

Generalized Bishop Sentences

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Abstract. It is often thought that ‘bishop’ sentences (e.g. *A bishop met a bishop, and he blessed him*) provide an important argument for dynamic theories and against E-type theories of unbound anaphora. In a nutshell, the problem for E-type approaches is that the two ‘bishop’ antecedents play such symmetric roles that pronouns-as-descriptions have trouble distinguishing their denotations. But we argue that dynamic theories are faced with a similar problem in a minimally different example: *At least two bishops (each) met at least two bishops, and they (each) blessed them*. The source of the difficulty is that numerals such as *at least two* give rise to maximal readings. Dynamic theories can handle them by positing maximality conditions either in the semantics of pronouns, or of quantifiers. Either way, *they* ends up denoting *the maximal set of bishops who each met at least two bishops*. If the sentence is true, this set must include at least four bishops – and there must be at least four blessings, which goes against intuition.

[1] There are two main approaches to ‘donkey’ sentences such as (1).

(1) A farmer owns a donkey. He beats it.

Dynamic theories argue that pronouns have the semantics of variables, but that existential quantifiers can bind outside of their c-command domain. E-type theories argue instead that pronouns have the semantics of definite descriptions, with *it* \approx *the donkey that the farmer owns* (e.g. Heim 1990), or just *the donkey* (Elbourne 2005). Such accounts require the adoption of an event- or situation-semantics, but no revision of the standard notion of scope.

Now (2) poses well-known difficulties for E-type theories.

(2) [A bishop]_i met [a bishop]_k. He_i blessed him_k.

Since the two antecedents play semantically symmetric roles, it is difficult to get *he* and *him* to refer to distinct individuals (note that *the bishop that meets a bishop* and *the bishop that a bishop meets* are synonymous). Dynamic theories have no such difficulty: each existential quantifier simply binds a separate pronoun.

We will show that dynamic approaches are faced with a similar ‘bishop’ problem in minimally different examples:

(3) At least two bishops will (each) meet at least two bishops. They will each bless them.

The source of the difficulty is that numerals give rise to maximal readings, as shown in (4).

(4) (Tomorrow,) I will meet at least two bishops. They will bless me.
=> All bishops that I meet (tomorrow) will bless me.

Dynamic theories have resorted to two strategies to capture the maximality condition; both backfire with (3).

[2] First, *at least two* could be treated as a generalized quantifier in the framework of Kamp and Reyle 1993 (they also give a ‘cardinal quantifier’ treatment, similar to the second theory we discuss below). They posit an ‘abstraction’ operation which make it possible for the pronoun *they* to be interpreted as *the sum of bishops that I will meet* (= [Σx : *x* bishop & *I will-meet x*] [p. 344]).

(5) [at least two bishops]_x I will-meet *x*. [Σx : *x* bishop & I will-meet *x*] will-bless me.

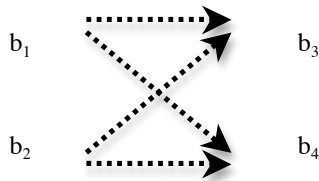
When this strategy is applied to (3), it yields the analysis in (6):

- (6) [at least two bishops]_x [at least two bishops]_y x will-meet y. [$\exists x$: x bishop & [at least two bishops]_y x meet y] each_x will-bless [**$\exists y$: y bishop & x meet y**]

Kamp and Reyle do not discuss the case in which abstraction produces an expression with a free variable, as happens with the object pronoun (in bold; by contrast, in the underlined expression corresponding to the subject pronoun, Kamp and Reyle's abstraction procedure produces an expression with no free variable); here we have opted to bind the variable with a distributive operator *each*. But our argument can be given for any plausible resolution of the object pronoun: the problem already arises with the subject pronoun.

Consider the situation in (7); meetings, which are symmetric, are represented as dotted lines. Blessings are asymmetric and are represented with arrows.

(7)



Intuitively, (7) makes (3) true, with *they* denoting $\{b_1, b_2\}$ and *them* denoting $\{b_3, b_4\}$. But the analysis in (6) predicts (3) to be false in (7): *they* must denote *all* the bishops who each met at least two bishops, i.e. $\{b_1, b_2, b_3, b_4\}$. But with this denotation, the second sentence of (3) is predicted to be false, since it is false that each of these individuals did some blessing (b_3 and b_4 didn't).

[3] Now consider van den Berg's analysis (1994) (it is rather close in this case to Kamp and Reyle's 'cardinal quantifier' analysis (p. 458)). (8)a is analyzed as in (8)b, with the truth conditions in (8)c (ε_x is a dynamic existential quantifier and M_x is a maximality operator; $\geq 2(x', x)$ means that at least two elements of x' are in x).

- (8) a. $[\geq 2 y: \text{bishops } y] I \text{ will-meet } y$
 b. $\varepsilon_y \wedge \varepsilon_{y'} \wedge M_y(\text{bishops } y') \wedge M_y(y \subseteq y' \wedge I \text{ will-meet } y) \wedge \geq 2(y', y)$
 c. There is a set y , and there is a set y' , and y' is a maximal set of bishops, and y is a maximal subset of y' whose members I will meet, and there are at least two members of y' that are in y .

Interpreting all predicates as distributive, (3) receives the analysis in (9) (for legibility, we leave the underlined part unanalyzed).

- (9) a. $[\geq 2 x: \text{bishops } x] [\geq 2 y: \text{bishops } y] (x \text{ will-meet } y). x \text{ blessed } y.$
 b. $\varepsilon_x \wedge \varepsilon_x \wedge M_x(\text{bishops } x') \wedge M_x(x \subseteq x' \wedge [\geq 2 y: \text{bishops } y] (x \text{ will-meet } y)) \wedge \geq 2(x', x)$
 $\wedge \varepsilon_y \wedge \varepsilon_y \wedge M_y(\text{bishops } y') \wedge M_y(y \subseteq y' \wedge x \text{ will-meet } y') \wedge \geq 2(y', y)$
 $\wedge x \text{ will-bless } y$

Without fully simplifying these truth conditions, it is enough to observe that the constraint on x which appears in bold guarantees that its denotation should include all of $\{b_1, b_2, b_3, b_4\}$: by treating the underlined part in the same way as in (8) (replacing I with x'), we end up with a requirement that x denote the maximal set of bishops who (each) met at least two bishops, i.e. $\{b_1, b_2, b_3, b_4\}$. With this denotation, $x \text{ will bless } y$ cannot be satisfied in (7).

[4] Plausible truth conditions can be obtained, but at the cost of separating the existential quantifiers ε_x and ε_y (boxed below) from their maximality conditions, as in (10)a, which can be simplified to (10)b (because ε_y plays the same role as ε_x):

- (10) a. $\boxed{\varepsilon_x \wedge \varepsilon_y} \wedge [\varepsilon_{x'} \wedge M_{x'}(\text{bishops } x') \wedge M_x(x \subseteq x' \wedge x \text{ will-meet } y) \wedge \geq 2(x', x)] \wedge [\varepsilon_{y'} \wedge M_{y'}(\text{bishops } y') \wedge M_y(y \subseteq y' \wedge x \text{ will-meet } y) \wedge \geq 2(y', y)] \wedge x \text{ will-bless } y$
 b. $\boxed{\varepsilon_x \wedge \varepsilon_y} \wedge [\varepsilon_{x'} \wedge M_{x'}(\text{bishops } x') \wedge M_x(x \subseteq x' \wedge x \text{ will-meet } y) \wedge \geq 2(x', x)] \wedge [M_y(y \subseteq x' \wedge x \text{ will-meet } y) \wedge \geq 2(x', y)] \wedge x \text{ will-bless } y$
 c. There is a set x , and there is a set y , and [there is a set x' which is the maximal set of bishops, and x is the maximal subset of x' which meets y , and there are at least two members of x' that are in x], and [y is a maximal subset of x' which x will meet, and there are at least two members of x' that are in y], and x will bless y .

The separation between existential force and maximality might be surprising; but it is also used in Sher's (1991) analysis of branching readings of generalized quantifiers.

References

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