Reprinted from

psychologia—An International Journal of Psychology in the Orient—

Vol. XXXII, No. 1 March 1989

BEYOND THE TRADITIONAL CONCEPT OF CONCEPTS: A SET-THEORETICAL AND PHENOMENOLOGICAL CASE STUDY OF THE "VALUE" CONCEPT IN "*CAPITAL*"

Akihiro YOSHIDA

The University of Tokyo, Japan

Psychologia Society

Department of Psychology
Kyoto University
Sakyo-ku, Kyoto 606, Japan

Psychologia, 1989, **32**, 1–15

BEYOND THE TRADITIONAL CONCEPT OF CONCEPTS: A SET-THEORETICAL AND PHENOMENOLOGICAL CASE STUDY OF THE "VALUE" CONCEPT IN "*CAPITAL*"

Akihiro YOSHIDA*

The University of Tokyo, Japan

A set-theoretical and phenomenological case study of the concept of the "value" in K. Marx's "*Capital*" is sketchily presented. The intent is to go beyond the traditional concept of concepts and concept formation that has been adopted in the long history of psychological concept formation studies. The "value" concept is set-theoretically formulated as the set of sections of a relation, and is phenomenologically explicated as the sedimentation of the determinations by the external social horizon. With this case study, these two formulations, the author believes, are shown to go beyond the traditional concept: "Disregarding the particulars and extracting the common features" and/or "common response to dissimilar stimuli". Thus, the article attempts to draw the attention of fellow psychologists to the relevance of both the Set theory and Husserlian Phenomenology to the psychological study of "real" concepts and concept formation.

1. The Problem and its Background

In the history of the experimental psychology, there is a long tradition of studies on concept formation—along with those on concept-acquisition, -identification, -learning and -assimilation—, which includes such a well-known classical study as Hull's (1920). After reviewing the extensive researches on concept formation over a period of six decades, Pikas (1966) discerned two different basic definitions of concept formation. The first is Aristotle's definition of concept formation as "*disregarding the particulars and extracting the common features.*" The second is the definition which received its formulation in S-R psychology relatively recently [as of 1966] "*common response to dissimilar stimuli*" (Pikas, 1966: 231–232). Regardless of whichever definition that may be adopted in a particular experiment, the concepts expected to be formed by the experimental subjects therein invariably are relatively simple ones such as "red" and/or "circle" and so on, based upon simple artificial "instances". Discussions are usually made however, with much confidence, as to the positive implications of these studies to our understanding of the formation of "everyday and/or scientific"—hereafter referred to as "real" where appropriate—concepts. This confidence was observed, for instance, in the classical experimental study "*A Study of Thinking*" (Bruner and others, 1962) in its detailed discussions, at the beginning of each chapter, on the types of "real" concepts and the corresponding strategies of the concept formation. The confidence is presumably based upon and supported by the empiricist's theory of concepts which does not or cannot see any fundamental difference in nature

* Department of School Education, Faculty of Education, The University of Tokyo, Hongo, Bunkyo-ku, Tokyo 113, Japan.

between the specially contrived concepts to be formed in the artificial experiments, and the "real" concepts in the real life-world outside of the experimental laboratory settings. Thus, the results obtained on concept formation experiments are claimed to be quite easily translatable in principle to the corresponding types of "real" concept formation. Accordingly, the optimistic views tend to prevail that the accumulation and systematization of the results from these kind of artificial experimental concept formation studies will, in some near future, cover the whole area of concept formation that will exhaustively correspond in principle to the whole area of "real" concept formation. As a typical formulation on concepts and abstraction supporting these strong confidence and optimism, we may refer to Hayakawa's "The Abstraction Ladder" (1952), which we shall examine later.

The author admits that the results obtained from the tradition of experimental studies on concept formation have remarkably enriched our understanding of human concept formation with artificially contrived concepts. He also recognizes that the kind of the formulations on concepts and abstraction supporting the tradition would cover some important parts of the area of "real" concepts. However, the author also believes that the majority of the important "real" concepts cannot find their counterparts among the artificially contrived experimental concepts thus far studied in the tradition and that the kinds of above-mentioned formulations on abstraction are intrinsically incapable, therefore inadequate, to cover many important "real" abstract concepts.

In the previous article (Yoshida, 1972), the author made the points above and proposed a set theoretical formulation of concepts. By virtue of the formulation, it became clear that a variety of "real" abstract concepts had not been studied in the tradition and that these concepts could be formulated in the proposed formulation. Toward the end of the article, he indicated that the "real" concepts such as "directive correlation", "purposive behaviour", "structure", "equilibrium" and "stable state" are set-theoretically formulated by W. R. Ashby (1964a). The author also pointed out that the analysis of the "real" concept "value" of the "commodity" given in the first chapter of "Capital" by K. Marx could also be formulated by a set-theoretical formulation, which would clearly demonstrate the powerfulness of the formulation and the limitations of both the traditional studies of concept formation and their supporting formulations of concepts and abstraction.

The purposes of the present article are: 1) to attempt to present a sketch of a set-theoretical formulation of the "real" concept "value" of the commodity in the "Capital" as a case; 2) to present a phenomenological explication of the same concept; by so doing, 3) to fulfil the overdue promise of actually performing the presentation of the analysis; 4) to demonstrate the possibility of both the set-theoretical formulation and the phenomenological explication for the concept formation studies of "real" concepts, and thus 5) to invite further investigation of "real" concept formation of the "real" abstract concepts.

In this article, the author would leave the admittedly out-dated review above as it is, and would rather concentrate on the presentation of the proposed formulations, in

the form of a case study of the "value" concept.

2. A Brief Summary of a Set-theoretical Formulation of Concepts: As was presented in the 1972 article.

Set theory, such as formulated by Bourbaki (1968) could relate to concept formation studies at least in the following three ways. First, Set theory formulates an important set of concepts, i.e. all the mathematical concepts. Evidently, however, not all concepts to be studied in psychology are mathematical. Second, Set theory formulates concepts to be formed—learned, identified, acquired, or assimilated—in concept formation. The formulation would make the analysis of concepts systematically exhaustive, which would help us view the actually existing concepts placed among the possible yet non-existing ones. It would also provide the common language for concept formation studies. And thirdly, Set theory could formulate the structure of the concept formation processes.

In the process of concept formation always involved is a process of specifying a subset of a set—a universe set of instances, object, phenomena, states of affairs, and so on—the subset being corrrespondent to the concept to be formed. This is at least partly because the subject forming the concept lives in the world, the universe, full of redundancy and utilizes the redundancy by "disregarding the particulars, and extracting the common features" and thus making "common response to dissimilar stimuli". Therefore, the central problems in concept formation studies are that of the specification process of the universe set and its subset, and that of the conditions under which the specification process of both sets proceeds. There are two kinds of ways for constructing the set and the subset to be specified, which corresponds to the two distinct ways of formulating concepts set-theoretically. These two ways are: the "connotative (intensive) formulation" and the "denotative (extensive) formulation". In the former, the sets of attributes—of instances, objects, phenomena, and/or states of affairs—are used as the initial base sets, while, in the latter, the sets of instances,—objects, phenomena, states of affairs and/or concepts—are used as such.

Here, a detailed presentation of Set theory would obviously be impossible. However, for those readers who might be unfamiliar with Set theory or who have no access to the 1972 article, the structure and implications of essential parts of Set theory needed here for our set-theoretical formulation may be described, from a very "naive" point of view, as follows.

First of all, "All the basic principles of set theory, except only the axiom of extension are designed to make new sets out of old ones" (Halmos, 1960: 4). The ways to generate new sets out of old ones are as follows. Suppose, for instance, we are given "three *distinct sets* E, F, G, we may form other sets from them by taking their sets of subsets, or by forming the product of one of them by itself, or again by forming the product of two of them taken in a certain order. In this way we obtain *twelve* new sets. If we add these to the three original sets E, F, G, we may repeat the same operations on these fifteen sets, omitting those which give us sets already obtained; and so on. In general, any one of the sets obtained by this procedure (according to an explicit

scheme) is said to belong to the scale of set on E, F, G, as base." (Bourbaki, 1968: 383). We could continue to produce new sets out of old sets by this procedure *ad infinitum*.

Here, we may distinguish basically three kinds of operations; 1) those forming subsets of a given set, 2) those forming product sets of given sets, and 3) those forming power sets of a given set. To be included, here in our discussion, among the first operations forming subsets are; those forming a union of subsets, an intersection of subsets, a complement of a subset and so on, and also, those forming a projection of or a section of a subset of a product set of sets.

The difference between the connotative formulation and the denotative formulation can now be described as follows; the former takes the set of "attributes" as base while the latter takes the set of "instances" as base. Therefore, in the connotative formulation, an instance is constructed as an element of a product set of attributes sets, so that the concept formation becomes a process of specifying a subset of a set of instances as a subset of a product set of attributes' sets. In the denotative formulation, on the other hand, an instance is an element of a set of instances. "It is fundamental in Bourbaki's method that a property is identified with the subset of elements that possess the property, (some total set or 'universe' always being defined, or at least clearly understood)" (Ashby, 1964a: 88). Therefore, the concept formation becomes a process of specifying the subset—of the universe set of instances,—that can be identified with an attribute, or a property, for instance.

Now, in the denotative formulation, if we make a power sets—i.e., the set of sets, —, a set of instances as base, and take a subset thereof, then the subset corresponds to and can be identified with a "concept of concepts", i.e., an "abstract concept". Implied in this formulation is that the formation of an abstract concept at a higher level as a "concept of concepts" becomes feasible only with the help of language and/or symbols. Also, if we make a product set of sets of instances and take a subset thereof, then the subset can be identified with a relational concept between instances. According to Ashby (1964a, & b), this idea of identifying a relational concept with a subset of a product set of instance sets owes to N. Wiener (1914).

Particularly important for our purpose of studying the concept of "value" is the attribute that is identified with a subset formed by the operation of forming a projection or a section on a subset of a product set of sets of instances. Let us elaborate on this point a little further. Suppose we have two sets of instances, E and F as base. Then, we can make a product set $E \times F$, a typical element of which is in the form of $\langle e, f \rangle$, where e is an element of E and f is an element of F respectively. Suppose further that we take a subset R of the product set $E \times F$, then the subset R—which is defined as a "graph" (Bourbaki, 1968: 75)—is identified with a relation between instances belonging to E and those belonging to F. We can derive attributes from this relation by the operation of either projection or section. As we recall, an attribute can be identified with a subset of the universe set of instances. We can form a subset of E by projecting the subset R of the product set into the set E, for instance. The projected set of E can possibly be identified with an attribute, definable only with the mediation of the rela-

tion R. In the same vein, the section of R at a generic element x of E is defined as the subset of F, the set of those elements in F that, with x, make a couple in R. Thus, the section of R at x of E, i.e., S(x), specifies a subset of F, therefore an attribute, again definable only with the mediation of the relation R.

At this point, it should be noted that "being given a certain number of elements of sets in a scale, relations between generic elements of these sets, and mappings of subsets of certain of these sets into others, all comes down in the final analysis to being given a single element of one of the sets in the scale." (Bourbaki: 383). Therefore, any subset to be identified with a concept derivable from the base sets of instances are all included, without exception, as a single element of one of the sets somewhere in the scale. This implies the systematic powerfulness and the exhaustiveness of the set-theoretical formulation of concept, which can formulate even the yet non-existing possible concepts as well as the already existing ones.

This much would suffice as a preparation for our purposes.

A Case Study: on the "Value" Concept in K. Marx's "Capital"

1. The "Value" Concept in Capital Reviewed

Before attempting to sketch a set-theoretical formulation of the concept "value" in "Capital" as a case study, let us first make a minimum review of the concept as is originally given in the classic.

First of all, the reasons why the author has chosen the concept as a case for the analysis here are: 1) The concept is a "real" scientific one, which is expected to be formed—learned, acquired, identified, assimilated—by every reader of the classic, "*Capital*", or most students of economics; 2) The concept has been considered to be formed only with great difficulties; and 3) The concept exemplifies an abstract concept that is mediated by a relational concept and by an abstraction of a higher level; and, thus, 4) The concept offers a good opportunity for demonstrating the cause proposed in this article.

That the concept of "value" in "*Capital*" is a "real" one would need no further comments. To examine and argue, as a critical student of economics might do, whether or not the concept is valid and acceptable in the discipline of economics is far beyond the present author's capacity and is not intended here. The intent is a very modest one of merely introducing, reviewing and reminding the concept given in the original as briefly and accurately as possible.

On the difficulty of forming the "value" concept, the following points made by Marx himself are relevant. "Every beginning is difficult, holds in all sciences. To understand the first chapter [on "Commodities"] especially the section that contains the analysis of commodities, will, therefore, present the greatest difficulty." (Marx, 1906: 11). Commodities are "something twofold, both objects of utility, and, at the same time, depositories of value." Take a coat for instance as an example of a commodity. "In the production of the coat, human labour-power, in the shape of tailoring, must have been actually expended. Human labour is therefore accumulated in

it. In this aspect the coat is a depository of value, but though worn to a thread, it does not let this fact show through." (ibid.: 60). "The value of commodities is the very opposite of the materiality of their substance, not an atom of matter enters into its composition. Turn and examine a single commodity, by itself, as we will. Yet in so far as it remains an object of value, it seems impossible to grasp it" (ibid.: 55).

The difficulty of understanding the concept of commodities lies in the difficulty of the very concept of the "value" of commodities. Thus, "...In the analysis of economic forms [such as commodities], ...neither microscopes nor chemical reagents are of use. The force of abstraction must replace both." (ibid.: 11). The difficulty, in essence, may be said to be with the force of abstraction required for understanding the "value" concept. "A commodity is therefore a mysterious thing, simply because in it the social character of men's labour appears to them as an objective character stamped upon the product of that labour; because the relation of the producers to the sum total of their own labour is presented to them as a social relation, existing not between themselves, but between the products of their labour. This is the reason why the products of labour become commodities, social things whose qualities are at the same time perceptible and imperceptible by the senses." (ibid.: 83). And also, "All commodities are non-use-values for their owners, and use-values for their non-owners. Consequently, they must all change hands. But this change of hands is what constitues their exchange, and the latter puts them in relation with each other as values, and realises them as values. Hence commodities must be realised as values before they can be realised as use-values." (ibid.: 97).

Suppose we observe a case of an exchange of commodities, for example, where 1 coat is exchanged for 20 yards of linen, i.e., 1 coat=20 yards of linen. Then, following the terminology of Marx, the value of "1 coat", in the relative form of value, is expressed by the value of "20 yards of linen", in the equivalent form of value. The coat expresses its value in the linen, the linen serves as the material in which the value is expressed. We may compare the above situation with the other situation in which a sugar-loaf and a piece of iron are thrown into the scales and found to be equal in weight. Thus observing, we may say that the weight of the sugar-loaf is expressed by the weight of the iron and write as follows; the sugar-loaf=the iron, very much in the same way as 1 coat=20 yards of linen. However, "The iron, in the expression of the weight of the sugar-loaf, represents a natural property common to both bodies, namely their weight; but the coat in the expression of value of the linen, represents a non-natural property of both, something purely social, namely, their value." (ibid.: 66) "Since, however, the properties of a thing are not the result of its relations to other things, but only manifest themselves in such relations, the coat seems to be endowed with its equivalent form, its property of being directly exchangeable, just as much by Nature as it is endowed with the property of being heavy, or the capacity to keep us warm. Hence the enigmatical character of the equivalent form..." (ibid.). By generalizing the above situation we eventually reach the situation, where "The linen, by virtue of the form of its value, now stands in a social relation, no longer with only one other kind of commodity, but with the whole world of commodities. As a com-

modity, it is a citizen of that world. At the same time, the interminable series of value equations [such as will be given shortly in the table "The General form of value" on page 26] implies, that as regards the value of a commodity, it is a matter of indifference under what particular form, or kind, of use-value it appears." (ibid.: 73)

Summing up: 1) A commodity has the following two-fold characters at the same time: a. the object of use-value and the object of value; b. the product of concrete useful labour and the product of abstract human labour; c. a non-use-value for its owner and a use-value for its non-owner: 2) The exchange of commodities put the commodities in relation with each other as values and realizes as values: 3) Commodities must realize as values before they can be realized as use-values: 4) The character of a commodity as an object of use-value can be observed by looking at the commodity as a physical material object, but its character as an object of value cannot be observed just by looking at it: 5) When we exchange commodities, we equate the different kinds of human labour that had been expended on the production of each commodity: 6) In a commodity, a product of human labour, the social character of human labour appears to human eyes as if an objective physical character of the product: 7) The value relation between the products of human labour as commodities is a definite social relation between men, but appears as if a fantastic relation between things themselves: 8) The commodities are social things whose qualities are at the same time perceptible (as use-value) and imperceptible (as value) by the senses.

So much for an extremely abbreviated summary on the concept of "value" as elaborated in the Chapter 1 of "*Capital*".

2. A Set-theoretical Formulation: A derivation of the concept as the set of sections of a relation

Now, let us attempt to formulate set-theoretically the concept of "value" as described above. Suppose we take a set W of all possible exchangeable commodities in the world of commodities. The set should be an "infinite set", containing an infinite number of commodities in it. Then, we form a product set $W_1 \times W_2$ (where $W_1 = W_2$, the suffix numbers serving only for identification). Then, the set $W_1 \times W_2$ is identified with the set of all possible exchanges, actual, possible and imaginable in the world of all possible commodities. The elements of the set take the generic form of a two-tuple $\langle x, y \rangle$, where $x \in W_1$ and $y \in W_2$. The exchange is expressed as $y = x$, where y is the relative form of value and x is the equivalent form of value. Thus, notice that the set $W_1 \times W_2$ includes even the trivial element such as $\langle x, x \rangle$, representing the scarcely realized exchange of a commodity x for the identical x. The set may also include such socially absurd exchanges as exchanging a house for a box of tissue paper, for instance, but these matters do not logically concern us here for our limited purpose. Now, we may form a relation R as a subset of $W_1 \times W_2$. The subset R represents the relation of exchanges in which the value of y of W_2, in the relative form of value, is expressed by the value of x of W_1, in the equivalent form of value. The y expresses its value in the x, the x serves as the material in which the value is expressed. Further more, we form the section of R at α of W_1, $S(\alpha)$, where $\alpha \in W_1$, then we get a subset of W_2. The common property, or the common attribute, which all the elements

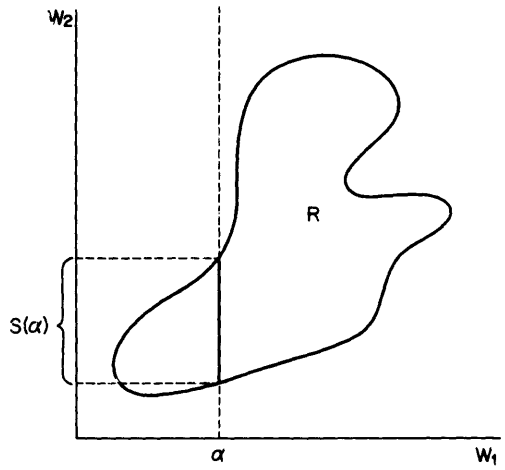

Fig. 1. Section $S(\alpha)$ in W_2 of R at α in W_1.

of $S(\alpha)$ share is the property that, as value, they are all equal to the value of α. The property, however, could never be one of a physical material property such as color, size, weight, and so on. The value of α, along with the value of each element of $S(\alpha)$ is defined as the common property shared by α and every element of $S(\alpha)$, and is identified with the set $V(\alpha)$, i.e., $\{\alpha\} \cup S(\alpha)$, i.e., the union of the sets $\{\alpha\}$ and $S(\alpha)$. Thus the value of α is definable only by mediation of R. Similarly, we could form $V(\beta)$, $V(\gamma)$, and so on, for commodities, β, γ, and so on. The set $\{V(\alpha), V(\beta), V(\gamma),\ldots\} = V$ is a subset of the set of subsets of W, i.e., a subset of the power set of W, i.e., an element of a power set of W. It is to be identified with the abstract concept of "value".

Let me elaborate the logic of identifying the set with abstract concepts here as follows, using the traditional experimental situations as an illustrative example. Let $X = \{x_1, x_2, x_3, \ldots x_n, \ldots\}$ be the universe set of artificial instances, instances with colors, shapes, and so on. A subset of X, whose every element is red, is to be identified with the concept of the color "red". A subset of X, whose every element is blue, is identified with the concept of the color "blue", and so on. A subset of X, whose every element is circle, is identified with the concept of the shape "circle". The same with the shape "triangle", "rectangle" and so on. Then the set C = {red, blue, yellow, ...} is identified with the concept "color", and the set S = {circle, triangle, rectangle, ...} is identified with the concept "shape", and so on. Finally, the set {C, S, ...} = {color, shape, ...} is identified with the concept "property" or "physical property". In other words, some particular elements of the power set of X, on one level of the scale of set on X as base, are identified with red, blue, yellow, ..., and circle, triangle, rectangle, ...respectively. On the next level of the scale, some particular elements are identified with color, shape, ...and so on. Finally on the next level of the scale, a particular element is identified with the concept of "property". As pointed out earlier (p. 22), all the abstract concepts derivable from the universe X are to be identified with a single element of one of subsets somewhere in the scale of set on X as base. It should be emphasized

that such abstract concepts as "color", "shape", "attribute", or "property" have their corresponding identifiable sets *never* among the immediate subsets of the original universe set X, but *only* among the subsets of the power sets of the X.

Thus, the author would assert that, very much in the similar way as above, the concept "value" is to be identified with an element of a power set of W, in the scale of set on W as base.

According to Marx, the only possible property shared by all the elements thereof would be that of being the products of the "abstract human labour", in contrast to the "concrete useful labour". The abstract human labour could be defined as the common property of all the elements of the set of every kinds of human labours producing every kinds of commodities.

The relation between α and $S(\alpha)$ is illustratively exemplified, in "The General form of value" (ibid.: 75), as follows:

The General form of value.

1 coat 10 lbs. of tea 40 lbs. of coffee 1 quarter of corn 2 ounces of gold 1/2 a ton of iron x com. A., etc.	}	=20 yards of linen

In the example above, only α and $S(\alpha)$ are given, whereas R and $W_1 \times W_2$ are only implicitly given. Obviously, here, "20 yards of linen" is the α and the set {1 coat, 10 lbs. of tea, 40 lbs. of coffee, 1 quarter of corn, 2 ounces of gold, 1/2 a ton of iron, x com. A., etc.} is the $S(\alpha)$. For our limited purposes, the essential points on the relationship among the concept of value, the α, $S(\alpha)$ and R would remain the same even when the α becomes "2 ounces of gold", or some "paper money". Thus, we choose not to go further into the discussion on the money form.

Now it becomes clear why the concept of the value, as the common property of commodities, "presents the greatest difficulty", as Marx had stated previously. In this author's interpretation, based upon the analysis above, the reason is simply that the concept of value can be grasped only after understanding and following the process of defining it as the common property shared by all the elements, commodities, of the section $S(\alpha)$, which is to be derived from and thus to be mediated by the relation R.

In other words, while we attempt to discover the common property shared by the commodities as such, the property is not to be found in the commodities themselves as physical properties. The property is, rather, to be discovered only in the belongingness of the commodities to the section $S(\alpha)$ of the relation R, which is to be determined only through social exchanges. The property, therefore, is "social" and, thus, indeed "imperceptible" in the commodities themselves. Difficulties arise, therefore, 1) when we remain believing that to examine the commodities themselves as physical materials—such as our α and/or elements of $S(\alpha)$—is the only possible way to discover

and to abstract their common property, and also, 2) when we are unaware of, do not believe in, and/or deny, the existence of the abstraction process in which the common property is discovered in the common belongingness to the section $S(\alpha)$ of the given relation R. As Marx clearly wrote, "Hence, when we bring the products of our labour into relation with each other as values, it is not because we see in these articles the material receptacles of [abstract] homogeneous human labour. Quite the contrary; whenever, by an exchange, we equate as values our different products, by that very act, we also equate, as human labour, the different kinds of labour expended upon them." (ibid.: 85). The relation R is formed socially by/between/among people, the owners of the commodities. Thus, the relation R is social, so is the $S(\alpha)$ which is derivable only from R, and so is the common property of the commodities as "the depositories of values", which is derivable again only from $S(\alpha)$. The understanding the process of this derivation, as Marx wrote, requires "the force of abstraction" in the place of microscopes or chemical reagents.

Incidentally, we may notice that even the property of the use-value of commodities is not to be considered as merely physical or material in nature. It is, rather, to be understood as essentially relational. For example, a coat would be useful to a person who wears it, but it would be non-useful to a person who never wears it. Thus we could construct a set P of persons and a set W of the world of commodities, and then we could define the relational set R as a subset of the product set P x W, R being the set of two-tuples $\langle x, y \rangle$, where, to x in P, y in W is useful. Then, the use-value to the person α can be identified with the section of R at some α of P, i.e., $S(\alpha)$, as the common property of all the elements of $S(\alpha)$. However, we can directly observe and perceive the usefulness, to a person x, of a particular coat y by watching the person x wearing the coat y. Thus, the use-value, as the property of a commodity, is much easier to grasp than the "imperceptible" value and evidently requires less of "the force of abstraction".

Here ends a sketch of our set-theoretical formulation.

3. *A Phenomenological Explication: The formation of the concept as the sedimentation of the determinations by the external social horizon*

The "value" concept can be explicated by the phenomenological understanding of the sedimentation in experience of the "determinations" by "external horizon". Particularly relevant to this point is the E. Husserl's posthumous work "Experience and Judgement". In Chapter 3 of the work, "The Apprehension of Relation and Its Foundation in Passivity", Husserl gives a detailed phenomenological "explication of the relational contemplation" in the "Prepredictive (Receptive) Experience". Later, he gives relatively short references to the "relation" on the level of "Predicative Thought and the Objectivities of Understanding" and also on the level of "The Constitution of General Objectivities and the Forms of Judging 'in General'".

In Husserl's view, "Every experience has its own horizon; every experience has its core of actual and determinate cognition, its own content of immediate determinations which give themselves; but beyond this core of determinate quidity [essence], of

the truly given as 'itself-there', it has its own horizon. This implies that every experience refers to the possibility—and it is a question here of the capacity of the ego—not only of explicating, step by step, the thing which has been given in a first view, in conformity with what is really self-given thereby, but also of obtaining, little by little as experience continues, new determinations of the same thing. Every experience can be extended in a continuous chain of explicative individual experiences, united synthetically as a single experience, open without limit, of the same. ...no determinations is the last, ...what has already been experienced always still has, without limit, a horizon of possible experience of the same." (Husserl, 1973: 32). Every experience of a particular thing has its horizon; an internal horizon, the horizon within the particular thing in and for itself, and an external horizon, the horizon surrounding the thing, —e.g. its relations to other things and, most generally, the world in which the thing is contained and situated. Whenever the particular thing is put into new horizons, its explication gives rise to its new determinations. The simplest form of "determination" on the level of the predicative thought is "S is p", where "S" is the substrate, the thematized object of experience, and "p" is the predicate, the determining moment. Even on the level of the pre-predicative experience, "determination" proceeds.

The seemingly simple predicative determination "A commodity is a depository of value" is a highly abstract determination, and thus is founded on many preceding founding determinations: such as "A coat is exchanged for 20 yards of linen", "A coat is a commodity", and "A commodity is something twofold; an object of utility and a depository of value", "Utility is...", "Value is..." and so on.

Now, we could easily see the following point. Recall what Marx wrote: "The commodity is...a mysterious thing, simply because in it the social character of men's labour appears to them as an objective character stamped upon the product of that labour; because the relation of the producers to the sum total of their own labour is presented to them as a social relation, existing not between themselves, but between the products of labour." In Husserlian way of understanding, the first determination that "This coat is a commodity, a depository of value" would be viewed as a different kind of determination from the second one that "This coat is made of wool". The second determination refers to the physical property of the substrate, the thematize object, and perhaps also to the material relations, e.g., the relation of the product to its raw material. On the other hand, the first determination refers to the social relations in which the object is situated. It is founded on such determinations as "I tailored this coat", "I cannot or will not use this coat", "Someone else needs this coat for use", "If someone agrees with me, I would exchange the coat for something I need for my own use" and so on. The determinations derivable from these would be "The coat, the product, is for exchange", "The coat, the product, has no use-value for me, the producer" and so forth. The entire set of those determinations which comprises the determination "This coat is a commodity" is social, as Marx had pointed out, but is the determinations of the coat, nevertheless. The sedimentation of determinations derived from numerous experiences—real, possible, as well as imaginary—of the "exchanges

of things", the things being such as α and elements of $S(\alpha)$ as discussed earlier (p. 26), would become attributed to the things themselves as the determinations of the things as "commodities". This sedimentation would, on the one hand, tend to give rise to the false impression, as Marx pointed out, that these determinations must be of "natural" properties, since they seem to be given in experience from the very beginning. These determinations, however, are originally derived from the social relations, the external horizon of the things, i.e., their situatedness within the exchanges of the things among people, i.e., the world of commodities. The insight that the concepts of "commodity" and "value" in determinations of things originated from the social relations needed the genius of K. Marx, perhaps because of their firm sedimentation. This is also one of the reasons why the traditional concept of concepts has been so blind to the concepts derived from a higher level abstractions, such as mediated by the external horizons and/or multiplly "founded" determinations. The external horizon corresponds to the product set, and the "founded" determination to the power set, in our set-theoretical formulation. Someone who believes that all the determinations of the coat must be inherent in the coat itself, would also believe in and perceive the value—the social character—stamped upon the coat as if a physical material property. In another way of putting it, the physical properties are founded on the determinations derived from the internal physical horizon of the thing, while the character of being the "depository of value" is founded on the determinations derived from the external horizon of the thing, especially the social horizon in which the thing is situated. The external social horizon consists of such relations as the relations of producers-labours-products, exchanges-between-products, producers-producers and the world of commodities. Husserl aptly writes, "That which is for us an object self-given in a simple intuition, such that it can be apprehended in its internal as well as in its relative characteristics, rests, therefore, not only on what is intuitive and self-given itself and capable of being self-given intuitively as the object's surrounding field of intuition. *It rests also on all the relations—which for the most part remain undisclosed—to what has been once given and which can possibly be representified, indeed, possibly on all the relations to the objectivities—to the extent that some relation of similarity can be established—of free imagination.* In order to understand in their complete range of the operations of prepredicative apprehension, and then of predicative determination, possible on the basis of simple firsthand experience, we will reach out beyond the domain of the self-given, indeed, even beyond that of positional consciousness; and in addition we will have to take account of the domain of presentifications and of the intuitions of imagination. It is only in this way that we will acquire a view of everything which contributes to relational contemplation and the relative determination of the intuitively self-given." (ibid.: 150-151) [emphasis: Yoshida].

Essentially, the same would apply to the predicative determinations.

Thus, what Marx called mystical about "the commodity with the value" appears to us mystical when we can see the commodity only in its intuitively given internal horizon. What Marx urges us is to see the commodity and the value in the horizon of all the social relations in which the commodity is situated. In short, we are urged to

see the social world through the value of the commodity, to see beyond the physical property, outside the horizon of the commodity as the material object.

Next, let us briefly look at what Husserl would say on the simpler concept of the two, i.e. the "use-value". At one point, Husserl discusses on the determinations of objects, those determinations which arise not from doxic (perceptual) experience" but from "our evaluative and voluntary behavior" and "which we find in the experience of objects". He takes the "usefulness of a particular tool" as an example of such determinations, and he writes as follows: "By these determinations, the object, to be sure, is determined, not in what it is in and for itself, but in relation to us, to our appraising and willing, according to what it signifies for us. These are constructions of sense which, as founded, can appear in objects, i.e., as founded in their purely natural determinations (the concrete in the narrower sense). We can also designate these determinations as determinations of significance, or, so far as they are apprehended logically in a spontaneity founded at a still higher level, as predicates of significance, and we can differentiate them from purely material determinations, from those which belong to objects as mere things." (ibid.: 265).

In the explication of the "usefulness of tool", Husserl differentiates the determination of significance from the purely material determinations, but he simultaneously relates the former to the latter in the relation of the "founded" and "foundation". That the determinations with the concepts of "value" and "commodity" are founded on the determinations derived from the external social horizon, rather than the internal physical horizon would need no further comments.

4. A Comment on the Traditional Concept of Concepts: "Disregarding the particulars and extracting the common features"

Representing a typical traditional theory on concepts and abstraction, Hayakawa (1952) once wrote, "The 'object' of our experience...is not the 'thing in itself,' but an interaction between our nervous system (with all their imperfections) and something outside them." (Hayakawa: 167). Bessie, a cow in front of us, is unique. "But our nervous systems, automatically abstracting or selecting from the process-Bessie those features of hers in which she resembles...classify her as 'cow.'" (ibid.) Then he proposed "The Abstraction Ladder", which starts from the bottom upwards: "The cow known to science" (consisting of atoms, etc.), then to "The cow we perceive", "The word 'Bessie'", "cow", "livestock", "farm assets", "asset", and finally "wealth". He writes, on the one hand, "The word 'wealth' is at an extremely high level of abstraction, omitting almost all reference to the characteristics of Bessie" (ibid.: 169). On the other hand, on the level of "The cow known to science", he wrote: "Characteristics are infinite at this level and ever changing. This is the process level." (ibid.). In this view of abstraction, abstraction is the process in which "our nervous systems", i.e., we, automatically abstract or select from the "process", i.e., the object or thing, those features of the "process" in which the "process" resembles other "process" and ignore the differences (ibid.: 167). This kind of conception, viewing the abstraction process as an impoverishing process of "disregarding the particulars and extracting the

common features", seems to be entirely unaware of the existence of those enriching abstraction processes of higher levels, mediated by relations, backed by variety of external horizons and full of sedimented determinations, as was exemplified by the abstraction process of the concept of the "commodity" and the "value" ingeniously carried out by Marx.

Conclusion

In contrast to the traditional concept of concepts, the set theory, with its set-theoretical formulation of concepts, will provide the psychological studies with a structural and systematic framework for a rigorous and exhaustive analysis of concepts, and thus opens up the horizon of the psychology of concept formation in general and that of the experimental psychological study on the formation of "real" concepts, in particular. In addition, the phenomenology of E. Husserl, as exemplified in his "Experience and Judgement"—along with his earlier works—will provide our psychological studies with a powerful conceptual system for a penetrating analysis—or "explication" in phenomenological terms—of the concept formation processes themselves, particularly from the perspective of the first person, i.e., the person actually experiencing the abstraction processes. Thus, the author believes that both the Set theory and the Husserlian phenomenology, cooperating together, will complementarily provide the prospective psychology with extremely rich resources for explicating the concepts and concept formation processes.

The purpose of this article, in essence, was to attempt just to draw the attention of concerned fellow psychologists to the great significance of both the Set theory and Husserlian phenomenology, by sketching the powerfulness of the two and by pointing out the limitations and weak points of the traditional concept of concepts, while performing a case study on the "difficult" concept of "value" in *Capital* as an illustrative example.

REFERENCES

Ashby, W. R. 1964a. The set theory of mechanism and homeostasis. In von Bertalanffy, L., & Rapoport, A. (Eds.) *General systems: Yearbook of the society for general systems research,* **9**, 83–97.

Ashby, W. R. 1964b. Constraint analysis of many-dimensional relations. *Technical Report,* **2**, Air Force Office of Scientific Research, Grant 7–63.

Bourbaki, 1968. *Elements of mathematics: Theory of sets.* Hermann.

Bruner, J. S., & others, 1962. *A study of thinking.* Science Editions.

Halmos, P. R. 1960. *Naive set theory.* Van Nostrand.

Hayakawa, S. I. 1952. *Language in thought and action.* George Allen & Unwin.

Hull, C. L. 1920. Qualitative aspects of the evolution of concepts. *Psychological Monographs,* **28**, 123.

Husserl, E. 1973. *Experience and judgment.* Northwestern University Press.

Marx, K. 1906. *Capital: A critique of political economy.* Edited by Engels, F. Trans. by Moore, S., & Aveling, E. The Modern Library. The Giant series. G 26.

Pikas, A. 1966. *Abstraction and concept formation.* Harvard University Press.

Yoshida, A. 1972. The abstract and the concrete: Toward the psychological studies on concept formation. A special article for *Annual review of Japanese child psychology.* Tokyo: Kaneko-shobo. 297–337. Included

also in A. Yoshida, 1978. *Instructional research and psychology.* Tokyo: Kokudo-sha. 137–198. Both in Japanese)

N. B. Wiener, N. 1914. A simplification of the logic of relations. *Proceedings of the Cambridge Philosophical Society*, **17**, 387–390.

(*Manuscript received December 20, 1988*)