The basis for individuals in Geach's theory of reference

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Much work in semantics has been concerned with the meaning or reference of noun phrases, and associated phenomena including descriptions, quantified expressions, and pronouns. Many analyses have been considered, but one thing most have in common is the assumption, following Frege, that the head noun itself is a predicate of individuals. For example, in *every dog*, the word *dog* is a predicate whose domain is the set of all individuals, and which returns true when applied to individuals who have the property of dogness and false when applied to individuals who don't.

One important exception is Peter Geach's (1962/1980) *Reference and Generality*. In this book, Geach constructs a solution to classic problems of reference which holds that common nouns in an argument position do *not* play the logical role of a predicate, and that the set of all individuals cannot be defined as such in the model against which natural language is evaluated. Curiously, although several aspects of Geach's proposal were quite influential within linguistic semantics—e.g. his re-introduction to the literature of the medieval 'donkey anaphora' cases, and his commitment to pronouns as variables—later commentators seem not to have appreciated the importance of Geach's theory of noun meaning to his solution to the classic problems of reference. In discussing Geach's proposals they often leave it unmentioned, and illustrate his analyses with logical forms that introduce nouns as predicates of individuals in the traditional way (e.g. Heim, 1982; Chierchia 1992). This is too bad, because it prevents a more accurate accounting of how Geach's approach to these phenomena fares against alternative proposals.

Here I will attempt to restate Geach's central assumptions and to draw out why his theory constitutes a different kind of solution to standard problems of reference.

1. Substantivals

Geach distinguishes predicates (*red*) from names (*John*), as Frege also did. Where Geach most sharply differs from Frege, Russell, and many of those who came after is the position that *dog* can also be a name, but a 'nonsingular' one—a name for any and every dog. He calls such terms 'substantivals'. The organization of Geach's book is famously difficult; his theory of substantivals is mostly laid out in Chapters 2 and 6.

Geach takes substantivals like *dog* to be systematically ambiguous[1], with the ability to serve as either a name or as a predicate. When a substantival appears in an argument position[2], it serves the role of a name, as in *Every dog left* or *I adopted a dog*. When a substantival appears in the traditional predicate position of the sentence (*Fido is a dog*), it indeed serves the role of a predicate. In Chapter 2, Geach furthermore argues that substantivals can also occur in non-propositional 'acts of naming' that simply acknowledge the presence of something (1980; p. 52), for example *Hullo, cat*.

Geach's proposal is unshakably committed to these two logical roles of common nouns being distinct; he writes elsewhere that Aristotle's idea that a term could play the role of a subject and a predicate without changing sense was 'comparable to the Fall of Adam' (Geach, 1972). This means that it is unlikely that we

[1] Geach never took it to be of central interest to provide the *explanation* for this systematic ambiguity in the language, although he gestures to Aquinas's account of material and formal uses of general terms (1980, p. 201).
[2] Geach refers to these as 'subject' positions, following his analysis of subject and predicate structure in Chapter 2. Although this analysis plays an important role in Geach's overall conception of the theory, I will leave it aside for now.

are accurately characterizing Geach's own analysis of sentences like *Some dog barked*, or *Every farmer sold his donkey*, if the logical forms we attribute to him include subcomponents like **x is a dog** or **y is a farmer** in which an argumental noun plays the role of a predicate.

2. The domain of individuals

The view that *dog* is a name for all the dog individuals, may not seem to be importantly different from the traditional view that *dog* is a predicate that will come out true when applied to all the individuals who satisfy the dog property. But one of Geach's reasons for distinguishing the logical roles of names and predicates is his belief that standard set theory leaves something unsaid: how the individuals in the domain are defined to begin with. Understanding this position is important for correctly representing Geach's semantic analyses.

A traditional approach defines the domain of individuals (in the model, or 'world') in terms of the arguments of predication (in the logic). The logic has terms for predicates of individuals and their arguments, and the set of individuals/objects in the model of the evaluation is the set of whatever those argument terms refer to. From this perspective, there is not much point in asking where the individuals in the model 'came from' or what determined that two elements are indeed two distinct elements; we just assume that they are, if expressions make distinct reference to them. In some sense then, here our first step is specifying the logic, and our assumptions about the logic are then what motivates our theory of what is in the 'world'. For people like Quine, this view is motivated by the suspicion that there are no independent, objective facts about the world. Therefore, in developing a theory of interpretation, the best we can do is to base our model of evaluation on what is possible in the logic, nicely evoked by Quine's slogan 'to be is to be the value of a variable' (Quine, 1948). Quine proposed that the same considerations should lead us to do away with individual constants (singular names) altogether, so that *John* and *Pegasus* would be treated as predicates as well. This solved what seemed to some people to be a problem for the traditional approach: if the logic is what motivates our theory of what is in the 'world', then if the logic includes a name like *Pegasus* that can serve as an argument of a predicate, we would seem to have to suppose that the 'world' contains an individual corresponding to this name, and yet it does not. If instead *Pegasus* is a predicate, it can simply be a predicate that is not true of any individual in the world.

Geach agrees with Quine that the traditional theory is wrong to take the individuals in the model for granted, but he thinks that Quine's suggestion is a non-solution that badly confuses levels, evading the real problem (Geach 1980, p. 185). Getting rid of *terms in the logic* that refer to individuals technically has no effect on the theorist's assumptions about the 'world'/model structure and which individuals are included in it. Since Quine was a pessimist about humans' ability to acquire true knowledge of the world, he may have hoped it was possible to develop a theory of interpretation that didn't require any commitment about the structure of the model, but Geach argues that this is folly: a theory of interpretation cannot avoid making commitments about the model structure.

Geach thinks that we need instead to reject the tenet of set theory that the theorist can simply assume the domain of individuals. He believes that by stating that there is a set of objects in the world or model, the theorist must be tacitly assuming additional axioms about identity and individuation. Axioms of identity define what makes an object in the model the 'same' vs. distinct from another. Axioms of individuation define whether and how counts of individuals are conducted. For Geach, set theorists may not state such axioms explicitly, but they are part of the unstated definition of 'object' or 'individual' and thus they tacitly underly any theory that assumes the model of evaluation includes objects or individuals. To put another way, to propose that the model of evaluation includes 'individuals', as the traditional theory does, elides the understood phrase '…which are distinct from each other, where by distinct we mean…'.

Now we can come back to Geach's name/predicate distinction. Geach says that when we notice that these tacitly assumed axioms of identity and individuation for defining the model are an essential component of

traditional set theoretic approaches, we can make those assumptions explicit and then examine whether there are equally plausible alternative assumptions that might lead to an improved semantics.

We might characterize the traditional theory as tacitly assuming that the same axioms of identity and individuation define every individual that the predicates of natural language range over. For example, since set theory assumes that it is possible to define a well-formed set that contains all of the individuals in the model, it must assume axioms that define what makes an individual in the model the same or not (since a set, by definition, only contains each element once) and whether/how a count of the elements in the set can be conducted. One piece of evidence that might seem to support this assumption is that natural languages do contain terms like 'object', 'thing', 'everything', etc., which seem at first glance to range over every individual that the predicates of natural language range over. We might question, however, whether 'object' and 'thing' do in fact provide consistent axioms of identity and individuation that support well-behaved counting operations and other kinds of quantification—e.g., cutting an object in half does not yield two 'half' objects, but two objects.

Geach argues that we should consider the merits of an alternative theory, which instead assumes multiple, distinct axioms of identity and individuation, which define distinct, incommensurate 'sets' of individuals in the model. One starting motivation for this kind of theory is classic puzzles of identity and individuation long discussed within philosophy: a boat might be judged to be the 'same' boat as 20 years before even though all of its wood has been replaced in the interim; the 'same' set of toy blocks may compose two 'different' castles on two consecutive days; I might say I just brought 'one book' to a classroom if I brought 20 copies of *Charlotte's Web*; if a woman takes two airline trips in a month, the airline might count her twice in their monthly count of passengers, but only once in their database of frequent flyers; from day to day it's the same river but not the same water. In such cases, identity and individuation appears to be determined not independently, but relative to the 'kind' of thing we're considering. Geach often used the example of the bafflement we would experience if asked to count the 'red' in the room. Without specifying a substantival like 'chair' or 'toy' or 'thing', this seems to be an impossible task. For example, if the room contains a person with a red polka-dotted skirt, it's not clear whether we should count 24 for the 24 red dots, or 1 for the 1 red-dotted skirt. If the person is also wearing a red sweater, should we count 2 for the red-dotted skirt and the red sweater, or should we count 1 for the person who has been made red by their clothing? Should we also add to the count the two rosy patches of red on her cheeks? What the objects in the room are, does not seem to be given to us without further assumptions.

Geach proposes that the model of evaluation for natural language is structured as follows: distinct, incommensurate domains[3] of individuals, defined by distinct axioms of identity and individuation. What this means is that, in order to refer to any individual, the appropriate axioms of identity and individuation which define the individual as such, must also be implicitly or explicitly specified for the interpreter. In Geach's view, substantivals are terms that accomplish this: in their naming role, they specify some particular axioms of identity and individuation and refer to all the individuals defined by those axioms. Proper names like *John* refer directly to an individual, but this individual is still defined by particular axioms of identity and individuation (for example, if my son builds a block castle that he names *Galador* on Tuesday, the name doesn't carry over to a bridge he makes from the same blocks on Wednesday). One reason for taking this alternative theory seriously is that its combination of assumptions about the model structure (multiple axioms of identity and individuation defining incommensurate 'sets' of individuals) and the logic (substantival terms that name individuals defined by a given set of axioms, and predicate terms which predicate those individuals), provide a candidate explanation for why most or all languages have distinct grammatical categories for nouns vs. adjectives/verbs (Baker 2003).

[3] 'Domains' is a bit of a misnomer in the sense that we no longer assume that these correspond to the domain of any particular predicate function; but seems preferable to 'set' or 'group'.

3. Some corollaries

We have now seen that for Geach, reference to individuals depends on criteria for identity and individuation. This commitment has wide-ranging effects on Geach's semantics, and on quantification in particular. For Geach, quantification is *only* possible when restricted by a substantival. Writing '∀x' to range over 'all' individuals doesn't make sense in this system because individuals are only *defined* with respect to a substantival—so without providing a substantival, you have nothing to range over. Instead, you must write something like ∀ dog x, to indicate that the potential values for x—the individuals—are identified and individuated by the criteria specified by the *dog* substantival[4]. Restricted quantification of this kind is forced by Geach's system, because in the absence of universal axioms of identity and individuation, individuals are undefined without a substantival that specifies those criteria. Whereas in the traditional system we might have said a predicate like *dog* 'picks out' a set of individuals that satisfy it, in Geach's system it would be more accurate to say that a substantival like *dog* 'defines' a set of individuals.

In the traditional account, any predicate can be used, when combined with an appropriate quantifier, to make statements about the individuals that satisfy it: the *red* predicate can be used to make statements about individuals that are red, and the *dog* predicate can be used to make statements about individuals that are dog[5]. The predicates themselves, though, are of course not what introduce the individuals into the truth conditions of the sentence—they are functions that take individuals as arguments. In the traditional account, it is the quantifier or determiner that make reference to the individuals in a sentence containing only common nouns like *dog*[6]. In Geach's system, only names—singular ones like *John*, and the nonsingular substantivals like *dog*—make reference to individuals. Terms like *red* and *smoke* are predicates which are used to state properties of the individuals referenced by the names. Quantifier terms are better understood as part of the predicate, or as specifying *how* the predicate attaches to the referenced individuals.

Existential quantification is made less necessary by the assumption that nouns are names. In Fregean logic, names are used to introduce individuals without any need for additional existence claims—for example, for the sentence *John smokes* we can assume a logical form like **smokes(John)** which contains no existential quantifier. Similarly then, if argumental uses of common nouns like *cow* are assumed to be nonsingular names which refer, e.g., to every cow, then we don't need to assume existential quantification in the logical form of the sentences containing them. The existence of reference-able cow individuals (past, present, or hypothetical) is presupposed by the existence in the logic of the substantival term *cow*, just as the existence of an individual named John is presupposed by the existence in the logic of the name *John* (if no cows exist, then argumental use of *cow* would induce referential failure just as in Strawson's account of the classic 'King of France' examples).

In providing logical forms, Geach often used capital *A* to stand for a substantival like *cow* or dog, and lowercase *a* to stand for the individuals identified by the criteria provided by the substantival A. Using *a* instead of the more traditional *x* and *y* when illustrating Geach's analyses, is one small measure that might help to prevent misreading his formulas in the way that we are more accustomed to for theories with a domain of unsorted/untyped individuals.

4. Referring expressions

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[4] As Geach points out in Chapter 7, the closest you can get to 'the full domain of individuals' in this kind of system is to quantify over each member of the set of substantivals, and then for each you can quantify over the individuals defined by that substantival; something like ∀ substantival, ∀x

[5] Therefore, many versions of this view hold that statements like *Every red is striped* or *Four reds are on the table* are semantically well-formed, and are only ruled out by syntactic constraints.

[6] In many set theoretic systems, the proper names are also treated as predicates, so then it is always quantifiers/determiners that introduce the individuals that are the arguments to the predicates.

We have said that in Geach's proposal, the use of the common noun *dog* in an argument position always refers to all the dogs, no matter what determiner precedes it[7]. One might understand this as just another way of saying 'all noun phrases are referring expressions' (Chapter 3), but Geach ultimately resists this kind of rephrasing (Chapter 4). It is worth comparing the theories again to understand why, where a number of practitioners of the traditional theory have found the need for a separate notion like 'referring expression', Geach does not.

Again, if we follow Frege, some terms are names like *John* referring to individuals (type *e*), and some are unsaturated predicates of individuals like *red* or *dog* (type <*e,t*>). We could understand a sentence like *A dog came in* in a Russellian way, as 'there exists some thing which is a dog and which came in', or in a Montague-semantics way as 'the intersection of the set of dog things and the set of things that came in is not empty'. But neither of these paraphrases, in the vernacular, sounds like the corresponding Fregean paraphrase of *John came in*, which is 'John falls under the concept of coming in' (or 'John is a member of the set of things that came in'). In a so-called 'narrow scope' interpretation of *A dog came in*, where, as the speaker, we don't know or care 'which' dog it was, this difference in paraphrases might seem exactly what we want. But in other cases, where the speaker has a particular dog in mind that she is going to continue to talk about (*A dog came in. Its name was Fido. It barked a lot and broke some of my pottery.*) we might have a feeling that the paraphrase should be much more like the one for *John came in*. We might feel that we'd like the theory to say something about the difference between noun phrases that can corefer with a subsequent pronoun and those (like in *No dog came in*) which can't (Karttunen, 1976, Heim, 1982). This discrepancy has caused a number of theorists over the years to introduce notions like 'referring expression', 'specificity', 'discourse referent', and 'file card' (or in the older doctrine of distribution Geach discussed, the distinction between 'distributed' and 'undistributed' reference). Theories may treat the determiner as an element that 'turns' a predicate of type <*e,t*> into something with type *e* that refers to an individual, such that we say that noun phrases can refer to individuals, but nouns do not.

In contrast, if we take the view that common nouns are nonsingular names as in Geach's proposal, a number of these questions simply don't arise. In this framework, we say just that names are always needed to refer to individuals, and predicates predicate the referenced individuals. It follows naturally from this that sentences containing nonsingular names like *dog* can refer to individuals, just like sentences containing singular names like *John*, and we don't need any extra notion like 'referring expression' to describe what is common to them: names are just the terms that refer to individuals. We assume that these names invariantly introduce all the things that they name into the truth conditions of any sentence that includes them as arguments. For Geach, the determiners which belong to the syntactic phrase are functional material which we could think of as part of the predicate (1980, p. 201). In other words, the determiners indicate how to compute the truth conditions over the referenced individuals and the other components of the predicate. To be sure, we will want to be able to characterize why we cannot follow certain expressions with certain coreferential pronouns, but it is not clear at the outset that doing this will require the theoretical notion of 'referring expression'.

We can see this more clearly by looking at examples from Geach's Chapter 7 illustrating the proposal. Imagine that there are exactly three dogs in the world, whose names are *Tripod, Towzer,* and *Fido.* Then *dog* is a non-singular name which refers to these three dog individuals—Tripod, Towzer, and Fido—whenever it appears in an argument position within a sentence. Now we can consider the two sentences:

(1) Every dog left.
(2) A dog left.

[7] In his book, Geach emphasizes this commitment by way of contrast in Chapter 1 to the doctrine of distribution, which held that in some contexts nouns refer only partially to all of the individuals that they denote.

In (1), *dog* refers as always to the three dog individuals, and we can express the truth-function as **Tripod left ^ Towzer left ^ Fido left**. In (2) *dog* refers to the three dog individuals, and we can express the truth-function as **Tripod left | Towzer left | Fido left**. When these clauses appear in assertions, as in (1) and (2), they are thus assertions about the same individuals in both. For Geach, what the change in determiner does is simply to change the form of the truth-function, while leaving the reference to individuals untouched.

We can also consider classic cases containing negation:

(3) No dog left.

For Geach, *dog* must still refer as always to the same three individual dogs. Therefore, the negative element *no* will once again specify the form of some truth function over these individuals, for example **(~Tripod left ^ ~Towzer left ^ ~Fido left).**

In order to capture the facts about subsequent pronoun interpretation, we need to state some additional, but fairly intuitive, rules. In the *every dog* case, we need to say something like, when the individual predications are conjoined in the truth conditions, the referent available to bind subsequent pronouns is the conjunction of the referenced individuals (*Every dog…They..*). Since the expression doesn't provide any grounds for specially distinguishing any one individual among those predications, there is no single individual available for binding a singular pronoun (*Every dog…*He*). In the *a dog* case, the truth conditions disjoin the individual predications. We need then to say something like, when the individual predications are disjoined, the individual predicated in the one that comes out true is the referent available to bind subsequent pronouns.[8] In the *no dog* case, the truth conditions conjoin the negated individual predications. Again, there is no basis in these truth conditions for specially distinguishing any one individual, so we cannot bind a singular pronoun (*No dog…*It*). We might predict though that reference should be available to the conjunction of the referenced individuals, as in the *every dog* case, and indeed this is possible (*No dog left. They were too interested in the bacon sizzling on the stove to move a muscle*).

These examples should make clear why from the perspective of a theory of nouns as nonsingular names like Geach's, it would be a confusion to ask questions of the form 'Do indefinite phrases refer?' or 'Which kinds of noun phrases refer?' or 'Does *a dog* denote a particular dog?' For this kind of theory, a given common noun in an argument position always results in introducing the same individuals into the truth function, in exactly the same way as a singular name. Whether the speaker had a particular dog in mind while uttering the sentence may be an interesting question about language use, but does not change the facts about what a common noun refers to, nor the truth conditions of the sentence.

5. More on pronouns

The kind of variation in subsequent pronoun use discussed above, has also motivated the idea that some pronouns have 'referential' uses (e.g. 4) in contrast to others that have 'bound variable' uses (e.g. 5).

(4) A dog came in. <u>It</u> lay down under the table.
(5) Every dog loves <u>its</u> owner.

[8] We might note that the truth conditions of *A dog came in* allow it to be true that more than one dog came in (*A dog came in…In fact, two dogs came in*). However, in this situation it would be infelicitous to then continue …*It started barking*. It would be equally infelicitous, in a situation in which two dogs came in, to say *A dog came in. They started barking*. So it seems the right thing to say is that while the truth conditions of the original sentence allow for more than one dog to come in, the conditions on pronominal anaphora (a number-matching binder for the pronoun) can't be met in the more-than-one case.

In (5), a claim is not being made about one particular dog and owner, but in the second sentence of (4), many people's intuition is that a claim is being made about one particular dog. This motivates the 'referential' vs. 'bound variable' pronoun terminology. Correspondingly, the ability for an indefinite noun phrase to be followed by a 'referential' pronoun in (4) has sometimes been taken as evidence that indefinite noun phrases refer.

Geach was famously associated with the slogan 'pronouns are variables' (he credits this view to Frege and Quine). In other words, Geach does not distinguish some pronoun uses as referential and some as bound variables; for him, they are all variables[9]. However, as we noted in the last section, we do not fully understand this position without understanding it in relation to his position on common noun reference. Since Geach holds that *dog* invariantly makes reference to <u>all</u> of the individual dogs, no matter what determiner it co-occurs with, if pronouns in simply 'picked up' or 'continued' the reference made by an argument in the prior sentence, then pronouns would always refer to all the individuals named by the prior substantival. As no one has the intuition that 'it' in (4) refers to all dogs, Geach's theory therefore *requires* a different notion than reference for pronouns. This is why Geach instead adopts Frege and Quine's view that pronouns are always variables, even in cross-sentential configurations like (4). Variations in pronoun use will be attributed to whether the truth function of the antecedent sentence can be combined with the variable-containing expression in a way that yields an interpretation of the variable, as illustrated in the examples in the last section.

Geach dedicates two chapters of *Reference and Generality* to his views on pronouns (Chapters 5 and 6), but these chapters are particularly challenging. One reason is that Geach adopts the same 'variable' and 'scope' terminology as Quine and others[10], even though he has a different view of noun reference from them. On Geach's view, identity can only be evaluated relative to the criteria for identity provided by a particular substantival. One may therefore get a better sense of the theory of pronouns as variables that Geach has in mind by noting his frequent translation of the pronoun into 'the same *a*', where a is one of the individuals named by the substantival A[11]. In other words, for Geach the pronoun is a variable, but again it is a variable inherently 'restricted' by some substantival.

Geach's approach famously leads to the consequence that sentences containing pronouns but not their binders like (4b) do not have independent truth-conditions, but can only be given truth conditions when taken in conjunction with the sentence containing the antecedent noun that actually makes reference. A discourse with repeated pronouns bound by the same distant antecedent are, for Geach, one very long conjoined predication on a single 'subject' (the substantival). Thus, facts of the kind Karttunen discusses with respect to modality (*I hope Mary buys a car. I would drive it every day / I hope Mary buys a car. #It is red*) can for Geach be accounted for in terms of conditions on felicitously combining propositions.

Up to this point we have seen that Geach's view has no use for referring expressions or referential pronouns. Only names themselves—singular, or nonsingular common nouns—refer. All pronouns are variables, indicating argument positions to be filled by an individual introduced by a name elsewhere. Now we will turn to Geach's treatment of 'donkey anaphora' as in the classic (6-7):

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[9] Although Geach admitted the possibility of what he called 'pronouns of laziness', there was some confusion and controversy in the literature about what he intended by that term. My current take is that Geach didn't want to rule out the possibility of substitutional uses, but that he didn't think anything in fact would go wrong with the truth conditions if they were all taken as variables.

[10] He notes (1980, p. 139) that Frege used the term 'indefinite indicator' instead because of the historical muddles associated with the term 'variable'

[11] Evans (1977) argued that Geach's theory of pronouns could not account for sentences like *John owns some sheep and Harry vaccinated them*, which seem to require that Harry vaccinated all the sheep John owns. Geach's book does not address the many interesting problems raised by pluralities, but of course this is an area in which set theoretic approaches famously face their own challenges.

(6) If a man owns a donkey he beats it.
(7) Every man who owns a donkey beats it.

Heim (1982) describes a 'Geachian' approach to donkey anaphora as 'an indefinite that occurs inside an if-clause or relative clause gets interpreted as a universal quantifier whose scope extends beyond this clause', giving the corresponding formula **∀x∀y((x is a man ∧ y is a donkey ∧ x owns y)→ x beats y)**. She hypothesizes the generalization 'An indefinite that occurs inside an if-clause or relative clause gets interpreted as a universal quantifier whose scope extends beyond this clause.' Heim then goes on:

> 'What are the exact truth conditions under which an indefinite may receive the wide-scope universal interpretation? And what if anything, explains why these conditions are as they are? The tentative generalization above is a rather insufficient answer: not only does it fail to subsume the two environments of 'if-clause' and 'relative clause' under a more revealing common property, but its predictions are not even correct. If they were, the indefinite 'a donkey' in sentence (12) (*A friend of mine who owns a donkey beats it*) should also admit for a wide-scope universal reading, which it does not…Geach himself refrained from attempting any generalization at all.'

Given Geach's different understanding of the nature of universal quantification, however, it may be more precise to say that these questions would never arise for him in this form.

First, for Geach, any occurrence of 'donkey' in an argument position will make reference to all the donkeys, and he would not have been able to write a formula that included predicates like 'is a man' and 'is a donkey' for sentences in which *man* and *donkey* occurred in argument position, as in the formula Heim gives. The difference between 'a donkey' and 'every donkey', for Geach, is in how all the donkeys are referenced in the truth conditions.

Second, Geach does not share Heim's assumption that sentences which share the surface syntax of a relative clause will be translated into the same underlying logical form. In fact, the first part of Geach's Chapter 5 is an extended argument to the effect that relative clauses have distinct meanings. When he finally gets to donkey anaphora, he writes (p. 145) that 'the right rewording' of the classic donkey sentence, whether it is in relative clause form (*Every man who…*) or conditional form (*If a man…*) is (8):

(8) Any man, if he owns a donkey, beats it.

In the same section Geach gives a sentence analogous to Heim's, *Some man who owns a donkey does not beat it*, and writes that the right rewording for this sentence is (9):

(9) Some man owns a donkey and he does not beat it.

Thus, Geach does offer a generalization; his generalization just relies on the assumption that the underlying logical forms of sentences containing relative clauses do not match the surface syntax. One certainly might disagree with Geach's analysis here, but we should at least grant that the cut he makes here between the *every/if* donkey sentences and the *some* donkey sentence is not an arbitrary one. What the *If a man*… and the *Every many who*… sentences have in common is that, unlike the *Some man who…* sentence, they do not assert that any predicate holds for an individual. Rather, they state a relationship between two propositions. We can thus understand Geach to be saying that it is this common factor in the *every/if* sentences that allows the relationship between the noun phrases and the pronouns to range across many values. In contrast, because the *Some man who…* sentence instead asserts that a predicate holds for one of the *man* individuals and one of the *donkey* individuals, the pronouns must take on the value of those particular individuals.

Following Heim, Chierchia (1992) also attributes to Geach the analysis **∀x∀y((x is a man ∧ y is a donkey ∧ x owns y)→ x beats y)**. He then argues that one problem for Geach's analysis are sentences like (10) from Cooper:

(10) Every person who has a credit card, will pay his bill with it.

Chierchia says (p. 115) 'It is intuitively clear that an analysis of any of [these sentences] along Geachian lines is just plainly untenable. For example in the case of [10] it would wrongly require that people pay with all their credit cards…Here the indefinite *a credit card* appears to be clearly linked to the pronoun *it* while having existential force.' Chierchia calls these '∃-readings' and contrasts them with the '∀-readings' that he associates with 'Geach-style truth-conditions'. With a clearer understanding of Geach's approach, however, the problem is not as immediately obvious, and at the least couldn't be characterized in these terms. For Geach, *person* always refers to all the persons, and *credit card* always refers to all the credit cards. Following his rewording of the standard donkey sentence in (8), we can expect that he would reword (10) as *Any person, if he has a credit card, will pay his bill with it.* To generate the truth conditions for (10), Geach will conjoin or disjoin individual predications on each of the persons and credit cards in some way or other, but there's no meaningful sense in which these Geachian truth conditions would contain existential quantification over credit cards. The difference between the meaning of (8) and (10) would for Geach, have to instead be stated as a difference in whether the individual predications in the antecedent of the conditional are each matched with a consequent containing the pronoun variable (*If Bill has card1, he will pay with card x; If Bill has card2, he will pay with card x*) or whether they are disjoined in the antecedent (*If (Bill has card1 | Bill has card2*), *then he will pay with card x*) such that the disjoined predication that comes out true in the antecedent provides the basis for the variable binding in the consequent. Since Geach does not spell out the details of the analysis here, it may be that we will discover that problems arise in justifying these alternative sets of truth conditions, but it is at least not clear from the outset that it must fail to predict the reading in (10).

6. Concluding remarks

My aim in this handout has been to illustrate why one cannot accurately characterize Geach's positions on pronoun meaning and reference using a standard set theoretic approach to common noun meaning. Geach's alternative approach to common noun meaning, in which common nouns in argument position are not predicates but nonsingular names, is an inextricable component of his analyses of these phenomena, and thus must be introduced explicitly if one wants to compare Geach's analyses against others.

I will end in suggesting that Geach's approach is worth further consideration by those in search of a cognitively-implementable semantic theory. Dynamic semantics approaches like Heim's and Kamp's appeared to many psychologists to be promising in making use of components like 'file cards' which could intuitively correspond to 'discourse referents', standing proxy for entities in the world and allowing successive sentences to apply predicates to the same particular entity. This was more difficult to achieve for approaches in which reference can only be made by means of combining quantifiers with predicates in each separate sentence. An approach like Geach's allows common nouns to refer to entities directly, opening up new analytic possibilities for capturing cross-sentential reference without the need for additional components like discourse referents. This approach predicts that natural languages should demonstrate restricted, not generalized quantification, as supported by experimental and typological/learnability evidence (e.g. Knowlton et al. 2023; Hunter & Lidz, 2013). Among psychological theories of human concepts, Sandeep Prasada's theory of 'instance-of-kind' concepts pairs well with Geach's semantics, and has been argued to account for a wide range of behavioral patterns across children and adults (see Prasada, 2016 and Prasada, forthcoming for reviews).

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