Plain Logic

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Introduction

In this wildly exhilarating essay, I have to go into two mathematical principles that I already solved years ago, but it's somehow a bit hard to get attention. The first one is, for as far as I can remember, a problem that was handed to us in my first year of university, and I immediately got that what they were doing was wrong, but the way we are taught, we're not allowed to question authority.

I don't care.

The first problem is the problem that you can't prove a logical system within itself, how do you prove that? The second is, how do you prove that when you have a system with a certain permutation that works, no other permutation will work? Piece of cake.

Why It's Impossible To Prove a Logical System Within Itself

It's quite simple really. The people that ask the question made a really simple mistake: based on the fact that the answer was dead-obvious, they decided to convolute the problem, by introducing a typo! So what then is the mistake? As any writer will tell you, it's the typo. You need to eliminate the typo.

I already came up with this in my first year in university, as said, meaning in 1998 or 1999. What it looks like is this:

$$\Sigma \vDash \Sigma^* \qquad \text{[Eq. 1]}$$

Now, as you can see in Eq. 1, they've noted an asterisk (*) behind the second capital sigma. Capital sigma stands for the logical system we're using. The asterisk means it's a copy, but the interesting thing is that it's noted nowhere in the logical language here employed, other than in noting this particular problem, which is, to say the least, peculiar.

Allow me to demonstrate why. Normally when you start with something that follows from a particular logical system, it for instance looks like in Eq. 2.

$$\Sigma \vDash p \longrightarrow q \qquad \text{[Eq. 2]}$$

What it says here is that from the logical system capital sigma, follows the "if p is true then q is true"-clause. When I then introduce a basic assumption, like for instance the notion that p holds, you get a p-introduction rule, like in Eq. 3. I'll also note a couple of follow-up equations, but what it boils down to is in Eq. 3.

$$\Sigma, p \vDash p, p \longrightarrow q \; [p, I] \qquad \text{[Eq. 3]}$$

$$\Sigma, p \vDash q \; [\longrightarrow, E] \qquad \text{[Eq. 4]}$$

$$\Sigma \vDash p \longrightarrow q \; [p, E] \qquad \text{[Eq. 5]}$$

As you may now note, even though the p on the right is also a copy, it doesn't receive an asterisk (no *). As such, there's no reason to place an asterisk on the capital sigma either. So in order to prove that a logical system can't be proven within itself, the basic equation becomes rather simple. It's supposed to look like Eq. 6 and reduces to Eq. 7, which also offers the official solution.

$$\Sigma \vDash \Sigma \qquad \text{[Eq. 6]}$$

$$\emptyset \vDash \emptyset \; [\Sigma, E] \qquad \text{[Eq. 7]}$$

What Eq. 7 basically says is that nothing follows from nothing, but what you're looking for as evidence, is that after reducing all of the equations to the bare minimum, is that from nothing follows the logical equation that you mean to prove. Here, since we're trying to prove that the logical system capital sigma holds, what we should get is the same as Eq. 8.

$$\emptyset \vDash \Sigma \qquad \text{[Eq. 8]}$$

As now becomes clear, this isn't what it reduces to. Since it isn't the same as what we're looking for, but instead it says that from nothing follows nothing, a logical system can never be proven within itself, because it reduces to nothing, eliminating all of its own equations. The fact that this isn't what we're looking for looks like Eq. 9.

$$\emptyset \vDash \emptyset \;\neq\; \emptyset \vDash \Sigma \qquad \text{[Eq. 9]}$$

I already came up with this solution a long time ago and published it via a note on LinkedIn in I think 2005, but I'm not sure. Anyway, here it is, once again, published to my website.

Proving That no Other Permutation of a System Works?

It's fairly easy to do so. A lot of people feel like you need to walk through all permutations in order to prove no other permutation holds. As I noted in my Master's thesis on the General Theory of Consciousness in 2004, chapter 7, you don't have to walk through all permutations (7! = 5040 permutations) to prove that this is the only permutation of the layers that will hold. What you need to realize is this...

Every other permutation other than the permutation that works always reverses the order of one of the layers with the one directly above it. So, if you can prove that it's always impossible that you reverse the order of each and every layer with the one directly above it, then you've proven for all other permutations that they don't work. That way you don't have to walk through all of the permutations.

If this isn't possible, use a computer. It will handle things more swiftly than you ever will.

Conclusion

I did my homework. I delivered the evidence. I delivered the goods. Enjoy.

Literature

Hobo, E.M. (2004) "The General Theory of Consciousness: The Abstract Definition of the Processes Required for the Emergence of Consciousness (Master's Thesis)" : University of Twente, Computer Science, Human Media Interaction.