# The Historical Relationship between Philosophy of Science and Analytic Philosophy in Japan

By

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**Preface**

*By: Daniel Knickerbocker*

Western philosophy found its way into Japanese academic circles in the early Meiji era. Prior to the imperial movement and the opening of Japanese borders to the international community, Japanese thinkers had their own kind of philosophy, but today's categorical distinctions between religion, philosophy, and other neighboring fields did not exist. However, Japanese academics were no strangers to incorporating foreign ideas, and soon among a flurry of new categories introduced by those studying abroad one for Western philosophy was developed, *tetsugaku* (哲学). At first, *tetsugaku* strictly referred to Western philosophy alone. But over the course of the Meiji era, thinkers from all kinds of backgrounds engaged with Western ideas, and those who studied abroad tackled historically Japanese questions with a Western approach. So much so that at the end of the second World War *tetsugaku* became the term commonly used for philosophy in general. By the middle of the twentieth century, what would now be called continental philosophy had become quite popular, with the Kyoto school that combined a typically Western systematic approach with Buddhist ideology rising to prominence.

Today, while arguably still not the dominant tradition, Japanese philosophy features just as much analytic work as continental, Buddhist, or nearly any other. Yet, at a glance, the Japanese analytic tradition looks quite different from its Western counterpart. There are two major associations of analytic philosophy, the Philosophy of Science Society, Japan (hereafter PSSJ, founded in 1968) and the Japan Association for Philosophy of Science (founded in 1954). While ostensibly organizations whose primary focus is the subject area of science, both have members whose primary research is analytic in approach but unrelated to science in subject matter. In fact, the journal of the PSSJ features works of philosophy about a range of subjects from language and mind to mathematics and logic just as often as it does those of philosophy of science.

In the typical self-critical fashion of analytic philosophy, a number of Japanese philosophers have sought to address the strange state of the tradition. One such work, "日本における科学哲学と分析哲学の歴史的関係," or "The Historical Relationship between Philosophy of Science and Analytic Philosophy in Japan," written by Tomohisa Furuta (古田 智久) a professor of philosophy at Nihon University, explicates how all kinds of analytic philosophy have found a home in journals and societies of philosophy of science by detailing the early days of analytic philosophy in Japan and highlighting some of the major players in the popularization of the field. Even though his more recent work on the topic, "Analytic philosophy in Japan 1933–2000" (2022) was written in English, this work stood in particular need of translation for its focus on the associations of Japanese analytic philosophy and on the formative years of the tradition. In English now, the work is required reading for anyone seeking to understand from the outside the current state of analytic philosophy in Japan.

## Introduction

Regarding this society (Philosophy of Science Society, Japan), in spite of being a society that is self-titled "Philosophy of Science," many researchers who specialize in analytic philosophy serve as members, and moreover, the articles published in the journal *Philosophy of Science* and the research presentations at annual autumn conferences as well, tend to more often use the analytic method than be philosophy of science themed. This manuscript aims to shed light on what caused the current condition of this society from a historical perspective. As for the structure of the argument in this manuscript, it will: firstly, address what kind of philosophy philosophy of science and analytical philosophy are individually; then, show how analytical philosophy and the philosophy of science differ; and then, explore the historical circumstances of how analytic philosophy linked to philosophy of science insofar as they are related to the philosophical trends in Japan; finally, present one possible answer for the issue stated above, i.e., why does the PSSJ accept analytic philosophy research? Through this manuscript's investigation, it will be revealed why logic and the philosophy of mathematics, which like analytic philosophy do not seem to be a part of "philosophy of science," are accepted by the PSSJ.

## 1. Current Philosophy of Science and Analytic Philosophy

Currently, it is understood that "philosophy of science" mainly indicates the exploration of philosophical inquiry regarding individual fields of science (natural sciences and social sciences), represented by philosophy of physics and philosophy of biology (i.e., inquiries concerning events/affairs - including their methodologies - in which one cannot directly verify/confirm by means of observation, or creation of an ideal situation in which one can indirectly/operationally verify/confirm by means of experiment). Things like this can be seen, for example, in the Gabbay et al. *Handbook of the Philosophy of Science* 16 volume lineup published between 2007 and 2012. Also, in the 2016 issue of the Humphreys (ed.), The *Oxford Handbook of Philosophy of Science*; section one, "Overview", is divided into chapters covering philosophy of computer science, philosophy of social science, philosophy of biology, philosophy of psychology and cognitive science, philosophy of physics, and overall philosophy of science. In contrast, formerly central (20th century) problems of philosophy of science like the causality of science, positive proof and induction, determinism and indeterminism, instrumentalism, scientific explanation, scientific progress, or scientific realism are dealt with in the second section, "Traditional Topics" (in this writing, the philosophy of mathematics is not mentioned). From such, today, it can be said that the primary (first and foremost) subject matter of philosophy of science is philosophical inquiries concerning individual sciences.

On the other hand, "analytic philosophy", in the present day, is just one philosophical research method, namely, what can be thought of as a philosophical research style that conforms to the method called "analysis" or "philosophical analysis." "Analysis" in this situation can be,

in general, thought of as resolution of a given complex concept or phrase into simple components/parts; or reduction/transformation from a given statement or expression to a fundamental statement or expression/assumed statement or expression; furthermore, definition or explication by expressing a given concept or word through other concepts or words; expressing a given statement another way (paraphrasing); or translation; etc. For example, the *Stanford Encyclopedia of Philosophy* notes the following:

> "Analytic philosophy, then, is a broad and still ramifying movement in which various conceptions of analysis compete and pull in different directions. Reductive and connective, revisionary and descriptive, linguistic and psychological, formal and empirical elements all coexist in creative tension; and it is this creative tension that is the great strength of the analytic tradition."

Incidentally, from around the end of the 20th century, analytic philosophers frequently ventured into philosophical "thought experiments." Putnam's "Twin Earth" or "Brain in a Vat," Searle's "Chinese Room," Parfit's "Teletransporter," Davidson's "Swampman," Chalmers's "Philosophical Zombie," Jackson's "Mary's Room," etc.. Whereas thought experiments in science are conducted with a decent awareness of a relationship with empirical evidence (scientists, for example, attempt thought experiments that are actually possible to conduct if they decided to, although difficult due to high costs), philosophical thought experiments are allowed to be conducted regardless of empirical evidence. All thought experiments, by previously mentioned philosophers, are scientifically impossible (experiments) to execute (or are impossible to execute by any means with the current level of science) and are thought simply to be things only possible in imagination (the overwhelming majority of philosophical thought experiments are, generally, thought to be dependant on the conceivability argument). Because such thought experiments, at a glance, are thought to be dependent on the method known as "synthesis," it may be thought that they can not be regarded as a type of "analysis" characteristic of analytic philosophy. Nonetheless, thought experiments, for example the thought experiment known as "Twin Earth," can be thought to serve as a "demonstration" process of the truth/validity in this case of the semantic externalism position. If so, that can be recognized as equivalent to "proof" (not synthesis) in logic or mathematics. Be that as it may, for a single philosopher to progress an inquiry, there is no problem in using both the method known as analysis and the method known as thought experiment. In fact, there are a large number of papers written that make use of both methods. Because of these established facts regarding the analytic philosophy research style, and also because in this manuscript I attempt to bring to light the difference between contemporary analytic philosophy and philosophy of science, for this paper (though it could be considered synthesis) I would like to recognize thought experiment as a major method of contemporary analytic philosophy.

As shown above, I think, in the present day, that the common understanding that analytic philosophy is a research method of philosophy (i.e. a philosophical research style in which

analysis - and thought experiment - is the primary method) is in the process of forming. Therefore, today, the method of analytic philosophy is applicable to any subject/theme and is used to consider and examine the likes of German Idealism's (which does not belong to the analytic tradition) history of philosophy research or metaphysics/ontology, as well as some topics of ethics or aesthetics, and even inquiry regarding human life.

If analytic philosophy is a style of philosophical inquiry that relies on the method of analysis as described above, it is a different thing from philosophy concerned with science that conducts synthesis/composition/integration based on empirical evidence, not simply analysis. In addition, if thought experiment composition/development does not adhere to empirical evidence, analytic philosophy is not supposed to be accepted as philosophy concerning science. Let us conclude. While contemporary philosophy of science is developed on the outcome of each case of science to the last based on observation/experimentation (even regarding the school of scientific realism's scientific metaphysics, the argument is developed as far as it does not contradict with empirical evidence such as observation and experiment - the form constrained by the limitations of empirical evidence), in analytic philosophy it is acceptable to develop an argument unrelated to observation or experimentation and so forth of empirical/naturalistic evidence that exists in the real world. Of course, because analytic philosophy is applicable to any subject, it is also conceivable to apply the method of analytic philosophy to inquiry of natural science. Note that it is the philosophy of logic and mathematics that are philosophies in which the object of inquiry is *a priori* disciplines (unlike empirical science), and nowadays they are considered as different things from "philosophy of science" (in which the object of inquiry is empirical science)(this is explained in "2").

## 2. Philosophy of Science and Analytic Philosophy in the 20th century: Carnap's Argument of Science

As seen in "1", in the 21st century, whereas “philosophy of science” is a field of philosophy classified based on research field and subject of research, “analytic philosophy” is a method of philosophy that is classified based on research methods, and we are in the era wherein we have become aware of the fact that depending on theme of inquiry, they can develop arguments that are mutually exclusive (the philosophical method that is suitable for philosophy of science is not analytic philosophy, but the method of naturalism after all). Nevertheless, how was this thought of in the 20th century? In this section, looking ahead to the inquiry regarding the circumstances of the foundation of the PSSJ, in the following section (as a preliminary investigation) I will examine the relationship between philosophy of science and analytic philosophy in the first half of the 20th century.

For example, according to the Craig (ed.), *Routledge Encyclopedia of Philosophy*, published in the late 20th century, the two major research categories of "philosophy of science" (more accurately "general philosophy of science") were "scientific epistemology" (theories regarding scientific knowledge) and "scientific metaphysics," as well as a third category that

included philosophy of the physics concerned with quantum theory and of the biology concerned with evolutionary theory. Such a view of philosophy of science, from about the middle to the end of the 20th century, was thought of as the reasonable standard view of philosophy of science (until the latter half of the 20th century, philosophical inquiry regarding individual sciences was limited exclusively to quantum theory, the theory of relativity, and evolutionary theory). In this encyclopedia, specific questions of scientific epistemology are listed, such as: the language/inference system construction in order to accurately represent scientific theories, investigations of the development of science or of paradigm shifts, the theory-laden nature of observation, the relationship between evidence and scientific theory (specifically, Hume's view of inductive reasoning and the problem of underdetermination between resulting evidence and theory), the relative merits of competing theories, the problem of the status of unobserved/undetected particles (are they real things, or else instrumental things, or even fiction), etc. On the other hand, the questions of scientific metaphysics listed include the issue of whether physical necessity should be required to distinguish natural laws from mere regularity, determinism and causality, the interpretation of spacetime, reduction of individual sciences, etc. Also, as for the entry on "analytic philosophy" in the Routledge Encyclopedia of Philosophy, it is characterized as [Philosophical analysis is a method of inquiry in which one seeks to assess complex systems of thought by ‘analyzing’ them into simpler elements whose relationships are thereby brought into focus.] Then the entry says, this philosophical analysis, at the beginning of the 20th century, was brought into the limelight by Russell's logical refinement, and during the 1930's, logical positivists claimed that "in the context of their anti-metaphysical programme, analysis was the only legitimate philosophical inquiry." If we look at the description in the entry "Analytic philosophy”: "It was after 1945, those philosophers who wanted to expand philosophical inquiries beyond the limits prescribed by the positivists extended the understanding of analysis to include accounts of the general structures of language and thought without the earlier commitment to the identification of ‘simple’ elements of thought." Since 1945, after the liberal "linguistic analysis" of Ryle, Austin, Strawson, etc., of the ordinary language school, as well as Quine's criticism of the logical positivists' analytic philosophy (in *Two Dogmas*, his critique of the analysis-synthesis distinction and of reductionism, and his claim of indeterminacy of translation and meaning in *Word and Object*), the view of analytic philosophy linked with the logical positivists’ epistemological (fundamentalist) claim has been abandoned. This is the understanding of the history of "analytic philosophy" in the *Routledge Encyclopedia of Philosophy*. In short, judging from the description from the encyclopedia, it can be understood that analytic philosophy, in the initial stages, was refined by the logical positivists, and that it was closely linked to philosophy of science inquiry.

In the above, based on the description from the *Routledge Encyclopedia of Philosophy* published in the latter half of the 20th century, we have seen a brief overview of the 20th century understanding of "philosophy of science" and "analytic philosophy." In order to discuss the subject of this paper, "the historical relationship of the philosophy of science and analytic philosophy in Japan," and consequently to investigate "the circumstances of the founding of the

PSSJ," noting that "the language/inference system structure that accurately represents scientific theory" and " the reduction of individual sciences," which are listed as themes of philosophy of science in this encyclopedia, have been subjected to philosophical analysis by the logical positivists and in analytic philosophy, I will outline Carnap's vigorous investigation, as a representative of the logical positivists, of these questions. In the former half of the 20th century, the philosophy of Carnap was an archetypal example of investigating themes of the philosophy of science using the methods of analytic philosophy. Here, I would like to, in particular, look at Carnap's "structure of the language used to represent science," "logic of science," and "unity of science." The reason the overview focuses on these themes is that these claims of Carnap's, from the pre-war Showa era (1926–1945) until the establishment of the forerunner of the PSSJ, the "Society of Scientific Logic," were accepted among Japanese philosophers whose major field of inquiry was philosophy of science with sympathy.

Carnap's early seminal writing "logische Aufbau der Welt" (The Logical Structure of the World) (1928) laid the foundation for the relationship (making it a first principle) between psychological objects called "elementary experiences or *Elementarerlebnisse*" and "recollection of similarity or *Ähnlichkeitserinnerung,*" which was an attempt to construct a system for "transforming (reducing)" all sentences of science into sentences that contain only predicates that ultimately display this foundational relationship, in a broad sense, called "recollection of similarity." Carnap himself quickly became aware that the program indicated in this work cannot be brought to completion, but nevertheless, this work is acknowledged as "one of the most important works of the history of analytic philosophy." Moreover, Carnap, in his paper "Überwindung der Metaphysik durch Logische Analyse der Sprache" (The Elimination of Metaphysics Through Logical Analysis of Language) (1932), demonstrated the method for "explicating the cognitive contents of scientific assertions and the meanings of terms appearing in them through logical analysis." This method, continuously defining by reduction terms used in science to other terms (for example, "Arthropoden" a term found in biology is defined/stipulated as "animals that have articulated bodies and legs with joints"), reduces the meaning of all terms to words that ultimately appear in so-called "protocol sentences." In this way, in this paper Carnap claimed the meaningfulness of sentences of science is guaranteed by their reduction to protocol sentences, but surely exactly this showed the meaningfulness of sentences of science (and the meaninglessness of sentences of metaphysics) using the method of analytic philosophy (as Carnap would say "logical analysis"). Furthermore, in Carnap's work "Logical Foundations of the Unity of Science" (1938), the analysis of terms that are used to express science was christened "Logic of Science." Specifically, formal "logical syntax," which aims solely at developing and refining the language of science itself without considering the extensions of linguistic expressions (defining the terms of science and clarifying deductive relations between scientific statements), and "semantics," which establishes (extensionally) the denotations of terms of science, are supposed to be research themes of the logic of science. Moreover, in this work, regarding the goal from the time of the foundation of the Vienna Circle, "the unity of science," he did not consider it an ontological reduction, but rather treats it as a problem of the

"logic of science" or a clarification of "the terms of various sciences and the logical relationship between laws," and presented the program of "physicalism," in which the languages of physics, biology, psychology, and social sciences are ultimately reduced to thing-language, with "thing-language" (rather than the phenomenological sense-data language) as the underlying language of reduction.

In addition, regarding the Vienna Circle's view on the status of logic and mathematics, Carnap, for example, thought logic and mathematics are "formal sciences," consisting of analytic statements; while empirical science, on the other hand, is constructed from synthetic statements of fact. Also, according to Kraft, this view of the Vienna Circle regarding logic and mathematics was an outright denial of [the Mill-like understanding of logic and mathematics as "experience generalized to the highest degree, i.e., the highest principles of existence and thought grasped in a completely abstract way and formulated;" and accordingly "logic and mathematics include natural laws, and are therefore inductive - and thus, can also be negated by experience"]. The Vienna circle considered "the validity of logic and mathematics to be completely independent of experience," and regarded propositions of logic and mathematics as independent of their correspondence with reality, based on conventions and rules of transformation for symbolic representation, and as *a priori* and analytical. Thus, according to the Vienna Circle, empirical science became an inquiry into the facts and laws of the world, and on the other hand, philosophy became on the whole a study of the composition of the language in which science is expressed (inquiry into the logic of science).

Based on the above, in Carnap's philosophy from the 1920's to the 1930's we can see an integration of philosophy of science and analytic philosophy (more precisely, the use of the methods of analytic philosophy on research of philosophy of science).

## 3. The Research of the History of the Philosophy of Science and Analytic Philosophy in Japan: The Times Before the Foundation of the Philosophy of Science Society, Japan

In this section, I'd like to take a look at the research history of the philosophy of science and analytic philosophy in Japan before the formation of this society. Named after Carnap's "logic of science," the PSSJ's predecessor "Logic of Science Society, Japan (科学論理学会)" was founded in 1949. The man who played a central role in the founding of the Logic of Science Society, Japan was Yu Shinohara (篠原雄). So, for a bit below, I'd like to follow Shinohara's philosophical journey (to the extent that it is relevant to this manuscript).

While the world of philosophy in Meiji era Japan (1868-1912) focused on the research of English philosophers of the same period, such as Mill and Spencer or 18th century Bentham, upon entering the Taishō era (1912-1926), Kant and Hegel representing German Idealism became popular. During the pre-war Shōwa era (1926-1945), research of the new Kantian School of the same era progressed, and German philosophical research became the mainstream. In March, 1928, disconnected from the mainstream philosophical world comprised of Imperial University faculty, the "Synthetic Natural History Society (綜合自然史学会)" was founded, led

by biologist Yu Shinohara, professor of preparatory medicine at the Jikei University School of Medicine. This Synthetic Natural History Society was retitled in November, 1933 to the "Synthetic Science Society, Tokyo (綜合科学協会)," and in May of the following year the journal of the Synthetic Science Society, Tokyo, *Synthetic Science,* published its first issue. The cover of volume 1 no. 1 featured the motto "Synthetic science, as a unified system of principles born from the synthesis of all the branches of science, is the only worldview we should have and the highest guiding principle," and on the reverse side of the cover was written, "What is most necessary for us now is to obtain a framework that will enable us to grasp and put into effect the enormous intellectual harvest that is being produced day after day in every field of science, in a well-organized, systematic, and most efficient manner, as soon as possible." The following first page contains the "Synthetic Science Society, Tokyo Prospectus," in which the claims that physical chemistry, biology, psychology, and social sciences, which were then being studied independently and separately, should be united, and moreover that philosophy, history, art, and even religion "should become one with science in the most essential sense," are presented. If we look in order from the first issue of the journal *Synthetic Science*, in vol. 1 no. 6, Shinohara introduced the idea of "unified science or Einheitswissenschaft" as a claim of the Vienna Circle for the first time. In this contribution, Shinohara wrote, "We established in the 6th year of the Shōwa era [1931] the prospectus and regulations of today's society and stipulated our goal 'to strive to synthetically and critically research the foundational principles of every science and construct a unified science of nature and societal life.'" Moreover, because it is assumed that Shinohara had not known of the Vienna Circle at that time, Shinohara's ideal of "Synthetic Science" can be presumed to be his own original idea. Furthermore, Shinohara, in this work, expressed that the Vienna Circle's "Unified Science" ideal "is extremely similar to the goal of our society which is to say the construction of a synthetic science." In addition, Shinohara in vol. 1 no. 6 of *Synthetic Science* translated/introduced Reichenbach's "*Zur Einführung*" published in *Erkenntnis*, Bd. at the beginning of vol. 1, and then went on to translate/introduce Schlick's "*Die Wende der Philosophie*" ("The Turning Point in Philosophy") in vol. 1 no. 7 and Carnap's *"Die alte und die neue Logik*" ("The Old and the New Logic") in vol. 1 no. 8. What is more, in vol. 1 no. 10 to vol. 2 no. 1, the translation/introduction of Carnap's "*Die Physikalische Sprache als Universalsprache der Wissenschaft*" (later known as "Unity of Science") was published (all published articles from *Erkenntnis*, Bd. 1 and 2). From this, we can see that at this time in Japan we can say that (or at least from Shinohara's own perspective) we reached a point at which the Vienna Circle's idea of "unified science" was understood to some extent. The *Synthetic Science* journal at first was monthly, but gradually the interval between publications grew, until Vol 3 no. 1 published in March of 1938 (due to containing a double issue), and a total of 23 issues were published (The Synthetic Science Society, Tokyo was affected by the upheaval of societal conditions due to the Second Sino-Japanese war that began in 1937 and dissolved in 1939).

In addition, in the pre-war period, Shinohara's translation of "The Vienna-Chicago School: Papers for the Unified Science" was published in May, 1942. In the opening of this translation "By way of explanation," he wrote "The first time this Vienna Circle held my

attention was when I was advocating for the synthesis of science in this country by forming the Synthetic Science Society, Tokyo, and making small efforts for the academic movement in this regard. The idea of unified science, about which a certain few among them spoke out, I thought could be very close to the ‘Synthetic Science’ ideal I spoke about, so I thought to study their ideological and logic research."

In the above manner, Shinohara, who understood the Vienna Circle's thought and worked hard to introduce them in the pre-war Showa period (1926-1945), became a central player in the foundation of "Logic of Science Society, Japan," after the war (1949). "Logic of science" is Carnap's terminology, and so it can be inferred that Carnap's ideas had a great influence during the founding of the Logic of Science Society, Japan. There are no remaining records of the early activities of the Logic of Science Society, Japan, which Shinohara was at the heart of, so the details are obscure, but after the Logic of Science Society, Japan and the American Philosophical Association cosponsored "The First Meeting of Scientific Philosophy" hosted at Waseda University (from around the second or third of November, 1957), we can start to understand those activities little by little. From the program of "The First Meeting of Scientific Philosophy", we see that the first the first research presentation session dealt with "General Philosophy and Science, Scientific Epistemology, Axiology, etc.," and the presentations "諸科学の統一についての一二の史実" (A Few Historical Facts Regarding the Unification of Various Sciences) (植田清次 Seiji Ueda) and "物理学的実在の実在性" (Physical Reality of Realism) (上田大助 Daisuke Ueda) were featured, among others. The second session dealt with "Logic, the Foundations of Mathematics, and Linguistics, etc.," and "公理的集合論における Skolem-Löwenheimの定理とその拡張について" (Regarding Skolem-Löwenheim's theorem in Axiomatic Set Theory and its Expansion) (石 本新 Arata Ishimoto), "言語分析とType Theory" (Linguistic Analysis and Type Theory) (坂本百大 Hyakudai Sakamoto), and "分析哲学における倫理説の 批判" (Criticisms of Ethical Theory in Analytic Philosophy) (Takeo Shioya 塩屋竹男) were included in the presentations. One of the symposiums held there was "The Significance of Linguistic Analysis," and among its participants were Shigeo Nagai (永井成男), Nobushige Sawada (沢田允茂), and Arata Ishimoto. In November of the following year, the second philosophy of science conference was held, but from this year forward The Japan Association for Philosophy of Science was included among the organizers. The first research presentation session dealt with "General Philosophy of Science, Scientific Logic, Axiology" and the second "Symbolic Logic, Foundations of Mathematics, Linguistic Analysis." The philosophy of science conference, before the foundation of the PSSJ, that is to say until 1967, was held every autumn a total of 11 times. This session structure was maintained to the end, albeit in slightly different forms. From the research presentations held at the philosophy of science conference, if we try to pick out some of the presentations that can be classified as analytic philosophy, there were: "‘プラグマティック’の用法 — Quine, White, Kaplan —” (How to use 'Pragmatic' — Quine, White, Kaplan —) (武田弘道 Hiromichi Takeda: from the second conference), "分析と正確化" (Analysis and Precision) (斎藤晢郎 Setsuo Saitō: from the 5th conference), "定義の方法について" (Regarding the Method of Definition) (大出晁 Akira Ōide: from the 8th conference), and

"繋辞の解釈" (Interpretation of Copula) (竹尾治一郎 Jiichirō Takeo: from the 10th conference). In 1961, when the fifth philosophy of science conference was held, the *Annual Review of Philosophy of Science* was founded, edited by the executive committee. Initially, it was also published by the executive committee (and printed at Waseda University Printing House), but from vol. 5 publication was picked up by Risosha publishing company, and up until one year before our society was founded, a total of 7 volumes were published. The *Annual Review of Philosophy of Science*, (similarly to research presentations held at the philosophy of science conference) also published works of analytic philosophy. At the beginning of the first volume of the *Annual Review of Philosophy of Science*, being a central figure of the Logic of Science Society, Japan,Yu Shinohara's words on the publication are printed. However, here I would like to introduce Arata Ishimoto's "科学哲学のあり方について" (Regarding How Philosophy of Science Should Be) (published in the first issue pages 12-13). Ishimoto, in this work, claimed that "in the early days of logical positivism, the logic of philosophers and the logic of mathematicians, which had become almost one and the same with the exception of a minority, was once again getting separated," after the second world war, and questioned, "Is it really okay for all philosophical logicians to devote themselves to this so-called analytic philosophy and give the impression to the outside world that this is philosophy of science?" He then concludes with, "Analytical philosophy of science must not exclusively be all there is to philosophy of science. The attitude to philosophize about what is closer to the cutting edge of individual sciences is to be desired" Ishimoto already recognized, in the time of the union/fusion of philosophy science and analytic philosophy, the difference between the so-called philosophy of science today and analytic philosophy, and encouraged philosophy of science research.

**Conclusion**

In [3], we reflected on the history of the foundation of this association, and from there we can see one of the historical circumstances (but a major one) for why the discipline of "philosophy of science" included the philosophy of logic and mathematics (symbolic logic and foundations of mathematics) and the philosophy of linguistic analysis/analytic philosophy: among the ideas of those who founded the Society was the idea inherited from the Vienna School (especially Carnap) that "the language for a unified science is constructed and developed using the tools of logic and mathematics." These directions and tendencies of the society continued after its founding (see the conference programs and journals since the founding of the society), and we can see that they have persisted unchanged to this day, when the ideas of the Vienna School have fallen out of the prevailing currents of philosophical research. However (whatever the historical circumstances), we can identify that the biggest reason for the mixture of research on these three fields in our society, even though the concept of "philosophy of science" has changed significantly (to philosophy of individual sciences) in the 21st century and has come to be distinguished from analytic philosophy and philosophy of logic and mathematics, is the small number of researchers specializing in philosophy of science, analytic philosophy, and philosophy

of logic and mathematics respectively. Supposing there were more than 1,000 people specializing in each field in Japan (and then, that there were several leaders seeking to establish a society specializing in each field), in all likelihood, one can imagine that a separate society for the philosophy of science, for analytic philosophy, and for logic and philosophy of mathematics would be founded.

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1. In this association's membership directory published September, 2015, there is a field describing members' area of specialization. Investigating the specialization of the listed members revealed, 112 members (are speculated to) specialize in the philosophy of science, 259 (are speculated to) specialize in analytic philosophy, 55 (are speculated to) specialize in philosophy of logic or mathematics, and 96 (including those who did not indicate a major field) in other fields (regarding the numbers above, due to members indicating multiple fields, the total number of people exceeds the total membership count). Furthermore, we looked at the fields of articles published in *Philosophy of Science* since 2001 (since volume 34) revealed, 43 were philosophy of science, 106 were analytic philosophy, 40 were philosophy of logic/mathematics, and 7 were others (excluding survey articles, book reviews, and discussions). In addition, in this manuscript, old-style kanji appearing in peoples' names and citations from Japanese works are intentionally written here in new-style characters.

2. Therefore, in this manuscript philosophical inquiry is not progressed, but historical circumstances are revealed, and the discussion style is different from the style of articles usually published in this journal. In addition, this theme is the same as the intent of the symposium "Philosophy of Science and Analytic Philosophy: Reconsidering the Pair's Historical Relationship" from the 50th conference of the PSSJ (held on November 18th-19th, 2017), and is also this issue's featured theme. In the explanation from this society's website of the intent of the symposium, the following is recorded. "This Society, as the name indicates, is a "philosophy of science" academic society. On the other hand, it is also well known that it is a so-called "analytical" society, and it is a matter of course that there are presentations at the annual conference that have little to do with science but are clearly part of analytic philosophy (e.g., metaphysics, aesthetics, etc.). However, even though for society members it is a familiar scene, from the perspective of at least external people, it must seem to reflect a strange state of affairs." This work was written in response to this suspicion.

3. As for the construction of this series, among all 17 volumes (Vol. 2: Philosophy of Physics has two volumes, Part A and Part B), at least 16 volumes featured philosophical inquiry regarding individual sciences.

4. Even still today, there are works (if you look for them) in which the philosophy of individual sciences is not the primary theme of the philosophy of science. E.g. Curd and Psillos, 2014. In this work (first edition of which was ten years ago in 2008) the philosophy of individual sciences is positioned in the fourth and last of the four parts. Furthermore, if we look at the latest editions of the past 10 years of the traditional philosophy of science journal *Philosophy of Science: Official Journal of the Philosophy of Science Association*, from the University of Chicago Press,

we can see that papers regarding philosophy of individual sciences, and papers regarding so-called general or traditional philosophy of science intermingle(without an inclination to one side). In view of this, it may be that we are now in a transitional period in which the theme of "philosophy of science" is changing.

5. Beaney, 2014. However, the view that answering what "analysis" in analytic philosophy is in one word is infeasible is deep-seated. In Dainton and Robinson, 2014, the possibility that the method called "analysis" will become characteristic of analytic philosophy is alluded to, but because of the diversity of "analysis", the argument that that kind of distinction does not work has been raised (Cf. ibid., pp 541ff.). In this work, in a narrow sense analytic philosophers can be characterized as philosophers who use one type of method of "analysis" (e.g., transformational analysis) that is used in the philosophy of language, philosophy of logic and mathematics, philosophy of science, and philosophy of mind, but on the other hand, it is said that analytic philosophers in a broad sense cannot be characterized without referring to historical conditions, such as philosophers endowed with self-awareness that they are successors of Russell, Moore, Frege, Wittgenstein. In addition, in Frost-Arnold, 2014, the question "what is analytic philosophy" is said to be an "unanswerable" question in the first place. (Cf. pp. 27-28). Moreover, in Bearney, 2017 published last year, it is considered that, "it is a mistake to define analytic philosophy by theories shared by all analytic philosophers and only by them." (p. 92). Thus, today the view that it is unfeasible to define analytic philosophy based on about one or two methods or theories or to characterize it succinctly is probably becoming the dominant one.

6. Whereas actual experiments in the natural sciences are inductive, conducted to test hypotheses and corroborate theories, thought experiments possibly can be considered deductive (not inductive if one had to say which), developed in order to prove the validity of theories. Incidentally, in Beaney, 2017, Quine, Davidson, and Putnam are referenced as major analytic philosophers of the post Second World War, but the description of Putnam there is chiefly an introduction of the "Twin Earth" thought experiment. p. 103).

7. For example, reference "Contemporary Thought December Special Issue - Analytic Philosophy Special Feature" (Seidosha, 2017)

8. For example, published at the beginning of the 21st century, Corradini, Galvan and Lowe, 2006, indicated an attempt to uncouple analytic philosophy from naturalism.

9. In this work, the methods of analytic philosophy are characterized by analysis and thought experiment, but because these are methods, regarding one research theme (e.g., metaphysics) rather than inquiry using the methods of analytic philosophy, inquiry using synthetic methods or methods of speculative philosophy are also possible. Regarding the possibility that thought experiment may be considered synthetic/speculative, not a method of traditional analytic

philosophy, simply, I would like to call attention again to the fact that analytic philosophers in recent years have tended to use it more and more.

10. Cf. Worrall, 1998, pp. 572-576. Incidentally, I'd like to point out that, in this encyclopedia, under the entry for "Philosophy of Science" philosophy of logic and mathematics is not referenced.

11. Cf. Baldwin, 1998, pp. 223-224.

12. In the *Stanford Encyclopedia of Philosophy* as well, as philosophers who use the method called "analysis" in analytic philosophy Frege, Russell, Moore, Wittgenstein, the Cambridge school of analysis, alongside the Oxford school of ordinary language philosophy, Carnap and logical positivism are listed. (Cf. Beaney, 2014). In addition, in *A Companion to Analytic Philosophy* as well, the heading "Carnap" appears and Carnap's 1920-1930 philosophy is elucidated. Martinich and Sosa, 2001, pp. 94-109).

13. According to Carnap, the reducibility (*Zurückführ-barkeit*) established in such a system is transitive (*transitiv*). (Cf. Carnap, 1928, S. 2).

14. Cf. Pincock, 2009, p. 951.

15. Cf. Carnap, 1932a, S. 219-224. (Japanese translation) pp. 10-15.

16. In this paper, it was simply "*Bestimmung*" or "definition", but subsequently, due to the introduction/establishment of "semantic rules" or "meaning postulates", a defining statement of this kind of term has come to be characterized as "true in all state descriptions". (Cf. Carnap, 1956, Chap. 1 and Supplement B).

17. In German "*Wissenschaftslogik*". Yu Shinohara translated this word to "The Logic of Science", which afterwards became the name of the society that was the predecessor of the PSSJ. (Cf. e.g. Carnap, 1934, 59 S. 2. (Japanese translation) p. 107).

18. Cf. Carnap, 1938, pp. 42-45. (Japanese translation) pp. 36-38. In this writing,"definition" is considered as "the most simple form of statement reduction, and is expressed in equivalent statement form, "....=....." (Ibid., p. 50. (Japanese translation) p. 43).

19. In the Vienna Circle's mission statement "Scientific World-Conception", the goal is expressed as "Unified Science", and it is claimed that all meaningful scientific statements can be "reduced to the simplest statements concerning empirical sense data" via Russell's manner of

"logical analysis", Verein Ernst Mach (hrsg.), 1929, S. 12-13. (Japanese translation) pp. 231-232).

20. In Carnap's paper "The Physical Language as the Universal Language of Science", he argues we should not speak of an entity in a world of object and circumstances, but speak of "word" instead of an object and "statement" instead of circumstances; and philosophical research is considered "language analysis" (Cf. Carnap, 1932b, S. 435. (Japanese translation) p. 191). In this paper, "physical language" is established as a universal language in order for the realization of universal science, through translating all scientific statements to this language, and in the end, it is claimed that (according to ordinary content speech) "everything in science is expressible in physical language." ibid., S. 453. (Japanese translation) p. 219. In addition, in Neurath's work "Protocol Language", in which he presents a criticism regarding Carnap's distinction of (subjective/*gestalt*) "protocol language" and (intersubjective) "physical language", he posits a language that includes both the language of advanced science, that is a "universal slang" that expresses the whole of unified science, and physicalist everyday language (and both are mutually translatable). (Neurath, 1932, S. 205- 206. (Japanese translation) pp. 168-169). In sum, the program/movement of unified science (and then physicalism) aimed at explicitly translating between speech or statements (sentences) through and through (not an ontological reduction like physical objects/matter/organisms to molecules, molecules to atoms, atoms to elementary particles). (Regarding this understanding, it has been pointed out that "unified science" has two meanings, and the understanding of unified science indicated here is simply the "narrow meaning". Cf. Cirera, 1994, p. 119.)

21. Cf. Carnap, 1938, p. 45. (Japanese translation) p. 39.

22. Cf. Kraft, S. 12-19. (Japanese translation) pp. 17-21.

23. According to the *Routledge Encyclopedia of Philosophy* entry on "Analytic Philosophy", in the latter half of the 20th century, the circumstances of the union of this kind of philosophy of science and analytic philosophy are differentiated from 1945 onward due to the ordinary language school and Quine's speculation. For example, the majority of works contained in the following collection of works published in the 1950's to 1960's are not the philosophy of science type of analytic philosophy works, which may support this description. Black, 1950. Flew, 1956. Butler, 1962, 1965.

24. The view that the central member of the effort to establish the Logic of Science Society, Japan, the predecessor of the PSSJ, was Yu Shinohara is based on Isono's 1968 account. Note that, in Ōe, 1977, written about 10 years after Isono's manuscript, a slightly different nuance can be found. In addition, regarding the circumstances at the time of the founding of the PSSJ, I also referred to Nagai, 1968.

25. Shinohara, 1934, pp. 70-73.

26. In this Japanese translation are collected the Japanese translations of 5 volumes selected by Shinohara, i.e., the translation of Schlick's work "*Die Wende der Philosophie,*" *Erkenntnis*, Bd. 1, 1930, 4-11 "The Turning Point in Philosophy", Carnap's work "*Die alte und die neue Logik*," *Erkenntnis*, Bd. 1, 1930, 12-26 Japanese translation "The Old and the New Logic", Reichenbach's pamphlet "*Ziele und Wege der heutigen Naturphilosophie*, Hamburg: Felix Meiner", 1931 Japanese translation "The objectives and methods of Modern Naturalist Philosophy", Carnap's pamphlet "*Die Aufgabe der Wissenschaftslogik*", Wien: Gerold & Co., 1934 Japanese translation "The Task of Philosophy of Science", Carnap's pamphlet "Foundations of Logic and Mathematics", Chicago: The University of Chicago Press, 1939 Japanese translation "Foundations of Logic and Mathematics". In the time before the end the war, another translated volume was published called *The Vienna Circle's Logic of Science* (other translations by Katsumi Nakamura, Nisshinshoin, 1944), but excerpts from the papers and writings collected here, unlike the title that calls to mind Carnap's view "Logic of Science", are predominantly writings on symbolic logic.

27. At that time *Foundations of Science* (Kōbundō) the predecessor to The Japan Association for Philosophy of Science the magazine was already established (founded October, 1947), the editors of the "Foundations of Science" wrote this magazine's goal, at the beginning of the founding issue "Inaugural Address", as follows. Because "Science today is extremely differentiated and specialized", "interdisciplinary understanding and connection is gradually being lost", and so "synthesis/unification of various sciences" will be considered "the ultimate aim of science". In order to realize this goal, first "generally bring to light the whereabouts of the root issues of each fundamental science and their status quo, and thereby, this is not simply a problem limited to specialists of a particular field, it is a broadly shared issue, being a common interest, therefore I'd like to expect that opportunities and chances for mutual cooperation will be formed among all scientists and as many intellectuals as possible." In short, it aims to "facilitate and realize the synthesis and systematization of science as a whole", and to firstly "make efforts towards that realization in fundamental science". This kind of intent of the publication of *Foundations of Science* used the words synthesis/unification of science, but due to its goal including an understanding of specialized science researchers in other departments and even intellectuals, it is a slightly different thing from the unified science advocated by the Vienna Circle. Partially inheriting the editorial policy of the journal *Foundations of Science*, in February, 1954 the Japan Association for Philosophy of Science was founded. However, in the submission rules of the magazine, *Journal of the Japan Association for Philosophy of Science*, even today, "A manuscript's theme should discuss fundamental theories of science or deal with specialized contents of various fields relating to fundamental theories of science, but when dealing with specialized contents, the purpose or intent of the manuscript should be understandable and interesting to even people outside of the specialized field."

28. See Isono, 1968, p. 217.

29. The "American Philosophical Association," was founded in 1953 by philosophers who participated in the "American Research Seminar" held from 1950 onwards annually in the summer primarily, at Tokyo University. With the goal of presenting the American Philosophical Association's research accomplishments, from 1954 to 1960, 5 volumes altogether of the compilation "Analytic Philosophy Research Collection" (Waseda University Press) edited and written by Seiji Ueda have been published .

30. In the "Philosophy of Science" entry in the *Encyclopedia of Philosophy* (Heibonsha, Revised Edition 1971) published in the 20th century, "philosophy of science" in the narrow sense, "is often used as a term to indicate not only a theory of science from the standpoint of analytic philosophy, i.e., simply ‘philosophy of science,’ but also a theory of science from the standpoint that advocates that it is ‘scientific philosophy’ at the same time." (p. 223). In addition, in the *Iwanami Dictionary of Philosophy and Thought* (Iwanami Shoten, 1998), the entry for "Philosophy of Science" says, "Armed with the symbolic logic systematized by Frege and Russell, they (Vienna Circle members) applied rigorous logical analysis to subjects such as the verification and confirmation of theories, the structure of scientific explanation,... and made major contributions to the explication of the essence and structure of science, and moreover, to its empirical foundations. That impact has led to the trend of the designation 'philosophy of science' to be equated with the currents of logical positivism and analytic philosophy." (p. 226) After all, in 20th century Japan, the philosophy of science and analytic philosophy may be seen as having been strongly connected.

31. Today, in Japan as the academic society holding the designation "Philosophy of Science" other than ours, there is the "Japan Association for Philosophy of Science (科学基礎論学会)." Both societies have a membership of about 500 people, and among them, roughly half are members of both societies. If described with a bit more detail, the information is a bit old, but when examining the register of both societies on hand near publication season (PSSJ's *Membership Registry* published October, 2012, and the Japan Association for Philosophy of Science's *Membership Registry* (published in December, 2013), at that point in time among the PSSJ's membership of 502 people and the Japan Association for Philosophy of Science's membership of 434 people, 212 belonged to both societies. Even till today, in the Japan Association for Philosophy of Science also, not just "philosophy of science," but works/research presentations of "analytic philosophy" and "philosophy of logic and mathematics" as well are accepted, and the situation is similar to the PSSJ. Because both societies’ circumstances bear such a close resemblance, the possibility of their merger or differentiation by field has come up occasionally (though not so explicitly written). I think as stated in this work, due to the small number of researchers in Japan, it is infeasible to clearly limit fields in each society, and

establishing an "association of philosophy of science," an "association of analytic philosophy," and an "association of philosophy of logic/mathematics." Because of the historical details of the establishment of the Philosophy of Science Society, Japan and the Japan Association for Philosophy of Science, as well as because there is no inconvenience in the existence of two similar societies (the advantage of the increased medium of presentation is thought to be important than the increased burden of the membership fee), for both societies to continue the status quo (rather than merging) may be appropriate.

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