The Monty Hall dilemma

Michael Clark (2012): Paradoxes from A to Z, pp. 133-135

Monty Hall hosts a game where a contestant must pick one of three indistinguishable doors. There is a prize behind only one of the doors. Monty knows which door is this. Before the door A chosen by the contestant is opened, Monty opens another door, B, and it is revelead that the prize is not behind that door. Monty next asks the contestant if he prefers to pick the remaining door C instead of the door A initially chosen. Should the contestant change doors?

• View 1. There is nothing to gain by changing doors because, being the prize behind one of two doors, the probability that any door contains the prize is ½.

• View 2. It is better to change doors. When the contestant made the initial choice A, the probability that the prize was behind one of the doors not chosen (B and C) was 2/3. After door B was opened, the knowledge that the prize was not behind B implies that 2/3 becomes the probability that the prize is behind B. Since the probability that A hiddens the prize remains at 1/3, it is more likely that the prize lies behind B. For this reason, changing doors looks like advisable.

The trolley problem

Michael Clark (2012): Paradoxes from A to Z, pp. 248-251
Martin Cohen (2007): 101 ethical dilemmas. pp. 12-13

A runaway empty trolley is heading towards five workmen on the track ahead. The only way of saving their lives is to pull a lever that will divert the trolley to another track, but at the expense of killing a workman on that track. Would you turn the trolley? Should it be turned?

Alternative scenario. You are on footbridge with a fat man just above the track leading to the five workmen. The only possibility of saving them is to derail the trolley by pushing the fat man and making him drop onto the track. Should he be sacrificed?

This problem is related with what is good and what is bad for an economy. The outcomes of an economy are always subject to assessment: is it "good" or "bad" to have a certain outcome, like a higher interest rate or a lower exchange rate? There is in general no clear-cut answer: some outcomes may be favourable to some people and, simultaneously, detrimental to other people.

A high interest rate is more beneficial to lenders than a lower one, as they receive more for lending money. Yet, borrowers are worse off with a higher than with a lower interest rate, since they have to pay more for getting a loan of money. The verdict on whether is the better a high or a low rate depends on how each group is regarded.

It is easier for European exporters to export to the US the lower the exchange rate (expressed in $/€ units), since the lower the rate, the more euros Americans get from one dollar. But the lower

the rate, the fewer the dollars Europeans consumers obtain from one euro, so the more costs (in euros) buying American goods. Hence, a lower euro-dollar exchange rate benefits European exporters but is detrimental to European importers.

Newcomb's problem

Michael Clark (2012): Paradoxes from A to Z, pp. 150-154
Mark Chang (2012): Paradoxes in scientific inference, pp. 206-208
Glenn W. Erickson; John A. Fossa (1998): Dictionary of paradox, pp. 137-138

There are two boxes, A and B. Your decision is between taking both boxes or taking only box B. Box A contains 1,000 EUR. Box B may contain 1,000,000 EUR or nothing. What B contains depends on the decision of an individual who has predicted correctly what thousands of people confronted with that dilemma have chosen in the past. The individual has put 1,000,000 EUR in box B if he has predicted that you will take only box B. He has put nothing in box B if he has predicted that you will take both boxes. Knowing all this, what choice would you make?

• View 1. The dominance principle. According to this principle, no matter what the individual predicts, choosing two boxes is a better option than choosing only one. If he predicts that both boxes will be taken, then the choice is between 1,000 EUR (if both boxes are selected) and nothing (the outcome of picking just box B). If he predicts that only box B will be taken, then the choice is between 1,000 + 1,000,000 = 1,001,000 EUR (if both boxes are selected) and 1,000,000 (the outcome of picking just box B). Whatever the case, more is obtained by choosing the two boxes.

• View 2. The expected utility principle. According to this principle only box B must be taken. If the individual is presumed to make correct predictions, there are only two possibilities. If the prediction is that both boxes are chosen, the resulting payoff is 1,000 EUR from box A plus nothing from box B. If the prediction is that only box B is chosen, then the payoff associated with that decision is 1,000,000 EUR. Consequently, picking just B yields a higher reward.

Gideon's problem (attributed to Gideon Schwarz)

Glenn W. Erickson; John A. Fossa (1998): Dictionary of paradox, pp. 73-74

You must choose between to boxes: box A, containing 1,000 EUR; and box B, containg 1 EUR. A philanthropic economist (an oxymoron?) promises to pay you 1,000,000 EUR if you choose irrationally (that is, not payoff maximizing). Which box would you choose?

If choosing B is the irrational choice, you would get 1,000,001 EUR. That makes A the rational choice, so you would receive only 1,000 EUR. This implies that B is not the irrational choice.

If choosing A is the irrational choice, you would get 1,001,000 EUR. That makes B the rational choice, so you would receive only 1 EUR. This implies that A is not the irrational choice.

If any choice of boxes is irrational, by opting for A you would get 1,001,000 EUR and by selecting B you would receive 1,000,001 EUR. This does not make choosing A an irrational choice.

If no choice of boxes is irrational, then by refusing to make a rational choice choosing a box you are making an irrational choice. In this case you would get 1,000,000 EUR. Yet, by choosing any of the boxes, the payoff is at most 1,000. That makes irrational the choice of any box.

Paradox of the Court

Mark Chang (2012): Paradoxes in scientific inference, p. 7

You are judging the following case. There is an initial contract between A and B according to which (i) A gives legal instruction to B and (ii) B pays for the instruction only after B wins his first case. When B's instruction has been complete, A asked B to pay for his instruction. B refuses to pay and you must solve the dispute. Is your decision in favour of A or in favour of B?

• View 1. A should be paid in any event. If A wins the case, he should be paid because he has won. If A does not win, then B wins his first case and, by the agreement with A, B should pay.

• View 2. B should not pay in any event. If B wins the case, he should not pay because of your verdict. If B does not win, then, by virtue of the initial agreement with A, B need not yet make any payment to A.

The dogmatism paradox (Gilbert Harman)

Glenn W. Erickson; John A. Fossa (1998): Dictionary of paradox, p. 51

Suppose you know some sentence **s** is true. This makes any evidence against **s** misleading, since it would be evidence against a true sentence. If one does not accept misleading evidence, the conclusion is that once something is accepted as true, there is a strong incentive to disregard any subsequent evidence against it. By ignoring evidence to what one holds as true, one becomes dogmatic, which does not seem a desirable trait of truth searchers.

The indoctrination paradox (suggested by Ludwig Wittgenstein)

Glenn W. Erickson; John A. Fossa (1998): Dictionary of paradox, p. 92

It seems that in a democratic society students should develop rationally grounded beliefs that are open to change. But this goal seems to demand acceptance by students of the belief in rational methods of forming beliefs. The paradox is that such a belief must be immune to challenges: to prevent indoctrination students must be indoctrinated.

The lottery paradox (Henry Kyburg)

Glenn W. Erickson; John A. Fossa (1998): Dictionary of paradox, p. 115

Suppose that a proposition is accepted when its degree of confirmation (support, evidence) is x, positive number smallest than 1. For example, let $x = 0.99$. Consider a fair lottery with 1,000 tickets, numbered from 1 to 1,000. Only one ticket is going to be chosen as the winner by means of a random mechanism that makes every ticket equally likely to be selected. Define $p(n)$ to be the proposition that ticket n will not selected. It seems reasonable to accept the degree of support for $p(n)$ is $1 - 1/1{,}000 = 999/1{,}000 = 0{,}999 > x$. Therefore, the conclusion that no ticket will be selected would be accepted. This contradicts the initial assumption that some ticket will be chosen.

Regression to the mean

Mark Chang (2012): Paradoxes in scientific inference, pp. 131-133

Measurements of empirical events are subject to the regression to the mean phenomenon. For example, skill and luck are important causal factors of exam scores. For a given exam, at least four groups of individual could in general be defined. Group 1: skilled students with good luck. Group 2: unskilled students with good luck. Group 3: skilled students with bad luck. Group 4: unskilled students with bad luck. Members of group 1 and some of groups 2 and 3 will be above average, whereas members of group 4 and the rest of groups 2 and 3 will be below average.

If the exam is repeated, it is not very likely that the members of group 2 above average will repeat their luck; as a result, they will not perform as well as in the first exam. Similarly, it is to be expected that the members of groups 3 will improve their luck and, consequently, will do better in the second exam.

Wrong causes may be attributed to certain phenomena when regression to the mean is not taken into account. For example, to what extent can one conclude that desirable changes in a macroeconomic variable are the result of a certain policy measure?

Framing Effect

Charles Holm (2015): The 25 cognitive biases: uncovering the myth of rational thinking

The framing effect occurs when conclusions depend on the way information is presented. For instance, options described in terms of outcomes viewed as positive tend to be preferred to equivalent options described in terms of outcomes viewed as negative. An economic policy expressed in terms of employment is more likely to be supported by people than the corresponding policy expressed in unemployment terms.

Example. There are 100 people, 80 of them unemployed and the remaining 20 employed. What policy do you prefer?

- Policy A: a measure that increases employment by 10 persons
- Policy B: a measure that reduces the unemployment rate by 10 percent points

- Policy C: a measure that reduces employment by 10 persons
- Policy D: a measure that increases the employment rate by 50%

- Policy E: a measure that reduces the unemployment rate by 10 percent points
- Policy F: a measure that increases the employment rate by 10 percent points

- Policy G: a measure that reduces unemployment by 10 persons
- Policy H: a measure that increases employment by 10 persons