"Why Did the Chicken Cross the Road?"

The Mathematical and Philosophical Approach

Peerayos Pongsachai

It is a common and familiar line that most people recognize immediately. It serves merely as an anti-joke to set up and betray people's expectation of a bland and normal punchline—"to get to the other side." However, the most peculiar aspect of the question is in the plain solution itself. If the Chicken crosses the road to get to the other side, what is its internal motive? People are only concerned with the grand inquiry into why the Chicken crosses the road; no one seems to desire to inquire why the Chicken would *want* to do that. It is through solving the fullest extent of the question that we find a unique phenomenon of philosophy overlapping with mathematics.

If we consider the question from the Chicken's point of view, looking at it as a creature with consciousness, then the simplest and most straightforward answer is: the Chicken crosses the road because it is unhappy. Using this reason as a determining factor, we can visualize two possible mental states for the Chicken: that it is either *happy* or *unhappy*. From this, there are four possible scenarios:

(1) that the Chicken is *happy* initially, then becomes *unhappy* after it crosses;
(2) that the Chicken is *happy* initially and stays *happy* after it crosses;

(3) that the Chicken is *unhappy,* then becomes *happy* after it crosses; and
(4) that the Chicken is *unhappy* initially and stays *unhappy* after it crosses.

With these scenarios, one can create a mathematical logic table using binary code.

Let the premise be that the Chicken is either *happy* or *unhappy*, where *happy* is 1 and *unhappy* is 0, and let there be condition B for *before crossing* and A for *after crossing*. With logic, the Chicken is ultimately *happy* if and only if the Chicken is *happy* in the *after* condition.

B	A
0	0
	1
1	0
	1

Now, why might it be *unhappy*? From the Chicken's stance, it would be because it is not satisfied with the conditions and environment of the side that it originates from. There are many different factors that can determine the satisfaction of the Chicken. Assuming it has the level of intellect and consciousness of any normal chicken, one should consider only the primary biological factors: finding a mate for reproduction and finding food to eat.

With such factors in mind, it is possible to assume that a *happy* state for the Chicken is possible *if and only if* both factors, food and mate, are satisfied. Thus, unless the Chicken has both food to consume and partner to mate, it will not be *happy*.

Let *x* be factor of food, and *y* be factor of mate, and let 0 indicate that the condition is *not* satisfied and 1 that it *is* satisfied.

x	y	x∧y
0	0	0
0	1	0
1	0	0
1	1	1

From this premise, the probability of the Chicken being *happy* is ¼ or 25%. Therefore it is not surprising to observe the Chicken crossing the road to the other side, because the probability of its initially being *unhappy* is 75%. However, if one disregards the factors of food and mate, the probability of the Chicken being *happy* is 50%, regardless of whether or not it crosses the road (as there are two possible states, *happy* and *unhappy*). With this another inquiry arises: Considering the factors of food and mate and the premises above, should the Chicken cross the road? The previous premise shows that crossing the road does not affect the probability of the Chicken being *happy* at all, but the premise that included the factors essential to the *happy* state shows that the probability of its being *happy* is low, so crossing the road while it is *unhappy* or *happy* would create a noticeable effect.

The question now is, how much effect would crossing the road have while the Chicken is *happy* or *unhappy*? Taking the two factors into account and the happiness status of before and after, the probability of the Chicken's being *happy* would still be 25% (Truth table, figure 3.a).

However, this is only the case when the Chicken crosses the road in *any* state of happiness. If the Chicken were to cross the road **only if** *unhappy*, then the probability would change (Truth table, figure 3.b).

The probability of the Chicken's being *happy* if it crosses the road then becomes 4/13 (4 out of 13 possible outcomes), which is approximately 30.77%. The probability of the Chicken's becoming *happy* increases by 5% if and only if it crosses when *unhappy* with the condition on the original side. Therefore, it makes sense mathematically for the Chicken to cross to the other side, since there is a higher probability of it being *happy* after it does.

From this discussion of the Chicken, we can then therefore investigate the bizarre but logical connection between mathematics and philosophy. In this particular case, we use philosophy to inquire into the question, "Why does the Chicken cross the road?" and then utilize mathematics to prove and illustrate the validity of our answer. In other words, we can use philosophy to question and investigate a topic, then use mathematics to demonstrate and ground the approach to that topic. As mathematics is simply a means to explain, rationalize, and prove questions that are philosophical in nature, it is not surprising that mathematics can be used to explain philosophical questions, even questions of the happiness of chickens.

B			A		
x	y	x∧y	x	y	x∧y
0	0	0	0	0	0
			0	1	0
			1	0	0
			1	1	1
0	1	0	0	0	0
			0	1	0
			1	0	0
			1	1	1
1	0	0	0	0	0
			0	1	0
			1	0	0
			1	1	1
1	1	1	0	0	0
			0	1	0
			1	0	0
			1	1	1

Figure 3a

Let B be the state before crossing, A the state after crossing, *x* the factor of food, and *y* the factor of mate, with 0 indicating that the condition is *not* satisfied and 1 that it *is* satisfied.

B			A			R
x	y	x∧y	x	y	x∧y	
0	0	0	0	0	0	0
			0	1	0	0
			1	0	0	0
			1	1	1	1
0	1	0	0	0	0	0
			0	1	0	0
			1	0	0	0
			1	1	1	1
1	0	0	0	0	0	0
			0	1	0	0
			1	0	0	0
			1	1	1	1
1	1	1	1			1

Figure 3b

Let B be the state before crossing, A the state after crossing, *x* the factor of food, *y* the factor of mate, and R the result thereof, with 0 indicating that the condition is *not* satisfied and 1 that it *is* satisfied.