Viralizing Video Clips

Q9.1 How to calculate the 72% chance of a correct cascade and the 12% chance of an incorrect cascade in the chapter?

For a correct cascade, we need the first two public actions to be 1. Referring back to the tree diagram in the book, this can happen with two combinations of private signals:

- `PRV I`, `PRV II` $= 1$: What is the chance of Alice and Bob both getting 1? 80% each. We multiply: $0.8 \times 0.8 = 0.64$, or 64%.
- `PRV I` $= 1$, `PRV II` $= 0$, `FLIP` $= 1$: What is the chance of Alice's `PRV I` being 1? 80%. How about Bob's being 0? 20%. And the coin flip? 50%. Multiplying, we get $0.8 \times 0.2 \times 0.5 = 0.08$, or 8%.

Adding these two numbers together, we get $64\% + 8\% = 72\%$, *i.e.*, 72% chance of having a correct cascade.

Now, what do the public actions need to be for an incorrect cascade? Both 0. Referring back to the tree diagram in the book, we see this can happen in one of two ways:

- `PRV I`, `PRV II` $= 0$: What's the probability of each case? 20%. So we have $0.2 \times 0.2 = 0.04$, or a 4% chance of this happening.
- `PRV I` $= 0$, `PRV II` $= 1$, `FLIP` $= 0$: These actions have probabilities 20%, 80%, and 50%, respectively. Therefore, the chance of this outcome is $0.2 \times 0.8 \times 0.5 = 0.08$, or 8%.

Adding these together, we get $4\% + 8\% = 12\%$, as expected.

Q9.2 What happens to the probability of correct, incorrect, and no cascade as the moderator's probability is varied?

In Illustration 31, we show the effect of varying the moderator's probability (from 50% to 100%) on each outcome's chance of being triggered. What happens when we change the probability from 80%? Dropping it decreases the chance of a correct cascade; at 60%, for example, it has dropped from 72% to about 48%, while that of an incorrect cascade rises from 12% to 28%. What about at 50%? Here, the two cascade types are equally likely. And how about on the other extreme,

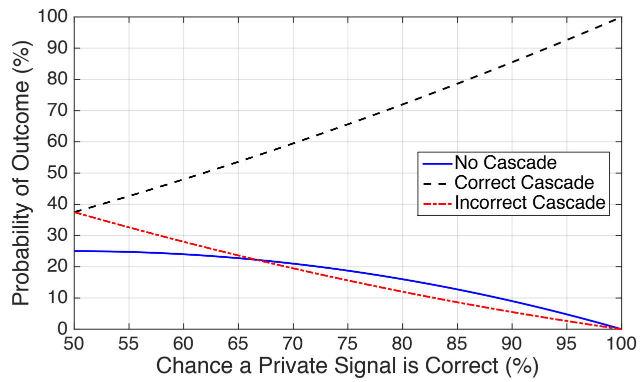

Illustration 31: This shows how the moderator's probability affects each outcome's chance of being triggered from the first pair of guessers. On the one extreme, when the moderator's probability is 50%, we have the same chance of correct as incorrect cascade, and less of a chance of no cascade. As the probability increases, the chance of a correct cascade increases, while that of incorrect and no cascade decrease. When it reaches 100%, the outcome is guaranteed to be a correct cascade.

at 100%? Here, we are *guaranteed* to have a correct cascade, for if the moderator always showed the the correct number, we'd never have the fallacy of crowds.

Q9.3 What does the relationship between the number of pairs and the probability of an incorrect cascade look like?

In Illustration 32, we show how the chance of triggering an *incorrect* cascade changes with the number of pairs. Each of the curves is for a different moderator's probability (50% to 100%). At 80%, for example, we see that it goes from 12% after one pair (as we found in our calculation before) to just under 15% after three pairs, and then stays the same. We notice this same trend in most of the cases: the probability jumps for the first few pairs, and is then more or less constant.

What does this tell us about whether the cascade will be correct or incorrect? Notice that the vertical axis on the graph only goes up to 50%. An incorrect cascade always has less than 50% chance of occurring, meaning that a correct cascade is always more likely. Still, the

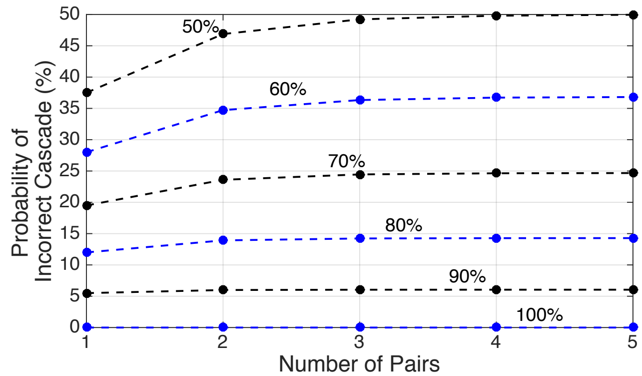

Illustration 32: This shows the probability that an incorrect cascade has been triggered after a number of guesser pairs have their turns. Each curve corresponds to a different moderator probability, from 50% to 100%. As more people guess, we are guaranteed some type of cascade, but the number of pairs doesn't have much bearing on which type of cascade it is.

numbers are rather unsettling, *e.g.*, with the moderator's probability at 60%, we still have over 35% chance the cascade will be incorrect!