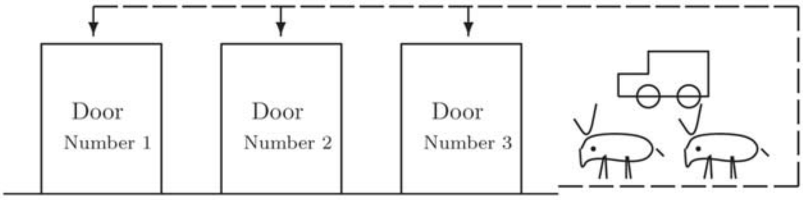
MATHEMATICAL FOUNDATIONS OF MEASUREMENT THEORY

「測定理論の数学的基礎」

[Monty Hall problem]. Suppose you are on a game show, and you are given the choice of three doors (i.e., "number 1", "number 2", "number 3"). Behind one door is a car, behind the others, goats. You pick a door, say number 1, and the host, who knows what's behind the doors, opens another door, say "number 3", which has a goat. He says to you, "Do you want to pick door number 2?" Is it to your advantage to switch your choice of doors?



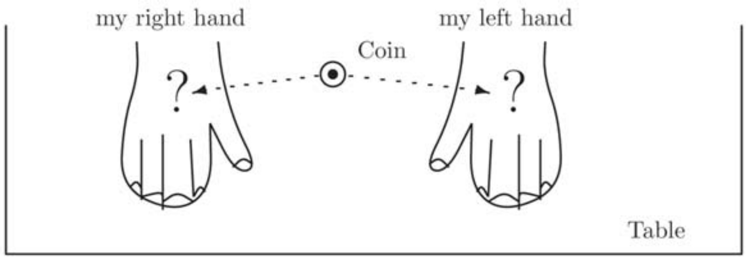
Four answers (Problem 5.12, Remark 5.13, Problem 8.8, Problem 11.13) are presented in this book.

The following old statement

[♯] *Since Socrates is a man and all men are mortal, it follows that Socrates is mortal,*

is, of course, famous. However, we have the question: "Is the syllogism [♯] true or not?"
Or, can you prove it? (See Theorem 7.19)

A coin is, at random, put under my right hand or my left hand. Suppose that you do not know which hand the coin is under, and you choose one of my hands which you guess that the coin is under. Then, the probability that the ball is under the hand you choose is, of course, equal to 1/2. Next, consider the case that the condition: "at random" is not assumed in this problem. How do you think about this case?



(See Problem 11.10)

[The problem concerning EPR-experiment]. Let A and B be particles with the same masses m. Consider the situation described in the following figure:

where "the velocity of A" = −"the velocity of B".

The position q_A (at time t_0) of the particle A can be exactly measured, and moreover, the velocity of v_B (at time t_0) of the particle B can be exactly measured. Thus, we can conclude that the position and momentum (at time t_0) of the particle A are respectively equal to q_A and $-mv_B$. Is this fact contradictory to Heisenberg's uncertainty relation?

(See §12.7)

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