

Dialectical Perspective on Quality and Quantity

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Abstract: The dialectical perspective on quality and quantity is expressed in the law of the transformation of changes in quantity into changes in quality and vice versa (in short, the quantity-quality law). Under that view, quality and quantity exist in unity in things; each thing has different qualities and quantities; each quality has a defined level of quantity, in which the qualitative change occurs in leaps while the quantitative change takes place gradually. The change in quantity will be translated into the qualitative change when reaching the highest or the lowest quantity limits. That qualitative change will be in turn translated into the change in quantity. The dialectical perspective on quality and quantity is simple in content, which anyone can understand and apply to their perception activities.

Key words: dialectical, quality, quantity, law.

1. Introduction

The law of the transformation of quantity into quality is one of the three fundamental laws of dialectics. Hegel was the first Western philosopher who built up that law (in the objective idealism) [4, pp.268-341]. There existed numerous thoughts about the law of dialectics in general and the quantity-quality law in particular [4] in ancient Chinese philosophy. The quantity-quality law was argued and proven by Engels via various examples in his works *Dialectics of Nature* and *Anti-Dühring* [2, pp.179-184, 510-518]. In Vietnam, the quantity-quality law is mainly found in the textbooks of dialectics. However, the presentation of the law remains not very simple and not very easy to understand. There even exist different interpretations of some of the contents of this law. When it comes to the quality-

quantity law, it is the dialectical perspective on quality and quantity to be discussed. This article seeks to add a number of contents to the perception and interpretation of the dialectical perspective on quality and quantity.

2. The concepts of quality and quantity

Quality and quantity are the two general concepts of perception, used in philosophy and all other sciences. Textbooks of dialectics put forward various different definitions for the two concepts. Below are a number of them: “Quality is a philosophical category referring to the inherent objective definition of a thing, being the organic unity of properties that differentiate the thing from others”; “Quantity is a philosophical category

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referring to the inherent objective definition of a thing in terms of quantity, size, level, rhythm of movement and development and properties of the thing” [1, pp.232, 235]; “Quality is the distinctive feature of a thing, making it unique and differentiating it from others”; “Quantity is a property of a thing by which (in reality or in thought) we can classify it into parts of the same type and can group the parts into one” [6, pp.81-82]. According to these definitions, quality and quantity of a certain thing are its properties (defining its features and characteristics). However, in the definitions, the explanation for the difference between quality and quantity remains unclear, for both quality and quantity “define a thing itself and differentiate it from others.” Moreover, it is redundant to say that “quantity is a property of a thing in terms of quantity” (or “quality is a property of a thing in terms of quality”). That way of explanation makes the concepts more complicated and unclear.

When using these two concepts, we need to find their definitions. However, not everyone gives the definitions as much complexity as defined above. It is advisable to define quality and quantity in a simple manner. When forming a definition (i.e. explaining) for a concept, first of all we need to refer it to the nearest concept, and then set out specific examples (about it and not about it). For example, we can define the concept of natural numbers as follows: “Natural numbers are non-negative integers. For example, 1, 2, 3, etc. are natural numbers, and $1/5$, $2/3$, etc. are not.” Similarly, when defining quality and quantity, we need to first of all explain that quality and quantity (of things) are (their) properties. Then, we should provide examples of quality and quantity as in the

following examples: In the clauses: “this thing is iron; that thing is copper; this thing is white; that thing is black; this thing is hot; that thing is cold; this thing is heavy; that thing is light,” iron and copper, black and white, hot and cold, heavy and light are different qualities. In the clauses: “this thing is 40°C hot; that thing is 50°C hot; this thing is 5m long; that thing is 6m long; this thing weighs 10kg; that thing weighs 15kg,” 40°C degrees and 50°C degrees, 5m and 6m, 10kg and 15kg are quantities.

Defining a concept does not mean to put forwards views about a contested matter, but to explain (to others) the meaning of that concept (to avoid misunderstanding when using the concept). Views on a particular issue might be right or wrong; the use of a particular concept in this sense or another depends on different individuals. Before discussing a particular issue, the involved parties should reach agreement on the use of concepts in the discussion (to avoid misunderstanding like in the proverb “to talk at cross purposes”). When people in both dialectical and metaphysical schools argue on the issue, they agree on the use of the senses of the “quality” and “quantity” concepts. However, their views on quality and quantity (on the characteristics of quality and quantity; the relationship between the change in quality and the change in quantity) are contradictory. So what is the dialectical perspective on quality and quantity?

3. Dialectical perspective on characteristics of quality and quantity

Understanding quality and quantity as above, dialectical people outline their following characteristics as follows:

First, quality and quantity exist only in things. Quality and quantity are properties of things; therefore, quality is the quality of things and quantity is the quantity of things as well. No properties exist outside things. Therefore, there are no quality and quantity existing outside things; i.e. there are no quality and quantity that are not the quality and quantity of a certain thing. Quality and quantity are both properties, and, moreover, general properties (rather than specific properties), which means when a certain thing ceases to exist, only its specific properties cease to exist; and general properties still exist (in other things). Quality and quantity exist in many things and will not disappear when a certain number of things cease to exist, for they still exist in other things.

Second, quality and quantity exist in consistency. Although they are the two properties of a thing, they agree with each other. The agreement of quality and quantity is shown in the instance that every quality has quantity in it. Moreover, a quality has myriad different quantities and any quantity must be of a certain quality. For example, weight is a qualitative property of an object. Weight in its turn has many different levels (one ton, 10 tons, etc.); each level of weight is a quantitative property. Ten tons is a quantitative level of the weight quality. When saying that something is heavy, we should say how heavy that object is, using the quantity. When “it weighs 10 tons” is said, it means we are talking about the quantity of the weight property. Similarly, white is a quality property of a thing, which has many different levels of quantity (whiteness of level 1, whiteness of level 2, etc.). When

saying “whiteness of level 1”, we are talking about a quantitative level of whiteness.

Third, there are a lot of qualities and quantities in a thing. One thing not only has one quality, but a lot of qualities. For example, in the clause: “the sun is spherical, big, heavy, and hot”, the sun is a thing and spherical, big, heavy, and hot are four different qualities of the sun. Or in the clause: “this thing is iron, hot, thermal and electrical conductive,” iron, hot, thermal [conductive] and electrical conductive are four different qualities of this thing. Because a quality has myriads of different quantities and a thing has many different qualities, a thing certainly has a lot of quantities. Another example is as follows: in the clause: “this thing is 5m long, 5kg heavy, 50°C hot”, 5m long, 5kg heavy, and 50°C hot are three different quantities (of three different qualities) of this thing.

Fourth, each quality has a fixed level of quantity. Each quality property has a variety of quantity properties. However, quantity properties are limited. Quantity cannot be infinite in number and also cannot be zero. The quantities of a quality of a thing can just reach some particular number (n) and cannot be zero (0) (since if there is zero quantity of a certain quality, it means that that quality does not exist). In other words, the number of quantities of a quality runs from zero to n (n is a specific number depending on the specific case). For example, “heavy” and “light” are two qualities and have different levels of quantity. The distinction between “heavy” and “light” is defined based on our choices. If anything weighing from 0 to 0.1kg is considered light and above 0.1kg is heavy,

then 0.1kg cannot be said as heavy (equivalent to 0 in terms of the level of being heavy). A thing must weigh at least more than 0.1kg to be said as heavy. There are the minimum and also the maximum levels of weight, since there are no objects of infinity in terms of being heavy. Another example is about the two qualities of “hot” and “cold”. The distinction between “hot” and “cold” depends on our choice. If above 0°C is hot, then the minimum level of cold is 0°C , and the maximum level of cold is -273°C (minus 273°C); and it must be higher than 0°C to be called “hot”. While the maximum level of hot remains unknown, it is sure it must be a specific number, cannot be infinite. Let us take another example: If income inequality is a quality property of a certain country, then it has different levels of quantity. The Gini index is the index used to measure the degree of income inequality, with values running from 0 to 1. If a country’s Gini index is 0, it means there is no inequality of income in that country. If the index reads 1, it means the income inequality of that country reaches the maximum level (the level of income inequality that cannot be any higher).

Fifth, the change in quality occurs in leaps (intervals) while the change in quantity takes place gradually (continuously). Things change (move), which means a thing may manifest this way in this moment (with certain properties) and that way in another moment (without the properties found in the first moment). The general formula for the change of things is as follows: thing S has property A at the point of time T1. At the point of time T2, it no longer has property A. For example, a thing changes from hot to cold, from light

to heavy, getting hotter from 50°C to 60°C , increased in weight from 1 ton to 2 tons, etc. Because things have only two types of properties, namely quality and quantity, change occurring to things only consists of the change in quality and the change in quantity. The change in quality takes place in leaps (in intervals) because it only changes for once. For example, a thing changes only once from hot to cold and vice versa. The change in quantity occurs gradually (continuously) because there are a lot of times of changes. Between the two quantitative properties, there always exists a third intermediate quantitative property. For example, for the temperature of a thing to increase from 40°C to 42°C , it must go through the temperature of 41°C . For the temperature increase from 40°C to 41°C , it must also go through the intermediate temperature of 40.5°C . The same thing goes on to infinity.

4. Dialectical perspective on the relation between the change in quantity into the change in quality

The change in quality and the change in quantity relate to each other. The relationship between the change in quality and the change in quantity under the dialectical perspective is shown as follows.

First, the change in quantity will transform into (lead to) the change in quality when it exceeds the limit, which means when it reaches the highest or the lowest ends (the nodal points). In the case when the change in quantity of a thing has yet to reach the limit, then the quality of that thing will not change. Any certain quality A will change (i.e. it can be - no longer - quality A) when its quantity reaches the highest or the lowest limits. There have

been numerous examples proving the above view in documents on dialectics and it is easy to examples (not excluding any examples). The much-touted example is the relationship between the change in the temperature (heat) of water and its states. In the normal pressure, when temperature of water reaches 0°C or 100°C , water is no longer in its liquid state; it turns into solid or vapor states, instead. However, this example needs more explanation. There exists not only the relationship between quality A and its quantity, but also the relationship between the quantity of quality A with other qualities. In more details, it is not only the relationship between hot and the level of "hot", but also the relationship between the level of "hot" and the level of "liquid" and the relationship between "liquid" and the level of "liquid". Hot and not-hot, liquid and not-liquid (illiquid) are four different qualities. Similarly, there are four different types of quantities, namely the level of hot, the level of not-hot, the level of liquid, and the level of not-liquid. The transformation of quality from liquid to not-liquid is directly caused by a change in the level of liquidity. When the level reaches the lowest limit (equivalent to the level of being hot at 0°C), the liquid state turns into not-liquid state (the solid state in this case). When the level of liquidity reaches the highest limit (equivalent to the level of being hot at 100°C), the liquid state turns into not-liquid state (i.e. the vapor state in this case). The transformation from being hot to being not-hot results from the change in the level of being hot. When the level of being hot reaches the lowest limit, the quality of being hot turns into quality of

being not-hot (cold in this case). Hot is opposite to cold; the quantity of hot is the level of being hot. Hot cannot be at 0°C because at 0°C not-hot occurs. If 0°C is considered the least cold level and temperatures higher than 0°C are hot level, then the level of 0° hot is equivalent to 0°C . The transformation in quality from hot to cold occurs when the level of being hot reaches its lowest limit (equivalent to 0°C). The transformation in quality from liquid to not-liquid, though caused directly by the change in the level of liquid, is also indirectly caused by a change in the level of being hot. The change in the level of being hot will lead to a change in the level of being liquid; the change in the level of being liquid will lead to a qualitative change from being liquid to not-liquid. The general formula is the change in quantity of quality A not only leads to the change of quality A itself, but also leads to the change in quantity of quality B. The quantitative change of quality B in turn leads to the change of quality B itself.

Above is an example of the transformation of quantity into quality. When considering the impact of the change in quantity on the change in quality, we do not just look at the change of one or two qualities, but need to consider the change of multiple qualities. For example, an air cylinder broke (or exploded) due to overheating. What has occurred here is that the increase in the heat level led to the increase in the pressure level of the gas. The increase in the pressure level led to the decrease in the durability (endurance) of the cylinder; the durability of the cylinder reduced to a certain level would cause the

qualitative change from durability to non-durability (from not-broken to broken). The general formula is the change in quantity of quality A not only leads to the change of quality A itself, but also leads to the change in quantity of quality B; the change in quantity of quality B leads to the change in quantity of quality C; the change in quantity of quality C leads to the change in quantity of quality C itself.

Second, the qualitative change will be translated into the change in quantity. The view that the qualitative change will be translated into the change in quantity is seldom referred to when it comes to quantity-quality law. F. Engels named this law “the law on the transformation of quantity into quality and vice versa” [2, p.510]. However, in the section “Dialectics. Quality and Quantity” of the work *Anti-Dühring* and section “Dialectics” of the work *Dialectics of Nature*, while presenting the contents of the quantity-quality law, he only explained how the change in quantity will be transformed into the change in quality, without any specific explanation of how the change in quality will be translated into the change in quantity [2, pp.510-518, 171-184]. When discussing the quantity-quality law, K. Marx did not mention the two words of “vice versa” at times. He wrote, “Just like in natural sciences, here the rightfulness of the law that Hegel discovered in his “Logics” is also verified. That law reads the pure change in quantity, to a certain limit, will be transformed into differences in quality” [2, p.179]. In his book *Dialectical Materialism and Historical Materialism*, J. Stalin looked into the quantity-quality law only from the side of the change in quantity resulting in the

change in quality, without any analysis of the law in the opposite side [6, pp.9-11]. The change in quality leading to the change in quantity in the quantity - quality law is only mentioned mainly in textbooks of dialectics.

A number of authors argue that the change in quality translated into the quantitative change means, “The new quality of the thing will reassert impacts on its quantity. The impact is shown in the fact that the new quality can alter the structure, size, level, and rhythm of the movement and development of the thing.” For example, when a student passes the graduation examination, which is also the point of change (leap), he/she will be entitled to receiving a bachelor’s degree. The higher level of education of the student will create conditions for him/her to change the structure, scale, and level of knowledge, helping him/her advance to event higher levels. Likewise, when water evaporates (changing from the state of liquid to the state of vapor), its molecules get higher velocity and its volume gets bigger in the state of vapor than in the state of liquid with the same mass. Its solubility also changes, etc. [1, p.238]. Such interpretation has yet to be clear and simple.

The reverse way in the relationship between the change in quality and the change in quantity should be explained in a simpler manner. Accordingly, the view that the change in quality results in the change in quantity can be explained as follows: when a certain quality ceases to exist, its quantity property also vanishes. When quality A turns into quality B, the quantity of quality A will be converted into the quantity of quality B due to the fact that

quality and quantity exist in consistency with each other, which means the quantity of quality A must be changed into the quantity of quality B when quality A becomes quality B. For example, when a thing goes from being hot to cold, the quantity of hot will be converted into the quantity of cold. Another example is that when a thing goes from bright to dark, the quantity of bright is converted into the quantity of dark. Similarly, when one thing changes from liquid to vapor, indicators measuring the liquid level will turn into those of the vapor level. When a student becomes a bachelor, indicators measuring the student quality will be converted into those of the bachelor quality.

5. Conclusion

The perception of a certain thing is about its quality (or quality identification) and quantity (or quantity identification) of it. The quality and quantity identifications are two different operations of perception in all fields. Depending on objects and purposes, people can use either one of or both of the operations. In the natural perception, the operation of quantity identification is widely used in conjunction with that of quality identification. In social perception, though not commonly used, the former has been increasingly in use. For example,

when saying that a country is democratic, happy, and wealthy, people quote the indicators of democracy, happiness, wealth, and equality of that country. To implement the operations of both quality and quantity identifications correctly, people need to base themselves on a sound theoretical foundation. That very foundation is the dialectical perspective on quality and quantity, which is simple in content. Everyone can easily perceive and apply it to their perception activities.

References

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