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SOME INNOCENT QUESTIONS ABOUT LANGUAGE

Ardon Lyon

Philosophers and others often believe that a language used to talk about *usage in a particular language should not be mixed with use of that language itself. I argue below that this opinion is mistaken.*

In Britain most people can speak English, in France French, and in Spain Spanish, and so on. People who study such languages are often called 'meta-linguists': they tell us *about* languages, whether ordinary speech or formal languages. The language used to talk about a language may itself be expressed in the same language; for example, we may use English to talk about English (in whatever variety). In 1933 the great Polish logician Alfred Tarski published a wonderful paper called 'The Concept of Truth in Formalised Languages', and he also published a long book about this problem.

About fifty years ago I was lucky enough to attend a public lecture by Alfred Tarski himself in which he wrote several sentences on the blackboard including some self-referential ones such as 'This sentence is in English', 'This sentence is in Chinese', and 'This sentence is false'. The first sentence is true, the second false, and as he then pointed out, the last one is if true then false, and if false then true (which had been realized for centuries). He then asked us to conclude that any language which mixes languages and meta-languages will itself be self-contradictory, and thus we certainly should not have any such mixture in a formal or indeed in any scientific language. Incidentally. I often write here, as Tarski usually did, of sentences being true or false rather than what the sentences are used on a particular

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occasion to express, which we might (also rather misleadingly) call the 'statement' being made – the same statement then normally being expressible in many different languages.

He must have said some other things, since the lecture lasted for about an hour, but after his formal talk ended he kindly asked the audience whether there were any questions. I didn't at that time understand what it could be for a whole language to be self-contradictory, and I confess that I still don't.

It can't mean one in which it is impossible to express self-contradictory statements, because we want any decent language to be able to do this, since we want it to be able to express statements which contradict each other, even if all in one breath. Could it mean one in which if one starts from true statements which are not also false and argues in a way that logicians call (to my mind not very perspicuously) 'validly' then one will inevitably reach self-contradictory conclusions? It cannot mean that either, for there cannot be such a language. (Of course, we may not *know* whether we are starting from true 'premises', but that is another matter.) So I still remain baffled about what it possibly could mean. If one starts from, for example, 'This sentence is false' (i.e. to be more accurate, *expresses* something which is false, since it might not have meant what it does mean in standard English) then one should reach, and pretty quickly, a statement which is if true false, and if false true. And if one also believes that *every* statement expressible within the language must be either true or false but not both, then one will have made a mistake. Well then, one will have made a mistake.

Be that as it may, I bravely asked the great man why it was that what he had written on the board showed that one should not mix languages and meta-languages, particularly not in formal languages or any language used to express a science. Not being as hard of hearing as I am now, I was sitting near the back of the room, and after I asked this question about two hundred pairs of eyes turned round and bored into me. I expect that I shrank, although I hope not

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visibly. For, I went on to say, if one starts with true axioms and argues validly, one will never reach any self-contradictory statements, since one will never even reach any false ones. And if one has an axiom such as 'This sentence is written in English' no contradiction will be reached so long as one argues validly. Not every expressible sentence or its negation will be derivable, no matter how many true axioms one has, but as I remarked, Gödel had shown this is so even for elementary arithmetic, and so not every truth will be derivable: the system will technically be called 'incomplete'. So perhaps if one has some self-referential truths in the axioms one may reach some interesting self-referential conclusions without also being able validly to reach a contradiction, and thus there is no reason not to do so, despite what Tarski had asserted.

(If one starts from a falsehood one may validly reach either a falsehood *or a truth*. An example of the latter is that from the assertion that (a) all trees are oaks it follows that (b) at least some trees are. Currently, the first is false and the second true, and I sincerely hope it will remain so for at least as long as there are humans on earth. It is also worth considering assertions of the form 'If (a) then (b)' and why, when we are pretty sure that (a) is false, we can in some cases conclude that probably if (a) *were* true, then (b) would also have to be, and in some cases not. Of course one can never argue *validly* from truths alone to falsehoods, but one might (invalidly) if one makes at least one mistake.)

Tarski did not reply that what I had said was wrong. Amazingly, he said instead (something such as) that even if it was in all likelihood true, nevertheless we do not *need* to mix languages and meta-languages in formal or in scientific discourse, we do not normally do so, and we should not.

Certainly, we do not *need* to mix languages and meta-languages. But *any* argument one uses may lead to a contradiction if one makes a mistake, and nobody can guarantee against that.

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I had asked one question, so felt it would be inappropriate to ask another, and in any event, I admit I did not relish having famous people staring at me again. But Tarski's response didn't seem right to me then, and it still does not. For surely, for example even within physics itself, because of empirical results the concept of an atom has been (and should have been) altered so that atoms are no longer thought of as indivisible entities. Sometimes, one and the same sentence states that atoms are divisible and is also used to express *why* the concept of an atom has and should have been altered. Such a form of words mixes language and meta-language.

If my reply, and the response that I did not make, are correct, then there is no reason not to mix languages and meta-languages within either scientific, formal (e.g. particularly in computer-) or any other languages so long as one does not start from 'axioms' such as 'This sentence is false' (more accurately, expresses a falsehood) and hence is not able to deduce theorems which are if true then false, and if false then true. (Again, I say, we may make a mistake: but there can be no guarantee against that.) Perhaps mixing them would lead to some interesting results, although my guess is that it would not. If, however, inventors of formal languages have not mixed them because they have accepted Tarski's criticisms, then I believe they should stop doing so, for the criticisms are not sound.[1]

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Note

[1] I am very grateful to Peter Cave and Imre Leader for their views about the above. I alone am of course responsible for any errors in it.

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