Conceptual Realism and the Nexus of Predication

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Abstract

The nexus of predication is accounted for in different ways in different theories of universals. We briefly review the account given in nominalism, logical realism (modern Platonism), and natural realism. Our main goal is to describe the account given in a modern form of conceptualism extended to include a theory of intensional objects as the contents of our predicable and referential concepts.

1 Introduction

A universal, according to Aristotle, is what can be predicated of things.[1] But what exactly do we mean in saying that a universal can be predicated of things? How, or in what way, do universals function in the nexus of predication?

In the history of philosophy, there are three major types of theories that deal with the problem of universals and that purport to answer these questions[2]:

(1) Nominalism: According to this theory there are no universals, and there is predication only in language; that is, only predicates can be predicated of things, and the only nexus of predication is the linguistic nexus between subject and predicate expressions.

(2) Realism: There are *real* universals, i.e., universals in reality, that are predicated of things, and the function of predication in language is to represent predication in reality. Different versions of realism explain the nexus of predication in reality in different ways.

(3) Conceptualism: There are *conceptual* universals, e.g., predicable concepts, that underlie predication in thought, and the nexus of predication in thought underlies the nexus of predication in language.

All three theories agree that there is predication in language—though each has a different account of how that kind of predication is possible and what it represents. The theory we will describe here in some detail is a modern form of conceptualism. Unlike traditional conceptualism (e.g., British empiricism), the conceptualism we describe here is not based on a theory of "ideas" (*Vorstellungen*), and it includes an intensional realism based on an evolutionary account

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[1] *De Interpretatione*, 17^{a}39.

[2] These three theories were first described by Porphyry in his *Introduction to Aristotle's Categories*.

of concept-formation. In this paper, our main purpose is to describe the conceptualist account of the nexus of predication.

Before turning to conceptualism, we will make some brief observations about nominalism and realism and our methodology.

2　Methodology

How do we study the role of predication in the different theories? What methodology should we adopt?

Our methodology is to reconstruct the different theories of predication as different predicate logics with predicate quantifiers, extended in some cases to include a modal logic as well, and, at least in the case of conceptualism, a logic of names and classes as many. We then compare the theories for consistency, completeness, and how each explains the nature of universals and the nexus of predication. Also, relevant in these comparisons is how well each theory explains philosophical issues connected with the problem of universals, including in particular how each accounts for number theory and mathematics in general. We have already logically reconstructed these three types of theories elsewhere[3] and will not go into those details here, except for the following observations.[4]

One important difference between these theories is the form assumed in each of the principle of compositionality regarding the representation of universals, or, in the case of nominalism, the principle generating nominalistically acceptable complex predicates. Such a principle is called a comprehension principle, and it determines when a formula with free variables can be taken as a substituent for bound predicate variables and thereby represent a universal of the theory in question. The principle can be formulated as follows:

$$(\exists F^n)\Box(\forall x_1)...(\forall x_n)[F(x_1,...,x_n) \leftrightarrow \varphi], \qquad \text{(CP)}$$

where φ is a formula, $x_1,...,x_n$ are distinct object variables, and F^n is an n-place predicate variable not occurring free in φ. If no modal logic is part of the theory, then $\Box$ is assumed not occur at all. As is well-known, the principle of universal instantiation of a formula for predicate variables,

$$(\forall F^n)\psi \rightarrow \psi[\varphi/F(x_1,...,x_n)] \qquad \text{(UI}_2)$$

is equivalent to (CP). In both principles, (CP) and (UI$_2$), we capture the idea that to be a universal of the theory in question is to be a value of the bound predicate variables, or in the case of nominalism, to be an acceptably generated complex predicate.

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[3] See, e.g., Cocchiarella 1986a and 1989a.

[4] As *logical constants* we use $\neg$ for negation, $\wedge$ and $\vee$ for conjunction and disjunction, respectively, $\rightarrow$ and $\leftrightarrow$ for (material) conditionals and biconditionals, and $\forall$ and $\exists$ for universal and existential quantification. For modal predicate logic we use $\Box$ for necessity and $\Diamond$ for possibility. Capital Roman letters are used for predicate variables and constants and lower-case letters for object variables. E.g., the following are typical formulas: $F(x)$, $G(y)$, $R(x,y)$, $(\forall x)F(x)$, $(\forall y)(\exists x)R(x,y)$, $(\exists F)(\forall x)F(x)$, $(\exists F)\neg(\exists x)F(x)$.

In nominalism, no predicate variable can occur in the formula φ in either of these principles, i.e., φ must be a first-order formula (or at most contain only free predicate variables). This is because in nominalism the quantified predicate variables do not have universals as values and are interpreted only substitutionally. As we have shown elsewhere, the logic that is complete with respect to this interpretation is standard "predicative" second-order logic. It is this logic, in other words, that is the appropriate representation of nominalism.[5]

In realism and (holistic) conceptualism there are no such restrictions because predicate variables have either concepts or real universals as their values. But there are two types of realism, a logical realism, which is a modern form of Platonism, and a natural realism, which is a modern form of Aristotle's moderate realism; and whereas the principle (CP) is valid in logical realism, it is not valid in natural realism where the question of what universals there are can be answered only by empirical investigations.

There are also two main types of conceptualism, a *constructive* conceptualism with constraints on concept-formation that are similar to, but not quite the same as, the restrictions required in nominalism, and a *holistic* conceptualism, which presupposes the constructive stage but transcends it by allowing for a pattern of concept-formation based on an idealized transition to a limit at which so-called "impredicative" concepts—such as that of a "least upper bound" in real number theory—can be formed. The logic of holistic conceptualism is similar to, but also different from, the logic of logical realism.[6] As already noted, we will not go into the details of the similarities and differences between these logics here, but will be concerned mostly with giving an account of the nexus of predication in conceptualism, by which we mean holistic conceptualism (though our account here also applies to constructive conceptualism as well).

3   Nominalization and Abstract Nouns

In some versions of realism universals are what nominalized predicates, i.e., *abstract nouns*, denote as singular terms. Here, by *nominalization* we mean the transformation of a predicate phrase into an abstract noun, which is represented in logical syntax as a singular term, i.e., the type of expression that can be substituted for first-order object variables. The following are some examples of predicate nominalizations:

is triangular	$\Rightarrow$	triangularity
is wise	$\Rightarrow$	wisdom
is just	$\Rightarrow$	justice

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[5] See Church 1956 chapter 5, §58, for a description of standard predicative second-order logic. This logic can be nominalistically extended to standard ramified second–order predicate logic, a description of which is also given in Church 1956.

[6] See Cocchiarella 1986b for a detailed account of the logic of constructive conceptualism, and how it is presupposed by holistic conceptualism.

It was Plato who first recognized the ontological significance of such a transformation and who built his ontology and his account of predication around it. In nominalism, of course, abstract nouns denote nothing.

Conceptual Platonism is a type of Platonism except that instead of a direct cognitive awareness of real universals as is assumed in Platonism we have only an indirect grasp of universals through the medium of our conceptual activity, and that our knowledge of them is in terms of the concepts we construct and by which they are represented.[7] The primary motivation for this theory is that we cannot account for mathematical objects and certain types of predication without allowing for nominalized predicates as abstract singular terms.

There is an alternative to conceptual Platonism, however, namely a conceptual form of intensional realism that is ontologically based on our conceptual activity in thought and communication. Abstract, intensional objects, on this account, do not exist independently of, and prior to, the evolution of consciousness, the way they do in conceptual Platonism and Platonism *simpliciter*. It is this kind of intensional realism that is part of what we mean by conceptual realism, which is the type of conceptualism we will be concerned with here.[8]

In both the logic of logical realism and conceptual realism we represent the nominalization of a predicate by simply deleting the parentheses that otherwise are a part of that predicate in its predicative role. Thus, for a monadic predicate F we have not only formulas such as $F(x)$, where F occurs in its predicative role, but also formulas such as $G(F)$, $R(x, F)$, where F occurs nominalized as an abstract singular term. In $F(F)$ and $\neg F(F)$, F occurs both in it predicative role and as an abstract singular term, though in no single occurrence can it occur both as a predicate and as a singular term. We note that even though it is now meaningful to have such formulas as $F(F)$ and $\neg F(F)$, Russell's paradox of self-predication does not arise in our reconstructions of these logics.

With nominalized predicates as abstract singular terms, it is convenient to have complex predicates represented directly by using Alonzo Church's (variable-binding) λ-operator. Thus, where φ is a formula of whatever complexity and n is a natural number, we have a complex predicate of the form $[\lambda x_1 ... x_n \varphi](\ )$, which has accompanying parentheses in its predicative role, but which are deleted when the complex predicate is nominalized. With λ-abstracts, the comprehension principle can be stated in a stronger and more natural form as

$$(\exists F)([\lambda x_1 ... x_n \varphi] = F). \tag{CP$_\lambda^*$}$$

This form is stronger than (CP) in that it implies, but is not equivalent to, the latter.

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[7] The Platonism Bertrand Russell held from 1903 until 1914 (when he switched to a logical atomist form of natural realism) is a good modern example of the Platonist view of our direct knowledge of universals. See Cocchiarella 1987 for an account of both Russell's early logical realism and his later natural realism.

[8] There is a conceptual natural realism, which we will briefly describe later, that can also be a part of conceptual realism.

4   The Nexus of Predication

How, or in what way, do universals function in the nexus of predication?

In nominalism, as we have noted, there are no universals, and the only nexus of predication is the linguistic nexus between subject and predicate expressions. Only predicates can be predicated in nominalism, and what this means is that only predicates can be true or false of things.

But what are the semantic grounds for predicates to be true or false of things? Are there no real or conceptual universals involved in such grounds? Also, what accounts for the unity of a sentence as opposed to a mere sequence of words? Can nominalism really explain the unity of the linguistic nexus?

In logical realism, which is a modern form of Platonism, universals exist independently of language, thought, and the natural world—and even of whether or not there is a natural world. Bertrand Russell and Gottlob Frege have described two of the better known versions of logical realism. In Russell's early form of logical realism, universals, are constituents of propositions, where the latter are taken as abstract entities. The nexus of predication in such a proposition is a relation relating the constituents and giving the proposition "a unity" that makes it different from the sum of its constituents.[9]

Now a relation, in Russell's modern form of Platonism, can also occur in a proposition as a term, i.e., as one of the constituents related. But then how can a relation occur in some propositions as a term and in others, and perhaps even in the same proposition, as the unifying relating relation? That is, how can a relation have a predicative nature holding the constituents of a proposition together and also an individual nature as one of the objects held together by the relating relation of that proposition? This was something Russell was unable to explain.[10]

Frege introduced a fundamental new idea regarding the unity of a proposition (*Gedanke*) and the nexus of predication. This was his notion of an *unsaturated function*, which applies to the nexus of predication in language as well as to propositions as abstract entities. On the unsaturated nature of a predicate as the nexus of predication of a sentence, Frege claimed that "this unsaturatedness ... is necessary, since otherwise the parts [of the sentence] do not hold together".[11] On the unsaturated nature of the nexus of predication of a proposition, Frege similarly claimed that "not all parts of a proposition can be complete; at least one must be 'unsaturated', or predicative; otherwise, they would not hold together".[12] It is the unsaturated nature of a predicate and the properties and relations it stands for that, for Frege, accounts for both

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[9] See Russell 1903, §55, p. 52.

[10] Thus, according to Russell 1903, p. 50, "a proposition ... is essentially a unity, and when analysis has destroyed this unity, no enumeration of constituents will restore the proposition. The verb [i.e., the relation the verb stands for], when used as a verb, embodies the unity of the proposition, and is thus distinguishable from the verb [relation] considered as a term, though I do not know how to give a clear account of the distinction."

[11] Frege 1979, p. 177.

[12] Frege 1952, p. 54.

predication in language and the unity of a proposition.[13]

Only objects are saturated entities in Frege's ontology, and functions, being unsaturated, cannot therefore be objects. This is an important point about Frege's ontology, and it has a counterpart in conceptualism. In particular, in Frege's ontology properties and relations of objects are functions that assign to objects the truth values "the true" or "the false". These truth values according to Frege are abstract objects, and in particular they are not the properties truth and falsehood that propositions have in Russell's form of Platonism.

In Frege's ontology, predication is explained in terms of functionality, and not functionality in terms of predication. But conceptually, it is predication that is more fundamental than functionality. We understand what it means to say that a function assigns truth values to objects only by knowing what it means to predicate concepts, or properties and relations, of objects. For conceptualism, as we will see, Frege's real contribution is his view of the unsaturated nature of universals as the ground of their predicative nature.

Natural realism is different from logical realism in that universals do not exist independently of the natural world and its causal matrix. Universals exist only in things in nature—or at least in things that could exist in nature—and whether or not a predicate stands for such a universal is strictly an empirical, and not a logical, matter.

Logical atomism is a form of natural realism that provides a clear and interesting account of predication in reality. In particular, in the *Tractatus Logico-Philosophicus*, Wittgenstein replaced Frege's unsaturated logically real properties and relations (as functions from objects to truth values) with unsaturated "material" (natural) properties and relations as the modes of configuration of atomic states of affairs. Reality, on this account, is just the totality of atomic facts—i.e., the states of affairs that obtain in the world; and the nexus of predication of a fact is the material property or relation that is the mode of configuration of that fact (atomic state of affairs). This is similar to Russell's theory of a relating relation as what unifies a proposition, except that instead of a proposition as an abstract entity we now have facts or states affairs, and instead of a logically real relation we have a material property or relation as the nexus of such a state of affairs. Also, because natural properties and relations have an unsaturated nature as the nexuses of predication, they cannot themselves be objects in states of affairs, unlike the situation in Russell's Platonist ontology.

One major flaw of logical atomism is its ontology of simple material objects (bare particulars?). The idea that the complex natural world is reducible to ontologically simple objects and atomic states of affairs is difficult, if not impossible, to defend. It is even more difficult to defend the added claim that all meaning and analysis must be based on ontologically simple objects and the atomic states of affairs in which they are configured.

But having natural properties and relations as modes of configuration of states affairs—i.e., as the nexuses of predication in reality—is an important

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[13]Frege usually reffered to properties (*Eigenshaften*) as concepts; but we will avoid that terminology here so as not confuse Frege's realism with conceptualism.

and useful view. In fact, we can retain this view of natural properties and relations and drop the idea of simple objects. And that is exactly what we do in conceptual natural realism, where instead of the simple material objects of logical atomism we have complex physical objects as the constituents of states of affairs. Conceptual natural realism is a modern counterpart to Aristotle's natural realism, just as conceptual intensional realism is a mitigated, modern counterpart to conceptual Platonism, and both are taken as part of what we mean by conceptual realism. Also, if we add to the logic of conceptual natural realism the modal operator $\Box^c$ for a causal, natural necessity and also add a logic of natural kinds, then we get a modern form of Aristotelean essentialism.[14]

5 Conceptualism

What underlies our capacity for language and predication in language, according to conceptualism, is our capacity for thought and concept formation, a capacity that is grounded in our evolutionary history and the social and cultural environment in which we live. Predication in thought is more fundamental than predication in language because what holds the parts of a sentence together in a speech act are the cognitive capacities that underlie predication in thought.

There are two major types of cognitive capacities that characterize the nexus of predication in conceptualism. These are (1) a referential capacity, and (2) a predicable capacity. These capacities underlie our rule-following abilities in the use of referential and predicable expressions. In particular, predicable concepts are the cognitive capacities that underlie our abilities in the correct use of predicate expressions. When exercised, a predicable concept is what informs a speech or mental act with a predicable nature—a nature by which we characterize or relate objects in a certain way. A predicate expression whose use is determined in this way is then said to stand for the concept that underlies its use.

Referential concepts are similarly cognitive capacities that underlie our use of referential expressions. When exercised, a referential concept informs a speech or mental act with a referential nature. Referential concepts are what underlie the intentionality and directedness of our speech and mental acts. A referential expression whose use is determined in this way is similarly said to stand for the concept that underlies its use.

Referential and predicable concepts are a kind of knowledge, more specifically a *knowing how* to do things with referential and predicable expressions. They are not a form of propositional knowledge, i.e., a knowledge that certain propositions about the rules of language are true, even though they underlie the rule-following behavior those rules might describe.

Referential and predicable concepts are objective cognitive universals. Their objectivity does not consist in being independently real universals, i.e., they do have the kind of objectivity universals are assumed to have in logical realism. Rather, their objectivity consists in being *intersubjectively realizable cognitive*

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[14]See Cocchiarella 1996 for a more detailed account of conceptual natural realism and its extension to a modern form of Aristotelian essentialism.
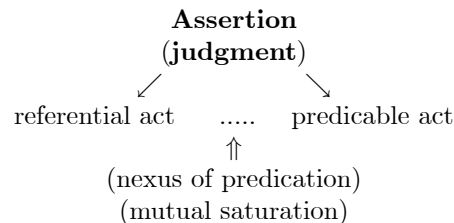
capacities that enable us to think and communicate with one another. As intersubjectively realizable cognitive capacities, moreover, concepts are not mental *objects*—e.g., they are not mental images or ideas as in the traditional conceptualism of British empiricism—though when exercised they result in objects, namely speech and mental acts, which are certain types of events. In particular, as cognitive capacities that (1) may never be exercised, or (2) that may be exercised at the same time by different people, or (3) by the same people at different times, concepts are not objects at all but have an unsaturated nature analogous to, but not the same as, the unsaturated nature concepts are said to have in Frege's ontology. In Frege's ontology, concepts are functions from objects to truth values, whereas in conceptualism, concepts are cognitive capacities that when exercised result in a speech or mental act (which may be either true or false).

Another important feature of predicable and referential concepts is that each has a cognitive structure that is complementary to the other—a complementarity that is similar to, but also different from, that between first- and second-level functions in Frege's ontology. In conceptualism, it is this complementarity that underlies the mental chemistry of language and thought. In particular, as complementary, unsaturated cognitive capacities, predicable and referential concepts mutually saturate each other when they are jointly exercised in a speech or mental act.

In conceptualism, in other words, the nexus of predication is the joint exercise of a referential and a predicable concept, which interact and mutually saturate each other in a kind of mental chemistry. A judgment or basic speech act of assertion, for example, is the result of jointly exercising a referential and a predicable concept that underlie the use, respectively, of a noun phrase (NP) as grammatical subject and a verb phrase (VP) as predicate:
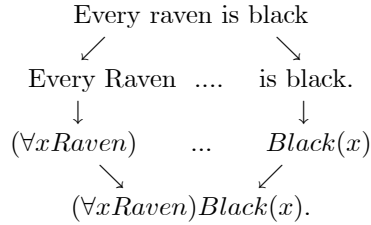
$$
\begin{array}{c}
\text{S} \\
\swarrow \quad \searrow \\
\text{NP} \quad \dots \quad \text{VP} \\
\Uparrow \\
\textbf{(nexus of predication)}
\end{array}
$$
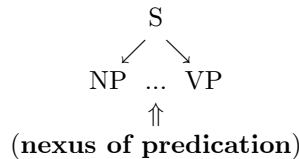
In conceptualist terms this act can be represented as follows:

$$
\begin{array}{c}
\textbf{Assertion} \\
\textbf{(judgment)} \\
\swarrow \qquad \searrow \\
\text{referential act} \quad \dots\dots \quad \text{predicable act} \\
\Uparrow \\
\text{(nexus of predication)} \\
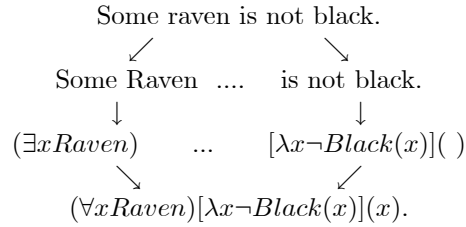\text{(mutual saturation)}
\end{array}
$$

A judgment that every raven is black, for example, is the result of jointly exercising, and mutually saturating, the predicable concept that the predicate phrase 'is black' stands for with the referential concept that the referential phrase 'Every raven' stands for.
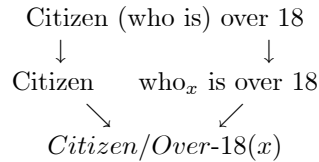
$$
\begin{array}{ccc}
& \text{Every raven is black} & \\
\swarrow & & \searrow \\
\text{Every Raven} \quad \ldots & & \text{is black.} \\
\downarrow & & \downarrow \\
(\forall x Raven) \quad \ldots & & Black(x) \\
& \searrow \qquad \swarrow & \\
& (\forall x Raven) Black(x). &
\end{array}
$$

A negative judgment expressed by 'Some raven is not black' is analyzed similarly as:

$$
\begin{array}{ccc}
& \text{Some raven is not black.} & \\
\swarrow & & \searrow \\
\text{Some Raven} \quad \ldots & & \text{is not black.} \\
\downarrow & & \downarrow \\
(\exists x Raven) \quad \ldots & & [\lambda x \neg Black(x)](\ ) \\
& \searrow \qquad \swarrow & \\
& (\forall x Raven)[\lambda x \neg Black(x)](x). &
\end{array}
$$

The negation in this judgment is internal to the predicate, which is a complex predicate expression, $[\lambda x \neg Black(x)](\ )$.

In addition to complex predicates, we need complex referential expressions, which in conceptualism are based on complex common nouns, or what we will call common names. To generate a complex common name, we use a forward slash, '/', as an binary operator on (a) expressions from the category of common names and (b) formulas as defining relative clauses. We can symbolize the restriction of the common name 'citizen' to 'citizen (who is) over eighteen', for example, as follows:

$$
\begin{array}{ccc}
& \text{Citizen (who is) over 18} & \\
\downarrow & & \downarrow \\
\text{Citizen} & & \text{who}_x \text{ is over 18} \\
& \searrow \qquad \swarrow & \\
& Citizen/Over\text{-}18(x) &
\end{array}
$$

An assertion of the sentence 'Every citizen (who is) over eighteen is eligible to vote' can then be symbolized as:

$$(\forall x Citizen/Over\text{-}18(x))Eligible\text{-}to\text{-}vote(x).$$

There are rules that connect the logical forms that represent speech and mental acts with forms that represent the truth conditions of those acts, and their logical consequences. For example, where

$$(\forall x) \quad \text{is an abbreviation of} \quad (\forall x Object),$$

we have the rules:

$$(\forall x A)F(x) \leftrightarrow (\forall x)[(\exists y A)(x = y) \rightarrow F(x)]$$
$$(\exists x A)F(x) \leftrightarrow (\exists x)[(\exists y A)(x = y) \wedge F(x)]$$

By means of these rules we can see why the argument:

$$(\forall x A)F(x)$$
$$(\exists y A)(b = y)$$
$$\therefore \quad F(b)$$

is valid in this logic.

Complex referential expressions can also be decomposed so that the relative clause is exported out. The following rules suffice for this purpose:

$$(\forall x A/G(x))F(x) \leftrightarrow (\forall x A)[G(x) \rightarrow F(x)],$$

$$(\exists x A/G(x))F(x) \leftrightarrow (\exists x A)[G(x) \wedge F(x)].$$

With these rules we can see why the argument:

$$(\forall x A/G(x))F(x)$$
$$(\exists y A)(b = y) \wedge G(b)$$
$$\therefore \quad F(b)$$

is also valid in this logic.
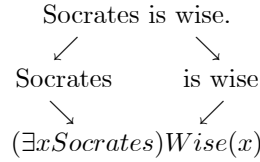
6   Singular Reference

The previous examples involve forms of general reference (to *every raven*, and to *some raven*). This is different from most modern theories of reference, which deal exclusively with singular reference. The sentence 'Socrates is wise', for example, is usually symbolized as $Wise(Socrates)$, or more simply as $F(a)$, where F represents the predicate 'is wise' and a is an individual constant representing the proper name 'Socrates'.

In conceptualism, because the nexus of predication is the mutual saturation of a referential act with a predicable act as cognitive capacities, singular reference is not essentially different from general reference. Also, there is just one

logical category of *names* in conceptualism, with common names and proper names as two distinct subcategories.

$$\begin{array}{ccc} & \text{Names} & \\ \swarrow & & \searrow \\ \text{proper names} & & \text{common names} \end{array}$$
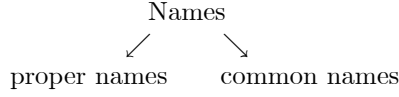
Now a proper name can be used either with or without existential presupposition that the name denotes, and for this purpose we can use the quantifiers $\exists$ and $\forall$ to indicate which use is being activated. In particular, we use $(\exists xSocrates)$ to represent a referential act in which the proper name 'Socrates' is used with existential presupposition, i.e., with the presupposition that the name denotes.

$$\begin{array}{ccc} & \text{Socrates is wise.} & \\ \swarrow & & \searrow \\ \text{Socrates} & & \text{is wise} \\ \searrow & & \swarrow \\ & (\exists xSocrates)Wise(x) & \end{array}$$

The existential quantifier phrase $(\exists xSocrates)$ indicates that the referential act in question presupposes that the name 'Socrates' denotes. In our larger framework proper and common names can be transformed into singular terms and occur in place of object variables as well as parts of quantifier phrases. In that larger framework, the above expression is equivalent to the form it has in first-order "free" logic; i.e., the following is valid in the wider framework:

$$(\exists xSocrates)Wise(x) \leftrightarrow (\exists x)[x = Socrates \wedge Wise(x)].$$

Although the right-hand side has the same truth conditions as the left, it does not represent the same cognitive structure. What the right-hand side says is:

There is something that is identical with Socrates and that is wise.

A referential use of a proper name, such as 'Pegasus', that does not presuppose that the name denotes can be represented by $(\forall xPegasus)$. Thus, the sentence 'Pegasus flies', where the name 'Pegasus' is not being used with existential presupposition can be symbolized as

$$(\forall xPegasus)Flies(x),$$

which in our larger conceptualist framework is equivalent to

$$(\forall x)[x = Pegasus \rightarrow Flies(x)].$$

Although the latter has the same truth conditions as 'Pegasus flies', it does not represent the same cognitive structure. Rather, what it says is,

Whatever is identifiable as Pegasus flies.

7 Nominalization, Deactivation and Abstract Nouns

A denial is not the same in conceptualism as an assertion in which a referential act has been exercised. To deny that some raven is white, for example, is not to refer to every raven and assert of it that it is not white, even though an assertion of the latter type has the same truth conditions as the denial. Grammatically, the denial can be analyzed as follows,

$$[\text{That some raven is white}]_{NP}[\text{is not the case}]_{VP}$$

where the sentence 'Some raven is white' has been nominalized and transformed into a grammatical subject. In this transformation the quantifier and predicate phrases of the sentence 'Some raven is white' have been "deactivated", indicating that the referential and predicable concepts these phrases stand for have not been exercised. The denial is about the propositional content of the sentence—namely, that it is false.

We could make this deactivation explicit by symbolizing the denial as,

$$Not([(\exists x Raven)White(x)]),$$

where the brackets around the formula $(\exists x Raven)White(x)$ indicate that the sentence has been transformed into an abstract singular term—i.e., an expression that can occupy the position of an object variable where it denotes the propositional content of the sentence. It is more convenient, however, to retain the usual symbolization, namely,

$$\neg(\exists x Raven)White(x),$$

so long as it is clear that, unlike the equivalent sentence,

$$(\forall x Raven)\neg White(x)]$$

which is read (in non-idiomatic English) as 'Every raven is such that it is not white', no reference is being made to ravens in the speech or mental act in question. In conceptualism, we distinguish a logical form that represents the cognitive structure of a speech or mental act from an equivalent logical form that gives a perspicuous representation of its truth conditions.

Deactivation applies to a predicate not only when it occurs within a nominalized sentence, but also when its infinitive form occurs as part of a complex predicate. In other words, deactivation also applies directly to nominalized predicates occurring as parts of other predicates. Consider, for example, the predicate phrase 'is famous', which can be symbolized as a λ-abstract $[\lambda x Famous(x)]$ as well as simply by $Famous(\ )$. The λ-abstract is preferable as a way of representing the infinitive 'to be famous', which is one form of nominalization:

$$to\ be\ famous$$
$$\downarrow$$
$$to\ be\ an\ x\ such\ that\ x\ is\ famous$$
$$\downarrow$$
$$[\lambda x Famous(x)]$$

Now the sentence 'Sofia wants to be famous' does not contain the active form of the predicate 'is famous' but only a nominalized infinitive form as a component of the complex predicate 'wants to be famous'. When asserting this sentence we are not asserting that Sofia is famous, in other words, where the predicable concept that 'is famous' stands for is activated; rather, what the complex predicate 'wants to be famous' indicates is that the predicable concept that 'is famous' stands for has been deactivated. The whole sentence can be symbolized as

$$\text{Sofia}_{NP}[\text{wants [to be famous]}]_{VP}$$
$$\downarrow \qquad \downarrow \qquad \qquad \downarrow$$
$$(\exists y Sofia)[\lambda y Wants(y, [\lambda x Famous(x)])](y)$$

Nominalized predicates do not denote the concepts the predicates stand for in their role as predicates, because the latter, as cognitive capacities, have an unsaturated nature and cannot be objects. As an abstract singular term, what a nominalized predicate denotes is the intensional content of the predicable concept the predicate otherwise stands for. In conceptual realism, what we mean by the intensional content of a predicable concept is the result of a projection onto the level of objects of the truth conditions determined by the concept's application in different possible contexts of use.

It is important to note here that the complex predicate

$$[\lambda y Wants(y, [\lambda x Famous(x)])]$$

does not represent a real relation between Sofia and the intensional object that the infinitive 'to be famous' denotes. What the complex predicate stands for is a predicable concept, which as a cognitive capacity has no more internal complexity than any other predicable concept. What is complex is the predicate expression and the truth conditions determined by the concept it stands for— i.e., the conditions under which the predicate can be true of someone in any given possible context of use.

It is a criterion of adequacy of any theory of predication that it account for predication even in those cases where a complex predicate contains a nominalized predicate as a proper part, as well as the more simple kinds of predication where predicates do not have an internal complexity. What this criterion indicates for conceptualism is that it needs to be extended to include an intensional realism of abstract objects as the intensional contents of both denials and assertions as well as of our predicable concepts.[15]

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[15] In addition to denials, conditional assertions also do not involve the exercise of referential and predicable concepts; rather, a conditional assertion states that if the propositional content of the antecedent of the conditional is true, then so is the propositional content of the consequent. See Russell 1903, §38, for a similar view, and on how 'If p, then q' differs from 'p; therefore q', where in the latter case both p and q are asserted, whereas neither is asserted in the former.

8   Conceptual Realism

The fundamental insight into the nature of *abstract objects* in conceptual realism is that we are able to grasp and have knowledge of such objects as the objectified truth conditions of the concepts whose contents they are. This "object"-ification of truth conditions is realized through a reflexive abstraction in which we attempt to represent what is not an object—e.g., an unsaturated cognitive structure underlying our use of a predicate expression—as if it were an object. In language this reflexive abstraction is institutionalized in the rule-based linguistic process of nominalization.

We do not assume Platonism here, as is done in logical realism, in order to account for abstract objects and the logic of nominalized predicates. In other words conceptual realism is not the same as logical realism (Platonism). Some of the reasons why this is so are:

(1) The abstract objects of conceptual realism are not universals in Aristotle's sense the way they are in logical realism—i.e., they are not predicable entities, and therefore they are not predicated of things.

(2) The abstract objects of logical realism (Platonism) exist independently of the evolution of culture and consciousness, whereas in conceptual realism all abstract objects, including numbers, are products of the evolution of language and culture. Nevertheless, although they are "man-made", they also have a certain amount of autonomy. They also have an essential role in the continuing evolution and development of knowledge and culture.

(3) In logical realism (Platonism), abstract objects are objects of direct awareness, whereas in conceptual realism all knowledge must be grounded in psychological states and processes. In other words, we cannot have knowledge of abstract objects if our grasp of them as objects must be through some form of direct awareness. According to conceptual realism we are able to grasp and have knowledge of abstract objects only as the intensional contents of the concepts that underlie reference and predication in language and thought. That is, we are able to grasp abstract objects as the "object"-ified truth conditions of our concepts as cognitive capacities.

9   The Intensional Contents of Referential Concepts

The reflexive abstraction that transforms the intensional content of an unsaturated predicable concept into an abstract object is a process that is not normally achieved until post-adolescence. An even more difficult kind of reflexive abstraction is also part of our conceptualist theory. It is a double reflexive abstraction that transforms the intensional content of a referential concept into a predicable concept, and then that predicable concept into an abstract object.

The full process from referential concept to abstract object is doubly complex because it involves a reflexive abstraction on the result of a reflexive abstraction. Where A is a name (proper or common, and complex or simple), and Q is a

quantifier (determiner), we define the predicate that is the result of the first reflexive abstraction as follows:

$$[QxA] =_{df} [\lambda x(\exists F)(x = F \wedge (QxA)F(x))].$$

In this definition the quantifier phrase (QxA) is transformed into a complex predicate (λ-abstract), which can then be nominalized in turn as being the intensional content of being a concept F such that $(QxA)F(x)$.

Consider, for example, an assertion of the sentence 'Sofia seeks a unicorn', which can be analyzed as follows:

$$\text{Sofia}_{NP}[\text{seeks [a unicorn]}]_{VP}$$
$$\downarrow \qquad \downarrow \qquad \downarrow$$
$$(\exists xSofia)[\lambda xSeek(x, [\exists yUnicorn])](x)$$

No reference to a unicorn is being made in this assertion. Instead, the referential concept that the phrase 'a unicorn' stands for has been deactivated. This deactivation is represented by transforming the quantifier phrase into an abstract singular term denoting its intensional content. The relational predicate 'seek' in this example is not extensional in it second argument position. In other words, the sentence does not imply that there is a unicorn that Sofia seeks. But the different assertion that Sofia finds a unicorn, which is symbolized in an entirely similar way:

$$\text{Sofia}_{NP}[\text{finds [a unicorn]}]_{VP}$$
$$\downarrow \qquad \downarrow \qquad \downarrow$$
$$(\exists xSofia)[\lambda xFind(x, [\exists yUnicorn])](x)$$

does imply that there exists a unicorn, and moreover that it has been found by Sofia. That is, the following

$$(\exists yUnicorn)(\exists xSofia)Finds(x, y).$$

is a logical consequence of the above sentence. Thus, even though the two different sentences,

$$(\exists xSofia)[\lambda xSeek(x, [\exists yUnicorn])](x)$$

$$(\exists xSofia)[\lambda xFind(x, [\exists yUnicorn])](x)$$

have the same logical form, only one of them implies that there is a unicorn.

The reason why the one sentence implies that there is a unicorn and the other does not is that the relational predicate 'find', but not the predicate 'seek', is extensional in its second argument position. The extensionality of 'find' is represented by the following meaning postulate:

$$[\lambda xFinds(x, [\exists yA])] = [\lambda x(\exists yA)Finds(x, y)].$$

By identity logic and λ-conversion, the following is a consequence of this meaning postulate,

$$(\exists x Sofia)[\lambda x Finds(x, [\exists y A])](x) \leftrightarrow (\exists x Sofia)(\exists y A) Finds(x, y)$$

Of course, there is no meaning postulate like this for the intensional predicate 'seek'.

Our analysis of the deactivation of quantifier phrases occurring as direct objects of transitive verbs such as 'seek' and 'find' is similar to the analysis given by Richard Montague in his paper "The Proper Treatment of Quantification in Ordinary English," except that Montague's framework is a type-theoretical form of logical realism.[16] There is a problem with Montague's analysis that would seem to apply to our approach as well. The problem arises when a quantifier phrase occurring as a direct-object of a complex predicate applies to two argument positions implicit in that predicate.

Consider, for example, an assertion of the sentence 'Sofia caught and ate a fish', which has the quantifier phrase 'a fish' occurring as the direct object of the complex predicate 'caught and ate', which implicitly has two argument positions for the direct-object, one associated with 'caught', and the other associated with 'ate'. The problem is how we can distinguish in logical syntax 'x (caught and ate) a fish' from 'x caught a fish and x ate a fish', where, as representations of cognitive structure, the quantifier phrase 'a fish' has been deactivated in each of its occurrences. This is a problem because although 'x (caught and ate) a fish' implies 'x caught a fish and x ate a fish', nevertheless the two are not equivalent.

Now if we take the analysis of 'x (caught and ate) a fish' as having a deactivated occurrence of the quantifier 'a fish' as the direct-object argument of the complex predicate 'to be a y such that x caught and ate y', or, in symbols,

$$[\lambda y(Caught(x, y) \land Ate(x, y))]([\exists z Fish]),$$

then the sentence 'Sofia caught and ate a fish' would be analyzed as

$$(\exists x Sofia)[\lambda x[\lambda y(Caught(x, y) \land Ate(x, y))]([\exists z Fish])](x),$$

which initially seems natural and appropriate. But, by λ-conversion, this analysis not only implies that Sofia caught a fish and Sofia ate a fish, it is also implied by the latter, i.e., on this analysis the two are equivalent, which is contrary to the result we want.

By way of a resolution of this problem, note that we take the sentence 'Sofia caught and ate a fish' to be synonymous with 'Sofia caught a fish and ate it', which makes explicit the two direct-object positions, one occupied by the quantifier phrase 'a fish' and the other by the pronoun 'it' that refers back to the quantifier phrase. It is also synonymous with 'Sofia caught a fish and ate that fish', which makes explicit the two direct-object positions as well. Now in a previous paper we have given a conceptualist analysis of co-referential pronouns

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[16]See Montague 1974.

in terms a variable-binding 'that'-operator, $\mathcal{T}$, as in 'that fish', which we symbolize as $(\mathcal{T}zFish)$.[17] Thus, by means of the $\mathcal{T}$-operator, we can symbolize 'Sofia caught a fish and ate that fish' as,

$$(\exists xSofia)[\lambda x(Caught(x, [\exists zFish]) \wedge Ate(x, [\mathcal{T}zFish]))](x),$$

where both the quantifier phrase 'a fish' and its co-referential phrase 'that fish' occur in deactivated direct-object positions. Assuming now, as seems correct, that both '$Caught$' and 'Ate' are extensional in their second-argument positions, the above sentence is equivalent to

$$(\exists xSofia)[\lambda x((\exists zFish)Caught(x, z) \wedge (\mathcal{T}zFish)Ate(x, z))](x),$$

which in turn, by the following rule for the $\mathcal{T}$-operator,[18]

$$(\exists zA)\varphi z \wedge (\mathcal{T}zA)\psi z \leftrightarrow (\exists zA)(\varphi z \wedge \psi z),$$

is equivalent to

$$(\exists xSofia)(\exists zFish)(Caught(x, z) \wedge Ate(x, z)).$$

This last implies, but is not equivalent to

$$(\exists xSofia)(\exists zFish)Caught(x, z) \wedge (\exists xSofia)(\exists zFish)Ate(x, z)),$$

which is the result we wanted, because the latter does not imply any of the other sentences as well. Thus, the above problem about the deactivation of a quantifier phrase occurring as the direct-object position of a complex predicate can be resolved in this way in our fuller conceptualist theory of reference.

10   Concluding Remarks

We conclude by noting the following observations about our conceptualist theory of the nexus of predication.
   • The nexus of predication in conceptualism is what holds together in thought and speech the exercise of a referential and predicable concept.
   • It is what accounts for the unity of a thought or speech act.
   • A unified account of both general and singular reference can be given in terms of this nexus. Such a unified account is possible because the category of names includes both proper and common names.
   • A unified account can also be given in terms of this nexus for predicate expressions that contain abstract noun phrases, such as infinitives and gerunds.

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[17] See Cocchiarella 1998, §7.
[18] This rule says that the sentence 'Some A is φ and that A is ψ' is equivalent to 'Some A is such that it is φ and ψ'. An example of the rule is the equivalence between 'Some man broke the bank at Monte Carlo and that man died a pauper' and 'There is a man who broke the bank at Monte Carlo and who died a pauper'.

The denotatum of an abstract noun phrase is the result of a reflexive abstraction in which the content of a deactivated, unsaturated predicable concept is "object"-ified and projected into the domain of objects. Logically, the admission of abstract noun phrases means the introduction of nominalized predicates as abstract singular terms. This amounts to a form of realism—but not necessarily a realism committed to a Platonic realm of abstract objects that are independent of mind, culture, including especially language, and the natural world.

• The same unified account also applies to complex predicates containing quantifier (referential) phrases as the direct objects of transitive verbs, such as the phrase 'a unicorn' in 'Sofia seeks a unicorn'. Conceptually, the content of such a quantifier phrase and the referential concept it stands for is "object"-ified through a double reflexive abstraction that first generates a predicable concept and then the content of that concept by deactivation and nominalization. All *direct objects* of speech and thought are intensionalized in this way so that a parallel analysis is given for 'Sofia finds a unicorn' as for 'Sofia seeks a unicorn'. And yet, relations, such as *Finds*, that are extensional in their second argument positions can still be distinguished from those that are not, such as *Seeks*, by meaning postulates.

Finally, we note that there is much more involved in a conceptualist analysis of language and thought beyond our account of the nexus of predication. One such issue, for example, is how both proper and common names can be "nominalized", i.e., transformed into singular terms occurring as denotative arguments of predicates, which is different from their referential role in as parts of quantifier phrases. Such singular terms denote classes as many, as opposed to sets as classes as ones. In addition to providing another account of "the one and the many", classes as many also provide truth conditions for plural reference, a topic we have not touched on here at all. Classes as many also lead to a natural representation of the natural numbers as properties of classes as many. These and other related topics are discussed and developed in our other papers on conceptual realism.[19]

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[19] A list of these other papers, as well as some of the papers themselves, can be found on the website: www.formalontology.it

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