CDD: 160

OCKHAM'S RAZOR AND CHATEAUBRIAND'S GOATEE

GUIDO IMAGUIRE

Departament of Philosophy
Federal University of Ceará
Avenida da Universidade, 2995, Benfica
60020-180 FORTALEZA, CE
BRAZIL

Guido_imaguire@yahoo.com

Abstract: In *Logical Forms II* Chateaubriand puts the simple question: Why should we accept Ockham's razor? He blames the principle of reduction as an unjustified dogma of nominalism. In this paper I present a justification for it. Contrary to Russell`s conception of reduction as elimination, I propose the thesis that reduction is explanation.

Keywords: Reduction. Nominalism. Russell.

A NAVALHA DE OCKHAM E O CAVANHAQUE DE CHATEAUBRIAND

Resumo: Em *Logical Forms II*, Chateaubriand levanta a questão: Por que deveríamos aceitar a navalha de Ockham? Ele critica esse princípio de redução como um dogma não justificado do nominalismo. Neste artigo apresento uma justificativa para o princípio. Ao contrário da concepção de Russell de redução como eliminação, eu proponho a tese de que redução é explanação.

Palavras chave: Redução. Nominalismo. Russell.

> Plato's conception is beautiful, grandiose, awe-inspiring. Who can read the parable of the cave and not feel moved? (Chateaubriand 2005, p. 379)

The answer to this question is very simple: many people, like Ockham, Russell, Goodman, Quine, and, why not say, myself. But to give an answer to Chateaubriand's opening question in chapter 23 of *Logical Forms II* – what is the justification for Ockham's razor? – is by no means an easy task. Chateaubriand's diagnosis is certainly correct. Many philosophers have been appealing to Ockham's razor time and time again without any justification. Why should we accept it? The aim of this paper is to explain a strategy for justifying it.

The usual formulation of the principle – entities must not be multiplied without necessity – gives rise to some alternative interpretations. It can be simply read as a pragmatic or methodological device: whenever entities of kind A *can* be reduced to entities of kind B, we should (we will do better if we) reduce A to B. Indeed, sometimes philosophers have been assuming this as the more basic sense of the principle. Russell's own justification in some passages is explicitly committed to this methodological interpretation:

> I always wish to get on in philosophy with the smallest possible apparatus, partly because it diminishes the risk of error, because it is not necessarily to deny the entities you do not assert, and therefore you run less risk of error the fewer entities you assume. (Russell PLA, 221-222)

Every device for reducing the risk of error is certainly welcome in science and philosophy. But Russell's argument is not clear. Why do we run less risk of error when we assume the smallest possible apparatus? It seems plausible to assume the very opposite: the more we reduce entities, the more complicated becomes our theory, for every reduction involves complicated and controversial statements concerning functional equivalence, isomorphism, supervenience, and so on. The more entities we assume as basic, the more redundant our theory becomes, but redundancy is not, strictly speaking, an error. It has been accepted as a general principle of logic, mathematics and metaphysics, that the smaller our basis is (number of axioms or rules of inference, or of metaphysical assumptions), tidier, sounder and more elegant the theory. But philosophy is not art, and aesthetic principles should not be taken as fundamental. Some might like desert landscapes, but others might like tropical forests, and I do not know how to decide this question of taste. Further, to reduce the number of "principles" or "axioms" is not the same as to reduce entities. For these and some other reasons, a merely pragmatic justification is certainly insufficient for deciding an essential question like that of the plausibility of nominalism. By the way, Russell uses the expression "partly" in this passage; so I suppose that he saw more arguments for supporting the principle. In this paper I will search for more than a mere "pragmatical/aesthetic" or "methodological" strategy.

1. THE VARIETIES OF BEARDS: FULL BEARDS, GOATEES, AND MOUSTACHES

Before we edge the razor, let us take a look at the beard. Since nominalism is characterized by means of the principle that entities must not be multiplied without necessity, should we characterize Platonism as the doctrine that we should multiply entities as much as we can? No, of course not. There is no principle of "exuberant capillarity" in Platonism. Plato's theory of pure forms was developed in order to explain the *unity* in the plurality, and not the *pluralities* of (or *in*) unities. Actually, Plato's theory of pure forms was a strategy for reducing the multiplicity of appearances to a unity – the multiplicity is illusory, the unity (the form) is real. Surprising as it might sound, the fact is that in some cases nominalists seem to be less economic than Platonists. A nominalist in mathematics who rejects every kind of abstract entity must identify the number 2 either with mental events in the minds of billions of subjects or with material inscriptions e.g. in displays, or some other kind of particular instances. Thus, he must assume many different "2's". A Platonist like Frege, on the other hand, must only accept one single abstract entity: the number 2. Who is multiplying entities here? The Platonist certainly not. There are many "shadows" of the number 2, but "the real" 2 is just one.

It is helpful to remember here the distinction Lewis introduced for justifying modal realism against the standard argument according to which this theory is implausible on the grounds of parsimony. Lewis (1973/2001: 87) distinguished two kinds of parsimony: qualitative and quantitative. Qualitative parsimony means parsimony of *number of kinds* of entities, while quantitative parsimony is parsimony of *number of entities*. A doctrine that posits many different concrete occurrences of the number 2 is not quantitatively, but qualitatively parsimonious (there are many entities, but just one kind: concrete particulars), while a doctrine that assumes concrete occurrences (instances) of 2 and, in addition, the abstract entity 2 is not qualitatively parsimonious (there are two kind of entities, concrete and abstract). But the point is, again, that Plato claimed that only the abstract entities were real, the others, i.e. the concrete instances of our empirical world, are just shadows. Perhaps, we could say: Plato is not a friend of exuberance, but of desert *abstract* landscapes. Bundle theory is often considered – and I think correctly – a contemporary fashion of Plato's ontology: concrete particulars are nothing else but bundles of universals, i.e. of pure forms. If this were correct, we could reduce concrete particulars to bundles of universals and, in this way, get an ontology with one single category. There is no multiplication, but reduction at work. In any case, one first lesson we could derive is this: the formulation "entities must not be multiplied without necessity" is misleading. Better were: "kinds of entities must not be multiplied without necessity".

But I think, quantity is just one aspect, and not really the only and most interesting philosophical point. Not the quantity of entities or of kinds, but the reality – and this means here: objectivity – of a domain of abstract entities is at stake in the classical dispute between Platonism and nominalism in the Middle Ages. When a medieval nominalist said that universals are not real, but merely "flatus vocis", his point was this: universals and concepts (or more generally, the conceptual scheme) we use to categorize reality are subjective, and not independent from mind and language. This "epistemological" question is not the same as the "ontological" question, whether universals are *ante rem*, i.e. there are non-instantiated pure forms. From the fact that universals are abstract, many derived the conclusion that this dispute was about concrete versus abstract ontologies.

But when neither nominalists nor Platonists are interested in multiplying entities, should we conclude that nobody in philosophy likes an exuberant ontology? No, unfortunately. Meinong's ontology is the best example for such an exuberant ontology. But it is important to note that he did not use Plato-style arguments for supporting it. Educated in the Austrian tradition of Bolzano and Brentano, Meinong was interested in the status of intentional objects, i.e. entities that can be objects of intentional (with-t) acts. Modal realism is perhaps another good example of an exuberant ontology: everything merely possible is real. But such extreme positions are not our theme here. This kind of exuberant capillarity needs more than a simple shave, probably even a hormone treatment. Rigorous Platonists, like Chateaubriand, do not have a beard, but a charming little goatee.

I will not argue in this paper for the plausibility of Ockham's razor by means of quantity (of entities or of kinds of entities), nor by means of the abstract-concrete dilemma (as Burgess in 1996), nor by means of epistemological dispute of objectivity of our conceptual schemes. In a certain sense, quantity will be a *derivatum* of the interpretation I defend in the last section, but it is not the motivation. Even Russell's suggestion by means of "reality" will be rejected, but this must be analysed in more detail.

2. REDUCTION AND REALITY

Ockham's principle becomes interesting when we read it as the principle of necessary reduction: whenever entities of kind A *can* be reduced to entities of kind B, we *must* reduce A to B. And why *must* we do it? According to the "reducibility as unreality" interpretation, the answer is this: because in this case A is not real, but merely a fiction. According to this interpretation, the talk of "reduction" or "elimination" must be understood as metaphorical, for you cannot reduce or eliminate an entity that simply does not exist or is unreal. How can you shave a beard that does not exist? Of course, you do not really eliminate it; you simply do not accept its existence in your theory.

This was certainly Russell's intuition for using the expression "logical fiction" whenever he explored many different kinds of reduction: numbers to classes, classes to propositional functions, concrete objects to sense data, time to events, universals to classes of similarity, etc. Of course, the fact that he used different expressions ("logical fiction", "logical construction", "incomplete symbol") is very irritating. A construction is not fiction. A mental construction like Sherlock Holmes is in a usual sense not real. But the house I constructed is not fiction, and, so I hope, "very" real. The expression "incomplete symbol" he also often used is even more irritating: what have to do the symbols we use to denote some entity with its ontological status? Russell's conception concerning irreducibility and reality must be explained.

First, for Russell reality and irreducibility are coextensive, sometimes even synonymous. Arguing for the reality of relations, for instance, Russell's often says that relations are *real* because they are *irreducible*. If the proposition aRb is not reducible to an S-P proposition (like [..Rb]a), then the relation R is real. Many universals are not real, because they can be reduced to classes of similarity. Thus, redness can be seen as the class of all entities (colour-)similar to a given paradigmatic red patch. But Russell also argued that some degree of Platonism is inevitable, because in order to build equivalence classes we need the dyadic universal *similarity*, and at least this universal is irreducible, and thus real. In many passages Russell expressed that reality and irreducibility are equivalent. But we must examine whether this thesis is plausible from a systematic point of view. He never presented explicitly arguments for it. And I think that the simple identification of reducibility with unreality by Russell is, indeed, very misleading. It is probably the ground for some, including Chateaubriand's, case against the principle.

Reality is basically an ontological notion. *Reducibility* can be seen as an *epistemological* (in the wider sense of this word) notion. When we assume the "reducibility as irreality" interpretation of Ockham's principle, the main idea in all the various stories of reduction seems to be this: if an entity (of kind) A can be *reduced* to another entity (of kind) B, A can be said to be unreal. But from the fact that temperature or heat can be fully reduced to movement of molecules, it does not follow that temperature or heat is unreal. If we could fully explain the human mind by means of brains, i.e. of some laws and structures of matter, should we conclude that our mind does not exist, or that our mind is merely a fiction? This is far from evident, I suppose even absurd. Nevertheless, such questions concerning reduction are, without any doubt, central for many areas of philosophy. Nobody could say that the attempt of reducing mind to matter is not relevant for philosophy of mind. But what is exactly at stake in these cases of reduction?

3. REDUCTION AS EXPLANATION

My proposal here is to defend another interpretation of the principle, that we could call “reduction as explanation”. Reduction and full explanation are equivalent. Thus, I take “A is reducible to B” as equivalent to “A can be fully explained by means of B”, or more explicitly: an entity (of kind) A can be reduced to another entity (of kind) B if and only if A can be fully explained by means of B. I defend, therefore, an epistemological interpretation of the razor, but with an ontological import, as I shall argue. A more careful interpretation could be this: an entity (of kind) A can be reduced to an entity (of kind) B if and only if entity A can be fully explained by means of a *theory* about B. Russell would propose in this sense: Physical objects can be fully explained by means of a theory of sense data, time can be fully explained by means of a theory of events and its relations, propositions can be fully explained by means of their constituents plus a believing subject and the relation of believing, numbers can be fully explained by means of a (logical) theory of propositional functions, etc. Notice that I am just using Russell’s examples for clarifying the interpretation I suggest here. I am not proposing that Russell himself would accept my notion of reduction. I want to think systematically, and not to make exegesis. In any case, with this new characterization of the notion of reduction, Ockham’s razor also gets a new interpretation: whenever an entity (of kind) A can be fully explained by means of an entity (of kind) B, we must yield the explanation.

But this new interpretation of the razor does not help if the expression "fully explained" remains obscure. Let us examine this expression. An entity A is said to be fully explained when the very nature of A is made explicit. I think this is the real and sound motivation for accepting Ockham's razor. Let us examine some important cases of reduction as full explanation in philosophy in order to get clarity about the relevance of such reductions.

The most basic and original sense of reduction is present in the discussion of ontological categories in metaphysics. Ontological theories are theories about the most basic categories of reality. Aristotle thought that all reality could be explained by means of the categories of substance and attributes. As the notion of substance involves many difficult questions concerning the distinction between essential and accidental attributes, diachronic and transworld identity, some modern authors prefer a more modest theory with particulars instead of substances. Frege's ontology of objects and concepts (or functions) is a version of this ontology. But not all were satisfied with this classical theory. Some authors perceived that the substance-attribute ontology, like its particulars-universals variant, was not plausible for explaining some phenomena of reality: Are hurricanes and football games substances or attributes? Some thought that we must introduce a third ontological category: processes or events. Barry Smith, e.g., defends an ontological theory of continuants and occurrents. But more radical ontologists of processes do not simply want to add a third category, but to *reduce* the category of particulars to processes. According to them, Socrates is not a substance or a particular thing, but strictly speaking a process that begins with his birth (or conception) and ends with his death (or decomposition). Take another theory, viz. the theory of bundles. The main thesis of the bundle theory is the proposal of a reduction: particulars are "nothing else" than a bundle of universals. I.e. the category of particulars can be fully reduced to the category of universals. If this is correct, we need only one category of universals. Finally, the last prominent theory is William's and Campbell's theory of tropes. According to trope theory, particulars are "nothing else" than co-present tropes, and universals are "nothing else" than classes of similar tropes. Thus, particulars and universals can be fully reduced to tropes. In other words, we need only one category, that of tropes.

The contemporary ontological discussion is difficult and involves very sophisticated arguments. But the interesting point concerning these rival ontological theories is very simple. Ontological theories are theories about the *most basic and irreducible* categories. Beyond all differences in conception, all ontologists agree on this point: they must develop a complete theory of all reality with the *smallest possible basis*. Basic categories must be exhaustive and mutually exclusive. Nobody would be satisfied with the "democratic and exuberant solution": take all categories together, i.e. there are substances, particulars, universals, attributes, tropes, processes, bundles of universals, aggregates of co-present tropes, etc. This solution could satisfy the criterion of political correctness, but not that of ontological correctness. But why not? There are ontological theories with one category, others with two categories, why should we not accept a theory with three, seven, eleven or even more categories?

The expression "A is nothing else than B" occurred many times in the paragraph above, and the meaning was always the same. To say that "A is nothing else than B" (and this is exactly the same as "A can be reduced to B") is the same as to say *what is exactly the very nature of A*. When the bundle theory is correct, in reducing particulars to bundles of universals, we are not eliminating particulars or showing that they are unreal, but saying what particulars *really are*. When the process ontology is correct in reducing particulars or substances to processes, we are not only reducing or eliminating particulars, but saying what particulars *really are*. Reduction is explanation of the very essence of things. And since we are talking about the "very essence" of things, my epistemological interpretation of the principle of reduction also has an ontological dimension (by the additional supposition of a kind of realism). In reducing entities we make explicit the very nature of the reduced entities. In identifying temperature with movement of molecules or human mind with some function of human brain, we are explaining what temperature and mind really are. In explaining that rainbows are not objects with a given size, a well-defined position in space, we are not saying that they are unreal. They just are not what they seem to be. Nominalists are therefore in agreement with Plato's basic insight that things are not as they seem to be, and that we should investigate their real nature.

Frege's logicism is also often interpreted as a project of reduction. And in a particular sense, it really was a project of reduction. Of course, it was not a project of reduction of ontological categories in the primitive sense explained above. The reduction of a given *class* of entities is not the same as the reduction of an ontological category to another. Frege's basic ontological categories were irreducible. Objects are not reducible to functions, and functions also not to objects. Numbers constitute a class of entities, but not a category. Thus, Frege's logicism does not suggest a reduction of categories. But the aim was the same: explanation of the nature of some class of entities, i.e. numbers. In reducing arithmetic to logic, Frege aimed to show that arithmetic is analytic and not synthetic as Kant thought. Again, in reducing arithmetic to logic Frege was explaining the very nature of numbers, i.e. explaining *what numbers really are*. He was neither trying to show that numbers are unreal, nor trying to eliminate them. "Let us do logic instead of mathematics" was not his lemma.

Russell's theory of descriptions is one of the most prominent cases of reduction in contemporary philosophy. We can accept or reject it, but no one can deny that it yields a useful strategy for eliminating ontological commitment to fictional entities such as the present king of France. Let us notice that this reduction, again, is not a reduction of ontological categories. We do not reduce a particular fictional substance to a bundle of properties or to a bundle of tropes. Again: the reduction of a given *class* of entities (fictional entities, e.g.) is not the same as the reduction of an ontological category to another. But in this case we have a *novum*. In the theory of descriptions, contrary to the case of logicism, we really have a case of reduction as "elimination". Meinong's subsisting and not-existing entities are not real, we must not accept them. But the elimination of fictions is just a secondary derivatum. The interesting point is that with this theory, as in the case of ontological categories and in logicism, we reveal the very nature of a possible object or of a fiction: it is not an object like the referent of a genuine proper name, but just a predicative function that is satisfied by no object of the given domain (of actual existing objects). In a nutshell: fictions are not the reference of a singular term, but a predicative construction. Even in this case, reduction is explanation of the very nature.

There is a second interesting point in this theory. We heard so often that Russell's theory of descriptions was a strategy for eliminating Meinong's ontological monster that we forget that in 1905 Russell was not concerned with the monarchy in France, but with philosophy of mathematics. He stressed many times that the theory of descriptions was essential for the no-class theory of *Principia*. Indeed, the similarity between the elimination of descriptions and the reduction of classes to propositional functions is clear. As in the perspicuous analysis of the theory of descriptions an apparent predication of the property ψ to a particular (the ϕ) becomes

$$[(\iota x)(\phi x)].\ \psi\ (\iota x)(\phi x)\ =:\ (\exists b)\ (\forall x){:}\ \phi x. \leftrightarrow x=b{:}\ \psi b$$

So, analogously, every statement that asserts a property *f* of the class $\hat{z}(\psi z)$ becomes in the no-class theory an assertion about a predicative propositional function:

$$f\{\hat{z}(\psi z)\}.\ =:\ (\exists\phi) : \phi!x \equiv_x \psi x : f\{\phi!z\} \quad \text{Df.} \ \ (\textit{Principia}\ ^{*}20.01)$$

With this definition, Russell was able to translate every statement about classes into a statement about propositional functions. But why was this reduction of classes to propositional functions so important?

I think the best answer to this was given some years before Russell's death by another author (I do not know whether Russell ever read this paper). Benacerraf's story about Ernie and Jonny in "What numbers could not be" (1965) is very illustrative, and his argument very simple. Since numbers can be reduced to sets according to two different systems, viz. Zermelo's and von Neumann's definitions, we should conclude that numbers cannot be sets (or classes). As in the cases above, Benacerraf wanted to reveal the "very nature" of numbers – what numbers *must* or *cannot be* – examining the possibility of their reduction. But a new aspect – we could say: a new intuition concerning reduction – emerges in his argument: when the entity A can be reduced to an entity B and, at the same time, to another entity C, A is neither B nor C. Of course, in this case B and C are both sets, but different sets, and this makes the argument very strong. The number 2 is neither $\{\{\varnothing\}\}$ nor $\{\varnothing, \{\varnothing\}\}$ simply because $\{\varnothing, \{\varnothing\}\} \neq \{\{\varnothing\}\}$. If we show that numbers can be reduced to two different classes of entities – e.g. to sets and to propositional functions – we could conclude that numbers are neither sets nor propositional functions only in case we also showed that sets and propositional functions are not mutually reducible. If numbers were (reducible to) sets, and sets, in turn, were (reducible to) equivalent propositional functions, as Russell and Whitehead defended in *Principia*, we still could sustain that numbers are "something else". Moreover, if numbers were reducible to different systems of sets, and these different systems of sets could be reduced to a single system of propositional functions, we can be sure that numbers are not sets, but propositional functions (of some order). Russell would simply respond to Benacerraf: of course, numbers cannot be (and are not) classes (or sets), because class theory can be reduced to the theory of propositional functions. Paraphrasing Ockham: whenever you *can* make a reduction, you *should* make it, i.e. you should not stop in the middle of the way. To stop the reduction of numbers at the level of classes is, thus, an error. Use Ockham's razor and you will run less risk of error.

In general: when entity A can be reduced to an entity B and, at the same time, to another entity B*, and the both B and B* can be univocally reduced to an entity C, A is neither B nor B*, but properly C. Except when you can reduce C to D, for in this case A is neither B, nor B*, nor C, but D. And so on. I think this kind of reasoning is typical for natural science: so long as light is explained by means of corpuscles and simultaneously by means of waves, physicists will have the feeling that they do not really get the very nature of light. This reasoning is used in mathematical structuralism: a formal theory is not a particular system, but a structure instantiable in different particular systems. Numbers are neither identical with von Neumann's sets nor with Zermelo's sets, but with an isomorphic structure instantiated in many different systems (not only of sets or classes). Thus, you can only be sure that you get the very nature of something when you reach the last possible reduction. Maybe this "last possible reduction" is only a regulative idea, in Kant's word, and we never reach such a last reduction for any kind of entities. But this is not a reason for stopping science and philosophy, and so not for rejecting Ockham's maxim. The nominalism I propose here is, in Burgess' (1993: 196) sense, an "Ocaamite" or "conditional" one: It is not based on a "philosophical intuition" that abstract entities are not real, but on the device that when a reduction can be proposed, it should be done in order to reveal the nature of the reduced entity.

Be that as it may, reduction of X is always an explanation of the nature of X. And as long as you accept that explanation of the nature of things is a central task of philosophy, you cannot reject Ockham's principle of reduction. This is not a methodological question, but concerns one essential task of philosophy.

REFERENCES

BENACERRAF, P. "What Numbers Could Not Be". *Philosophical Review*, 74, 1965. Repr. in P. Benacerraf and H. Putnam (eds.) (1983), pp. 272-294.

BENACERRAF, P., PUTNAM, H. (eds.). *Philosophy of Mathematics*. Cambridge: Cambridge University Press, 1983.

BURGESS, J.P. "Occam's Razor and Scientific Method". In: M. Schirn (ed.) (1996), pp. 195-214.

CHATEAUBRIAND, O. *Logical Forms. Part II: Logic, Language and Knowledge*. Campinas: CLE/UNICAMP, 2005. (Coleção CLE, v. 42)

LEWIS, D. *Counterfactuals*. Oxford: Blackwell, 1973.

RUSSELL, B. [1918] "The Philosophy of Logical Atomism" [PLA]. In: *Logic and Knowledge*. London: George Allen and Unwin, 1956.

______. "On Denoting" (1905). Repr. in B. Russell (1956), pp. 42-56.

______. *Logic and Knowledge*. London: George Allen and Unwin, 1956.

SCHIRN, M. (ed.). *The Philosophy of Mathematics Today*. Oxford: Clarendon Press, 1996.

WHITEHEAD, A.N., RUSSELL, B. *Principia Mathematica* (1910-13). Second Edition. Cambridge: Cambridge University Press, 1968.