Chapter Appendix: The Tickle Defense

In this section I will tell you about the **Tickle Defense,** which is a way of defending the Principle of Expected Value Maximization in the face of cases like the mathematosis example.

Recall our discussion of mathematosis in Lecture 5.3.2, and consider the question of how the mathematosis gene is supposed to cause people to do mathematics? Let us suppose that mathematosis causes a certain urge to do mathematics, and that this urge has a distinctive feeling—a *tickle*, if you will. (We'll talk more about whether this is a plausible assumption below.) If that's how the gene works, then the presence or absence of a tickle gives you information about whether or not you're likely to get the disease.

In particular: if you feel the tickle, that gives you some evidence that you will get the disease. The reason friends of the Tickle Defense think this is interesting is that they think that once you've felt the tickle, the decision to do mathematics won't provide you with any *additional* evidence that you'll get the disease.

To put things in probabilistic terms: everyone agrees that the probability of getting the disease (D), given that you do mathematics (M), is higher than the probability of getting the disease given that you don't:

$$P(D|M) > P(D|\overline{M})$$

But proponents of the Tickle Defense think for someone who *has felt the tickle* (T), the probability of getting the disease, given that one does mathematics is the *same* as the probability of getting the disease, given that one doesn't do mathematics:

$$P(D|MT) = P(D|\overline{M}T)$$

And from this it follows that once you've felt the tickle, doing mathematics is probabilistically independent from getting the disease:

$$P(D|MT) = P(D|\overline{M}T) = P(D|T)$$

When T is related to M in the above way,T is said to **screen off** the evidential import of M and $\overline{M}$. That is, any evidence that would be provided by M or $\overline{M}$ on the matter of getting the disease will have already been taken into account once you learn T.

Similarly, proponents of the Tickle Defense think that *not having felt the tickle* $(\overline{T})$ screens off the evidential import of M and $\overline{M}$:

$$P(D|M\overline{T}) = P(D|\overline{M}\overline{T}) = P(D|\overline{T})$$

So, says the Tickle Defender, the Principle of Expected Value Maximization is right after all. For, as long as you make your decision about whether to do mathematics once you've felt the tickle, or once it's clear that you're not feeling it, the expected value of doing mathematics will be *higher* than the expected value of not doing mathematics.

To illustrate how this might come about, let us suppose that having the tickle is very highly correlated with getting the disease:

$$P(D|T) = 0.9$$

Since having the tickle screens off the evidential import of M and $\overline{M}$, we have:

$$P(D|MT) = P(D|\overline{M}T) = 0.9$$

Let's now suppose that you've felt the tickle. Then your options are:

MT doing mathematics in a world in which you've felt the tickle.

$\overline{M}T$ not doing mathematics in a world in which you've felt the tickle.

The expected values of these options are as follows, assuming you take the disease to have value −100000, doing mathematics to have value 90, and the tickle itself to have no intrinsic value.

$$\begin{aligned} EV(MT) = & \quad v(DMT) \cdot p(D|MT) + v(\overline{D}MT) \cdot p(\overline{D}|MT) \\ = & \quad (-99910 \cdot 0.9) + (90 \cdot 0.1) \\ = & \quad -89,910 \end{aligned}$$

$$\begin{aligned} EV\left(\overline{M}T\right) &= v\left(D\overline{M}T\right)\cdot p\left(D|\overline{M}T\right) + v\left(\overline{D}\overline{M}T\right)\cdot p\left(\overline{D}|\overline{M}T\right) \\ &= \left(-100000\cdot 0.9\right) + \left(0\cdot 0.1\right) \\ &= -90,000 \end{aligned}$$

So, once you've felt the tickle, you will see the expected value of doing mathematics as *greater* than the expected value of not doing mathematics, which means that the Principle of Expected Utility Maximization will tell you to do mathematics.

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