POSTSCRIPT

In this book I propose "measurement theory", that is,

> an epistemology that is considered to be the mathematical representation of "the mechanical world view".

In this sense, I may not deny that this book is regarded as the book of philosophy.[§]

I surmise that a "postscript" is the part that is firstly (and most frequently) read throughout a book. Thus, in what follows I would like to enumerate important new results (≈ my favorite results) in this book.

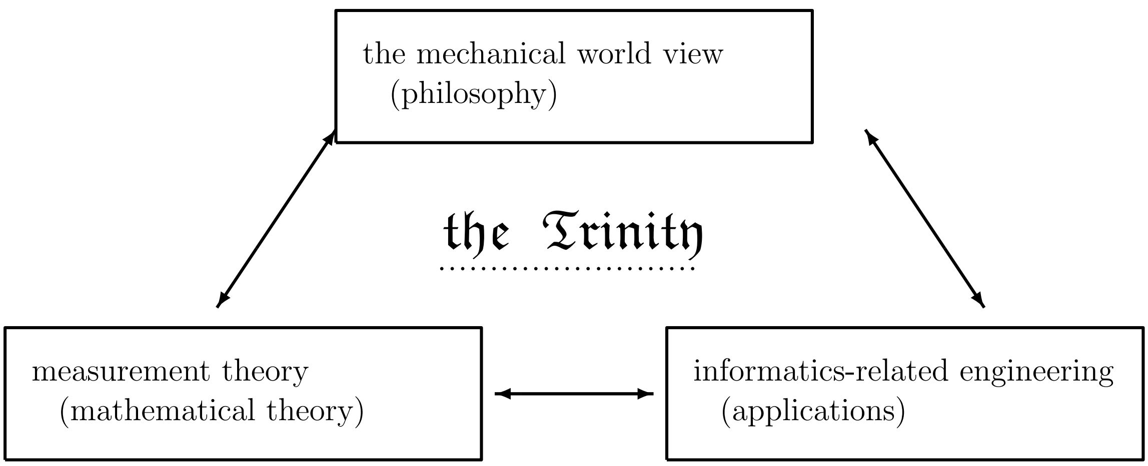
(1) MT (= measurement theory) is the mathematical representation of the epistemology called "the mechanical world view", and thus, it is also called GDST (= general dynamical system theory). I hope that the following assertion (= Table (1.7)) will be generally accepted.

Table (1.7′)

- **Sci. Theor.**
  - **Mathematics** "Foundations of math." — logic, number theory, topology, differential geometry, complex analysis, real analysis, operator algebra, differential equation, probability theory, etc. (C_1)
  - **Math. Sci. Theor.**
    - **Theor. Physics** 'TOE' — Newtonian mechanics, quantum mechanics, Maxwell's electromagnetic theory, Einstein's relativity theory, Weinberg-Salam theory, quantum chromodynamics, etc. (C_2)
    - [My proposal in this book] **Theor. Informatics** MT (= GDST) — dynamical system theory, quantum system theory, practical logic, statistics, circuit theory, control theory, multivariate analysis, information theory, chaotic system theory, automata theory, OR, game theory, etc. (C_3)
  - **Usual Sci. Theor.** — economics, chemistry, biology, medicine, psychology, statistical mechanics, fluid mechanics, engineering (also, see (I_7) and (I_8) in §1.2), etc. (C_5)

[§]In fact, this book can not be read and understood without Chapter 1 (the philosophy of measurement theory).

We assume that "measurement", "its philosophy" and "its applications (≈ informatics-related engineering)" should be regarded as "the Trinity" as follows:



(2) I propose the characterization of Bell's inequality in the framework of PMT (i.e., Axioms 1 and 2), *cf.* §3.7. I conclude that:

- if we admit PMT (= "Axiom 1 + Axiom 2 (Markov relation)"), we must admit the fact that there is something faster than light. (3.49)

This assertion is, of course, one of the most profound scientific assertions in all science. As mentioned in the footnote below §3.7.1, my understanding of Bell's inequality may be shallow. Thus, I think that the most of originality may not be due to me but great pioneers (i.e., de Broglie, A. Einstein, J.S. Bell, etc.).

(3) I assert that equilibrium statistical mechanics should be due to "STI" (= "staying time interpretation of statistical mechanics in (4.28)") and not "PI" (= "probabilistic interpretation of statistical mechanics in (4.30)"]) in Chapter 4. That is, under the "STI" (which is nearly regarded as common sense), equilibrium statistical mechanics can be understood in classical PMT as follows:

$$\text{“equilibrium statistical mechanics”} = \underbrace{\underset{((A_1)(=\text{Axiom 1}))}{\text{“probabilistic rule”}} + \underset{((T^1)\text{ and }(T^2))\text{ under (EH)})}{\text{“Newton equation”}}}_{(\text{STI } (\approx \text{“common sense”}))} \tag{4.28 (=(4.4))}$$

Also, see the other proposals (4.29) and (4.31).

(4) I stress the following correspondence:

Axiom 1 (measurement) in PMT $\leftrightarrow$ Fisher's likelihood method in statistics

That is, Fisher's likelihood method is one of aspects of Axiom 1 (measurement). Cf. Theorem 5.3.

(5) Regression analysis II (6.48) (and not Regression analysis I (6.7)) in Chapter 6. This and the above (4) imply that Fisher's statistics is "theoretically true", (*cf.* Declaration 1.11).

(6) In §7.1, I assert that "measurement", "inference" and "control" are the different aspects of the same thing. Also, since "(practical) logic" is a qualitative aspect of "inference", there is a reason to consider that "(practical) logic" [resp. "inference"] is used in rough [resp. precise] arguments.

(7) Theorem 7.19 (practical logic in classical measurements). This theorem justifies the following famous saying;

- *Since Socrates is a man and all men are mortal, it follows that Socrates is mortal.*

Also, the following strange logic is proposed:

$$\text{"SWEET"} \Rightarrow \text{"RIPE" and "RIPE"} \Rightarrow \text{"RED" implies "RED"} \Rightarrow \text{"SWEET" (in some sense)} \tag{7.38}$$

(8) If Zadeh's assertion is that *system theory has a logical aspect,* I agree with him. In fact, practical logic is discussed in the framework of GDST (= MT) in Chapter 7. However, I think that Zadeh's fuzzy sets theory overstates many things. Thus, in §7.5, I assert "Zadeh's fuzzy sets theory can not be completely formulated in MT". That is, his theory is not completely "theoretically true" (*cf.* Declaration (1.11) in Chapter 1). And thus we do not add Zadeh's fuzzy sets theory to (C_3) in (1.7). His "theory" sholud be regarded as one of empirical methods in MT. However, the fashion of his theory gave me the original motivation of our theory (*cf.* the footnote below Problem 1.2 in Chapter 1).

(9) The measurement theoretical formulation of Kalman filter in §8.4 (though it is merely a simple corollary of the generalized Bayes theorem (= Theorem 6.6 or Theorem 8.13)).

(10) The entropy of a measurement (particularly, Examples 8.17 and 8.18).

(11) Theorem 8.20 (Bayes theorem for belief measurements). It should be noted that belief measurements have no samples spaces. Thus, the proof is different from the proof of Bayes theorem for statistical measurements.

(12) Bertrand's paradox is clear in MT (*cf.* §8.7). It is obvious that we encounter Bertrand's paradox if "invariant state" is unreasonably regarded as "statistical state". It should be noted that "invariant state" and "statistical state" are not directly related in MT.

(13) The generalized moment method in §9.4. I want to compare Fisher's likelihood method (Theorem 5.3), Bayes' method (Theorem 8.13, Remark 8.14) and the moment method in the framework of measurement theory. In order to do so, we have to propose the generalized moment method (in §9.4).

(14) The definition of "particle's trajectories" due to Theorems 10.1 [W^*-algebraic generalization of Kolmogorov's extension theorem]. Particularly, the definition of Brownian motion $B(t)$ in §10.4. Since Brownian motion is not a "motion" but "measured values", we can understand the fact: the velocity "$\frac{dB(t)}{dt}$ does not exist".

(15) The definition of "measurement error" in §11.1. This is superior to the "conventional definition" such as | "true value" − "measured value" |. Also, this is essential to the characterization of Heisenberg's uncertainty relation (*cf.* Chapter 12).

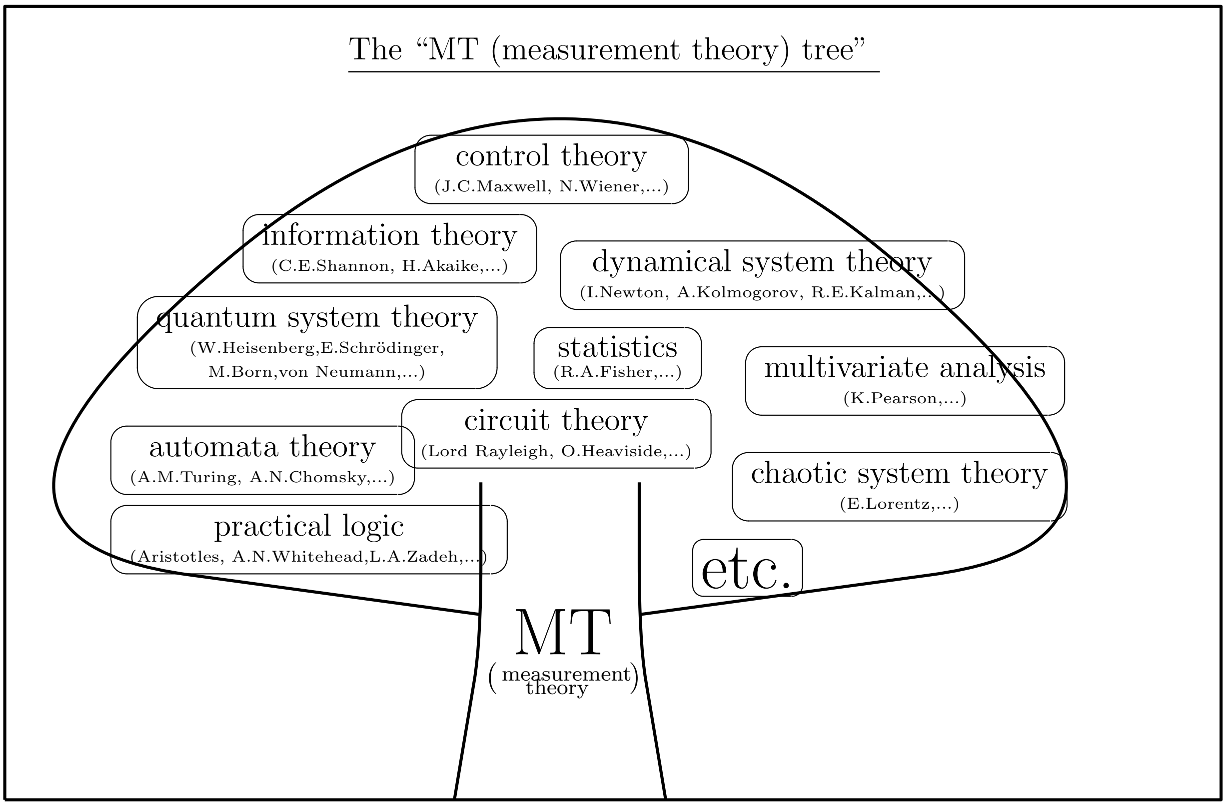
(16) Theorem 11.12 (The principle of equal probability, SMT_{PEP}-method), which makes Bayes theorem quite applicable. That is, I consider that this theorem (=Theorem 11.12) and the generalized Bayes theorem (= Theorem 8.13) are the most important in SMT.

(17) Four answers to the Monty Hall problem (i.e., Problem 5.12, Remark 5.13, Problem 8.8, Problem 11.13) are presented in this book. Although these are all reasonable, the answer in Problem 11.13 may be the most natural.

(18) I assert the mathematical representation of Heisenberg's uncertainty relation in §12.7. This solves the paradox between Heisenberg's uncertainty relation and EPR-experiment in §12.7.

Note that "*the mechanical world view*" (due to I. Newton, "Principia";1687, [66]) is one of the most successful epistemologies in the history of science as well as mechanics. This is the histrical fact. And therefore, I am convinced that our proposal (i.e., "measurement theory" (=the mathematical representation of "*the mechanical world view*")) has a gerat power to understand and analyze every phenomenon.

I hope that "MT tree" will grow more and more.



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[¶]For the further information (development, errata, etc.) of our theory, see "http://www.keio-up.co.jp/kup/mfomt/"