

The Compleate Logician
or
Miss Blackmore's Unspeakable Sin

by

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A series of Science/Fantasy novels by Fletcher Pratt and L Sprague deCamp started in the nineteen forties, and were collected later in *The Incomplete Enchanter*. They featured Harold Shea, who travelled into the world of Norse Myth, and subsequently into other fictional worlds, including Spenser's *Faery Queen* and the Finnish epic the *Kalevala*. This was accomplished by the syllogismobile: it consisted of reciting and focussing the mind on the underlying logical premises of these worlds. While it made entertaining fantasy, even in my early teens I was sceptical of the efficacy of a syllogismobile, although it did turn my adolescent mind to the question of logic. Other SF books with a related element were the Null-A books of A.E. Van Vogt, in which the hero is equipped with two brains and can think in a non-Aristotelian logic, an ability denied to lesser mortals.

Contemplating the ideas underlying the books, the question arises: what is the status of Logic? Does it, as Pratt and Sprague deCamp suggest implicitly, underlie the structure of the Universe? Or does it as Van Vogt suggests underlie the structure of our minds or brains? Is it possible for a human being to think in a non-classical logic? Could other logics be used, possibly to advantage in understanding this world we live in? These ideas were heady and liberating, and I knew sufficiently little to feel free to speculate and to reason— and even to read, with some difficulty, some of the works of the logician Post on non-Aristotelian logics.

Some years later, in my late teens, I went to live in Harrow in North London, and stayed with a landlady, a Miss Blackmore. She was elderly, but tolerant and charming. She endured my after dinner arguments with admirable grace and astonishing fortitude. I learnt a good deal from Miss Blackmore, not least an appreciation of logic that had not been as clear as it might have been at that point.

It came about as follows: One night I constructed an argument demonstrating the non-existence of God. The reader may be sceptical about its validity, but that is irrelevant to the point I am making and I ask your forbearance. I concluded triumphantly if perhaps erroneously: 'Therefore God does not exist!' Miss Blackmore expressed a polite dissent. 'Oh, but He does,' she said, smiling.

'Then which of my premisses do you deny?' I demanded.

'Oh none of them, they are very nice premisses. All quite true,' Miss Blackmore encouraged me.

'Then where is the error in my reasoning?' I asked.

'Oh, your reasoning is splendid and quite without flaw,' Miss Blackmore said happily.

'But if you accept my premisses and also agree that my arguments are valid, then you must accept my conclusion!' I thundered at her.

'Oh no, I don't *have* to at all,' said Miss Blackmore. And she was right, she didn't.

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I confess that I was shocked. What Miss B was doing was refusing to apply the law of inference known to Logicians since the Middle Ages as Modus Ponens. It says: 'Whenever the proposition P is true, and the proposition P implies Q is true, then Q is true.' Symbolically we write:

$$\begin{array}{l} P \\ P \Rightarrow Q \\ \hline Q \end{array}$$

Miss B had accepted that P was true, where P was the conjunction of my various premisses. She had accepted that $P \Rightarrow Q$, since this was the reasoning. But she absolutely refused to have any truck with Q. To deny Modus Ponens was to do something unspeakable, to strike at the very heart of reasoning. And she did it with a sweet and forgiving smile.

I was pretty clear therefore that Miss B had done something heinous. Whether it merited a prison term I was not quite clear. Maybe it was something where pointing out the error of her ways and deporting her to Australia would be enough. But clearly it was very bad. Immoral if not illegal.

Or was it? What exactly was wrong with refusing to allow Modus Ponens if you didn't feel like it?

Miss B's gentle refusal to accept Modus Ponens goes some way to settling the question of whether Logic encodes immutable facts about the Universe, facts that are more basic than those of Physics. Obviously Miss B had her very own Syllogismobile but it had left her in North Harrow, sharing not only the same Universe but indeed the same house as me. It also left me in some doubt as to whether Logic could underlie brain functioning, as Miss B (and since her, many arts undergraduates) clearly had a brain of some description but it did not seem to have Modus Ponens built in. The arts graduates, indeed, felt exceedingly liberated by not being obliged to be logical. They generally felt that they transcended Logic; this view was particularly strongly held by certain feminists who explained that Logic was a tool of domination of men by women. Obviously not a very effective one in general.

In order to understand the status of Logic, it helps to have studied probability theory, which may be viewed as a logic taking a continuum of values in the interval of all real numbers between 0 and 1, instead of just the end points. What this demonstrates rather convincingly is that it is possible to use non-Aristotelian logic, and that in fact people do this all the time. Well, some people do. Not everyone seems to be able to do mathematics or statistics. In fact not everyone seems able to learn to read or follow complicated arguments. Or to put it another way, the speed with which people can follow a complicated argument varies a good deal across the human species, and some people can grasp in seconds what others would take a lifetime to master. This is an observable fact well known to anyone who has been obliged to teach Pure mathematics to any large group of people.

The psychologist Piaget places the learning of Logic and reasoning at the end of his list of skills acquired by the child mind, and one can only agree, with the reservation that not everyone gets there at all.

In order to see the exact nature of Miss Blackmore's crime, imagine meeting someone who interchanged the meanings of cat and dog. Whenever they referred to a cat barking and running after cars, or a dog curled up by the fireside, close examination leads us to realise that what we call a cat is not what they call a cat, and likewise dogs are not dogs. Such a person would constitute a problem for us, because we would have to mentally translate their terminology into the conventional one. More seriously, we would begin to wonder how many other, thus far undiscovered, idiosyncratic usages had been adopted. Could one trust them if one day they came out shouting 'My father has just murdered my mother,' when it might turn out that the word *murdered* was used to mean *kissed* and perhaps vice-versa?

And just how do we learn the correct usage of words anyway? Some of it is done by having one's errors corrected. Some of it done by the ability of the brain to derive rules from data. Both are exemplified by the child who comes to its parent and says: 'Mummy, yesterday I seed two mans in the garden.' The child has inferred that to get the past tense of a verb one puts an *-ed* sound on the end, and to get the plural of a word one appends an *s*. These rules are generally correct but alas fail in these cases, and Mummy is likely to reply: 'No, yesterday, you *saw* two *men* in the garden.'

In general, one is not taught logic, one is merely exposed to it, and if one has the internal machinery ready, one infers the rules. This is obviously a very different sort of inference from logical inference. One generalises from samples. And one may generalise incorrectly. Nevertheless, it is a distinctive property of brains that we do in fact pick up rules.

If you doubt this, imagine doing the following experiment with a small child. You show it two hats. You reach into hat number one and pull out a strip of paper and read from the strip: 'ABABABAB'. You reach into the same hat and pull out another strip and read it: 'ABABAB'. And a third: 'ABABABABAB', and a fourth: 'ABAB'. Then you reach into hat number two and pull out a strip of paper and read it: 'AAAABBBBB'. A second strip from hat number two reads: 'AAABBBBB', while a third reads: 'AAAAAABBBBB'.

Now I reach into my pocket and pull out a new strip, different from the others and read it out: 'AAAABBB'. Now we ask the question, from which hat did I draw the last strip? If I took it from one hat before the show began, can you say which hat you believe it came from? Most small children pick the second hat. Big ones do too. Obviously there can be no guarantees about this, but the child

is likely to guess that strips from the first hat have A's and B's alternating, and from the second hat have some string of A's followed by a string of B's. They extracted these rules from the rather sparse data provided and I expect you did too.

Since this goes to the problem of induction, I shall give my solution, which is to enquire, if you were going to build a robot which had to make guesses at what the universe is likely to throw up next in order to survive, would you see any alternative to having its brain build on experiences as though it has a principle of induction built into it? Would you not, in fact, be obliged to build something like a principle of induction into it? Or something a good deal stronger than a principle of induction, in order to deal with the problem of the hats? Those with the necessary skills might amuse themselves by writing a computer program which could do the problem of the two hats, with various kinds of strips in each hat. Reaching the level of competence of a ten year old child would constitute a triumph. Test your program against any ten year old child, but be sure to put it back after use.

In fact brains do not just reason that if something has happened umpteen times it is likely to expect it to happen again, although they do that. They also extract rules from observations. And remarkably small sets of observations, too. In technical terms, they do *grammatical inference*.

Only sometimes they don't. If the rules are very complicated, some brains give up. They do not see the underlying logic. Although human brains are amazingly good at inferring rules from samples, some of them are better than others. If you don't believe this, look at an intelligence test.

In language use, the convention that negation of a sentence can be accomplished with the word 'not' inserted judiciously can be inferred by some people. The rule inferred by some human beings is that 'not' means denial of the truth of some proposition. If you have also inferred that propositions must be true or false, although one may not know which, then if we negate a proposition twice, we get back to the original. Not Not P = P

Some human beings interpret *Not* as disavowal. So the more Nots you put in the more passionately you deny P. Not Not P \Rightarrow Not P

These are different interpretations of how the word *Not* is correctly used. It is not difficult to find people who have adopted the second rule, which is wrong in standard English. You ain't not allowed to do things like that, not nohow.

It would be nice to believe that rejection of Modus Ponens gives rise to a freedom from the tyranny of classical (Dead White Male) Logic. Actually, all it means is that you haven't correctly extracted the correct rules which specify how the words AND, OR, NOT, IMPLIES are in fact used. This is Miss Blackmore's sin: she simply did not use the conventions for usage of certain words. Just like the person who gets cat and dog reversed, it raises doubts about her reliability in certain areas. In this case, it would have been unwise to trust any of her arguments. On the other hand she was an excellent cook.

Abandoning a convention may be a sin, a crime, a radical innovation and stroke of genius or just plain stupidity. Driving on the left hand side of the road is OK in Britain and Australia, not OK in the United States or France. A firm convention makes for easier traffic flow, and so we follow it. Anyone wishing to be brilliantly innovative and violate the convention will, if caught, suffer at least a fine and may get killed. The penalty for violating a law of logic is that people will stop taking much of what you say seriously, since it is an indicator that you have failed to infer some linguistic conventions, so cannot be relied upon to have got other things right. Since Propositional Logic is simply the grammar for the connective words AND, OR, NOT, IMPLIES, and little else, and since you have failed to grasp how these are correctly used, you are clearly retarded and may be ignored. Except in your own circle of friends who will share your disability, but the chances of any of you producing complicated arguments which are reliable are slight: that is after all why the language was made that complicated.

There is no need for putting violation of Modus Ponens on the criminal code, the crime carries its own penalty: people who can reason will stop taking you seriously.

If you sit around with friends bemoaning the fact that nobody will listen to your views on how to improve the world, this just may be the explanation. You may test it by doing a course on Logic or Pure mathematics. If you pass, there is probably another explanation. Your capacity for inferring rules is adequate, and your capacity for dealing with abstractions admirable. If, on the other hand, you find algebra gives you a headache, logic leaves you confused and you cannot see why you need to have any dealings with the stuff, don't. Give it

up. Take up pottery or basket weaving. But you will be happier if you also give up having strong opinions on nuclear physics, economics, ecology or anything else complicated. I tell you this as a friend, although I have my doubts about whether you will see it that way.