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Blood and bloody ashes!

-Lan Mandragoran

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The Dark One can't win: a proof

Submitted by terpstra
Posted on 12/29/2004 4:33:19 AM

I am sure everyone already believes that the Dark One will lose. However, I can prove it with mathematical rigour.

I define the Dark One winning as him breaking the wheel and remaking the pattern in his own image / blah power trip. When this happens, the cycle of ages breaks down.

You may argue he could settle for a smaller victory, but the only thing I will prove is that he cannot acheive this ultimate victory.

Recall: the wheel turns and turns and has no beginnings or ends. I choose to ignore the 'ends' part as optimism. However, I choose to believe that the wheel never began; the wheel has turned endlessly with no beginning till the present Randland day. Everyone in the Randland accepts this as true, even those who believe the dark one can break the cycle.

We can assign the current turning the number 0. Every previous turn gets a number based on how far back it was (-1, -2, -3, ...). Because there are no beginnings, there is no smallest number/turning. Therefore, every negative integer corresponds exactly to one previous wheel rotation. In mathematics a set of this size is called countable (which means you can "count" and eventually reach any given number, but never reach all of them).

As people learn in Highschool mathematics if you flip a fair coin twice, the probability of getting heads twice is 0.5 * 0.5=0.25. It is important that the events be 'independent', if so then you can take the product of (multiply) the two probabilities to be the chance that both happen.

Now, suppose that the Dark One had even a tiny chance of winning. Let's call this probability p where p must be > 0.

(1-p) is the chance that the Dark One loses. The probability that dark one lost last spin and the spin before is (1-p) * (1-p) = (1-p)^2, supposing he gets an independent chance each time. However, the Dark One has actually lost more times than any number we pick; (each negative integer is in the list of turnings).

So, if he lost the last k turnings the probability of that is (1-p)^k. (1-p) < 1

because we are assuming he has a hope (p>0). Let's look at what happens as k gets very big (since he lost more times than any number we pick).

If you punch any number between 0 and 1 (excluding 1) into your calculator and repeatedly square it, you will see it drop slowly to zero. This is called a limit.

If you know calculus, we can take the limit as k 'goes to infinity' and the value (1-p)^k=0. You can see this by making k get bigger and bigger and imagine taking this to the inevitable end.

What this means is that the chance that the Dark One has never won is zero, ie: impossible. However, that contradicts what we see in the books today; he hasn't won yet!

Therefore, my assumption that he has a chance must have been in error. Ergo, he has no chance. It doesn't matter one bit what Rand does. The main characters can all go on holiday, the books' conclusion is foregone.

Incidentally, this proof can be generalized to work even without the 'independent' chances per turning assumption, but to do this proof properly becomes much more technical and requires analysis and markov processes, so I have left it out.

(One more aside to those who know about uncountable sets: yes the uniform distribution over reals has a zero probability for each number and yet a particular number is chosen. However, that Dark One only gets a countable number of chances (the positive turnings) and that is not enough for this effect to happen here.)

So, my question to you is: why can the Dark One never win? He seems to think he can. My answer: the pattern prevents him; by boring through the pattern he becomes a thread to be woven as the pattern wills. 'He who thinks he turns the wheel of time may learn the truth too late' could also apply to the Dark One.

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