

An Essay on Isomorphic and Idiosyncratic Characteristics of Social and Natural Science*

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Abstract

The schools of natural science, especially since Newton, have continuously influenced the social science in two ways. As seen in the example of the systems theory or social Darwinism, many social scientists have got insights from the ideas of natural science. It is quite natural that a scientist discovers a new way of thinking or an implication from a different academic discipline; however, the mainstream social scientists have trapped themselves by confining their science with the methodology obtained from natural science in order to validate it. This paper aims to reveal this methodological trap of social science by showing the influence of natural science to social science in the context of validation and by contrasting the differences between social and natural science issue by issue. The issues raised in this paper include the possibility of the monology and the normal science in social science, the debate over fact-value dichotomy and obtaining objectivity in social science, and the role of science and methodological reductionist issue. Considering such idiosyncrasies of social science, it is claimed that social science should keep its methodological uniqueness and autonomy.

I. Introduction

Since the establishment of Newtonian paradigm in the field of physics, the impact of

* A deep appreciation is acknowledged for Professor Sintaek Kang's tutelage and review of the paper.

natural science on social science has been continuous and substantial. Not only has the former instilled social scientists with a new way of thinking, but it also has demonstrated the ultimate exemplar of the theory which they ought to pursue. As a matter of fact, many of mainstream social scientists hold a view that contemporary state of social science is compare to that of a young natural science, and eventually, will evolve to be as mature as natural science. Diesings (1971: 24) following remark describes such a position succinctly:

Repent! You aren't being truly scientific! That was only an explanation sketch, not an explanation! Stop trying to act like scientists! The phrase 'policy science' is logically self-contradictory!

However, others claim that the differences between social and natural science are not a matter of degrees but fundamental ones, and as a result, social science does not necessarily have to follow the methodology of natural science. Bernstein quotes the propositions of the scholars who have tackled these problems seriously as follows (Bernstein, 1976, emphasis added): "the replacement of political theory by a natural science of human beings would *not* be the triumph of value neutrality and objectivity," (Berlin) "the idea of a social science based upon the natural science is a *mistake*," (Winch) and "since moral categories are not scientific concepts and can not be reduced or replaced by scientific concept, a science of human action is *impossible*." (Louch)

This paper is to relate such relationships between social and natural science focusing on isomorphic and idiosyncratic characteristics between the two. The purpose of the paper is 1) to reveal how social science is trapped methodologically by showing isomorphic characteristics of explanatory structure between social and natural science and 2) to acknowledge how both sciences are fundamentally different by showing its methodological idiosyncrasies. Indeed, "our thinking about society is mesmerized by the success story of natural science." (Cleveland, 1988) Even though one ought to appreciate the efforts of social scientists to establish a set of fully axiomized and generalized theory, he or she should also recognize the possibility that the social science thereby loses its social relevance and vitality by confining itself within the methodology obtained from natural science.

In proposing aforementioned arguments, the paper is composed of two parts. The first half discusses the impact of natural science on social science by shedding lights on the isomorphic aspects. The influence of natural science on social science can be comprehended in two different context: the context of discovery versus validation. Hence, the influences in both contexts are mentioned. The later half examines the differences between the two issue by issue. The issues raised in this paper include: the

possibility of monology and normal science in social science, the debate over fact-value dichotomy and obtaining objectivity in social science, and the role of science and scientists. Based on the grounds of those idiosyncrasies of social science, it is claimed in the conclusion section that social science should keep its methodological uniqueness and autonomy to keep its relevance, vitality, and responsibility.

II. The Isomorphic Explanatory Structure of the Mainstream Social Science

To discuss the influence of natural science onto the mainstream social science, it is necessary to conceptually differentiate the dimensions of influence: the context of discovery and the context of validation (Kang, 1995: 15-16). The context of discovery concerns the ways and conditions through which scientists get intuitions about their inquiry. A scientist can be inspired by his or her own experience in social and everyday life or by the works of any academic field. The context of discovery means such kinds of processes as a scholar is inspired. So, the context of discovery is very liberal "process" before doing a serious scientific theory-building.

On the other hand, the context of validation relates the way, structure, or logic that verifies a theory. Once a to-be-theory is produced, the concern is centered on whether the theory has the falsifiability, utility, and conceptual coherence (Bacharach, 1989) not on through what process it is produced. The discourses about explanatory structure, obtaining objectivity and generalizability, and logical coherence and conceptual parsimony are related to the context of validation. So, this context primarily focuses on the science as a "product" not as a process.

This paper argues that it is not problematic for social science to get metaphors and intuition from natural science for scientific *discovery*; however, it gives rise to problems to *validate* social science by the way natural scientists use. For example, Morgan (1986: 342) compares organization to psychic prison as a metaphor. The use of metaphor can give a scientist the insight in intuitively reading organization as Morgan asserts. However, it does *not* convey a logical basis of a theory if Morgan uses this metaphor in validating his view on organization. When using metaphor, we may develop *a way of thinking* that can deal with ambiguity and paradox (*Ibid.*: 342) by illustrating the "isomorphic elements" between the two. However, we cannot validate the other by using the metaphor. In this sense, using metaphor is useful as long as it remains in the context of discovery. Subsequent section entails the influence of natural science to social science in the context of discovery.

1. The Influence in the Context of Discovery

Since Newton established the linear and certain world of physics, natural science has put great impact on social science in the context of discovery. The Newtonian paradigm is still regarded as one of the most influential ways of thinking in both natural and social science. Most deductive ways of explanation are influenced by his concepts such as laws of movement unwittingly or not. In other words, Newton showed the social scientists the reality that there could exist "the objective, *a priori*, and ever-lasting real world" among the phenomena that surround them. This ontology about nature and truth that Newton found had been the fundamental assumption in social and natural science. In the mainstream approach, the main purpose of social science has been to discover the unified law of social phenomena as Newton did in the field of physics.

Until Heisenberg and Bohr's theory of modern physics, the Newtonian paradigm was so prevalent in the field of both natural and social science that the Newtonian assumptions were almost taken for granted. The influence of Heisenberg and Bohr's theory of quantum physics to modern social science is crucial in the sense that it makes it possible to introduce Aristotle's concept of dynamics (potentiality) to ontology (Heisenberg, 1958: 13; 1989tr.). This "potentiality in ontology" means that there is neither isolated mechanical system nor absolute way to observe the position and momentum of a matter.¹⁾ Another implication of their theory is the problem of observer-observed relationship. They show that the nature of the observed quantum is determined by the very way they observe it. In other words, ontology can be determined by epistemology and "objectivity must thus be a property that stems from the observer." (Morgan, 1983: 12) This conclusion is crucial for understanding the discussion that claims that "every datum is theory-laden." It is rather interesting that even the non-positivists ontological and epistemological grounds are based on the quantum physics.

Another example can be found in the theory of social Darwinism and the systems theory. Darwin's concept of evolution and survival of the fittest has been a favorite analogy of history and sociology. In a broad sense, the main ideology of capitalismmarket principleis also based on this kind of evolutionary thinking. In the systems theory, many conceptual elements are borrowed from natural science. From the basic concepts such as input, output, feedback, and system itself; and the concepts of equifinality, negative entropy²⁾ and homeostasis³⁾ that maintains a system (Katz and Kahn, 1966: 17-34), the basic similarities between the work of biology and/or thermo-dynamics and the systems theory are easily found.

Multi-paradigmatic approaches in organizational studies as Morgan et al. (1983)

propose are also based on the mathematical concept of Goedel's impossibility theorem. The theorem implies that there's at least one proposition that can *not* be proven by a system of the theory to which the very proposition belongs. The implication is that we need to have more than at least one theory in order to prove theoretical propositions.

The intuitive and metaphoric influences of natural science are so numerous as to require a separate intensive study. A non-linear concepts from the chaos theory, for example, recently draw attentions of social scientists (Thietart and Forgues, 1995). Such tendency is thought to contribute to the growth of knowledge in social science as long as the influences stay in the context of discovery. But when one attempt to *validate* the social theory according to the methodology that natural science uses, the case is not as simple as it meets the eyes.

2. The Influence in the Context of Validation

This section explains four main explanatory structures of social science that are heavily influenced by the methodology⁴⁾ of natural science and some issues related to the level of analysis problem including methodological individualism and reductionism which prevail in most of positive social sciences such as new- (or neo-) institutional economics, positive political economy, economics, positive politics, and so on. These influences are in the context of validation since they are related to internal logic behind theory-building.

The explanatory structure of social science is classified by various scholars: Kang (1995: 156-194) clarifies the typology of traditional explanatory structure as genetic, dispositional, teleological I (purposive), teleological II (self-regulatory) explanations; Diesing (1971: 2-17) classifies it into the experimental method, the participant-observer method, formal method, and clinical method; Hempel (1965: 155-171) makes a typology of in the natural and the social sciences by classificatory types, extreme types, and ideal types; and Nagel (1961: 20-26) identified four types of explanation as the deductive model, probabilistic explanations, functional or teleological explanations, and genetic explanations. These kinds of classifications are mostly made to show the structural isomorphism between social and natural science. This paper classifies four formats that mainstream social science utilizes in theory building: axiomatic formats, causal process formats, typological formats, and cybernetic formats,⁵⁾ then shows how they are isomorphic compared with those of natural science.

First, the axiomatic formats of explanation is most typical in scientific research of society. According to Turner (1978: 10), the axiomatic organization of theoretical statements takes, in general, the following form:

First, it contains a set of concepts that have operational definitions [...] Second, there is always a set of existence statements that describe those situations in which concepts and relational statements apply⁶⁾ [...] Third, and most nearly unique to the axiomatic format, relational statements are stated in a hierarchical order.

In the axiomatic formats of explanation, the explanations are made in the hierarchy of axioms-propositions-hypothesis-empiricals relations. As the explanation goes to upper level (axioms), it becomes more abstract while the opposite level (empiricals) is more concrete. Therefore, this structure is the grammar of deductive (from axioms to empiricals) and inductive (from empiricals to axioms) way of explanation. Turner (*Ibid.*: 11) writes the virtue of this format as follows: "by virtue of this logical interrelatedness of the propositions and axioms, research can be more efficient since the failure to refute a particular proposition lend credence to other propositions and to the axioms. Second, the use of a logical system to derive propositions from abstract axioms can generate many interesting propositions that point to previously unknown or unanticipated relationships among social phenomena." Mathematics or physics in natural science is the typical examples of the axiomatic formats and Cartesian way of thinking in positivistic social science is based on this kind of validating structure. The attempts to elucidate "the law" of social phenomena through induction and deduction are, after all, the efforts to find out the axiom in this explanatory structure.

Secondly, the form of causal process formats is similar to axiomatic theory in that it contains both abstract and concrete concepts with appropriate operational definitions and that it reveals a set of existence statements that establishes the scope conditions of the relationships. But, unlike axiomatic theory, the causal process format presents a set of *causal* statements describing the effect of one variable on others without establishing a strict hierarchical ordering of the statements. Thus the causal process format takes a form of a flow diagram that charts the interactions among selected variables (*Ibid.*: 11). Turner describes the merit of the causal process formats as follows: "[the causal process format] may allow for more 'understanding' of events than would the axiomatic form. The exact *causal chains* involved in these derivations are not always clear. To provide 'understanding of the world,' it has been argued that the causal chains need to be sorted by theory. It is presumed that the causal process format is superior." (*Ibid.*: 12) The law of conservation of matter and the equality of action-and-reaction in physics have developed this way of logic. And most of the methodology in social science, especially the statistical analysis including regression technique, path analysis, LISREL, etc., focuses on identifying the variables in causal relations. Even within axiomatic formats, the hypothesis that has "the more... the more..." form is based on such logic.

Thirdly, the typological formats try to organize empirical data into one category by the defined characteristics.⁷⁾ Since the categories are to be arranged by dimensions, the typological formats offer a sort of generality in the empirical worlds. Turner indicates that the typological structure can explain *how* various phenomena are related, even though it is difficult to explain *why* those phenomena are classified into different groups. The typological formats can be seen not only in the table of periodicity (chemistry) and the classification of species (biology) but also in the classification goods (political economy), typology of regimes (politics), and chi-square analysis (statistical method) which is frequently used in empirical field of social science research (e.g., Ostrom & Ostrom, 1977: 7-49).

Lastly, the cybernetic format explains an entity by a communicative system that has self regulating elements through feedback process continuously interacting with the environment. In this format the main structure of explanation is to show how a system convert inputs into outputs, how outputs affect input (feedback), and how a system react upon environments. In this sense, a system can be compared to a self-regulating organism that consistently corresponds to the external environments. According to Deutsch (1966: 76), the merit of cybernetic format "represents a shift in the center of interest from drives to steering, and from instincts to systems of decision, regulation, and control, including the non-cyclical aspects of such systems." In its scope, the cybernetic format is comparable to Lavoisier's stress on quantitative chemistry and Darwin's concept of evolution. The biological concept such as homeostasis is used to explain the self-sustaining process of a system. In addition to Easton's model of political system, Deutsch's communication model follows the cybernetics format.⁸⁾ The emphasis on the importance of environment and open systems concept are thus originated from natural science.

In addition to the explanatory formats in social science, the influence in deciding level of analysis needs to be noted. The unit of analysis in natural science has traditionally been on individual level and the methodology has been individualism and reductionism. Especially under the Western tradition⁹⁾ of scientific inquiry¹⁰⁾, analyzing means the reduction to the individual units. In other words, in the field of physics, the basic units are atom, which compose condensed matter; in biology, organisms are reduced to cells. Under such a tradition, methodological individualism or micro-reductionism¹¹⁾ has been fairly prevalent in the social science, too. The methodology of micro-economics, new institutional economics, and behavioralism in politics and sociology are the examples of this tradition.

Thus, it is so far discussed how the scientific thinking about society has borrowed the naturalistic ways of explanation in validating the theories. As mentioned, voluminous ideas of natural science may contribute to discoveries and the growth of

knowledge¹²⁾ in social science. The aforementioned isomorphic structure of explanation and methodological assumption between social and natural science implies that the predominance of natural science does not pause in the context of discovery, however. As the influence dominates its validating context, social science is going to lose its vitality and social relevance when it strictly adhere to the explanatory formats blindly. Why so? The next section of idiosyncratic characteristics of social science relates the reasons for such possibilities.

III. Methodological Idiosyncrasies of Social Science

The difference between natural and social science *prima facie* lies in the object that is being studied: natural entities or phenomena; and the nature of society or human being. Naturalists¹³⁾ have attempted to prove that the only difference between the two is the object of study. We can see those examples in the work of Russell who claimed neutral monism, Descartes and Kant who thought that the structure of human mentality is correspond to the structure of real world *a priorily*, Chomski who tried to prove this kind of thinking by linguistic analysis, and so on.

The differences are, however, fundamental ones rather than a matter of degrees or objects. Therefore, the methodological efforts to be redeemed to the heaven of physics should be paused. The natural science-like methodological strictness does not guarantee the lift; rather, on the contrary, it may let go of contextualized description, deep understanding of the real world, and relevant prescription for social problems. The rest of the section is the rationale for such proclaims about the methodological idiosyncrasies, if not ontological or epistemological differences.

1. The Possibility of Monology and Normality

The search for the universal law or even grand theory has been the zeal of many social scientists. They have believed the possibility of monology in social science. Or, they delved into finding out, at least, probabilistic law. Even when dealing with culture, some positive philosophers of science (e.g., Nagel, 1961: 464) say that "it is therefore clear that the 'historically conditioned' character of social phenomena is no inherent obstacle to the formulation of comprehensive transcultural laws." In order to deal with the universal laws in social science, it is necessary to make it clear what law means. If we define the law as methodological conventions or logical generalization of causality in a broader sense, social science also has the law. However, if we understand the law as the rule that can be applied to every social phenomenon regardless of culture, history, and other settings like institutions, such

kind of law hardly exists. This is so because the law has its marginal conditions to be applied, and these conditions are the product of the very knowledge of law makers (Giddens, 1979: 324). Dilthey indicates social science is the science of "understanding" (Verstehen), while natural science is that of "explaining" (Erklären). So, the way of explanation and understanding is inevitably different: there is no necessity for single universal law in the dimension of understanding while the law is indispensable in the dimension of explaining.

If uncovering a universal law or utmost generalization is not plausible, is it possible or necessary to establish the normal science or a paradigm (Kuhn, 1970) in social science? Apparently, naturalism seems to strive to establish the normal scientific methodology in social science by borrowing the methodology from natural science. However, as Popper (1970: 56) properly indicates, "it is just a dogma a dangerous dogma that the different frameworks are like mutually untranslatable language." In other words, various different frameworks (including methodology) are inter-dependent in delving into the truth. Feyerabend (1970: 208) also mentions the inter-dependence of different paradigms as follows: "Now these different paradigms were far from being 'quasi-independent'. Quite the contrary, it was their *active interaction* which brought about the downfall of classical physics."

Therefore, it is dangerous to pursue the normal science in social science in that the pursuit may deny the inter-dependence of different so-called paradigms.¹⁴ "In science, as distinct from theology, a critical comparison of the competing theories, of the competing frameworks, is always possible. And the denial of this possibility is a mistake." (Popper, 1970: 57) In this sense, what is needed is a liberal tolerance about different paradigms and methodology to accomplish a growth of knowledge rather than to pursue the normal science.

2. Subjectivity and Value Problem

The differences in the mode of explanation partly stem from the problem of how to obtain objectivity and to deal with subjectivity in social science. The objectivity has been regarded as taken by deducing from axiom to empiricals, by inducing from empiricals to axioms, by clarifying the variables and causal processes, or by classifying dimensions. These procedural rigidity does not assure the objectivity. The problems inherent in objectivity, however, as phenomenologists articulate as follows.

According to Husserl, it is necessary to parenthesize naturalistic phenomena through phenomenological reduction (Bernstein, 1976: 126-135). The residuals outside of the parentheses can be understood. Such ways of understanding phenomena is very essential in obtaining subjectivity in social science. In other words, phenomenologists

emphasize the importance of subjectivity and the objectivity itself can only be guaranteed by shared inter-subjectivity. In this sense, phenomenology opened new horizon for the discourse of subjectivity. As phenomenologists asserts, obtaining objectivity is not a simple task in social world where the objects of analysis have own predisposition and even voluntaristic will.

One of the inevitable solutions to resolve the subjectivity problem is focusing on facts, free from values. Positivists contend that the matter of value and fact should be dichotomized in social science. Comte, for example, primarily focused on the fact instead of transcendent philosophical fantasy. By dividing the stages of development of knowledge (theological state, metaphysical stage, and positive stage) and by illustrating the hierarchies of positive science (astronomy-physics-chemistry-biology-sociology), he showed how positivistic thinking had developed. More extreme trend of fact-value dichotomy can be found in the works of logical positivists. The Wien/Chicago School including Carnap and the Berlin School including Hempel and Nagel have developed "unified science" that analyze natural scientific concepts or proposition by logic and have striven to evacuate metaphysics in social science (Kim, 1986: 462). They, closely associated with language analysis, set aside the problem of values from the discourse of social science.

Facts about social phenomena and human activities are neither value-neutral nor value-free, though (Longino, 1990). Positivists seem to dichotomize value and fact not because the two should be logically dichotomized but because it is easier to become similar to natural science by doing so: putting the cart before the horse. The suggestion of New Public Administration (NPA) in the study of public administration can be an example in this regard. Values (social equity, for example) and moral contexts (Etzioni, 1988) that are ignored by so-called naturalists and logical positivists now should be re-emphasized according to NPAs prescription. Only by paying more attention to the values, social science can be meaningful in this prescriptive sense. The debate is therefore closely related to the role of science.

3. The Role of Science and Methodological Issue

Primary roles of science are to explain and understand social phenomena. In this sense the role is not so different as that of natural scientists. However, the role of social science goes further than that: to prescribe actions for the society, if not to empower and emancipate it (e.g., Fay, 1987). In this regard, the value problem in social science becomes more distinctive. The responsibility of scientists about products and findings of their scientific achievement also matters. In a general sense, physicists may not be concerned about the use of atomic power whether it is used as atomic

bomb or atomic power-generation; nor may social scientist. Or, both natural and social scientist have to be concerned about their scientific products. If the scientific process itself is really value-free, as for natural scientists, it would matter *before* they start the research (the purpose of the research) not *during and after* the research (the process and the product of the research).

As for social scientists, they ought to be responsible for the works even after the scientific process because the products themselves are loaded with value, implications and prescriptions. Social science needs to be more "relevant" science to human society. The methodological naturalism has neglected relevance to human aspects by delving into the facts free from value, pursuing objectivity without considering subjective aspects of human behavior, and by quantification as camouflage of the reality. Andreski (1972: 41-42) precisely indicate this aspect as follows: "Problems of this kind have not only a theoretical but also a *practical* significance. [...] As to the methodology of the social sciences, it seems certain that without taking this factor into consideration, it must remain on the level of unrealistic quantification, no matter how refined its statistical techniques might be."

Social relationship is "I-and-Thou" relationship (Buber, 1954). But naturalism estranged social relationship into "I-and-It" by confining theories of social science into purely positive form. It is mainly raised by the critical social scientists: they showed how false-consciousness affects the society and why and how social scientists contribute to the education, liberation of society (Fay, 1987). On the other extreme, history witnessed many so-called social scientists who offered ideological, political, economical, and legal basis for the dictatorship during the tyranny.¹⁵⁾

Social science is not isolated from the real world: the science constantly influences the world, and at the same time the world influences the science. Major economic and political actions by citizens, firms, and governments are based on theories and science. Especially in the developing countries, scholars take part in establishing national planning and major public policy that are crucial for national development. In this regards, the role of social science is more than meets the eyes.

A brief note about methodological individualism and relating to the scientific role should be mentioned. Another factor that distinguishes social science is a reductionism issue: the relationship between part and whole. As noted, there have been a tendency that a substance can be analyzed through studying its part in natural science. Though there have been a lot of debate about reduction and aggregation, the social reality need to be grasped as a whole according to the Frankfurt School who asserts that we can criticize a society only by analyzing societal totality (Soziologische Totalitat) the internal dynamics that induces historical origins and societal movements (Adorno, 1984: 84-88). In this regards, social science has considerable idiosyncratic features and should be treated as such.

IV. Conclusion : Toward Methodological Liberalism

"Theories are nets: only he who casts will catch." (Novalis)

The importance of theory and methodology is too substantial to overemphasize in scientific enterprise. As Popper (1968: 11) quotes above, it is impossible to comprehend phenomena without a theory or a methodology. This paper does not deny the significance of methodology in social science. Nor did it assert methodological anarchism. Rather, it insists that social science be more liberal from the mode of explanation of natural science in its methodology because of its idiosyncrasies.

In doing this assignment, the paper has differentiated the context of discovery and validation. It is true that social scientists can get whatever intuition from natural science in the context of discovery, but they begin to trap themselves by over-conforming with the methodology of natural science in the context of validation. As a result, the explanatory structure of social science copied that of natural science e.g., axiomatic, causal process, typological, and cybernetic formats. But the consideration of issues such as the possibility of monology and normal science, value and subjectivity, the role of social science, and its totality negate naturalism. Therefore, the methodological liberalism is asserted in the sense that i) it is difficult to accept the concept of normal science in social science, ii) social science ought to be relevant to the society into which it delves, and iii) social science cannot be analyzed by the parts that consist society and human beings.

The debate whether social science is a science is nothing but a product of naturalistic concept of science. The answer about such a question depends on the very criteria used. For example, "some scientists would say that a science requires: 'well articulated hypotheses and their systematic testing'; 'precise measurement and operationalization of concepts'; 'careful observation by publicly checkable method'; 'sophisticate and rigorous conceptual structure, and great insight'; and 'shared paradigms.'" (Lindblom, 1990: 152) If we take more liberal view on the methodology of social science, if we use different and liberal criteria on the meaning of "science" in social science, then those kinds of debates will be less problematic.

The process influences the reality, the way how we think influences what are to we think, and the methodology influences ontology. We create the world in which we live (Bois, 1978: 128-131). The rationale of stressing methodological autonomy in social science so far is that the naturalistic methodology influence the ontology itself of social science. The problem is, I contend, that the social scientists have limited ourselves and the world we inquire by confining to the methodology that is borrowed from the field which is totally different. For the salvation of social science to the millennium of

natural science, it will have to wait for the Messiah who has never advented yet, or who may never will.

Notes

- 1) Even Einstein disagreed to this ontology as expressed in his famous words, "God does not play dice."
- 2) Entropy in thermo-dynamics means that everything tends to change into complicated and non-recoverable matter. System theorists assert that every system has negative entropy in order to survive. Also refer to Schumacher's *Small is Beautiful* (1988) which also uses the concept of entropy.
- 3) Homeostasis is the process organisms obtain stability. It explains the tendency that organisms are to remain their original status. It is one of the critical factors for the survival of the system.
- 4) Hempel distinguishes the concept of methodology from method. He contends that the latter can be different between social and natural science while the former is and ought to be exactly the same between the two. (See, Hempel, 1965) Here, the term "methodology" is used in the sense that social science can also have its own unique methodology free from that of natural science.
- 5) First three formats are identified by Turner (1974, 1978) and the last format by the author.
- 6) This is usually called the scope conditions of the theory.
- 7) Turner did not identified the typological formats in the first edition of his book. See, Turner (1978: 27-28).
- 8) Noticeable is the similarity between the model on political communication and control and Deutsch's model. (See, Deutsch, 1966: 75-97, 258)
- 9) Generally speaking, in the Oriental thinking, especially in Taoism and Buddhism, holistic approach has been widely spread. (See, Zukav, 1988tr.)
- 10) This tradition can be traced up to the Greek philosophers' quest for the "arche" such as Demokritos' concept of "atoma."
- 11) Methodological individualism and reductionism are not the same here per se but are still closely related.
- 12) The debate about paradigmatic thinking and growth of knowledge will be discussed in the later section.
- 13) This paper use the term naturalist as the scholars who emphasize the isomorphic explanatory structure between social and natural science.
- 14) See the debate in Lakatos and Musgrave (1970).
- 15) How social science can be misused or abused are illustrated in Andreski (1972).

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