Is Choice Still a Choice?*

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Abstract

Geurts (2000) argues against choice-functional analyses of indefinites, identifying four problems with this kind of analysis. We shall address three of these, which we call *the empty set problem*, *the pronoun problem*, and *the attitude problem*. We argue that the first two of these can be solved if attention is restricted to *constant partial choice functions* and a certain flavour of three-valued logic is employed to handle partiality. The last one will be argued to be an instance of a more general problem, the solution to which will also solve the attitude problem.

1 Introduction

Choice-functional analyses of indefinites have been suggested, most notably, in order to deal with exceptional wide scope phenomena (Reinhart, 1997; Winter, 1997; Kratzer, 1998). Unlike other quantifiers, indefinites are able to escape islands. Analysing indefinites using choice functions that pick an element of the restrictor and are expressed either as bound (Reinhart, 1997; Winter, 1997) or free (Kratzer, 1998) variables has been suggested as a strategy to keep island constraints on quantifier displacement simple and universal. More recently, Lahm (2016) offered an analysis that elaborates on an idea probably put forth by Kratzer (1998) for the first time, namely that Skolemised choice functions can be used to analyse sentences like *every guest is from a different town*. Lahm (2016) analyses sentences of this type as involving a Skolemised choice function that assigns towns to guests and is restricted by *different* to be injective.

But choice-functional analyses are not without problems, and Geurts (2000) presents some particularly bothersome of these. Here we argue that two of these problems can be overcome by restricting attention to *constant partial choice functions*,[1] i.e. functions that satisfy (1). Another is argued to be solveable by mechanisms that are independently motivated.[2]

(1) For any sets S, S', if $\uparrow f(S)$ and $\uparrow f(S')$, then $S(f(S))$ and $f(S) = f(S')$.[3]

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[1] This concept has been employed already in (Lahm, 2016) in a more general form, suitable to deal with Skolem functions, namely *centered* partial Skolemised choice functions. There it has also been conjectured without further argument that the concept might solve the problems pointed out in (Geurts, 2000), a claim to be substantiated here.

[2] A fourth problem, having to do with negative polarity items, will not be discussed here. Not so much because we do not believe it can be solved but rather because the analysis of NPIs goes beyond the purely semantic questions dealt with here and involves taking a stance on the syntax-semantics interface, which we do not intend to do here.

[3] $\uparrow f(S)$ means that $f(S)$ is defined. Note also that I collapse here the notions of a set and its characteristic

2 The Problems

2.1 The empty set problem

Demanding of a CF f only that $S(f(S))$ holds for every $S \neq \emptyset$ leaves $f(\emptyset)$ unrestricted. So the specific reading (2-b) would be true if *anything* kicked every businessman, given that unicorns do not exist. Further restrictions are thus necessary.

(2) a. Every businessman was kicked by a unicorn.
b. $\exists f(CF(f) \wedge \forall x(B(x) \rightarrow K(f(U),x)))$

Geurts (2000) discusses the possibility of requiring that, for any CF f, $f(\emptyset) = *$, where $*$ is taken to be a universal falsifier. Geurts (2000) argues that this is inadequate since it makes the specific reading of (3-a) come out true if the speaker has no Polish friends.

(3) a. I didn't introduce Betty to a polish friend of mine.
b. $\exists f \neg I(i,b,f(\lambda x.P(x) \wedge F(x,i)))$

But this only shows that $*$ should not be treated as a universal falsifier. Instead, as considered by Reinhart (1997), the value of f for $\emptyset$ should be undefined and the presence of an undefined argument should make everything below $\exists f$ come out as undefined. Reinhart (1997) suggests that $\exists f \phi$ should be true if there is a value for f that makes ϕ true and false otherwise. This would render (3-b) false if the speaker has no Polish friends. But this approach gives wrong results for a sentence like (4-a), construed with *a unicorn* taking scope above and *a goblin* taking scope below *not*.

(4) a. A unicorn did not invite a goblin.
b. $\exists f \neg \exists g I(f(U),g(G))$

Represented as (4-b), the sentence is predicted to be true if there are no unicorns, since $f(U)$ will be undefined and so will $I(f(U),g(G))$. $\exists g I(f(U),g(G))$ would then be false and its negation true, resulting in the truth of (4-b).

This problem can be solved by adopting the semantics for the existential quantifier given in (5).[4] The definition presupposes the concept of a *probe*, defined in (6).

(5) $$[\![\exists f \phi]\!]^h = \begin{cases} 1 & \text{if there is a constant partial} \alpha \text{ such that } [\![\phi]\!]^{h[f/\alpha]} = 1 \\ 0 & \text{else, if there is a probe } \alpha \text{ such that } [\![\phi]\!]^{h[f/\alpha]} \in \{0,1\} \\ undefined & \text{else} \end{cases}$$

(6) A function of type $\langle\langle e,t\rangle,e\rangle$ is a *probe* iff $\uparrow f(S)$ whenever there is $x \in D_e$ such that $\uparrow S(x)$.

A partial function need not take a value for every argument. A constant partial function takes the same value whenever defined. Constancy will become important in the next subsection.

To get the right results for (4-b) it would suffice to let the second clause quantify over all functions of type $\langle\langle e,t\rangle,e\rangle$. Probes will only become relevant in cases with indefinites that have further, specifically construed indefinites inside their restrictors.

Regarding (4-b), the non-existence of goblins prevents the first clause of definition (5) from applying: the scope of $\exists g$ cannot become true for any choice function assigned to g, so it will

function, writing $S(x)$ instead of $x \in S$. Note further that, ultimately, S may pe a *partial* set. $S(x)$ means, in this case, that $S(x)$ is defined with value 1.

[4] In certain respects, this definition is very close to that proposed by van den Berg (1996).

either be false or undefined. Since there are no unicorns either, if f is assigned a choice function, $f(U)$ and thus $I(f(U),g(G))$ cannot take a defined value, regardless of what value $g(G)$ takes. So the second clause of definition (5) also cannot apply with respect to $\exists g$. This only leaves the third clause, thus $\exists g I(f(U),g(G))$ will be undefined, and so will the scope of $\exists f$. Hence (4-b) cannot become true.

If f is itself assigned a probe, a probe for g will render $I(f(U),g(G))$ true or false by the second clause. This will result in a defined value of the scope of $\exists f$, and thus the desired falsity of (4-b) due to the second clause of (5).

Probes, as defined in (6), are functions of the same type as choice functions, but they always return some (arbitrary) object, except for the case that their argument is totally undefined, i.e. undefined for each argument. Probes are needed since indefinites can occur in the restrictors of other indefinites, as in (7-a).

(7) a. Betty did not invite a unicorn that offended some goblin.
b. $\exists f \neg \exists g I(b, g(\lambda x.U(x) \wedge O(x, f(G))))$

If *some goblin* is construed specifically but *a unicorn* is supposed to take narrow scope with respect to the negation, as shown in (7-b), it needs to be ascertained that the sentence is predicted to be false. This is achieved as in the simpler case (4-a), but now it needs to be ascertained first that $I(b, g(\lambda x.U(x) \wedge O(x, f(G))))$ is actually undefined for any choice function that is assigned to f. Now the function denoted by $\lambda x.U(x) \wedge O(x, f(G))$ is totally undefined due to the undefinedness of $f(G)$, but if probes could be defined for the totally undefined function, $I(b, g(\lambda x.U(x) \wedge O(x, f(G))))$ could end up with a defined value. The definition of probes in (6) excludes that possibility: if the argument of g is totally undefined, so is its value. The remainder is then as in the case of (4-a).

2.2 The pronoun problem

The next problem that Geurts (2000) identifies is illustrated by (8-a).

(8) a. Every girl invited a boy she fancied.
b. $\exists f \forall x(G(x) \rightarrow I(x, f(\lambda y.B(y) \wedge F(x,y))))$

If every girl fancies at least one boy, the traditional assumptions about CFs predict that the specific reading shown in (8-b) implies that every two girls who happen to fancy exactly the same boys gave the invited the same boy. We agree with Geurts (2000) that this is not a possible reading of (8-a) and that excluding it by intensionalising the arguments to CFs is unattractive. But if, as we suggest they should be, CFs are taken to be constant functions, in our view, the problem disappears: then (8-b) represents a specific reading saying that there is a boy whom every girl fancies and invited. Geurts (2000) seems to deny the existence of such a reading. We are not convinced, however, that this reading does not exist.[5] For (9-a), the reading seems plausible. For (9-b), it might even be judged natural.

(9) a. Every boy wants to go to a discotheque that he heard about on the radio.
b. Every girl in the fifth form was baffled by a scientific breakthrough that her PE teacher had achieved. (It was expected to solve all energy problems.)

[5] An anonymous reviewer judges the reading unnatural. Since unnatural is not the same as impossible, this does not appear to be a particularly damaging criticism. After all, one would probably also like to keep the highly unnatural wide-scope reading of the indefinite in *there is a window in every wall* possible.

Especially (9-b) invites a specific understanding by restricting the universal quantifier to boys who are in the same form and thus likely to have the same PE teacher. Furthermore, scientific breakthroughs are relatively rare, and much more so those achieved by PE teachers. Of course, the sentences in (9) could be true if all boys want to go to the same discotheque or were baffled by the same scientific breakthrough without having *to mean* that. We are not arguing however that the reading must exist but that assuming its existence does not cause harm.[6] As far as it goes, the possibility to pick up the indefinite in (9-b) anaphorically, while not a watertight criterion of specificity, rather supports the possibility of the specific reading than that it speaks against it.

2.3 The attitude problem

The last problem that Geurts (2000) points out is illustrated in (10).

(10) Bob believes that all sows were blighted by a witch.

Geurts (2000) remarks that a CF analysis of (10) will always embed the restrictor of *a witch* under the attitude verb. As a result, even under the specific reading of (10), the witch need only be a witch in Bob's beliefs, without any committment on the speaker's side. Nothing seems to speak against the assumption that this reading exists: Bob may believe that Katrina is a witch (while the speaker does not) and that she blighted all sows, thus making this specific construal of (10) true.[7] What is missing is the reading under which witchhood is solely ascribed by the speaker. Geurts (2000) considers the possibility of evaluating *witch* at a different world parameter (e.g. the actual world), but claims this would only pay lip service to the idea of analysing indefinites *in situ*. Since allowing for the evaluation of a quantifier's restrictor with respect to different world parameters and changing its scope are two quite different things, the merits of this objection are *prima facie* unclear. Furthermore, as Bäuerle (1983) has shown, it is quite generally necessary to be able to evaluate the restrictors of quantifiers outside of attitude contexts in which they are embedded without raising the complete quantifier, which would give wrong results in some cases.[8] This independently motivates a mechanism for deriving these readings which can plausibly be assumed also to derive the missing reading of (10).

3 Conclusion

We have shown that some of the problems of CF analyses of indefinites pointed out by Geurts (2000) can be overcome by assuming that these functions always are constant partial functions. Using constant functions removes the bothersome variation of the functions' values depending on the set that happens to be the extension of the indefinite's restrictor, assimilating quantification over CF more to quantification over individuals. Using partial functions and an appropriate three-valued logic solves problems with negation. Finally, the interaction of choice functions and propositional attitudes seems to be unproblematic if the insights of (Fodor, 1970; Bäuerle, 1983) are taken into account.

[6] This is to be expected since the specific reading implies the non-specific one, whose existence nobody denies. In order for situations that support the specific reading to be excluded, the non-specific reading would thus be required to *enforce* some amount of variation in addition to assigning the indefinite narrow scope.

[7] For more general arguments in favour of the existence of such readings see (Szabó, 2010).

[8] Similar observations regarding indefinites had earlier been made by Fodor (1970), who observes what she calls *unspecific de re* readings, also referred to as the *third reading* in (von Fintel and Heim, 2002).

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