History of Western Philosophy from the quantum theoretical point of view; Version 2

by

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Abstract: Recently we proposed "quantum language", which was not only characterized as the metaphysical and linguistic turn of quantum mechanics but also the linguistic turn of Descartes=Kant epistemology. And further we believe that quantum language is the only scientifically successful theory in dualistic idealism. Hence, the turn urges us to dream that Western philosophies (i.e., Parmenides, Plato, Descartes, John Locke, Berkeley, Hume, Kant, Wittgenstein, etc.) can be understood in quantum language. In this paper this is done. Particularly, we give a final solution to the mind-body problem (i.e., How are "mind" and "body" connected?) under the hypothesis that philosophy has made progress to the direction of quantum language. Since our approach is always within dualistic idealism, we believe that our linguistic answer is the only true solution to the mind-body problem in dualistic idealism.

Preface

Quantum language (i.e., MT (= measurement theory), the linguistic interpretation of quantum mechanics) proposed by myself is a language that is inspired by the Copenhagen interpretation of quantum mechanics, and moreover, it has a great power to describe classical systems as well as quantum systems. My lecture for graduate students in the faculty of science and technology of Keio university has been continued, with gradually improvement, for about 20 years. The contents of my lecture are represented as in the following Assertion 0.1.

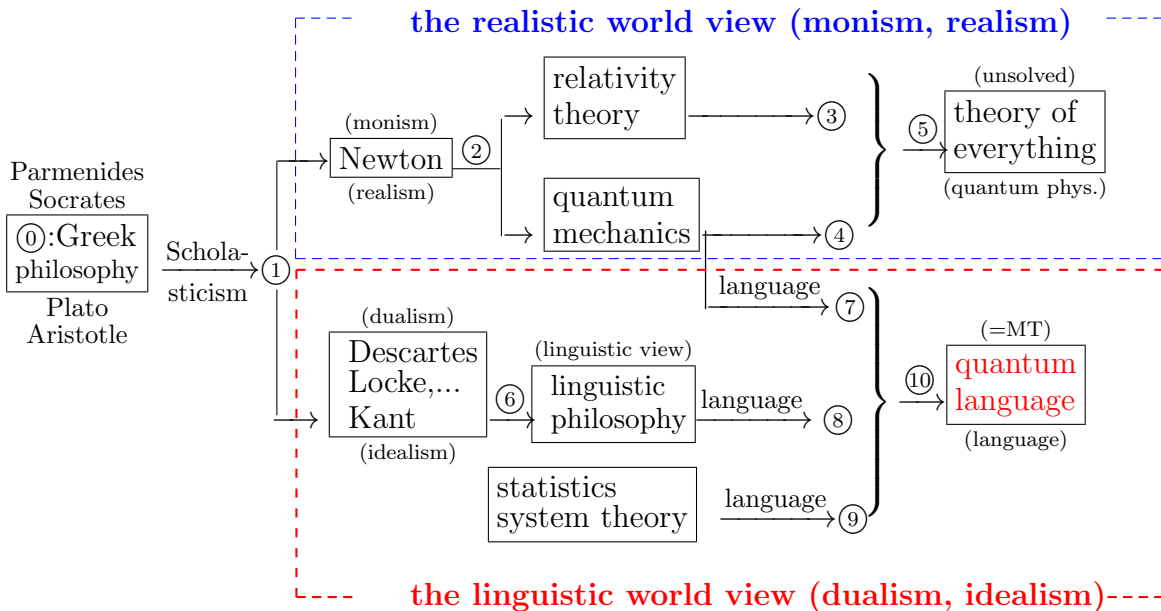**Assertion 0.1** [The location of quantum language in the history of world-description (*cf.* ref.[14, 32])]

Figure 0.1: **The history of the world-description**

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The part of quantum theory $\left[\ ②\ -\ ⑦\ -\ ⑩\ \right]$ and statistics $\left[⑨\ -\ ⑩\ \right]$ in the above were already published in the following:

(A) ref. [32]: S. Ishikawa, "Linguistic interpretation of quantum mechanics: Quantum Language [Ver. 2]", Dept. Math. Keio University, 2016, KSTS/RR-16/001, 416 pages (`http://www.math.keio.ac.jp/en/academic/research.html`) or, (`http://www.math.keio.ac.jp/academic/research_pdf/report/2016/16001.pdf`)

Also, this draft is published as the book: *"Linguistic Interpretation of Quantum Mechanics –Towards World-Description in Quantum Language -"* Shiho-Shuppan Publisher,(2016) (ref. [32]).

Therefore, in this paper I devote myself to the part $\left[\ ⓪\ -\ ①\ -\ ⑥\ -\ ⑧\ -\ ⑩\ \right]$, which is almost equal to the history of western philosophy. It is sure:

- if someone believes that he/she finds the theory beyond ⑩, he/she certainly wants to talk about the landscape $\left[\ ⓪\ -\ ①\ -\ ⑥\ -\ ⑧\ \right]$ seen from the theory.

This is my motive of writing this paper.

It is certain that the followings are the two biggest unsolved problems in dualistic idealism (= the main stream of western philosophy):

(B_1) The mind-body problem (i.e., How are "mind" and "body" connected?)

(B_2) The causal problem (i.e., What is "causality"?)

In this paper, reviewing and answering the following progress problem (which should be regarded as a part of the above Assertion 0.1):

(C) Has western philosophy $\left[\ ⓪\ -\ ①\ -\ ⑥\ -\ ⑧\ \right]$ made progress? Or what is the measure of "progress"?

I will give the answers to the above problems (B_1) and (B_2). Also, note that this paper is composed of ref.[33] and ref. [34] (i.e., "this paper" = "ref.[33]" + "ref. [34]").

Lastly I want to add the following:

- this paper can be read without the knowledge of quantum theory.

Readers are recommended to go reading this paper fast, and further, to advance reading [32][2].

May 2017
Shiro Ishikawa

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[2] For the further information concerning quantum language, see my home page: `http://www.math.keio.ac.jp/~ishikawa/indexe.html`

Contents

Chapter 1

The outline of quantum language (=measurement theory)

In this chapter I briefly explain solutions to the two biggest unsolved problems in dualistic idealism (= the main stream of western philosophy):

($\sharp_1$) The mid-body problem (i.e., How are "mind" and "body" connected?)

($\sharp_2$) The causal problem (i.e., What is "causality"?)

as I review the following the progress problem (which should be regarded as a part of the above Assertion 0.1):

($\sharp_3$) Has western philosophy made progress? Or what is the measure of "progress"?

In order to read this paper, it is not needed to understand "quantum language (ref. [32])" completely. It suffices to read the outline of quantum language (and the linguistic Copenhagen interpretation) in Section 1.1 of this chapter (without background information). Also, it may be possible to read this paper from Chapter 2 (i.e., skip this chapter). That is because it may be recommended to read ref. [32] after this paper is read first.

In Section 1.2, I remark that

($\sharp_4$) roughly speaking, western philosophy and the linguistic Copenhagen interpretation are similar

Further, in Section 1.3, I explain the world description, which is classified by the following three,

($\sharp_5$) • the realistic world description,
• the fictional linguistic world description,
• the scientific linguistic world description.

In Section 1.4, I summarize my assertions (i.e., the above ($\sharp_1$) and ($\sharp_2$)).

1.1 The outline of quantum language(=measurement theory)

1.1.1 Axiom 1 (measurement) and Axiom 2 (causal relation)

The idea of quantum language (it is also called "measurement theory") is due to quantum mechanics, in which the micro-phenomena are analyzed. Quantum language is a language, by which we cannot only describe quantum mechanics but also almost sciences (e.g., economics, psychology, engineering, etc.). However, it should be noted that quantum language is not almighty, for example, the theory of relativity is beyond the description of quantum language.

The framework of measurement theory(=quantum language) is simple, that is, it is composed with two axioms (Axiom 1 concerning measurement and Axiom 2 concerning causal relation) and the manual to use Axioms 1 and 2 (called the linguistic Copenhagen interpretation). That is, (*cf.* refs [13, 32]),

$$
\underset{\text{(=quantum language)}}{\boxed{\text{measurement theory}}} = \underset{\text{[Axiom 1]}}{\boxed{\text{measurement}}} + \underset{\text{[Axiom 2]}}{\boxed{\text{causal relation}}}
$$

$$
+ \underset{\text{[the manual to use Axioms 1 and 2]}}{\boxed{\text{linguistic Copenhagen interpretation}}} \tag{1.1}
$$

Although it is not needed to read Axioms 1 and 2 for reading this paper, we, for completeness, mention them as follows.

Axiom 1 (measurement)

(The readers can read this axiom after they read Section 2.7 of ref. [32])

With any system S, a basic structure $[\mathcal{A} \subseteq \overline{\mathcal{A}}]_{B(H)}$ can be associated in which measurement theory of that system can be formulated. When the observer (=**"I"**) takes a measurement of an observable (or, by a measuring instrument) $\mathsf{O}=(X, \mathcal{F}, F)$ for a system $S_{[\rho]}$ i.e., a system S with a state ρ), the probability that a measured value x $(\in X)$ obtained by the measurement belongs to Ξ $(\in \mathcal{F})$ is given by $\rho(F(\Xi))(\equiv {}_{\mathcal{A}^*}(\rho, F(\Xi))_{\overline{\mathcal{A}}})$.

And

Axiom 2 (causality)

(The readers can read this axiom after they read Section 10.3 of ref. [32])

Let T be a **tree** (i.e., semi-ordered tree structure). For each $t(\in T)$, a basic structure $[\mathcal{A}_t \subseteq \overline{\mathcal{A}}_t]_{B(H_t)}$ is associated. Then, the **causal chain** is represented by a **sequential causal operator** $\{\Phi_{t_1,t_2} : \overline{\mathcal{A}}_{t_2} \to \overline{\mathcal{A}}_{t_1}\}_{(t_1,t_2)\in T_{\leqq}^2}$.

2

♠**Note 1.1.** Note that the answer to the causality problem is given by Axiom 2 (Causality).   □

Here, note that

(A) **the above two axioms are kinds of spells (i.e., incantation, magic words, metaphysical statements), and thus, it is impossible to verify them experimentally. what we should do is not to understand the two, but to learn the spells (i.e., Axioms 1 and 2) by rote.**

In this sense, quantum language is metaphysics. Therefore,

(B) **The formation of quantum languages depends on human marvelous language ability**

♠**Note 1.2.** If metaphysics did something wrong in the history of science, it is because metaphysics attempted to answer the following questions seriously in ordinary language:

($\sharp_1$) What is the meaning of the keywords (e.g., measurement, probability, causality, space-time ?

Although the question ($\sharp_1$) looks attractive, it is not productive. What is important is *to create a language* to deal with the keywords. So we replace ($\sharp_1$) by

($\sharp_2$) How are the keywords (e.g., measurement, probability, causality) used in quantum language ?

The problem ($\sharp_1$) will now be solved in the sense of ($\sharp_2$). If there are some failure in the history of philosophy, philosophers failed to propose a suitable language. It should be noted that Newton's success is due to the proposal of "the language called Newtonian mechanics".

1.1.2   Linguistic interpretation(= Linguistic Copenhagen interpretation)

1.1.2.1   Descartes figure(linguistic Copenhagen interpretation)

In the previous section, we introduced the outline of quantum language. Here, note that

(C_1) *the axiom is a kind of spells (i.e., incantation, magic words, metaphysical statement), so that, it is impossible to verify it experimentally.*

And thus, we say:

(C$_2$) Since quantum language is a language, it may be difficult to use it well at first. We need to make practice, and will master it only by trial and error.

However,

(C$_3$) if we want to master quantum language as quick as possible, we will need a good manual to use the axioms.

Here, we think that

(C$_4$)   the linguistic interpretation
     = manual to use spells (Axioms 1 and 2)

Since Axiom 1 includes the term "measurement", the concept of "measurement" should be, at first, understood in dualism as illustrated in Figure 1.1.
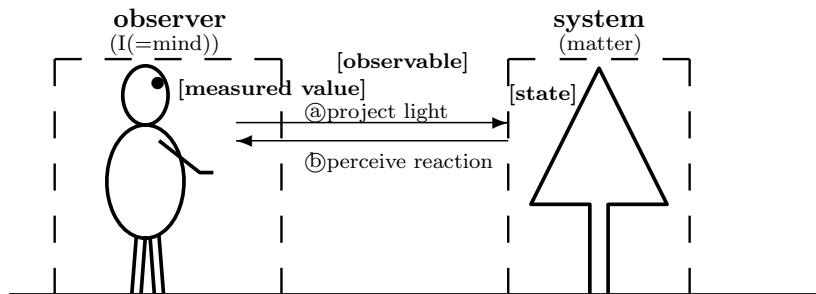
Figure 1.1: [Descartes Figure]: Image of "measurement(=ⓐ+ⓑ)" in dualism

In the figure, "measurement" is characterized as interaction between "observer" and "system"(matter or object to be measured, measuring object), composed of

(D$_1$) ⓐ projection of light onto the object
     ⓑ perception of the reaction of the object

However, I want to emphasize that the interaction cannot be represented by kinetic equations. Therefore,

(D$_2$) in measurement theory (= quantum language), we use the term "measurement" instead of "interaction".

After all, we think that:

(D$_3$) there is no measured value without observer, and that measurement theory is composed
of three keywords (*cf.* Note 3.1):

$$\boxed{\text{measured value}}_{\text{(observer, brain, mind)}} \ , \quad \boxed{\text{observable (= measuring instrument)}}_{\text{(thermometer, eye, ear, body, polar star)}} , \quad \boxed{\text{state}}_{\text{(matter)}} .$$

In view of the above figure, it might be called "trialism" instead of "dualism". But,
following the convention, we use *"dualism"* throughout this paper.

1.1.2.2   The linguistic interpretation [(E$_1$)-(E$_7$)]

The linguistic interpretation is "the manual to use Axiom 1 and 2". Thus, there are various
explanations for the linguistic interpretations. However, it is usual to consider that the linguistic
interpretation is characterized by statements in Panel (E), among which the most important is

(E$_4$) Only one measurement is permitted.

(E):The linguistic interpretation (=quantum language interpretation)

With **Descartes figure 1.1 and the following (E$_1$)-(E$_7$)** in mind,
describe every phenomenon in terms of Axioms 1 and 2.

(E$_1$) Consider the **dualism** composed of "observer" and "matter (= object to be measured)",
where "observer" and "matter" must be absolutely separated. Figuratively speaking,
"Audience should not go on stage".

(E$_2$) While "matter" has the space-time, the observer does not. Thus, the question: "When
and where is a measured value obtained ?" is out of the scope of measurement theory.
In other words, there is no tense either in measurement theory or in science.

(E$_3$) In measurement theory, we emphasize "measurement" more than "interaction".
Also, "observable(=measuring instrument≈body)" is more important than "measured
value(≈mind)" and "state(≈matter)" in (D$_3$).

(E$_4$) Only one measurement is permitted. Thus, the state after measurement (or, wave
function collapse, the influence of measurement) is meaningless.

(E_5) There is no probability without measurement.

(E_6) State never moves,

and so on.

Since

quantum language is the final goal of dualistic idealism

(*cf.* ⑧ in Figure 0.1 in Assertion 0.1 (in Preface), it is deduced that

(E_7) maxims of the philosophers (particularly, the dualistic idealism) can be regarded as expressions in linguistic interpretation.

Some people may wonder (E_7). However, note

(F_1) Descartes=Kant philosophy and quantum language have the same purpose to establish the world view,

and

(F_2) Descartes=Kant philosophy and quantum language have the same methodology of non-realistic dualism.

Then, it is natural to consider

maxims of philosophers $\approx$ the linguistic interpretation.

♠**Note 1.3.** It is one of the roles of the linguistic Copenhagen interpretation to exclude a scientifically nonsense propositions from a quantum language (e.g., self-referential proposition (*cf.* Sec.7.1). As mentioned later, for example,

$(\sharp_1)$ Cogito proposition **"I think, therefore I am"** is not the proposition within quantum language.

In cogito proposition, we see that "observer"="I" and "object to be measured"="I", which is inconsistent with that the above (E_1). Thus, cogito proposition is not a proposition in quantum language. Also,

$(\sharp_2)$ The hypothesis that **the world was created five minutes ago** (due to B. Russel) is not within quantum language.

That is because this hypothesis is considered under the premise such that the observer's time, which is prohibited by (E_2). I consider that the above two are related to self-referential proposition, which is often discussed in this paper. Although the definition of "self-referential" is not clear yet, we want a characterization such as "linguistic Copenhagen interpretation = anti self-reference".

We assert the following.

Assertion 1.1. [descriptive power of quantum language](*cf.* ref. [32])
Roughly speaking,

- quantum language has a great descriptive power more than statistics.

Therefore, we assert that

(F) **quantum language is a language, by which almost sciences (e.g., economics, psychology, engineering, etc.) are described**

Quantum language is a language, by which we cannot only describe quantum mechanics but also almost sciences (e.g., economics, psychology, engineering, etc.). Thus, we consider that

(F) **To do sciences is to describe phenomena by quantum language**

However, it should be noted that quantum language is not almighty, for example, the theory of relativity (i.e., physics) is beyond the description of quantum language.

1.2 The history of world description and our purpose

1.2.1 Quantum language in the history of world description

We assert that, in the history of world description, quantum language is located as follows.

Assertion 1.2. [The location of quantum language in the history of world-description (*cf.* ref.[14, 32])]
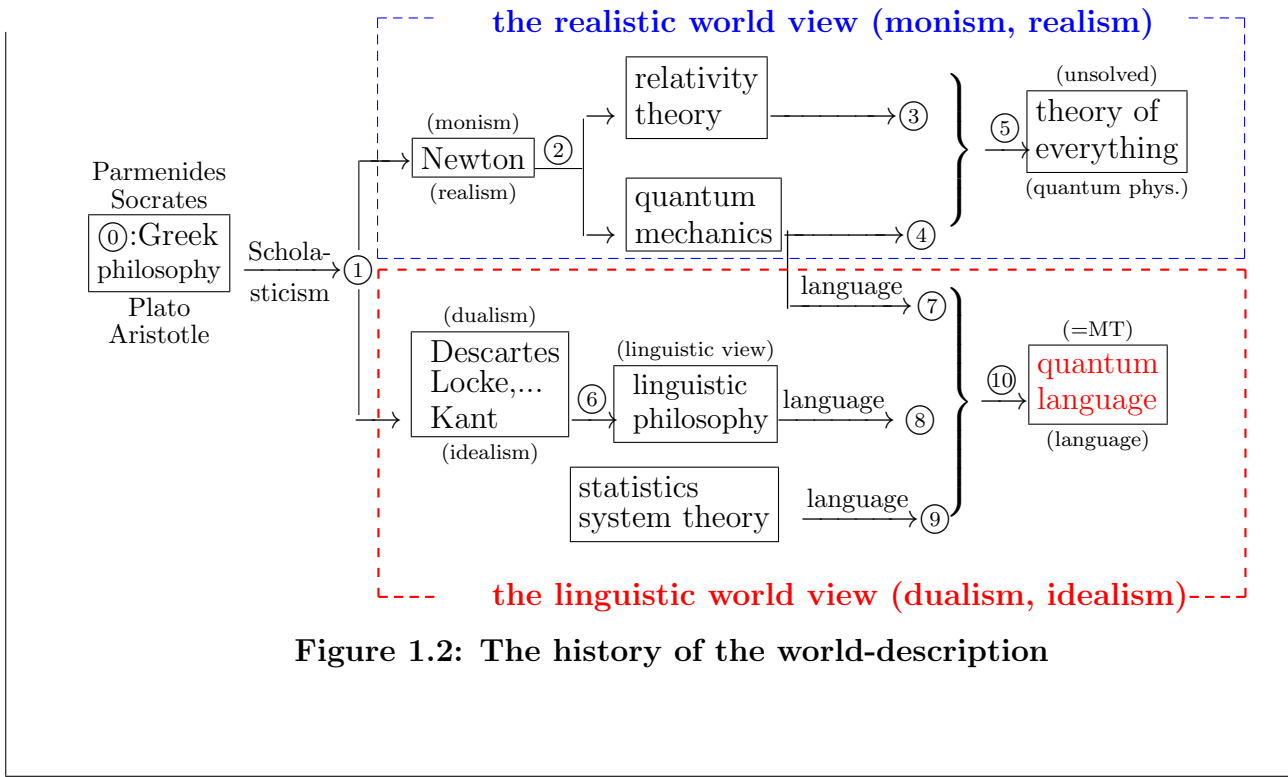
Figure 1.2: The history of the world-description

Therefore, quantum language has the following three aspects:

The three aspects of quantum language

$$
= \left\{
\begin{array}{l}
\text{⑦: the linguistic turn of quantum mechanics} \\
\quad \text{(i.e., the true color of the Copenhagen interpretation)} \\
\text{⑧: the final goal of dualistic idealism} \\
\quad \text{(i.e., the linguistic turn of the Descartes=Kant epistemology)} \\
\text{⑨: the dualistic reconstruction of statistics}
\end{array}
\right.
\tag{1.2}
$$

1.2.2 Our purpose

The above figure says that

quantum language is the final goal of the dualistic idealism[⓪ - ① - ⑥ - ⑧]

And thus,

(A_1) maxims of the philosophers (particularly, the dualistic idealism) can be regarded as expressions in linguistic interpretation.

Also, we think that

(A_2) If and only if philosophers enter blind alleys, they do not obey the linguistic Copenhagen interpretation

This is not strange, since

(B) the purpose of western philosophy and that of quantum language are the same, that is, the world-description[1]. And therefore, we consider that

(B$_1$) : philosophers' wise sayings $\approx$ to obey linguistic Copenhagen interpretation

(B$_2$) : philosophers' blind alleys $\approx$ not to obey linguistic Copenhagen interpretation

---

Purpose 1.3. Thus, the purpose of this paper is

(C$_1$) to reconsider history of western philosophy from the quantum theoretical point of view

Or,

(C$_2$) to investigate dualistic idealism (i.e., to find a firm theory in dualistic idealism)

Or, equivalently, to answer the following two:

(C$_3$) The mind-body problem (i.e., How are "mind" and "body" connected?)

(C$_4$) The causal problem (i.e., What is "causality"?)

♠**Note 1.4.** It should be noted that Einstein's success is due to the proposal of "the language called the theory of relativity". On the other hand, we think that

($\sharp_4$) *philosophers failed because they did not propose a suitable language.*

Talking cynically, we say that

($\sharp_5$) Philosophers has investigated "linguistic interpretation" (="how to use Axioms 1 and 2") without language (i.e., Axiom 1 (measurement) and Axiom 2 (causality)).

Therefore, in most cases many philosophers wander. However, great philosophers rarely miss the point. For example, Wittgenstein did not propose his language, but he left the maxim such that

($\sharp_2$) "The limits of my language mean the limits of my world"

which is just the spirit of quantum language (as mentioned in Chapter 9).

1.3 Realistic world description and linguistic world description

Quantum language is the only one successful world-description in the historical flow:

$$[\text{ Plato }] \to [\text{Schola}] \to [\text{Descartes}] \to \cdots \to [\text{Kant}] \to [\text{quantum language}]$$

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[1]In this paper, we consider that "idealism"= "metaphysics (except mathematics)". Here, metaphysics means the discipline which cannot be tested by experiments.

Thus, some may have the following question:

(A) How is the difference between $\big[[\text{ Plato }] \to \cdots \to [\text{Kant}]\big]$ and $\big[\text{quantum language}\big]$?

In this paper, we conclude that this is the difference between "fictional linguistic world description" and "scientific linguistic world description".

1.3.1 The world descriptionism

The world descriptionism is

<div align="center">the spirit which starts from world description</div>

That is,

(B): The world descriptionism

The world descriptionism has the following form:

(B)
$$\underset{\text{premise}}{\boxed{\overset{\text{world is so}}{\text{world description}}}} \xrightarrow{\text{therefore}} \underset{\text{subject}}{\boxed{\overset{\text{conclusion}}{\text{discussions, calculation, logic, properties}}}}$$
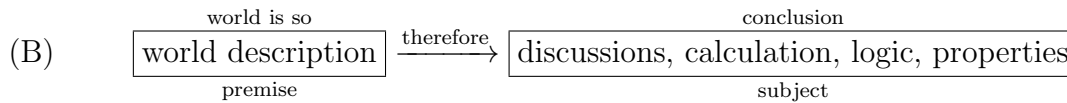
That is, the world descriptionism is the spirit such that "Start from world description"
[**Remark**] This is not trivial. That is because the above (B) says that the world description is greater than logic. (*cf.* Section 2.4.1[Zeno's paradoxes], Section 3.8.2[Aristotle's syllogism] etc.). Arguing repeatedly in this paper, we consider that the ignoring of the world descriptionism causes that philosophy falls into a blind alley.

As mentioned later, we devote ourselves to the following three kinds of world descriptions $(B_1) - (B_3)$:

(B_1)
$$\underset{\text{premise,law}}{\boxed{\overset{\text{The world is ruled by Newtonian mechanics}}{\text{world description}}}} \xrightarrow{\text{therefore}} \underset{\text{discussion}}{\boxed{\overset{\text{Heliocentrism is true}}{\text{discussions, calculation, logic, properties}}}}$$

and

(B_2)
$$\underset{\text{(fictional)premise}}{\boxed{\overset{\text{invisible man exists}}{\text{world description}}}} \xrightarrow{\text{therefore}} \underset{\text{main subject}}{\boxed{\overset{\text{don't steal a glance}}{\text{discussions, properties}}}}$$

and

(B_3)
$$\underset{\text{language}}{\boxed{\overset{\text{the term "probability" is useful}}{\text{language by which world is described}}}}$$
$$\xrightarrow{\text{therefore}} \underset{\text{discussions}}{\boxed{\overset{\text{the probability that the head happens is 1/2 in fair coin tossing}}{\text{calculation,logic,properties}}}}$$

1.3.2 Realistic world description and (fictional, scientific)linguistic world description

The world description is, roughly speaking, to describe (or, understand, explain) world. This is classified by two i.e., the realistic world description("world is previous and word is later") and the linguistic world description("world is previous and word is later"). And further, the linguistic world description is classified by the fictional linguistic world description and the scientific linguistic world description as follows.

(C) $\begin{cases} \bullet \ (C_1)\text{: the realistic world description("world is previous and word is later")} \\ \quad \text{The world exists first, and next the language is made in order to explain the world} \\ \\ \bullet \ (C_2),(C_3)\text{:the linguistic world description("word is previous and world is later")} \\ \quad \text{the linguistic world description is classified by two (i.e., } [(C_2)\text{:fictional] and} \\ \quad [(C_3)\text{:scientific])} \\ \\ \left\{ \begin{array}{l} (C_2)\text{: fictional linguistic world description} \\ (C_3)\text{: scientific linguistic world description} \end{array} \right\} \text{ is defined as follows:,} \\ \text{First we make} \left\{ \begin{array}{l} \text{(fiction) story} \\ \text{language} \end{array} \right\}, \text{and next we describe (understand, explain)} \\ \\ \text{our world} \left\{ \begin{array}{l} \text{along the (fiction) story} \\ \text{by the language} \end{array} \right\} \end{cases}$

That is, we consider the three world-descriptions as follows.

(D) $\begin{cases} \bullet \quad \text{realistic world description (Newtonian mechanics, etc.)} \\ \\ \bullet \left\{ \begin{array}{l} \text{fictional linguistic world description (western philosophy)} \\ \text{(Plato, Descartes, Kant, etc.)} \\ \\ \text{scientific linguistic world description} \\ \text{(e.g., statistics, quantum language)} \end{array} \right. \end{cases}$

In the following subsections, we explain the three world descriptions (realistic world description and (fictional, scientific)linguistic world description).

1.3.3 The realistic world description(physics)

(E): The realistic world description (physics)

The realistic world description has the following form:

(E) $\quad \underset{\text{law}}{\underbrace{\boxed{\text{realistic world description}}}} \overset{\text{therefore}}{\xrightarrow{\hspace{1.2cm}}} \underset{\text{discussion}}{\underbrace{\boxed{\text{scientific properties} \cdot \text{calculation}}}}$
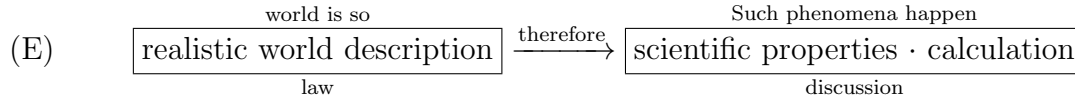
Hence,

(E$_1$) $\big[$world is so$\big]$ is a law, truth, (which should be verified by experiment),

(E$_2$) $\big[$such phenomena happen$\big]$ is a consequence

As examples of the realistic world description, we see that

Newtonian mechanics, electromagnetism, theory of relativity, etc.

For example,

(F) $\quad \underset{\text{premise} \cdot \text{law}}{\underbrace{\boxed{\text{world description}}}} \overset{\text{therefore}}{\xrightarrow{\hspace{1.2cm}}} \underset{\text{discussion}}{\underbrace{\boxed{\text{discussions, calculation, logic, properties}}}}$
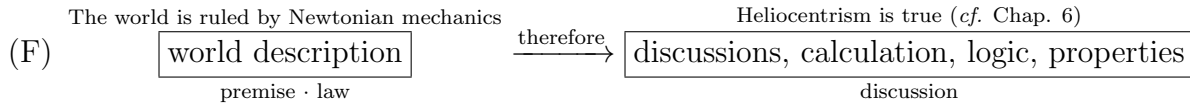
Note that the realistic world description (=physics) is the most authorized.

1.3.4 The fictional linguistic world description (Wester philosophy)

Our main theme of the preprint is the following fictional linguistic world description:

(G): The fictional linguistic world description (western philosophy)

The fictional linguistic world description (in Platonic method of telling philosophy) is as follows.

(G) $\quad \underset{\text{preface, introduction, (fictional)premise, expedient}}{\underbrace{\boxed{\text{fictional linguistic world description}}}} \overset{\text{therefore}}{\xrightarrow{\hspace{1.2cm}}} \underset{\text{main subject}}{\underbrace{\boxed{\text{ethics, morals}}}}$
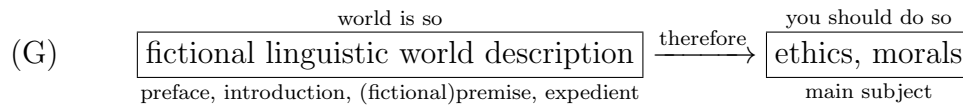
Therefore,

(G$_1$) $\big[$world is so$\big]$ is secondary,

(G$_2$) $\big[$you should do so$\big]$ is main theme

For example,

Chap. 1 The outline of quantum language (=measurement theory)

(H$_1$) $\underset{\text{(fictional)premise}}{\overline{\underset{}{\boxed{\text{fictional linguistic world description}}}}}$ $\overset{\text{invisible man exists}}{}$ $\xrightarrow{\text{therefore}}$ $\underset{\text{main subject}}{\boxed{\text{discussions, properties}}}$ $\overset{\text{don't steal a glance}}{}$

and

(H$_2$) $\boxed{\text{fictional linguistic world description}}$ $\overset{\text{ultimate beauty exists}}{}$ $\xrightarrow{\text{therefore}}$ $\boxed{\text{ethics, morals,aesthetic sense}}$ $\overset{\text{she is an embodiment of beauty.}}{}$
premise,fiction $\qquad$ *mainassertion*
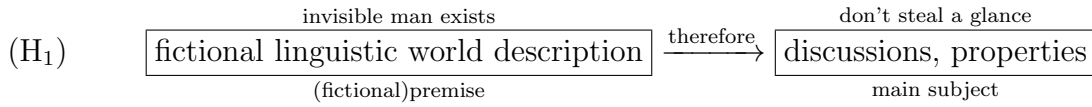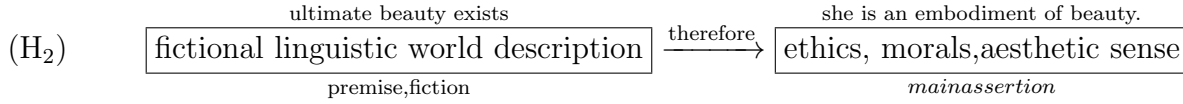
The fictional linguistic world description forms the main current of western philosophy such as

Plato, Scholasticism, Descartes, Leibniz, Locke, Hume, Kant, Husserl

etc. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ □

1.3.5 The scientific linguistic world description (statistics, quantum language)

(I): The scientific linguistic world description (Statistics, quantum language)

The scientific linguistic world description is as follows.

(I) $\boxed{\text{scientific linguistic world description}}$ $\overset{\text{language is proposed}}{}$ $\xrightarrow{\text{therefore}}$ $\boxed{\text{scientific properties}}$ $\overset{\text{describe phenomena by the language}}{}$
language, words $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ discussions

Therefore,

(I$_1$) [language is proposed], that is, "establish the verbal system"

(I$_2$) [describe phenomena by the language]

For example, it suffices to consider statistics (and moreover, quantum language). Also, recall that

(I$_3$) $\boxed{\text{language by which world is described}}$ $\overset{\text{the term "probability" is useful}}{}$
language

$\xrightarrow{\text{therefore}}$ $\boxed{\text{calculation,logic,properties}}$ $\overset{\text{the probability that the head happens is 1/2 in fair coin tossing}}{}$
discussions
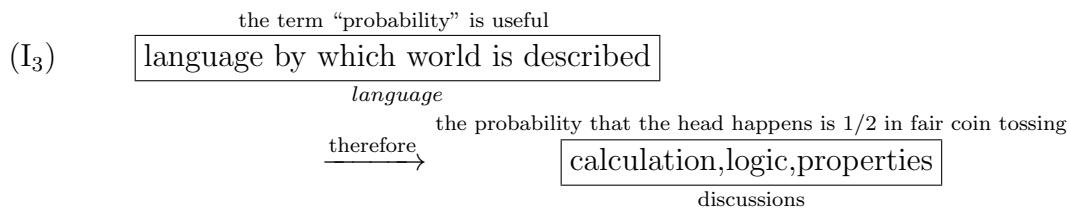
Assertion 1.1 says that, for example,

- Economics is to describe economical phenomena in terms of quantum language (or statistics)

- psychology is to describe psychological phenomena in terms of quantum language (or statistics)

♠**Note 1.5.** For example, it is certain that

($\sharp_1$) there is no physics without the world

However,

($\sharp_1$) mathematics itself is not related to the world. In an extreme case, there may exist mathematics without the world

Therefore, in this paper, we do not consider that mathematic is a kind of world description, in spite that mathematics is the most important and firm language.

1.4 Preview of the assertions in this paper

1.4.1 Realistic world description?, (fictional, scientific)linguistic world description?

Assertion 1.4. [realistic world description?, (fictional, scientific)linguistic world description? The classification of philosophers] We consider the following classification of philosophers.

$(\flat)$
$\begin{cases} (\flat_1)\text{: the realistic world description (physics)} \\ \quad \text{Aristotle, Archimedes, Galileo, Newton, Einstein,} \cdots \\ \\ (\flat_2)\text{: the fictional linguistic world description (Western philosophy)} \\ \quad \text{Plato, Scholasticism, Descartes, Locke, Leibniz, Berkeley, Hume, Kant, Husserl} \\ \\ (\flat_3)\text{: the scientific linguistic world description (statistics, quantum language)} \\ \quad \text{Parmenides, Zeno, J. Bernoulli, statistics (e.g., Fischer), quantum language} \end{cases}$

Assertion 1.5. [Dispute: realistic world description vs. linguistic world description]
"realistic world description? linguistic world description?" is the biggest dispute in the history

---

of philosophy. However, from our view-point, the two have to exist together as follows.

Table 1.1 : realistic world description vs. linguistic world description

dispute ＼ [R] vs. [L]	Realistic world description (monism, realism, no measurement)	Linguistic world description (dualism, idealism, measurement)
ⓐ: motion	Hērakleitos	Parmenides
ⓑ:Ancient Greece	Aristotle	Plato
ⓒ: Problem of universals	Nominalism(Ockham)	Realism(Anselmus)
ⓓ: space-time	Newton	Leibniz
ⓔ: quantum theory	Einstein	Bohr

ⓐ is my fiction, ⓒ is a confusion. ⓓ is the Leibniz=Clarke correspondence(*cf.* Note 7.9), ⓔ is Bohr=Einstein debates. Quantum language is proposed as one of answers to Bohr=Einstein debates(*cf.* ref. [32]).

1.4.2　Keywords: realistic world description and linguistic world description

Assertion 1.6. [The correspondence of key-words]
It is a matter of course that each world description has the corresponding key-words. If Western philosophy (i.e., world description) makes progress, its key-words are naturally refined and clarified. The key-word's progress of the realistic world description [resp. linguistic world description] is written as follows.

[**The key-words of the realistic world description**] The realistic world description is monism, and its completed version is realized as Newtonian mechanics, whose key-words are "mass point" and "state". Thus, we see:

Aristotle	/	/	eidos [hyle]
Newton	/	/	state [mass point]

That is, we consider the following progress:

$$[\text{eidos}] \xrightarrow[\text{progress}]{} [\text{state}], \qquad [\text{hyle}] \xrightarrow[\text{progress}]{} [\text{mass point}]$$

[**The key-words of the linguistic world description**] The linguistic world description is the mind-matter dualism, which is composed of three key-words, that is, [A](= mind), [C](= matter) and [B](= body: something connecting [A:mind] and [C:matter]). Thus, we see that:

mind-matter dualism	[A](= mind)	[B](between A and B)	[C](= matter)
Plato	actual world	Idea	/ [/]
Thomas Aquinas	universale post rem	universale ante rem	/ [universale in re]
Descartes	I, mind, brain	body	/ [matter]
Locke	mind	secondary quality	primary quality [/]
Berkeley	mind	secondary quality	/ [God]
Kant	actual world	perception	/ [thing-in-itself]
statistics	sample space	/	parameter [population]
quantum mechanics	measured value	observable	state [particle]
quantum language	**measured value**	**observable**	**state [system]**

♠**Note 1.6.** (i): In mind-matter dualism, [B:medium] is the most important (*cf.* the linguistic Copenhagen interpretation (E_3) in Sec. 1.1.2). Thus, we consider that Plato's Idea theory is dualism. On the other hand, statistics lacks [B:medium]. Thus, statistics is not usually regarded as dualism but mathematical theory. However, in this paper, statistics is listed up as "incomplete dualism" in the above table.

(ii): The readers may wonder that "actual world≈mind(=human)" in Plato. However, it should be understood under the maxim: "Man is the measure of all things". Similarly, we think that "measured value≈mind(=human)" in quantum language. That is because there is no "measured value" without "mind(=brain)".

(iii): In [C: matter], the terms "state" and "system" in quantum language are always used as the form "the system with the state" (*cf.* Axiom 1 in Sec. 1.1). In the history of western philosophy, "state" and "system" were often confused, and in most cases, only one of the two has been found. Also, seeing statistics in the above table, the reader may find that understanding the difference between "parameter" and "population" is surprisingly difficult. And thus, in this paper, the difference is not emphasized.

1.5 Progress problem, Mind-body problem, Causality problem

1.5.1 Progress problem

Assertion 1.7. [**Progress problem**]; If Western philosophy (i.e., dualistic idealism) makes progress, its key-words are naturally refined and clarified. Also, since the complete version

is realized as quantum language, each dualistic idealism can be completely understood in comparison with quantum language. For example,

- "Plato's idea" is ambiguous, however, "secondary quality" is rather clear, and further, "observable(=measuring instrument)" can be completely understood.

That is, the term "observable" can be used as mention in Axiom 1 in Section 1.1.
Therefore, we obtain the following conclusion:
If "to make progress" is defined by "to come near quantum language", we can say that

$$\boxed{\text{Plato}} \xrightarrow[\text{progress}]{} \boxed{\text{Descartes}} \xrightarrow[\text{progress}]{} \boxed{\text{Locke}} \xrightarrow[\text{progress}]{} \boxed{\text{Kant}} \xrightarrow[\text{progress}]{} \boxed{\text{Quantum language}} \quad (1.3)$$

Also, we roughly say that

$$\boxed{\text{Plato}} \xrightarrow[\text{progress}]{\text{Cogito turn}} \boxed{\text{Descartes} \cdot \text{Kant}} \xrightarrow[\text{progress}]{\text{linguistic turn}} \boxed{\text{Quantum language}} \quad (1.4)$$

♠**Note 1.7.** The following question is natural:

($\sharp_1$) Why is "progress" defined by "approaching quantum language"?

The reason is:

($\sharp_2$) quantum language is the only successful theory in dualistic idealism

This is my opinion. If some assert the other definition, they may have the different discussion more than mine.

1.5.2 Mind-body problem and Causality problem

Concerning the causality problem, we already mentioned it in Note1.1, that is,

$$\text{"The solution to the causality problem"} \Leftrightarrow \text{"Axiom 2"} \quad (1.5)$$

Lastly, let us mention the solution to the mind-body problem (i.e., How are "mind" and "body" connected?) as follows.

Answer 1.8. [The solution to the mind-body problem]; The correspondence of the key-words (Assertion1.6) says that

$$\overset{\text{(mind, body)}}{\boxed{\text{Descartes, Kant}}} \xrightarrow[\text{the correspondence of the key-words}]{} \overset{\text{(measured value, measuring instrument)}}{\boxed{\text{Quantum language}}}$$

This and the formula (1.4) say:

the epistemological mind-body problem

$$\boxed{\text{Descartes, Kant}}$$

How are "mind" and "body" connected?

the epistemological mind-body problem

$$\xrightarrow[\text{linguistic turn}]{} \qquad \boxed{\text{quantum language}} \tag{1.6}$$

How are "measured value" and "measuring instrument" connected?

If so, we can easily solve the mind-body problem (in the right-hand side of the formula (1.6), that is,

(A) "The solution to the mind-body problem"⇔"Axiom 2"

Therefore, by the formula (1.5), we have the following equivalences:

to propose quantum language

⇔to propose Axiom 1 (measurement) and Axiom 2 (causality)

⇔to solve the mind-body problem and the causality problem $\qquad$ (1.7)

Chapter 2

Ancient Greek philosophy (before Socrates)

Readers can start reading from this chapter (i.e., skip Chapter 1).

In Ancient Greek philosophy (before Socrates), the phase "the first thing (= arche) of all things is ◯◯" is standard. Here "◯◯" is, for example, as follows.

Thalēs······water	Democritus······atom
Pythagoras······number	Hērakleitos······motion, fire
Parmenides······logic, motion	Zeno······logic, motion

In this chapter, Zeno's paradoxes(flying arrow, Achilles and a tortoise), is written from the quantum linguistic point of view.

2.1 Thalēs (BC.640 - BC.546)

2.1.1 Thalēs: the first philosopher: "the arche of all things is water"

Every race had the respective "myths". It is a myth to explain the world for reason of the god. A myth has been handed down from generation to generation from an ancestor by oral instruction and the character.

Many races crowd, and an exchange is popular, and moreover the one as the situation for which it's difficult to be unified by the force (Marine trade is popular and vast plains are not.) is the rare situation. This situation was realized about 1000 BC. In the eastern Mediterranean coast of the region (when we say now, Greece - Turkey - Syria - Israel - (Egypt)), each other mixed a variety of civilization and culture, a new culture was born.

Particularly,we should remark the two: "philosophy as integration of several myths" and "alphabet as integration of the several characters". That is,

(A) $\begin{cases} \text{integration of several myths} & \implies \text{philosophy} \\ \\ \text{integration of the several characters} & \implies \text{Phoenician alphabet} \implies \text{alphabet} \end{cases}$

Alphabet is a phonetic character. Because it made with the intention of the common character of inter-ethnic. Egypt has been armed unified had advanced civilization (pyramids, etc.), philosophy was not developed.

In the writings of Aristotle of "metaphysics", Thalēs is called "the first philosopher."

For example, for the question: "Why does an earthquake happen?", every myth would answer "their God is angry." In Miletus of ancient Greece, Thalēs is appearing and say as follows:

(B) The first principle of all things is water. Therefore, the earthquake is caused by the vibration of the water

This may be childish, but is an explanation that does not brought out the "God" . This is the reason why Aristotle said the Thalēs as the "the first philosopher."

♠**Note 2.1.** A.N.Whitehead (1861 - 1947) said that

(♯) **Western philosophy is characterized as a series of footnotes to Plato**

Although I do not know Whitehead's intension, I want to think that this (♯) means "Plato is the first philosopher", which is the same as the spirit of this paper.

2.1.2 Thalēs' ability at math

By the statement:"The first principle of all things is water", we cannot judge Thalēs' knowledge, However, the following is known as Thalēs' theorem (which shows his ability of math):

Theorem 2.1. [central angle = β, inscribed angle= α] $\Longrightarrow \beta = 2\alpha$
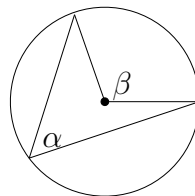
Proof. It suffices to draw the additional line through the center. □

♠**Note 2.2.** When Thalēs visited Egypt, there is a story that the king of Egypt was impressed by Thalēs' measuring the height of the pyramid in the way of measuring called triangulation. But, I think it is unreliable. Three great pyramids in the Egyptian Giza desert (deceased persons are Khufu, Khafre, Menkaure) erecting time of is the 2500 B.C. Of course, the triangulation in those days (2000 years before Thalēs) was common sense in Egypt. If so, Thalēs' theorem should be doubt whether it owes Thalēs. However, even as a true prover was unknown, the ability of mathematics at the time (i.e., the discovery of the concept of "proof") should be surprising. This leads to Euclid's Elements (due to Euclid (275 BC - 330 BC)).

2.2 Pythagoras (BC.582 - BC.496)

2.2.1 The mathematical ability of Pythagorean religious organization

Pythagoras was a leader in the mathematics study group, which may be regarded as the religious organization called Pythagorean religion. As the mathematical achievements, the followings are known:

- the discovery of irrational numbers, the Pythagorean theorem, the construction of a regular pentagon

and so on.

Theorem 2.2. $\sqrt{2}$ is an irrational number.

Theorem 2.3. (Pythagorean theorem): In $\triangle ABC$, the followings are equivalent:

($\sharp_1$) $\angle A = 90°$

($\sharp_2$) $AB^2 + CA^2 = BC^2$

Construction 2.4. the construction of a regular pentagon

Explanation: In a regular pentagon as shown in the figure below (left), put $AB = BC = CD = DE = EA = 1$. Then, we see

$$AC = AD = \frac{1 + \sqrt{5}}{2}$$

Hence, it suffices to construct $\frac{1+\sqrt{5}}{2}$. By the Pythagorean theorem, $\sqrt{5}(= \sqrt{1^2 + 2^2})$ can be constructed as follows (the figure below (right)). Thus, we easily get $\frac{1+\sqrt{5}}{2}$.
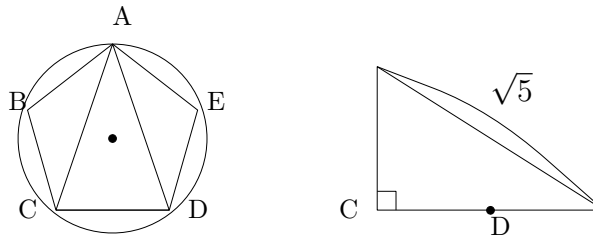
♠**Note 2.3.** It could have been something extra, but I wrote the explanation of the construction of a regular pentagon for beginners.

♠**Note 2.4.** The above two (the discovery of irrational numbers and the Pythagorean theorem) are one of the most important mathematical discoveries. If the following episodes are true, we can trust his mathematical ability.

($\sharp_1$) Pythagoras was killing the disciple, who found the irrational number, in order to hide the existence of irrational numbers.

($\sharp_2$) When Pythagoras discovered the Pythagorean theorem, he celebrated it, offered the sacrifice of the bull.

The two theorems, about 2000 years from the originally discovered to modern times, not been used even once with an essential meaning. Nevertheless, their importance had been recognized in the organization. This suggests a high mathematics force of the organization.

2.2.2 The first principle of all things is number

The main spirit of Pythagorean religious organization is "the first principle of all things is number".

Now let us explain the following principle (called Pythagoreanism in this paper):

(A):Pythagoreanism

The first principle of all things is number. That is,

Describe the world using mathematics.

(Notice)   After about 2000 years from Pythagoras, Galileo was talking about a similar thing. That is, *the universe is written in the language of mathematics.*

The phrase: "The arche (= first principle) of all things is ○○" is a fashion in those days. Note that "water", "fire" etc. are visible, but "number" is not.

Of course, Pythagoreanism (A) is true modernly. But, it is obvious that the pure Pythagoreanism:

• The world is written in only the language of mathematics.

is not true. If it can be written in only the language of mathematics, it is just mathematics.

Hence we have the following problem (i.e., the problem of world description), which is the main problem in this paper:

Problem 2.5. The problem of world description is as follows.

• When the world is written by "mathematics + α",

$$\text{what is } \alpha?$$

As mentioned later, let us say here conclusion now. For example, α is "motion", "causal relation", "probability", "measurement". From the quantum theoretical point of view, that is, in this paper, we devote ourselves to "measurement (Axiom 1) and causality (Axiom 2) (*cf.* Sec.1.1).

2.3 Hērakleitos and Parmenides

2.3.1 Hērakleitos(BC.540 - BC.480)

Hērakleitos said the following.

(A):Hērakleitos(BC.540 - BC.480)

The first principle of all things is fire.

And, further,

Everything flows.

Although "Everything flows" and "You cannot step into the same river twice" are interesting, everyone may be able to say similar thing.

Hence, in this paper, we interpret "Everything flows" as follows.

(B) "motion" is the most fundamental key-word (by which science is described).

If so, we can relate the (B) to Parmenides.

2.3.2 Parmenides(BC.515 - unknown)

In the same period of Hērakleitos, Parmenides said the exact opposite of words of Heraclitus. That is,

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(C):Parmenides(BC.515 - unknown)

Parmenides said:

(C$_1$) Everything does not change. There is no motion and no change. Time does not exist. There exists only "one", and not "many".

Also,

(C2) We should not be relying on the sense to understand the world, it should be considered logically by reason. Even if they seem to be moving, that will be only a case that man possesses the sense to see so, and be not the guarantee of the existence of movement.

(Notice): Remark the similarity between (C$_1$) and the linguistic Copenhagen interpretation (in Sec.1.1.2). Also, in case of quantum mechanics, its object is too small, is not seen. Thus, we cannot rely on the sense, but calculation. We can completely consent to Parmenides's assertion (C$_2$) in case of quantum mechanics.

Since Parmenides said "Motion does not exist", we think that he recognized importance of "motion" sufficiently. Hence we consider that Parmenides' assertion is the same as Hērakleitos', that is,

(D) "motion" is the most fundamental key-word in science.

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The following (E_1) and (E_2) are my fiction about the difference between Hērakleitos and Parmenides:

(E_1) Since Hērakleitos said "The first principle of all things is fire", he seems to premise the realistic world. Thus, his motion is similar to the motion in physics.

(E_2) Parmenides might study the abstract motion in the linguistic world view. For example, his motion is "vegetable growth", "increase of the population", "economic growth" and so on.

In this paper, we discuss the subject under this fiction, though we do not know the real thing.

2.3.3 Motion function method in the scientific linguistic world description

As mentioned in the previous section, Pythagoras said "The first principle of all things is number", Hence,

(F) Mathematics is indispensable to describe the world. However, words to connect mathematics and the world are necessary

And further, we want to consider the following fiction:

(G) As an influential candidate of the words, Parmenides (and Heraclitus) thought of "motion"

As one of the scientific linguistic world descriptions, we introduce the following "motion function method", which is assumed to be due to Parmenides (*cf.* Note2.7).

(H): (Scientific linguistic) motion function method (due to Parmenides?)

Let T be time axis, and let X be space axis. A function $f : T \to X$ is called motion function.

Then, the motion function method (in the scientific linguistic world description) is proposed as follows:

(H_1) **"motion" should be described by the motion function $f : T \to X$.**

♠**Note 2.5.** In the above, we should note that

($\sharp_1$) "Moving feeling" is erased.

If it is so, as Parmenides says, we think that

($\sharp_2$) if we devote ourselves to logic or mathematics without relying on the sense, then we cannot look at "motion".

Also, the motion function method belongs to the realistic world description as well as the scientific linguistic world description. In this paper we usually consider that it belongs to the scientific linguistic world description.

The motion function method is easy, and it is usually studied in elementary school as follows.

Chap. 2 Ancient Greek philosophy (before Socrates)

Problem 2.6. An A spot and a B spot are 1400 meters away. Amy left the A spot for a B spot by 80 m per minute. Betty left the B spot for A spot at the same time by 60 m per minute. How many minutes later will Amy and Betty meet?

[**Answer**] Amy's motion function $f_A : \mathbb{R}(\text{time axis}) \to \mathbb{R}(\text{one dimensional space axis})$ is defined by $f_A(t) = 60t$, Betty's motion function $f_B : \mathbb{R}(\text{time axis}) \to \mathbb{R}(\text{one dimensional space axis})$ is defined by $f_B(t) = 1400 - 80t$, Thus, solving $f_A(t) = f_B(t)$, we see

$$60t = 1400 - 80t \quad \text{then,} \quad t = 10$$

Hence, after 10 minutes later, the two meet. □

♠**Note 2.6.** Some may think that to consider two motion functions f_A and f_B is not consistent with Parmenides' saying: *there exists only "one" and not "many"*(*cf.* Sec.1.1.2: linguistic Copenhagen interpretation). However, if so, it suffices to consider the following motion function:

(♮) $(f_A, f_B) : \mathbb{R}(\text{time axis}) \to \mathbb{R}^2(\text{two dimensional space axis})$

♠**Note 2.7.** (a): Although I do not know the discoverer of the motion function method, I want to assume that Parmenides is the main character. Strictly speaking, the discovery might not be in Ancient Greece since the complete understanding of the concept of "function" is after Leibniz. However, we think that the spirit of the motion function method was understood by Pythagoras, Aristotle, Archimedes, etc.

(b): Of course, the above "motion function method" is incomplete and temporary. The motion function $f : T(\text{time}) \to X(|mboxspace)$ is not sufficient without the answers to the questions "What is time?" and "What is space?" (the Leibniz=Clarke correspondence(*cf.* Note 7.9)). For the quantum linguistic answers to this questions, see ref. [32].

(c): There are various problems as mentioned above. We think that the first step of the world description was formed by Parmenides as follows (*cf.* Assertion 1.4[the classification of philosophers]):

$$(♭) \begin{cases} (♭_1) : \text{the realistic world description (physics)} \\ \quad \text{Aristotle, Archimedes, Galileo, Newton, Einstein, } \cdots \\ \\ (♭_2) : \text{the fictional linguistic world description (The main street of western philosophy)} \\ \quad \text{Plato, Scholasticism, Descartes, Locke, Leibniz, Berkeley, Hume, Kant, Husserl} \\ \\ (♭_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\ \quad \textbf{Parmenides}, \text{Zeno J. Bernoulli, statistics (Fischer, etc.), quantum language} \end{cases}$$

In this paper, Pythagoras has no position in the above since we decide that mathematics is not a kind of world description.

♠**Note 2.8.** As the world descriptions before Newtonian mechanics, the most important is

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2.4 Zeno(BC490 - BC430)

"the motion function method" and "Archimedes' principle of leverage and buoyant force"

Some may have a question such as

- Why isn't the importance of the motion function method emphasized? Why can't the discoverer of the motion function method be specified?

Although I have no clear answer, we consider as follows:

- The realistic world description (i.e., physics) was usually discovered by one genius, for example, Archimedes, Newton, Maxwell, Einstein and so on. On the other hand, the scientific linguistic world description is discovered by plural persons. For example, the discoverer of the theory of probability (e.g., Pascal, J. Bernoulli, Laplace, Kolmogorov, etc.) cannot be specified. Probability theory was imperceptibly formed by a number of people. In this paper (*cf.* ref. [32]), we want to regard quantum theory, discovered by Heisenberg, Schrödingerand Born, as a kind of scientific linguistic world description (and not realistic world description).

2.4 Zeno(BC490 - BC430)

In this section, from the quantum linguistic point of view, we study Zeno's paradoxes, the oldest paradox in science.

It should be noted that

- all argument in this section is not standard, but my opinion.

2.4.1 What is Zeno's paradoxes?

Zeno was the student of Parmenides. Although Zeno's paradox has some types (i.e., "flying arrow", "Achilles and a tortoise", "dichotomy", "stadium", etc.), I think that these are essentially the same problem. And I think that the flying arrow expresses the essence of the problem exactly and is the first masterpiece in Zeno's paradoxes.

Now we present Zeno's paradoxes (i.e., flying arrow) as follows:

Please taste the literary pleasure.

Paradox 2.7. [Zeno's paradoxes: The literature-like antinomy]

The literature-like proof of [Flying arrow is at rest]

- Consider a flying arrow. In any one instant of time, the arrow is not moving. Therefore, if the arrow is motionless at every instant, and time is entirely composed of instants, then motion is impossible. □

The literature-like proof of [Flying arrow is not at rest]

- We have to accept that an arrow passes there. However, "to pass there" is not equivalent "to exist there". What is "to pass there"? "To pass there" is both "to exit there" and

---

"not to exist there". Therefore, flying arrow is not at rest.

□

Now we can answer the question "What is Zeno's paradoxes?". That is, we consider that

- Zeno's paradoxes say "Don't trust on the logic in ordinary language"

since Paradox 2.7 shows that "antinomy" happens in the logic in ordinary language. If so, we have to obey the world descriptionism in Sec. 1.3.1. that is,

- First declare the world description, and discuss the world in the world description. Namely,

$$\underbrace{\boxed{\text{world description}}}_{\text{premise}} \overset{\text{therefore}}{\xrightarrow{\hspace{2cm}}} \overset{\text{conclusion}}{\underbrace{\boxed{\text{discussions, calculation, logic, properties}}}_{\text{subject}}}$$

with "world is so" above world description

Therefore, to solve Zeno's paradoxes is to solve the following problem

Problem 2.8. Propose a certain world description, in which Zeno's paradoxes (e.g., Flying arrow) can be discussed.

[**Answer**]; This is answered in Answer2.9 below.

2.4.2 The discussion about Zeno's paradoxes (e.g., Flying arrow) in the motion function method

If we obey the motion function method (in the scientific linguistic world description), we can easily solve Zeno's paradoxes (e.g., Flying arrow) as follows.

Answer 2.9. [**An answer to Problem 2.8(scientific answer)**] Under the motion function method (*cf.* Section 2.3.3) in the scientific linguistic world description, we discuss "Flying arrow" as follows.

- Consider the motion function $x(t)$, that is, for each time t, the position $x(t)$ of the arrow is corresponded. It is obvious that

    - "for each time t, the position $x(t)$ of the arrow is corresponded" do not imply that the motion function $x(t)$ is a constant function.

Therefore, the arrow is not necessarily at rest.

$\square$
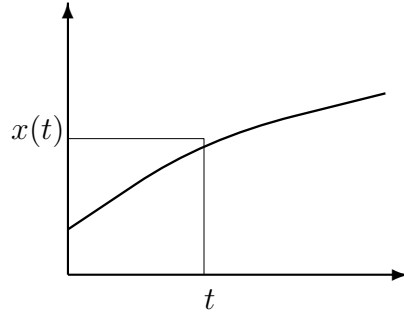
♠**Note 2.9.** Recall that we were confused in Paradox2.7[Zeno's paradoxes]. However, we could easily solve it in Answer 2.9. Thus we should be surprised at the power of the motion function method. If a certain world description is determined, Zeno's paradoxes can be solved. Thus, the motion function method is not necessarily determined uniquely. For example, it is a good exercise to solve Zeno's paradoxes under Newtonian mechanics or the theory of relativity.

2.4.3 Appendix: The discussion about Zeno's paradoxes (e.g., Achilles and a tortoise]) in the motion function method

Readers should also taste the literary pleasure in the following.

Paradox 2.10. [Zeno's paradoxes(the literature-like answer)]
[Achilles and a tortoise]
Zeno's paradox (Achilles and a tortoise) is as follows.

- Consider the competition of Achilles and a tortoise. Let the start point of a tortoise (a late runner) be the front from the starting point of Achilles (a quick runner). Suppose that both started simultaneously. If Achilles tries to pass a tortoise, Achilles has to go to the place in which a tortoise is present now. However, then, the tortoise should have gone ahead more. Achilles has to go to the place in which a tortoise is present now further. Even Achilles continues this infinite, he can never catch up with a tortoise.
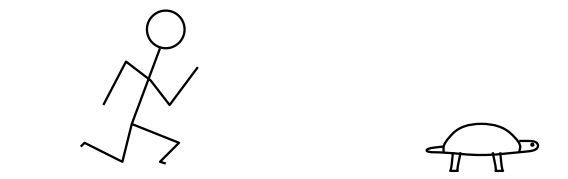
[**The scientific answer to Zeno's paradox (Achilles and a tortoise) by the motion function method**]

For example, assume that the velocity $v_q(= v)$ [resp. $v_s(= \gamma v)$] of the quickest [resp. slowest] runner is equal to $v(> 0)$ [resp. γv $(0 < \gamma < 1)$]. And further, assume that the position of the quickest [resp. slowest] runner at time $t = 0$ is equal to 0 [resp. a (> 0)]. Thus, we can assume that the position $q_1(t)$ of the quickest runner and the position $q_2(t)$ of the slowest runner at time t (≥ 0) is respectively represented by the following motion function:

$$
\begin{cases}
q_1(t) = vt \\
q_2(t) = \gamma vt + a
\end{cases}
\tag{2.1}
$$

Chap. 2 Ancient Greek philosophy (before Socrates)

The formula (2.1) can be calculated as follows (i.e., (i) or (ii)):
[(i): Algebraic calculation of (2.1)]:
Solving $q_1(s_0) = q_2(s_0)$, that is,

$$vs_0 = \gamma v s_0 + a$$

we get $s_0 = \frac{a}{(1-\gamma)v}$. That is, at time $s_0 = \frac{a}{(1-\gamma)v}$, the fast runner catches up with the slow runner.
[(ii): Iterative calculation of (2.1)]:
Define t_k $(k = 0, 1, ...)$ such that, $t_0 = 0$ and

$$t_{k+1} = \gamma v t_k + a \quad (k = 0, 1, 2, ...)$$

Thus, we see that $t_k = \frac{(1-\gamma^k)a}{(1-\gamma)v}$ $(k = 0, 1, ...)$. Then, we have that

$$\big(q_1(t_k), q_2(t_k)\big) = \Big(\frac{(1-\gamma^k)a}{1-\gamma}, \frac{(1-\gamma^{k+1})a}{1-\gamma}\Big)$$
$$\to \Big(\frac{a}{1-\gamma}, \frac{a}{1-\gamma}\Big) \tag{2.2}$$

as $k \to \infty$. Therefore, the quickest runner catches up with the slowest at time $s_0 = \frac{a}{(1-\gamma)v}$.
[(iii): Conclusion]: After all, by the above (i) or (ii), we can conclude that

(♮) the quickest runner can overtake the slowest at time $s_0 = \frac{a}{(1-\gamma)v}$.
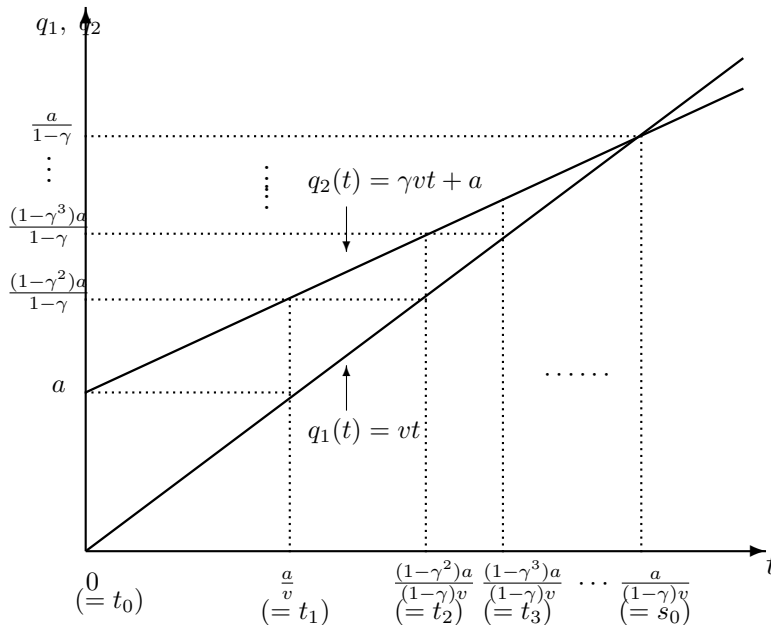
Graph: $q_1(t) = vt$, $q_2(t) = \gamma vt + a$

♠**Note 2.10.** As mentioned in Preface, the purpose of this paper is to understand the history of western philosophy from the quantum linguistic point of view. Thus,

($\sharp_1$) We aren't interested about how Zeno considered his paradoxes.

The established theory may say that

($\sharp_2$) Zeno might study the infinite division of time (and space)

However, if so, Zeno's paradoxes are the problem in physics and not philosophy. Then the problem should be entrusted to physicists. However, in this paper, we assume that Zeno's paradoxes belong to philosophy and not physics. Also, although in this section we solved Zeno's paradoxes under the motion function method, our present problem is how to characterize the motion function method in the framework of quantum language (*cf.* Note 2.7:(b)). This is solved in ref. [32].

Chapter 3

The Big Three in Greek Philosophy

By the appearance of The Big Three in Greek Philosophy (Socrates, Plato, Aristotle), the origin of western philosophy was formed as follows.

$$(\flat) \begin{cases} \text{the realistic world description(Aristotle} \rightarrow \text{Newton)} \\ \\ \text{the linguistic world description} \begin{cases} \bullet \text{ the fictional linguistic world description} \\ \quad \text{the main current of western philosophy} \\ \quad \text{(Socrates, Plato, Descartes, Kant, etc.)} \\ \\ \bullet \text{ the scientific linguistic world description} \\ \quad \text{(Parmenides} \rightarrow \text{statistics, quantum language)} \end{cases} \end{cases}$$
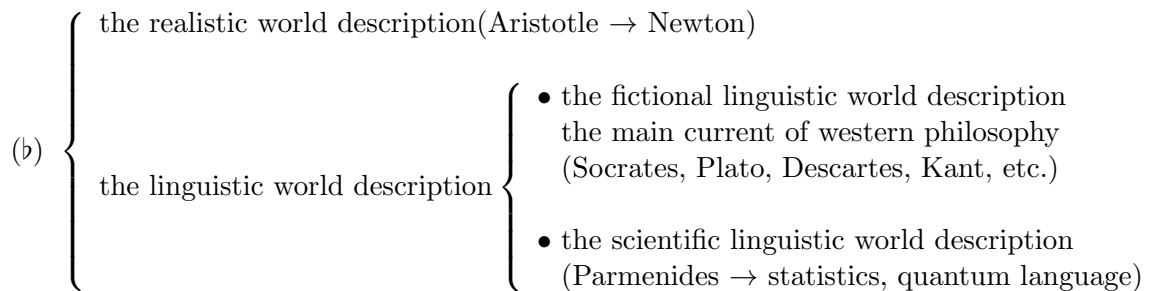
3.1   Protagoras and Socrates

The philosophy of world description aimed at the following problems

(A) How is the world described?   How is the world understood?
By what kind of language is the world described?

But, there is another philosophy (i.e., philosophy of ethics) different from the world description.

Ethics,morals [How should we live?]

Most may think that ethics is only art of public speaking. In fact, the central person **Protagoras** of sophists (the persons who told elocution and rhetoric as occupation in ancient Greece) explained **"Man is the measure of all things".** And Protagoras insisted on the relativism by which he assume that anything such as objective truth didn't exist only by each person's subjective judgment.
According to modern capitalism, we see:

$$\text{"the average of subjective value"} = \text{"price"}$$

Therefore, the assertion of sophists is rational, and, the modern common sense.

However, **Socrates** (BC.469 - BC.399) had objected to this idea. He investigated that

(B) How should we live?

And, he clarified the following words:

(C) "goodness", "happiness", "virtue", "justice", "courage", "love" $\cdots\cdots$

That is, Socrates showed that the investigation of the above words is also the central theme of philosophy. In the following dispute:

"relativism (rational sophists) " vs. "absolutism (a man of faith: Socrates) "

Socrates has advocated the ethical philosophy.

Note that three philosophers (Socrates (BC.469 - BC.399) , Buddha (BC.565 - BC.486), Confucius (BC.551 - BC.479) and Mozi (BC.470 - BC.390)) were contemporary, and investigated the same problem (B). It is a matter of course that

(D) If these words mentioned in the above (C) didn't spread, the human race might have been ruined. At least, we wouldn't be able to form "human society". Maybe the mankind perished.

Therefore, I cannot overemphasize the importance of ethical philosophy. Also, the philosophy of ethics is worldwide. When it isn't so, we're in trouble. That is, when it isn't so, "world peace" isn't achieved.

As emphasized throughout this paper, I believe that

- **The main theme of philosophy is ethics (and not world description).**

Hence I agree that Socrates is called the father of philosophy.

♠**Note 3.1.** Socrates did not leave a book. The story "Sophists vs. Socrates" is Plato's fiction (Plato is a student of Socrates). Thus, it is not fair. For example, the strongest logic **"I know that I know nothing"** is as follows.

- Sophists: something is asserted $\cdots\cdots$
- Socrates: deny Sophists' assertion
- Sophists and Socrates: debate (called Socratic Method)
  $\cdots\cdots$ Sophists and Socrates tell eloquently, and thus, they get tired. $\cdots\cdots$
- Socrates says "Your ignorance is now revealed. I know that I know nothing, but you do not know that you know nothing. Thus, I am superior to you".

This is Socrates' strongest logic **"I know that I know nothing"**. If we, without sticking to an established theory, read Plato's novel which makes Socrates a main character, we may consider that the following question cannot easily be answered:

- Who uses sophistry, Socrates or sophists? □

In physics, the truth can be determined by an experiment. In mathematics, it suffices to complete the proof. In engineering, to be useful is first. However, in ethics, how to put ends is not established. Thus, we think that how to put ends discovered by Socrates(i.e., Plato) is just the invincible logic **"I know that I know nothing"**, which is the magic sentence such as **self-referential proposition**. That is, Socratic method is as follows.

(E) in order to terminate the discussion, Socrates says a paradoxical statement such as disrupting the opponent's head

Speaking of bad, this is a psychological trick of technique. However, if Plato did not so, his novel would be a never ending story.

Throughout this paper, we frequently emphasize that the self-referential propositions (e.g., "I know that I know nothing", "I think, therefore I am", etc.) play important roles in western philosophy (*cf.* Note 1.3).   That is, we always emphasize that **western philosophy is not logical**.

3.2   Plato(BC.427 - BC.347)

3.2.1   The theory of Ideas – Asserted fiction –

In the binary opposition (in ethics):

(A)   "relativism (rational sophists)" vs. "absolutism (a man of faith: Socrates)"

Plato, a student of Socrates, established "the theory of Ideas" as the foundation of absolutism in order to support Socrates.

If the propositions such as "Man's life is heavier than the Earth" , "Love is forever", "Love always overcomes money", etc. are the objective truth, the occupation of the insurance company does not hold. However, Socrates wanted to believe so. To help Socrates, Plato proposed the occult heavenly world (i.e., the world of Idea), which related ethics to the world description. That is,

(B) the theory of Ideas is a reckless attempt such that the rationalization of "How should we live" results in the world description "How should the world be described".

which became the standard form of "how to tell philosophy" in the history of two thousand hundreds of years.

⌒────────── **(C): The fiction called "the theory of Ideas"** ──────────⌒

The theory of Ideas is as follows

- It cannot be said that love always overcomes money in the real world. However, there exists another world (i.e., the world of Idea), where "love always overcomes money" is believed as the the objective truth. That is, there exists Idea (= the true form) in heavens. A thing existing on the ground is only the shadow.

This is the theory of Ideas.

⌣──⌣

Then, the real world is a shadow picture, hence, in the real world,

(D₁) love sometimes loses money

(D₂) Good man is sometimes unhappy.

That is, Plato wanted to say that

> "love always overcomes money" is the objective truth in the world of Idea,
> therefore, "Believe in love!"

Apart from whether or not we believe in this reasoning, the discovery of this idea (i.e., the two key-words: the world of Idea and the real world) is a beginning of the dualistic idealism, which has continued to be a mainstream of philosophy in spite of twists and turns. The theory of Ideas, proposed as the covering fire of ethical philosophy, became a mainstream of western philosophy.

(E) Our human DNA prefers the logic (or, reasoning) such as ethical philosophy is derived from the the philosophy of world description. That is,

> "the world is so", therefore "we should live so"

namely,

- $\underbrace{\boxed{\text{fictional linguistic world description}}}_{\text{introduction·preface·fiction}} \overset{\text{world is so}}{\underset{}{\xrightarrow{\text{therefore}}}} \overset{\text{we should live so}}{\underset{\text{main subject}}{\boxed{\text{Ethics·morals}}}}$
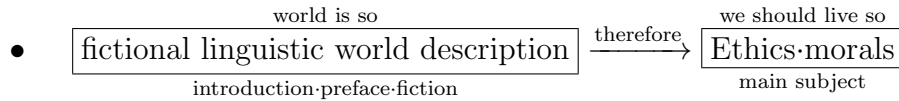
This is, of course, irrational since this is a reckless attempt such that the problem "How should we live?" is answered from the objective point of view. But a human brain moves only by a logic. "Logic" cannot function without some kind of sensuous common soil.

♠**Note 3.2.** Aesop (BC.620 - BC.510): We consider that the theory of Ideas is similar to Aesop's Fables. Aesop's Fables was already famous before the late 5th century BC. Of course, Plato should have been aware of the persuasive power of Aesop's Fables.

Plato's say is as follows: No matter how much we discuss the problem about "relativism (rational sophists) vs. absolutism (a man of faith: Socrates)", there is no reason to obtain the conclusion. It is not the truth that people demand. There may not be the truth.

<p style="color:red; text-align:center;">**The one people want is "the asserted fiction" and not the truth.**</p>

And, this is the philosophy. I believe that Plato consider so.

♠**Note 3.3.** In order to avoid eternal argument, Socrates invented "Socratic method", that is, the magic sentence "I know that I know nothing". Plato also invented the theory of Ideas.

For completeness, we add the following:

(F) I think that Plato did not believe in the existence of the world of Idea. If he believed in it, he was not a philosopher but a founder of religion. He also understood that the theory of Ideas is sophistry, and there is no truth in ethics.

Even so, there may be a reason to consider that

(G) something such as the sense of ethics of the human commonness is printed in the arrangement of a human DNA,

However, this idea may not be within philosophy.

3.3   Plato: The fictional linguistic world description

3.3.1   The necessity of idealism and dualism

Let us review Platonic method of telling philosophy (=the fictional linguistic world description, *cf.* Sec. 1.3.4).

(A): The fictional linguistic world description

Platonic method of telling philosophy (in the main current of western philosophy) is as follows.

$$\text{(A)} \quad \underbrace{\boxed{\text{fictional linguistic world description}}}_{\text{preface, introduction, (fictional)premise, expedient}} \overset{\text{therefore}}{\xrightarrow{\hspace{1cm}}} \overbrace{\underbrace{\boxed{\text{ethics, morals}}}_{\text{main subject}}}^{\text{you should do so}}$$

with "world is so" over the first box.
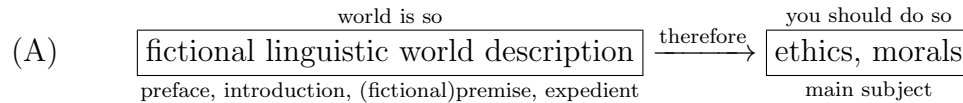
Therefore,

(A$_1$) $\big[$world is so$\big]$ is secondary,

(A$_2$) $\big[$you should do so$\big]$ is main theme

In Plato philosophy, the theory of Ideas (=the fictional linguistic world description) is only the fiction (= parable, fable). Platonic method of telling philosophy is common to all philosophies such as the genealogy of the dualistic idealism:

(B) Plato(the theory of Ideas)⟶Augustinus⟶Thomas Aquinas ⟶Descartes
⟶Kant(epistemology)

If so, we may hesitate to reply "Yes" for the following question:

- Does the philosophy of world description proposed by them merit serious discussion?

As mentioned throughout this paper, we consider that

- every world description in the genealogy (B) of the dualistic idealism is an allegory as similar as the theory of Ideas.

In fact, epistemology (due to Kant) is, from the scientific view point, an allegory less than brain science.

3.3.1.1 The necessity of the world description

Even if the theory of Ideas is an allegory, there is a reason in Plato's idea such as

(C) Ethics·morals is dependent on the world (=environment around).

It is a matter of course that there is a difference between the ancient Greek ethics and the modern American ethics. In this sense, strictly speaking, the following (=the Platonic method of telling philosophy) is true:

(D)
$$\underset{\text{preface, introduction, (fictional)premise, expedient}}{\boxed{\overset{\text{world is so}}{\text{fictional linguistic world description}}}} \xrightarrow{\text{therefore}} \underset{\text{main subject}}{\boxed{\overset{\text{you should do so}}{\text{ethics, morals}}}}$$

For example, note that the fortune-teller advises us after hearing appearance.

3.3.1.2 The necessity of idealism (= metaphysical world)

If the (D) is strictly put into practice, this is not philosophy but life consultation. That is, the strict and concrete world description is inflexible. Also, there is a possibility that a mistake is pointed out for the concrete description. It is certain that Plato wanted more general and flexible answer for the question "How should we live?". Hence, he might consider that

(E) Metaphysical world description (i.e., idealism) is desirable

This is the reason to adopt the idealism (i.e., metaphysical world) in the Platonic method of telling philosophy

3.3.1.3 The necessity of dualism

Also,

(F) The term: "$\xrightarrow{\text{therefore}}$" in Platonic method of telling philosophy should be remarked. If the reasoning as "$\xrightarrow{\text{therefore}}$" is required, the world where a human being is reflected in some kind of meanings is preferable. That is, the world composed of "matter" and "something where a human being is reflected" is desirable.

For example,

- It isn't usually done to get a moral lesson from the monism such as Newtonian mechanics.

This is the reason to adopt "mind-matter dualism" in philosophy.
    After all, we conclude that

(G$_1$) **in the philosophy of world description, dualistic idealism is desirable.**

Or,

(G$_2$) **it is not overwhelming to say that the purpose of the world description of Western philosophy is to investigate dualistic metaphysical world.**

♠Note 3.4. The above argument is important for quantum language: For instance, we have a famous question:

($\sharp_1$) Why does quantum mechanics (which is one of fields of physics) belong to dualism?

In order to answer this question,

($\sharp_2$) we proposed quantum language (which is not physics but dualistic idealism), and further, characterize quantum mechanics (as well as economics) in terms of quantum language.

(*cf.* ref. [32]).

3.4 Key words of dualism

3.4.1 Three key-words of dualism

The key-words are simple. That is because

- The mind-matter dualism should have [A](mind) and [C](matter). However, if the two are not related, this implies only that there are two monism. Therefore, there must be [B](medium(=device that mediate [A] and [C]))

If so,

- The structure of mind-matter dualism is as follows

$$[A](\mathbf{mind}) \quad \longleftarrow [B] \longrightarrow \quad [C](\mathbf{matter})$$
$$\mathbf{(medium)}$$

That is, it is composed of [A](mind),[B](medium),[C](matter).

In history, there are incomplete dualism that does not include three [A](mind), [B](medium), [C](matter).

- We consider that [B](medium) is the most important than the other two (*cf.* Linguistic Copenhagen interpretation (E_3) in Sec.1.1.2). Therefore, if the theory includes [B](medium), it is called "dualism".

3.4.2 [Idea]=[the meter standard]

Western philosophies are connected as follows.

$$\boxed{\text{Plato}} \rightarrow \boxed{\text{Scholasticism}} \rightarrow \boxed{\text{Descartes·Kant}} \rightarrow \boxed{\text{quantum language}}$$

Of course, the meaning of "be connected" is important. The meaning is in the sense of the following table.

Assertion 3.1. (= Assertion1.6) [**The correspondence of key-words**]

[**The key-words of the linguistic world description**] The linguistic world description is the mind-matter dualism, which is composed of three key-words, that is, [A](= mind), [C](= matter) and [B](= body: something connecting [A:mind] and [C:matter]). Thus, we see that:

mind-matter dualism	[A](= mind)	[B](between A and B)	[C](= matter)
Plato	actual world	Idea	/ [/]
Thomas Aquinas	universale post rem	universale ante rem	/ [universale in re]
Descartes	I, mind, brain	body	/ [matter]
Locke	mind	secondary quality	primary quality [/]
Berkeley	mind	secondary quality	/ [God]
Kant	actual world	perception	/ [thing-in-itself]
statistics	sample space	/	parameter [population]
quantum mechanics	measured value	observable	state [particle]
quantum language	**measured value**	**observable**	**state** **[system]**

♠**Note 3.5.** (= Note 1.6) (i): In mind-matter dualism, [B:medium] is the most important (*cf.* the linguistic Copenhagen interpretation (E$_3$) in Sec. 1.1.2). Thus, we consider that Plato's Idea theory is dualism. On the other hand, statistics lacks [B:medium]. Thus, statistics is not usually regarded as dualism but mathematical theory. However, in this paper, statistics is listed up as "incomplete dualism" in the above table.

(ii): The readers may wonder that "actual world≈mind(=human)" in Plato. However, it should be understood under the maxim: "Man is the measure of all things". Similarly, we think that "measured value≈mind(=human)" in quantum language. That is because there is no "measured value" without "mind(=brain)".

(iii): In [C: matter], the terms "state" and "system" in quantum language are always used as the form "the system with the state" (*cf.* Axiom 1 in Sec. 1.1). In the history of western philosophy, "state" and "system" were often confused.

Assertion 3.2. [**Progress problem**]; If Western philosophy (i.e., dualistic idealism) makes progress, its key-words are naturally refined and clarified. Also, since the complete version is realized as quantum language, each dualistic idealism can be completely understood in comparison with quantum language. For example,

- "Plato's idea" is ambiguous, however, "secondary quality" is rather clear, and further,

"observable(=measuring instrument)" can be completely understood.

That is, the term "observable" can be used as mention in Axiom 1 in Section 1.1.
Therefore, we obtain the following conclusion: If "to make progress" is defined by "to come near quantum language", we can say that

$$\boxed{\text{Plato}} \xrightarrow[\text{progress}]{} \boxed{\text{Descartes}} \xrightarrow[\text{progress}]{} \boxed{\text{Locke}} \xrightarrow[\text{progress}]{} \boxed{\text{Kant}} \xrightarrow[\text{progress}]{} \boxed{\text{Quantum language}}$$

Also, we roughly say that

$$\boxed{\text{Plato}} \xrightarrow[\text{progress}]{\text{Cogito turn}} \boxed{\text{Descartes} \cdot \text{Kant}} \xrightarrow[\text{progress}]{\text{linguistic turn}} \boxed{\text{Quantum language}}$$

The meaning of the table in Assertion 3.1 will be explained throughout this paper. Now it suffices to remark the following.

①:Idea $\xrightarrow[\text{clarification}]{}$②: secondary qualities $\xrightarrow[\text{clarification}]{}$③: observable (= measuring instrument)

Here, the meaning of "$\xrightarrow[\text{clarification}]{}$" can be understood in the following

① Idea (= true form)
   "the Idea of beauty, the Idea of goodness, $\cdots$"
   $\Longrightarrow$
   "absolute beauty", absolute goodness", $\cdots$
   $\Longrightarrow$
   "the meter standard of beauty, the meter standard of goodness, $\cdots$"

② secondary qualities(=sensations of inherent nature (=primary qualities))
   "sweet, pungent", "hot, cold", "beautiful,ugly" $\cdots$

③ observable(=measuring instrument)
   saccharimeter, thermometer, $\cdots$

In this real world, "Man is the measure of all things" may be almost true. In the world of Idea, the absolute measure is always believed. That is, there exists the Ideas (= true forms).

- There exists the absolute standard of "love", "beauty", "goodness", etc.

In our real world, the absolute standard is blurred and invisible. Every thing in the real world is the shadow picture (= measured value including large errors) of the absolute standard (in the world of Ideas).

3.4.3   The meaning of "logic": 'Science and math' people cannot understand "logic" in philosophy

3.4.3.1   Psychological logic

Let's start from the next unclear established sentences.

(A) It was possible to get only "ambiguous knowledge" by a sensation, and Plato thought it was possible to catch "right knowledge" only by reason. Mathematics gets a solution by reason, not a sensation, so Plato emphasizes mathematics very much. It was written in the gate of the entrance of the school (Platonic Academy) which Plato established, **"The person who does not know the geometry should not pass through this gate."**

However, we think that **this is not Plato's real intention but his advertising statement.** I have belonged to Faculty of mathematical science in university. However, I have not received education that is arousing importance of the logic expressly, and there is not the memorizing that I did. The field where importance of the logic is emphasized is the field where it is hard to do logical and quantitative arguments. Thus, I think that the above sentence: "The person who does not know the geometry should not pass through this gate" resembles that there is a mathematics subject of entrance examination of the Faculty of Law and Faculty of Economics. That is,

(B) The interest of Plato is concentrated to the field where a logical and quantitative argument is hard to make. In fact, "I know that I know nothing" and "the theory of Ideas" are "psychological logic" and not "mathematical logic". Also, it should be noted that the mathematical level of Platonic Academy is not so high as Pythagoras, Archimedes, Euclid and so on.

The illogical persuasion method to emphasize "logical and mathematical" repeatedly is one of the most effective persuasion methods to date since Plato. For example, Kant's "Critique of Pure Reason" and Wittgenstein's "Tractatus Logico-Philosophicus" are not logical. Of course, I'm not negative for Plato, Kant, Wittgenstein. If there is a philosophy which is logical, then I think that it is not a good philosophy.

However, "mathematical, logical, reasonable" must be emphasized in philosophy. That is because the difference between philosophy and religion becomes obscure without the emphasis.

Hence we consider:

Science and math people who believe that "logic=mathematical logic",
cannot understand philosophy.

3.4.3.2 The philosophy of world description is a kind of literature

Literature has various genres. As an example, it is a love story, a detective story, SF (science fiction), poetry, nonfiction. In the same sense, **the philosophy of world description is a kind of literature concerning "dualism idealism" (*cf.* Sec.3.3.1).** More precisely speaking, in the following (=the Platonic method of telling philosophy):

(C)

$$\underset{\text{preface, introduction, (fictional)premise, expedient}}{\overset{\text{world is so}}{\boxed{\text{fictional linguistic world description}}}} \xrightarrow{\text{therefore}} \underset{\text{main subject}}{\overset{\text{you should do so}}{\boxed{\text{ethics, morals}}}}$$
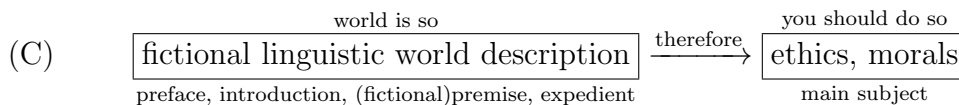
the fictional linguistic world description is a kind of literature. For example, its title is "The theory of Ideas", "Discourse on the Method ", "Critique of Pure Reason" etc.

It may be a little extreme explanation, but it's better to think so. For example, readers must not consider:

<div align="center">"The philosophy of world description" = "quest for truth"</div>

There is never a case that philosophy remarked on truth. The department of philosophy belongs to the faculty of literature at most universities. This fact is due to the above (C).

"Logic" is various. We think that

(D) **the "logic" in philosophy (i.e., the fictional linguistic world description) is similar to the "logic" in detective story**

It isn't being talked about by a negative nuance. If there is a philosophy which is logical or mathematical, then I think that it is not a good philosophy.

> ♠**Note 3.6.** Most 'science and math' people may not understand that the study of Plato is a major of philosophy. That is because the study of Newton is not major field in physics. However, they should consider that the study of Plato is similar to the study of Shakespeare and not the study of Newton. Hence, in spite of our assertion (i.e, Assertion 1.7, Assertion 3.2), some may have an opinion that philosophy did not make progress.

3.5   Summary: Platonic method of telling philosophy

3.5.1   Summary

(A):

Platonic method of telling philosophy (i.e., the fictional linguistic world description)

In Platonic method of telling philosophy,

(A_1) the fictional linguistic world description is characterized as the premise (or, introduction, preface, fiction) of the main theme (i.e., ethics, moral).

In other words, consider the following figure, i.e., Platonic method of telling philosophy:

(A_2)

<div align="center">

world is so $\qquad$ you should do so

$$\boxed{\text{fictional linguistic world description}} \xrightarrow{\text{therefore}} \boxed{\text{ethics, morals}}$$

preface, introduction, (fictional)premise, expedient $\qquad$ main subject

</div>

Literature has various genres. As an example, it is a love story, a detective story, SF (science fiction), poetry, nonfiction. In the same sense, the above fictional linguistic world description (as the support of the main assertion [ethics. moral]) is a kind of literature.

(Notice)

(A_3) Some consider that the term: "$\xrightarrow{\text{therefore}}$" implies that the fictional linguistic world description should be "logical". Here, it should be noted that the "logical" is similar to the "logical" of detective story.

Remark 3.3. Whitehead(1861 - 1947) said:

(B) Western philosophy is characterized as a series of footnotes to Plato

Although we do not know his true intention, our understanding is as follows.

(C) The various fashions of the Buddhism, Confucianism and the Taoism jumbled up at the Orient. And those continued for 2500 years by a subtle strained relation. On the other hand, in the Western, Christianity was too strong. Thus, the main theme (i.e., ethics, morals) is mostly due to "Christianity + Socrates", and thus, the various fashions were not born.

However, according to Platonic method of telling philosophy, the introduction part (i.e., the fictional linguistic world description) is changeable.

Therefore, the progress of Western philosophy (which was not realized in the East) can be realized as follows.

- Plato⟶Augustinus⟶Thomas Aquinas ⟶Descartes⟶Locke⟶...⟶Kant

That is,

Platonic method of telling philosophy could keep freshness.

If the example is say, we think that there has been an effect, such as **the model change of car**. The Platonic method of telling philosophy is almost always the main current of Western philosophy. This device (i.e., the model change) brought the prosperity of Western philosophy.

If we do not consider so, we cannot explain the fact useless western philosophy lasted for 2500 years.

♠**Note 3.7.** We consider that

- Philosophy of ethics is common to man and is the world standard.

Or, we want to consider so. If it is not so, world peace cannot be realized. However, the western philosophy (i.e., the fictional linguistic world description in the Platonic method of telling philosophy) is not the world standard, i.e., it is one of the country philosophies that accomplished unique evolution in the environment of the West. That is, it may be called "Galapagos philosophy". On the other hand,

- the realistic world description is the world standard (moreover, the universe standard)
  Aristotle⟶Archimedes⟶Newton⟶ · · ·

- the scientific linguistic world description is also the world standard:
  $$\underset{\text{(motion function method)}}{\text{Parmenides·Zeno}} \xrightarrow[\text{Tunnel of two thousand several hundred years}]{} \text{Fischer(statistics)}$$

And, it is a matter of course that the above two (the realistic world description and the scientific linguistic world description) are useful. It is remarkable that the philosophy of world description (=the fictional linguistic world description) isn't useful at all but it continued for 2500 years. That is, we think that "Galapagos" ⇔ "scientifically useless". This may be due to the shadow supporter (i.e., Christianity), i.e., as mentioned in the above remark, Christianity is too strong.

3.5.2   Overview of the following chapters

Western philosophy was formed by a lot of philosophers who understood an aim of Plato. For example, we add the followings (which will be precisely explained later).

(D₁) Scientist Aristotle was not able to accept the theory of Ideas (proposed by his teacher Plato). Aristotle was able to establish the Aristotle philosophy of the style (i.e., the realistic world description) that was different from Plato's. And this led to Newtonian mechanics.

(D₂) Platonic method of telling philosophy was convenient for father Augustine and Thomas Aquinas. Reputation as "the wise father who has a profound knowledge of Greek philosophy" might be only necessary.

(D₃) Spinoza might confuse Plato's "psychological logic" with "mathematical logic" And he considered that ethics should be investigated mathematically logically. But when Spinoza's earnest sincerity appealed people, it can't be said that Spinoza philosophy is failed. Because philosophy isn't science.

(D₄) Philosophers (Locke, Leibniz, Berkeley, etc.) in the modern age were affected by the Newton mechanics (= the realistic world description) too much. Hence, they (Locke, Leibniz, Berkeley, etc.) was too eager in the philosophy of the world description (i.e., the introduction part of the Platonic method of telling philosophy). As the time had passed, in the Platonic method of telling philosophy:

- $$\underset{\text{preface, introduction, (fictional)premise, expedient}}{\boxed{\text{fictional linguistic world description}}} \xrightarrow[]{\text{therefore}} \underset{\text{main subject}}{\boxed{\text{ethics, morals}}}$$
  (world is so)   (you should do so)
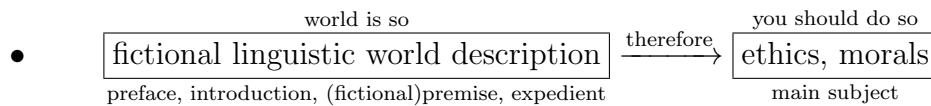
the fictional linguistic world description tends to be standing on its feet.

In the final form (=quantum language), ethics and morality are erased entirely, and only the scientific linguistic world description exists.

(D₅) Kant is highly regarded on today. The reason is that Kant understood Plato's intention perfectly.

- $$\underset{\text{preface, introduction, (fictional)premise, expedient}}{\boxed{\text{fictional linguistic world description}}} \xrightarrow[]{\text{therefore}} \underset{\text{main subject}}{\boxed{\text{ethics, morals}}}$$
  "Critique of Pure Reason (1781)"   "Critique of Practical Reason (1788)"
                                       "Critique of Judgment(1790)"
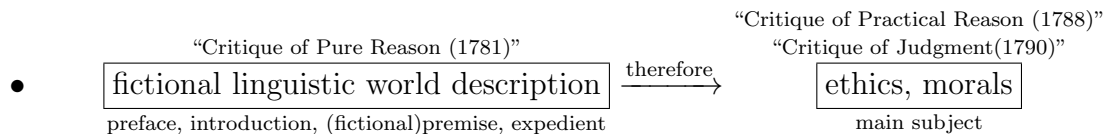
If some today criticize "Critique of Pure Reason" from the scientific point of view, they do not understand Platonic method of telling philosophy. "Critique of Pure Reason" is merely a preface for Kant philosophy.

(D₆) Since Plato emphasized the importance of "logic", some may consider that mathematical logic is essential in philosophy. However, in this paper, we consider that mathematical logic is not related to philosophy.

Though the world description (of western philosophy) continued failing as science, the reason why European philosophy always won respect is that the world description was not the main subject of the western philosophy. A part of the main subject was covered with Christianity, so the base to be respected has been prepared.

♠**Note 3.8.** Now we have the following classification of philosophers. (*cf.* Assertion 1.4[the classification of philosophers]):

$$(\flat) \begin{cases} (\flat_1) : \text{the realistic world description (physics)} \\ \qquad \text{Aristotle, Archimedes, Galileo, Newton, Einstein, } \cdots \\ \\ (\flat_2) : \text{the fictional linguistic world description (the main street of western philosophy)} \\ \qquad \textbf{Plato}, \text{Scholasticism, Descartes, Locke, Leibniz, Berkeley, Hume, Kant, Husserl} \\ \\ (\flat_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\ \qquad \textbf{Parmenides}, \textbf{Zeno} \; \text{J. Bernoulli, statistics (Fischer, etc.), quantum language} \end{cases}$$

Spirit of Pythagoras is inherited, and Parmenides and Zeno have argued establishment of the world description as science sincerely. However, Plato used the fictional linguistic world description as a means of the protection of Socrates(ethic philosophy) and has dwarfed the world description in non-scientific way. But, as Whitehead said "Plato's footnote", the fictional linguistic world description, that is,

($\sharp_1$) Plato→Augustinus→Thomas Aquinas ⟶Descartes⟶Locke→...→Kant⟶Husserl

has continued to be supported over a long time of more than 2000 years. On the other hand, the scientific linguistic world description was established by Fischer , etc. as follows:

($\sharp_2$) Parmenides·Zeno→ $\boxed{\begin{array}{c} \text{Tunnel of more than 2000 years} \\ \text{Dark age of the scientific linguistic world description} \\ \text{J.Bernoulli,Bayes,Laplace,etc.} \end{array}}$

→ Fischer(statistics)⟶quantum language

3.6 Aristotle

3.6.1 Edios and Hyle

Aristole (BC.384 - BC.322), the student of Plato, is the father of all the sciences ($\approx$ the father of the realistic world description). He could not accept Plato's theory of Ideas(=⌈ asserted fiction ⌉). That is,

- **Philosopher Plato preferred the asserted fiction to the truth**

On the other hand,

- **Scientist Aristotle preferred the truth to the asserted fiction**

And he proposed the concepts such as "eidos" and "hyle" as follows.

(A): Edios(Aristotle's Idea) and hyle

Aristotle said that

- **Edios** (= Aristotle's Idea = true form) is not in the heaven, but in **hyle** (= matter = particle).

Now let us explain it as follows.

- Recall that the philosophy of world description has made progress as follows.

$$\left\{ \begin{array}{c} \boxed{\text{Aristotle}} \\ \boxed{\text{Plato}} \end{array} \right\} \rightarrow \underset{\text{Dark Ages}}{\boxed{\text{Scholasticism}}} \rightarrow \left\{ \begin{array}{c} \boxed{\text{Newton}} \rightarrow \boxed{\text{theory of relativity}} \\ \boxed{\text{Descartes·Kant}} \rightarrow \boxed{\text{statistics·quantum language}} \end{array} \right.$$
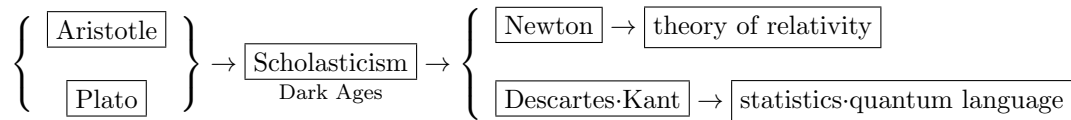
  where "top row" is the realistic world description, and "down row" is the linguistic world description.

Of course, the meaning of "make progress" is important, this is, it implies the following.

Assertion 3.4. (= Assertion 1.6)

[**The key-words of the realistic world description**] The realistic world description is monism, and its completed version is realized as Newtonian mechanics, whose key-words are "mass point" and "state". Thus, we see:

Aristotle	/	/	eidos [hyle]
Newton	/	/	state [mass point]

That is, we consider the following progress:

$$[\text{eidos}] \xrightarrow[\text{progress}]{} [\text{state}] \qquad [\text{hyle}] \xrightarrow[\text{progress}]{} [\text{mass point}]$$
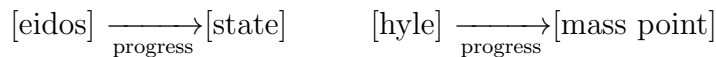
We can easily use Newtonian mechanics as follows.

- **mass point**(=particle with the mass m) with the **state**(=(position, momentum)= (x, p))

♠**Note 3.9.** A state has different expressions by how to take it a coordinate. For example, the circular motion is represented by two variables (x, y) in the two dimensional Descartes coordinates. However it can be represented by angular θ in polar coordinates. In this meaning, the representation of the state is various.

♠**Note 3.10.** To compare Assertion3.1 and Assertion 3.4 (or, see Assertion 1.6), we can guess that Aristotle cannot understand Plato's theory of Ideas. That is, Aristotle tried to propose the other theory (i.e., the realistic world description) than Plato's theory (i.e., the linguistic world description). To this it becomes clear, it took 1500 years time (that is, to wait for the appearance of Newton). (As mentioned Chapter 5, "Plato" and "Aristotle" were confused in Scholasticism of the Middle Ages). After all, by Aristotle, we can get the original pattern (of three kinds of world descriptions) (*cf.* Assertion 1.4[the classification of philosophers]):

$$(\flat) \begin{cases} (\flat_1) : \text{the realistic world description (physics)} \\ \quad \textbf{Aristotle}, \text{Archimedes}, \text{Galileo}, \text{Newton}, \text{Einstein}, \cdots \\ \\ (\flat_2) : \text{the fictional linguistic world description (the main street of western philosophy)} \\ \quad \textbf{Plato}, \text{Scholasticism}, \text{Descartes}, \text{Locke}, \text{Leibniz}, \text{Berkeley}, \text{Hume}, \text{Kant}, \text{Husserl} \\ \\ (\flat_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\ \quad \textbf{Parmenides}, \textbf{Zeno} \ \text{J. Bernoulli}, \text{statistics (Fischer, etc.)}, \text{quantum language} \end{cases}$$

3.7 Why does the motion happen?

3.7.1 From purpose to causality: Modern science started from the discovery of "causality"

When a certain thing happens, the cause always exists. This is called *causality(=causal relation)*. You should just remember the proverb

Smoke is not located on the place which does not have fire.

However the situation is not so simple as you think. Consider, for example,

- This morning I feel good. Is it because that I slept sound yesterday ?   or

  Is it because I go to favorite golf from now on ?

You will find the difficulty in using the word "causality". In daily conversation, it is used in many contexts, mixing up "a cause (past)", "a reason (implication)", and "the purpose and a motive (future)".

Pioneering research on movement and change may be found in

$$\begin{cases} \bullet \ \text{Heraclitus(BC.540 -BC.480): "Everything flows."} \\ \\ \bullet \ \text{Parmenides (born around BC. 515): "There is no movement."} \\ \quad \text{(Zeno's teacher)} \end{cases}$$

Although their assertions are not clear, they recognized that "movement and change" were the primarily important keywords in "world description". That is,

(B)   [**The beginning of World description**]

= [The discovery of movement and change] = $\begin{cases} \text{Heraclitus} \\ \\ \text{Parmenides} \end{cases}$

Aristotle (BC384–BC322) further investigated:

(C) What is the essence of movement and change

and concluded as follows.

──────────── **(D):Purpose (Aristotle)** ────────────

Aristotle asserted that **all the movements had the "purpose".**

- For example, a stone falls because it has the purpose to go downward, and smoke rises because it has the purpose to go upward.

Under the influence of Aristotle, "*Purpose*" had remained as a mainstream idea of "Movement" for a long period of 1500 years or more.

We were freed from the spell of "Purpose", only after Galileo, Bacon, Descartes, and Newton et al. discovered the essence of movement and change lies in "Causality".

<p align="center">Revolution from "Purpose" to "Causality"</p>

is the greatest paradigm shift in the history of science. It is not an exaggeration even if we call the shift "*birth of modern science*".

the birth of world description   the birth of modern science

$$\boxed{\text{Movement}} \xrightarrow[\text{Aristotle :(About 1500 years)}]{\text{"purpose"}} \boxed{\text{Causality}}$$

(Heraclitus, Parmenides, Zeno)   (Galileo, Bacon, Descartes, Newton)
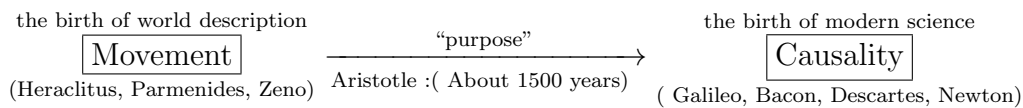
I cannot emphasize too much the importance of the discovery of the term: "causality". That is,

(♯) Science is the discipline about phenomena that can be represented by the term "causality". (i.e., "No smoke without fire")

Thus, I consider that the discovery of "causality" is equal to that of science.

In the realistic world description, Newtonian kinetic equation (i.e., the equation of the chain of causality) was final in a sense. However, in the linguistic world description, the problem "What is causality?" is not solved yet. For the complete answer to the problem, we had wait for the appearance of quantum language (Axiom 2 (causal relation) in Sec.1.1.1, also, see ref. [32]).

Summary 3.5. [Solutions to the causality problem] For example, we see:

(E_1) The causality is represented by Newtonian kinetic equation in Newtonian mechanics

(E_2) The causality is represented by Maxwell's equations in electromagnetism

(E_3) The causality is represented by Schrödinger equation (or equivalently, Heisenberg's kinetic equation) in quantum mechanics

(E_4) The causality is represented by Axiom 2 (in Section 1.1) in quantum language

<p align="center">47</p>

3.8 Logic; syllogism

3.8.1 The world descriptions takes precedence over syllogism (or logic)

3.8.1.1 Aristotle's syllogism in ordinary language

If the ecology of various animals is observed, it will be clear that the base of language was due to intimidation, solidarity, reproduction. Language was one of the strongest arms for the survival and breeding. Such a time have continued for millions of years. Of course, the greatest incidents in "the history of language" happened, for example,

(E) "rhythm and song", "logical structure", "quantity concept", "grammar", "tense", "character", etc.

However, it was too long years ago, we cannot specify the contribution person's name. The surprise that the logical structure was found in ordinary language, has been handed down as "Aristotle's syllogism"

The following statement is often cited as the example of a typical syllogism:

(F) *Since Socrates is human being, and human being is mortal, it follows that Socrates is mortal.*

However, from the world description view point, this example (due to Aristotle) can't be accepted obediently. That is because this contradicts the world descriptionism(Sec.1.3.1). That is, the following question is not answered yet:

(G) Under what kind of world description is the statement (F) mentioned?

Then, the statement (F) is within ordinary language, and not scientific proposition. And hence, we cannot completely believe in the statement (F). As seen in Sec. 2.4 (Zeno's paradoxes), the logic in ordinary language cannot be trusted.

3.8.1.2 Logic under the world descriptionism

Throughout this paper, our belief is the world descriptionism (i.e., the world description first) as follows:

(H): world descriptionism (*cf.* Sec. 1.3.1)

The world descriptionism has the following form:

(H) $\underset{\text{premise}}{\boxed{\overset{\text{world is so}}{\text{world description}}}} \xrightarrow{\text{therefore}} \underset{\text{subject}}{\boxed{\overset{\text{conclusion}}{\text{discussions, calculation, logic, properties (motion, etc.)}}}}$
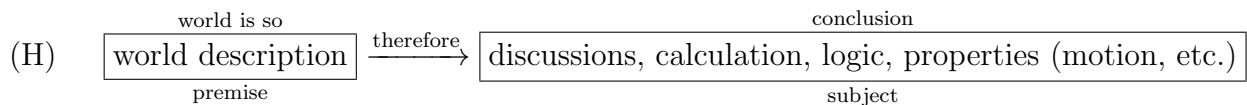
that is, the spirit such that "Start from world description"

As mentioned before, Zeno's paradoxes suggest the necessity of the world descriptionism. After the proclamation of the world description (e.g., Newtonian mechanics, the theory of relativity, quantum language, etc.) , we have to discuss Zeno's paradoxes (*cf.* Sec. 1.3.1).

Of course, the world descriptionism is indispensable to the arguments "syllogism" as well as "motion". That is,

(I) After a world description (i.e., language system) is decided, logic is decided automatically and naturally. On the contrary, when a world description (i.e., language system) is not decided, logic is not decided. That is,

<div style="text-align:center; color:blue; font-weight:bold;">the world description takes precedence over syllogism (or logic).</div>

In this sense, it is not exaggeration even if we say "language = logic". If so, we may nod that there is the meaning of both of "language" and "logic" for Greek "logos".

♠Note 3.11. The above arguments may be obvious. For example, consider the world description called Newtonian mechanics. It is a matter of course that

- After the declaration of the world description (=the law of Newtonian mechanics), the language system called Newtonian mechanics is established. That is,

<div style="text-align:center; color:magenta; font-weight:bold;">there is no calculation without Newton's law</div>

Hence, under the language system, the reason (e.g., calculation, logic) is formed.

Therefore, it is obvious that the world descriptions takes precedence over syllogism (or logic).

3.8.2 Four kinds of syllogisms

Under the above preparation, let us discuss "syllogism". That is, we will show that

(J) under a world description, syllogism holds, but, under another world description, syllogism does not hold.

We don't know the name of the mathematician who discovered syllogism. It is sure that Pythagoras easily used it. However, the problem "What is mathematics?" is firstly answered in modern mathematics (i.e., set theory), which started only about one hundred and tens of years ago.

┌────── ①: Syllogism in modern mathematics ──────┐

["A ⇒ B" and "B ⇒ C"] ⇒ "A ⇒ C"

└──┘

This ① is an axiom in mathematics (or logic).

The "syllogism" in ordinary language is sometimes called "Aristotle's syllogism" as follows.

┌────── ②: Aristotle's syllogism in ordinary language ──────┐

Since Socrates is human being, and human being is mortal, it follows that Socrates is mortal.

└──┘

This is not guaranteed. But this can be almost trusted as the logic in court of justice. In this sense, ② is not obvious. That is because

(K) As seen in (I), since a world description is not declared, Aristotle's syllogism is not guaranteed. Recall that Zeno's paradoxes deceive us.

That is, it is not guaranteed that the mathematical syllogism① is applicable to our world. But, the following can be proved(*cf.* ref. [9, 32]).

─────── ③ **Syllogism in classical quantum language** ───────

Syllogism holds in classical quantum language

Also, we can show the following: (*cf.* ref. [32]).

─────── ④ **Syllogism in quantum language** ───────

Syllogism does not hold in quantum language

In daily conversation, 'science and math' people cannot use following words:

- "logical", "proof", "100 percent safe"

That is because there is room to doubt even syllogism.

♠**Note 3.12.** Using EPR (Einstein - Podolsky - Rosen paradox:1936 (*cf.* ref. [5]), we can easily prove ④. that is,

- Syllogism does not hold in quantum language.

(*cf.* ref. [32] (Chap. 8: Practical logic), refs. [14, 18]). That is, if Socrates is sufficiently small, Aristotle's syllogism② does not hold. Here, we have the following question:

(♯) Why are "Zeno's paradoxes" and "Aristotle's syllogism" famous? Why are those discussed repeatedly in philosophy?

General philosophers might feel "something which doesn't fit nicely (i.e., the neglect of the world descriptionism)" in "Zeno's paradoxes" and "Aristotle's syllogism". This feeling is transmitted more than 2,000 years. This is our answer to the above (♯).

Chapter 4

Around Alexandria

Wisdom of pyramid building for thousands of years was accumulated by Egypt (Alexandria). Bright people studied in Egypt from each place of the Mediterranean Sea coast to learn it. For example,

Euclid⋯geometry   Aristarchus⋯Heliocentrism

Archimedes⋯buoyancy, lever   Eratosthenes⋯the measurement of the earth

Ptolemaeus⋯Geocentrism

4.1   Around Alexandria

Under the influence of pyramid construction engineering tradition, the Alexandria school work is solid and scientific. Conversely, it can be said that there was no philosophical appeal that transcends the logic. The Alexandria school should have known the work of Plato.

- Probably they did not think that Plato philosophy also survived in more than 2000 years.

In Sec.4.3, I will explain Heliocentrism of Aristarchus a little in detail as the preparation of Chap. 6, in which we say that

- "Geocentrism vs. Heliocentrism" is a metaphysical problem that cannot be put on black-and-white in the experiment. That is,

  (♯) "Geocentrism vs. Heliocentrism" is a philosophical problem, and not the problem of truth or falsehood.

4.2   Euclid(BC.330 - BC.275)

4.2.1   Euclid geometry - Parallel postulate

Three great pyramids in the Egyptian Giza desert (deceased person is Khufu, Khafre, Menkaure) erecting time of is the 2500 BC. Since then more than 2,000 years later, Euclid (BC.330 - BC.275) was born. Euclid is referred to as the "father of geometry" who was active in Alexandria (the mouth of the Nile). His book "Elements" is one of the most influential works in the history of mathematics. When I think from now,

(A) Euclid advocated geometric axiomization and considered the parallel postulate, and was the mathematician who intuited that the concept of "self-evident" isn't self-evident. Here, the parallel postulate is in what follows:

- If a line segment intersects two straight lines forming two interior angles on the same side that sum to less than two right angles, then the two lines, if extended indefinitely, meet on that side on which the angles sum to less than two right angles.

In spite of close attention of Euclid, the next wrong belief has been formed by "Element".

(B) It is the best method to start from a self-evident thing.

Much philosophers (Descartes and Spinoza, etc.) have fallen into this wrong belief. It is a well known thing if now, but cogito proposition "I think, therefore I am." of Descartes is an incomprehensible proposition.

♠**Note 4.1.** In "Elements", geometry is not only written but also algebra. For example, it is shown that prime numbers are infinite. The proof is as follows.

(♯) Assume that the set of prime numbers is finite, that is, $\{2, 3, 5, 7, ..., n\}$. Put

$$N = (2 \times 3 \times 5 \times 7 \times ... \times n) + 1$$

Then, N is a prime number or it can be divided by the larger prime number than n. In each case, it contradicts the assumption that n is the largest prime number. □

4.2.2 non-Euclidean revolution

Discovery of non-Euclid geometry (due to Gauss(1777 - 1855), etc.) defeated the wrong belief (B) and asserted

(C) **Start from "productive" than "self-evident"!**

that is, "It turned out all right in the end.".
    In this paper, we call the non-Euclidean revolution, that is,

(D) non-Euclidean revolution $\left[\text{(B): self-evident} \xrightarrow[\text{non-Euclidean revolution}]{} \text{(C): productive} \right]$

It can't be said that the non-Euclidean revolution is still generally also recognized sufficiently in today. There is no successful theory which starts from "self-evident things". For example, Newtonian mechanics, the theory of relativity, quantum mechanics, etc. do not start from "self-evident things". Paradoxically saying, we see that

(E) The question: "What is 'self-evidence'?" is not self-evident.

Axiom of choice of mathematics is not self-evident, where axiom of choice is as follows.

- Given any set X of pairwise disjoint non-empty sets, there exists at least one set C that contains exactly one element in common with each of the sets in X.
  (For example, consider a set $X = \{\{a, b\}, \{c, d, e\}, \{g\}, \{h, i, j, k\}\}$. Then, we can construct a set $C = \{a, c, g, j\}$)

This is not self-evident (i.e., trivial). For instance, Banach-Tarski theorem says that

(F) If we adopt axiom of choice, we have to admit the following

- A ball B is resolved into parts of several finite numbers, and we assume that it's put together again. Then, we can get the same two balls which are also the same as the ball B.

$$\bigcirc \xrightarrow[\text{and put together again}]{\text{resolve into parts of several finite numbers}} \bigcirc \quad \bigcirc$$
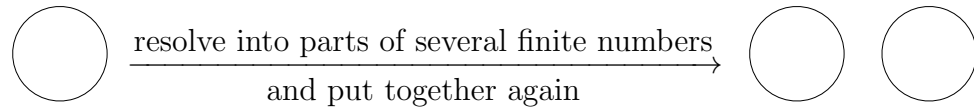
Then, we want to doubt axiom of choice, but a description of the mathematics largely decreases when I do not accept axiom of choice. Hence, we usually accept axiom of choice.

♠**Note 4.2.** In this paper, we consider mathematics as a kind of world description, because, as seen in Note 1.5,

($\sharp_1$) mathematics is not related to the world. Thus, this is something of an exaggeration, but there may exist mathematics without the world

Therefore, in this paper, we do not consider that mathematic is a kind of world description. Hence, In this paper, Euclid has no position in the lower:

$$(\flat) \begin{cases} (\flat_1) : \text{the realistic world description (physics)} \\ \quad \textbf{Aristotle}, \text{Archimedes}, \text{Galileo}, \text{Newton}, \text{Einstein}, \cdots \\ \\ (\flat_2) : \text{the fictional linguistic world description (The main street of western philosophy)} \\ \quad \textbf{Plato}, \text{Scholasticism}, \text{Descartes}, \text{Locke}, \text{Leibniz}, \text{Berkeley}, \text{Hume}, \text{Kant}, \text{Husserl} \\ \\ (\flat_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\ \quad \textbf{Parmenides}, \textbf{Zeno} \ \text{J. Bernoulli}, \text{statistics (Fischer, etc.)}, \text{quantum language} \end{cases}$$

♠**Note 4.3.** There was also tradition of pyramid construction, and Egypt was an advanced country of mathematics. Pythagoras and Archimedes also learned geometry in Egypt. Then Alexandria was an academic city as there was Alexandria library having 700,000 collection of books. After Euclid, we know that

- Eratosthenes (BC.275 - BC.194) : He was determined to 46250km the whole circumference of the earth.
- Cleopatra(BC.69 - BC.30)

4.3 Aristarchus (BC.310 - BC.230)

4.3.1 the diameter of the moon : the diameter of the sun

Aristarchus (BC.310 - BC.230) was an ancient Greek astronomer and mathematician who presented Heliocentrism. He calculated as follows.

Proposition 4.1.

(A_1) the diameter of the moon : the diameter of the earth ≈1:3 (Recent result says that 1 : 3.669)

(A_2) the diameter of the moon : the diameter of the sun≈1:19

(A_3) Thus, the diameter of the earth : the diameter of the sun ≈1:6.333 (Recent result says that 1 : 109)

(A_4) Since each volume is proportional to [diameter]^3, the sun is much larger than the earth.

The answer to (A_1) Look at the lower left figure (lunar eclipse). Since the sun is very far, it suffices to consider that "the diameter of the earth=the diameter of earth's shadow". Hence, measuring by eye, we see (A_1).

The answer to (A_2): Look at the lower left figure (the first quarter moon). Note that $\cos 87° \approx 1/19$. And using the fact that The sun and the moon are seen as the same size, we can calculate:

$$\frac{\text{the diameter of the moon}}{\text{the diameter of the sun}} = \frac{\text{the distance between the moon and the earth}}{\text{the distance between the sun and the earth}} = \cos 87° \approx \frac{1}{19}$$

lunar eclipse

earth's shadow

earth

87°

sun

first quarter moon
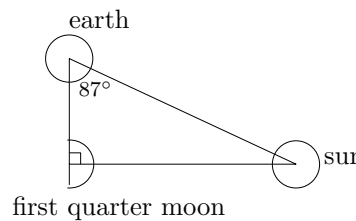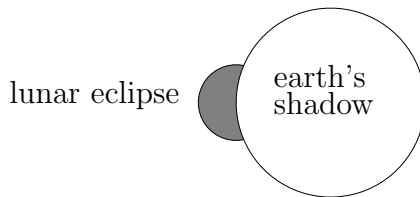
4.3.2 Ancient Heliocentrism

Aristarchus considered as follows:

(B_1) The sun is overwhelmingly larger than the Earth. If so, it is wrong that the big sun goes around the small earth. It is sure that the small earth goes around the big sun.

That is,

(B_2) Aristarchus proposed Heliocentrism

His argument is almost complete since the difference between "the volume" and "the mass" is trivial.

Next problem is as follows.

(C) measuring the diameter of the earth

This was solved by Eratosthenes (*cf.* Sec.4.5).

4.4   Archimedes (BC.287 - BC.212)

Archimedes was born in Syracuse on the island of Sicily in the Mediterranean. Archimedes studied in Alexandria that was a center of the study and engaged in the study of "Elements" with pupils of Euclid afterwards. He returned to Syracuse later and spent life in Syracuse.

4.4.1   Buoyancy (Archimedes' principle)

Archimedes' principle is as follows.

(A) Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object. If some want to avoid the term "force", then

$$
\begin{aligned}
&\big[\text{the weight of the matter in water}\big]\\
=&\big[\text{the weight of the matter}\big] - \big[\text{the weight of water with the same volume of the matter}\big]
\end{aligned}
\tag{4.1}
$$

I have not yet examined the following.

(B) Did Archimedes know "fluid pressure"?   That is, did he know the following?

$$
\begin{aligned}
\big[\text{Buoyancy}\big] =&\big[\text{Sum of the fluid pressure from the bottom of the object}\big]\\
&- \big[\text{Sum of the fluid pressure from the top of the object}\big]
\end{aligned}
$$

♠**Note 4.4.** A famous anecdote of the golden crown is the delicate anecdote that there is not connected with Archimedes' principle. In like there is a relationship, I try to write this in what follows.

- The King of Syracuse asked Archimedes "Can you check whether silver is not mixed by the crown without breaking the crown". Archimedes notices next answer (♯) during bathing: while shouting with joy too much "Heureka!"(="I have found it!"), was running around the streets naked without even wearing clothes.

  (♯) Preparing the gold bullion of the weight same as the crown, compare the weight the gold bullion and the weight is the crown in water. Then, we can, by the (4.1), compare the volume of the gold bullion and the volume of the crow.

♠**Note 4.5.** For each great discovery, an anecdote (or, a catch copy) is left as follows.

  ($♯_1$) Archimedes······golden crown

($\sharp_2$) Galileo$\cdots\cdots$Leaning Tower of Pisa, "And Yet It Moves"

($\sharp_3$) Newton$\cdots\cdots$Newton's apple, "Geocentrism vs. Heliocentrism"(*cf.* Note 6.7)

($\sharp_4$) Descartes$\cdots\cdots$"I think, therefore I am."

($\sharp_5$) Einstein$\cdots\cdots$Elevator

($\sharp_6$) quantum mechanics$\cdots\cdots$Heisenberg's uncertainty principle

($\sharp_4$) and ($\sharp_6$) are due to my opinion(($\sharp_4$):Sec.7.3, ($\sharp_6$): refs. [8, 32]).

4.4.2   The tomb of Archimedes

Consider the ball B of radius r. Archimedes showed the followings:

$$\text{The volume of the ball } B = \frac{4\pi r^3}{3}, \qquad \text{The surface area of the ball } B = 4\pi r^2$$

If you are a genius, you may find the proof by seeing the lower illustration('the cylinder which is circumscribed to a ball' called "the tomb of Archimedes"). If you are not genius, you can calculate it by using the differential and integral calculus.
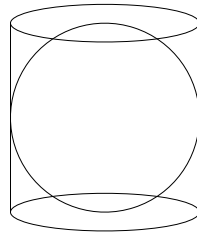
4.4.3   Principle of leverage

Archimedes found" principle of a lever" and did more various invention with a lever. He said "Give me a place to stand, and a lever long enough, and I will move the world". In spite that Archimedes referred Aristarchus' Heliocentrism in his book: "The Sand Reckoner", he supported Aristotle's Geocentric model. However, Archimedes, found " principle of a lever", have to restate Aristarchus' Heliocentrism((B_1) in Sec.4.3.2) as

(C) Since the sun is overwhelmingly larger than the earth, the thing center of gravity that merged the earth with the sun is predominantly near to the sun. Hence, **the sun and the earth go around the center of gravity of both the earth and the sun.**

If Archimedes said so, science history would be history which is completely different from now.

♠**Note 4.6.** Note that

- Archimedes did not speak ambiguous things like Plato's philosophy.

Therefore the work of Archimedes is quantitative, clear and easy to understand. Since power could interpret the vague philosophy conveniently, philosophy could influence to maintain harmony with religion or politics. In fact, philosophy survived in the middle ages as a maid of theology. On the other hand, Archimedes' work was almost forgotten.

4.5   Eratosthenes (BC.275 - BC.194)

4.5.1   The biggest ancient observer

Because the lunar eclipse was a shadow of the earth, Aristotle knew that the earth was a ball. Because it seems to be an arc when seeing a sea, someone would find that more earth is a ball from before However, if we have to specify the two discoverers, we may say a scientist:"Eratosthenes" and an explorer:"Magellan".

Eratosthenes measured the whole circumference of the earth as follows.
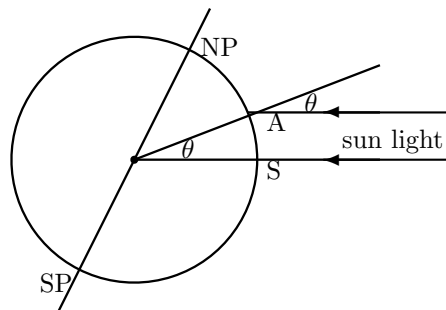
NP:North pole, SP:South pole, A:Alexandria, S:Syene(=Aswan)

- Syene is on the tropic of cancer, thus, the sun is seen in right above at noon on the summer solstice.

- Aswan is located just south of Alexandria. The distance $=AS$=925km.

Hence,

the whole circumference of the earth $= 2 \times 3.14 \times$ [the radius of the Earth] $= 360AS/\theta$
$=360 \times 925/7.2 = 46250km$

As the recent result:40009km, it may be surprising.

♠**Note 4.7.** Since Aristarchus discovered

[the diameter of the moon] : [the diameter of the earth] : [the diameter of the sun]
$=$ 1 : 3 : 19

then, by Eratosthenes's result, we know that

[the diameter of the moon], [the diameter of the earth], [the diameter of the sun].

4.6 Claudius Ptolemaeus (AD.83 - AD.168)

4.6.1 The ancient scientific collected studies

Ptolemaic Dynasty is ruined by the death of Cleopatra, Rome became the heyday of the Five Good Emperors era. At this time, Ptolemaeus (AD.83 - 168) played an active part in Alexandria. In his book "Almagest", he adopted Aristotle's Geocentrism (i.e., the sun goes around the earth). Ptolemaeus explained the retrogression seen at a planet in Mars such as Mars revolves around the earth while drawing a small circle as "epicycle". Ptolemaeus compiled the latest theory in those days and concluded the Geocentrism under the enormous measured data.

(A) Ptolemaeus followed Aristotle, Archimedes, etc.

And it is sure

(B) **Ptolemaeus is a top-notch researchers.**

♠**Note 4.8.** Archimedes is the discoverer of "principle of buoyancy", which belongs the realistic world description. we can get as follows (*cf.* Assertion 1.4[the classification of philosophers]).

$$(\flat) \begin{cases} (\flat_1) : \text{the realistic world description (physics)} \\ \quad \textbf{Aristotle}, \textbf{Archimedes}, \text{Galileo}, \text{Newton}, \text{Einstein}, \cdots \\ \\ (\flat_2) : \text{the fictional linguistic world description (The main street of western philosophy)} \\ \quad \textbf{Plato}, \text{Scholasticism}, \text{Descartes}, \text{Locke}, \text{Leibniz}, \text{Berkeley}, \text{Hume}, \text{Kant}, \text{Husserl} \\ \\ (\flat_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\ \quad \textbf{Parmenides}, \textbf{Zeno} \ \text{J. Bernoulli}, \text{statistics (Fischer, etc.)}, \text{quantum language} \end{cases}$$

Chapter 5

The Middle Ages - Dark Ages -

The Middle Ages may be characterized as "the time of the thought stop for about 1500 years" Thus, it is called

"Dark Ages" or "Philosophy is a maidservant of theology"

In this chapter, we discuss:

($\sharp_1$) Augustinus(354 - 430): Christianity became the state religion of the Roman Empire. Subjective time theory

($\sharp_2$) Anselmus(1033 - 1110): the father of Scholasticism, Arguments for the existence of God, Realism in Problem of universals

($\sharp_3$) Thomas Aquinas(1225 - 1274): Completion of the scholasticism (Summa Theologica): Compromise between Plato philosophy and Aristotle philosophy

($\sharp_4$) Ockham(1285 - 1347): Occam's razor, Nominalism in Problem of universals

5.1 Augustinus(AD. 354 - AD.430)

5.1.1 Philosophy is a maidservant of theology

One of the largest events in the Western history is

AD.380: Christianity became the state religion of the Roman Empire

A wonder of Western philosophy is:

(A) Western philosophy met with a dying crisis many times. Western philosophy was rescued by a hand of someone's help (such as a hand of help of a god) .

Augustinus (AD. 354 - 430) is one who extended a helping hand to dying Plato philosophy. Catholic father Augustinus used Plato philosophy to reinforce a theoretical backbone of Christianity.

For this,

(B) It's desirable that God (in Christianity) and Idea (in Plato philosophy) have the similar nature.

The opinion of Socrates=Plato is contrary to sophists' opinion (i.e., "Man is the measure of all things"), which is also contrary to Christianity (i.e., "God is the measure of all things"). Therefore, there is a reason to consider that

$$\text{God' intelligence} \approx \text{Idea}$$

Augustinus might think so.

The Plato philosophy got the strongest supporter (i.e., Christianity).

(C) Philosophy won a help from Christianity. But this implied "Philosophy is a maidservant of theology". And philosophy fell into a thought stop, but, at least, Philosophy survived.

All proceeded as Augustinus' plan.

♠**Note 5.1.** It isn't known whether fathers of Christianity (Augustinus, etc.) were serious in Plato philosophy. I do not think that they were serious because the famous philosopher Anselmus appeared 600 years later after Augustinus.

♠**Note 5.2.** Readers may have the following question:

($\sharp_1$) Why do fantasy theories always win the Western philosophy?

My opinion is as follows. Recall the Platonic method of telling philosophy:

($\sharp_2$) $\quad$ $\overset{\text{world is so}}{\underset{\text{introduction·preface·fiction}}{\boxed{\text{fictional linguistic world description}}}} \xrightarrow{\text{therefore}} \overset{\text{Live so}}{\underset{\text{main subject}}{\boxed{\text{Ethics·morals}}}}$
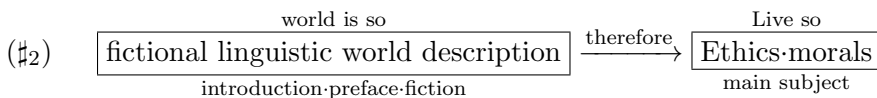
Therefore,

- $\big[$world is so$\big]$ is secondary, subsidiary,

- $\big[$you should do so$\big]$ is main theme

Most of the main subject (i.e., ethics·morals) is guaranteed by Christianity. Therefore, the preface (i.e., the world description) does not matter anything in fantasy theory even in fiction, even allegory. However, the following question may be suggestive:

($\sharp_3$) If there is no "the theory of Ideas" only by "I know that I know nothing", did Augustinus adopt Greek philosophy?

We think that "the theory of Ideas" had an unexpected effect (i.e., the effect that Plato might not expect).

5.1.2 "Confessions" by Augustinus: Time theory prohibited by the linguistic Copenhagen interpretation

We want to know:

    ① How do we live?

    ② How is the world made?

Fathers of Christianity preached this answers to the people as a spokesman of God. It should be noted that people never want the scientific answer about ② but a short story.
    Bible says:

(D$_1$) This world was created by God.

If so, people may have a question:

(D$_2$) How about before God made it?

However, if we believe in (D$_1$), then we consider that

(D$_3$) Time was also made at the same time as the world.

Therefore,

(D$_4$) The sentence "before God made it" is nonsense.

If we are told by fathers of Christianity so, we think that

(D$_5$) my Bible reading was superficial. I had a boring question

It should be noted that people want such a short story, and not scientific arguments.

    Augustinus asserted the following in his book "Confessions".

(E):Augustinus' theory of time as a short story

(E) **Only present exists, and neither future nor past exist.**

In fact,

(F) the future is in "prediction", the past is in "memory". There is what we can realize "only now".

This is the beginning of the subjective time (which may be a main theme in philosophy). Although this "time" cannot be use in science, this time can be use in the Platonic method of telling philosophy as follows.

$$\underset{\text{introduction·preface·fiction}}{\overset{\text{Only present exists}}{\boxed{\text{fictional linguistic world description}}}} \xrightarrow{\text{therefore}} \underset{\text{main subject}}{\overset{\text{Live in now carefully}}{\boxed{\text{Ethics·morals}}}}$$

5.1.3 There is no tense in science

Now,

- Augustinus' tense (past, present, future) is a kind of sermon. But it may be interesting in comparison with the linguistic Copenhagen interpretation (*cf.* (E$_2$) in Sec.1.1.2), i.e.,

$$\text{There is no tense in science.}$$

Thus, it is prohibited to Augustinus' tense (i.e., the subjective time) is discussed in science. However, we can appreciate literary pleasure from the philosophical discussions.

5.1.4 "Subjective time" is a magic word which excites our delusion.

The subjective time (tense, observer's time) attracts philosopher's interests. For example, Bergson (1859 - 1941) tried to challenge the controversy to Einstein about time theory. But, Einstein said, "I did not know the time of the philosopher" and declined a debate. Even now, researchers of quantum mechanics have been confused yet in "observer's time". For example, in quantum mechanics, some researchers may accept "So-called Copenhagen interpretation" such as

- At the moment when an observer measures it, a wave function collapses.

In order to explain "At the moment when observer measured it", von Neumann made a non-scientific word "abstract ego", and said

- "At the moment when observer measured it" is "at the moment when a signal reach abstract ego"

which is of course prohibited by the linguistic Copenhagen interpretation (*cf.* (E$_2$) in Sec.1.1.2). For the quantum linguistic understanding of "wave function collapse", see [31, 32].

♠**Note 5.3.** "What is the subjective time?" This is a problem of brain science for science as well as a literature-like problem (a kind of word play concerning self-reference) for philosophy. When we thought by the scale as the human history, "subjective time" was almost all everything and "objective time" may be negligible. It is sure that a cat and a dog etc. have clock gene or biological clock, thus they have to feel the subjective time. This is a scientific problem. However, if we study the subjective time without experiment, that is, we think in brain that "intracerebral clock" is perceived by brain, our investigation becomes rather self-referential, i.e., philosophical. The subjective time makes us appreciate the literary pleasure (i.e., the pleasure of wordplay) of "self-reference".

♠**Note 5.4.** For completeness, let us rewrite as follows.

    ① How do we live?   ② How is the world made?

Here,

- "①: the problems of life" and "②: the problem of world" are different things

In spite of the difference, we prefer to Platonic method of telling philosophy:

- the "logic" which is dressed so that ① may be derived from ②.

In this sense, the ② is a reason attached later. We might be convinced that "the world description was to describe the world plainly and with no fiction". However, Plato and Augustinus consider that

- the world description is to create the world that it is convenient for faith or doctrine.

This is a replacement of the problem. However, this succeeds in science as well as philosophy. As seen later (Kant' Copernican revolution, Wittgenstein' words "The limits of my language mean the limits of my world", and finally, quantum language),

- the world description is not to to describe the world plainly and with no fiction, but to create the world that it is convenient for faith or doctrine. (*cf.* Explanation 9.1).

that is, "not realistic painting, but abstract painting". Concretely saying, for example,

- When there is a kind of the paint only in "red" and "green", We draw as much as possible it seems realistic picture in this two colors

This is not only the philosophical case but also the scientific case (i.e., quantum language). That is because two axioms (Axiom 1 and Axiom 2 in Sec.1.1) are chosen by our selfish convenience.

5.2 Scholasticism – from Plato to Aristotle –

5.2.1 Aristotle's philosophy spread to the Islamic world

I do not know the details of the reason, but I say:

(A) Plato philosophy survived by the support of Christianity(e.g., Augustinus). On the other hand, Aristotle philosophy spread over Islam.

Baghdad was a center for eastern Islam. The western Islam culture developed for Cordoba of the Andalucia district of south Spain as a center, and it was developed and was a city with the biggest population in the world in the 10th century. Islam learned much wisdom from a book of ancient Greece and Rome and developed the original thought, technique. Aristotle is believed in. And there was Islamic culture in a tip of the world.

♠Note 5.5. In this paper we adopt the story such as (A). Actually, it may not be such a simple story.

5.2.2   Crusade expedition and Inflow of Islamic culture

In the era of crusade expedition (1096 - 1270), the Western countries were in a downturn (dark ages under Christianity). Such public opinion had been drifting.

- An outcome of a crusade doesn't rise by Plato way: Thus, let's study Aristotle which is the tip of Islamic culture!

Regardless of all ages and countries,

- the necessary workforce is people in the literature in peace time, people in science in wartime.

As the by-products of crusade expedition, Aristotle philosophy has flowed into Western Europe, and fused with Plato philosophy. That is, Scholasticism was born. As the typical persons of Scholasticism, we list up as follows.

(B$_1$) Anselmus (1033 - 1109) "The father of Scholasticism", Realism

(B$_2$) Thomas Aquinas (1225 - 1274) "Summa Theologica", Greatest man in Scholasticism

(B$_3$) Ockham (1285 - 1347) "Ockham's razor", Nominalism

After all,

$$\text{Scholasticism is a fusion of Plato philosophy and Aristotle philosophy}$$

Of course, it is impossible to succeed this trial: That is because

- $\begin{cases} \text{the realistic world description:(Aristotle)} \underset{\text{(monism)}}{\longrightarrow} \text{Newton} \longrightarrow \cdots \\ \\ \text{the linguistic world description :(Plato)} \underset{\text{(dualism)}}{\longrightarrow} \text{Descartes} \longrightarrow \cdots \end{cases}$

That is, Plato philosophy and Aristotle philosophy are "oil and water", and these are different categories (*cf.* Assertion 1.2[the history of world description]).   However, in this paper, we prepare the story such as

- in the process of fusion of Plato philosophy and Aristotle philosophy, disadvantages of the theory of Ideas became clear, which led to Descartes.

Also, by-product of crusade expedition, we have to note

- "Positional notation (= the discovery of zero)" of the origin in India

which will be mentioned in what follows.

5.3 The discovery of zero

5.3.1 Positional notation (= the discovery of zero): Arabic numerals

As mentioned in the previous section

(A) Plato philosophy was transmitted to Christianity world, and Aristotle philosophy was transmitted to Islam world.

The two (i.e., Aristotle philosophy and the positional notation) flowed into Europe from Islam by an expedition of a crusade.

♠Note 5.6. "Which was influential, Aristotle philosophy or the positional notation?" Then, at least we can say as follows.

"Which was indispensable for the proposal of Newtonian mechanics?" Then, we may choose the positional notation.

How to write numbers to learn in an elementary school is the positional notation. For example,

- +5040302, - 15, +39.045, - 81.5, +3.1415···
  - 1000, +0.009876, +0.3333··· , 0,

and so on. That is, By 13 symbols "0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, −, . (radix point)", we can express all real numbers by the positional notation.

Hence, we may say

-   the discovery of the positional notation (= Arabic numerals)
    = the discovery of all real numbers.

(the radix point was discovered in Europa of 16 century AD.)

Of course, the discovery of zero is

(B) the discovery of how to use zero called the positional notation

5.3.2 Arabic numerals and Roman numeral

Roman numerals are often used on the clock face such as

$$1=I, 2=II, 3=III, 4=IV, 5=V,...,10=X, 11=XI,$$

However, it is too hard to represent large numbers such as

$$495 = CDXCV, 1888 = MDCCCLXXXVIII, 3999 = MMMCMXCIX$$

5.3.3   The explosion of mathematics

Mathematician Gauss(1777 - 1855) said

(C) "If genius Archimedes invented the positional notation, I am certain that the mathematics must have progressed drastically."

The positional notation triggered off the following "the explosion of mathematics" happened:

(D) Solution of algebraic equations, complex numbers, the function concept, betting of problem (probability), analytic geometry (Descartes coordinates), calculus, differential equations, linear algebra, number theory, etc.

♠**Note 5.7.** There may be several opinions about the three big discoveries of mathematics. We think as follows.

① the discovery of the plane (geometry)

② the discovery of zero (positional notation)

③ the discovery of sets

Of course, it is needless to say that the biggest discovery is "⓪:the discovery of natural numbers".

5.4   The proof of the existence of God

5.4.1   Anselmus (1033 - 1109)

From the our standing-point proposed in this paper, the following proof is not trusted since it is not discussed under a certain world description.

Proof 5.1. Anselmus: the proof of God's Existence

①: It is a conceptual truth (or, so to speak, true by definition) that God is a being than which none greater can be imagined (that is, the greatest possible being that can be imagined).

②: God exists as an idea in the mind.

③: A being that exists as an idea in the mind and in reality is, other things being equal, greater than a being that exists only as an idea in the mind.

④: Thus, if God exists only as an idea in the mind, then we can imagine something that is greater than God (that is, a greatest possible being that does exist).

⑤: But we cannot imagine something that is greater than God (for it is a contradiction to suppose that we can imagine a being greater than the greatest possible being that can

be imagined.)

⑥: Therefore, God exists.

□

The above proof is not worth validating since it is not discussed under a certain world description. This is just a word game.

5.4.2 Review: the world descriptionism

Let us review the world descriptionism.

⎛───────────── **(A): World descriptionism** (*cf.* **Sec.1.3.1**) ─────────────⎞

The world descriptionism is as follows.

world is so   conclusion
(A) | world description | $\xrightarrow{\text{therefore}}$ | discussions, calculation, logic, properties |
premise   subject

⎝───⎠
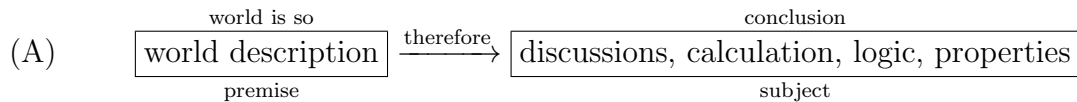
That is,

(B) The world descriptionism is the spirit "Start from the world description".

Thus, from the our standing-point (i.e., world descriptionism), Proof 5.1 is not trusted.

5.4.3 The inflow of Aristotle philosophy

Although we cannot understand Proof 5.1, we think that Anselmus did not say much more than the following:

(C) "Aristotle philosophy flowed in via Islam, and I underwent the influence".

That is,

$$\text{Plato} \longrightarrow \text{Idea} \longrightarrow \text{God} \longrightarrow \text{The existence of God}$$
$$\text{via Islam} \uparrow \text{inflow}$$
$$\text{Aristotle} \longrightarrow \text{syllogism} \longrightarrow \text{proof}$$
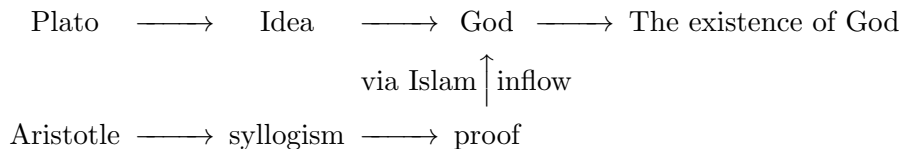
If Aristotle Philosophy said something to the existence of God, we can conclude that

(D) Augustinus' intention:"intelligence of God=Idea" passed expiration date. And Aristotle's influence is increased

5.4.4 Saying in an exaggerated manner, $\cdots$

Although Anselmus' argument itself is nonsense, Scholasticism may be the revolution in Christianity in the following sense:

(E) $\boxed{\underset{\text{Plato}}{\text{Belief}}} \xrightarrow{\text{+ Aristotle}} \boxed{\underset{\text{Scholasticism}}{\text{Belief and Thought}}}$
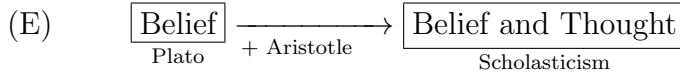
The reason Anselmus won fame is due to the above (E), that is,

(F) the discovery of the magic phrase "the proof of the existence of God", which breaks a thought stop.

It is said that the work of Anselmus had a big influence on philosophers (such as Descartes, Kant) of modern times. Probably, it is true. Descartes rashly deduced the existence of God from the cogito proposition. Kant has made a careless error in "antinomy"(*cf.* Sec.8.1). As Newton was devoted to alchemy, I think that the philosophy gradually developed to the present age while trailing the Middle Ages.

♠**Note 5.8.** All scientists are interested to "god". "What is god ?(= How about neuronal circuit concerning belief?)" and "What is subjective time? (= How about biological clock?) are one of the most interesting problems in brain science.

5.5 Problem of universals

5.5.1 Problem of universals –Graft a bamboo shoot on a tree –

The problem of universals is the biggest dispute in Scholasticism. This problem is as follows.

(A):Problem of universals

"Problem of universals" is as follows.

(A$_1$) It is certain that Mr. Smith, Mr. White, Mr. Brown, etc. exist. Then, we have the following problem:

$$\text{Do "honesty", "intelligence", etc. exist?}$$

If "Yes", then, Realism. If "No", then, Nominalism.

Since the meaning of "exist" is not defined, the above problem is only word-play. However, let us say a little as follows.

Explanation 5.2. In what follows, let us review Plato philosophy and Aristotle philosophy:

(B_1) $\begin{cases} \bullet \text{ Plato: [the actual world and the world of Idea]} \\ \quad \text{the world of Idea ("honesty", "intelligence", etc.) exists} \\ \quad \text{the actual world is a shadow picture of the world of Idea} \\ \\ \bullet \text{ Aristotle: [hyle and eidos]} \\ \quad \text{matter (=hyle) exists,} \\ \quad \text{state (=eidos), whose components have various names ("honesty", "intelligence", etc.)} \end{cases}$

Therefore,

(B_2) Plato school agree to "Realism": that is, "honesty" exists in the world of Idea.
e.g., Anselmus (1033 - 1109)

(B_3) Aristotle school agree to "Nominalism": that is, "honesty" is a certain component of the state (*cf.* Note 3.9)
e.g., William of Ockham (1285 - 1347)

Most people may have the following question:

- Why did great Fathers argue eagerly in a problem like such word game?

After all, we think

- This is the problem such that "(since Augustinus) Plato school (Realism) vs. (via Islam)Aristotle school (Nominalism)". The power in the church gradually shifted to the Aristotle group. In this sense, it may be called "confusion" than "dispute".

As seen in the following table, the problem "realistic world description(monism) vs. linguistic world description(dualism)" is the biggest dispute in philosophy and science. Nominalism (Ockham) in Problem of universals is a little irrational since religion is not realistic.

Table 5.1 : realistic world description vs. linguistic world description (*cf.* Assertion 1.5)

dispute \ [R] vs. [L]	Realistic world description (monism, realism, no measurement)	Linguistic world description (dualism, idealism, measurement)
ⓐ: motion	Hērakleitos	Parmenides
ⓑ:Ancient Greece	Aristotle	Plato
ⓒ: Problem of universals	Nominalism(Ockham)	Realism(Anselmus)
ⓓ: space-time	Newton	Leibniz
ⓔ: quantum theory	Einstein	Bohr

ⓐ is my fiction, ⓒ is a confusion rather than dispute. ⓓ is the Leibniz=Clarke correspondence(*cf.* Note 7.9), ⓔ is Bohr=Einstein debates. Quantum language is proposed as one of answers to Bohr=Einstein debates(*cf.* ref. [32]).

5.5.2 Ockham's razor

William of Ockham (1285 - 1347), a Scholastic philosopher or theologian born in Ockham in England, is known as an advocate of Ockham's razor(=the law of parsimony) in philosophy and science.

(C):Ockham's razor(=the law of parsimony)

Ockham's razor is as follows:

(C) Shave unnecessary assumptions with a razor!

However, this may be a self-evident truth.

For example,

(C$_1$) Assume that you were a student of Plato and Plato asked you

- "The sun goes around the earth? or the earth goes around the sun?"

Then, which did you answer to Plato?

Probably, you, by Ockham's razor, answer that the sun goes around the earth. In fact Aristotle did so. Ockham's razor is dependent on the environment around. Thus I have a question:

(C$_2$) Is there a case as which Ockham's razor is functioning effectively (besides the mathematical theorems) ?

I guess that

(C$_3$) What Ockham wanted to shave with a razor is the theory of Ideas

(*cf.* Sec.5.5.3).

5.5.3   Thomas Aquinas (1225 - 1274)

The Catholic priest: Thomas Aquinas (1225 - 1274) wrote "Summa Theologica" as the summing-up of Scholasticism. He was the most important at the intermediate time of Scholasticism (or, Problem of universals), that is,

$$\boxed{\text{Anselmus}} \longrightarrow \boxed{\text{Thomas Aquinas}} \longrightarrow \boxed{\text{Ockham}} \qquad (5.1)$$
$$\underset{\text{(Realism)}}{} \quad \underset{\text{(compromise or fusion)}}{} \quad \underset{\text{(Nominalism)}}{}$$

His proposal is the compromise of Realism (due to Plato) and Ockham (due to Aristotle), thus, his theory has three key-words:

(D$_1$) :[universalia ante res] as Plato's Idea (i.e., measuring instrument in quantum language)

(D$_2$) :[universalia in rebus] as Aristotle's eidos (i.e., state in quantum language)

(D$_3$) :[universalia post rem] as actual world (i.e., measured value in quantum language).

Since Plato philosophy and Aristotle philosophy are "oil and water", and these are different categories (*cf.* Assertion 1.2[the history of world description]), it is a matter of course that Aquinas' idea is irrational. However, as seen in Table 5.2, we say:

(E) in the process of fusion of Plato philosophy and Aristotle philosophy, deficiencies in the theory of Ideas is turned to reveal, this led to Descartes.

that is,

Table 5.2 : Key-words in each world description

Plato	actual world	Idea	/ [/]
Aristotle	/	/	eidos [hyle]
Thomas Aquinas	universale post rem	universale ante rem	/ [universale in re]
Descartes	I, mind, brain	body	/ [matter]
quantum language	**measured value**	**measuring instrument**	**state** **[system]**

Review 5.3. In the above table, the meaning of the correspondence of key-words is as follow.
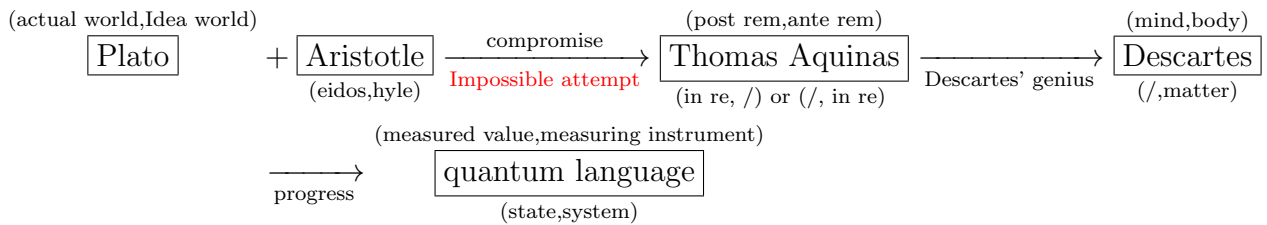
Also, the formula 5.1(=the history of Scholasticism) is rewritten as follows.
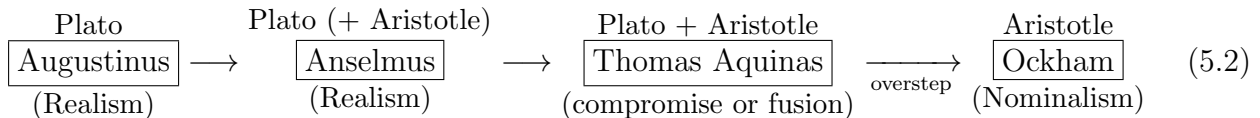
Thus, I guess that Ockham shaved Plato's Idea theory with a razor. (*cf.* (C$_3$) in Sec. 5.5.2).

♠**Note 5.9.** It's said that the problem of universals is incomprehensible. This is due to the fact:

- The fusion of Plato and Aristotle is an unreasonable trial,

That is,

(♯$_1$) Aristotle (as well as Newton) do not fit in Christianity.

(♯$_2$) Although the key-words of Thomas Aquinas philosophy and those of Descartes philosophy are similar (i.e., those have three key-words as seen in Table 5.2), this may be accidental. (*cf.* Review5.3).

♠**Note 5.10.** A seen in the above, the problem of universals is in confusion. However, we think that Scholasticism belongs to the linguistic world view. Thus, we have (*cf.* Assertion 1.4[the classification of philosophers]).

$(\flat)$ $\begin{cases} \\ \\ \\ \\ \\ \\ \\ \\ \end{cases}$ $(\flat_1)$: the realistic world description (physics)
    Aristotle, **Archimedes**, Galileo, Newton, Einstein, $\cdots$

$(\flat_2)$: the fictional linguistic world description (main street of western philosophy)
    Plato, **Scholasticism**, Descartes, Locke, Leibniz, Berkeley, Hume, Kant, Husserl

$(\flat_3)$: the scientific linguistic world description (statistics, quantum language)
    Parmenides, **Zeno** J. Bernoulli, statistics (Fischer, etc.), quantum language

Chapter 6

Early modern – From Geocentrism to Heliocentrism

We assume that the three greatest paradigm shifts are as follows

($\sharp_1$) Aristotelian world view (purpose) $\longrightarrow$ Newtonian world view (causal relation)

($\sharp_2$) Ptolemaic system: Geocentrism $\longrightarrow$ Copernican system: Heliocentrism

($\sharp_3$) Christianity: Adam and Eve $\longrightarrow$ Darwin: evolution theory

In this chapter, we are concerned with ($\sharp_1$) and ($\sharp_2$), and conclude that

- ($\sharp_2$) is a metaphysical dispute, which cannot be made clear by experiments. And it was clarified by ($\sharp_1$). In this sense, ($\sharp_2$) is included in ($\sharp_1$).

6.1 Paradigm shift

Eastern Roman Empire was made to be ruined by Ottoman Turkey in 1453.

- 1453:The Eastern Roman Empire extinction (Constantinople surrender)

The influence on Christ cultural area of this great event is immeasurable.
Traffic of "Silk Road" became inconvenient. And thus,

<div align="center">Age of Discovery had begun</div>

Also, engineers, artists, cultural people, etc. (of Eastern Roman Empire) had flowed into Western Europe as refugees. And hence,

<div align="center">Renaissance rose suddenly.</div>

The timeline is as follows.

Before Galileo: The era of observation and experiment

- 1450: Gutenberg's printing press

- 1453:The Eastern Roman Empire extinction (Constantinople surrender)
- 1492: Columbus, discovery of the American Continental
- 1498: Vasco da Gama, discovery of the sea route to India
- 1500s: Leonardo da Vinci, "Mona Lisa's smile"
- 1510: Copernicus, Heliocentrism.
- 1510: Raffaello, "The School of Athens", Admiration to ancient Greece
- 1517: Luther, Protestant Reformation
- 1519 - 20: Magellan, the first circumnavigation of the Earth
- 1540s: Michelangelo, "The Last Judgment"
- 1609∼1619: Kepler's laws of planetary motion
- 1610: Galileo, A telescope was made and moons of Jupiter were found.
- 1620: Francisco Bacon, "knowledge is power", The father of British Empiricism
- 1633 Galileo's trial "And yet it moves"

After Galileo: The era of thought

- 1637: "Discourse on the Method", Rene Descartes (1596 - 1650), the father of modern philosophy, Cogito proposition
- 1670: Pascal, "Pensèes"
- 1685 - 1750: Bach
- **1687: Newton, "Principia"**
- 1688: Glorious Revolution
- 1690: John Locke, the father of British Empiricism, "An Essay Concerning Human Understanding", tabula-rasa, the secondary quality
- around 1700: Jakob Bernoulli, the law of large numbers,
- 1703: Leibniz, "New Essays on Human Understanding"
- 1715 - 16: Leibniz-Clarke correspondence (*cf.* Note 7.9)
- 1739: Hume, "A Treatise of Human Nature"
- 1781: Kant, "Critique of Pure Reason"

♠**Note 6.1.** The law of large numbers, discovered by J. Bernoulli(1654 - 1705), is as follows.

(♯) If a fair coin (one with probability of heads equal to 1/2) is flipped a large number of times, the proportion of heads will tend to get closer to 1/2 as the number of tosses increases.

I think that Bernoulli's achievement equals Galileo's achievement. That is,

$$\begin{cases} \text{Scientific pioneer in the realistic world description} \cdots \text{Galileo} \\ \\ \text{Scientific pioneer in the linguistic world description} \cdots \text{J. Bernoulli} \end{cases}$$

It is difficult to identify the founder of the probability theory to one person. But, J. Bernoulli is one of the founders.

6.2 Bacon (1561 - 1626): The father of empiricism, Inductive reasoning

6.2.1 How to create science: The exclusion of idols (=prejudice, preconception)

Bacon has been called the father of empiricism. In 1620, he proposed "how to create science" (called inductive reasoning, or induction principle) in his book "Novum organum".

────── **(A):Induction principle (by bad idols), how to create science** ──────

His proposal is as follows.

(A) ①:Exclusion of bad idols ⟶②:data collection⟶③:scientific theory

Let us explain this in what follows.

① : Firstly, we have to exclude bad idols (=prejudice, preconception) Here, idols is as follows.
Idols of the Tribe: prejudice due to sense organs
Idols of the Cave: prejudice due to custom, the education
Idols of the Market: prejudice due to language
Idols of the Theatre: prejudice due to thought, theory

② : Next, we have to collect data by observation, experiments,

③ : Lastly, find the essence from the data, and build science theory.

Here, "②+③" is called "abduction".

6.2.1.1 Isaac Newton (the exclusion of bad idols) (1642-1727)

Newton said:

"I frame no hypotheses"

And he practiced Bacon's induction principle, and proposed Newtonian mechanics as follows.

(B): ①exclude bad idols (i.e., Aristotle's purpose, Geocentrism) ⟶ ②Data collection (due to Tycho Brahe, Kepler, Galileo) ⟶ ③Science theory (Newtonian mechanics)

♠**Note 6.2.** This may be say in a philosophy side. We must add the next section (good idols).

6.2.2   How to create science; good idols

Bacon's induction principle is not simple. there is another way (by good idols) such as

⸺ **(C): Induction principle (by good idols)** ⸺

Induction principle (by good idols) is as follows.

(C) ①believe good idols ⟶ ②Data collection ⟶ ③Science theory

6.2.2.1   Isaac Newton (good idols) (1642-1727)

Newton said:

"I frame no hypotheses"

And he practiced Bacon's induction principle (good idols), and proposed Newtonian mechanics as follows.

(D): ①believe good idols (i.e., Causal relation) ⟶ ②Data collection (due to Tycho Brahe, Kepler, Galileo) ⟶ ③Science theory (Newtonian mechanics)

♠**Note 6.3.** Although ironically,

(♯) Bacon, who proposed the exclusion of idols, was also one of discoverers of "good idols" called "causal relation".

If so, what Bacon wanted to say really may be

$$\big[\text{ bad idols } \big] = \big[\text{ dogmatism in Scholasticism } \big]$$

6.3   From Geocentrism to Heliocentrism

6.3.1   What is "Geocentrism vs. Heliocentrism"?

As mentioned in Chap.4,

- Heliocentrism due to Aristarchus (BC.310 - BC.230) is based on the arguments:

The big sun cannot go around the small earth.

I think his Heliocentrism to have reached the scientific level. (*cf.* Sec. 4.3).

- Geocentrism due to Ptolemaeus (AD.83 - AD.168) can explain the motion on planets by epicycle theory. Thus, I also think his Geocentrism to have reached the scientific level at the time. (*cf.* Sec. 4.6).

However, Heliocentrism due to Copernicus (1473 - 1543) might not reach the scientific level. It may be the popular view, but there is an opinion that

- At the time, Europe is in the cold period, the masses were hungry for "the sun".The public was hungry for the sun central principle. Therefore, there is a foundation that allows the germination of Heliocentrism.

Thus, I cannot have the conviction that there was the firm argument for Heliocentrism due to Copernicus.

I'll leave above-mentioned things to historians. In this paper, I discuss the next.

(A): What is "Heliocentrism vs. Geocentrism"?

Now,

(A) Note that motion is relative. Thus, if the earth is assumed to be at center, the sun goes around the earth (i.e., Heliocentrism). Also, if the sun is assumed to be at center, the earth goes around the sum (i.e., Geocentrism). Hence,

The difference between Heliocentrism and Geocentrism
may be only a difference of how to take the coordinate system.

♠**Note 6.4.** The coordinate does not exist in nature, that is, it is artificial. Cf. Note 3.9.

6.3.2   Somehow "from Geocentrism to Heliocentrism"

In what follows, I will arrange the history of "Heliocentrism vs. Geocentrism".

Analyzing the enormous data obtained by Tycho Brahe's steady astronomical observation, Kepler found the following laws:

- Kepler's laws of planetary motion:
  1609: The first law of elliptical orbits, The second law of areal velocity,
  1619: The third law of Periods:

And

  1610: Galileo found the moons of the Jupiter by his telescope of the self-made

And further,

  1633: Galileo said "And yet it moves" in the Trial of Galileo

In this way, we think:

(B) Somehow the air "to Heliocentrism" has been formed.

Still, I am worried about this problem (A)"What is 'Geocentrism vs. Heliocentrism'?"
That is,

(C$_1$) Did Both Galileo and the church understand the essence of 'Geocentrism vs. Heliocentrism'?

which is equivalent to

(C$_2$) In order to win the definitive victory, what should they (Galileo or the church) have done?

In order to answer to this question, we first have to clarify the meaning of "Heliocentrism vs. Geocentrism".

♠**Note 6.5.** In the next year of 1642 when Galileo died, Isaac Newton was born in the British country.

6.3.3 "Geocentrism vs. Heliocentrism" is the problem of the world-view

As mentioned in the previous section, how to decide "Geocentrism vs. Heliocentrism" is somewhat difficult. That is because

(D) Thus, if the earth is assumed to be at center, the sun goes around the earth (i.e., Heliocentrism). Also, if the sun is assumed to be at center, the earth goes around the sum (i.e., Geocentrism). Hence, The difference between Heliocentrism and Geocentrism is only a difference of how to take the coordinate system.

In the same sense, we say that

(E) **No matter how much there are exact observation data, we cannot decide "Geocentrism or Heliocentrism"**

In the famous trial of Galileo, he said

"And Yet It Moves"

However, I wonder if Galileo knew the (E)?

♠**Note 6.6.** No matter how much there are exact observation data, we cannot decide "Geocentrism vs. Heliocentrism" we have to need the world description. That is,

(♯$_1$) it is a matter of course that there is no science without measurement

However, we believe that

(♯$_2$) there is no science without world description

Thus, as seen later, we cannot decide "Geocentrism vs. Heliocentrism" without world description

6.3.4   The Galileo legend; Leaning Tower of Pisa, Trial of Galileo

The world view of Aristotle has kept its position for 1500 years. Thus,

> This world view is not a so bad world view.

But, this worldview was a little inconvenient to organize the data, obtained by technological innovation (e.g., telescope, navigation, etc.). The history of the increase of the inconvenience is as follow:

$$[\text{Copernicus}] \Rightarrow [\text{Kepler}] \Rightarrow [\text{Galileo}]$$

However, these are not sufficient to decide "Geocentrism vs. Heliocentrism". It is a matter of course that there were excellent persons in the church. And they might think:

- if they insisted that motion is relative, they did not lose the dispute, at least, they could make "Geocentrism vs. Heliocentrism" endless dispute.

Galileo legend

　　Galileo was an active leader of the overthrow of the world view of Aristotle, and his targets were the following (F_1) and (F_2):

(F_1) Ptolemaic Geocentrism

(F_2) Aristotelian purpose such as "Heavy objects fall faster"

Concerning the two, We have two episodes called "Galileo legend" as follows.

　　For (F_1), "And Yet it moves" in trial of Galileo

　　For (F_2), Leaning Tower of Pisa

　　Thus,

- At the time (1633) of the trial of Galileo, the church side could drew the dispute (i.e., endless dispute).

Endless dispute implies the win of the church. The church is not so stupid.

> No way, the church did not think that Newton would appear

Nobody would expect an appearance of Newton.

　　After all, Galileo was the active leader of the overthrow of the world view of Aristotle, but he could not propose the new worldview. In this sense, the Galileo legend is only an opening act of the Newton appearance.

6.4   Principia; Newtonian worldview

6.4.1   Principia (1687)

"PhilosophiæNaturalis Principia Mathematica" (in short, "Principia") , written by Newton (1687), is the most famous and important book in science. Three laws of Kepler were derived

from three laws of dynamics and the law of universal gravitation. Principia was written based on elementary geometry and not the differential and integral calculus. Why did Newton (= advocate of differential and integral calculus) not write Principia based on differential and integral calculus? Although there may be several opinions for this question, The work (based on differential and integral calculus) was succeeded by Leibniz, J. Bernoulli, Euler, D'Alembert, Lagrange and Laplace, etc. and was completed.

6.4.2　After all, the world descriptionism

The following biggest paradigm shift in the history of science is as follows.

(A) Motion $\big[$ Motion function method: (Parmenides, Zeno, Aristotle) $\big]$

$$\xrightarrow{\text{paradigm shift}}$$

Causal relation $\big[$ Kinetic differential equation method: (Newton) $\big]$

That is, we see:

─────────── **(B): Paradigm shift [Newtonian mechanical worldview]** ───────────

Now,

(B) $\boxed{\text{Aristotle's worldview}}$ $\xrightarrow{\text{paradigm shift}}$ $\boxed{\text{Newtonian worldview}}$
　　　(purpose)　　　　　　　　　　　　　(causal relation)

Here, Newtonian worldview means Newtonian mechanics, that is,

Newton's kinetic equation (i.e., the chain of causal relations)
+ the law of universal gravitation

Recall that the main theme of this paper is the world descriptionism(*cf.* Sec. 1.3.1). As mentioned frequently up to this point,

(C$_1$) The argument in ordinary language (or, in the motion function method (*cf.* Sec.2.3.3)) is fuzzy, and thus, "Geocentrism vs. Heliocentrism" cannot be decided. Thus, we need a new worldview.

In Principia, Newton proposed Newtonian mechanics (i.e., Newtonian world view) and showed that

(C$_2$) **When the motion of the sun and the planets is studied, the calculation becomes easy under the assumption that the planets go around the sun.**

Therefore, even the definitions "center" and "go around" depend on the worldview. After all, we conclude that

(D) "Geocentrism vs. Heliocentrism" is not the problem of measurements, but the problem of the world description.

♠**Note 6.7.** If so, the following established opinion should be reconsidered:

($\sharp_1$) Aristotelian world view (purpose) $\longrightarrow$ Newtonian world view (causal relation)

($\sharp_2$) Ptolemaic system: Geocentrism $\longrightarrow$ Copernican system: Heliocentrism

($\sharp_3$) Christianity: Adam and Eve $\longrightarrow$ Darwin: evolution theory

That is because ($\sharp_2$) is a consequence of ($\sharp_1$). There may be a reason to consider that ($\sharp_2$) is an episode of the birth of ($\sharp_1$) (*cf.* Note 4.5).

♠**Note 6.8.** Here, we have (*cf.* Assertion 1.4[the classification of philosophers]).

($\flat$) $\begin{cases} \\ \\ \\ \\ \\ \\ \end{cases}$

($\flat_1$) : the realistic world description (physics)
   Aristotle, **Archimedes**, **Galileo**, **Newton**, Einstein, $\cdots$

($\flat_2$) : the fictional linguistic world description (main street of western philosophy)
   Plato, **Scholasticism**, Descartes, Locke, Leibniz, Berkeley, Hume, Kant, Husserl

($\flat_3$) : the scientific linguistic world description (statistics, quantum language)
   Parmenides, **Zeno** J. Bernoulli, statistics (Fischer, etc.), quantum language

Chapter 7

Modern philosophy(from Descartes to before Kant)

The following is called the flower of modern philosophy:

$$
\boxed{\text{Descartes}} \atop \text{[The father of modern philosophy]} \longrightarrow \left\{ {\boxed{\text{British Empiricism}} \atop \text{[Locke, Berkeley, Hume]}} \atop {\boxed{\text{Continental Rationalism}} \atop \text{[Leibniz]}} \right\} \longrightarrow {\boxed{\text{Kant philosophy}} \atop \text{[summing-up]}}
$$

Now, although it is incredible, philosophy was believed "the king of the academic", and it was the times when philosophy was respected. Even so,

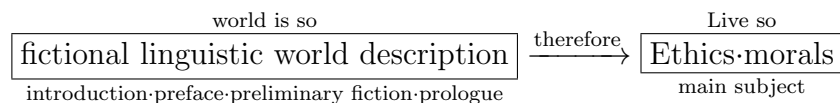- Why were top elites in those days absorbed in the **useless** philosophy?

As mentioned frequently, I think that this is due to Platonic method of telling philosophy.

In this chapter, we discuss Descartes, British empiricism, Continental rationalism.

7.1 Self-referential propositions

7.1.1 The theory of Ideas: The expiration date expired

Let us review Platonic method of telling philosophy:

$$
{\overset{\text{world is so}}{\boxed{\text{fictional linguistic world description}}} \atop \text{introduction·preface·preliminary fiction·prologue}} \overset{\text{therefore}}{\longrightarrow} {\overset{\text{Live so}}{\boxed{\text{Ethics·morals}}} \atop \text{main subject}}
$$

Then, ethics, morals is main, and the fictional linguistic world description is only preface. Although it is desirable that the world description in preface is a dualistic idealism (*cf.* Sec.3.3.1), the fairy tale is enough for anything. In fact, the theory of Ideas is just a fable. In an extreme case, using the psychological tricks such as

(A) "Intellectual's remark can be trusted", "As for the beautiful woman, a heart is fair" "We can trust the assertion of Kant who was too serious and stiff.", etc.

it may suffice to win the reader's trust in the preface (= world description).

The main current of western philosophy keeps Platonic method of telling philosophy. In Plato philosophy, the world description (=the theory of Ideas) is completely an allegory, and the main subject is due to Socrates' ethics. In cases of Augustinus and Scholasticism, the main subject is of course Christianity. Hence, the world description in the preface is not so important. For example, "only present exists" [resp. "barren discussion: Plato or Aristotle?"] is the intellectual act of killing time in Augustinus philosophy [resp. Scholasticism].

However, after the age of geographical discovery and the Renaissance, fairy tales and barren discussions are not quite satisfactory.

And Descartes thought that

<p style="text-align:center;color:blue;">**The expiry date of the theory of Ideas was expired.**</p>

Descartes, using self-referential cogito proposition "I think, therefore I am", proposed the world description (i.e., Descartes philosophy (= mind-matter dualism)). Roughly speaking,

$$\underset{\text{(Plato)}}{\boxed{\text{the theory of Ideas}}} \xrightarrow{\text{cogito turn}} \underset{\text{(Descartes)}}{\boxed{\text{mind-matter dualism}}} \tag{7.1}$$

The philosophy of world description is only an anecdote, however, it should be effective for general people (and thus, quantitative arguments are not desirable). After all, following Socrates' self-referential statement "I know that I know nothing",

<p style="text-align:center;">Descartes also wanted to use self-referential trick "I think, therefore I am"</p>

> ♠**Note 7.1.** There is a good reason for the birth of Newtonian mechanics, for example, the age of discovery, positional notation, etc. On the other hand, there may not be a firm reason for the birth of Descartes philosophy as the continuation of Platonic method of telling philosophy. my opinion is as follows.
>
>   • Under the Christian strong influence, it could not be free to discuss the ethics. And thus, western philosophy devoted itself to the preface (i.e., world description) than the main subject (i.e., ethics).
>
> Platonic method of telling philosophy might be a desperate strategy for western philosophy to coexist with Christianity. Some may assert that there was no need for Descartes=Kant epistemology. I may agree with them if I do not know the argument in Chapter 9, i.e.,
>
> $$\boxed{\text{Descartes=Kant epistemology}} \xrightarrow{\text{linguistic turn}} \boxed{\text{Quantum language}}$$

7.1.2 Self-referential proposition

7.1.2.1 Philosophy is to enjoy wordplay concerning self-referential propositions?

The wordplay concerning self-referential propositions is often used in philosophy. This may be a tradition since Socrates' "I know that I know nothing".

Although I do not the exact definition of "self-reference", it suffices to consider that it is a proposition such that "Oneself talks about oneself". For example,

① Epimenides the Cretan says "All Cretans are liars."

② The set of all sets (this appears in Russel's paradox)

③ Number theory cannot be used to prove its own consistency. (Gödel's second incompleteness theorem)

④ "I know that I know nothing" due to Socrates

⑤ Time in brain (=subjective time: The brain senses the time in the brain.)

⑥ cogito proposition: "I think, therefore I am" (*cf.* Note 1.3, or Note 7.3)

and so on.

A self-referential proposition has the charm which always attracts interest. However, the cases, that the proposition of self-reference appearing quite frequently in philosophy is only interesting as a puzzle but is nonsense, are often found. The proposition of self-reference that emerges in mathematical fundamental theory may be regarded as the highest class in the history of mankind like Gödel's incompleteness theorem.

In fact, I consider as follows:

(B_1) The self-referential argument is sometimes significant in mathematical logic. But, in the world descriptions (i.e., science and philosophy), self-referential arguments are always non-sense. Of course I did not deny the fact that, in philosophy, this is effective as a "signature phrase" and "impressive phrase".

Therefore, conclusively speaking,

(B_2) from the scientific point of view, the cogito proposition "I think, therefore I am" does not produce anything.

If we believe the (B), we can understand the reason that

- the genealogy of dualistic idealism (mind-matter dualism):

$$[\text{Descartes} \to ... \to \text{Kant} \to ... \to \text{Husserl}]$$

is not (scientific) productive but fun for literary arts.

♠**Note 7.2.** In this paper, we are interested in the non-sense self-referential propositions. As mentioned in Sec.3.5, the philosophy of world description is a kind of genre of literature. Thus, it is a matter of course that self-referential proposition plays an important role in philosophy.

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7.2 I think, therefore I am. ("Discourse on the Method" by Descartes)

7.2 I think, therefore I am. ("Discourse on the Method" by Descartes)

Let us start from the most famous philosophical proposition (Cogito ergo sum, cogito proposition) "I think, therefore I am" in Descartes' book "Discourse on the Method".

After Descartes read Bacon's "Novum organum", he decided "Start from the unquestionable truth", this is the most famous philosophical proposition (=cogito proposition):

<div align="center">

"I think, therefore I am"

</div>

That is, Descartes think:

<div align="center">

I think that 'I think, therefore I am'

</div>

which is rather self-referential. And further, he was convinced that

- Every statements derived from the cogito proposition are absolutely trusted

That is,

Proposition 7.1. The first principle (= cogito proposition) in philosophy
Now,

(A) Descartes doubted everything. And he arrived in the cogito proposition which has no doubted room. That is, he arrived in

  (B) I think, therefore I am.

  And, he proclaimed that the cogito proposition (B) is the first principle in philosophy.

(Notice) "I" and "exist" are incomprehensible words, and thus, the cogito proposition as well as "the existence", "Kant's antinomy") is a kind of "What we cannot speak about". Also recall the relation between the cogito proposition and the linguistic Copenhagen interpretation (*cf.* Note 1.2).

In ordinary language, the meaning of "exist" is not clear as follows.
(a): Does the sun exist?
(b): Does "beauty" exist?
(c): Does "mathematics" exist?
(d): Does "love" exist?
(e): Does "Higgs boson" exist?
(f): Does "dinosaur" exist?
(g): Does "nothing" exist?
(h): Does "past" exist?
(i): Does "time" exist?
(j): Does "I" exist?

When thinking now, "Descartes' misunderstanding" is obvious. As spoke many times before, the logic in ordinary language cannot be trusted. For example, without world description, we see several inconvenience as follows:

<div align="center">86</div>

- Zeno's paradoxes (*cf.* Sec.2.4),

- Aristotle's syllogism (*cf.* Sec.3.8.2),

- Only "now" exists (*cf.* Sec.5.1),

- Anselmus' "Arguments for the existence of God" (*cf.* Sec.5.4),

- The difference between Geocentrism and Heliocentrism is not clear (*cf.* Chap.6),

First, neither "the proposition which has no doubted room" nor "self-evident proposition" exists.

(C) No theory that is started from the proposition which has no doubted room cannot succeed. Also, the meaning of "self-evident" is not self-evident.

Three motion laws in Newtonian mechanics are not self-evident. The theory of relativity and quantum mechanics are not evident. Non-Euclid geometry (due to Gauss (1824) , Lobachevsky (1829) ,etc.) says that

$$\text{Start from "productive" than "self-evident"!} \quad (\textit{cf. } \text{Sec.4.2})$$

I suspect that

(D) Would there be really people who took Descartes' idea seriously?

In Platonic method of telling philosophy, the world description is only the preface (or, advertising slogan). In this sense, instead of the theory of Ideas, the cogito proposition might be used.

♠**Note 7.3.** (= Note 1.3)   Note 1.3 is rewritten as follows. It is one of the roles of the linguistic Copenhagen interpretation to exclude a scientifically nonsense propositions from a quantum language (e.g., self-referential proposition (*cf.* Sec.7.1). As mentioned later, for example,

(♯) Cogito proposition **"I think, therefore I am"** is not within quantum language.

In cogito proposition, we see that "observer"="I" and "object to be measured"="I",which is inconsistent with the linguistic Copenhagen interpretation (E_1) in Sec.1.1.2. Thus, cogito proposition is not a proposition in quantum language.

Summary 7.2. [Summary of the cogito proposition] Let us summarize the cogito proposition as follows.

(E_1) The cogito proposition "I think, therefore I am" is an incomprehensible proposition (*cf.* Note 7.3),

But,

(E_2) This has attracted the interest of many people. And Descartes had now declared a "the existence of 'I'". After all, Descartes Asserted that "I" is the key-word in Descartes'

philosophy as well in science.

Therefore, I would like to conclude that

(E_3) **Descartes' discovery "I" is the most important discovery in science**

See Exercise 9.3 and Answer 9.4.

7.3 Descartes' strategy

The most important key-word in Descartes' philosophy is "I" (= "the first person"). Descartes thought that

Nobody pays attention even if Descartes appeals for the existence of "I" aloud.

Thus, as mentioned in Summary 7.2,

(A) Descartes used the advertising slogan "I think, therefore I am"

The cogito proposition is not important. What Descartes wanted to say is

(B) "I" is the most important key-word in Descartes philosophy.

His strategy succeeded wonderfully. If "I" is accepted, the existence of "matter" (which is perceived by "I") is accepted. And further, the medium of "I" and "matter" is automatically accepted as "body (= sensory organ)".
    Therefore, the key-words of Descartes philosophy (= mind-matter dualism) is

(C)   "I"(="brain", "mind"), "body"(="sensory organ"), "matter"

For completeness, it should be noted that this is not a consequence of the cogito proposition. That is the cogito proposition is the reason added afterwards.

(D) : The mind-matter dualism
Descartes' problems (the mind-body problem, the subjectivity problem)

Descartes proposed the fictional linguistic world description which starts from the three key-words

(D_1) "I"(="brain", "mind"), "body"(="sensory organ"), "matter"

And, Descartes declared the mind-matter dualism, and proposed the following problem (i.e., mind-body problem):

Problem 7.3. mind-body problem:

(D_2) How are "body" and "mind" connected?

For the answer, see Answer 9.5 in Chapter 9.

♠**Note 7.4.** The subjectivity problem:

- *The world I perceive is the same as the world you perceive?*

may be also famous. However I do not have a clear answer. This may be pseudo-problem concerning self-reference. Or, the linguistic turn of this problem may be the same as Wittgenstein's saying "*The limits of my language mean the limit of my world*".

After all,

(E) The cogito proposition "I think, therefore I am" is an advertising slogan of Descartes philosophy. And the world description is composed of Descartes problem (i.e., "mind-body problem" and "subjectivity problem").

Descartes might think as follows.

(F) The theory of Ideas has expired expiration date. Thus, in order to refresh philosophy, a new model-change (or, a new wrapping paper) is needed such that

$$\text{Descartes' problem (D)}$$

Even if this is a non-sense problem, this theory is stable until after 400 years (i.e., until the brain science is powerful). According to Platonic method of telling philosophy:

$$\underset{\text{introduction·preface·fiction}}{\boxed{\text{fictional linguistic world description}}} \overset{\text{world is so}}{\underset{\text{therefore}}{\longrightarrow}} \underset{\text{main subject}}{\boxed{\text{Ethics·morals}}} \overset{\text{Live so}}{}$$

by rewriting of the signboard, philosophy can be revived.

In fact, Descartes realized the biggest model-change.

♠**Note 7.5.** I think that Descartes problem is a kind of self-referential problem, which is scientifically non-sense. In fact, Descartes problem was not fruitful from the scientific point of view. The followings also seem to be kinds of self-reference.

($\sharp_1$) [a brain in a vat] You don't know that you have hands. That is because
①: If you're a brain in a vat then you don't have hands
②: You don't know that you're not a brain in a vat
③: Therefore you don't know that you have hands

($\sharp_2$) Qualia problem, "What am I?"

($\sharp_3$) Arguments for the existence of God

($\sharp_4$) Time in brain, (= subjective time; perceive time in a brain by brain)

Everyone can enjoy the above as literary. If you are experimental scientists of brain science, you are interested in "brain circuit that believe in God" and "brain circuit of qualia". However, it should be noted that there is no brain science without experiment.

♠**Note 7.6.** As mentioned in ref. [32], I rewrite as follows. It is not true to consider that every phenomenon can be describe in terms of quantum language. Although readers may think that the following can be described in measurement theory, but we believe that it is impossible. For example, the followings cannot be written by quantum language:

$$
\begin{cases}
① : \text{ tense—past, present, future —} \qquad ② : \text{ Heidegger's saying "In-der-Welt-sein"} \\
③ : \text{the measurement of a measurement,} \qquad ④ : \text{Bergson's subjective time} \\
⑤ : \text{ observer's space-time,} \\
⑥ : \text{Only the present exists (due to Augustinus(354-430))}
\end{cases}
$$

If we want to understand the above words, we have to propose the other scientific languages (except quantum language). We have to recall Wittgenstein's sayings

<div style="color:blue; text-align:center;">

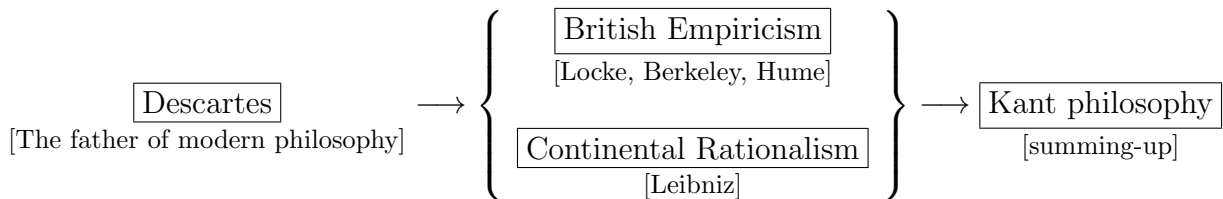The limits of my language mean the limits of my world

</div>

I consider that ①–⑥ are related to self-reference in the wide sense.

7.4   The correspondence of key-words in Descartes philosophy and quantum language

The key-words of Descartes philosophy (= mind-matter dualism) is

"I"(="brain", "mind"), "body"(="sensory organ"), "matter"

However, we cannot expect the substantial result even if we consider Descartes' problem. In fact, from the scientific point of view, the following modern philosophy is not fruitful:

$$
\boxed{\text{Descartes}} \atop {\text{[The father of modern philosophy]}} \longrightarrow
\begin{cases}
\boxed{\text{British Empiricism}} \\
\text{[Locke, Berkeley, Hume]} \\
\boxed{\text{Continental Rationalism}} \\
\text{[Leibniz]}
\end{cases}
\longrightarrow \boxed{\text{Kant philosophy}} \atop \text{[summing-up]}
$$

However, the above three key-words are essentially important in the relation with the quantum language: Now let us explain this.

For example, consider:

- Examine whether the hot or cold water in the bath and put your hands in the bathtub.

In this case, "hand" is regarded as "measuring instrument". In the same sense, "eye" is also regarded as "measuring instrument". Conversely, Glasses, microscope, telescope, etc. is a kind of body (= sensory organ). If so, we want to conclude that

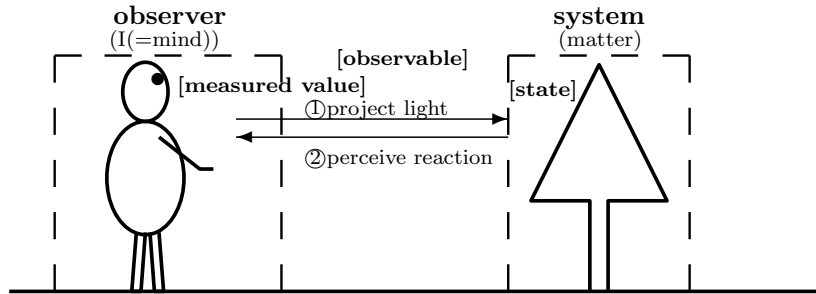body (particularly, sensory organ) $\fallingdotseq$ measuring instrument

Figure 7.1: [Descartes Figure]: Image of "measurement(=①+②)" in dualism

In the above Descartes figure, slightly incomprehensible one may be

$$\text{"I" (= "brain", "mind")} \doteqdot \text{measured value}$$

However, it suffices to consider "there is no measured value without brain". For example when a needle of a voltmeter just moved, it is only a physical phenomenon. Nevertheless a movement of this needle is read, and it's sensed by a brain. Then, it for the first time becomes "measured value".

The reason that Descartes philosophy is useless is as follows.

(A) In spite that three key-words "mind", "body", "matter" are gathered, Descartes philosophy has no computable structure. This is only the fictional linguistic world description, and not the scientific linguistic world description.

Table 7.1: Key-words in each world description (*cf.* Assertion 1.6)

mind-matter dualism	[A](= mind)	[B](between A and B)	[C](= matter)
Plato	actual world	Idea	/ [/]
Descartes	I, mind, brain	body	/ [matter]
quantum language	**measured value**	**measuring instrument**	**state** **[system]**

That is, using the following change:

$$[\text{I}] \implies [\text{measured value}], \; [\text{body}] \implies [\text{measuring instrument}], \; [\text{matter}] \implies [\text{system}]$$

we get the computable world description (i.e., Axioms 1 and 2 in Sec. 1.1.1), i.e., quantum language.

If so, we may affirmatively answer Problem 7.4, i.e.,

Can the direction:"Plato $\xrightarrow[\text{model-change}]{}$ Descartes" be regarded as progress?

If so, the following problem is essential.

Problem 7.4. Descartes' model-change:

$$\text{the theory of Ideas} \xrightarrow{\text{model-change}} \text{Descartes philosophy (Descartes problem 7.3)}$$

is regarded as a progress? That is, it is sure that Descartes' model-change is supported by many people. Almost people certainly believe that science makes progress, that is, science development is not fashionable change. However, there may be a lot of opinions about philosophy. We completely agree that it is fun to think of dualistic idealism (= dualistic metaphysical world). However, we have the question:
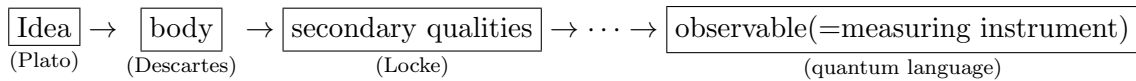
- Did western philosophy make essential progress?

which is essentially the same as

- Does dualistic idealism (= dualistic metaphysical world) deserve to study?

This will be answered throughout this paper.

Brief explanation of Problem 7.4: Our answer to Problem 7.4 is "essential progress". As the reason mentioned in Assertion 1.7 of Sec. 1.4, the following key-words converge to "observable" such as

$$\boxed{\text{Idea}} \to \boxed{\text{body}} \to \boxed{\text{secondary qualities}} \to \cdots \to \boxed{\text{observable(=measuring instrument)}}$$
$$\text{(Plato)} \qquad \text{(Descartes)} \qquad \text{(Locke)} \qquad \qquad \text{(quantum language)}$$

It should be noted that there is no settlement (i.e., "essential progress" or "fashionable change"?) without ultimate goal (= quantum language). □

7.5 Locke (1632 - 1704): The father of British Empiricism

7.5.1 "An Essay Concerning Human Understanding" by Locke (1689)

There may be a reason to consider that

(A) The role of Descartes was the elimination of such "spiritual power" and "supernatural being", and to prepare the social environment of the appearance of Newton. That is, Descartes was only the opening performer. In this sense, "I think, therefore I am" (the existence of "I") was only the side show of the opening performer.

And so,

(B) The role of Descartes, as the opening performer, had been finished by the appearance of Newton.

Even if there was such history, it wasn't strange.

However, strangely, there were people who took "the existence of I" or "Descartes figure" seriously. For example, John Locke (1632 - 1704) thought as follows.

> **(C) :"An Essay Concerning Human Understanding" by Locke (1689)**
>
> Locke is the successor of Descartes philosophy. He philosophically (i.e., without experiments) discussed the Descartes figure (i.e., the relation among "I"(="brain", "mind"), "body"(="sensory organ"), "matter"). He is called "The father of British Empiricism ($\approx$ epistemology)".

Locke may thought as follows.

(D) In the field of "matter" of Descartes figure, activity of Newton is remarkable. However, concerning the relation among "I"(="brain", "mind"), "body"(="sensory organ"), "matter", he wanted to reach the summit.

If so,

(E) It was too early more than 300 years to study "epistemology" in science in earnest.

Thus, it is impossible to expect the result.

However,

(F) If we think that the work of philosophers is "model-change", then the achievements of Locke is enormous.

7.5.2 "Tabula rasa", primary quality and secondary quality

7.5.2.1 "tabula rasa"

Tabula rasa is a Latin phrase often translated as "blank paper" in English, that is,

(G) The "brain circuit" is a blank paper state at the start, but we look and hear in various ways, then "concept (= complex brain circuit)" is made.

Present-day brain science may say:

"It's equal to say nothing by such general opinion."

however, at any rate, the (G) is the starting point of British Empiricism.

♠**Note 7.7.** (*cf.* Note 7.10, Summary 9.2) As mentioned later, considering "language" and not "cognition", then, in several languages (ordinary language, mathematics, Newtonian mechanics, programing language, etc.), we say tat

($\sharp$) "ordinary language" is like tabula rasa

When a baby was born, a baby doesn't know ordinary language at all (i.e., a baby is with tabura rasa state). The baby is acquiring ordinary language by trial and error.

7.5.2.2 Primary quality and secondary quality

According to Locke,

(H$_1$) **primary quality** (i.e., inherent nature (=primary quality)) $\cdots$ weight, temperature, length, etc.

(H$_2$) **secondary quality** (i.e., sensations of inherent nature)$\cdots$ sweet, red, hot, salty, etc.

That is,

(I) :Locke's world description

The world is composed of two (i.e., "matter" and "mind (= observer)". "Matter" has inherent nature (= primary quality), "observer" has body (="sensory organ"). Through the sensory organ, secondary quality (sweet, red, hot, salty, etc.) is felt by our brain.

In terms of quantum language, we say:

primary quality$\Longrightarrow$state,
secondary quality$\Longrightarrow$observable (= measuring instrument)

as seen in the table below.

Table 7.2: The key-words of world descriptions (*cf.* Assertion 1.6)

mind-matter dualism	[A](= mind)	[B](between A and B)	[C](= matter)
Plato	actual world	Idea	/ [/]
Descartes	I, mind, brain	body	/ [matter]
Locke	mind	secondary quality	primary quality [/]
quantum language	**measured value**	**observable**	**state [system]**

Here,

(J) Locke represents the most important concept in dualistic idealism as the term "secondary quantity". The terms such as Idea, body, etc. may be not comprehensive. However,
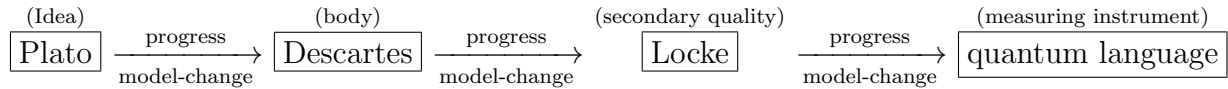
- "secondary quantity" is a word making the feeling that we can understand. Hence, Locke's achievement should be honored.

Again, note that "secondary quantity" is a word that forms the foundation of dualism.

If so, we may affirmatively answer Problem 7.4, i.e.,

Can the direction:"Descartes $\xrightarrow[\text{model-change}]{}$ Locke" be regarded as progress?

That is, we may assert that

<table>
<tr><td>(Idea)</td><td></td><td>(body)</td><td></td><td>(secondary quality)</td><td></td><td>(measuring instrument)</td></tr>
<tr><td>Plato</td><td>$\xrightarrow[\text{model-change}]{\text{progress}}$</td><td>Descartes</td><td>$\xrightarrow[\text{model-change}]{\text{progress}}$</td><td>Locke</td><td>$\xrightarrow[\text{model-change}]{\text{progress}}$</td><td>quantum language</td></tr>
</table>

if "to make progress" is defined by "to come near quantum language" (*cf.* Assertion 1.7).

♠**Note 7.8.** By the way, Merleau-Ponty (1908 - 1961) might think in the following manner.

($\sharp_1$) I shake hands with my right hand and the left hand. In this case, if I regard the right hand as the measuring instrument, I feel the existence of my left hand. On the contrary, if I regard the left hand as the measuring instrument, I feel the existence of my right hand.

Such thing is worth arguing. I do not know yet the meaning of the symmetry, i.e.,
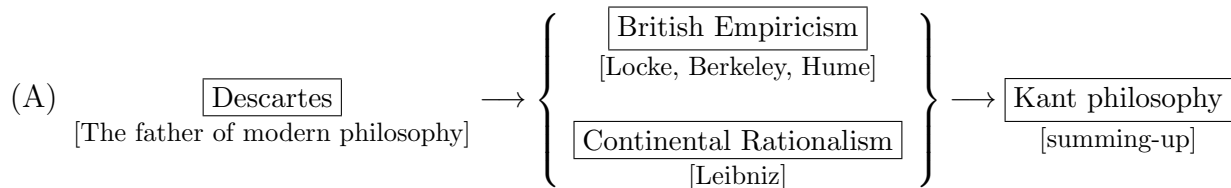
($\sharp_2$) "right and left", "Geocentrism vs. Heliocentrism (*cf.* Sec. 6.3)"

7.6 Dramatic presentation of "British Empiricism vs. Continental Rationalism"

Modern philosophy became popular through the following rival relation:

British Empiricism vs. Continental Rationalism

That is,

(A) Descartes $\longrightarrow$ $\left\{ \begin{array}{c} \boxed{\text{British Empiricism}} \\ \text{[Locke, Berkeley, Hume]} \\ \\ \boxed{\text{Continental Rationalism}} \\ \text{[Leibniz]} \end{array} \right\}$ $\longrightarrow$ Kant philosophy
[The father of modern philosophy]   [summing-up]

Let us explain the above:

Modern philosophy

British Empiricism$\big[$**"tabula rasa"(= blank paper)**$\big]$
"An Essay concerning Human Understanding" (by Locke, 1690) says that

(B) He eliminated the possibility of innate knowledge before experience. Human being is born as the blank state ("tabula rasa") . (Locke, Berkeley, Hume, $\cdots$)

Continental Rationalism$\big[$**nativism**$\big]$
"New Essays on Human Understanding" (by Leibniz, 1703) says that

(C) nativism (= not "tabula rasa"). the human mind as it is at birth, with ideas or thoughts in it.

(Descartes, Leibniz,$\cdots$)

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That is, from

"An Essay concerning Human Understanding" vs. "New Essays on Human Understanding"

the rival relation:

British Empiricism["tabula rasa"] vs. Continental Rationalism[nativism]

began. After nearly 100 years of twists and turns,

Appearance of Kant (Critique of Pure Reason: 1781)

And

(D) Kant has integrated "tabula rasa vs. nativism"

Such an outline is said generally.

(Notice) In this paper, we think that the above is only "model change" or "Repainting of signboard". However, we have the following Problem 7.4:

- Has Western philosophy been making progress?

This is answered throughout this paper.

7.6.1   Would Leibniz be serious for this argument (i.e., nativism) ?

Gottfried Wilhelm Leibniz (1646-1716) was one of the great thinkers of the seventeenth and eighteenth centuries and is known as the last "universal genius". He made deep and important contributions to the fields of metaphysics, epistemology, logic, philosophy of religion, as well as mathematics, physics, geology, jurisprudence, and history.

Everyone may have the following question:

(E) Why would such a genius participate in a nonsense argument (i.e., "nativism vs. tabula rasa") ?

It is clear that Locke's theory is too extreme, and thus, it is a matter of course that Leibniz was critical in "tabula rasa". However,

(F_1) The story that Leibniz got over Locke in "New Essays on Human Understanding" is too exaggerated.

The argument about "nativism vs. tabula rasa" is non-sense in the following sense:

(F_2) Even if future brain science will make a decision favorable to one of them (i.e., "nativism vs. tabula rasa"), it is independent of Leibniz's (or, Locke's) evaluation. That is because "Continental Rationalism vs. British Empiricism" is regarded as a problem less than science. What is the most important is to form the ground on which the dualistic idealism can be argued scientifically. Without the ground, it is useless even if they said something[1].

---

[1] For example, from the scientific point of view, atomism due to Democritus (BC.460-BC.370) is non-sense.

For the argument about "Continental Rationalism vs. British Empiricism" from the linguistic point of view, see Summary 9.2 in Chap. 9.

Ordinary people may want to find the big name of "Genius Leibniz" in the debates of "British Empiricism vs. Continental Rationalism".

♠Note 7.9. [**What is space · time?**] Here, let us add Leibniz-Clarke Correspondence (1715–1716) (*cf.* ref. [1, 32]), which is important to know both Leibniz's and Clarke's (=Newton's) ideas concerning space and time.

($\sharp_1$) [**The realistic space-time**]
Newton's absolutism says that the space-time should be regarded as a receptacle of a "thing." Therefore, even if "thing" does not exits, the space-time exists.

On the other hand,

($\sharp_2$) [**The metaphysical space-time**]
Leibniz's relationalism says that

- Space is a kind of state of "thing".
- Time is an order of occurring in succession which changes one after another.

Therefore, if "thing" does not exit, the space-time does not exist.

Therefore, I regard this correspondence as

$$\underset{\text{(realistic view)}}{\boxed{\text{Newton } (\approx \text{Clarke})}} \quad \underset{\text{v.s.}}{\longleftrightarrow} \quad \underset{\text{(linguistic view)}}{\boxed{\text{Leibniz}}}$$

which should be compared to

$$\underset{\text{(realistic view)}}{\boxed{\text{Einstein}}} \quad \underset{\text{v.s.}}{\longleftrightarrow} \quad \underset{\text{(linguistic view)}}{\boxed{\text{Bohr}}}$$

Many scientists may think that

Newton's assertion is understandable, in fact, his idea was inherited by Einstein. On the other, Leibniz's assertion is incomprehensible and literary. Thus, his idea is not related to science.

However, recall the classification of the world-description (Assertion 1.1):

$$\begin{cases} ① : \underset{\text{(realistic world view)}}{\text{Newton, Clarke}} \quad \cdots \overset{\text{(space-time in physics)}}{\underset{\text{``What is space-time?''}}{\boxed{\text{realistic space-time}}}} \quad (\text{successors: Einstein, etc.}) \\ \\ ② : \underset{\text{(linguistic world view)}}{\text{Leibniz}} \quad \cdots \quad \overset{\text{(space-time in measurement theory)}}{\underset{\text{``How should space-time be represented?''}}{\boxed{\text{linguistic space-time}}}} \quad (\text{i.e., spectrum, tree } (cf. \text{ ref. } [32])) \end{cases}$$

in which Newton and Leibniz respectively devotes himself to ① and ②. Although Leibniz's assertion is not clear, we believe that

- Leibniz found the importance of "linguistic space and time" in science,

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Also, it should be noted that

($\sharp$) Newton proposed the scientific language called Newtonian mechanics,
on the other hand,
Leibniz could not propose a scientific language

I want to believe that "realistic" vs. "linguistic" is always hidden behind the great disputes in the history of the world view. That is,

$$\boxed{\text{realistic world view}} \quad \underset{\text{v.s.}}{\longleftrightarrow} \quad \underbrace{\boxed{\text{linguistic world view}}}_{\text{(idealistic)}}$$

(*cf.* Assertion 1.4 in Sec. 1.4).

♠**Note 7.10.** (*cf.* Note 7.7, Summary 9.2) As mentioned later, considering "language" and nit "cognition", then, in several languages (ordinary language, mathematics, Newtonian mechanics, programing language, etc.), we say tat

($\sharp$) mathematics is nativism

That is because mathematics is based on set theory Here it should be noted that set theory (= axiomatic set theory) is due to Kantor, Hilbert, Zermelo- Fraenkel, etc. And thus, it was completed in the early 20th century.

7.6.2 Subjective idealism: Berkeley, "To be is to be perceived"

7.6.2.1 Priest: Berkeley

Berkeley (1685 -1753) is famous as follows.

(G$_1$) Berkeley is a priest, and he interpreted Locke's primary quality as the state of things that come from a supernatural power such as a god. Thus his philosophy is called subjective idealism.

(G$_2$) Berkeley indicated that the mathematical definition of $\lim \frac{0}{0}$ is not complete

(G$_3$) He said "To be is to be perceived", which represented the essential spirit of dualism.

Summing up, Berkeley was always the standpoint of anti-Newton (= anti-realism).

• If we think that modern philosophy (from Descartes to Kant) has significance as a buffer zone of Christianity with Newtonian mechanics, we can conclude that Berkeley is honest.

The mathematical definition of $\lim \frac{0}{0}$ (i.e., (ϵ, δ)-definition of limit) was more important than Newton thought, and it was discovered one hundred and tens of years later (by Cauchy, Weierstrass, etc.). When I think from now on, there was a possibility that Leibniz discovered it, but he was busy in the other things.

7.6.2.2 (G$_3$): To be is to be perceived

Consider the following saying:

(H$_1$) There is no science without measurement
       ($\approx$ [To be is to be perceived])

Everyone may believe that this saying (H$_1$) is absolutely true. In fact, the importance of "measurement" is emphasized as follows (*cf.* Sec. 1.1).

$$\underset{\boxed{\text{measurement theory}}}{\overset{\text{(=quantum language)}}{}} = \underset{\boxed{\text{measurement}}}{\overset{\text{[Axiom 1]}}{}} + \underset{\boxed{\text{causal relation}}}{\overset{\text{[Axiom 2]}}{}}$$

$$+ \underset{\boxed{\text{linguistic Copenhagen interpretation}}}{\overset{}{}} \quad (7.2)$$
$$\text{[the manual to use Axioms 1 and 2]}$$

But, it is Genius Newton (and Einstein) that neglect this absolute truth (H$_1$). In fact, Newtonian mechanics is formulated as follows.

$$\boxed{\text{Newtonian mechanics}} = \boxed{\text{No measurement}} + \underset{\boxed{\text{causal relation}}}{\overset{\text{[Newtonian kinetic equation]}}{}} \quad (7.3)$$

Here, note that Newton removed "measurement" from (7.2). The insightfulness of Newton is surprising. A genius isn't also confused by "the absolute maxim (H$_1$)".

   The following is my fiction:

(H$_2$) "Exclusion of the measurement" is the conclusion that Newton repeats consideration and arrived at. However, Berkeley, the forerunner of anti-Newton, considered that the exclusion is a weak point of Newtonian mechanics. And he said

<p style="text-align:center">To be is to be perceived</p>

If we think so, we can understand the following "realistic world description vs. linguistic world description".

7.6.2.3 "Einstein=Tagore Meeting" and "Bohr=Einstein debates"

Concerning "realistic world description vs. linguistic world description", Einstein=Tagore (poet, thinker in India) meeting in 1930 is famous, in which they asserted as

- Tagore: "Truth is always limited by human perception."

- Einstein: "Truth is independent of our consciousness, For instance, if nobody is in this house, yet that table remains where it is[2]."

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[2]Einstein often said this kind of statement at various places, for example, "Does the moon disappear when I'm not looking at it?"

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In the above, Tagore's assertion is similar to Berkeley's "To be is to be perceived", which belongs to the situation of dualistic idealism(=linguistic world description).

On the other hand, Einstein's saying:

(I₁) if nobody is in this house, yet that table remains where it is (= Does the moon disappear when I'm not looking at it?)

is the same as

(I₂) Truth is independent of us (= realistic world description)

Thus, Einstein and Newton are similar, in the sense that

Truth is independent of human being (i.e., physics holds without measurement)

Thus, it should be noted that (7.3) is significant.

In this paper, we are not concerned with Bohr=Einstein debates in quantum mechanics (in order to solve this problem, I proposed quantum language), (*cf.* ref. [32])). However, Bohr=Einstein debates is similar to the above. Thus, summing up, we see:

realistic world description vs. linguistic world description (*cf.* Table 1.1 in Assertion 1.4)

Realistic world description [monism, realism, no measurement]	Linguistic world description [dualism, idealism, measurement]
Newton	Berkeley
Newton (and Clarke)	Leibniz
Einstein	Tagore
Einstein	Bohr

Now, concerning Bohr=Einstein debates, The impression that Einstein lost now has been left, but the author does not think so (*cf.* ref. [32]).

♠**Note 7.11.** Omitting "Newton vs. Berkeley" and "Einstein vs. Tagore" in the above table, I repeatedly mention the following table (*cf.* Assertion 1.4):

Realistic world description vs. linguistic world description (= Table 1.1 in Assertion 1.4)

dispute ╲ [R] vs. [L]	Realistic world description [monism, realism, no measurement]	Linguistic world description [dualism, idealism, measurement]
ⓐ: motion	Hērakleitos	Parmenides
ⓑ:Ancient Greece	Aristotle	Plato
ⓒ: Problem of universals	Nominalism(Ockham)	Realism(Anselmus)
ⓓ: space-time	Newton (≈ Clarke)	Leibniz
ⓔ: quantum theory	Einstein	Bohr

ⓐ is my fiction, ⓒ is a confusion. ⓓ is the Leibniz=Clarke correspondence(*cf.* Note 7.9), ⓔ is Bohr=Einstein debates. Quantum language is proposed as one of answers to Bohr=Einstein debates(*cf.* ref. [32]).

7.6.3 Hume; skeptic who didn't measure, "A Treatise of Human Nature"

7.6.3.1 The review of Descartes

Let us review Descartes philosophy.

(J₁) Descartes found the indisputable truth, i.e., cogito proposition "I think, therefore I am". Therefore, everything derived from cogito proposition can be trusted. That is, he started from "the existence of I".

It is touched by a pureness of Descartes, but in the first place "I think, therefore I am" and "the existence of I" is suspicious (*cf.* Note 1.3 or, Note 7.3). Hence, the following is also suspicious:

(J₂) "The existence of I" is certain. **Therefore**, the matters that I perceive exist. And further, Descartes introduced "body (= sensor organ)" which mediates between "I" and "matter". After all, he reached and discussed "mind-matter dualism" (= Descartes problem 7.3), that is, "the problem of mind-matter dualism" and "mind-body problem".

Although Descartes problem 7.3 is, from the scientific point of view, a barren discussion, Descartes philosophy was supported a lot of people. Since the philosophy of world description is a kind of fashion or "model-change", to be supported by many people is the most important.

(J₃) If Descartes and Locke asserted that

- there is a possibility that mind-matter dualism (with keywords "matter", "I (= mind, brain)", "body(=secondary quality)", "matter") succeeds.

then, I think that they are, from the quantum linguistic point of view, true.

If so, we may affirmatively answer Problem 7.4, i.e.,

$$\text{Can the direction: "Descartes} \xrightarrow[\text{model-change}]{} \text{Locke" be regarded as progress?}$$

That is, we may assert that

$$\text{Plato} \xrightarrow[\text{model-change}]{\text{progress}} \text{Descartes} \xrightarrow[\text{model-change}]{\text{progress}} \text{Locke}$$

7.6.3.2 Hume's straying[Less than brain science]; Hume's wordplay

Descartes philosophy is a philosophy which has the risk of entering the science. In fact, Hume approached the zone of science.

In "A Treatise of Human Nature" (1739), Hume pointed out the leap in logic of **"Therefore"** in the above (J₂). As Hume says, it is sure that "the existence of matter" cannot be derived from "the existence of I"[3]. Also, it is not guaranteed that "matter I perceive" is equal to "true matter". Thus, the existence of "matter" is doubtful. However, it is sure that I feel so. Hume states that

---

[3]This kind of logic is a typical self-reference (*cf.* Note 1.3 or, Note 7.3). Thus, Hume's logic (or generally, philosophical logic) in ordinary language cannot be trusted. That is, it is only a wordplay.

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May 12, 2017

7.6 Dramatic presentation of "British Empiricism vs. Continental Rationalism"

(K) "a bundle of perceptions" (= brain circuit) exists

That is,

(L) "matter" and "causal relation" are a kind of bundle of perceptions

I think that the above "$(J_1)\to(K)\to(L)$" is self-referential in the wide sense. That is,

- "$(J_1)\to(K)\to(L)$" is a kind of psychological illusion as having been able to understand all events by the word "bundle of perceptions".

To enjoy such convinced form may also be a pleasure of philosophy. Thus,

(M) It is said Hume's philosophy is the goal of British Empiricism

Hume took the faultfinding of Descartes, and Hume has entered into wrong direction "brain science". The research of "the bundle of perceptions" belongs to brain science.

(N) If Hume was a scientist, he was too early for 300 years

The cause of victory of Galileo was a "telescope". Hume studied "brain science" without measuring instrument in spite that Hume thought that he himself is a philosopher and not scientist. Hence, I think that

$$\boxed{\text{Descartes}} \xrightarrow[\text{progress}]{} \boxed{\text{Locke}} \xrightarrow{\text{regress}} \boxed{\text{Hume}}$$
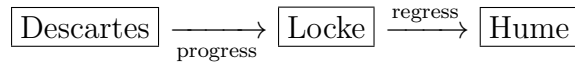
However, Hume was revived by Kant (this will be discussed in Chap. 8 [Kant]). Then, I want to say that

$$\boxed{\text{Descartes}} \xrightarrow[\text{progress}]{} \boxed{\text{Locke}} \xrightarrow[\text{progress}]{} \boxed{\text{Hume}} \xrightarrow[\text{progress}]{} \boxed{\text{Kant}}$$
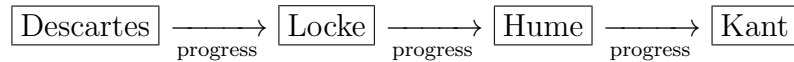
7.6.3.3 Hume; The causality problem

It is a matter of course that the representation of "causal relation" is the most important theme in world description. In Newtonian mechanics, the causality is represented by Newtonian kinetic equation. In Descartes=Kant philosophy, the representation of "causal relation" is as follows.

($\sharp_1$) **[Cognitive causality]:** David Hume, Immanuel Kant, etc. thought as follows. :

> We cannot say that "Causality" actually exists in the world, or that it does not exist in the world. And when we think that "something" in the world is "causality", we should just believe that the it has "causality".

Most readers may regard this as "a kind of rhetoric", however, several readers may be convinced in "Now that you say that, it may be so." Surely, since you are looking through the prejudice "causality", you may look such. This is Kant's famous "Copernican revolution", that is,

<p align="center">"recognition constitutes the world."</p>

which is considered that the recognition circuit of causality is installed in the brain, and when it is stimulated by "something" and reacts, "there is causal relationship." Probably, many readers doubt about the substantial influence which this ($\sharp$) had on the science after it. However, in this book, I adopted the friendly story to the utmost to Kant.

($\sharp_2$) **[Linguistic causal relationship (MeasurementTheory)]:** The causal relationship of measurement theory (= quantum language) is decided by the Axiom 2 (causality; §1.1.1) of this chapter. If I say in detail,:

- Although measurement theory consists of the two Axioms 1 and 2, it is the Axiom 2 that is concerned with causal relationship. When describing a certain phenomenon in quantum language (i.e., a language called measurement theory) and using Axiom 2 (causality; §1.1.1) , we think that the phenomenon has causality.

♠**Note 7.12.** In the book "The astonishing hypothesis" (by F. Click (the most noted for being a co-discoverer of the structure of the DNA molecule in 1953 with James Watson)), Dr. Click said that

($\sharp_1$) *You, your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules.*

It should be note that this ($\sharp_1$) and the dualism do not contradict. That is because quantum language says (*cf.* Assertion 1.1):

($\sharp_2$) **Describe any monistic phenomenon by the dualistic language (= quantum language)!**

Also, if the above ($\sharp_1$) is similar to Hume's assertion, Hume was a pre-scientist rather than a philosopher. And further, this ($\sharp_2$) is familiar to most scientists. That is because they usually use statistics (or, probability theory), which is the dualism composed of "trial" ($\approx$ measurement).

♠**Note 7.13.** Here, we have (*cf.* Assertion 1.4[the classification of philosophers]).

($\flat$)
$$\begin{cases}
(\flat_1) : \text{the realistic world description (physics)} \\
\quad \textbf{Aristotle}, \textbf{Archimedes}, \textbf{Galileo}, \textbf{Newton}, \text{Einstein}, \cdots \\
\\
(\flat_2) : \text{the fictional linguistic world description (main street of western philosophy)} \\
\quad \textbf{Plato}, \textbf{Scholasticism}, \textbf{Descartes}, \textbf{Locke}, \textbf{Leibniz}, \textbf{Berkeley}, \textbf{Hume}, \text{Kant}, \text{Husserl} \\
\\
(\flat_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\
\quad \textbf{Parmenides}, \textbf{Zeno J. Bernoulli}, \text{statistics (Fischer, etc.)}, \text{quantum language}
\end{cases}$$

Chapter 8

Kant

In this chapter, we discuss Kant in the flower of modern philosophy:

$$
\boxed{\text{Descartes}} \longrightarrow
\left\{
\begin{array}{c}
\text{[tabula rasa, experience]} \\
\boxed{\text{British Empiricism}} \\
\text{[Locke, Berkeley, Hume]} \\
\\
\text{[a priori, nativism]} \\
\boxed{\text{Continental Rationalism}} \\
\text{[Leibniz]}
\end{array}
\right\}
\longrightarrow
\boxed{\text{Kant philosophy}}
$$

[The father of modern philosophy]   [summing-up]
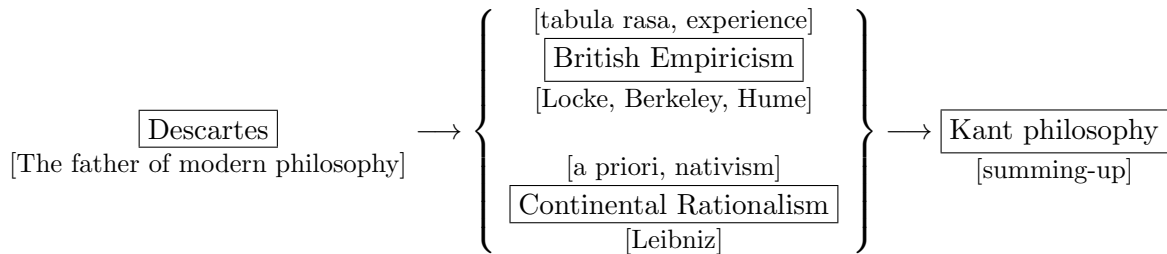
Kant completely followed Platonic method of telling philosophy (i.e., the fictional linguistic world description) as follows.

$$
(\sharp) \qquad
\overbrace{\boxed{\text{fictional linguistic world description}}}^{\text{world is so}}
\xrightarrow{\text{therefore}}
\overbrace{\boxed{\text{ethics, morals}}}^{\text{you should do so}}
$$

preface, introduction, (fictional)premise, expedient   main subject
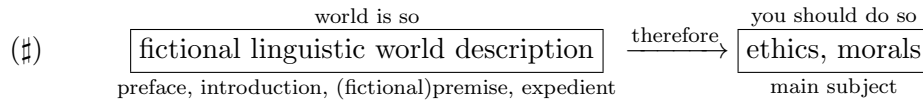
That is, Kant executed the following:

$(\sharp_1)$ $\big[$world is so$\big]$ is secondary,
"Critique of Pure Reason (1781)":

$(\sharp_2)$ $\big[$you should do so$\big]$ is main theme
"Critique of Practical Reason (1788)", "Critique of Judgment(1790)"

The reason why Kant got the highest possible evaluation is that Kant carried out the above.

8.1   "Surely You're Joking, Mr. Kant!": Antinomy

8.1.1   Three Critiques

Immanuel Kant (1724 - 1804) is one of the most influential philosophers in the history of Western philosophy. His main work is "Critique of Pure Reason (1781)", "Critique of Practical Reason (1788)", "Critique of Judgment(1790)", whose theme is respectively "truth" (i.e., "like truth" in the sense of this paper), "virtue", "beauty". That is, he followed Platonic method of telling philosophy as follows.

(A) "Critique of Pure Reason (1781)"   "Critique of Practical Reason (1788)"
                                                "Critique of Judgment(1790)"

$\boxed{\text{fictional linguistic world description}} \xrightarrow{\text{therefore}} \boxed{\text{ethics, morals}}$

preface, introduction, (fictional)premise, expedient   main subject
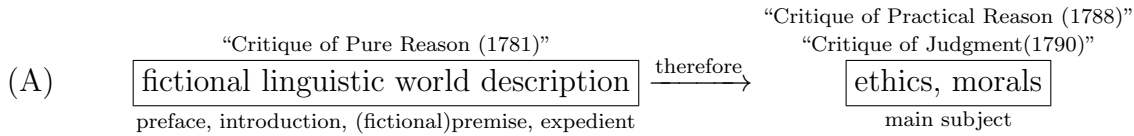
Of course, the interest of this paper is concentrated to the world description (i.e., "Critique of Pure Reason"). Have said many times in this book, philosophy of the world description is only a "preface", thus, it might be immature. However,

(B) "Critique of Pure Reason" might be perfect as a preface.

♠**Note 8.1.** As mentioned frequently up to this point, the fictional linguistic world description is really "asserted fiction", however, we must pretend not to accept the fictional linguistic world description as "asserted fiction". That is because, if we accept it, the difference between philosophy and religion becomes fuzzy. Therefore, we must use the terms: "logic", "reason", etc. in the fictional linguistic world description. For example, "Critique of Pure Reason", "Tractatus Logico-philosophicus", etc. I think that Platonic method of telling philosophy (i.e., The fictional linguistic world description) is a desperate survival strategy for Western philosophy to co-exist with Christianity.

8.1.2   Antinomy

Kant asserted that

(C) There is a proposition P such that "P is true" and "P is not true"

And he called such a proposition antinomy.

Antinomy 8.1. [Four Antinomies]
Kant assert that he finds the following four antinomies:

(D$_1$) The world has a beginning in time, and is also limited as regards space.

(D$_2$) Every composite substance in the world is made up of simple parts, and nothing anywhere exists save the simple or what is composed of the simple.

(D$_3$) Causality in accordance with laws of nature is not the only causality from which the appearances of the world can one and all be derived. To explain these appearances it is necessary to assume that there is also another causality, that of Spontaneity.

(D$_4$) There belongs to the world, either as its part or as its cause, a being that is absolutely necessary.

[**Notice**] Propositions (D$_1$) $-$ (D$_4$) are only word play since the "logic" in ordinary language cannot be trusted, that is, it is not discussed under a certain world description. Thus, **the following proof is not worth reading.**
Proof of (D$_1$)

Although each proposition (i.e., $(D_1) - (D_4)$), for example, according to Kant, let us show that the proposition (D_1) concerning time is antinomy as follows.

1. If the world has no beginning, then for any time t an infinite series of successive states of things has been synthesized by t.
2. An infinite series cannot be completed through successive synthesis.
3. The world has a beginning (is limited in time).

Therefore, Kant concludes that

- The proposition (D_1) concerning time is antinomy ☐

At any rate, we want to say

"Surely You're Joking, Mr. Kant!"

As emphasized throughout this paper, we must again emphasize the importance of world descriptionism "Begin with the world description!" (*cf.* (B) in Sec.1.3.1). As pointed out by Zeno more than 2000 years ago,

we must not rely on the logic of ordinary language.

since **the logic of philosophy is comparable to (= resembles) the logic of detective stories.**

To put it concretely, philosophical puzzles appear in ordinary language as follows.

(E) Zeno's paradoxes (*cf.* Sec.2.4),
Aristotle's syllogism (*cf.* Sec.3.8.2),
Only "now" exists (*cf.* Sec.5.1),
Anselmus' "Arguments for the existence of God" (*cf.* Sec.5.4),
The difference between Geocentrism and Heliocentrism is not clear (*cf.* Chap.6),
Descartes' cogito proposition (*cf.* Sec.7.2),

If we say "Would Kant not understand this (E) at all?", Kant may answer as follows.

(F) "Critique of Pure Reason" as well as the theory of Ideas are kinds of prefaces. Main assertion is written in Critique of Practical Reason.

I guess that this is Kant's real intention.

8.2   Kant's epistemology

8.2.1   Kant's compromise

Now, it is usually said that

(A) Kant's "Critique of Pure Reason" is a kind of compromise between Continental Rationalism and British Empiricism

That is,

$$
\boxed{\text{Descartes}} \longrightarrow
\left\{
\begin{array}{c}
\text{[tabula rasa, experience]} \\
\boxed{\text{British Empiricism}} \\
\text{[Locke, Berkeley, Hume]} \\
\\
\text{[a priori, nativism]} \\
\boxed{\text{Continental Rationalism}} \\
\text{[Leibniz]}
\end{array}
\right\}
\longrightarrow
\begin{array}{c}
\text{["Critique of Pure Reason"]} \\
\boxed{\text{Kant philosophy}} \\
\text{[summing-up, compromise]}
\end{array}
$$

[The father of modern philosophy]
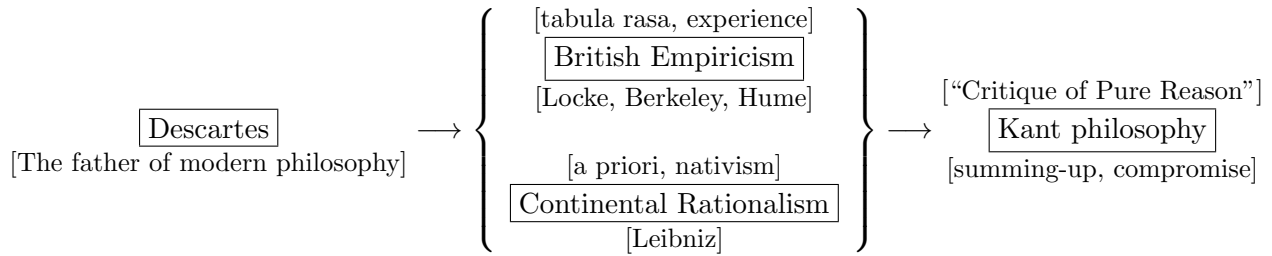
The meaning of "compromise" is as follows.
A priori concept is, for example,

(B) sensibility (= space-time perception) and understanding (=thought)

which is within Continental Rationalism and not "tabula rasa". But,

(C) Cognition, judgment is going to be formed gradually through the experience

which is similar to British Empiricism.

In this paper, we do not appreciate Kant's compromise. Our assertion is briefly mentioned in Note8.2 below:

♠**Note 8.2.** (= Summary 9.2)   Consider "language" and not "cognition". That is, consider the following linguistic turn (*cf.*   Chap.9):

$$
\underset{\text{(Descartes·Kant)}}{\boxed{\underset{\text{(cognition)}}{\text{mind-matter dualism(=epistemology)}}}} \xrightarrow{\text{linguistic turn}} \underset{\text{(Wittgenstein)}}{\boxed{\overset{\text{(language)}}{\text{linguistic philosophy}}}}
$$
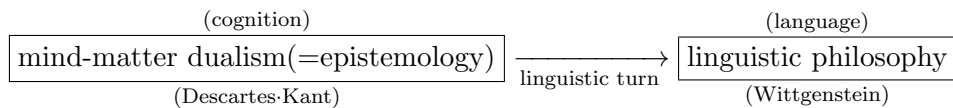
Then, in several languages (ordinary language, mathematics, Newtonian mechanics, programing language, etc.), we say tat

($\sharp_1$) "ordinary language" is like tabula rasa (i.e.,British Empiricism)(*cf.* Note 7.7)

($\sharp_2$) Mathematics is like Continental Rationalism(*cf.* Note 7.10)

($\sharp_3$) **quantum language is like Kant's compromise**

This will be again discussed in Summary 9.2 in Chap.9.

8.2.2   Thing-in-itself, Copernican revolution; from copy theory to constitution theory

Kant thought that

(D) We can understand the "world" only through the human perception. Also, cats can understand the "world" only through the cat perception. Thus,

There is "cat's world" for cats. and further, there is "butterfly's world" for butterflies.

If there are aliens whose cognition ability is finer than ours, their world is different ours. Although the difference of the worlds is made by that of the cognition ability, it is sure there exists something, which is called "thing-in-itself" by Kant.

That is, Kant thought as follows.

- we do not perceive the world such as copy, but we perceive the world such as it is constituted by cognition ability.

That is, Kant proposed so called Copernican revolution such that

$$\text{from "copy theory" to "constitution theory"}$$

namely,

(E) not "The world is previous, recognition is later" but "Recognition is previous, the world is later"

♠**Note 8.3.** As said in the linguistic Copenhagen interpretation (E_3) in Sec. 1.1.2, "measuring instrument" is superior to "matter (= thing-in itself)". Recall Barkeley's saying:

- To be is to be perceived.

which is similar to "Recognition is previous, the world is later"

8.2.3 "Critique of Pure Reason (1781)" The outline extracted from Microsoft Encarta (2009)

This section is the preparation of next chapter 9.

Explanation 8.2. (The preparation of Explanation 9.1 in Chap.9)
 "Critique of Pure Reason (1781)" : Extracted from Microsoft Encarta (DVD version, Japanese (2009)

————————————————————————

What was revealed in [Critique of Pure Reason] is that human [perception ability] is not just to passively replicate things of the world. Rather it acts on the world actively and creates the subject of its [recognition]. Even though we make it, the world is not necessarily completed from nothing as God did. The world is already there in some form. In order for [recognition] to be established, information from this world that can be obtained through a sense is necessary as a material. However, this information is only disorganized confusing as it is. Human [perception ability] gives an orderly order to information of this confused sensation through a certain form that is inherent in human beings. It is necessary to compile the subject of unified [recognition] for the first time.
    According to [Kant], its format (= [a priori synthetic judgment]) is as follows.

(i) [Form of sensitivity(intuition)(Space-time (=$\mathbf{R} \times \mathbf{R}^3$))]

(ii) [Form of understanding(thinking)]

If so, the proposition that "everything is in time and space" or "everything follows causality" cannot be proved empirically. Nevertheless, it will apply unconditionally to all subjects of experience. The reason is that the object is composed for the first time in a format such as [space, time, causality, etc.]. For example, [if we wear green sunglasses], the remark that "the world is green" is similar to being regarded as a correct remark for all human beings. (MSN (the Encarta encyclopedia. 2009 DVD Japanese version(translated by the author))).

In the scientific sense, the above is meaningless, or it does not reach the level of the publication. However, applying the following linguistic turn (*cf.* Chap.9) to above, that is,

$$(F) \quad \underset{\text{(Descartes·Kant)}}{\overset{\text{(cognition)}}{\boxed{\text{mind-matter dualism(=epistemology)}}}} \xrightarrow{\text{linguistic turn}} \underset{\text{(Wittgenstein)}}{\overset{\text{(language)}}{\boxed{\text{linguistic philosophy}}}}$$
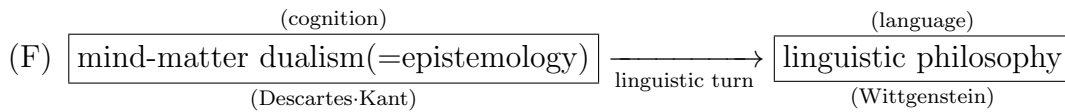
the above becomes big theory from the philosophical and scientific point of view, (*cf.* Explanation 9.1 in Chap.9).

At any rate, Kant proposed the Copernican revolution:

$$(G) \quad \underset{\text{(the world is previous, recognition is later)}}{\boxed{\text{Copy theory}}} \xrightarrow{\text{Copernican revolution}} \underset{\text{(recognition is previous, the world is later)}}{\boxed{\text{Constitution theory}}}$$
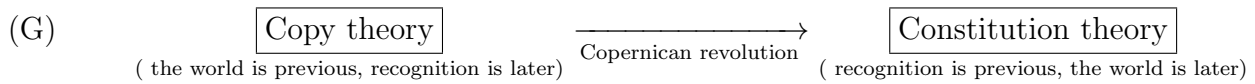
Summing-up, we consider that the following is the standard of western philosophy:

(I) the world is composed and described by our selfish convenience.

In fact, Plato composed the theory of Ideas by Socrates' convenience.
We think that

(J) **using the term "Copernican revolution", Kant prevented that epistemology enters into the zone of brain science.**

Naming of "Copernican revolution" does not mean that self-congratulation of Kant. I'd like to believe that strong intention of Kant which says "Epistemology is not science, but philosophy.", is included in the term: "Copernican revolution".
As mentioned in Chap.9, we believe that

(K) epistemology should enter into the zone of language and not brain science.

♠**Note 8.4.** Physics and science make up a theory while making modifications by the result of the experiment. Thus, physics and science can expect sound development. On the other hand, the philosophy of world description is metaphysics, which cannot be determined by experiments. Thus, the question "Did the philosophy of world description make a progress?" is not easy to answer. That is because, if we consider that

- the western philosophy was able to keep freshness for a long time by renewing a preface part of world description such as the model change of a car.

then, we must conclude that the philosophy of world description does not make a progress. However, in this paper, we assert that

($\sharp_1$) the philosophy of world description has been making a progress. And moreover, it finally converges to quantum language.

More precisely, we assert that

($\sharp_2$) If "to make progress" is defined by "to come near quantum language" (*cf.* Assertion 1.7), then the philosophy of world description has been making a progress.
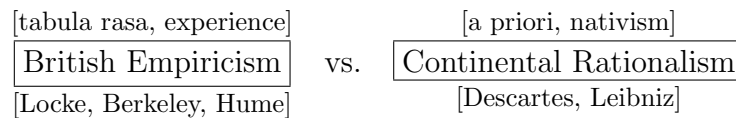
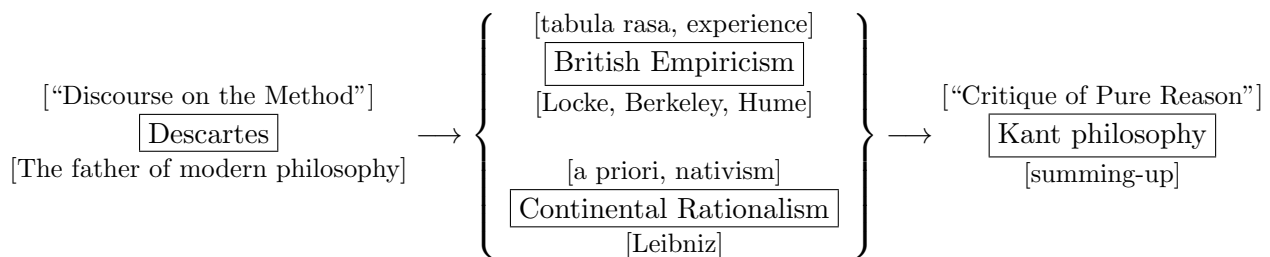# 8.3 Summary ; Descartes=Kant philosophy

8.3.1 Before Kant

Every thing started from Descartes figure(=Figure 1.1=Figure 7.1), i.e., "mind", "body", "matter". For example, in "An Essay Concerning Human Understanding (1689)", Locke might think as follows.

(A) In the field of "matter" of Descartes figure, activity of Newton is remarkable. However, concerning the relation among "I"(="brain", "mind"), "body"(="sensory organ"), "matter", he wanted to reach the summit.

Leibniz (in "The human being intelligence new discussion" 1703) which advocated an objection in Locke can also be conscious of Newton. After all, Unproductive confrontation structure "Locke vs. Descartes·Leibniz" began. That is,

[tabula rasa, experience]　　　　　　　[a priori, nativism]
British Empiricism   vs.   Continental Rationalism
[Locke, Berkeley, Hume]　　　　　　　[Descartes, Leibniz]

And further, through Berkeley, Hume, modern philosophy had been flowering as follows.

["Discourse on the Method"]　　　　⎧ [tabula rasa, experience]　　　　　⎫　　　["Critique of Pure Reason"]
Descartes　　　　　　　　　　→ ⎨ British Empiricism ⎬ →　Kant philosophy
[The father of modern philosophy]　　⎪ [Locke, Berkeley, Hume] ⎪　　　　[summing-up]
　　　　　　　　　　　　　　　　⎪ [a priori, nativism] ⎪
　　　　　　　　　　　　　　　　⎩ Continental Rationalism ⎭
　　　　　　　　　　　　　　　　　 [Leibniz]

According to Platonic method of telling philosophy (*cf.* (G) in Sec. 1.3), we may expect the following:

───── **(B): The fictional linguistic world description (western philosophy)** ─────

The fictional linguistic world description (=How to tell philosophy due to Plato) is as follows.

$$\text{(B)} \quad \underset{\substack{\text{preface, introduction, (fictional)premise, expedient}}}{\overset{\text{world is so}}{\boxed{\text{fictional linguistic world description}}}} \xrightarrow{\text{therefore}} \underset{\text{main subject}}{\overset{\text{you should do so}}{\boxed{\text{ethics, morals}}}}$$
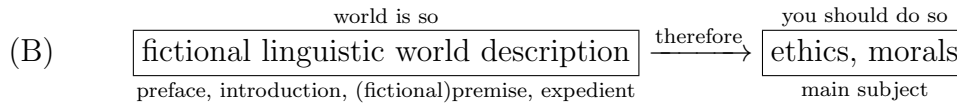
Therefore,

(B$_1$) $\big[$world is so$\big]$ is secondary,

(B$_2$) $\big[$you should do so$\big]$ is main theme

In spite of the above (B$_1$), we think that

(C) In modern philosophy, philosophers might be too eager to the preface (i.e., fictional linguistic world description).

This might be due to the fact that rivalry to Newtonian mechanics was too strong. Or, Christianity might hope that modern philosophy played a role of rivalry to Newtonian mechanics.

8.3.2 The inevitability of Kant's appearance

We think that

> when it comes to the 1770s, the expiration date of epistemology was running out.

Therefore, many people might want to say

(D) Newtonian mechanics moved the world. Does the world move by epistemology? It was too early for 300 years? After all, is the "epistemology" important or not ?

Thus,

(E) **Someone, please finish the epistemology nicely!**

This is the atmosphere of 1770's, in which Kant appeared. Kant theory was the conclusion declaration named "unification".

(F) Greatness of Kant is to have prevented that epistemology faces the direction of the brain science by the showy name called "Copernican revolution".

That is, Kant understand that, even if the epistemology is clarified by the brain science, this is non-sense from the philosophical point of view.

Thus, Kant follows Platonic method of telling philosophy such that

$$\text{(G)} \quad \underset{\substack{\text{preface, introduction, (fictional)premise, expedient}}}{\overset{\text{"Critique of Pure Reason (1781)"}}{\boxed{\text{fictional linguistic world description}}}} \xrightarrow{\text{therefore}} \underset{\text{main subject}}{\overset{\substack{\text{"Critique of Practical Reason (1788)"}\\\text{"Critique of Judgment(1790)"}}}{\boxed{\text{ethics, morals}}}}$$
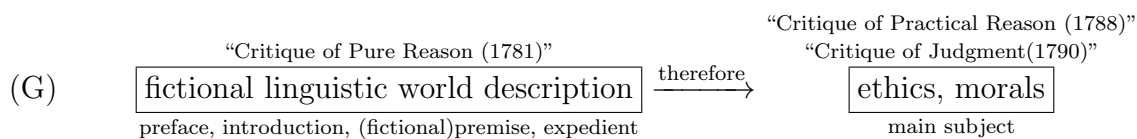
This implies the end of Grand Narratives (i.e., epistemology), and the start of "one phrase philosophy (i.e., the philosophy of proverb)" such as

(H$_1$) Bentham(1789): "the greatest happiness of the greatest number"

(H$_2$) Hegel (1770 - 1831) : "thesis-antithesis-synthesis"

(H$_3$) Darwin(1809 - 1882) :"the survival of the fittest"

(H$_4$) Nietzsche(1844 - 1900) : "God is dead"

♠**Note 8.5.** The epistemology was completed by Kant. However, it is not based on experiment, thus, no wonder was a reckless attempt to further develop the epistemology of Kant. Husserl attempted to associate Kant's epistemology with psychology. It is sure that psychology is a good science. But, I do not think his theory was successful as science. That is, I think that the foundationalism based on cognition is a kind of self-reference.

Thus, I consider that

- $\boxed{\text{Kant}} \xrightarrow[\text{regress}]{} \boxed{\text{Husserl}}$
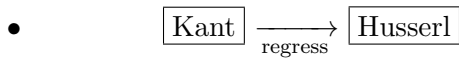
if "to make progress" is defined by "to come near quantum language" (*cf.* Assertion 1.7). That is, I think that Husserl's work may be regarded as a kind of "science fiction (concerning cognitive science)".

♠**Note 8.6.** Here, we have (*cf.* Assertion 1.4[the classification of philosophers]).

$$(\flat) \begin{cases} (\flat_1) : \text{the realistic world description (physics)} \\ \qquad \textbf{Aristotle}, \textbf{Archimedes}, \textbf{Galileo}, \textbf{Newton}, \text{Einstein}, \cdots \\ \\ (\flat_2) : \text{the fictional linguistic world description (main street of western philosophy)} \\ \qquad \textbf{Plato}, \textbf{Scholasticism}, \textbf{Descartes}, \textbf{Locke}, \textbf{Leibniz}, \textbf{Berkeley}, \textbf{Hume}, \textbf{Kant}, \textbf{Husserl} \\ \\ (\flat_3) : \text{the scientific linguistic world description (statistics, quantum language)} \\ \qquad \textbf{Parmenides}, \textbf{Zeno \ J. \ Bernoulli}, \text{statistics (Fischer, etc.), quantum language} \end{cases}$$

Chapter 9

Linguistic philosophy

The epistemology was completed by Kant. Or equivalently, the expiration date of epistemology has expired in Kant era. From the quantum linguistic point of view, we consider that the next development is was directed by Wittgenstein, i.e., the linguistic philosophy. After all, we say, roughly speaking, that the history of the philosophy of world description is summarized as follows.

$$
\boxed{\substack{\text{the theory of Ideas} \\ \text{(Plato)}}} \xrightarrow{\text{cogito turn}} \boxed{\substack{\text{(cognition)} \\ \text{mind-matter dualism} \\ \text{(Descartes·Kant)}}} \xrightarrow{\text{linguistic turn}} \boxed{\substack{\text{(language)} \\ \text{linguistic philosophy} \\ \text{(Wittgenstein)}}} \tag{9.1}
$$
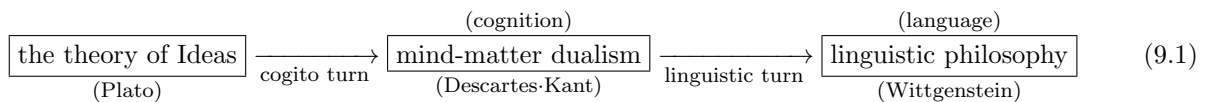
9.1 Linguistic turn

9.1.1 Dr. Hawking and Ludwig Wittgenstein (1889 - 1951)

Dr. Hawking said in his best seller book [7]:

(A) *Philosophers reduced the scope of their inquiries so much that Wittgenstein the most famous philosopher this century, said "The sole remaining task for philosophy is the analysis of language." What a comedown from the great tradition of philosophy from Aristotle to Kant!*

This implies that

(B) No philosophers who can explain Wittgenstein's philosophy to an excellent scholar like Dr. Hawking are in all over the world.

That is because, if someone can do it, it is sure that Dr. Hawking has ears to hear.

9.1.2 Wittgenstein "Tractatus Logico-Philosophicus"

After studying with Bertrand Russell, Wittgenstein (1889 - 1951) wrote the "Tractatus Logico-Philosophicus (1921)", which explores the relationship of language to the world. He was a major influence on logical positivism but later repudiated this, and in "Philosophical Investigations (1953)" he argues that philosophical problems arise from insufficient attention to the variety of

natural language use. As said frequently in this paper, we also note that philosophical problems arise from the lack of world descriptionism (and "self-reference").

Contemporary great theories are as follows:

(C$_1$) Einstein's general theory of relativity (1916)

(C$_2$) Heisenberg, Schrödinger, Born : quantum mechanics (1925,6)

(C$_3$) Fischer: "Statistical Methods for Research Workers" in statistics(1925)

(C$_4$) Gödel's incompleteness theory (1930)

(C$_5$) von Neumann: 『Mathematical foundations of quantum mechanics (1932)

(C$_6$) A. N. Kolmogorov: Foundations of the theory of probability (1933)

(C$_7$) J. M. Keynes, Macro economics (1936)

Although Wittgenstein's "Tractatus Logico-Philosophicus" is famous, I think that it does not reach the level of the above (C$_1$)-(C$_7$). That is because

(D) it is sure that the above (C$_1$)-(C$_7$) are comprehensible for any ordinary scholar. On the other hand, "Tractatus Logico-Philosophicus" is incomprehensible for a excellent scholar like Dr. Hawking.

In other words, I believe that a good theory must be comprehensible for everyone[1].

9.2　The power of Wittgenstein's word

However, in this paper, we want to assert that Wittgenstein is one of the greatest philosophies (Plato, Descartes, Kant, etc.). That is because he proposed the following sayings (E$_1$) - (E$_3$):

(E$_1$) **"The limits of my language mean the limits of my world."**

(E$_2$) **"What we cannot speak about we must pass over in silence"**

(E$_3$) **"Language-game"**

The above is just the spirit of quantum language. Instead of my poor explanation of the spirit of quantum language, I prefer to saying

(F) "I claim as well as Wittgenstein the above (E$_1$) - (E$_3$)"

However, we have to pay our attention to the term "my language" in(E$_1$). That is, we have the following question:

(G) What is "my language"?

Wittgenstein could not answer this question. Thus, when Dr. Hawking said (A), that is,

(H) Wittgenstein said "The sole remaining task for philosophy is the analysis of language." What a comedown from the great tradition of philosophy from Aristotle to Kant!

---

[1]Strictly speaking, among the theory of Ideas, Descartes philosophy, Kant philosophy and quantum language, only quantum language is comprehensible.

many philosophers cannot contradict Hawking's opinion. After all, we think that

- although Wittgenstein could not propose his language[2]. Thus I want to think that he prepared the wise sayings (E_1) - (E_3) for quantum language.

9.3 The linguistic turn of "Critique of Pure Reason"

Contemporary, a severe evaluation may be given to the modern philosophy (i.e., the world description: from Descartes to Kant)). In fact, most people may today think that

(A) modern philosophy is only the self-referential word play without experiment. It may not be bad to enjoy this word play. However, if someone wants to understand cognition, he/she should study the brain science.

♠**Note 9.1.** By the philosophical consideration (i.e., without experiment), we may develop Kant philosophy in two next directions:

($\sharp_1$) According to the linguistic turn of Kant epistemology, we make a language (i.e., quantum language).

($\sharp_2$) we want to clarify the meaning of "self-reference".

Here, ($\sharp_1$) is realized by quantum language. ($\sharp_2$) may be unsolved.

9.3.1 Batch conversion (from Critique of Pure Reason to quantum language)

A severe evaluation may be given to Critique of Pure Reason, which revives by the linguistic turn (due to Wittgenstein, etc), i.e.,

$$\underset{\text{Descartes=Kant}}{\overset{\text{transcendent}}{\boxed{\text{epistemology}}}} \xrightarrow[\text{linguistic turn}]{} \underset{\text{Wittgenstein}}{\overset{\text{language game}}{\boxed{\text{linguistic philosophy}}}}$$
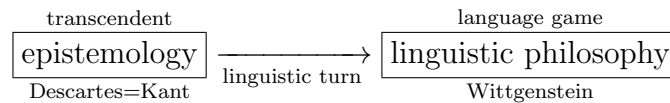
That is, it suffices to change "cognition" (in Critique of Pure Reason)) to "language", that is,

$$\boxed{\text{"cognition"}} \xrightarrow{\text{batch conversion}} \boxed{\text{"language"}}$$
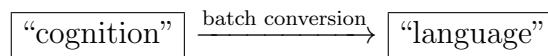
by which "the spirit of Critique of Pure Reason" changes to "the spirit of quantum language" as follows.

Explanation 9.1. (Continued from Explanation 8.2 in Chap.8)
Explanation of the spirit of quantum language : i.e., from Critique of Pure Reason to quantum language (*cf.* [21])

---

[2] The success of physics is due to the proposal of language, for example, the language called Newtonian mechanics, the language called the theory of relativity, etc.

That is, read such as

[Explanation 8.1]   [the outline of "Critique of Pure Reason"]
[**Explanation 9.1**],   i.e.,   [the spirit of quantum language]

_____

[Critique of Pure Reason]   [perception ability]
What was revealed in [Quantum language] is that human [linguistic ability] is not just to passively replicate things of the world. Rather it acts on the world actively and creates the subject
[recognition]
of its [language]. Even though we make it, the world is not necessarily completed from nothing
[recognition]
like God. The world is already there in some form. In order for [description] to be established, information from this world that can be obtained through a sense is necessary as a material.
[perception ability]
However, this information is only disorganized confusing as it is. Human [linguistic ability] gives an orderly order to information of this confused sensation through a certain form that
[recognition]
is inherent in human beings. It is necessary to compile the subject of unified [language] for
[Kant]   [a priori synthetic judgment]
the first time. According to [quantum language], its format (=   [Axioms 1 and 2]   ) is as follows.

[Form of sensitivity(intuition)(Space-time (=$\mathbf{R} \times \mathbf{R}^3$))]
(i)   [Axioms 1 (measurement)]

[Form of understanding(thinking)]
(ii)   [Axioms 2 (Causality)]

If so, the proposition that "everything is in time and space" or "everything follows causality" cannot be proved empirically. Nevertheless, it will apply unconditionally to all subjects of experience. The reason is that the object is composed for the first time in a format such
[space, time, causality, etc.]   [if we wear green sunglasses]
as [measurement, causality]. For example, [we know the only term "green"], the remark that "the world is green" is similar to being regarded as a correct remark for all human beings.

Summary 9.2. Consider "language" and not "cognition". That is, consider the following linguistic turn:

(cognition)   (language)
mind-matter dualism(=epistemology) $\xrightarrow{\text{linguistic turn}}$ linguistic philosophy
(Descartes·Kant)   (Wittgenstein)
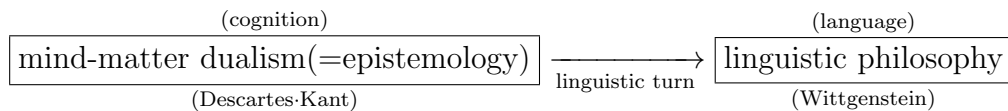
Then, in several languages (ordinary language, mathematics, Newtonian mechanics, programing language, etc.), we say that

($\sharp_1$) "ordinary language" is like tabula rasa (i.e.,British Empiricism)(*cf.* Note 7.7)

($\sharp_2$) Mathematics is like Continental Rationalism(*cf.* Note 7.10)

($\sharp_3$) **quantum language is like Kant's compromise**

In quantum language (*cf.* Sec.1.1), Axioms (measurement and causality) are first declared,

and thus, quantum language is not like "tabula rasa". However, the linguistic Copenhagen interpretation is going to be formed gradually through the experience, thus, quantum language is like Kant's compromise. As seen in the formula (1.1) in Chap. 1, we see that

$$
\underbrace{\boxed{\text{measurement theory}}}_{\text{(=quantum language)}} = \underbrace{\boxed{\text{measurement}}}_{\text{[Axiom 1]}} + \underbrace{\boxed{\text{causal relation}}}_{\text{[Axiom 2]}}
$$

$$
+ \underbrace{\boxed{\text{linguistic Copenhagen interpretation}}}_{\text{[the manual to use Axioms 1 and 2]}}
$$

♠**Note 9.2.** If "Why is our cognition possible?" is asked, then, we may have only answer such that "Wonder of the human recognition ability", which is represented by "transcendent" (due to Kant). And moreover, If "Why is our language possible?" is asked, then, we may have only answer such that "Wonder of the human language ability", which is represented by "language game" (due to Wittgenstein). That is,

$$
\underset{\text{Kant}}{\overset{\text{transcendent}}{\boxed{\text{epistemology}}}} \xrightarrow{\text{linguistic turn}} \underset{\text{Wittgenstein}}{\overset{\text{language game}}{\boxed{\text{linguistic philosophy}}}}
$$
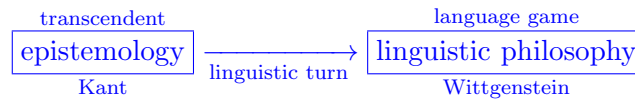
9.3.2 The linguistic turn of the cogito proposition

Let us start from the following exercise, which is the most enlightening exercise in this paper:

Exercise 9.3. Descartes thought, in his book: "Discourse on the Method", that

the theory of Ideas has expired expiration date.

And Descartes asserted that the cogito proposition "I think, therefore I am" is the unquestionable truth. And further, Descartes proclaimed that "I" exists. Here, we present the following exercise:

(C_1) Where did Descartes find **"I"**?

Of course, the answer was not written in "Discourse on the Method". Thus,

(C_2) Answer this problem (C_1) from the quantum linguistic point of view!

- **[Hint]:** Again see Sec. 1.1.1 [Axiom 1 (measurement) and Axiom 2 (causal relation)]. Then, everyone can easily get the answer, which is uniquely determined.

If you can understand this problem without seeing Answer 9.4, you may taste exhilarating feeling. And,

You will completely understand

> **the true meaning of "I think, therefore I am".**
>
> Although Descartes himself might not have known the true meaning, he might have been convinced that the essence of dualistic idealism was hidden in the proposition "I think, therefore I am". This will be explained below.

Lastly, let us present the answer of Exercise 9.3.

Answer 9.4. [Exercise 9.3:Where is "I"?] It suffices to find the "I" in Sec.1.1.1. The following is mentioned:

(D):Axiom 1 (measurement) in Sec.1.1.1 (in Sec.1.1.1)

(The readers can read this axiom after they read Section 2.7 of ref. [32])

With any system S, a basic structure $[\mathcal{A} \subseteq \overline{\mathcal{A}}]_{B(H)}$ can be associated in which measurement theory of that system can be formulated. When the observer ($=$**"I"**) takes a measurement of an observable (or, by a measuring instrument) $\mathsf{O}=(X, \mathcal{F}, F)$ for a system $S_{[\rho]}$ i.e., a system S with a state ρ), the probability that a measured value x ($\in X$) obtained by the measurement belongs to Ξ ($\in \mathcal{F}$) is given by $\rho(F(\Xi))(\equiv {}_{\mathcal{A}^*}(\rho, F(\Xi))_{\overline{\mathcal{A}}})$.

Thus, the answer is

<div align="center">

"I" exists in Axiom 1 (measurement).

</div>

This implies that

(D$_1$) quantum language is the language that "I tell" (i.e., the language told by the first person)

Also, recall Assertion 1.1:

(D$_2$) quantum language is a language, by which almost sciences (e.g., economics, psychology, engineering, etc.) are described

If so, $[(D_1) + (D_2)]$ implies that

(D$_3$) **Sciences should be told by the first person**

Therefore, we may conclude that Descartes' discovery **"I"** is the biggest in science as well as philosophy. □

9.4 Three approaches to the mind-body problem (*cf.* ref. [34])

If quantum language is the only scientifically successful theory in dualistic idealism, it is natural to study the mind-body problem in quantum language. This will be discussed in Section 9.4.4 (The third approach).

9.4.1   The mind-body problem

Now let us introduce the mind-body problem, which is said to be the greatest unsolved problem in dualistic idealism.

In spite that the cogito proposition "I think, therefore I am" is non-sense (*cf.* ref. [32, 33]), Descartes used it in order to propose Descartes philosophy (i.e., mind-matter dualism). That is, he asserted

(E_1) If the existence of "I" is deduced from the cogito proposition, the existence of "matter" (which is perceived by "I") is accepted. And further, the medium of "I" and "matter" is automatically accepted as "body (= sensory organ)".

Therefore, the key-words of Descartes philosophy (= mind-matter dualism) is

(E_2)   "I"(= "mind"), "body"(= "sensory organ"), "matter"

Here, we have the following problem:

(F): The mind-body problem in dualistic idealism

How are "mind" and "body" connected?

(or more generally, how are "mind", "body" and "matter" connected?)

This is generally considered to be the most important problem in dualistic idealism.

9.4.2   The first approach; Cognitive scientific approach

Although I think, from the philosophical point of view (as mentioned in Note 8.5), that

(G_1) $\boxed{\text{Kant}} \xrightarrow{\text{regress}} \boxed{\text{Husserl}}$,

some may consider, from the scientific point of view, that

(G_2) $\boxed{\text{Kant}} \xrightarrow{\text{progress}} \boxed{\text{Husserl}} \xrightarrow{\text{progress}} \boxed{\text{Philosophy of mind (based on cognitive science)}}$.

This (i.e., the contradiction of (G_1) and (G_2)) may be due to the confusion of philosophy and science. As mentioned in Note 7.12, Dr. Click (the most noted for being a co-discoverer of the structure of the DNA molecule in 1953 with James Watson) said in his book "The astonishing hypothesis" [4]) as follows.

(H_1) *You, your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will,are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules.*

I agree to his opinion (H_1) (i.e., the denial of the substance dualism), and thus, I believe that the direction of (G_2) implies the abandonment of dualistic idealism. Although I fully understand the importance of the scientific aspect of the mind-body problem, this is the work of scientists, not the work of philosophers. I think that the mind-body problem (F) should be within philosophy (particularly, dualistic idealism), and thus, the direction (G_2) is hopeless

for the mind-body problem (F) in dualistic idealism. Hence, I am not concerned with the first approach (i.e., the study related to the (G$_2$)).

Also, I add that this (H$_1$) (i.e., the denial of the substance dualism) and the dualistic idealism (i.e., quantum language) do not contradict each other. That is because quantum language says:

(H$_2$) *Describe any monistic phenomenon (such as* (H$_1$) *) by dualistic language (=quantum language) !*

(*cf.* [32, 33])

9.4.3 The second approach; Illusory problem?

It should be noted that

(I) the term "mind" and "body" in the mind-body problem (F) is ambiguous in Descartes=Kant epistemology.

That is, the sentence "How are 'mind' and 'body' connected?" is meaningless in Descartes=Kant epistemology. Thus, there may be a reason to consider that the mind-body problem is just "what we cannot speak about". Therefore, according to Wittgenstein's famous saying "What we cannot speak about we must pass over in silence" (in [42]), some may conclude that we must speak nothing about the problem (F). That is, the mind-body problem is an illusory problem. However, I think, by (J) and (K) mentioned in the following section, that this second approach is not only non-productive but also wrong.

9.4.4 The third approach; Quantum linguistic solution to the mind-body problem

It should be noted that

(J) the demarcation problem (i.e., how to distinguish between "what we cannot speak about" and "what we can speak about") depends on language.

For example, the proposition "the earth goes around the sun" can not be written in mathematics but in the Newtonian mechanical language. Note that both "the limits of my language mean the limits of my world" and "the limits of your language mean the limits of your world" are true. Therefore,

(K) in order to solve the mind-body problem in dualistic idealism, we should create the language in which the mind-body problem can be regarded as "what we can speak about"

Without this challenge (K), we cannot obtain the solution to the mind-body problem (F). In this sense, the second approach in Section 9.4.3 may be shallow.

Concerning the causality problem, we already mentioned it in Note1.1, that is,

$$\text{"The solution to the causality problem"} \Leftrightarrow \text{"Axiom 2"} \tag{9.2}$$

Lastly, let us mention the solution to the mind-body problem (i.e., How are "mind" and "body" connected?) as follows.

Answer 9.5. [The solution to the mind-body problem]; The correspondence of the key-words (Assertion1.6) says that

$$
\underset{\text{Descartes, Kant}}{\boxed{\text{Descartes, Kant}}}\xrightarrow[\text{linguistic turn}]{\text{the correspondence of the key-words}} \underset{\text{Quantum language}}{\boxed{\text{Quantum language}}}
$$

(mind, body) ... (measured value, measuring instrument)

This says:

the epistemological mind-body problem

$$\boxed{\text{Descartes, Kant}}$$

How are "mind" and "body" connected?

the epistemological mind-body problem

$$\xrightarrow[\text{linguistic turn}]{}\qquad \boxed{\text{quantum language}}\tag{9.3}$$

How are "measured value" and "measuring instrument" connected?
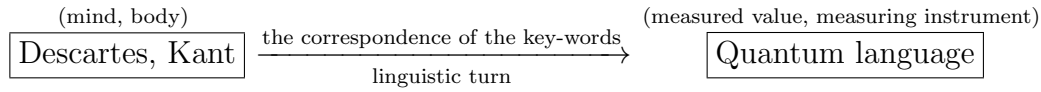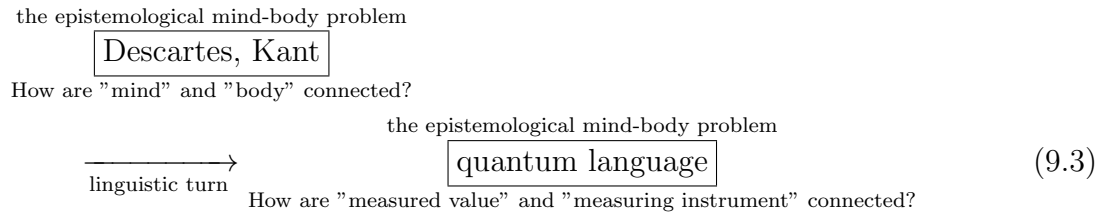
If so, we can easily solve the mind-body problem (in the right-hand side of formula (9.3) that is,

────── **The solution to the mind-body problem** ──────

The solution to the mind-body problem is just Axiom 1 (in Sec.1.1.1), that is, the relation between "measured value" and "measuring instrument" is given as follows.

- With any system S, a basic structure $[\mathcal{A} \subseteq \overline{\mathcal{A}}]_{B(H)}$ can be associated in which measurement theory of that system can be formulated. When the observer takes a measurement of an observable (or, by a measuring instrument) $\mathsf{O}=(X,\mathcal{F},F)$ for a system $S_{[\rho]}$ i.e., a system S with a state ρ), the probability that a measured value x ($\in X$) obtained by the measurement belongs to Ξ ($\in \mathcal{F}$) is given by $\rho(F(\Xi))(\equiv {}_{\mathcal{A}^*}(\rho, F(\Xi))_{\overline{\mathcal{A}}})$.

Therefore,

(A) "The solution to the mind-body problem"⇔"Axiom 2"

Hence, by this (A) and the formula (9.2), we have the following equivalences:

$$
\begin{aligned}
&\text{to propose quantum language}\\
\Leftrightarrow&\text{to propose Axiom 1 (measurement) and Axiom 2 (causality)}\\
\Leftrightarrow&\text{to solve the mind-body problem and the causality problem}
\end{aligned}\tag{9.4}
$$

and further, we want to add:

$$
\begin{aligned}
\Leftrightarrow&\text{to build a firm theory in dualistic idealism (i.e., metaphysics)}\\
\Leftrightarrow&\text{to do what philosophers wanted to do}
\end{aligned}\tag{9.5}
$$

That is because I consider that "physicists vs. philosophers" is summarised as the following table (*cf.* Section 7.6.2.3):

Realistic world description [monism, realism, no measurement]	Linguistic world description [dualism, idealism, measurement]
Hērakleitos	Parmenides
Aristotle	Plato
Nominalism(Ockham)	Realism(Anselmus)
Newton	Berkeley
Newton (and Clarke)	Leibniz
Einstein	Tagore
Einstein	Bohr

I think that we must fulfill the linguistic world view. And further, I hope that the mind-body problem must be the biggest problem in the history of western philosophy. Hence I am convinced that Answer 9.5 is the only true solution to the mind-body problem.

Chapter 10

Postscript

Throughout this paper I always assume the following hypothesis:

Hypothesis (A): (*cf.* **Assertion 1.7).**

(A) In the history of western philosophy, "to make progess" is defined by "to approach quantum language" (i.e.,"to come near quantum language")

I believe that all results (and assertions) in this paper are consequences of the hypothesis (A). That is, I think that this hypothesis (A) is equivalent to the following figure (where $\longrightarrow$ is intepretated as $\underset{\text{progress}}{\longrightarrow}$ in the linguistic world view):

Assertion 10.1. (= Assertion 0.1= Assertion 1.2) [The location of quantum language in the history of world-description (*cf.* ref.[14, 32])]
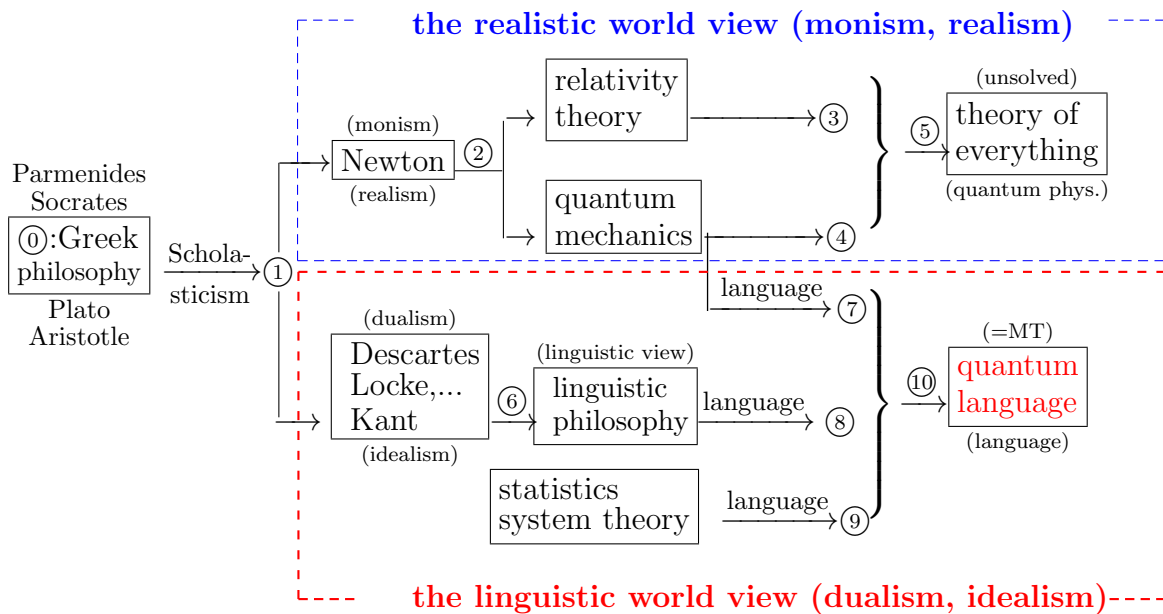
Figure 1.2: The history of the world-description

And further, from the hypothesis (A), we can see the following equivalence (i.e., formulas (9.4) and (9.5)):

> to propose quantum language
> ⇔to propose Axiom 1 (measurement) and Axiom 2 (causality)
> ⇔to solve the mind-body problem and the causality problem
> ⇔to build a firm theory in dualistic idealism (i.e., metaphysics)
> ⇔to do what philosophers wanted to do

Therefore, we conclude that

- If what philosophers wanted to do is to build a firm theory in dualistic idealism, western philosophy has made progress.

I hope that my proposal will be examined from various point of view.

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For the further information on my research, see the following home page:

(`http://www.math.keio.ac.jp/~ishikawa/indexe.html`)

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