Fuzzies for Natasha

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3rd April 2010

Part of the hostility of the Fuzzy brigade towards people who don't like fuzzy logic stems, i think, from a mistaken identification. Fuzziphiles tend to think that people like me who don't think fuzzy logic is the answer are not taking seriously the deeply indeterministic chaotic nature of reality and are insisting on reasoning about it in a way that contumaciously refuses to respond appropriately to its complexity. But this is to misunderstand us. Do we believe that the world is a four-dimensional manifold every point of which is—or rather *either-is-or-is-not*—occupied by a perfectly elastic billiard ball whose mass is concentrated at a single point? Of course not. Nobody believes *that*. The question is not whether or not the world is that kind of place; the question is whether or not adopting Fuzzy Logic is the right way to cope. Perhaps in some ways it's like the debate over whether or not methadrone should be defined as a class 'B' drug. The question is not: "should our young people be taking it?", we know the answer to *that*; the question is: "is banning it the right way to stop it?"

The general view among logicians is that Fuzzy Logic is the work of the Devil. The view that nonstandard logics are generally the work of the devil is associated particularly with the American philosopher Quine who—on the whole—is a controversial (if respected) figure. However on this one he seems to speak for us all. Why are we so united?

The impulse to fuzzy logic comes to people for different reasons, but the reasons

chaotic unpredictability, Heisenberg uncertainty, quantum indeterminacy, asynchronicity-mediated unpredictability, even logical incompleteness (free associated to Gödel) and just plain ambient *noise* drowning the signal. These are all radically different phenomena, and yet people look for the same solution in all cases. Is this because fuzzy logic is a wonderful unifying logical insight that captures what all these things have in common? It might be of course, but it all looks too easy, and the suspicion is that it is not.

The point is often made that boundaries of real concepts are fuzzy. That is true, but quite a lot of the time they aren't. The earth-crossing asteroid either does crash into earth or it doesn't, and you either do or do not marry Mr./ Collins. There *are* differences and the differences can sometimes be perfectly clear. But (and here i am going to be Devil's Advocate) ... is it really clear whether or not the asteroid crashes? Didn't I read somewhere that there is a

trail of giant gouges in the plains of Patagonia caused by a glancing blow from an Near-Earth-Asteroid that eventually got away? Yes, I did. But that doesn't prove that the phenomenon is inherently vague, what it proves is that where you want to draw the line depends on which problem you are trying to solve. Am I bald? It depends who's asking. By now I am certainly bald according to most criteria, but there was a time when i would have been considered bald among 30-year olds but not among 60 year olds. Does this prove that baldness is vague? No, this multiplicity of possible answers doesn't prove that baldness is vague, the multiplicity of answers might be a manifestation of the fact that there is not merely one single concept but a cluster of related concepts, for all of which we use the same word. If we were more interested in baldness we would have 150 different words for it. Perhaps trichologists do, God help them.

Anyway the moral that this points is that if you discretise continuous data in all possible ways then—by examining the way in which the various discretisations overlap and interact—you can recover the continuous information.

There is a parallel here with the way in which the fact that the earth is round can be recovered from the—strictly planar—maps in an atlas. The blurred edges so characteristic of the real world emerge once you integrate the discretisations. Another moral, perhaps is that the blurred nature of reality is something sophisticated and emergent that you should absolutely not expect to capture with anything as simple as a mutilation of the logic.

Two-valued measures

But less sermonising. Let me give a very simple example that illustrates very clearly the mistake that we logicians suspect underlies many situations where people want to reach for fuzzy or many-valued logic. Consider the scenario where your data collection might occasionally fail for some reason, so that as well as getting the answers 'yes' and 'no' (or '0' and '1' or 'true' or 'false' or whatever it is) you also—from time to time—fail to get any answer at all. Wouldn't it be a sensible precaution to have also a `don't-know` up our sleeve as a third truth-value? [1] The trouble is that although 'don't-know' is third possibility, it's not a third possibility for the parameter of the system you are examining, rather it's a third possible state of your relation to that parameter: a relation of not-knowing.

(What is it you don't know? You don't know which of the two(!) values is the correct one!)

The point of this example is that it illustrates how you can be led to suppose that your logic is three-valued even if the system you are examining is squeaky-clean two-valued. The three-valued thing is not the system but your state of knowledge of it. That may be fine of course, but if you are trying to describe the system not your knowledge of it then this move is a mistake. (And don't give me any quantum tosh about observers pertubing the experiment: that's a separate issue.) There may be reasons for reaching for three-valued logics in

[1] And why stop there? On at least one reading of a text (The Heart Sutra) in the Classical Buddhist literature there are no fewer than *five* truth-values: `true` and `false` as usual of course, but also `both`, `neither` and finally `none-of-the-above`.

the hypothetical situation you are in, reasons that arise from the phenomena themselves, but your uncertainty about them doesn't provide any such reason.

The suspicion is that in every case where people feel the urge to mutilate logic in this way there is an error of this kind being made. But why not mutilate Logic? I'm not sure why Quine thought it was such a bad idea, so perhaps i should go and re-read him and see if he ever explains it. My feeling is that mutilating logic is a bad idea because Logic reflects the underlying structure of reality at its deepest levels, that is to say, at a level that we all reach if we go down far enough—wherever we start from, and that that Logic is the same everywhere. So a decision to use a mutilated logic is a decision to go for a superficial analysis.

If you don't think that's what Logic is, then perhaps we are using the word in different sense. That would hardly be surprising! But it would have the cheering corollary that perhaps we aren't disagreeing after all. One way in which this could happen is by using different parts of the Janus-head of Logic: Normative vs descriptive.

T O B E C O N T I N U E D

Phallocracy. Fuzzy feeling ...

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