

THE CONCEPT OF CHANGE IN ARISTOTLE'S PHYSICS

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ABSTRACT

This study aims to investigate change (kinesis) as it is handled by Aristotle in Physics. With this aim, it analyzes the basic concepts which constitute the ground of this definition. In Physics, Aristotle starts with what is prior to us and moves to principles and causes. Thus, first, he elaborates on the things which are subject to change and he introduces the idea of categories. Substance (ousia) as the first category is what underlies the change. Other categories are the properties that are applied to substance. Then he claims that the thing which underlies change functions as matter (hypokeimenon) and the property which is predicated of substance at the end of change functions as form (eidos). Thus, change is described as having a form of a matter. In other words, in change, the matter is determined by the form. But this determination can only be possible if the matter has the capacity to be determined in a specific way. It is called potential. When the form determines the matter, its potential is actualized. In Physics Book III, Aristotle defines change as the actualization (energeia) of a potential (dynamis). Some scholars argue that in the definition "actualization" refers to a process while others argue that it refers to having an end. In this study, considering Aristotle's examples of actuality and potentiality, it is claimed that change involves both.

Key Words: Change, Categories, Substance, Matter, Form, Potential.

ARİSTOTELES'İN FİZİK ESERİNDE DEĞİŞİM KAVRAMI ÖZ

Bu çalışma, Aristoteles'in Fizik eserinde, "değişim" kavramını nasıl ele aldığını incelemektedir. Bu amaçla, Aristoteles'in hangi kavramlardan hareketle değişimin tanımına ulaştığı ortaya konulmuştur. Aristoteles, bu eserde, duyumsadığımız şeylerden başlayarak ilkelere ve nedenlere yönelen bir araştırma sürdürür. Önce nelerin değişime uğradığı üzerinde durur ve kategoriler düşüncesini ortaya koyar. İlk kategori olarak töz, değişime rağmen değişmeden kalan şeydir. Diğer kategoriler, töze yüklenen niteliklerdir. Daha sonra, değişmeden kalan şeyin madde, değişimin sonunda töze yüklenen niteliğin de form olduğunu öne sürer. Böylece değişim, maddenin form kazanması olarak tanımlanır. Yani madde, form tarafından belirlenmektedir. Formun maddeyi belirlemesi, ancak, maddenin böyle bir belirlenme olanağına sahip olmasıyla mümkündür. Bu olanağa, potansiyel adı verilir. Formun maddeyi belirlemesi, maddenin potansiyelinin aktüel hale gelmesi anlamına gelir. Aristoteles de, Fizik Kitap III'te, değişimi, potansiyelin aktüel hale gelmesi olarak tanımlar. Bazı Aristoteles uzmanları, bu tanımda bahsi geçen "aktüel" ifadesinin bir etkinlik sürecine işaret ettiğini, diğerleri ise etkinlik süreci sonunda ulaşılan sonuca işaret ettiğini öne sürmektedir. Bu çalışmada, Aristoteles'in potansiyel ve aktüel ilişkisi için verdiği örnekler değerlendirilerek, değişimin hem süreci hem de sonucu içerdiği öne sürülmektedir.

Anahtar kelimeler: Değişim, Kategoriler, Töz, Madde, Form, Potansiyel.

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Introduction

This study aims to investigate the concept of change focusing on Aristotle's *Physics*. In *Physics* Book III, Aristotle defines change as the actuality (*energeia*) of a potential (*dynamis*) as such. Some scholars argue that in this definition "actuality" refers to a process while others argue that it refers to having an end. In this study, considering Aristotle's examples of actuality and potentiality, I will show that change involves both. In order to clarify the meaning of change, I will analyze basic concepts and theories Aristotle deals with in relation to the concept of change. First, I will focus on categories and substance (*ousia*). The substance is presented as the first category. It is defined as the thing on which other categories are predicated. Secondly, I will focus on the distinction between substantial and accidental change. Substantial change signifies coming to be without qualification and accidental change signifies coming to be with qualification. Then, I will analyze the distinction of form and matter and how it functions in change. In relation to it, I will consider the four causes of change that Aristotle introduces in *Physics* Book II. Lastly, focusing on the distinction between actuality and potentiality, I will point out that the definition of change in *Physics* III, as the actuality of a potential, involves both a process and having an end.

Aristotle begins his investigation on change assuming that nature (*physis*) is the source of change. Entities we encounter are subject to change. This is something that cannot be demonstrated. He expresses his idea at the beginning of *Physics* by saying that "We, on the other hand, must take for granted that the things that exist by nature are, either all or some of them, in motion – which is indeed made plain by induction."¹ Then, he proceeds to study in detail what kinds of entities are subject to change and he focuses on the categories first.

The Categories and Substance

Aristotle claims that whatever we encounter is either a substance (*ousia*)² or a quality or a whole that consists of both. In the *Categories*, he introduces ten different categories. He says "of things said without any combination, each signifies either substance or quantity or qualification or a

¹ Aristotle, *Physics*, in *The Complete Works of Aristotle*, Vol. 1., Ed. J. Barnes, Princeton: Princeton University Press, 1985, p.315

² We should keep in mind that Aristotle uses the word substance (*ousia*) as having two different meanings, either referring to particular things or the *eidos* of particular things. Kuçuradi argues that when *ousia* is reduced to "substance", the existence is assigned to *ousia*. (Ioanna Kuçuradi, *Çağın Olayları Arasında*, Ankara: Türkiye Felsefe Kurumu Yayınları, 2009, p.161)

relative or where or when or being-in-a-position or having or doing or being-affected.”³ These are the categories of substance, quantity, quality, relation, time, space, state, action, and affection. The first category is substance and the other nine categories are the properties of the substance. He says that everything has properties and the carrier of properties is the substance (*ousia*). Properties of things can change; a thing may lose one of its properties or it may gain a new one but substance qua being substance cannot change.

Aristotle defines substance in the following sentence: “A substance – that which is called a substance most strictly, primarily, and most of all – is that which is neither said of a subject nor in a subject, e.g. the individual man or the individual horse.”⁴ The substance in the primary sense is not a property but is the carrier of properties. That is to say, the substance cannot be predicated on something but everything else can be predicated on substance in its primary sense. David Ross points to the meaning of substance as the first category by saying that “The existence of substance, and the distinction between it and the other categories, is for Aristotle self-evident. The primary meaning of substance is ‘that which is not asserted of a subject but of which everything else is asserted.’”⁵

Aristotle distinguishes primary substance from the secondary substance. Primary substance is neither said of a subject nor it is in a subject whereas secondary substance may be said of a subject or be in a subject. Individual things are substances in the primary sense. For instance, an individual man, an individual bird, an individual pen are primary substances. But the species of individual things are secondary substances. Aristotle states that “The species in which the things primarily called substances are called secondary substances.”⁶ For instance, “man” and “bird” as a genus are called secondary substances. The kind of substance which is subject to change is the primary substance. We can talk of an individual man’s becoming musical from unmusical or an individual man’s coming into existence but not a genus of man.

We should also note that substance exists independently of other categories whereas all other categories exist in relation to the substance. In this respect, the substance is ontologically prior to other categories. “There is one kind of being which is in the strictest and fullest sense – substance; and all other things are simply by virtues of standing in some definite relation to substance – as qualities of substance, relations between substances or the

³ Aristotle, *Categories*, in *The Complete Works of Aristotle*, Vol. 1, Ed. J. Barnes, Princeton: Princeton University Press, 1985, p.4

⁴ Aristotle, *Ibid*, p.4

⁵ David Ross, *Aristotle*, New York: Routledge, 1995, p.173

⁶ Aristotle, *Categories*, p.4

like.”⁷ Things other than substances require a substance for their existence. In the sentence “Socrates is walking”, ‘Socrates’ refers to a substance in the primary sense, and ‘walking’ refers to a property that belongs to the category of doing. In this sentence, the property of walking is predicated on Socrates. Socrates as a substance can exist independently of anything else whereas the property of ‘walking’ can only exist in relation to Socrates.

Aristotle refers to the distinction between substance and properties while he explains the change. The substance is the thing that underlies change. It is what resides both at the beginning and the end of change. One can thus claim that the substance constitutes the ground and the possibility of change.

“One can gather from surveying various cases of becoming in the way we are describing that there must always be an underlying something, namely that which becomes, and that this, though always one numerically, in form at least is not one. For to be a man is not the same as to be unmusical. One part survives, the other does not: what is not an opposite survives (for the man survives), but not musical or unmusical does not survive, nor does the compound of the two, namely the unmusical man.”⁸

According to Ross, Aristotle makes a distinction between substance and other categories in order to explain change because he needed something subject to change. “A quality cannot change. It is what it is and cannot become anything else; it can only be succeeded by another quality. If there is such a thing as change, as distinct from bare succession, there must be substance as distinct from qualities.”⁹ Irwin emphasizes the need for a substance in change too. He says that “Questions about change show why there is some reason to recognize substances. Change, as opposed to mere replacement, requires something to persist through it, to be the subject that changes; and if a subject cannot exist without having the property (e.g. whiteness) that it loses in the change, then it is not the subject of the change.”¹⁰

Aristotle argues that primary substances go through various kinds of change. The change in quality, change in size, coming into existence or ceasing to exist, and locomotion. Ross explains them in detail:

“If we start with a concrete terrestrial object, say a living body, we find that it is capable of change in four respects. It can move in

⁷ Ross, *Ibid*, p.164

⁸ Aristotle, *Physics*, p.324

⁹ Ross, *Aristotle*, p.174

¹⁰ Terence Irwin, *Aristotle's First Principles*, New York: Oxford University Press, 1988, p.60

space; it can change in quality; it can become larger or smaller; it can be destroyed (and has been generated). Matter (*ύλη*) being for Aristotle that which is presupposed by change, a thing that can change in all four ways is regarded as embedded, as it were, in four layers of matter—'local matter' or matter for locomotion, matter for alteration, for change of size, for coming into being and passing away."¹¹

All these types of change can be classified into two general categories; substantial change and accidental change. Change in quality, change in size and locomotion are counted as accidental changes whereas coming into existence or ceasing to exist are counted as substantial change.

Substantial and Accidental Change

In Book I, Chapter 7 Aristotle analyzes different kinds of change. There are two kinds of change which he points out; "coming to be without qualification" and "coming to be so and so". We may also call them "coming to be" and "becoming". "Coming to be" is coming into existence and only substances come into existence. Aristotle says that "Things are said to come to be in different ways. In some cases, we do not use the expression 'come to be', but we say 'come to be so-and-so'. Only substances are said to come to be without qualification."¹² It follows that "coming to be" is coming into existence of a primary substance and it refers to substantial change whereas "becoming" refers to accidental change.

Substances come to be without qualification in different ways: "by change of shape, as a statue; by addition, as things which grow; by taking away, as the Hermes from the stone; by putting together, as a house; by alteration, as things which turn in respect of their matter."¹³ In each case, a substance, in the sense of a particular thing, comes into existence. When the statue of Hermes is shaped out of stone, it is the statue of Hermes which comes into existence but there is also something that underlies the change which is the stone. Aristotle claims that in both kinds of change, there is always something that underlies the change.¹⁴ Things come to be with or without qualification from something else. It is easier to recognize the underlying thing in the accidental change. Socrates becoming musical is an accidental change and Socrates is the thing that underlies this change and it is the primary substance. "The man remains a

¹¹ Ross, *Aristotle*, p.174

¹² Aristotle, *Physics*, p.325

¹³ Aristotle, *Physics*, p.325

¹⁴ Aristotle, *Physics*, p.325

man and is such even when he becomes musical, whereas what is not musical or is unmusical does not survive, either simply or combined with the subject.”¹⁵

In Aristotle's analysis, there are three elements in both kinds of change. “The most general form of change, one might say, is simply this: ‘At one time it was not the case that p and at a later time it was the case that p’ (and to obtain the form of generation, in our sense of the word, one takes ‘p’ as an existential proposition).”¹⁶ In every change, there is an underlying thing that survives through the change and two opposites: the absence of a property at the beginning and the existence of a property at the end.¹⁷ If we analyze the example of “Socrates’ becoming musical from unmusical” we see that Socrates is the thing which subsists through change. It is the carrier of two opposites: the property of being unmusical at the beginning and the property of being musical at the end. Those properties are predicated of Socrates.

Aristotle claims that the thing which underlies both substantial and accidental change functions as matter (*hypokeimenon*). And the property which is predicated of the matter at the end of a change corresponds to the form (*eidos*). It follows that change can be defined as having a form of a matter. Aristotle states that sensible things consist of matter and form: “I say, everything comes to be from both subject and form. For the musical man is composed in a way of man and musical: you can analyze it into the definitions of its elements. It is clear then that what comes to be will come to be from these elements.”¹⁸ He claims that every change involves matter (*hypokeimenon*), form (*eidos*), and privation (*steresis*). “Form and privation are practically the negations of one another, for anything which is of the right sort to have a certain form but does not have it will be said to have the corresponding privation, and vice versa.”¹⁹ Socrates’ becoming musical from unmusical is an example of an accidental change in which Socrates, which is a primary substance, functions as matter, musical functions as form, and unmusical functions as the privation of the form of being musical. When Socrates is determined by the form of being musical, he becomes a musical man.

The form gives a characteristic to a matter by determining it. The form determines matter in two different ways: as a substantial form and an accidental form. Substantial form occurs in the substantial change and accidental form occurs in the accidental change. Ross explains it in the following paragraph:

¹⁵ Aristotle, *Physics*, p.324

¹⁶ David Bostock, *The Principles of Change in Physics, Space, Time, Matter and Form: Essay's on Aristotle's Physics*, Oxford: Clarendon Press, 2006, p.5

¹⁷ David Ross, *Aristotle's Physic*, Oxford: Clarendon Press, 1936, p.23

¹⁸ Aristotle, *Physics*, p.325

¹⁹ Bostock, *The Principles of Change in Physics*, p.9

"We must distinguish, it would appear, between generation proper (the origination of a new Substance) and the minor forms of change (change of quality or of size, which will include all production of *artefacta*). In the former case the form must pre-exist actually, in the male parent; in the latter it need only pre-exist potentially"²⁰

In generation, the form pre-exists at the beginning of change whereas in becoming, the form (*eidos*) does not pre-exist at the beginning. For instance, in the generation of a human being the form of human beingness pre-exists in the man who is the father. But in the example of Socrates' becoming musical, the form of musical does not preexist at the beginning in actuality. It exists only in potentiality. But whether it pre-exists or not, form functions as a cause of change.

Four Causes of Change

Aristotle claims that four causes are found in change. The first one is the material cause. He says "In one way, then, that out of which a thing comes to be and which persists, is called a cause, e.g. the bronze of the statue, the silver of the bowl, and the genera of which the bronze and the silver are species."²¹ In the example of a building, it is the bricks and concrete which functions as a material cause.

Secondly, there is the efficient cause or primary cause. Aristotle makes a distinction between primary cause and secondary cause. He says "In investigating the cause of each thing it is always necessary to seek what is most precise (as also in other things): thus a man builds because he is a builder, and a builder builds in virtue of his art of building. The last cause then is prior; and so generally."²² Namely, the primary cause is the last cause which is found in change. It is who or what initiates change. In a construction of a building, it seems that it is the architect who is the primary cause because the individuals who work on the construction cannot perform the act of building without the presence of an architect. But an architect can build a house because he has the art of house-building. If he did not have this art, he would not perform such an activity. Now it seems that the art of house-building is the primary cause rather than the architect himself because the architect has this art accidentally.

An agent acts as a source of change because he has the relevant capacity and this capacity is the form that constitutes the formal cause of change. The

²⁰ Ross, *Aristotle*, p.181

²¹ Aristotle, *Physics*, p.332

²² Aristotle, *Physics*, p.334

architect is the one who has the form of a house in his mind and he ascribes this form (*eidos*) onto matter. First, there is the form of the house and then he makes the form to be realized by making the builders work on the construction materials in a way that reveals the form he has in his mind.

The final cause (*telos*) is the fourth kind of cause. The final cause is for the sake of which a thing is done. It is the end to be fulfilled through change. In architecture, it is the actual building that constitutes the final cause of change. In the case of Socrates' becoming musical, the actual musical man constitutes the final cause.

According to Aristotle, substance (*ousia*) functions as a cause of change in different ways:

"It is the answer to the question 'why?', e.g. 'why does it thunder?' or 'why do these bricks and stones make a house?' In all such cases we are looking for a cause which is—to speak abstractly—the essence, but is in some cases, as in that of a house (or generally of *artefacta*), the end to be subserved, and in some (as in that of thunder) the moving cause."²³

The substance (*ousia*) refers to either *the thing which is* or the essence (*eidos*) of a thing. The essence is the order according to which particular materials are brought together. Thus, we can say that substance constitutes the formal cause of a being. But it also functions as the final cause and efficient cause. It functions as an efficient cause because the form of man is carried out by a man. In this sense, the formal cause becomes the efficient cause. It functions as the final cause because the flesh and bones are formed in a way that they compose a man. Ross says that "Aristotle points the way to a more real explanation by saying that what we describe abstractly as the essence is, viewed concretely, sometimes a final, sometimes an efficient cause. Normally it is a final cause. The reason why this flesh and these bones make a man is that they are informed by the form of man and because they are organized in such a way as to subserve the ends for which man exists"²⁴ It shows that sometimes different kinds of causes coincide. Aristotle expresses it in the following paragraph.

"Now, the causes being four, it is the business of the student of nature to know about them all, and if he refers his problems back to all of them, he will assign the why in the way proper to his science – the matter, the form, the mover, that for the sake of which. The last three often coincide; for the what and that for the sake of which are

²³ Ross, *Aristotle*, p.179

²⁴ Ross, *Aristotle*, p.180

one, while the primary source of motion is the same in species as these.”²⁵

According to Aristotle, in human procreation, the matter is the human seed. But matter cannot give itself the particular order of its motion to bring out a result. It is the father and mother²⁶ who provides the order to the matter. But the primary cause is not the father rather it is the essential form of the father, the form of human beingness. The essential form of human beingness is both the formal cause and primary cause – the mover. It also constitutes the final cause – the cause of that for the sake of which – because the end of the biological production is the actual human being.

In change, the form is transmitted from the mover to the moveable and determines it. This transmission can only be done if the moveable has the capacity to be determined in this way. It is called potential. In a generation, the father transmits the form of human beingness to the baby since it has the potential to become a human being; and in the building of a house, the builder transmits the form of a house to construction materials since they have the potential to become a house. When the form is transmitted to the moveable by the mover, the potential of the moveable is said to be actualized.

In *Physics* Book III, Chapter 1, Aristotle makes a distinction between actuality and potentiality as two different types of being and he defines change as the actualization of a potential: “We have distinguished in respect of each class between what is in fulfilment and what is potentially; thus the fulfilment of what is potentially, as such, is motion²⁷.” (201a10-11) Although this definition seems clear, it brings out a discussion on the meaning of fulfilment (*energeia*) namely actuality.²⁸ The “fulfilment” in this definition is interpreted in two different ways, either as a process or an end. If we consider the student of architecture who is potentially an architect, according to the first

²⁵ Aristotle, *Physics*, p.338

²⁶ The mention of the role of a mother in human procreation is my addition. Aristotle does only talk about the role of a father.

²⁷ I should note that Aristotle uses the terms ‘motion’ and ‘change’ interchangeably in *Physics* Book III. Sometimes he uses one of these terms, sometimes he uses them together (such as ‘motion or change’, ‘motion and change’). Although in Book V. 1 we see that motion can be considered as change or a kind of change and there are changes which do not involve motion, in *Physics* Book III it applies for change. For this discussion, see Sarah Waterlow’s *Nature, Change and Agency in Aristotle’s Physics*.

²⁸ For the details of this discussion, see James Kostman’s “Aristotle’s Definition of Change”.

interpretation, actuality is the learning process of the student; according to the second interpretation, it is the student who acquires the art of architecture at the end of the learning process. If we consider bronze which is the potentiality of a bronze statue, according to the process view it is the sculpturing process of the statue, whereas according to the actuality view it is the statue that is created. The first interpretation is called process-view and the second interpretation is called actuality-view.²⁹

The process view holds that according to Aristotle change is the process of actualization of a potential. If we consider Aristotle's following words, it seems that he refers to the process rather than the end:

"It is evident that this is motion, and that motion occurs just when the fulfillment itself occurs, and neither before nor after. For each thing is capable of being at one time actual, at another not. Take for instance the buildable: the actuality of the buildable as buildable is the process of building. For the actuality must be either this or the house. But when there is a house, the buildable is no longer there."

Following this explanation, the process view holds that change is the process towards an end. The most important objection to the first interpretation is that it makes the definition of change circular. Coope explains this problem in the following way: "to define change as a process of actualization is singularly uninformative, for if one is puzzled about the notion of change, one is likely to be at least as puzzled by the notion of a process of actualization."³⁰ Coope's answer to this objection is that in *Physics* Book III, Aristotle aims to define the change in relation to other notions he cares about. That's why she thinks Aristotle did not mind the circularity problem.

According to Coope, this interpretation brings out a more serious objection. She argues that Aristotle was writing in times when the possibility of change is questioned. Therefore, he tried to show that change is possible in reality. Making change a process in which a potential is becoming actual would be restating the problem.³¹ To clarify it, if we take actuality as the process of learning architecture rather than the acquirement of the art of architecture, the possibility of real change in the student can be questioned. With this reason, she is inclined to adopt the actuality view.

²⁹ James Kostman, Aristotle's Definition of Change, *History of Philosophy Quarterly*, Vol. 4, No. 1, 1987, p.3

³⁰ Ursula Coope, Change, Actuality and Potentiality, *Blackwell Companion to Philosophy: A Companion to Aristotle*, (ed. G. Anagnostopoulos), Oxford: Wiley-Blackwell, 2009, p. 279

³¹ Coope, *Ibid*, p.280

On the other hand, the actuality view holds that change is the product of a process in which a potential is being actualized. Some scholars argue against the actuality view saying that it gives rise to a puzzle. Anagnostopoulos calls it "the product puzzle".³² Kostman agrees with it and says that besides giving rise to a puzzle, actuality-view seems to lead us to some un-Aristotelian and incoherent notions³³ such as diminishing the difference between the change and its product.

Coope summarizes the puzzle by referring to some examples:

The complete actuality of what is potentially healthy, considered simply as potentially healthy, is a healthy thing... These examples immediately give rise to a puzzle for Aristotle's definition of change as a kind of actuality. For they suggest that the actuality is the product of a change, rather than the change itself.³⁴

Although Coope is aware of the puzzle, she still embraces the actuality view providing a different interpretation. She says that "Change is the actuality of what is potentially in some particular different state, qua such. For example, the change that is becoming a statue, is the actuality of what is potentially a statue, qua potentially a statue."³⁵ According to her, the product puzzle is solved by referring to the expression "as such" in the definition. It follows that in someone's becoming healthy, change does not refer to just a healthy thing (namely the end of a process) but it refers to the actuality of a thing which is potentially healthy qua being potentially healthy. So, "actuality" in the definition refers to the actuality (*Energeia*) of having some potential.

Waterlow adopts the same interpretation with Coope. "Although the product of change is the paradigmatic actuality of the potential being, the change, and it alone, is the actuality of the potential being 'qua such [potential]'. Thus, while the definition characterizes change as (i) a genuine actuality of (ii) a genuine potential being, and so avoids circularity, (iii) the phrase 'qua such' ensures that it picks out changes but not the products of change."³⁶ Thus, they adopt the actuality view which allows for the possibility of real change and they also get rid of the product puzzle. But they still don't include the process or the activity in change.

³² Anagnostopoulos, Change in Aristotle's *Physics* 3, In *Oxford Studies in Ancient Philosophy XXXIX*, (ed. B. Inwood), New York: Oxford University Press, 2010, p.33

³³ Kostman, Aristotle's Definition of Change, p.3

³⁴ Coope, Change, Actuality and Potentiality, p.279

³⁵ Coope, Change, Actuality and Potentiality, p.282

³⁶ Sarah Waterlow, *Nature, Change and Agency in Aristotle's Physics: A Philosophical Study*, Oxford: Clarendon Press, 1982, p.35

Barnes deals with the product puzzle more modestly. According to him, in this definition, Aristotle points to the type of actuality which is involved in change, the type of actuality in which “being actually so-and-so is quite compatible with still being potentially so-and-so”.³⁷ For instance, when someone is smoking a pipe, she still has the potential to smoke a pipe.³⁸ Although Barnes’ interpretation gets away from the problems of both views, similar to other interpretations, it reduces change into actualities of one sort and excludes some cases of change -which are called qualitative changes³⁹ - such as becoming white from not-white.

I think that all of the mentioned solutions are successful in their attempt to solve the circularity problem and the product puzzle in different ways but they face a bigger problem. Their interpretations of actuality limit the definition of change in a way that focuses only one aspect of change. The process view only focuses on the activity and excludes the end of the activity. Similarly, the actuality view only focuses on the end of change or the actuality of a potential end in the process but it excludes the process itself such as in the process of learning an art.

To sum up, all of these interpretations have the same problem. They only cover one aspect of change while excluding the other. I believe that this problem can be overcome by analyzing the relation between actuality and potentiality and their role in change more carefully. Aristotle argues that there are different types of being and different kinds of change apply to them. There are things which are in actuality and things which are in potentiality: “There is that which is fully and actively itself, but also that which is what it is, in part, only potentially: either being a this, being this much, being of this kind, or similarly with the other ways of attributing being.”⁴⁰ Accordingly, we can talk about the actual being of bronze (*energeia ousia*) and the potential being of the bronze statue (*dynamis ousia*).

Ross thinks that Aristotle does not define potentiality but he tries to clarify it by giving some examples. According to him, Aristotle “sees clearly that the notion of potentiality is indefinable; he can only indicate its nature by pointing to particular instances. As a man who is building is to one who knows how to build, as the waking is to the sleeping, that which sees to that which has

³⁷ Jonathan Barnes, *Aristotle: A Very Short Introduction*, New York: Oxford University Press, 2000, p. 81

³⁸ Barnes, *Ibid*, p.82

³⁹ See Jacob Rosen, Motion and Change in Aristotle’s “Physics” 5. 1, *Phronesis. Vol. 57*, No. 1, pp. 63-99. In this article, he distinguishes changes that involve motion from the ones that do not.

⁴⁰ Joe Sachs, *Aristotle's Physics: A Guided Study*, New Brunswick: Rytgers University Press, 1998, p.73

sight but has its eyes shut, that which is shaped out of matter to its matter, the finished product to the raw material, so in general is actuality to potentiality.”⁴¹ These examples help us to understand the notions of actuality and potentiality. In some of these examples, there is a capacity involved in potentiality and in actuality, this capacity is being manifested, as in a man who is building is the actuality of a man who knows how to build or a thing which sees is the actuality of a thing which has sight. But in other examples, there is a thing which is produced out of matter. A bronze statue is the actuality of a bronze which has the potential of being a statue.

Aristotle says that “this is what motion is, is clear from what follows: when what is buildable, in so far as we call it such, is in fulfillment, it is being built, and that is building. Similarly, with learning, doctoring, rolling, jumping, ripening, aging.”⁴² In these examples, change refers to the process of performing an activity. On the other hand, there are some examples of change that do not refer to an activity but the product of an activity, such as becoming hot from cold or Socrates’ becoming musical from unmusical. But when carefully analyzed one can see that in those examples both the process and the product are involved. In other words, change can be regarded as a process towards an end but the end is not merely a product that can be excluded from the process, on the contrary, it is inherent in the process itself as being potential. To put it differently, the end of the process is inherent in the process itself in potentiality. Hintikka states that “The only way in which a potentiality can exist (be actual) as potentiality, that is without already having given rise to whatever it is a potentiality of, according to Aristotle is a change (movement) toward that which is potentiality of.”⁴³ One can still object to this view by saying that it makes real change questionable. But it doesn’t necessarily follow from this view. As Aristotle already stated once the house is built the change is completed. And we cannot disregard what Aristotle says concerning the nature of change just to ensure that real change is possible.

Consequently, Aristotle’s definition in *Physics* Book III, Chapter I, seems unclear to some scholars and it leads them to interpret “actuality” in the definition as either a process or an end. But when we analyze his views in detail, including the concepts of actuality and potentiality, and two kinds of change we see that he conceives change as covering both. Limiting the definition to one of these interpretations would be ignoring Aristotle’s view on different types of being. To conclude, change involves both the activity and the end; and I think that this interpretation is compatible both with the process view and actuality view.

⁴¹ Ross, *Aristotle*, p.183

⁴² Aristotle, *Physics*, p.343

⁴³ Jaakko Hintikka, *Analyses of Aristotle*, Dordrecht: Kluwer Academic Publishers, 1982, p.82

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