an agent and whatever is expressed by a small clause, and on another reading it expresses a three-place relation between an agent, an object or individual, and an expression. The other way to account for (1) and (14), which Fara accepts, is to assume that names—including quote names of expressions—function as predicates in the appellation position of appellative-'called' constructions.[22]

If Fara is correct, then the metalinguistic analysis of appellative quantifiers is fundamentally misguided. The analysis takes 'something', as it occurs in (2), to be a first-order quantifier whose domain is expressions of English. This requires that the appellation position of appellative-'called' constructions be an argument position that can be occupied by a singular term like a first-order variable. But this is precisely what Fara's proposal rejects.

4 Second-order quantification

One way around the problems for the metalinguistic analysis above is to suppose instead that 'something' in (2) is a second-order quantifier binding a variable in predicate position. Assuming that second order quantification involves quantification over properties, we allow assignments of values to variables to assign properties to predicate variables. Then the second-order analysis of appellative quantifiers is that the proposition expressed by (2) is (15):

(15) $\langle$SOME, $g_2\rangle$

where SOME is again the property of being true of at least one thing, and g_2 is a propositional function such that for any property P, $g_2(P)$ is the proposition (16):

(16) $\langle$CALL, $\langle$Mirka, $\langle$Roger, $P\rangle\rangle\rangle$

This proposal avoids the first problem for the metalinguistic analysis above, because g_2(being handsome) just is the proposition (11). Thus we can provide an explanation of how the truth of (2) follows from the truth of (1): (1) is true if and only if the proposition it expresses, (11), is true. So if (1) is true, then (11) is true. But if (11) is true, then the propositional function g_2 in (15) is true of at least one property: being handsome. So g_2 has the property SOME, and hence (15) is true. Since (15) is the proposition expressed (on this proposal) by (2), (2) is true.

[22] Fara (2011) also distinguishes between being called Roger and being called 'Roger'. On the analysis of appellative-'called' constructions as involving small clauses, examples like this require that 'Roger Roger', as it occurs in 'Mirka called Roger Roger', are small clauses. This is consistent with Fara's view of names as predicates, though it may seem like an odd consequence. It remains the case, however, that if Mirka calls Roger Roger, then she has called Roger something. I thank a referee for discussion.

The proposal also avoids the second problem for the metalinguistic analysis: if the quantifier 'something' in (2) is second-order, it can bind variables in positions that can only be occupied by a predicate. Thus the proposal is consistent with Fara's suggestion that the appellation position of appellative-'called' constructions must be occupied by predicates.

Where the second-order quantifier proposal appears to fall short, however, is in providing an account of (5):

(5) Mirka called Roger something, and someone so called is handsome.

It is a common assumption that 'so' requires an expression as antecedent. (We will return to this assumption in Sect. 4.2.) According to the second-order proposal above, 'something' is non-substitutional. Yet a non-substitutional second-order quantifier cannot provide an antecedent for 'so' any more than the standard first-order quantifier does in (4):

(4) *Someone was so-called because of his size.

If the common assumption about 'so'-anaphora is correct, then appellative quantifiers cannot be analyzed as non-substitutional second-order quantifiers.

4.1 Weakly substitutional second-order quantification

Provisionally adopting this common assumption, we may extract from the argument thus far three constraints on an adequate account of 'something' as it occurs in (2) and (5):

(i) it must explain how (2) follows from (1);
(ii) it must be able to bind variables in predicate position; and
(iii) it must provide an antecedent for 'so' both alone and in 'so-called'.

A metalinguistic account fails to satisfy the first two constraints. Non-substitutional second-order quantification fails to satisfy the third.

The semantics proposed by Rosefeldt (2008) for what he has called *non-nominal* quantifiers satisfies all three constraints. Non-nominal quantifiers occur in positions in sentences where singular terms cannot occur. Rosefeldt offers as one example (17):

(17) Ada did everything Van did.

He notes that

Van did chase a butterfly

is a consequence of (17) and

Ada did chase a butterfly.

Since 'chase a butterfly' is a verb phrase, the quantifier 'everything' in (17) is binding a variable whose syntactic type is the same as that of a verb phrase. If, as Fara and Matushansky have argued, the variable bound by 'something' in (2) occupies the position of a predicate, then it is a clear example of a non-nominal quantifier according to this characterization. As such we should expect Rosefeldt's semantics to apply. And it does.

Rosefeldt proposes a general theory of non-nominal quantification in which quantifiers can bind variables of any arbitrary syntactic type. For Rosefeldt, the class of syntactic types is the smallest set S that includes the types e (the class of singular terms), and t (the class of sentences), and is such that if a and b are in S, then so is $\langle a, b \rangle$. Let L be a language containing both constants and variables of various syntactic types, let I be an interpretation of the constants of L, and for any constant α (which may not be in L), let the α-variants of an interpretation I be the interpretations that assign some value to α and that differ from I at most in what they assign to α. If v is a variable of a given syntactic type, then according to Rosefeldt (2008, p. 323), the semantics for the particular non-nominal quantifier 'something' (or '$\exists$') is as follows:

NQ $\ulcorner(\exists v)\psi\urcorner$ is true relative to an interpretation I if and only if $\psi[\alpha/v]$ is true relative to at least one α-variant of I, where α is any constant of the same syntactic type as v that does not appear in ψ.

In Rosefeldt's semantics, $\psi[\alpha/v]$ is the result of substituting α for v wherever the latter occurs free in ψ. Thus Rosefeldt's semantics is weakly substitutional: the variables in his semantics serve merely as placeholders. Yet Rosefeldt (2008, p. 331, n. 25) insists that the quantifier is not substitutional:

> Note that although this definition makes reference to a substitution instance of ψ it is not substitutional quantification. If $[v]$ and α are of the type of singular terms, the truth-conditions…are the same as in traditional objectual interpretation.

Rosefeldt is here concerned with whether the quantifier is strongly substitutional. And he is correct that it is not. As on Mates's (1965) semantics, quantifiers according to NQ are weakly substitutional.

As with MQ, however, NQ is inadequate as a semantic proposal, because it does not specify the contribution made by a non-nominal quantifier to the propositions expressed by sentences (relative to contexts) containing that quantifier. Once again, we can remedy this inadequacy by specifying an appropriate kind of propositional function. For each type τ of expressions of a language L, fix some ordering of the constants of L belonging to τ. Then for any formula ϕ of L, let α^{τ}_{ϕ} be the first constant in the ordering for the type τ that does not occur in ϕ. (If needed, we may add constants to L.) We may then state a propositional semantics for weakly substitutional quantification as follows, where v_S is a substitutional variable of type τ:

PN The proposition expressed by $\ulcorner(\exists v_S)\phi\urcorner$ relative to an interpretation I is $\langle$SOME, $g\rangle$, where SOME is the property of mapping some semantic value to a true proposition, and g is the propositional function such that for any value ν of the appropriate semantic type for α^{τ}_{ϕ}, $g(\nu)$ is the proposition expressed by $\psi[\alpha^{\tau}_{\phi}/v_S]$ relative to the α^{τ}_{ϕ}-variant of I that assigns ν to α^{τ}_{ϕ}.

The role of both substitution and of variant interpretations of a language are clear in PN.

Now suppose that α is the first constant in some canonical ordering of predicates for English.[23] According to the non-nominal analysis of appellative quantifiers, (2) expresses (18) relative to an assignment I of values to expressions of English:

(2) Mirka called Roger something.

(18) $\langle$SOME, $g\rangle$.

Here g is the propositional function such that for any property P, $g(P)$ is the proposition expressed by (19) relative to the α-variant of I that assigns P to α:

(19) Mirka called Roger α

Thus $g(P)$ is just (16) from Sect. 2. PN preserves the truth-conditional analysis of NQ, because (2) is true relative to an interpretation I if and only if (19) is true relative to some α-variant of I.

Now assume that (1) is true relative to the actual interpretation I of English that assigns the property being handsome to ‘handsome’. Since (11) is the proposition expressed by (1) relative to I, (11) is true. Let I^* be the α-variant of I that also assigns being handsome to α. Then (19) relative to I^* also expresses the true proposition (11). Thus the propositional function g in (18) has the property SOME, because g(being handsome) is the proposition expressed by (19) relative to I^*. So (18) is true. Since (18) is the proposition expressed by (2) relative to the actual interpretation I, (2) is true relative to I. In this way, the non-nominal analysis explains how (2) follows from (1). The analysis of appellative quantifiers as substitutional second-order quantifiers satisfies the first condition of adequacy above.

That such quantifiers can bind variables in predicate positions is obvious, since the reason Rosefeldt introduces non-nominal quantification is to provide a general account of quantifiers that can bind variables in various different positions. The argument of the previous paragraph assumes that ‘something’ as it occurs in (2) is a weakly substitutional quantifier binding a variable in predicate position.

Finally, a substitutional analysis of ‘something’ as it occurs in (2) explains the behavior of ‘so called’ in (5):

(5) Mirka called Roger something, and someone so called is handsome.

Weakly substitutional quantification satisfies PLACEHOLDER: a substitutional variable is merely a placeholder for expressions in the associated substitution class. The variable receives no independent assignment of values: it simply gets replaced by an appropriate phrase or expression. This phrase or expression is then available to serve as the antecedent for ‘so’. This is clear when we look at the substitution instance (6) of (5):

(6) Mirka called Roger handsome, and someone so called is handsome.

In (6), the first occurrence of ‘handsome’ is the antecedent for ‘so’. Any instance of (5) will work similarly, just as we want. A substitutional analysis of appellative quantifiers solves our puzzle: the anaphora is preserved in the application of existential

[23] If proper names are predicates, we must be a little more careful. I set this worry aside for now.

generalization because the semantics for appellative quantifiers provides the required antecedent.

The substitutional semantics for second-order quantification above illustrates an important point about the treatment of propositional functions in this paper. Propositional functions are not merely functions in extension.[24] Let v_1 be a standard second order variable (of the kind considered in Sect. 3), and let v_2 be a weakly substitutional variable of the syntactic type of predicates. Then the propositions expressed by

$$\exists v_1 \phi$$

and

$$\exists v_2 \phi$$

are

$$\langle \text{SOME}, g_1 \rangle$$

and

$$\langle \text{SOME}, g_2 \rangle$$

respectively. Yet for any property P, $g_1(P) = g_2(P)$. If propositional functions were functions in extension, then it would be the case that $g_1 = g_2$, but it is central to the argument of this paper that $g_1 \neq g_2$. Propositional functions in the semantics for non-nominal quantifiers are characterized in part by the substitution of constants for variables. This feature of the semantics of non-nominal quantifiers is what distinguishes them from standard quantifiers, and is crucial for explaining the behavior of 'so' in (5) and elsewhere. But it makes no difference in the pairing of input with output.

To summarize: a weakly substitutional analysis of the appellative quantifiers in (2) and (5) satisfies all the constraints we identified above. In addition, this approach to appellative quantifiers seems to get something right about them, something that made the metalinguistic analysis appealling (at least initially) as well. Of course, as we have seen, this metalinguistic analysis does not quite capture what we need. The weakly substitutional analysis does.

4.2 'So'-anaphora and proper names

The argument against non-substitutional second-order quantification relies on the assumption that 'so' requires an expression as antecedent. One argument for this assumption turns on the interaction of 'so'-anaphora and quotation:

(20) LF is a theory of the nature of so-called "logical" form.

(21) LF is a theory of the nature of so-called "logical form".

The difference between these appears to be in the value assigned to 'so'. In each, this value is determined or indicated by the scope of the quotation marks. Without quotation marks,

[24] See Cartwright (2005, p. 915).

LF is a theory of the nature of so-called logical form

is ambiguous. In the example from Sect. 2.2:

my so-called life,

there is no room for such scope ambiguity, and quotation marks are unnecessary, but in

my so-called younger brother

the ambiguity returns. In all these examples, ‘so’ clearly takes an expression as antecedent. The simplest hypothesis is that it always does. Call this the *antecedent hypothesis*.[25]

It is possible to account for all of the data of this paper while rejecting the antecedent hypothesis. Instead of requiring that ‘so’ have an expression as antecedent, we may instead treat ‘so’ as requiring in some cases, such as (5), only that ‘so’ be assigned a property—the value of a predicate. On this proposal, we may treat ‘so’ as a second-order variable anaphorically linked to the variable bound by the occurrence of ‘something’ in (5), so that it is assigned the same value as the variable. The variable is not an antecedent as required by the antecedent hypothesis. Rather, the variable serves to link the occurrence of ‘so’ to the argument place occupied by the variable. I objected above that non-substitutional second-order quantification fails to satisfy the third constraint identified at the beginning of Sect. 4.1. The current proposal responds to this objection by rejecting the constraint.

One might seek support for this non-substitutional analysis of some occurrences of ‘so’ in the observation that ‘so’-anaphora also seems permissible with other instances of second-order quantification besides appellative quantifiers:

(22) Roger is something, and someone so called is handsome.

For those who find this example less satisfying than (5) (and I am one), it sometimes helps to focus on the inference from (23) to (22) (where the occurrences of ‘so’ in each refer to the relevant positions in each):

(23) Roger is handsome, and someone so called is handsome.

(22) sounds better to me when I focus on inferring it from (23). A related defense of this analysis is based on (24), itself based on a suggestion of a referee of this journal:

(24) Mirka called Roger something we all hope he is, and someone so called is handsome.

Here the appellative quantifier appears to bind variables in both an appellative position and a regular predicate position.[26]

Yet the inference from the examples (22), (23), and (24) to the conclusion that ‘something’ in (22) and (24) is a non-substitutional second-order quantifier begs

[25] Predelli (2013, p. 153ff.) notes uses of ‘so’ where the antecedent of ‘so’ is not a linguistic expression. Such uses may require a slightly expanded version of the antecedent hypothesis.

[26] This example also appears to confirm Fara’s hypothesis (see Sect. 3) that the appellation position of appellative-‘called’ constructions are occupied by predicates.

the question against the antecedent hypothesis: the inference is not justified if the antecedent hypothesis is true. Here the simplicity of the antecedent hypothesis has considerable weight. One might equally point to such data to argue that since 'so' always requires an expression as an antecedent, examples like (22) support the conclusion that 'something' as it occurs therein is at least weakly substitutional. This is consistent with Rosefeldt's original discussion of non-nominal quantification. Rosefeldt's focus is more general than the focus of this paper, but applying the techniques of this paper to Rosefeldt's theory generally requires sorting out restrictions on the non-nominal quantifiers to those that bind predicate variables. In addition to being concerned with more foundational considerations than the details of these restrictions, I focus on appellative quantifiers in this paper in large part because of the observation in Sect. 3: calling is a linguistic act. This guarantees that the antecedent hypothesis is satisfied for the quantifiers introduced via introduction rules into appellative positions. As a result, such cases are the clearest instances of the kind of existential inference with which I am concerned. I find the data more tenuous in cases like (22), and others with whom I have discussed the data agree—even those who insist on the acceptability of (22) admit that the relevant reading of (5) is easier to recognize. Whether the argument of this paper generalizes to all syntactically appropriate cases of non-nominal quantification remains an open question.

Let us return to the analysis under consideration. We suppose that 'so' is bound, either directly or indirectly, by 'something' in (5), and as a result is assigned whatever property the variable bound by 'something' in (5) is assigned in the interpretation of 'something' in (5). This analysis rejects the antecedent hypothesis, but it also has consequences for the account of Quine's original example:

(3) Giorgione was so-called because of his size.

For 'so' here to be a second-order variable, it must be linked to something that provides a property as value. Given the locality constraint identified in Sect. 2.2, 'so' is linked to the occurrence of 'Giorgione' in (3). Thus the occurrence of 'Giorgione' in (3) must provide a property as its value. But a property is the semantic value of a predicate. As a result, this treatment of 'so' appears to require a view of proper names as predicates. Such a view has recently been defended by Fara (2015).[27] Insofar as such a view is plausible, the present analysis of 'so' together with a non-substititional second-order semantics for appellative quantifiers is adequate to all the data in the introduction.

Millianism about proper names, however, is inconsistent with a view of names as predicates. So if some version of a view of names as predicates is required in order to give a non-substitutional analysis of appellative quantifiers, then if Millianism is true then appellative quantifiers are substitutional. Yet this consequence need not be a problem for Millianism, insofar as that view of names is consistent with a semantics like PN in Sect. 4.1. Other than the simplicity considerations raised in this section, I limit the thesis of this paper to the conditional that if Millianism is true, then appellative quantifiers are substitutional. As I argued in the introduction, this thesis is not without interest. Whether other views of names are consistent with a treatment of names

[27] See also Bach (2002), Burge (1973), Elugardo (2002) and Matushansky (2008).

as predicates is a matter for further investigation.[28] But by the same argument, any such view appears to be committed to a weakly substitutional theory of appellative quantifiers.

4.3 'So' and the logic of demonstratives

One objection to the argument of this paper arises from a demonstrative analysis of 'so' as equivalent in some strong way to 'this expression'. (The antecedent hypothesis is an immediate consequence of such a view: successful reference of a use of 'so' is reference to an expression.) Until I return to the issue of hyphenation later in this section, when I use '(3)' and '(4)', I mean the following unhyphenated variants of (3) and (4) respectively:

Giorgione was so called because of his size.

Someone was so called because of his size.

The objection is this: given the above demonstrative analysis of 'so', there is a clear reading of (4) according to which it does follow from (3). So Quine's philosophical point fails, and the puzzle motivating the semantic investigations in this paper is no puzzle at all. It is another example of a very general lesson: we must keep track of demonstrative reference in inference.[29]

I could not agree more with this general lesson. Furthermore, I think that the crucial premise—given the demonstrative analysis of 'so', there is a clear reading of (4) according to which it does follow from (3)—is correct, in a way that we can make considerably more precise. In the logic of demonstratives, logical properties like logical truth and logical relations like logical consequence obtain or fail to obtain only relative to contexts (Georgi 2015b). The distinguishing feature of valid arguments containing multiple occurrences of a demonstrative expression is coordination in a context, where coordination in a context is a kind of guarantee of coreference in the context.[30] Two occurrences of a demonstrative may be coordinated relative to one context, but not relative to another, and relative to a context in which two occurrences of a demonstrative are coordinated, an argument may be valid, while the same argument may be invalid relative to a context in which the same two occurrences are not coordinated.

28 Cumming (2008), for example, argues that names are objectual variables. This thesis is also inconsistent with a view of names as predicates, and so also requires a treatment of appellative quantifiers as substitutional. Whether Cumming's view could be adapted to treat names as second-order variables is an open question.

29 The classic example of tracking demonstrative reference in inference is due to (Kaplan 1989, 589):

> we can concentrate, try not to blink, and try to hold our attention on the same addressee, in the hope that we will succeed in targeting the same individual with the second demonstrative. In this case, the form of the argument is really something like, "You$_1$ stay. Therefore, it is not the case that you$_2$ do not stay", and hence not valid. Even if we idealize the speed of speech, so that we are certain that they haven't pulled a switcheroo, the form of the argument is still not that of Double Negation because of the equivocation involved in the use of a second demonstrative.

Thanks to a referee from this journal for pressing this objection.

30 Fine (2003, 2007) highlights the importance of coordination in reference and quantification. In the case of demonstratives, coordination is a feature of the context of utterance (Georgi 2015b).

Given a demonstrative analysis of ‘so’, the argument ⌜(3), therefore (4)⌝ is valid relative to any context in which the occurrence of ‘so’ in (3) and the occurrence of ‘so’ in (4) are coordinated. For example, let both occurrences of ‘so’ be coordinated, and suppose that they both refer to the occurrence of ‘Giorgione’ in (3). Relative to such a context, the argument ⌜(3), therefore (4)⌝ is clearly valid, and comes out valid in a logic of demonstratives.

This observation about the logic of demonstratives, however, does not undermine the puzzle in the introduction in any way. In the relevant inferences from (3) to (4) and from (6) to (5)—the examples that generate the puzzle motivating this paper—the occurrences of ‘so’ in each are not coordinated. They are not even coreferential. On the intended readings of these, the occurrence of ‘so’ in (6) (for example) refers to the expression occupying a particular position in (6), whereas the occurrence of ‘so’ in (5) refers to the expression occupying a particular position in (5). The intuitive validity of the inference from (6) to (5) in such contexts is the puzzle to be explained. The logic of demonstratives does not explain this inference, because the two occurrences of ‘so’ are not coordinated. The argument ⌜(6), therefore (5)⌝ is not valid in the logic of demonstratives without further commitments about the semantics of appellative quantifiers.

Thus rather than giving rise to an objection, the demonstrative analysis of ‘so’ clarifies the difference between the inference from (6) to (5) and the inference from (3) to (4). It also clarifies the utility of the hyphenated ‘so-called’ in Quine’s original example: the hyphenated ‘so-called’ forces the relevant interpretations of (3) and (4), assuming as I do in Sect. 2.2 that ‘so-called’ imposes a locality constraint on the interpretation of the hyphenated ‘so’. Such a restriction is easy to implement within a demonstrative analysis of ‘so’ like the one in this section: the demonstratum of a hyphenated occurrence of ‘so’ must be a constituent of the noun phrase modified by ‘so-called’. The inference that motivates the original puzzle requires that the occurrence of ‘so-called’ in (3) refers to the expression occupying a particular position in (3), while the occurrence of ‘so-called’ in (4) refers to the expression occupying a particular position in (4), and this is secured by the hyphenated construction. Relative to a context in which the occurrences of ‘so’ refer in this manner, the argument ⌜(3), therefore (4)⌝ is not valid in a demonstrative logic for ‘so’. This makes all the more striking the intuitive validity of the relevant inference from (6) to (5), and reveals all the more clearly that the validity of the inference is a result of the interaction between ‘so’ and the appellative quantifier ‘something’. It is this interaction with which we are concerned in this paper.

5 Strongly substitutional quantification

In Sect. 4.1 I introduced three constraints on an adequate semantics for appellative quantifiers, and I argued that Millianism requires a substitutional semantics in order to satisfy all three. In fact, two different substitutional approaches to appellative quantifiers satisfy these constraints. The first we met in Sect. 4.1: appellative quantifiers are weakly substitutional. According to the second, they are strongly substitutional. For comparison, I briefly introduce a strongly substitutional analysis.

Adopting (though see below and Sect. 2.1) the common convention of using 'Σ' as a strongly substitutional quantifier, we consider the following proposal for the truth conditions for (2):

SSQ (2) is true if and only if Σx Mirka said or did something that entails that Roger is x.

We suppose that the substitution class associated with the substitutional variable 'x' is restricted to predicates and names, (including names of expressions, and assuming that Fara is correct that names in the appellation position of appellative-'called' constructions function semantically as predicates). As with MQ and NQ, SSQ yield the correct truth conditions for (2).

But as with MQ and NQ, truth conditions are not enough. We need to know what proposition is expressed by (2), on the assumption that 'something' as it occurs there is a strongly substitutional quantifier. This is particularly pressing in the case of strong substitutional quantification, because the standard truth-conditional semantics for strong substitutional quantification, due to Kripke (1976), reduces strong substitutional quantification to metalinguistic quantification. Where v_S is a substitutional variable, t a term in the substitution class associated with v_S, and $\phi[\mathrm{t}/v_S]$ the result of substituting t for v_S wherever the latter occurs free in ϕ, the standard semantic treatment for the particular substitutional quantifier is given by the following rule:

$\ulcorner(\Sigma v_S)\ \phi\urcorner$ is true if and only if $\exists\mathrm{t}(\phi[\mathrm{t}/v_S]$ is true).

The right-hand side of this biconditional contains a metalinguistic quantifier. While this approach to substitutional quantification gets the (extensional) truth-conditions correct, it does not offer any further insight into the meaning of the substitutional quantifier (Georgi 2015a; Lycan 1979; Soames 1999; van Inwagen 1981). As a result, this treatment of substitutional quantification offers no further insight into appellative quantifiers than does the original proposal in Sect. 3 that appellative quantifiers are metalinguistic quantifiers. Yet we have seen that the metalinguistic analysis of appellative quantifiers cannot explain even how (2) follows from (1). If the strongly substitutional analysis is to fare any better, strongly substitutional quantifiers require a different semantics.

The following semantics for strongly substitutional quantifiers [from Georgi (2015a)] avoids this problem. Again, let v_S be any substitutional variable:

PS The proposition expressed by $\ulcorner(\Sigma v_S)\ \phi\urcorner$ relative to the substitution class S is $\langle$SOME, $g_S\rangle$, where SOME is the property of being a function that maps at least one thing to a true proposition, and g_S is the function that maps each term t of S to the proposition expressed by $\phi[\mathrm{t}/v_S]$ (and is undefined otherwise).[31]

The strongly substitutional analysis of the appellative quantifier 'something' as it occurs in (2) is thus that (2) expresses the following proposition:

(25) $\langle$SOME, $g_S\rangle$

[31] A consequence of this rule is that (2) expresses different propositions relative to different substitution classes. But this seems to me to be the right result, similar to the different propositions expressed by 'there is no beer' relative to different domain restrictions in different contexts.

For any predicate F in the relevant substitution class S, $g_S(F)$ is (26)—the proposition expressed by ⌜Mirka called Roger F⌝ (the result of substituting F for 'something', or what it binds, in (2)):

(26) ⟨CALL, ⟨Mirka, ⟨Roger, | F |⟩⟩⟩

(Here I depart from Fara in treating | F | as the property expressed by F.)

So, for example, g_S('handsome') is (11), because g_S('handsome') is just the proposition expressed by (1):

(11) ⟨CALL, ⟨Mirka, ⟨Roger, being handsome⟩⟩⟩

Thus we can explain how the truth of (2) follows from the truth of (1): if (1) is true, then the proposition (11) it expresses is true. Thus if (1) is true, the substitutional propositional function g_S in (25) is true of the predicate 'handsome', because g_S('handsome') is just the true proposition (11). Assuming that 'handsome' is in the salient substitution class, g_S has the property SOME, and the proposition (25) is true. Since on the current proposal, this is the proposition expressed by (2), (2) is true.

It is also clear that a substitutional analysis of 'something' as it occurs in (2) explains how it can bind a variable in a predicate position. Substitutional variables in formal languages, particularly in Kripke's (1976) defense of substitutional quantification, can take the place of any string in a formula, as long as there are suitable restrictions on the associated substitution class. In the case of (2) as long as the substitution class is restricted to expressions that can occupy the position of a predicate in a sentence, there is no problem interpreting 'something' as it occurs in (2) substitutionally.

Finally, insofar as a strongly substitutional analysis of 'something' as it occurs in (2) satisfies PLACEHOLDER, a strongly substitutional analysis explains the behavior of 'so-called' in (5) as well as a weakly substitutional analysis does. Thus both the strongly substitutional analysis and the weakly substitutional analysis of appellative quantifiers satisfy the three desiderata identified in Sect. 4.1. They are also similar in the following respect: neither one requires positing an ambiguity in the quantifier 'something'. As I have argued elsewhere (Georgi 2015a), the rule PS does not entail that the quantifier 'something' is ambiguous between an objectual reading and a strongly substitutional reading. The quantifier is assigned the same semantic content whether it is interpreted objectually or substitutionally: the property SOME. The difference between objectual and strongly substitutional quantification, on this view, is in the variables bound by the same quantifier. The discussion of second-order quantification in Sect. 4 shows that the same point applies to non-substitutional second-order quantifiers and to weakly substitutional second-order quantifiers. In each case, the differences between the different varieties of quantification are due to the differences in the variables bound by the same quantifier.

These results show that the combination of Millianism and either weakly or strongly substitutional quantification need not take on the added complexity of an ambiguity in quantification. But Lycan's objection favors a weakly substitutional theory. Lycan's objection, mentioned in the introduction, is based on (7) (repeated here):

(7) Σx$\exists x$(x is a dog $\supset$ x is a mammalx.

Lycan argues that there can be no evidence in natural language for strongly substitutional quantification:

> no semanticist has ever used a substitutional quantifier as powerful as the one I have introduced; no sentence of any natural language would have [(7)] assigned to it as its logical form. This is because the substitutional quantifiers that semanticists do make use of are intended to capture the roles of quantificational expressions of English or other natural languages, and such expressions (at least superficially) appear to bind pronouns, just as do those quantificational constructions which semanticists construe objectually. (Lycan 1979, p. 216).

We may flesh out this objection as follows: any semantic theory of quantification for English or any other natural language has to follow the syntax of that language. The syntax will rule out as ill-formed any formulas, such as (7), that cannot be accounted for using either weakly substitutional quantification or non-substitutional quantification.

Note that in spelling out Lycan's objection in this way, we invoke weakly substitutional quantification. This is an important difference between weakly substitutional quantification and strongly substitutional quantification. The strongly substitutional theory PS is, like Kripke's semantics for substitutional quantification, designed to account for the truth of examples like (7). This consequence of Kripke's theory is the target of Lycan's objection. But the weakly substitutional theory of appellative quantifiers does not offer any account of (7). It applies only to quantifiers binding variables that occur in recognizable positions in the structure of a sentence. The semantics for weakly substitutional quantification restricts the substitution class to expressions of the same syntactic type as the variable bound by the quantifier. This point extends to any attempt to generalize a weakly substitutional semantics to other cases of non-nominal quantification. Thus Lycan's objection misfires against the weakly substitutional theory PN, and so gives a Millian a reason to adopt PN over PS.

6 Conclusion

Substitutional quantification sometimes seems like something dreamt up by philosophical logicians in order to avoid certain kinds of ontological commitments or to state theories of truth. This dismissive view of substitutional quantification is not allayed by most of the arguments that have heretofore been offered in its support. In order to respond adequately to this dismissive view, one would have to provide evidence for the existence of substitutional quantification in natural language, such that this evidence is not itself motivated by philosophical scruples over ontology or reliant on questionable assumptions about particular natural language constructions.

An example of an argument that fails to satisfy the latter criterion is due to Christopher Hill. Hill argues for the legitimacy of substitutional quantification on the basis of examples like (27):

(27) Whenever Mirka says that so-and-so, believe that so-and-so.

The argument is this: the intuitive generality of (27) suggests that the occurrences of 'so-and-so' in (27) are bound by the adverb 'whenever', but 'so-and-so' is not an objectual variable. The phrase 'so-and-so' occurs after the complementizer 'that' in (27), where grammatically we require a complete sentence. Thus the natural interpretation of 'so-and-so' as it occurs in (27) is that it is a substitutional variable whose substitution class is restricted to declarative sentences (Hill 1999, pp. 101–102). [In earlier work (Georgi 2015a), I also endorse this argument, with some reservations.]

Central to this argument is the assumption that 'so-and-so' is a variable. Yet the only evidence for this is the weak intuition that the occurrence of 'so-and-so' in (27) appears to be bound by the adverb of quantification 'whenever'. It seems to me equally plausible, however, to interpret 'so-and-so' as it occurs in (27) as behaving like a schematic letter, and so to regard (27) as a schema. This would capture the intuitive generality in (27), but undermine the use of (27) as evidence for the existence of substitutional quantification in English.

The argument of this paper also relies on assumptions about a particular feature of natural language: proper names. The thesis of this paper is that if Millianism is the correct theory of proper names, then appellative quantifiers (and possibly other non-nominal quantifiers) are weakly substitutional. Given the nature of substitutional quantification, it may be impossible to avoid assumptions about some linguistic constructions (other than quantification itself) in an argument for substitutional quantification. Unlike in Hill's argument, however, the controversy over Millianism has no effect on the status of appellative quantification as quantification. If anything is a quantifier in English, 'something' is.

Acknowledgements In addition to the individuals mentioned in the paper, I would like to thank the participants in the 2015 Midsouth Philosophy Conference, where I presented an early version of the arguments, and my many colleagues and friends who thoughtfully (and patiently) responded to my questions about the examples.

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