

His name is Socrates because that's what he's called: A model-theoretic account of name-bearing

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Abstract

The notion of name-bearing, and its relation to the use of proper names to refer to individuals, has long remained mysterious in linguistics. In the present paper, I provide a novel semantics for proper names as variable expressions that enforce restrictions on their syntactic indexation, in order to give a precise model-theoretic definition of name-bearing that explicitly depends on the notion of reference to individuals using proper names.

1 Introduction

Semantic accounts of proper names traditionally propose that all literal, linguistically appropriate uses of a proper name to refer to an individual require that the individual bear the name. As Bach ([1]: 371) puts it:

Socrates is called 'Socrates' because he has the property of bearing the name 'Socrates.'
He is called 'Socrates' because that's his name.

This sounds trivial, but it harbors substantial theoretical commitments. Bach's dictum involves two distinct but related claims: first, that there is a name-bearing relation that holds between a name and an individual, and second, that this relation allows uses of that name to refer to that individual. The former is taken to be a necessary condition on the latter, and since the ability to refer to an individual using a name depends on the name-bearing relation, but not vice-versa, it must be possible to characterize name-bearing independently of reference using a name (see also [6]).

The consensus on this issue in the literature cuts across otherwise disparate approaches to the semantics of proper names.¹ Appeals to name-bearing relations established independently of reference are made at the level of predicative content, when names are treated either as predicates ([2], [5], [15], [19]) or as definite descriptions ([1], [6], [12], [14]); at the level either of indexical character ([17], [20]) or semantic use conditions ([18]), when they are treated as indexicals; and supplementarily in many referentialist approaches, which propose that proper names come to be associated with their conventional referents via procedures establishing name-bearing relations, and that they refer in particular utterances via causal chains of communication tracing back to these procedures ([13]).

Gray ([7]) has recently challenged this picture on both empirical and conceptual grounds. Empirically, he notes that many name-bearing relations are established as a result of speakers' referential habits, rather than vice-versa — these include cases of so-called reference transfer, like Evans' ([4]) famed example of 'Madagascar' coming to refer to an island off the coast of Africa rather than a portion of the continent's mainland. Conceptually, he casts doubt on the claim that the notion of name-bearing can be characterized independently of capacity for

¹Outside this generalization lie older approaches to proper names that have not traditionally been taken up by linguists, such as classical descriptivism and the use of Quinean artificial name-predicates.

reference to begin with: to bear a name itself substantially consists in being able to be referred to using that name. The present proposal is an exercise in formally implementing the spirit of this claim.² It is in virtue of a name being able to refer to an individual that the individual bears the name. So Bach's dictum is inverted: His name is 'Socrates' because that's what he's called. My goal is to provide a precise model-theoretic account on these terms of what it means for an individual to bear a name. Because name-bearing is so closely bound to the semantic properties of proper names themselves, this requires a novel account of the semantics of proper names out of which the notion of name-bearing naturally falls.

In broad outline, the proposal is as follows. In line with a standard Kripkean referentialist semantics, proper names are rigidly designating referential expressions of extensional semantic type *e*. But in contrast with the traditional Millian view, proper names are formally not constant expressions, but variable expressions, as proposed by Cumming ([3]). Their semantic value is a function, often non-constant, from variable assignments to individuals, such that a proper name's referent in a given context is relative (i) to a contextually supplied assignment function, and (ii) to a syntactic referential index. In addition to this basic variabilist framework, the present account proposes two innovations. First, proper names enforce restrictions on which referential indices they can be tagged with: the interpretation function is defined on proper names only when the name is indexed with some member of a proper subset of the set of all possible indices. Second, the set of assignment functions available for interpreting expressions in a language does not necessarily include all formally definable functions from indices to individuals: rather, it includes only an (almost always proper) subset of these.

While the basic variabilist framework provides the core semantic contribution of proper names, these two proposed innovations work in tandem to characterize name-bearing. For example, suppose that the proper name 'John' can only be interpreted when it is syntactically indexed in a certain way, and call the indices that 'John' permits in this way, 'John-indices.' Further suppose that the assignment functions available in the language are a proper subset of all those that are formally definable. Then there might be, or might not be, available assignments that map John-indices to a certain individual. If there are, then that individual is named 'John,' and if not, then it isn't. In other words, given the restrictions that proper names have on the way they can be indexed, which individuals are named what is a function of which assignments are available in the language. An individual bears a name just in case for every index allowed by that name, there exists some assignment that maps that index to that individual. And this in turn happens only if that individual can be referred to using that name, since the individual that the index maps to is a possible referent of the name in some context. Thus, name-bearing depends on the capacity for a proper name to refer to an individual.

This approach allows for a formally definable notion of name-bearing, which until now has remained a black box in linguistics, with almost all authors taking the notion for granted, and at least one prominent attempt to explicate the notion explicitly despairing of giving a unified account of it ([6]). It also yields a robust way to characterize the semantics of different kinds of proper names. The class of proper names is not semantically uniform, as has been previously assumed, and the present approach allows the different kinds of proper names to be characterized in terms of the different kinds of syntactic indices that they permit. At the same time, it allows the class as a whole to be unified under a general characterization of what a proper name is — and this characterization is inherently tied to the notion of name-bearing described here. Section 2 fleshes out and expands the empirical domain of proper names; section

²The present account is however hugely different from, even incompatible with, Gray's own. Gray assumes that proper names are predicates, and I believe there is strong morphosyntactic evidence to the contrary; the issue outruns the scope of this paper.

3 provides a semantics of proper names and nam-bearing; section 4 briefly concludes.

2 Three kinds of proper names

As mentioned above, the class of proper names is not semantically uniform. I will introduce three distinct kinds of proper names here, though I do not intend this list to be exhaustive.³

First, a distinction must be drawn between *shared names* and *unique names*. The intuitive difference between these two is clear enough: shared names exist in a kind of linguistic reservoir, with the understanding that they can be used for any number of individuals, while unique names are tied to a single referent. Shared and unique names are not randomly distributed, but systematically occupy different sections of the lexicon. For example, personal names, both given and familial, tend to be shared ('John,' 'Smith'), while calendrical names, ('Thanksgiving,' 'Tuesday') location names ('Spain'), names of institutions ('The University of Chicago'), and titles of works ('*War and Peace*') tend to be unique.⁴

But beyond this superficial observation, shared and unique names are also semantically distinct. Different sorts of semantic competence are required in order to master the use of shared names versus unique names. It is possible to be fully semantically competent with a shared name without knowing of any particular individuals at all that bear the name. A learner of English knows all there is to know about the semantics of 'John' upon learning that it is a masculine shared name, so long as the learner is competent with shared names generally: it is a matter of indifference to the learner's competence whether he or she knows of any individual to whom 'John' can actually refer, since who bears the name, if anyone, is no part of the word's definition.

This is not the case with unique names, semantic competence with which requires knowledge of their referents. One simply cannot claim to know what 'California' means without knowing that it refers to a particular state. The semantics of a shared name makes no inherent mention of any particular individual, while the semantics of a unique name does — for unique names, the establishment of a name-bearing relation therefore coincides with the coinage of an expression, since the unique individual to which the name refers is hard-wired into its semantics. This difference will be reflected in the proposed semantics in section 3 below.

There is additionally a third kind of proper name, which I term *ephemeral names*. These are far more marginal than shared or unique names: extremely few are present in the English lexicon, and their characteristic 'ephemerality' comes in part from the fact that a large portion of their uses involve nonce-expressions. Some of them have been conventionalized, however, and English examples include 'Captain Obvious,' 'Mr. Right,' and 'Negative Nancy.' Nonce-expression ephemeral names are extraordinarily productive, especially when they include titles of address that signal their status as proper names, e.g. 'Mr. I Don't Know What Time It Is.'⁵

As with predicative expressions, the individuals to which ephemeral names are applicable are only those that bear a certain property: for example, the referent of 'Captain Obvious' is someone who points out the obvious. But these expressions behave morphosyntactically as

³To give an example of a class of expressions not considered here that might fairly be called proper names: some referential expressions obligatorily take on the form of relational nouns, whose referents must bear the relation denoted by said noun, preferably toward the speaker, such as 'Mom' and 'Teacher.'

⁴These observations about the division of kinds of proper names in the lexicon are only tendencies that serve to elucidate the distinction, and aren't meant to be universally binding within or across languages. In fact it is quite likely that languages differ as to how different parts of the onomasticon are divided between kinds of proper name: for example, the use of name signs in American Sign Language as reported e.g. in [16] seems to hint that there personal names are unique rather than shared.

⁵I owe this example to Itamar Francez.

proper names, and not as uncontroversial predicative expressions like count nouns. Like other proper names, they are referential expressions, and in languages like English that ordinarily prevent proper names from occurring with overt determiners such as the definite article in argument position (see [19]),⁶ ephemeral names are bound by that same restriction. Thus ephemeral names pattern in this respect like uncontroversial proper names, and unlike common nouns.

- (1) John needs to be quiet.
- (2) *The John needs to be quiet.
- (3) Captain Obvious needs to be quiet.
- (4) *The Captain Obvious needs to be quiet.
- (5) *Cat needs to be quiet.
- (6) The cat needs to be quiet.

Morphosyntactically, all three of these kinds of proper names look to behave identically, and semantically they have a major feature in common, as will be shown in section 3.4. The task now is: (i), to formally spell out the semantics of each kind of proper name; (ii), to show how the semantics does justice to the empirical observations noted here; (iii), to demonstrate that in spite of their differences, these kinds of proper name deserve to be placed in a common semantic class; and (iv), to provide a formal notion of name-bearing that arises naturally as a result of the proposed semantics.

3 The semantics of proper names and name-bearing

To begin, I assume that a semantic model contains a set of contexts of utterance \mathcal{C} , a set of possible worlds \mathcal{W} , a set of assignment functions \mathcal{G} ,⁷ a domain of individuals \mathcal{D} , and a set of indices \mathcal{V} , which is the set of positive integers. The members of \mathcal{G} are then partial functions $\mathcal{V} \nrightarrow \mathcal{D}$, i.e. mappings from indices to individuals. I also assume that for every index $i \in \mathcal{V}$, there is some assignment $g \in \mathcal{G}$ such that $g(i)$ is defined; that is, there are no vacuous indices that never map to anything.

Adopting a framework similar to [10] as adopted in [3], I further assume: (i), that the semantic value of an expression is a function from contexts of utterance to intensions, which are themselves functions from indices of evaluation (here, world-assignment pairs) to extensions; (ii), that contexts are ordered tuples containing several contextual parameter values; and (iii), that among these parameters for any context c is included a contextually provided world of evaluation $c_w \in \mathcal{W}$, and a contextually provided assignment function $c_g \in \mathcal{G}$. Here the first innovation mentioned in section 1 above comes into play: because an expression must be interpreted relative to some member of \mathcal{G} , and per the above \mathcal{G} need not contain all formally definable partial functions from indices to individuals, it follows that not all such formally definable functions need be available for linguistic interpretation. That is to say, some *formally* definable assignment functions are *linguistically* impossible to use.

⁶Though see [9] for evidence that this restriction can be pragmatically relaxed in the appropriate context, where a name is treated predicatively as part of a definite description.

⁷I assume that the set of assignments is part of the model, because the model represents linguistic competence, and as will be clear below, I believe that knowledge of which formally definable functions $\mathcal{V} \nrightarrow \mathcal{D}$ are members of \mathcal{G} is a kind of linguistic competence.

Proper names are referential variable expressions whose referents are determined relative to an assignment function g . I assume that the interpretation function operates on syntactic structures, and that all proper names are syntactically tagged by some referential index $i \in \mathcal{V}$.⁸ The index then acts as an argument to g to determine the extension of the proper name. A basic template for the semantics of a proper name n indexed with i is thus as follows: this is simply a standard interpretation of variable expressions as might be found e.g. in a Traces and Pronouns rule of interpretation, as in [8].

- (7) **Core variabilist semantics of a proper name n indexed with i**
 $\llbracket n_i \rrbracket^{c,w,g} = g(i)$

For the present, I assume that g is always the contextually provided assignment c_g , though nothing in principle prevents expressions from shifting the local assignment, just as modal contexts shift the world of evaluation from c_w .⁹ While on this treatment proper names are assignment-sensitive, they are not world-sensitive: the world of evaluation w here makes no non-trivial contribution to a proper name's extension. Proper names are thus rigidly designating in the manner of Kripke ([13]).¹⁰ Finally, as g is contextually provided, and the semantic value of a proper name is a possibly a non-constant function from assignments to individuals, the extension of a proper name may vary from context to context: in this sense, proper names have a non-stable character and so are indexical expressions (though as will be shown in section 3.2, this is not true of unique names, whose extensions are invariant across contexts).

All kinds of proper names share this core semantics. But as stated in section 1 above, they also enforce restrictions on the way that they can be syntactically indexed. What these restrictions consist in constitutes the semantic difference between different kinds of proper names.

3.1 Shared names

Shared names can refer to any number of individuals. Further, there is no grammatical (that is, semantic) reason why shared names can refer to some individuals and not others: name-bearing relations holding between shared names and individuals are grammatically arbitrary, though they are not socially or historically arbitrary.¹¹ To reflect this, I introduce a restriction on the way in which shared names are capable of being syntactically indexed. Every shared name has associated with it some infinite proper subset of \mathcal{V} ; tagging a shared name with an index outside of this subset renders the expression uninterpretable. To reflect the grammatical arbitrariness of shared name-bearing, the subset that the shared name allows is itself arbitrarily selected. That is, for each shared name, there is simply some set of indices that it allows, and there is no deeper model-theoretic reason why this set should include some indices and not others.

The semantic entry for a shared name is thus as follows, where s is the semantic type of an index of evaluation (a world-assignment pair), w_s and g_s are the world and assignment contained in the pair s , respectively, and $\mathcal{V}_n \subset \mathcal{V}$ is an infinite set of arbitrarily chosen indices.

⁸I remain agnostic here about the syntactic structure of NPs or DPs containing proper names, and how this affects the referential index. The present approach is intended to be compatible with any standard account that involves referential indices. It's then a further question whether it can be imported in spirit to e.g. a variable-free approach.

⁹Quantificational expressions would traditionally be treated as assignment-shifters in this sense, as would the result of Heim and Kratzer-style predicate abstraction. See [3] for an account of belief contexts as assignment-shifters.

¹⁰Though see section 3.3 below: ephemeral names are world-sensitive in some sense, though this does not threaten their rigidity.

¹¹This simplifies to exclude grammatical factors like gender features, which I do not have space to discuss.

(8) **Semantics of a shared name n indexed with i**

- (a) $\llbracket n_i \rrbracket^c = \lambda s : i \in \mathcal{V}_n \cdot g_s(i)$
- (b) $\llbracket n_i \rrbracket^{c,w,g} = g(i)$, if $i \in \mathcal{V}_n$; else undefined
- (c) $\llbracket John_1 \rrbracket^{c,w,g} = g(1)$, if $1 \in \mathcal{V}_{John}$; else undefined

(8a) says that the intension of a proper name relative to a context c is a function from world-assignment pairs to individuals. In each case, the individual is $g_s(i)$, the value that results from applying the assignment function of the world-assignment pair to the syntactic index i . This is simply a recapitulation of (7) above. What is novel here is the domain restriction: the function returns $g_s(i)$ only if i is a member of the arbitrarily selected infinite set of indices, \mathcal{V}_n . If it isn't, then no value is returned: thus, n only permits interpretation if it is indexed using some member of \mathcal{V}_n . (8b) provides an equivalent formulation for the extension of n : relative to a context c , world w , and assignment g , the name's referent is $g(i)$, but only if $i \in \mathcal{V}_n$; otherwise, its value is undefined. (8c) shows an example of the extension of 'John,' indexed with 1.

Shared names require that they be indexed with a member of some arbitrarily selected proper subset of the set of indices. How does this guarantee that shared names can refer to any number of individuals, and moreover, that they can refer to some individuals and not others? The answer lies in the innovation introduced above, viz. that the set of assignments \mathcal{G} need not contain all formally definable partial functions from indices to individuals, but might contain only a proper subset thereof. Suppose for instance that an occurrence of 'John' is indexed with 1, and that $1 \in \mathcal{V}_{John}$, so that the expression is interpretable. It might be, or it might not be, that there exist assignments $g \in \mathcal{G}$ that map 1 to some individual, say d_3 , such that $g(1) = d_3$. If there are such assignments, then in some context, d_3 is a possible referent of 'John' indexed with 1, and if there are no such assignments, then it isn't such a possible referent. What this means is that the set of individuals to which a name is capable of referring, given some index, is determined by which functions $\mathcal{V} \nrightarrow \mathcal{D}$ are members of \mathcal{G} . The presence or absence of various assignments is what, given the semantic restriction that shared names have on their indexation, determines whether an individual can be referred to using an appropriately indexed shared name. How this ties into name-bearing will be shown in section 3.4 below.

The semantic entry in (8) makes no reference to any particular individual. This fits with what was said in section 2 above, that semantic competence with a shared name requires no knowledge of what bears the name, i.e. to which individuals it can possibly refer. The semantic entry for a shared name is minimal and formulaic: given the knowledge that some lexical item is a shared name, a learner is *ipso facto* equipped with its semantics (excluding complications like gender features). The only semantic difference between different shared names is that they allow indexation with possibly different sets of indices.

The division of labor in becoming competent with the use of a shared name is split in two. On the one hand, one must learn the minimal semantic entry, which yields semantic competence, and on the other, one must learn the status of \mathcal{G} , which yields competence in the matter of which individuals bear the name and which do not. There are therefore two corresponding types of incompetence possible with shared names — one might not know what the name means, or one might not know who bears the name.

On the present approach, shared names are not at all ambiguous for the fact that they have multiple possible referents. Referentialist approaches to the semantics of proper names often adopt the so-called ambiguity thesis, popularized in [10] and [11], according to which every instantiation of a shared name is in fact a separate lexical item with a separate semantics. Thus, if two individuals are named 'John,' then they literally bear different homophonous names, and the semantic contents of these names differ, since they have distinct referents. Here, shared

names are not ambiguous in this way: the referentialist approach to the semantics of proper names is preserved while maintaining a single, simple semantic entry for each shared name. When an individual comes (or ceases) to bear a shared name, lexical items are not created (or destroyed). Rather, the membership of \mathcal{G} is altered.

3.2 Unique names

Unique names refer to a single individual, and semantic competence with a unique name requires knowing which individual that is. To capture this, I introduce a new kind of restriction on the indices that a proper name can allow. Unlike with shared names, however, this restriction is not model-theoretically arbitrary, since there is a reason that a unique name allows for some indices and not others: a unique name is inherently tied to a certain individual, and thus it allows only for indices that map only to that individual.

(9) **Semantics of a unique name n referring to individual d indexed with i**

- (a) $\llbracket n_i \rrbracket^c = \lambda s : \forall g : i \in Dom(g)[g(i) = d].g_s(i)$
- (b) $\llbracket n_i \rrbracket^{c,w,g} = g(i)$, if for all g such that $g(i)$ is defined, $g(i) = d$; else undefined
- (c) (where d_1 is Spain):
 $\llbracket Spain_1 \rrbracket^{c,w,g} = g(1)$, if for all g such that $g(1)$ is defined, $g(1) = d_1$; else undefined

The intension of a unique name carries a new kind of domain restriction: the function only returns a value if for all assignments in \mathcal{G} that map i to some value, that value is always some single individual d . A unique name therefore always refers to the same individual, when it refers at all.

In addition to being world-insensitive, and therefore rigidly designating, the extensions of unique names are assignment-insensitive, because their semantics is defined in such a way that no matter which g is chosen, the extension of the name will always be the same individual so long as the name is interpretable. Because the contribution that context makes to the extension of a proper name is to yield an assignment function, it follows that the extension of a unique name is context-invariant, and so unique names have a stable character and are non-indexical. In other words, the present proposal recapitulates the classical Millian semantics of proper names as constant expressions whose semantic contents are exhausted by their referents.

But there are two important differences between the present proposal and classical Millianism. First, the Millian semantics applies only to unique names, and not to shared or ephemeral names, both of which are context-sensitive. The traditional Millian semantics is therefore correct so far as it goes, but is overly narrow, failing to recognize the semantic diversity of proper names. The second is that in spite of the fact that unique names are *in effect* constant expressions, they are *formally* still variable expressions, just variable expressions of a certain special kind. This constitutes a kind of reduction of constants to variables: the former are ‘frozen’ instances of the latter.

The semantic entry for a unique name makes reference to some specific individual in the domain: it only allows for indexation with indices that map only to said individual. This recapitulates the fact that in order to be semantically competent with a unique name, one must know the individual to which it refers, unlike with shared names. To know the meaning of a unique name is essentially to know its referent, and this referent is encoded in the name’s semantics. As stated in section 2 above, and as proposed by traditional referentialist accounts of proper names, the establishment of a name-bearing relation between a unique name and an individual coincides with the coinage of that name.

3.3 Ephemeral names

Ephemeral names can refer to an individual only if that individual bears some property in w , the world of evaluation relative to which the name is interpreted. In order to capture this, I introduce a new sort of restriction on the kind of index that a proper name allows: in order to be interpreted, an ephemeral name must be tagged with an index that always maps only to individuals that bear a certain property p in the world of evaluation w . The semantic entry for an ephemeral name is as follows, where a property p is a function from indices of evaluation to individuals to truth values.

- (10) **Semantics of an ephemeral name n limited by property p indexed with i**
- (a) $\llbracket n_i \rrbracket^c = \lambda s : \forall g : i \in \text{Dom}(g)[p(s)(g(i)) = \text{true}].g_s(i)$
 - (b) $\llbracket n_i \rrbracket^{c,w,g} = g(i)$, if for all g such that $g(i)$ is defined, $g(i)$ bears p in w ; else undefined
 - (c) $\llbracket \text{Captain Obvious}_1 \rrbracket^{c,w,g} = g(1)$, if for all g such that $g(1)$ is defined, $g(1)$ points out the obvious w ; else undefined

The only indices that an ephemeral name permits, relative to a world of evaluation w , are those that always map to an individual that bears a certain property in w so long as they map to anything at all. Like shared names, ephemeral names are thus context-dependent, but they are so in two ways: w is dependent on the context via c_w to fix the set of individuals to which the ephemeral name is capable of referring in that context, and g is provided by the context to determine which of these individuals is in fact being referred to. Ephemeral names are rigidly designating, but their sensitivity to w means that modal contexts can have an impact on which single referent they allow.¹² Ephemeral names do not ‘stick’ to any individuals in particular, but change their possibilities of reference as the properties that individuals bear change. In addition to their penchant for nonce-uses, this is what the ‘ephemerality’ of ephemeral names consists in, and as will be shown in the following section, it yields the result that ephemeral names, despite being grammatically proper names, nonetheless do not take part in name-bearing relations.

Semantic competence with an ephemeral name does not require knowing any particular individual to which it can refer, but only knowing which property constrains its indexation. The further task of knowing to which individuals it can refer is then accomplished not by knowledge of \mathcal{G} , as with shared names, but rather with knowledge of which individuals bear the relevant property in w .

3.4 Name-bearing

I have provided an account of the semantics of the three kinds of proper names introduced in section 2, along with an explanation of how these semantics recapitulate the empirical observations made there. As promised, these semantics allow for a unified model-theoretic notion of name-bearing.

Let the name-bearing relation \mathcal{NR} be a set of ordered pairs $\langle n, d \rangle$, where n is a proper name and d is an individual in the domain — d then bears n just in case $\langle n, d \rangle \in \mathcal{NR}$. Name-bearing can then be characterized by how \mathcal{NR} is defined, in the following way.¹³

¹²To see how ephemeral names can be world-sensitive, yet rigid, consider a sentence like, ‘Julie thinks she’ll meet Mr. Right.’ The ephemeral name has both a shifted and an unshifted interpretation: ‘Mr. Right’ might refer, within the scope of the belief operator, to some one man who must be marriageable in each of Julie’s doxastic alternatives, or, outside the scope of the operator, to some one man who is marriageable in the actual world, whom Julie independently believes she will meet.

¹³As defined here, the relation \mathcal{NR} is determined independently of any possible world, and thus name-bearing relations are ‘necessary’ from the perspective of the language. What this means is that where counterfactuals

(11) **Definition of name-bearing**

For any proper name n and individual d , $\langle n, d \rangle \in \mathcal{NR}$ iff:

- (a) there is a set of indices $\mathcal{I} \subset \mathcal{V}$ such that for all $i \in \mathcal{V}$, $i \in \mathcal{I}$ iff for all c , w and g for which $g(i)$ is defined, $\llbracket n_i \rrbracket^{c,w,g}$ is defined, and:
- (b) for all $i \in \mathcal{I}$, there is some $g \in \mathcal{G}$ such that $g(i) = d$.

What this definition says is that an individual bears a proper name just in case (a) there is some set of indices consisting of all and only those that the proper name always allows, and (b) for each of these indices, there is some assignment available in the language that maps that index to the individual. In other words, an individual bears a proper name just in case that individual is always a potential referent of that name, depending on the selection of g . This is the formal rendition of the inverted dictum: his name is ‘Socrates’ because that’s what he’s called.¹⁴

A consequence of the definition provided here is that ephemeral names do not participate in name-bearing relations. This is because in the case of any ephemeral name n , there are no indices i such that for all c , w and g such that $g(i)$ is defined, $\llbracket n_i \rrbracket^{c,w,g}$ is defined. The reason for this is that which indices are permitted by an ephemeral name is sensitive to w . For any ephemeral name n and index i , one can therefore find a w relative to which, for some c and g , $\llbracket n_i \rrbracket^{c,w,g}$ is undefined: simply select a w in which $g(i)$ does not bear p .¹⁵ The point of name-bearing is that all of a proper name’s always-allowed indices have some assignment that maps them to a certain individual; but the ‘ephemerality’ of ephemeral names guarantees precisely that there are no such always-allowed indices, and therefore that individuals do not bear ephemeral names in the way they bear shared and unique names.

I have shown the semantic variety of proper names, and demonstrated that their variety is the result of the types of semantic restrictions on their own indexation that they allow. But each of these different kinds of expression deserves to be collected under the common umbrella term, ‘proper name,’ because all of them place semantic restrictions on their indexation. Proper names can therefore be defined as a semantic class as follows.

(12) **Semantic definition of a proper name**

A proper name is an assignment-sensitive referential expression whose extension relative to some c , w , and g is defined only if the expression is syntactically indexed with a member of some proper subset of the total set of referential indices.

and so on are considered involving alternate name-bearing relations, these are counterfactual situations in which the *language* is different, and not the properties of the individual apart from the language — this reflects that name-bearing is a linguistically determined relation. From the language’s perspective, one cannot find a possible world in which John does not bear the name ‘John’ for its own purposes of reference, but one can find a possible world in which English is such that, from the perspective of the language *as used in that possible world*, he does not.

¹⁴I have posited that in order for an individual to bear a name, for *every* index that a name always allows, there has to be some assignment mapping that index to that individual. The reasoning behind this is that it is a matter of indifference which specific index the proper name is tagged with, so long as it is one that the proper name always permits. It would be very strange, and formally there would be no sense in supposing, that an individual was named ‘John,’ in spite of the fact that some oddball John-index, e.g. $876 \in \mathcal{V}_{John}$, was incapable of mapping to that individual. The point is that the name itself, regardless of which specific index that it always allows is chosen, can refer to an individual. Note also that the definition of name-bearing provided here overgenerates in the sense that it allows for many formally definable name-bearing situations that natural languages seem not to make use of. This just means that natural language generally makes use only of a proper subset of possible name-bearing scenarios: and though I don’t have space to talk about it here, the types of name-bearing exploited in natural languages can be characterized using a small set of simple possible operations on \mathcal{G} .

¹⁵Assuming that p is not metaphysically necessary, which I take to be true for all ephemeral names.

4 Conclusion

The foregoing approach provides a precise model-theoretic definition of name-bearing that reflects the idea that name-bearing is dependent on reference using a proper name. It opens a number of issues regarding the syntax and semantics of proper names that cannot be addressed here, including the relation between proper names and pronouns, proper names' status as R-expressions and their interaction with bound variable interpretations, and the sociolinguistic role of naming conventions. But I hope to have shown that name-bearing can be given a rigorous and intuitively plausible formal characterization.

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