On Aristotle's Hylomorphic Theory of Change: A Philosophical Investigation

Submitted by

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Abstract of thesis entitled

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The research of this thesis is conducted under the trend of interpreting Aristotle's doctrine of hylomorphism in terms of modern science and applying it to solve contemporary philosophical problems.

This thesis majorly discusses Aristotle's answers to the following basic problems about change with his doctrine of hylomorphism: (i) How change is possible? (ii) If change is possible, then how substantial change is possible? (iii) What is the nature of change? The major goal of the thesis is to show that Aristotle's hylomorphic theory of change correctly depicts the nature of change (at least the very change in our common sense), in particular, it captures the dynamic nature of change, in virtue of which, it is superior to some notable contemporary theories of change. To achieve this goal, we put forward a distinctive interpretation of how Aristotle invokes his theory of the principles of change to solve the Parmenidean puzzle about change, as well as bringing his hylomorphic theory of change into the contemporary context and arguing that it is better than the perdurantist theories and some other endurantist theories of persistence and change.

Specifically, in the first chapter, we give a review of the dispute over the persistence of the subject of change, which reveals different understandings of how Aristotle invokes his theory of

the principles of change to solve the Parmenidean puzzle. We conclude that the traditional argument for the persisting subject is flawed.

In the second chapter, we first put forward an alternative argument for the persisting subject, according to which it is the dynamic nature of change that necessitates something's persisting through the change, and an essential role of the subject of change is to ground the dynamic nature of change. Then we reexamine Aristotle's solution to the Parmenidean puzzle and argue that the true force of the puzzle is not how to distinguish change from sheer replacement but how to accommodate the subject of change so as to ground the dynamic nature of change. Third, given that every instance of change presupposes some persisting subject, we argue that Aristotle's recognition of substantial change is not a trivial move.

In the third chapter, in order to justify the possibility of substantial change, we clarify the ternary relation of hylomorphic composition, i.e., the hylomorphic composite substance-matter-substantial form relationship, by illustrating how Aristotle invokes this sort of relation to solve a puzzle about definition.

In the fourth chapter, we argue that perdurantism does not offer us a proper way to explain change, for it fails to depict the dynamic nature of change. Then we develop a more specific account of the nature of the Aristotelian subject of change and how it persists and changes. Besides, we compare our interpretation to Brower's and argue that ours is immune to an objection to Brower's and captures the dynamic nature of change which Brower's cannot do.

Declaration

I declare that this thesis represent my own work, except where due acknowledgement is made, and that is has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signature: WU Yuexuan

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Introduction

Aristotle's theory of change, which we discuss in this thesis, majorly consists of his answers to the following basic problems about change: (i) Given that the so-called Parmenidean puzzle about change has led the Eleatics to conclude that change is impossible, how do we solve the puzzle so as to defend the reality of change? (ii) Even if change is real and thus possible, it seems that every instance of change is no more than a change in some persisting and underlying thing, so how could there be something with a completely new essence that comes into existence, or something that already exists with an essence but goes out of existence? In other words, how substantial change is possible? (iii) What is the nature of change?

Specifically, Aristotle's answers to the above-stated problems are commonly based on his doctrine of hylomorphism, according to which, every generable and corruptible substance is intrinsically a hylomorphic composite, i.e., a composite of substantial form and matter, and every generable and corruptible substance can further compose a hylomorphic composite in the loose sense, i.e., a so-called accident-substance composite, or an accidental unity of substances.

Notably, in the past two decades, Aristotle's doctrine of hylomorphism has become a live topic in analytic philosophy. On the one hand, philosophers interpret or recondition the doctrine in terms of contemporary science including physics, chemistry, biology, and psychology. For example, Koons (2021, 2019, 2014) interprets the relation of hylomorphic composition in terms of causal powers and justifies an ontology consisting of substances, fragments of substances, and heaps of substances by appealing to the works of quantum physics; Koslicki (2018, 2008) develops a systematic theory of the material constitution of concrete particular objects according to a special interpretation of Aristotle's hylomorphism that can be traced back to Duns Scotus; Austin and Marmodoro (2017) present an account of substantial form and its role in grounding the unity of the associated material substance in terms of contemporary developmental biology. On the other hand, philosophers apply their understandings of the doctrine to solve various contemporary problems. For example, Simpson (2021) offers an account of the de Broglie-Bohm version of

quantum mechanics inspired by the Thomist interpretation of Aristotle's hylomorphism; according to his interpretation of Aristotle's hylomorphic theory of psychological phenomena, Charles (2021) develops a solution to the post-Cartesian mind-body problem that is distinct from the general solutions in philosophy of mind; Brower (2014) applies the Thomist interpretation of Aristotle's hylomorphism to solve the contemporary problem of temporary intrinsics and the puzzle of material constitution.

It is in such a trend that we carry out the research of this thesis, and the major goal of this thesis is to show that Aristotle's hylomorphic theory of change correctly depicts the nature of change (at least the very change in our common sense), in particular, it captures the dynamic nature of change, in virtue of which, it is superior to some notable contemporary theories of change. To achieve this goal, we will establish a proper understanding of his theory of the so-called three principles of change and the relation of hylomorphic composition, as well as bringing it into the contemporary context and argue that it is better than the perdurantist theories and the other endurantist theories of persistence and change.

Methodologically, we try to make a balance between solving philosophical problems and doing exegesis. On the one hand, we aim to argue that Aristotle's hylomorphic theory of change is not only tenable but also has a strong power to solve contemporary metaphysical problems, rather than that our interpretation is best supported by Aristotle's text. Accordingly, although we are inevitably involved in a series of disputes over the interpretation of Aristotle's text, we focus on the philosophical implications of a certain interpretation. Moreover, whenever presenting our interpretation of Aristotle's thoughts, we will illustrate what philosophical problems Aristotle intends to solve with these thoughts and how these problems are solved. On the other hand, we also try to avoid the objection that our version of the hylomorphic theory of change is an Aristotelian theory in name only. Accordingly, we will articulate the historical context of Aristotle's thoughts, including the general ideas of his predecessors that Aristotle intends to object. In addition, we will also cite and explain Aristotle's text to support our interpretation.

As for the content arrangement, in the first chapter, we give a review of the dispute over the persistence of the subject of change, which reveals different understandings of how Aristotle invokes his theory of the three principles of change to solve the Parmenidean puzzle and further different conceptions of the principles themselves. Specifically, we introduce the traditional argument for the persisting subject as well as two objections against it, with the conclusion that the traditional argument is flawed, it is not as sound as its proponents originally thought.

In the second chapter, we give our response to the dispute presented in the first chapter. Specifically, we first put forward an alternative argument for the persisting subject, according to which it is the dynamic nature of change that necessitates something's persisting through the change, and an essential role of the subject of change is to ground the dynamic nature of change. Then we reexamine Aristotle's solution to the Parmenidean puzzle and argue that the true force of the puzzle is not how to distinguish change from sheer replacement but how to accommodate the subject of change so as to ground the dynamic nature of change. Third, given that every instance of change presupposes some persisting subject, we argue that Aristotle's recognition of substantial change is not a trivial move.

In the third chapter, in order to justify the possibility and the intelligibility of substantial change, we clarify the ternary relation of hylomorphic composition, i.e., the hylomorphic composite substance-matter-substantial form relationship, and to achieve this, we illustrate how Aristotle invokes this sort of relation to solve a puzzle about definition. Specifically, after introducing the historical context where the puzzle is raised, we present what a good definition given in terms of genera and differentiae is like, and then illustrate how the puzzle is solved and how the relation of hylomorphic composition is embodied in such a good definition.

Lastly, in the fourth chapter, we bring Aristotle's hylomorphic theory of change into the contemporary debate on the issue of how ordinary objects persist and undergo change. Specifically, after a sketch of the so-called perdurantist view of persistence and change as well as its motivation, we give a critical comment on this view from the Aristotelian perspective,

according to which the perdurantist view is disqualified from a proper explanation of change, let alone a definition, for it fails to capture the dynamic nature of change. Then we develop a more specific account of the nature of the Aristotelian subject of change and how it endures over time along with undergoing different states of property possession. Besides, we compare our interpretation of Aristotle's endurantist view of change to Brower's and argue that ours is immune to an objection to Brower's and captures the dynamic nature of change which Brower's cannot do.

Chapter 1 The Dispute over the Persistence of Subject

In this opening chapter, we will start with Aristotle's theory of the three principles of change, i.e., the form, the privation, and the subject, in virtue of which Aristotle solves the Parmenidean puzzle about change and thus justifies the possibility of change. Then we will majorly focus on the dispute over the persistence of the subject of change, for it reveals different understandings of the roles of these three principles in Aristotle's solution to the Parmenidean puzzle and further different conceptions of the principles themselves. Specifically, given the traditional view that for a thing to be the subject of a change, it is necessary for it to persist through the change, we aim to show that the traditional argument for the traditional view is flawed, and to achieve this, we will introduce the traditional argument in section two and then two objections that are majorly raised in recent years in sections three and four.

1.1 Three Principles of Change

In *Physics* I, Aristotle establishes three principles of change, i.e., three fundamental conditions that constitute the nature of change.

First, he agrees with the physicists and the Platonists that every instance of change must involve difference or not-being, i.e., the initial state and the end state of a change must *not* be the same. Moreover, in *Physics* I 5, he indicates that the initial state and the end state must be a pair of contraries or opposites: on the one hand, they are related in content, such that they are about a certain aspect and thus belong to a single genus at a certain level of universality; on the other hand, they *per se* are incompatible, so that nothing can be characterized by them at the same time. For example, paleness and tanness are a pair of contraries that belong to the genus complexion, whereas paleness and roundness are not. In particular, the contrary that serves as the end state of a change is the so-called *form* of the change, while the contrary that serves as the

initial state of the change is the so-called *privation* of the form in question. Accordingly, a change always occurs between a pair of contraries about a certain aspect, specifically, it occurs temporally from the privation to the form.

Instances of change are then classified into different kinds according to the Aristotelian categories (i.e., the highest genera, including substance, quality, quantity, location, etc.) to which the change-involved contraries belong. For example, an alteration is a change between a pair of contrary qualities; a locomotion is a change between a pair of contrary positions; a growth is a change between a pair of contrary quantities. In general, an accidental change is a change whose contraries belong to an accidental category. Distinctively, there are instances of change between substances, the so-called substantial changes, where the substantial forms of the involved substances serve as the contraries of these changes. For example, that Socrates dies and his corpse comes into being is a substantial change, for Socrates and his corpse (or some parts of his corpse) are considered by Aristotle as numerically distinct substances.

In addition to the contraries, Aristotle in *Physics* I 7 introduces *subject* (*hypokehemenon*) as the third principle of change, such that for every instance of change, there must be something serving as the subject of the change in question. The following descriptions of the subject of change are generally agreed by the Aristotelian commentators: (i) the subject of a change is what comes to be through the change properly comes from; (ii) the subject of a change is one in number but at least two in account (*logos*), specifically, the subject and the privation are identical in number but distinct in account; (iii) the subject of a change *per se* is in potentiality to be characterized by the form of the change, and if what comes to be through the change is X, then the subject is the so-called potential X; (iv) the subject of an accidental change is the substance upon which the involved contrary accidents are existentially dependent, where the substance persists through the change, while the subject of a substantial change is the matter of the generated substance.

Here are some examples that help us to apprehend the above-stated three principles of change. First, that Socrates comes to be pale from being tanned is an accidental change, in particular, an alteration, where the substance Socrates is the subject of the change, the form of the change that Socrates ultimately comes to possess is an instance of paleness, while the privation that Socrates possesses at the beginning of the change is an instance of tanness. Second, that a lump of bronze is shaped into a statue is an auxiliary example Aristotle uses to understand a genuine substantial change, where the subject of the change is the lump of bronze, the form of the change is the form of the statue, i.e., the shape of the statue, while the privation is the absence-of-the-form-of-the-statue. Third, the generations of living beings are considered by Aristotle as the paradigmatic cases of substantial change. In particular, in the generation of a human being, the subject of the change is considered by Aristotle as the mother's menstrual blood, the form of the change is the substantial form of the generated human being, while the privation is the absence-of-the-substantial-form-of-the-generated-human-being.

Notably, in *Physics* I 8, Aristotle sketches a puzzle that leads the Eleatics like Parmenides to deny the possibility of change, the so-called Parmenidean puzzle about coming-to-be: "So they say that none of the things that are either comes to be or passes out of existence, because what comes to be must do so either from what is or from what is not, both of which are impossible. For what is cannot come to be, because it is already, and from what is not nothing could have come to be, because there must be a subject." (191a26-31)

Aristotle's response to the puzzle in the same chapter is two-fold. One the one hand, he admits that in the so-called unqualified sense, what is can neither come from what is nor from what is not, so the puzzle says some truth. On the other hand, he argues that there is still a sense, the so-called accidental sense, in which what is can both come from what is and what is not, i.e., coming-to-be is possible, so the puzzle is not a sound argument in support of the claim that change is impossible.

Importantly, the accidental sense relies on the very theory of the three principles of change, in particular, the view established in *Physics* I 7 that what comes into being through a change properly comes from the subject of the change that is one in number with the privation. This means that one significance of the theory of three principles of change is to help Aristotle to answer how change is possible.

However, as we shall see in the remaining sections of this chapter, scholars disagree on how exactly Aristotle solves this puzzle with his theory of three principles of change, in particular, how exactly the notion of subject of change helps him to answer how change is possible.

1.2 The Traditional Argument for the Persisting Subject

The traditional view of the subject of change holds that for a thing to be the subject of a change, it is necessary for it to persist through the change, in other words, the notion of the subject of change implies persistence. Accordingly, for every instance of change, the subject of the change persists through the change.

When it comes to an instance of accidental change, it is easy to see that the candidate for the subject persists through the change, for what is supposed to be the subject is just the substance on which the change-involved accidents are commonly dependent in existence, whenever the accidents exist, the substance exists, and the substance itself endures over time. For example, Socrates is the subject of his coming-to-be pale from being tanned, and he does endure the change.

By contrast, in the case of substantial change, Aristotle claims that what serves as the subject of a material substance's generation is its matter. In some of his auxiliary examples for understanding the genuine substantial changes, what are supposed to play the role of matter apparently persist

through the associated changes. For example, the lump of bronze out of which a statue is made, playing the role of matter, apparently persists through the production of the statue and ultimately survive in the statue; the house-buildable bricks, stones, and mortar out of which a house is built collectively play the role of matter, and they apparently persist through the building of the house and ultimately survives in the house. However, since a genuine substantial change could be extremely radical, it is doubtful that there is always something (let alone the observable thing) that persists through the substantial change so as to be the subject of the change. Moreover, some Aristotle's examples of the matter of a material substance seem to counter the view that the matter persists through the change. For example, in *Physics* I 7 (190a14-21), Aristotle indicates that the matter of an oak tree is the seed from which it grows, and the seed apparently does not survive in the oak tree; moreover, in the birth of a human being, the mother's menstrual blood, as a part of the matter of the baby, seems to not persist through its birth.

The above consideration of the case of substantial change naturally calls for an argument in support of the traditional view of the subject of change, i.e., an argument that explains why persisting through the change is a necessary condition of being the subject of a change. In what follows, we will present an argument for the traditional view. Specifically, since the idea of the argument can be found in the literature from years ago, such as Scaltsas (1986), Gill (1989), and Code (1995), and has been wildly accepted by commentators, it can be called "the traditional argument for the persisting subject".

Before presenting the traditional argument, it is worth to note that to evaluate the plausibility of the tradition view of the subject of change, we should not expect that the empirical data can give us a decisive answer of whether there is always something that persists through a substantial change, because that a thing persists means that it remains its identity over time, and as Pasnau says, "Questions of identity over time—whether a thing endures, or is succeeded in time by something new and perhaps qualitatively quite similar—are metaphysical questions that can never be decisively settled by observation". Instead, we should examine whether there is some appropriate theoretical role of the notion of the subject of change, such that the role requires the

subject of a change to persist through the change. The traditional argument that is about to be presented is just given in terms of the role that the notion of the subject of change plays in Aristotle's solution to the Parmenidean puzzle about coming-to-be.

According to the traditional argument, the unqualified sense of "what is cannot come from what is" means that if something ever comes into being, then it cannot come from itself, in other words, coming-to-be cannot be the case that what comes into being already exists; the unqualified sense of "what is cannot come from what is not" means that if something ever comes into being, then it cannot come from absolute nothing, in other words, coming-to-be cannot be the so-called *absolute emergence*, i.e., what comes into being comes from absolute nothing.

Then, in Aristotle's view, Parmenides is right about these two claims, i.e., that coming-to-be cannot be these two cases, but he fails to recognize what else coming-to-be could be, so he denies the possibility of change. Therefore, for Aristotle, to solve the Parmenidean puzzle and thus to justify the possibility of coming-to-be is to distinguish coming-to-be from these two cases, i.e., to give an account of how coming-to-be is neither of them.

Note that there is a parallel puzzle about ceasing-to-be: ceasing-to-be can neither be the case that what ceases to be still exists after the ceasing-to-be nor be the so-called *absolute annihilation*, i.e., the case that what ceases to be cannot cease into absolute nothing. Accordingly, given the assumption that every instance of change involves both an instance of ceasing-to-be and an instance of coming-to-be, Aristotle actually faces a more general puzzle, which can be called "the Parmenidean puzzle about change": change can neither be the case that what ceases to be still exists after the ceasing-to-be or what comes into being already exists before the coming-to-be, nor be the so-called *sheer replacement*, i.e., what ceases to be ceases into absolute nothing and then is replaced by what comes into being that comes from absolute nothing. Correspondingly, for Aristotle, to solve the Parmenidean puzzle about change and thus to justify the possibility of change is to distinguish change from these two cases, in particular, to distinguish change from sheer replacement.

Then, Aristotle's solution to the Parmenidean puzzle about change can be stated as follows. On the one hand, in every instance of change, what ceases to be, say X, no longer exists after the ceasing-to-be, and what comes into being, say Y, does not exist before the coming-to-be, so the change from X to Y does involve replacement of X with Y and thus must not be the case that what ceases to be still exists and what comes into being already exists. On the other hand, the change from X to Y is nevertheless a continuous process, for there is necessarily some part of X, say Z, such that Z survives in Y, i.e., X properly ceases into Z and what Y properly comes from Z, whereas the sheer replacement of X with Y is not a continuous process in this sense, so change must not be sheer replacement. But why does such Z necessarily exist? Because Z is just the subject of the change from X to Y that necessarily exists as a principle of the change in question.

Therefore, the traditional argument holds that the role of the subject of change in Aristotle's solution to the Parmenidean puzzle is to guarantee the continuity of change, in virtue of which change is distinguished from sheer replacement; crucially, for the subject to guarantee the continuity of the change, it is necessary for it to be something that persists through the change, for being a part of what ceases to be and then surviving in what comes into being means remaining its identity throughout various times presupposed by the change.

One can apprehend the idea of the above-stated argument by reading Scaltsas' and Gill's comments cited below.

Scaltsas says, "Aristotle does not believe that there is creation *ex nihilo* or complete annihilation of a material substance. But independently of that, what distinguishes any change, whether it is substantial transformation or accidental alteration, from creation *ex nihilo* or annihilation is the fact that something remains the same throughout the change. Clearly the subject [i.e., what ceases to be] cannot play this role for change in general, since in substantial transformation the subject does not survive. But something must survive throughout each change. It is not enough that something remains at the end of the change, since that in itself does not guarantee physical

continuity in the course of the change. In the annihilation of x, immediately followed by the *ex nihilo* creation of y, there would be something left at the end of the sequence, viz., y; but even if that were physically possible, it would not be change, since nothing at all would survive throughout that sequence"[1].

Gill says, "Parmenides denied the possibility of change because, on his view, for coming-to-be to occur, something must come to be from nothing. Aristotle agrees with his predecessor in excluding such absolute emergence yet accommodates change by insisting that coming-to-be, although involving replacement, also involves continuity. He thus avoids the charge that, when a change takes place, the preexisting thing simply perishes into nothing and is replaced by a product that emerges out of nothing. Since some part of the preexisting entity survives in the outcome, change is not a sheer replacement"[2].

However, in recent years, Ebrey (2007) and Cao (2014) respectively raised objections to the traditional argument from different aspects, which shows that the traditional argument is flawed.

1.3 Ebrey's Objection

Ebrey (2007)'s objection to the traditional argument is embedded in his objection to the so-called sheer replacement motivation for matter, which holds that what motivates Aristotle to introduce matter as the subject of substantial change and makes it so prominent is the need of solving the so-called sheer replacement puzzle inspired by Parmenides, i.e., how we can distinguish (substantial) change from sheer replacement. He argues that it is rather because matter has a sort of causal-explanatory power to substantial change that Aristotle introduces matter.

[1] See Scaltsas (1986), p. 216.

[2] See Gill (1989), p. 7.

According to his objection proper to the traditional argument, the traditional argument falsely holds that positing something that persists through substantial change sufficiently or adequately distinguishes substantial change from sheer replacement. And this false view results from its incorrect diagnosis of the reason why substantial change cannot be sheer replacement or why sheer replacement is impossible but substantial change is possible, i.e., the diagnosis that substantial change is a continuous process whereas sheer replacement is not. Instead, the correct diagnosis is that it is in substantial change rather than sheer replacement that there is a causal-explanatory connection between the beginning state and the end state of the process. And crucially, positing something that persists through the process is insufficient to or even not an adequate strategy to build up the causal-explanatory connection, so thinking persistence does not really solve the sheer replacement puzzle as the proponents of the traditional argument think. Therefore, the sheer replacement puzzle actually does not provide good grounds for introducing something that persists through change, let alone justifying the traditional view that the subject of change is just that persisting thing.

Then, let's see his diagnosis of the reason why substantial change cannot be sheer replacement and how he concludes that thinking persistence does not really solve the sheer replacement puzzle in details.

First, Ebrey indicates that the best textual resource for figuring out why substantial change cannot be sheer replacement or why sheer replacement is impossible is Parmenides' own poem rather than Aristotle's report in *Physics* I 8, for the reason Aristotle there gives is that there must be a subject, i.e., "from what is not nothing could have come to be, because there must be a subject." (191a30-31)", but what we are trying to determine is why subject is necessary for coming-to-be to be distinguished from absolute emergence. Accordingly, Ebrey turns to examine Parmenides' poem. For the sake of illustration, we cite the relevant poem:

"It never was nor will be, since it is now, all together, one, continuous. For what birth will you seek for it? How and whence did it grow? I shall not allow you to think from not being: for it is

not to be said nor thought that it is not; and what need would have driven it later rather than earlier, beginning from the nothing, to grow? Thus it must either be completely or not at all. Nor will the force of conviction allow anything besides it to come to be ever from not being." (Fr. 8 lines 6-10)

From the poem, he summarizes two reasons why sheer replacement is impossible: (i) the not-being problem: nonexistence is not thinkable, so it is meaningless to assert that a thing comes out of nonexistence; (ii) the insufficient reason problem: even if non-existence is thinkable, it still fails to make any contribution towards an explanation of why and how the change proceeds in the way that it does, e.g., it cannot explain why the product is generated at this time but not at another, and why it is this kind of thing rather than another that is generated.

Accordingly, to distinguish coming-to-be from absolute emergence and thus make coming-to-be possible, we must prevent coming-to-be from being troubled by the not-being problem and the insufficient reason problem. Then he argues that to achieve this, adding a persisting thing is inadequate: to prevent coming-to-be from being troubled by the not-being problem, we only need to posit some preexisting thing of which the product of coming-to-be comes out, and "a persisting thing would not solve the not-being problem any better than a non-persisting thing would"[3]; to prevent coming-to-be from being troubled by the insufficient reason problem, "adding the persisting thing does not contribute at all to an explanation"[4].

The idea of the second point can be grasped by considering the example of a substantial change from an egg to a dog. To prevent the substantial change from the egg to the dog from being troubled by the insufficient reason problem, we must build up a causal-explanatory connection between the egg and the dog by introducing something that explains why the egg ceases to be and why the dog rather than something else then comes into being. However, positing something that persists through the process *as such* cannot play these explanatory roles, for it just tells us

[3] See Ebrey (2007), p. 24.

[4] Ibid., p. 25.

that some part of the egg remains unscathed throughout the process and also constitutes the dog as its concurrent part. As Ebrey says, "I know what happened to the persisting part of the egg – it does not change at all – but that does not tell me what happened to the whole, the egg. If we do not know what happened to the egg, finding part of the egg unscathed does not provide us with an answer. Similarly, we do not know how the puppy came to be. We understand why there is a persisting thing at the end – that itself never changed – but we do not know where its dogginess came from so we really do not know how the puppy came to be."[5]

Note that Ebrey's objection neither entails that for any instance of change, something must persist through the change, nor that for any instance of substantial change, nothing persists through the change, and Ebrey sets himself neutral on the issue of whether persisting through change is implied by being the subject of a change. Again, his point is that adding a persisting thing is not an adequate strategy to solve the sheer replacement puzzle.

1.4 Cao's Objection

Cao in her book *Change and Persistence: A Study on Aristotle's Theory of Matter* (2014) aims to establish that the matter of a material substance necessarily does not persist through its generation and corruption, so she proposes some arguments against the traditional view of the subject of change, i.e., the view that the notion of the subject of change implies persistence. In particular, she argues that the traditional argument involves an invalid inference, i.e., the inference from that change is a continuous process to that something persists through the change.

Her argument actually consists of two parts: for one thing, she argues that when Aristotle uses the term "continuous" to describe a change, he actually does not understand it in the sense assumed by the traditional argument, and according to Aristotle's conception of continuity, the

[5] Ibid., p. 25.

claim that a change is continuous and the claim that something persists through the change do not entail each other; for another, she argues that even if we understand the continuity of change in the way the traditional view does, the claim that change is a continuous process still does not entail the claim that something persists through the change. Since we focus on the reason why the traditional argument is not sound rather than the issue of whether the traditional argument can really be attributed to Aristotle himself, in what follows, we set aside the former and present the latter.

She indicates that the continuity of change assumed by the traditional argument is the so-called *material continuity*, which means that the whole process of a change, from the beginning to the end, does not contain any material vacuum or nonexistence, in other words, the change always occurs on some material object existing at a certain moment. Indeed, the claim that something persists through the change entails that the whole process of the change does not contain any material vacuum. However, the latter does not entail the former, i.e., simply from the premise that the whole process of the change does not contain any material vacuum, we cannot conclude that something persists through the change. The idea can be grasped by an analogy: the continuity of a segment can be satisfied by infinitely many numerically distinct points, analogically, the material continuity of a change can be satisfied by infinitely many mutually distinct material objects existing at different moments.

Moreover, in response to the challenge that in the substantial change from X to Y, if none of the material parts of X survives in Y, then once X corrupts, it can immediately conclude that Y comes from absolute nothing, so the substantial change from X to Y collapses into the sheer replacement of X with Y, she contends that there are two senses of "X corrupts", one is that X perishes into nothing, another is that X *turns into* something else; it is the second sense that represents Aristotle's view of substantial change. According to her interpretation of Aristotle's view, when X turns into Y, Y comes from X rather than absolute nothing; since X turns into Y or something intermediate between X and Y, X neither perishes into absolute nothing nor persists; importantly, such a turning-into process does not contain any material vacuum at any moment, so

the change is still materially continuous. Therefore, Cao's stance towards the sheer replacement is more radical than Ebrey's, for she explicitly denies that substantial change must involve some persisting thing so as to distinguish itself from sheer replacement.

To support the idea of understanding the substantial change from X to Y as the materially continuous process of X's turning into Y, she refers to a passage in *On Generation and Corruption*, where Aristotle says, "If, then, someone of the things which are is constantly disappearing, why has not the universe been used up long ago and vanished away—assuming of course that the material of all the several comings-to-be was finite? For, presumably, the unfailing continuity of coming-to-be cannot be attributed to the infinity of the material. That is impossible; for nothing is actually infinite, and potentially things are infinite by way of division; so that we should have to suppose there is only one kind of coming-to-be, viz. one which never fails, such that what comes-to-be is on each successive occasion smaller than before. But in fact, this is not what we see occurring. Why, then, is this form of change necessarily ceaseless? Is it because the passing-away of this is a coming-to-be of something else, and the coming-to-be of this a passing-away of something else?" (318a15-25). She supplies with a rhetorical question, "A seed grows into an oak tree, a food turns into human flesh, neither seed nor food survives, but who on earth thinks there is a material vacuum in these processes?"[6].

1.5 Conclusion of the Review

From the above review, we see that the traditional argument for the persisting subject assumes that the main challenge raised by the Parmenidean puzzle is how to distinguish change from sheer replacement (and thus absolute emergence), and it holds that (i) it is the continuity that distinguishes change from sheer replacement, and the role of the subject of change in Aristotle's solution is to ground the continuity of change; (ii) it is necessary for the subject of change to be a

[6] See Cao (2014), p. 75.

persisting thing to ground the continuity of change. Then, Ebrey (2007) objects (i) and holds that it is the internal causal-explanatory connection between what ceases to be and what comes into being after the change that distinguishes change from sheer replacement, so the role of the subject of change in solving the sheer replacement problem is to ground the internal causal-explanatory connection of change, and it is not sufficient for the subject of change to be a persisting thing to ground the internal causal-explanatory connection of change; Cao (2014) objects (ii) and holds that the continuity understood by the traditional argument is actually material continuity, and it is unnecessary for the subject of change to be a persisting thing to ground the material continuity of change.

In response, the proponents of the traditional argument are required to further clarify the notion of the continuity of change so as to distinguish it from Cao's notion of the material continuity of change, as well as arguing that the continuity so understood is still an essential feature of change that distinguishes it from sheer replacement and also implies the existence of some persisting thing. Alternatively, they can agree with Ebrey that the internal causal-explanatory connection between the termini of the change is an essential feature of change that distinguishes it from sheer replacement, but then they are required to argue that to build up the internal causal-explanatory connection between the termini of the change, something must persist through the change.

Even if the proponents of the traditional argument might succeed in establishing the traditional view of the persistence of subject by further revising the original argument in either of the above-stated two ways, it suffices to conclude that the traditional argument is flawed, it is not as sound as its proponents originally thought.

Chapter 2 The Persisting Subject and Substantial Change

In this chapter, we will give our response to the dispute over the persistence of subject that has been reviewed in the last chapter. Specifically, in section one, we will put forward a distinctive argument for the persisting subject, which is no longer given in terms of the continuity of change but the so-called dynamic nature of change; in section two, we will also put forward a distinctive interpretation of Aristotle's solution to the Parmenidean puzzle, where the exact role of the subject is to ground the dynamic nature of change; lastly, in section three, we will show that there is tension between the traditional view of the persistence of change and the possibility of substantial change, and Aristotle's recognition of substantial change is not a trivial move.

2.1 The Dynamic Nature of Change and the Persisting Subject

According to our common sense, for any instance of change, it must involve something that changes, in other words, there must be some changing thing. That a thing changes means that the thing undergoes different states of form characterization: there is some form, such that the thing is characterized by the form and also not by the form. Further, given that nothing can be characterized by the form and not by the form at the same time, the changing thing must be characterized by the form at one time but not by the form at another time. Importantly, this implies that the changing thing must remains the same identity throughout the various times presupposed by the change. Therefore, every instance of change must involve something that persists through the change.

The view that every instance of change must involve some changing thing actually follows from our fundamental intuition about change, i.e., change in its nature is a dynamic process. Suppose

there is a process that does not involve a changing thing but is still qualified as an instance of change, the process would be a sequence consisting of things existing at various times, such that if any two of them are characterized by the change-involved forms respectively, then they must be numerically distinct. Importantly, no matter how these numerically distinct things are connected to each other, since none of them persists over time along with undergoing different states of form characterization, each of them is completely static at the time it exists, and the process as a whole is also static, which contradicts to the supposition that the process is an instance of change and thus dynamic. Therefore, that change in its nature is a dynamic process entails that every instance of change must involve some changing thing.

One might object that a process without a changing thing can still be dynamic, for it can be a process of successive absolute emergence and absolute annihilation (or simply accumulated absolute emergence) of the relevant numerically distinct things. In response, a process of successive absolute emergence and absolute annihilation is just an instance of sheer replacement, which is disqualified as an instance of change; neither a process of simply accumulated absolute emergence is qualified as an instance of coming-to-be, let alone an instance of change that involves ceasing-to-be as well as coming-to-be; moreover, when we conceive the absolute emergence or absolute annihilation of X as a dynamic process, we actually presuppose a changing thing, i.e., the universe or the domain itself, such that it endures over t_1 and t_2, where it contains X at t_1 but not at t_2. So if the universe neither itself is a changing thing nor contains any changing thing, the universe is completely static.

One can apprehend the necessity of the existence of a changing thing to a change by considering a flying arrow. We can take a series of numerically distinct photos of a flying arrow, each of which captures the flying arrow occupying a certain space at a certain time, no matter how many photos are taken and how closely these photos are placed in a certain order, we will never say that these photos themselves constitute a change, say that an arrow flys. This is because these photos are static, i.e., none of the objects in any of these photos changes. Analogically, a series of numerically distinct resting arrows occupying different spatial-temporal locations does not

constitute a change that an arrow flies, because each of these arrows is at rest and thus does not properly move from one place to another place over time.

Then, we hold that to be the subject of a change is just to be the changing thing that is characterized by the change-involved forms (i.e., the privation, the form, and the intermediates between them) at different times. This means that an essential role of the subject of change is to ground the dynamic nature of change. Moreover, remember that being a changing thing entails being a thing that persists through the associated change, being the subject of a change thus entails being a thing that persists through the change. This is the reason why we endorse the traditional view of the subject of change.

In addition, another essential role of the subject of change is to ground the unity of change. For why is the change that involves X's ceasing-to-be and Y's coming-to-be is a single process rather than two independent or disconnected processes, i.e., the absolute annihilation of X and the absolute emergence of Y? Because it is the subject's change, i.e., it is because the subject first ceases to be characterized by the form of X and then comes to be characterized by the form of Y that X's ceasing-to-be and Y's coming-to-be are integrated into a single process. Hence, in our view, what essentially distinguishes the change from X to Y from the sheer replacement of X with Y is rather that it is the former rather than the latter that is a single process.

Last but not least, consider an instance of change from the privation non-F-ness to the form F-ness (whether F-ness is a substantial form or an accidental form), where the persisting subject of the change is Z, then what comes into being after the change, say Y, is identical to Z when it is actually characterized by F-ness, while what ceases to be during the change, say X, is identical to Z when it is actually characterized by non-F-ness. Accordingly, that Y comes into being essentially is the process that Z comes to be F, i.e., Z is not characterized by F-ness in the beginning but by F-ness in the end, where Z is what Y properly comes from; that X ceases to be essentially is the process that Z ceases to be non-F, i.e., Z first is characterized by non-F-ness in the beginning but then not by non-F-ness in the end, where Z is what X properly passes into.

Therefore, even if the change in question, which involves X's ceasing-to-be and Y's coming-to-be, can be conceived as the process that X turns into Y, as Cao thinks, the process is essentially the process that the persisting subject Z first ceases to be non-F and then comes to be F. It is impossible for X's turning-into Y to be an instance of change without involving a persisting subject.

2.2 Reexamining Aristotle's Solution to the Parmenidean Puzzle

In fact, grounding the dynamic nature of change is exactly the role the subject of change plays in Aristotle's solution to the Parmenidean puzzle about change, and the true challenge of the Parmenidean puzzle is not how we can distinguish change from sheer replacement but rather how we can accommodate the changing thing of a change so that the change is distinguished from a static process which cannot be change. To see this, we have to reexamine the Parmenidean puzzle about coming-to-be discussed by Aristotle in *Physics* I 8.

Again, the primitive expression of the puzzle is as follows:

(1) If what is comes to be, then it either comes from what is or what is not;
(2) What is cannot come from what is;
(3) What is cannot come from what is not;
(4) Therefore, what is cannot come to be.

Given that *being* in ancient Greek is ambiguous between existence and predication, we prefer the predicative reading of "is" in "what is" and "what is not" involved in the puzzle, for as we shall see later, the puzzle under the predicative reading implies the one under a special existential

reading. Then, the puzzle under the predicative reading is as follows: let F-ness be the form of the coming-to-be,

(1*) If what is F comes to be, then it comes from either what is F or what is not F;
(2*) What is F cannot come from what is F;
(3*) What is F cannot come from what is not F;
(4*) Therefore, what is F cannot come to be.

Crucially, according to the analysis given in the last section, that what is F comes to be, where F-ness is the form of the coming-to-be, is essentially the process that some changing thing, as the subject of the coming-to-be, comes to be F, and the changing thing that comes to be F is just what is F properly comes from. Therefore, the disjunction in (1*) is actually about the subject of the coming-to-be: it is either characterized by F-ness or not, while (2*) and (3*) are the denials of the disjuncts. The puzzle thus can be equivalently expressed as follows:

(1*) If there is an instance of coming-to-be, where the form of the coming-to-be is F-ness, then the changing thing that comes to be F either is F or not F;
(2*) It is impossible that the changing thing that comes to be F is F;
(3*) It is impossible that the changing thing that comes to be F is not F;
(4*) Therefore, there is no instance of coming-to-be.

Then we propose that (2*) and (3*) in the unqualified sense should be understood as follows:

(2*-*per se*) It is impossible that the changing thing that comes to be F *per se* is F;
(3*-*per se*) It is impossible that the changing thing that comes to be F *per se* is not F.

That is, (2*-*per se*) and (3*-*per se*) together claim that the account of the identity of the subject can neither entail that it is F nor that it is not F. Importantly, these two claims are true:

(2*-*per se*) is true, because suppose the changing thing that comes to be F, say X, *per se* is F, then this means that whenever X exists, X must actually be F; moreover, as the changing thing, X persists through the coming-to-be; these two conditions together entail that at the end of the coming-to-be, X, as what already is F, is said to come to be F, which is absurd.

(3*-*per se*) is also true, because suppose the changing thing that comes to be F, say X, *per se* is not F, then this means that whenever X exists, X must actually not be F; moreover, as the changing thing, X persists through the coming-to-be; these two conditions together entail that at the end of the coming-to-be, X would actually be F and not be F *at the same time*, which is also absurd.

However, for Parmenides, it is impossible that there is a thing, say X, such that it is neither that X *per se* is F nor that X *per se* is not F. This is because, in *Physics* I 3, Parmenides is understood by Aristotle to be committed to the so-called doctrine of *unicity of being*: the meaning of a term *exhausts* the identity of the thing to which the term is applied, i.e., for any object X and any predicate P, whenever P is applied to X, to be P *exhausts* what it is to be X[7], in other words, X is identical to P-ness itself. For example, when "white" is applied to a thing, the essence of the white thing in question is simply to be white, in other words, the white thing is just identical to the whiteness itself. Accordingly, given the law of excluded middle, in Parmenides' ontology, for any object X and any predicate F, it is either that X *per se is* F or that X *per se is* not F, where the involved copula "is" signifies the identical relation.

Consequently, in Aristotle's view, nothing in Parmenides' ontology can really serve as the changing thing that comes to be F, and since F-ness can be any form presupposed by any coming-to-be, Parmenides denies the possibility of coming-to-be. The following argument summarizes the reason why Parmenides denies the possibility of coming-to-be:

[7] See Angioni (2021).

(1*-*per se*) If there is an instance of coming-to-be, where the form of the coming-to-be is F-ness, the changing thing that comes to be F either *per se* is F or *per se* is not F;

(2*-*per se*) It is impossible that the changing thing that comes to be F *per se* is F;

(3*-*per se*) It is impossible that the changing thing that comes to be F *per se* is not F;

(4*) Therefore, there is no instance of coming-to-be.

Further, according to the doctrine of unicity of being, whenever there is a thing to which the term "being" is applied, say X, X must be identical to being itself and cannot be any specific being, because a specific being is not being itself; moreover, for any object, if it exists, then it must be what "being" is applied to; therefore, in Parmenides' ontology, only Being, i.e., being itself, exists, as opposed to Non-Being, which *per se* is not any specific being or being itself. To use Aristotle's terminology, Being and Non-Being is a pair of contraries. Then, when "what is" and "what is not" involved in the primitive expression of the puzzle are read in the Parmenidean existential sense, i.e., "what is" signifies Being, while "what is not" signifies Non-Being, the argument is sound to Parmenides:

(1**) If Being comes to be, then it comes from either Being or Non-Being;

(2**) Being cannot come from Being;

(3**) Being cannot come from Non-Being;

(4**) Therefore, Being cannot come to be.

Note that the reason why Being cannot come from Non-Being also explains why we have the intuition that absolute emergence is impossible: absolute nothing *per se* is not any specific being, let alone being itself, if absolute nothing itself comes to be a being, then it would be actually both not any being and a being at the end of the coming-to-be, so it itself cannot come to be a being, in other words, absolute nothing itself cannot be what a being properly comes from.

Aristotle can save change from the Parmenidean dilemma, because, as he says, "It is impossible for the contraries to be acted on by each other. But this difficulty also is solved by the fact that what underlies [i.e., the subject] is different from the contraries; for it is itself not a contrary" (190b35). That is, basically, Aristotle is not committed to what we call "the principle of *per se* predication", i.e., for any object x and any predicate P, if x actually is (not) P at a time, then x *per se* is (not) P, in other words, every predication of an object constitutes or exhausts its identity, let alone the doctrine of the unicity of being. Then, notably, the subject of a change, where the privation is non-F-ness, and the form is F-ness, rather is *accidentally* F (and also accidentally not F): (i) whenever the subject exists, it is *actually* characterized by a change-involved form, i.e., it actually either is F or not F; (ii) nevertheless, it is neither the case that it *per se* is F nor the case that it *per se* is not F, which means that neither F-ness nor any of its contraries constitute the identity or nature of the subject, in other words, the subject has an identity or nature independent from F-ness and its contraries. For example, Socrates is defined independently from paleness and its contraries, so Socrates himself is not any of these contraries. Therefore, for Aristotle, (1*-*per se*) is false, and the Parmenidean argument from (1*-*per se*), (2*-*per se*), and (3*-*per se*) to (4*) is unsound, which means that Parmenides fails to raise a genuine dilemma of coming-to-be.

But what can we say about the subject *per se* in its relation to F-ness, if it is neither the case that it *per se* is F nor the case that it *per se* is not F? In Aristotle's view, the subject *per se* is *potentially* F (and also *potentially* non-F and thus not F), i.e., the subject *per se* is something capable of being F (and also of being non-F and thus not F). Accordingly, when "what is not F" signifies what accidentally is not F rather than what *per se* is not F, what is not F can come to be F. It is in such an accidental sense, what is can come from what is not.

In sum, given that every instance of change is a process that involves a pair of contrary forms, to distinguish a change from non-F-ness to F-ness from a static process that involves non-F things and the F thing, e.g., to distinguish that Socrates really comes to be pale from being tanned from the static process consisting of tanned-Socrates and pale-Socrates, what is at stake is whether one can accommodate some changing thing that comes to be F from being non-F, specifically,

whether there is something in the ontology, such that it satisfies the requirement indicated by (2*-*per se*) and (3*-*per se*), i.e., it is neither possible that it *per se* is F nor possible that it *per se* is not F. Parmenides fails to achieve this due to his commitment to the doctrine of unicity of being, which leads him to deny the possibility of change. By contrast, Aristotle can achieve this, because he considers the subject as something whose identity is independent of the changed-involved contraries and in its nature in potentiality to these contraries.

Last but not least, that the subject is accidentally F means that there are at least two different accounts of the subject at the same time: one is the account of the identity of the subject, i.e., the account of what the subject *per se* is, another is the account of the subject in the current actual state, i.e., what the subject actually is at this time, where the former does not tell us whether the subject is F or not at this time, whereas the latter does. And it is the former rather than the latter that is persistently applied to the subject. Accordingly, there are two corresponding ways of picking out the subject at a certain time. For example, consider that Socrates comes to be musical from unmusical, to pick out the changing subject, for one thing, we can invoke the definite description "the thing that is unmusical" at the beginning of the change and "the thing that is musical" at the end of the change; for another thing, we can invoke the substance-term "Socrates" at any time during the change. The former is the way according to the account of what the subject actually is at a certain time, whereas the latter is the way according to the account of what the subject *per se* is.

In terms of entities, the account of the identity of the subject signifies the so-called subject as such, whereas the account of the subject in an actual state at a certain time signifies what we can call "an enformed subject", and it is the subject as such rather than an enformed subject that persists through the change. For example, the material substance Socrates is the subject of coming-to-be musical as such, while the so-called substance-accident unity unmusical-Socrates is an enformed subject; bronze is the subject/matter of the generation of a brazen statue as such, while the hylomorphic composite brazen statue is an enformed subject/matter. Then note that at the same time, the enformed subject existing at this time and the subject as such are merely

distinct in account rather than in number, for they are just the entities signified by two different accounts of the numerically one and the same changing thing at a certain time. In other words, they are just two distinct entities abstracted from the numerically one and the same thing at a certain time. As Aristotle says, "that which becomes, and that this, though always one numerically, in form at least is not one. (By 'in form' I mean the same as 'in account'.) 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" (190a15-20).

Moreover, these two accounts of the numerically one and the same changing thing at a certain time are correlative to each other. For any time during the process of change, say t, the account of the identity of the subject is merely a general and thus an incomplete description of the subject in the actual state at t, so it is a proper part of or embedded in the account of the subject in the actual state at t. In terms of entities, the subject as such is a determinable that has the change-involved forms as its determinants, while an enformed subject is a determinate of the subject as such. Accordingly, the subject as such is just a non-full-fledged entity that is commonly abstracted from the relevant enformed subjects existing at different times.

2.3 The Significance of Recognizing Substantial Change

Now we have established that for any instance of change, there must be some changing thing serving as the subject of the change, such that (i) it persists through the change; (ii) it is accidentally characterized by the change-involved forms. However, in this section, we will see that there is actually a tension between holding this conception of the subject of change and recognizing the kind of substantial change, which means that Aristotle's recognition of the kind of substantial change is not a trivial move.

Again, according to our conception of the subject of change, whenever a change is conceived as Y's turning/transforming into X, where Y is conceived as what ceases to be in the change, while X as what comes into being after the change, the change essentially is the process that the persisting subject, say Z, first ceases to be characterized by the privation, say non-F-ness, and then comes to be characterized by the form, say F-ness, and Y is identical to non-F-Z, i.e., Z when it is non-F, while X is identical to F-Z, i.e., Z when it is F. Specifically, the identity of Z is independent of both F-ness and non-F-ness, whereas the identity of X (and also Y) depends on Z, so Z can exist without X (and also Y), but not vice versa.

It thus seems that the thing that is identified as Z already has a completely determinate essence before it comes to possess F-ness, only with indeterminacy in some accidental aspects, while non-F and F-ness are a pair of contraries about a certain accidental aspect. If this is the case, X's coming-into-being is essentially the process that some substance (with a completely determinate essence) comes to possess the accident F-ness, which means that the substance (*ousia*) of the thing that is identified as X is still Z or something underlying Z, rather than the particular form of F-ness that characterizes Z, therefore, although it is said that x comes into being, it does not come as an entity with a new essence, instead, it is merely the preexisting substance (remaining the same essence) when it possesses a new accident.

The same pattern of analysis can also be applied to Y's ceasing to be and Y. Consequently, it seems that there is no genuine substantial change at all, for what appears to be a substantial transformation between two entities is no more than some non-essential changes in the subject, in other words, it is no more than some persisting substance's accidentally taking on contrary accidents at different times, rather than a process that involves an old substance's ceasing-to-be and a new substance's coming-to-be. For example, according to this putative view, the transformation from a bronze sphere to a bronze statue is no more than an accidental qualitative change in the relevant subject, i.e., a lump of bronze, something that does not need to possess any determinate shape to have a completely determinate essence. Specifically, the *ousia* of the

thing that is identified as the bronze sphere and the *ousia* of the thing that is identified as the bronze statue are numerically same, for the *ousia* in question is just the lump of bronze.

Moreover, together with the idea that what is initially considered as the subject of a change might further have some other entity as its own subject, and the idea that for every instance of change, there must be the unique ultimate subject, the above-stated putative view entails that every instance of change is no more than some accidental change in the relevant ultimate subject, where the ultimate subject is a single substance or multiple substances. We call this view "the reductionist view of the subject of change".

Historically speaking, both the physicists and the Platonists endorse the reductionist view of the subject of change, so they deny the possibility of substantial change and recognize accidental changes only. Moreover, they also believe that there are a few kinds of entities or even only a single sort of entity that serves as the ultimate and common subject of all changes. For example, Thales proposes water as the ultimate subject; Empedocles proposes fire, earth, and air, as well as water; Democritus proposes atoms and void; Anaximander proposes *apeiron*, i.e., the infinite; Plato of *Timaeus* proposes the receptacle. Note that they recognize accidental changes only, not because they recognize fewer instances of change than Aristotle did, but rather because they endorse the reductionist view of the subject of change and thus hold a different framework to evaluate some of the same instances. For example, in Democritus' view, that Socrates dies is no more than an accidental change in a bunch of atoms, i.e., a bunch of atoms still remain their essences even when they are no longer arranged in the Socrates-wise way; in Plato of *Timaeus*' view, that Socrates dies is no more than an accidental change in the receptacle, i.e., the receptacle still remains its essence even when it no longer participates in the platonic form of Man.

Since Aristotle recognizes substantial changes as well as accidental changes, so he must deny the reductionist view of the subject of change, but he does not assertively adopt a different framework that contains the kind of substantial change as well as the kind of accidental change to analyze various instances of change. Specifically, in addition to justifying the adequacy of

evaluating some changes as instances of substantial change in *On Generation and Corruption*, in *Metaphysics* Z3, Aristotle proposes an argument against the reductionist view, which is generally called the "stripped-off argument". In this argument, Aristotle imitates Plato's approach to reach the ultimate and common subject of all changes in *Timaeus*, i.e., the so-called stripped-off procedure, and he agrees with Plato that the ultimate subject as such does not have any determinate characteristic, which is called by Aristotle "prime matter". However, as opposed to Plato's view, he indicates that prime matter is not qualified as a substance, and the reductionist view must be rejected, for the view implies that the ultimate subject as such is a substance. Then let's see how the stripped-off procedure runs and why prime matter is not qualified as a substance.

The procedure is called the "stripped-off procedure", because according to the procedure, to obtain the ultimate and common subject of all changes is to progressively strip off the change-involved forms. Specifically, it consists of two major steps: the forms that are first stripped off include affections, actions, powers, motions, relations, dispositions, portions, since they are thought to be apparently possessed by some other entities underlying them. What remains is the so-called pure body, the three-dimensional (length, depth, and height) quantified entity. Note that the pure body is considered as the common subject of four natural elements, which means that none of the four kinds of natural elements can serve as the ultimate subject. Then, the second step is to further strip off the three-dimensional quantities, and what remains is considered as the ultimate subject as such.

Plato proposes that the ultimate subject resulting from the stripped-off procedure is the so-called receptacle, which can receive images of platonic forms, i.e., attributes that are similar but not identical to platonic forms. But he has trouble in giving any informative description about the receptacle except indicating that it is insensible and eternal, for all of the determinate attributes have been stripped off through the procedure. Aristotle admits the difficulty of describing it in its own right, he says, "But when length and breadth and depth are stripped away we do not see anything left over, unless what is determined by these is something" (1029a10-30). And he

emphasizes that the difficulty is not caused by a lack of language or thought but rooted in the ontological fact that prime matter does not contain any determinate actual attribute, "the last thing is not *per se* either something or so-much or anything else" (1029a10-30).

Then, crucially, Aristotle indicates that such an entity cannot be a substance. This is because, for an entity to be a substance (*ousia*) is for it to be the substance (*ousia*) of some concrete thing, i.e., it is the proper answer to the what-is question asked about some concrete thing. Accordingly, if prime matter is the genuine substance (*ousia*) of every generable entity, say a human being, then it is tantamount to saying that the concrete thing that is identified by us as a human being is essentially nothing, but this is absurd, for when we refer to a human being and ask "What is this?", we assume that it essentially must be *something* and thus expect a more specific answer that tells us what this something is. Nevertheless, could prime matter just have being-nothing as its nature, as Plato thought? This is not going to work, because, again, what *per se* is nothing cannot come to be anything.

Despite the shortage of words to describe prime matter, it does not mean that Aristotle's notion of prime matter is absurd or obscure. Equipped with the notions of potentiality and actuality, Aristotle claims that prime matter is *potentially* anything, which means that prime matter is like the highest determinable, which can be determined by a maximal range of determinants into various determinate things. As Menn indicates, "It [i.e., prime mater] is, in any given case, either actually hot or actually cold, either actually wet or actually dry, not being either *per se*; to describe it *per se*, we must say not what it is (or is not) actually, but what it is potentially, being *per se* in potentiality to all sensible contraries. Aristotle therefore replaces Plato's description of matter as privation by a description of matter as potentiality. This potentiality is eternal and so prior temporally, and also by Plato's test, to each of the sensible"[8].

[8] See IIb2 in Menn's book-manuscript entitled "The Aim and the Argument of Aristotle's Metaphysics".

Accordingly, in Aristotle's view, for any instance of substantial change, the subject-form composite that comes into being, say X, is a substance with a new essence, and since what serves as the subject, say Y, already exists before the change and remans its identity through the change, the new essence consists in the new from rather than the subject, which means that it is the form, rather than the subject, that is the *ousia* of the thing that is identified as X. The new form is thus called "substantial form". By contrast, what serves as the subject, i.e., the matter of X, itself is *potentially* some substance (such as X), which means that it itself is a *determinable* in respect of essence, i.e, it is capable of being further determined or specified so as to have a completely determinate essence and thus become an actual substance. Again, as the changing subject, matter already exists before the change and remans its identity through the change (as we will see in the next chapter, matter only exists non-separately). Hence, to accommodate substantial change, one must not conflate the notion of identity and the notion of essence: every entity has its own identity, but this does not mean that every entity is qualified as a substance and thus its identity is qualified as an essence. For example, in Aristotle's ontology, triangle as such is an entity that can be said to exist (non-separately), and we can of course given an account of the identity of triangle as such, i.e., an account of what it is to be a triangle. Nevertheless, as a determinable, triangle as such is not completely determinate or specified, and there is nothing whose essence is simply to be an triangle, which means that being a triangle is not qualified as an essence. By contrast, the entity Socrates as such is a substance, and its identity, i.e., being Socrates, is an essence.

Chapter 3 The Hylomorphic Composition

In order to justify the possibility and the intelligibility of substantial change, we will further illustrate the ternary relation of hylomorphic composition, i.e., the hylomorphic composite substance-matter-substantial form relationship, in this chapter. To achieve this, we will show how Aristotle invokes this sort of relation to solve a puzzle about definition. Specifically, after introducing the historical context where the puzzle is raised, we will show in section two what a good definition given in terms of genera and differentiae is like; lastly, in section three, we will illustrate how the puzzle is solved and how the ternary relation of hylomorphic composition is embodied in a good definition.

3.1 The Historical Context

According to Menn's interpretation[9], Aristotle in *Metaphysics* book Z examines some general procedures of searching for the *archai*, i.e., the very first principles of all things, that are proposed by his predecessors, and consequently concludes that none of them is promising. Notably, the two general procedures examined in *Metaphysics* Z10-16, one proposed by the pre-Socratic physicists and another by the Platonists, are commonly based on a special conception of the *definition* of an entity X, i.e., the account of what the thing that is identified as X is, or to use a jargon, the *logos* of the *ousia* of the thing that is identified as X. We call such a conception "the materialist conception of definition", which can be stated as follows:

An entity is definable, if and only if it is a *materialist composite*, in the sense that it is somehow *constituted of* and thus *divisible into* several different entities, call such entities the 'constituents' of the composite. Specifically, a materialist composite might have multiple levels of constitution, i.e., some of its constituents themselves might be materialist composites and thus have its own

[9] See Menn (2001).

constituents, where the constitution relation in question is transitive, i.e., if x constitutes y, and y constitutes z, then x constitutes z. Nevertheless, every materialist composite must have finite levels of constitution, which means that the constituents at the bottom level of the constitution of a materialist composite do not have their own constituents, and such entities are called the "elements" (*stoicheiai*) of the materialist composite. In addition, if x and y are constituents of z at the same level of constitution, then x and y exist separately from each other and also from z. Importantly, the *ousia* of a materialist composite is just the totality of its elements. In other words, a materialist composite is *identical* to the totality of its elements. This means that the definition of a materialist composite is just a list of the elements into which the composite in question is ultimately divided.

Together with the assumption that if x is prior to y in definition, i.e., x is invoked to define y, then x is prior to y in existence, the materialist conception of definition entails that the elements of a materialist composite are the most prior things in existence among its constituents. This induces the idea of conceiving *archai* as the elements of materialist composites, which is both held by the physicists and the Platonists.

The physicists hold that the generable and corruptible material individuals are materialist composites, where the constitution relation is the ordinary material constitution. The non-elemental material constituents of a corruptible individual are the material individuals that are still corruptible but more persistent; the material elements are the material individuals that are incorruptible and thus exist eternally. Moreover, all of the corruptible individuals are ultimately constituted by a few kinds of material elements. Then, the material elements are considered as *archai*, the candidates of which include water, fire, earth, air, and atoms. Since the *ousia* of a corruptible individual is thought to be the totality of all of its material elements, the physicists search for the *archai* by practicing the so-called physical definition, i.e., breaking the corruptible individuals down into their material constituents and ultimately the material elements.

As for the Platonists, they hold that the formal *ousia* of a generable and corruptible material individual is a separate platonic form in which it participates. For example, the platonic form Human Being is the separate essence in which all of the particular human beings commonly participate. While platonic forms are immaterial and completely unchangeable individuals, the Platonists still apply the materialist conception of definition to them and thus conceive them as materialist composites. A composite platonic form is constituted of a more universal platonic form as its proximate genus and another platonic form as the associated differentia, call such platonic forms its "dialectical constituents"; further, the proximate genus might also have its own dialectical constituents, and so on, until reaching the highest genus, which is one of the most universal platonic forms and thus a dialectical element. Then the highest genera are considered as *archai*, the candidates of which include the One and the Being. Since the *ousia* of a composite platonic form is thought to be its highest genus together with the associated sequence of differentiae, the Platonists search for the *archai* by practicing the so-called genus-differentia definition, i.e., breaking the composite platonic forms down into their dialectical constituents and ultimately the highest genera.

However, for Aristotle, both the materialist conception of definition and the idea of conceiving some elements of a composite as *archai* are problematic. First, the materialist conception of definition holds that the definiendum as a whole is identical to the totality of its multiple elements, but this means that strictly speaking, the definiendum is not a single thing but the heap of multiple things. In other words, this conception destroys the unity of the definiendum.

One may object that the unity problem occurs because of incomplete enumeration, i.e., the list given by the definition merely includes the apparent elements into which the composite is ultimately divided, without the relational element that signifies the relation held by the apparent elements, and once we succeed in complete enumeration, there is no problem of the unity of definiendum. For example, if the definition of syllable βα enumerates not only α and β but also the relational element β-being-placed-immediately-before-α, then the definition will not destroy the unity of βα, for the relational element explains why elements α and β are united into one

thing. However, for Aristotle, such an objection does not work, because, to use the example of syllable βα to illustrate, even if the relational element explains why elements α and β are united into one thing, the relational element itself is still an element, which means that it is not by itself united with other elements, i.e., α and β, and thus requires some other entity as the principle to explain why it itself is united with α and β into one thing. Therefore, simply adding some element as the principle of the unity of other elements cannot solve the unity problem.

Second, given the assumption that to be a substance is to be an ontologically independent entity, if a composite is essentially constituted of some substances that are actually present in it, then the composite turns out to be a heap or an accidental unity of these actual substances, which is ontologically dependent on these substances and thus itself cannot be a substance. In other words, no substance is constituted of actual substances, which is the so-called doctrine of non-overlapping substances. Accordingly, given the assumption that for an entity to be an *arche*, it is necessary for it to be a substance, the idea of conceiving some elements of a composite as *archai* destroys the ontological independency of the definiendum and thus excludes the definiendum from being a substance.

The physicists might be willing to accept Aristotle's criticism while insisting that only material elements are substances and thus unities in the strict sense. For example, Aristotle describes Democritus as a proponent of this doctrine, "Thus if the substance is one thing, it will not be out-of substances that are present in it and [composed out-of them] in the way that Democritus correctly describes: for he says that it is impossible for one thing to come-to-be out-of two or two out-of one: for he makes the indivisible magnitudes the substances" (1039a3-14).

However, Aristotle holds that all of the material individuals, including the so-called natural 'elements' proposed by the physicists, are corruptible and thus divisible, so there are actually no genuine material elements, in particular, no Democratic atoms. Moreover, Aristotle distinctively holds that some middle-scale material individuals as well as some microscopic material individuals are substances, such as human beings. These jointly entail that there are material

individuals, such that on the one hand, they are corruptible and thus have their material constituents, still, on the other hand, they are substances, so each of them is a unity in the strict sense. But if one is committed to both the idea of conceiving some material elements of material composites as *archai* and the doctrine of non-overlapping substances, then he cannot accommodate such corruptible substances coherently. Therefore, in Aristotle's view, the idea of conceiving *archai* as the material elements of corruptible individuals leads to an empirical error, the associated procedure of seeking *archai* by practicing physical definitions thus should be rejected.

The situation is even worse in the case of dialectical constitution. Since platonic forms are conceived by the Platonists as eternal substances, the Platonists not only fail to explain how two platonic forms, one as the proximate genus and another as the differentia, could constitute a single essence, so "Men will be, not by participation in Man or in [any] one thing, but in two, Animal and Biped' (1045a18-19), but also is threatened by inconsistency, for a platonic form having other platonic forms as its dialectical constituents itself is also conceived as a substance, which means that the complex platonic form essentially is both actually one thing and many things (and thus not one thing). Therefore, in Aristotle's view, the idea of conceiving *archai* as the dialectical elements of complex platonic forms is committed to a logical error, the associated procedure of seeking *archai* by practicing genus-differentia definitions thus should be rejected. In addition, as we will see in a later section, the Platonists also have difficulty in explaining how one and the same genus can be simultaneously united with contrary differentiae in the dialectical definitions of different species.

Accordingly, Aristotle concludes that both the physicists and the Platonists' procedures of searching for the *archai* are unpromising, and this motivates his own conception of *archai* that they are the eternal substances that extrinsically move material individuals as their efficient and final causes rather than intrinsically constituting them as their material or formal causes.

However, Aristotle's criticism against his predecessors also raises a severe challenge to himself. According to the doctrine of non-overlapping substances that he endorses, if there is a definable substance at all, say X, then none of the constituents of X given by the definition of X is an actual substance, but if they are non-substances, since they are invoked to define X and thus prior in definition to X, then they are prior in existence to X, which is absurd, for no non-substance, say a quality, could be prior in existence to a substance. Consequently, the initial assumption that there is a definable substance should be rejected, which means that no substance is definable. This is a puzzle Aristotle raises in *Metaphysics* Z13 (1039a14-23), where the conclusion is unacceptable to him: he thinks that science is knowledge about substances, and defining substances are the starting point of obtaining knowledge about them, so if no substance is definable, then science is impossible.

Therefore, despite Aristotle's main concern in *Metaphysics* is *archai*, the desiderata of the first philosophy, and he concludes that seeking *archai* by practicing definition doesn't work, in order to save the possibility of science, he has a responsibility to solve the above-stated puzzle. Specifically, in addition to explain why the argument of the puzzle is unsound, he is required to show what a good definition should be like, so that it does not destroy the unity and the ontological independency of the definiendum, and this is just the major task of *Metaphysics* Z17 and the book of H.

In what follows, we will first illustrate what Aristotle thinks a good definition is like, then how the puzzle is solved, and ultimately how the relation of hylomorphic composition is embodied in the definition.

3.2 A Good Genus-Differentia Definition

Basically, there is no definition *of* any particular material substance, but only definitions *of* material substance species, i.e., species of material substances. For example, we can define the species of human beings but not any particular human being. This is because the possession of scientific knowledge obtained by definition is a persisting state, which requires that the objects of scientific knowledge must be the entities that are permanently accessible to us. However, particular material substances either themselves cease to exist, so we have no more access to them through sensation, or simply are not present in our sensation due to the limit of our sensation. By contrast, species as universals exist eternally and permanently accessible to our intellect[10]. Moreover, that the proper definienda are species implies that the entities signified by the definiens must also be universals, for otherwise, the definition turns out to be the definition of some particular material individual. In sum, definitions can only be given at a universal level.

Then, a good definition can be expressed in terms of genus and differentia, but the involved species, genera, and the differentiae, as well as the relations among them, must be distinguished from their counterparts in a platonic dialectical definition. Remember that in a platonic dialectical definition, what serve as the defined species, the genera, and the associated differentiae are the platonic forms, the eternal substances, while the species-genus-differentia relationship is understood as the whole-constituent-constituent relationship, specifically, the whole is identical to the totality of its constituents. For example, the Platonists hold that Biped Animal, as a complex platonic form, is definable, and the definition of Biped Animal is just the list that includes the genus Locomotive Animal and the associated differentia Biped, which are also platonic forms and the constituents of Biped Animal. By contrast, in a good genus-differentia definition, as indicated above, the involved entities are Aristotelian universals, which

[10] Note that on the one hand, distinct from the nominalist view, species of material substances are not merely universal thoughts or terms but entities that are said to exist; on the other hand, distinct from the Platonist view, they do not exist separately as substances, instead, their existence is parasitic on the existence of the material substances that belong to them.

do not exist separately; importantly, the species-genus-differentia relationship is analogical to the relation of hylomorphic composition, i.e., the hylomorphic composite-matter-form relationship. In what follows, in order to make the idea more accessible, we use the relationship among biped animal, locomotive animal, and being biped as an example to illustrate the species-genus-differentia relationship in a good definition.

In the good definition of biped animal, biped is *predicated* of locomotive animal, i.e., locomotive animal *is* biped, and this can be understood in terms of the *determinable-determinant* relation.

First, severing as the subject of a predication, locomotive animal itself is a determinable. On the one hand, since it is not the highest determinable, it has some determinate features. For example, we can determinately decide whether a given material individual is an instance of locomotive animal or not; moreover, being a locomotive animal entails being capable of perception and thus not being a plant. On the other hand, locomotive animal itself is not yet completely determined, in the sense that it involves many indeterminate aspects, each of which has a certain range of incompatible options, and it is indeterminate which specific option obtains. For example, it is indeterminate in respect of the organs of locomotion, such that although being locomotive animal entails either being biped or being quadruped or …, but it does not entail any specific disjunct. Accordingly, for anything that is simply said to be a locomotive animal, it is indeterminate whether it is biped or quadruped or ….

It is helpful to apprehend the determinability of locomotive animal by referring to the conceptual scheme proposed by Funkhouser[11]. He identifies the determinate features of a determinable as its *non-determinable necessities*, which are thought to be the features that each instance of the determinable must have, but with regard to which the determinates under it do not differ. For example, the generic kind triangle is a determinable, which has various specific kinds of triangle as its determinates at different levels of specificity, such as isosceles triangle and equilateral

[11] See Funkhouser (2014).

triangle, but all of them do not differ in regard to the features like being three-sided, being closed, and being a plane figure, and every instance of triangle must have these features. Moreover, he identifies the indeterminate aspects of a determinable as its *determination dimensions*, along which the determinable can be further specified and the determinates under it differ from each other. Specifically, each of the determination dimensions ranges over a set of *determination values*, which can also be called the relevant "determinants", and a determinate of a determinable is a specific kind that is the same as the determinable, i.e., having the same non-determinable necessities and the determination dimensions, except that for each of these determination dimensions, the set of determination values over which it ranges in the determinate is the subset of the set of determination values over which it ranges in the determinable. For example, triangle can be considered to have a single determination dimension, i.e., three sides lengths, and this dimension in the determinable triangle ranges over all of the possible combinations of three sides lengths. Then, the specific kind equilateral triangle is a determinate of triangle, such that the former is the same as the latter except that the former only ranges over the combinations of three sides lengths in which the lengths of three sides are equal. To take another example, the generic kind color is a determinable that can be considered to have three determination dimensions: hue, brightness, and saturation, each of which ranges over a set of the possible degrees. Then the specific kind red, as a determinate of color, is the same as color except that each of the determination dimensions in red only ranges over a proper subset of the possible degrees.

Accordingly, locomotive animal is a determinable involving both the non-determinable necessities and multiple determination dimensions, where being capable of locomotion is a non-determinable necessity, with regard to which different species of locomotive animal do not differ, and which every instance of locomotive animal must have; the aspect of the organs of locomotion is one of the determination dimensions, which ranges over a set of values, where being biped and being quadruped are two mutually exclusive subsets.

Then, that biped is *predicated of* locomotive animal can be understood as that locomotive animal, as a determinable, is *determined by* the determinant being biped: the set of values that the dimension of the organs of locomotion involved in locomotive animal ranges over is *narrowed down* to being biped. Note that locomotive animal's being determined by being biped does not signify a heap of two constituents but a single entity, which we can call "biped animal's biped-ness". This single entity *per se* presupposes locomotive animal as its subject/determinable, which means whenever the entity obtains, it must be the case that locomotive animal exists and has already been determined by being biped. Animal's biped-ness is thus distinguished from other species' biped-ness, say robot's biped-ness, because a robot essentially is not an animal, its biped-ness is thus not animated, instead, robot's biped-ness *per se* presupposes locomotive mechanical materials as its subject/determinable.

Importantly, biped animal's biped-ness, as a single entity which *per se* presupposes locomotive animal as its subject/determinable, is the proper differentia and also the nature/*ousia* of the definiendum biped animal. So, if a material substance species' definition only involves a unique genus and a unique differentia, then the *ousia* of the material substance species is exactly the unique differentia, which *per se* presupposes the genus as its subject/determinable.

In general, a material substance species' definition involves multiple genera and multiple differentiae. Nevertheless, it is easy to generalize the above-stated idea to this case. Let the definition of a material substance species, say G_n, involve n genera, say G_0, …, G_{n-1}, and n differentiae, say D_1, …, D_n, where $n>1$, then they are arranged in the following recursive way:

Basic:

The *ousia* of G_1 is exactly D_1, and D_1 *per se* presupposes G_0 as its subject/determinable;

Induction: for $2 \leq i \leq n$,

The *ousia* of G_i is exactly D_i, and D_i *per se* presupposes G_{i-1} as its subject/determinable.

As a result, the *ousia* of the material substance species G_n is exactly the ultimate differentia D_n, which *per se* first presupposes G_{i-1} as its subject/determinable, whose *ousia* is exactly D_{n-1}, and if $n>2$, it *per se* further presupposes G_{n-2} as its subject/determinable, whose *ousia* is exactly D_{n-2}, and so on, until reaching the highest differentia D_1, which *per se* presupposes the highest genus G_0. Accordingly, the material substance species G_n exists, if and only if, the ultimate differentia D_n obtains, which implies that G_{n-1} exists and D_n is predicated of G_{n-1}, which further implies that D_{n-1} obtains, if $n>2$, then G_{n-2} exists and D_{n-1} is predicated of G_{n-2}, and so on, until reaching that the highest differentia D_1 obtains, which ultimately implies that the highest genus G_0 exists and D_1 is predicated of G_0. In other words, the *ousia* of a material substance species is exactly the single entity that serves as the ultimate differentia of its definition, which implicitly presupposes its genera and the associated differentiae at higher levels of universality. As Aristotle says, "The ultimate differentia is the *ousia* and definition of the thing" (1038a19-20).

Note that differentiae at different levels of universality do not necessarily belong to a single determination dimension of the highest genus. For example, in defining human being, after dividing locomotive animal according to the aspect of the locomotive organs, we can further divide the resulting biped animal according to another aspect, say the respiratory organs, so long as the new differentia *per se* divides biped animal, so that whenever it obtains, it must have already divided biped animal. Accordingly, the above-stated recursive structure of *per se* predication among genera and differentiae in a good definition can also be stated in terms of the determination relation as follows.

Basic:

G_0 is a determinable, such that it has some non-determinable necessities and n determination dimensions, which can be expressed as $D_1/{\sim}D_1$, …, $D_n/{\sim}D_n$, where for any $1\leq i\leq n$, $D_i/{\sim}D_i$ ranges over D_i and its contraries as determination values.

Induction: for $1 \leq i \leq n$,

G_i is a determinate of G_{i-1}, in particular, G_i is the same as G_{i-1} except that the set of values over which $D_i/\sim D_i$ ranges is narrowed down to D_i.

From this, we can derive that for any $2 \leq i \leq n$, if the set of values over which $D_i/\sim D_i$ ranges is narrowed down to D_i, then the set of values over which $D_{i-1}/\sim D_{i-1}$ ranges has already been narrowed down to D_{i-1}, which reflects the fact that in a good definition, that a differentia at a non-highest level of universality obtains implies that the differentia at the next higher level of universality obtains.

Last but not least, it is necessary to clarify again the ontological status of the genera and the differentiae in a good definition, for it is crucial to solve the aporia that Aristotle raises in *Metaphysics* Z12 to object the Platonistic view of definition. The idea of the aporia runs as follows:

Given that to guarantee the unity of a genus-differentia definition, each of the differentiae should be predicated of the genus that it *per se* presupposes, one and the same genus has contrary differentiae predicated of it in various definitions at the same time. For example, the genus locomotive animal has biped predicated of it in the definition of human being, and at the same time, the locomotive genus animal also has quadruped predicated of it in the definition of horse, where being biped and being quadruped are a pair of contraries. However, if the genus locomotive animal is conceived as a substance and thus a numerically one thing, as the Platonists did, then it would violate the law of non-contradiction, for the law dictates that there is no *numerically* one thing that can be and not be *in the same respect* and *at the same time*. Consequently, the Platonists face two choices: one is to give up the numerical sameness of a genus in various definitions so that the platonic form locomotive animal in the definition of human being and the platonic form locomotive animal in the definition of horse are numerically distinct. However, multiplying the platonic forms is undesirable to the Platonists, not to mention that it is hard to explain how such numerically distinct but indiscernible platonic forms arise.

Another is to give up the unity of a definition, such that neither human being nor horse are unified things, they are thus disqualified to be genuine platonic forms. However, this implies that only undefinable and thus simple intellectual individuals could be genuine platonic forms, which is also undesirable to the Platonists.

Again, for Aristotle, none of the universals, including material substance species and their genera, is a substance, in other words, none of them is the proper answer to a question "What is this?" asked about something; instead, to use a jargon, each of them is a *such*, i.e., a such-and-such sort of thing, which means that it is the proper answer to a question "what is this *like*?" asked about something. For example, whenever a thing is identified as [an] animal, "it is [an] animal" merely answers what the thing in question is like, i.e., what sort of thing it is, for nothing whose essence is just to be [an] animal. Accordingly, a *such* exists non-separately, it is always existentially parasitic on some substance, because, say, [an] animal exists, if and only if there is something that is [an] animal, and for anything to be [an] animal, it must ontologically first be something else, i.e., be what it is, say Socrates, and afterwards be [an] animal. In other words, the answer to the question of what something is like is always based on the answer to the question of what the thing in question is. Then, it is this mode of existence every genus has that explains why there is no problem to say that a genus has incompatible differentiae predicated of it at the same time, for a genus is not a numerically one thing and thus not restricted by the law of non-contradiction; moreover, there is no absurdity to say that contrary entities are *such and such in the generically same way* at the same time.

3.3 Solution and Hylomorphic Composition

For Aristotle, the argument of the puzzle is false, because it assumes that if x is prior to y in definition, i.e., x is invoked to define y, then x is prior to y in existence. Instead, in a good definition, although the genera are prior in definition to the definiendum species, their existence

are parasitic on the existence of the species, which means that they are posterior in existence to the species. Crucially, the genera are neither actual substances species, as the doctrine of non-overlapping substances dictates, nor accident kinds, such as redness, 1-meter, instead, genera are the so-called potential substances species, entities that have potential to be determined into various actual substance species.

Moreover, Aristotle also rejects the materialist conception of definition. Again, in a good genus-differentia definition, the definiendum material substance species is not understood as something whose *ousia* is just the totality of the differentiae and the genera, where the differentiae and the genera are the so-called dialectical constituents of the material substance species in question. Instead, the *ousia* of the material substance species is exactly the ultimate differentia, which in itself presupposes the differentiae and the genera at the higher levels of universality, and the differentiae and the genera at different levels of universality are arranged into a linear relationship, i.e., a lower-leveled differentia presupposes the next higher-leveled genus as its subject. Specifically, the ultimate differentia is on the same par with the definiendum material substance species in existence. Therefore, although the genera, as the potential substances species, collectively are still posterior in existence to the definiendum material substance species, since the definition also involves the ultimate differentia, there is no worry about the situation that considering the genera as something posterior in existence to the definiendum material substance species would make the definiendum more posterior in existence.

As for the unity of the definiendum, again, in a good definition, the *ousia* of the definiendum is not considered as the totality of multiple constituents, instead, the *ousia* of the definiendum is exactly the unique ultimate differentia. This unique ultimate differentia is a single entity, so the definiendum has a single essence (type) and thus one thing in the strict sense. Nevertheless, it is not simple but in itself presupposes entities that have potential to be determined into it, so it can be expressed by articulating in virtue of what (i.e., the determinant) these potential substance species, as genera and thus determinables, are ultimately determined into the definiendum. In other words, the account of the *ousia* of material substance species can be given by investigating

the cause in virtue of which the presupposed potential substances are determined into the material substance species.

Moreover, if instances of a material substance species are divisible into multiple material constituents, then a good definition of the material substance species in question can also be given in terms of material constituent types, which coincides with the one given in terms of genus and differentia. Specifically, the essential material constituent types together with an indeterminately described form serves as the genus, while the associated ultimate differentia is just the state of affairs that encodes how these essential material constituent types are arranged into the substance species in question. For example, suppose syllable type βα is a material substance species, where type α and type β are the essential material constituent types, then *syllable type consisting of type α and type β* serves as the genus, which is a determinable and capable of being further determined into syllable types αβ and βα, while the ultimate differentia and thus the *ousia* of type syllable βα is just the state of affairs that β is placed immediately before α. Notably, the state of affairs implicitly presupposes the determinable syllable type consisting of type α and type β (and thus type α and type β), for whenever the state of affairs obtains, the determinable syllable type consisting of type α and type β exists (and thus type α and type β exist) and has been determined in a certain way. This means that the ultimate differentiat/ *ousia* of syllable type βα *in itself* united to the essential constituent types, i.e., type α and type β: it not only explains why type α and type β are united into one thing but also why it itself together with type α and type β are united into one thing, so it itself is not an element additional to type α and type β. This contrasts to the materialist definition of syllable type βα that we introduce in the first section, according to which, the *ousia* of syllable type βα is the so-called relational element additional to type α and type β, so it still requires another entity as the principle of the unity of it itself and the types α and β.

Lastly, let's turn to see how the hylomorphic composite-matter-form relationship is embodied in a good genus-differentia definition.

First, the material substance-substantial form relationship is analogical to the species-differentia relationship. The *ousia*/essence of a material substance is exactly its unique substantial form, which is essentially distinguishes the material substance from other comparable substances; the form is simultaneous in existence with the material substance, i.e., the material substance exists, if and only if the form obtains. Moreover, the particular form of a material substance is expressed at a universal level by the good definition of the species to which the substance essentially belongs, which means that the universal that serves as the ultimate differentia of the good definition is just the particular form taken universally

Second, the material substance-the matter relation is analogical to the species-genus relation. Specifically, the following conditions about the matter-of relation, i.e., the relation of x's being the matter of y, are the ones in virtue of which the matter-of relation is said to be analogical to the genus-of relation, i.e., the relation of x's being the genus of y.

(1) The matter-of relation is asymmetric, irreflexive, and transitive.

(2) If y and z are both the matter of x, then either z is the matter of y, or y is the matter of z.

(3) If x is the matter of y, then x must not be a substance, in other words, nothing can have a substance as its substance. Accordingly, if a substance has matter, then the substance must be the maximal point of its matter-of sequence.

(4) If x is the matter of y, then the existence of x is parasitic on the existence of y, so x is posterior in existence to y.

(5) If x is the matter of y, then either y is a substance or y is the matter of some substance. Together with (3), this means that there is always some substance serving as the maximal point of a matter-of sequence, in other words, when something is considered as matter, it must be the matter of some substance.

(6) If x is the matter of y, then y must not be prime matter, in other words, nothing can be the matter of prime matter.

(7) If x is the matter of y, then either x is prime matter or prime matter is the matter of x. Together with (6), this means that prime matter always serves as the minimal point of a matter-of sequence, in other words, when something has matter, it must also has prime matter as its matter.

(8) Every substance is maximally determinate/specified in respect of nature, whereas prime matter is maximally indeterminate and thus the highest determinable in respect of nature, which means that prime matter in itself is capable of becoming any material substance.

(9) If x is the matter of y, then x is not maximally determinate/specified but instead a determinable in respect of nature, which means that its nature is capable of being further determined/specified in various incompatible ways, and y is one of the determinates of y. Accordingly, if x is the matter of y, then there must be z, such that x is the matter of z, but z is not the matter of y, and y is not the matter of z, which means that the matter of x could have not become x but something else.

Moreover, if x is the matter of y and x is not prime matter, then x can be considered as a heap of material constituents of y. Further, the genus of the species to which y essentially belongs is just the appropriate material constituents of y taken universally and then together with an indeterminately described form. For example, the proximate matter of a house can be considered as a heap of the bricks, stones, etc. Then the genus of species house is the so-called building, which essentially is some buildable materials arranged in a certain way for the sake of satisfying some human's requirements.

Third, the substantial form-matter relation is analogical to the differentia-genus relation. For any material substance X, the substantial form of X must be *enmattered*, in the sense that it *per se* presupposes some appropriate matter, say Y, and the substantial form is just the state or condition of how Y is determined/specified (in respect of nature) into X. Therefore, the substantial form of X is also a sort of cause of the existence of X, which is causally responsible for Y's being determined into X rather than anything else.

Chapter 4 Aristotle's Endurantism in Contemporary Context

In this chapter, we will bring Aristotle's hylomorphic theory of change into a contemporary inquiry of how ordinary objects persist and change. Specifically, after a sketch of the so-called perdurantist view of persistence and change in the first section, we will give a critical comment on this view from the Aristotelian perspective in the second section, according to which the perdurantist view is not qualified as a proper explanation of change, let alone a definition. Then in the third section, we will give a more specific account of the nature of the Aristotelian subject of change and how it endures over time along with undergoing different states of property possession. In the final section, we will compare our interpretation of Aristotle's endurantist view of change to Brower's and argue that ours is immune to an objection to Brower's and captures the dynamics of change which Brower's cannot do.

4.1 The Perdurantist View of Persistence and Change

In our common sense, things persist over time by *enduring*, i.e., by being wholly present at each of the times they exist. Accordingly, to say that Sam persists through a period of time is just to mean that for any time of the period, Sam maintains his complete identity and thus exists as a whole; moreover, for any two times t_1 and t_2 of the period, Sam existing at t_1 is just numerically identical to Sam existing at t_2. Such an ordinary view of how things persist is the so-called *endurantism*, and Aristotle endorses endurantism. Specifically, material substances and their matter, as the subject of different kinds of changes, endure over time.

However, some contemporary metaphysicians, such as D. Lewis, M. Heller, and T. Sider[12], have put forward the so-called *perdurantism* as an alternative to our ordinary view of how things

[12] See Lewis (1986), Heller (1990), and Sider (2002).

persist over time. According to this view, the way that a thing persists through a period of time is analogical to the way that a thing extends through a region of space. To illustrate the idea, let's take a road as an example. Suppose a road extends through region R, then the way it does this is not that it is wholly present in every subregion of R, but that for any subregion of R, there is a spatial part of the road, such that the spatial part extends through this subregion. In other words, the road is partially present in each of the subregions of R. Further, if a subregion of R itself is divisible, then the way that a spatial part of the road extends through this subregion is exactly the same as the way that the road extends through R. And if there are indivisible subregions of R, i.e., spatial points, then there must be spatial parts of the road that are wholly present in these spatial points. Analogically, a thing persists through a period of time, say T, not by being wholly present at every segment of T, but by *perduring*: for any segment of T, it has a *temporal part* that persists through this segment. In other words, a persisting thing is *partially* present at each of the times it exists. Accordingly, a thing that spreads out in time as well as space is a four-dimensional object, i.e., a space-time worm, and it occupies an extended spatiotemporal region by having spatiotemporal parts confined to the various subregions.

A notable argument for perdurantism is that it is considered by the perdurantists as a comparatively satisfying solution to the so-called problem of *temporary intrinsics*. The problem can be stated as follows. Suppose that Sam changes from being tanned to being pale, according to our ordinary conception of change, we have (1): at a time, say t1, Sam is tanned and thus not pale, whereas at another time, say t2, Sam is pale, where t1 is before t2. Then, according to endurantism, we also have (2): Sam existing at t1 is numerically identical to Sam existing at t2. However, according to the principle of timeless predication[13] (i.e., for any object x and any property F, if x *is*, *was*, or *will be* F, then x is F; to put it in another way, if at a time t, x is F, then x is F). Consequently, we have (3): Sam is both pale and not pale, which violates the law of noncontradiction. Therefore, we have a responsibility to save the intrinsic change from such an apparent contradiction

[13] This principle is the same as the principle P mentioned in Brower (2010), p. 886

There are several notable kinds of solutions to this problem that uphold endurantism and thus the truth of (2). In what follows, we sketch two of them, which are generally considered by the perdurantists, in particular, Lewis[14], as problematic.

One kind of solution appeals to *presentism*, i.e., the doctrine that only the present is real. According to this solution, the principle of timeless predication is false, for it converts every tense predication into a timeless predication and thus treats the past, the present, and the future as equally real. In addition, the expression of (1) should be amended into either that Sam is now tanned and thus not pale, but he will be pale in the future, or that Sam is now pale, but he was ever tanned and thus not pale; the expression of (2) should be amended into that Sam will be the numerically same person in the future, and Sam was numerically the same person in the past. Then, as long as it is not the case that Socrates now is both pale and not pale, there is no absurdity at all to hold the two amended claims. Therefore, the apparent contradiction about intrinsic change arises from a mistaken philosophy of time.

Another kind of solution relativizes the temporary intrinsics to time. That is, paleness is actually a relation to time, and the proper expression of paleness is that x is pale-with-respect-to-t, rather than that x is pale *simpliciter*. Accordingly, (1) is false, for it does not treat paleness as a relation to time. Moreover, we can thus accept the principle of timeless predication without falling prey to any contradiction, for once we treat paleness as a relation to time, according to the principle, what we derive from the assumption of Sam's changing from being tanned to being pale is that Sam is both pale-with-respect-to-t_2 and not pale-with-respect-to-t_1, where being pale-with-respect-to-t_2 and being pale-with-respect-to-t_1 are two different but compatible relational properties.

However, in the perdurantists' view, to the first kind of solution, the presentism to which it appeals is a controversial doctrine, and the price of accepting presentism is too high to pay; to the

[14] See Lewis (1986), pp. 202-204.

second kind of solution, it violates the fundamental intuition that paleness is an intrinsic property rather than a relational and thus extrinsic property, and paleness-with-respect-to-t seems no more intrinsic than being-shorter-than-5cm.

Then, in light of these costs of the endurantist solutions, the perdurantists propose their solution. Specifically, they commonly assume the principle of timeless predication whereas rejecting endurantism in favor of perdurantism. This means that (2) is false, for Sam existing at t_1 and Sam existing at t_2 should be understood as two numerically distinct things, each of which is a temporal part of the space-time worm perduring Sam. Correspondingly, (1) should be understood as that at t_1, Sam existing at t_1, as a temporal part of the perduring Sam, is tanned and thus not pale, while at t_2, Sam existing at t_2, as another temporal part of the perduring Sam, is pale. Then, together with the principle of timeless predication, what we derive from the assumption of Sam's changing from being tanned to being pale is that one temporal part of the perduring Sam is pale and another temporal part is not pale. Since these two temporal parts are numerically distinct, there is no contradiction at all. As for the perduring Sam, it does not make any sense to simply claim that it is pale or not pale.

But perdurantists have different theories of the sorts of things we ordinarily refer to with names, describe with predicates, and quantify over with quantifiers. There are majorly two of them: the worm theory and the stage theory. According to the worm theory, it is spacetime worms, rather than their temporal parts, that are the referents of proper names, members of ordinary domains of quantification, subjects of ordinary predications, and so on. Accordingly, when we say that Sam changes from being tanned to being pale, "Sam" refers to the perduring Sam, and the change is understood as that the perduring Sam has a temporal part located at t_1 that is tanned and another temporal part located at t_1 that is pale.

Accordingly, the claim that the road is not bent in subregion r_1 and bent in subregion r_2 should be understood in the following sense: neither does it make sense to claim that the road is bent simpliciter nor that the road is not bent simpliciter; instead, it has a spatial part that is wholly

present in r_1 and not bent simpliciter, and another distinct spatial part that is wholly present in r_2 and bent *simpliciter*.

By contrast, the stage theorist claims that the things we ordinarily talk about are instantaneous temporal parts of persisting objects. Accordingly, when we say that Sam changes from being tanned to being pale, "Sam" does not refer to the perduring Sam but one of its instantaneous temporal parts, which is also called a "stage" of the perduring Sam. Suppose "Sam" refers to a stage at t_1, then Sam's changing from being tanned to being pale is understood as that Sam, as a stage at t_1, bears a *temporal counterpart relation* to the stage at t_2, which is pale. Then, one merit over the worm theory that the stage theory has is that Sam is pale or not pale *simpliciter*.

4.2 An Aristotelian Response to Perdurantism

In our view, the problem of temporary intrinsics is a pseudo-problem, because the principle of timeless predication (i.e., for any object x and any intrinsic property F, if x *is*, *was*, or *will be* F, then x is F) should be rejected, specifically, if x is what properly changes, we cannot convert the claim that x is F at a time to the claim that x is F (and full stop). However, the reason why we reject the principle is not that it treats the past, the present and the future as equally real and thus contradicts the doctrine of presentism, but that it contradicts an essential feature of change. Remember that change involves dynamics as well as contrariety, and this means that there must be something that endures over time along with undergoing different states of form possession *at different times*. That is, there is some property F, such that *at a time*, it is not F, whereas *at another time*, it is F; to put it in another way, it *is now* F but *was ever* not F, or it *is now* not F but *will be* F. This means that when describing something's properly changing, we cannot convert a predication that involves time to a timeless predication, for otherwise, it will lead us to an apparent contradiction, i.e., the changing thing is both F and not F. Therefore, in our view, the argument leading to a contradiction involved in the problem of temporary intrinsics is rather a

reduction to absurdity, where the objected supposition is just the principle of timeless predication.

Note that Aristotle's law of noncontradiction (ALNC) involves the time factor: for any object x and any property F, x cannot be both F and not F in the same respect and *at the same time*. So it does not exclude the possibility that x endures over time, and it is F *at a time* but not F *at another time*. Specifically, ALNC implies the Aristotelian principle of the Indiscernibility of Identicals (APII): for any changeable objects x and y, if x is numerically identical to y, then *at the same time*, for any property F, x is F, if and only if y is F. Correspondingly, it does not exclude the possibility that x is F *at a time*, and y is not F *at another time*, but x and y are numerically the same. This means that Heller's argument for the theory of temporal parts that appeals to the timeless principle of Indiscernibility of Identicals (PII)[15] does not work. That is, according to his idea, if there is an object existing at a time that is called "Sam" and not pale *simpliciter*, as well as an object existing at another time that is also called "Sam" but pale *simpliciter*, then according to PII, these two objects must be numerically distinct, so to uphold the intuition that objects possess intrinsic properties *simpliciter*, it is better two treat them as two numerically distinct temporal parts of a perduring space-time worm. However, as indicated above, changeable things satisfy APII rather than PII. PII and the timeless law of noncontradiction (LNC) that implies PII are merely applied to the unchangeable things, because they eternally possess their properties, the time factor involved in predications of them can thus be dismissed.

Moreover, not only the problem of temporary intrinsics that motivates perdurantism but also the perdurantist theories of change are committed to the principle of timeless predication. For the common idea of the perdurantist theories of change is that if a persistent object apparently possesses a property at a time but lacks it at another time, then it must do so by having two numerically distinct temporal parts, where one possesses it *simpliciter*, while another lacks it *simpliciter*. This means that in the domain of perdurantism, nothing endures over time along with undergoing different states of property possession, but everything eternally possesses its

[15] See Heller (1992), pp. 695-704.

properties. Therefore, although both the temporal wholes and their temporal parts are time-bounded, the time factor can still be dismissed in the predications about them. In other words, predications of objects in the domain of perdurantism are in effect timeless. Correspondingly, the perdurantist theories of change are also committed to LNC and thus PII

It is because nothing in the domain could properly change that we disqualify each of the perdurantist theories of change as an explanation of change, let alone a definition of change. For again, from the perspective of Aristotle's theory of change, change involves dynamics as well as contrariety, which means that there must be something that properly changes over time.

At most, a perduring space-time worm can be viewed as the *trajectory* of a change of the associated subject, which encodes both the spatial and temporal information. Importantly, the trajectory of a change is not the change itself, the former is static, whereas the latter is dynamic; moreover, the former is the byproduct of the latter, in the sense that it is only because something properly changes that there is a corresponding trajectory. Correspondingly, a temporal part of the space-time worm can be viewed as a *segment* of the trajectory, which is divided out of the trajectory and thus ontologically depends on the trajectory, in the way that parts depend on the whole. Note that just like a flying arrow that occupies a non-terminal space at a certain time is not identical to a resting arrow occupying the same space, a changing thing that is characterized by a temporary property at a certain time is not identical to a temporal part that is characterized by the same temporary property at the same time, for the former is also in potentiality to be and thus will be characterized by the contrary temporary property, whereas the latter does not. In sum, a change of the associated subject grounds the existence of the corresponding space-time worm, which in turn grounds the existence of its temporal parts.

Nevertheless, can change understood in a perdurantist way be a real kind of change, though it is not what Aristotle calls change? It is still hard to make sense, for the perdurantists at least are

required to solve the following tricky puzzle[16]. First, there is no sense to say that objects occupying different regions of the pure space can constitute a change, regardless of the number of these objects and the relationship among them. For example, it is absurd to say that a sequence of arrows at rest at different spatial locations constitutes an event that an arrow is flying, even if these arrows are indiscernible except for the locations where they are at rest. Second, perdurantism spatializes the dimension of time, to the effect that an object persisting through a period of time is analogical to the way that an object extends through a region of space so that no object can be wholly present at different locations on the dimension of time, just as no object cannot be wholly present at different locations on the dimension of space. Then, why objects occupying different regions of the so-called four dimensions, i.e., space-time, can constitute a change at all, whether they do so by holding a temporal part-whole relation or a temporal counterpart relation? The answer must lie in some feature of time that distinguishes it from space. However, since perdurantism has spatialized the dimension of time, it is not like endurantism which can appeal to the distinctive way that objects spread out in time, i.e., it is in time rather than the pure space that objects can be wholly present at any location on the dimension at which they exist. Consequently, it must appeal to some other feature, but which has not yet been developed by the perdurantists, and it is hard to see what it is.

Last but not least, remember that perdurantism satisfies PII, according to which, for any object x, once there is a property F, such that x is F but y is not F, we can immediately conclude that x and y are not numerically identical. This means that perdurantism also satisfies the principle of *per se* predication that we introduced in the second chapter, i.e., for any object x and any property F, if x is F, then x *per se* is F, i.e., being F constitutes the identity of x; if x is not F, then x *per se* is not F, i.e., not-being F constitutes the identity of x. It is at this point that we can see the connection between the perdurantists and Parmenides. It is because they are both committed to the principle of *per se* predication that they think the ordinary conception of change is problematic: suppose that x is not F at a time, then it endures over time and ultimately comes to be F at another time; according to the principle, this means that x *per se* is both F and not F, which is absurd.

[16] A similar argument can be seen in Oderberg (2004), p. 708.

Parmenides' reaction is that change is thus impossible, we should do away with the talk of change at all, whereas the perdurantists' reaction is that there is an alternative way to understand change, which appeals to the temporal part-whole relation or the temporal counterpart, but as we have argued above, the success of the perdurantist view of change is suspicious.

4.3 Aristotle's Endurantist View of Change

Again, Aristotle is not committed to the principle of timeless predication, so we will not derive that x is both F and not F (and full stop) from the assumption that x endures over time and is non-F at a time but F at another time. However, simply to claim that the time factor is essential for the subject of a change to properly change is far from enough to explain why and how the subject of a change is able to do this. Instead, we shall give a more specific account of the nature of the subject of change and how it endures over time along with undergoing different states of property possession.

Fundamentally, the subject of a change *per se* is *in potentiality* to possess the form and the privation. Specifically, in some cases, the subject of change *per se* is indifferent to the form and the privation, i.e., it is equally in potentiality to possess each of them. For example, Socrates *per se* is equally in potentiality to be tanned and to be pale; whereas, in some other cases, the subject of change *per se* is teleologically in potentiality to possess the form rather than the privation, although it would be characterized by the privation when it fails to possess the form. For example, the matter of a human being *per se* is teleologically in potentiality to be a human being rather than a corpse. Further, the potentiality of the subject of change should be understood in terms of *indeterminacy* and *determinability*: that x *per se* is in potentiality to be F means that the account of the identity of x, as a set of sentences, is *inferentially incomplete* relative to the sentence that x is F, i.e., the account neither logically derives that x is F nor that x is not F. In other words, x *per se* is indeterminate to be F. Nevertheless, this means that it is not only

consistent that the account is embedded into another account that derives that x is F, but also consistent that the account is embedded into another account that derives that x is not F. In other words, x *per se* is not only capable of being F but also capable of being not F. In still other words, x *per se* is open to being F and being not F.

In what follows, we use the substance Socrates, as the subject of his accidental coming to be pale, and the matter bronze, as the subject of the production of a brazen statute, where the statue is conceived to be a substance, as examples to further illustrate the point.

Again, to say that Socrates is a (primary) material substance means that "Socrates" is a meaningful term that can be used as a predicate to pick out a changing thing, and when applied to the changing thing, it signifies precisely what it is. In other words, when referring to a changing thing and asserting "this is Socrates", it properly answers the what-is question asked about the thing in question. Then the account of Socrates, i.e., the account of the identity of Socrates, manifests the substantial form of Socrates. By contrast, when the term "pale" is applied to a changing thing, it merely signifies what the thing is like in respect of quality rather than what the thing is, while the term "paleness" signifies what is abstracted from the pale things. Importantly, in Aristotle's ontology, parallel to the priority of the answer to the question "What is it?" over the answer to the question "What is it like?", and the ontological priority of concrete things over the items abstracted from them, Socrates is ontologically prior to the pale thing, which is further ontologically prior to paleness.

Then, while the account of Socrates derives that Socrates has a complexion, which is either pale or tanned or …., it must not specify which complexion he has. That is, for each of these complexions, say F-ness, we cannot derive simply from the account of Socrates that Socrates is F nor that Socrates is not F. In other words, the account of Socrates is incomplete relative to the sentence that Socrates is F. Nevertheless, this means that it is not only logically possible, i.e., consistent, for the account of Socrates to be embedded into an account which entails that Socrates is F, but also logically possible for the account of Socrates to be to be embedded into

another account which derives that Socrates has a complexion contrary to F-ness and thus is not F. These logical possibilities of the account of Socrates are grounded by the ontological fact that Socrates, as the subject of his coming to be pale, *per se* is in potentiality to possess mutually incompatible complexions at different times.

As for the case of bronze, it is also necessary to refresh what it means by saying that bronze is the matter of something. When understood as matter, "bronze" signifies an abstract item, which can be discerned by abstracting away the concrete things to which 'brazen' is universally applied and considering what it is for something to be brazen in general. Importantly, when "brazen" is applied to something, it does not signify what it is but merely what it is like in respect of material constitution. Accordingly, when we refer to a concrete thing that is a statue of David and assert that it is a lump of bronze, the claim does not signify what this thing is. In Aristotle's terminology, bronze as matter is *paronymously* predicated of the statue, while the statue is a *paronym* of bronze. This means that bronze as matter is not a primary substance and thus not ontologically fundamental, instead, just like paleness, it is ontologically tertiary, whose existence is parasitic on the existence of some brazen things, while the latter ultimately is parasitic on the existence of some primary substances.

Then, analogical to the case of Socrates, the account of bronze is also incomplete to some extent. From the account of bronze, we can derive that bronze is conductive, but neither that the shape of bronze is David-like, nor that the shape of bronze is something other than David-like. Nevertheless, it is not only logically possible for the account of bronze to be embedded into an account that entails that the shape of a lump of bronze is David-like so that the thing in question is a brazen statue of David, but also logically possible for the account of bronze to be embedded into an account which entails that the shape of a lump of bronze is a sphere and thus not David-like, so that the thing in question is a brazen sphere rather than a statue of David. Then these logical possibilities are grounded by the ontological fact that bronze *per se* is in potentiality to possess the substantial forms of different brazen things and thus to be substances of different species at different times.

Now let's see how the subject of change in general endures over time and properly changes. Consider x properly changes from being non-F to being F. Specifically, the change involves x's coming to be F as well as x's ceasing to be non-F. On the one hand, x's coming to be F is the process of the *actualization* of x's potentiality to be F, which means that the account of x is embedded into the account which derives that x is F. As indicated above, since the account of x does not derive that x is not F, so it is consistent for it to be embedded into such an account. Moreover, since it is an *extension* of the account of x, the account of x remains intact, which means that x remains its complete identity through the process. On the other hand, x's ceasing to be F is the process of the *reduction* of x's actuality to be F, which means that the account of x is extracted from the account which it is embedded into and derives that x is non-F. Since the account of x does not derive that x is F, the account from which the account of x is extracted is also consistent. Moreover, the account of x also remains intact, which means that x maintains its complete identity through the process.

In sum, in the very beginning, x's potentiality to be non-F is completely actualized, x is thus actually non-F, then as time goes by, the actuality of x's being non-F is in the process of being reduced back to x's potentiality to be non-F; meanwhile, x's potentiality to be F is in the process of being actualized; in the end, x's potentiality to be F is completely actualized, x is thus actually F. During the whole period, x maintains its complete identity and thus is wholly present at each of the times.

4.4 A Response to Brower's Interpretation

Brower (2010) also develops a solution to the problem of temporary intrinsics based on Aristotle's hylomorphic theory of change and considers it as an alternative to other contemporary

endurantist and perdurantist solutions. However, his interpretation of Aristotle's endurantist view of change differs from us in some significant ways. In this section, we give a response to it.

First, we agree with Brower in that Aristotle's endurantist view of change neither relativizes the temporary intrinsics nor property possession to times. Specifically, although we stress that in the Aristotelian view, the time factor cannot be dismissed when predicating the subject of change with the change-involved predicate, say "F", we neither paraphrase "F" as "F-with-respect-to-t" nor understand the subject's being F at a time as its being F *in a particular way*. Instead, as Oderberg proposes[17], the temporal factor works as a non-truth functional operator: (at time t), x is F *simpliciter*. So one cannot derive that x is F simply from that (at time t) x is P, as one cannot derive that x is F simply from that necessarily x is F or that possibly x is F. And this is ultimately grounded by the ontological fact that the actualization of the subject's potentiality to be F always occurs at a certain time.

Moreover, there is a problem common to the theories that relativize temporary intrinsics to times and the theories that relativize property possession to times, that is, presumably they merely accommodate coming-to-be but not ceasing-to-be. To the former, since the temporary intrinsics are no more incompatible due to the temporal relativization, say being F-at-t_1 and being non-F-at-t_2, the enduring subject of change does not need to cease to be non-F-at-t_1 when it comes to be F-t_2; to the latter, it is consistent that at the same time, the enduring subject of change is-$t_1$ly non-F and is-$t_2$ly F, so the enduring subject of change does not need to cease to be-$t_1$ly non-F when it comes to be-$t_2$ly F. In other words, together with the commitment to the A-theory of time, to the former, there is only accumulation of the enduring object's temporalized but compatible properties, whereas to the latter, there is only accumulation of the enduring object's temporalized possession of incompatible properties.

[17] See Oderberg 2004, pp. 698-701.

Distinctively, Brower illustrates Aristotle's endurantist view of change in terms of the part-whole relation. For the sake of simplicity, we take Sam's coming to be happy from being sad as an example again to articulate his main idea. According to him, the substance Sam, the accidental unity sad-Sam, and the accidental unity happy-Sam are complex objects that are mutually nonidentical. Specifically, sad-Sam is wholly present at t_1 and composed of Socrates and the property sadness, while happy-Sam is wholly present at t_2 and composed of Socrates and the property happiness, where the common constituent Socrates is further composed of the relevant matter (understood as stuff) and the property humanity. Further, analogical to perdurantism, he distinguishes two kinds of property possession and thus predication, according to which it does not make sense to assert that Sam is sad *simpliciter* or sad *simpliciter*. This is because he stipulates that only when a hylomorphic compound, say O, contains the property F-ness as one of its constituents that O is F *simpliciter*. Nevertheless, Sam is sad *derivatively* at t_1, in the sense that Sam and sad-Sam are wholly present at t_1, sad-Sam is sad *simpliciter*, Sam is a constituent of sad-Socrates, and they share all of their matter in common; in the same way, Sam is happy *derivatively* at t_2. Accordingly, Sam's coming to be happy from sad is understood by him as the process that Sam successively *enters into* sad-Sam that is wholly present at t_1 and straight-Socrates that is wholly present at t_2. Therefore, Brower indicates that the Aristotelian endurantism so understood is structurally similar to perdurantism except that the latter identifies the persisting Sam as an object composed of sad-Sam and happy-Sam, and thus Sam persists by perduring, whereas the former identifies Sam as a common constituent of sad-Sam and happy-Sam, and thus Sam persists by enduring.

However, such a *simpliciter*-derivative distinction on property possession makes Brower's interpretation of Aristotle's endurantist view of change subject to Bailey's objection. As Bailey argues,

"According to the hylomorphic solution, something having me and the property hoping for rain as parts—call it 'hoping-me'—lasts just so long as I hope for rain, and it hopes for rain in the primary sense. I enjoy the distinction of hoping for rain in a secondary or derivative sense by

being a part of hoping-me. But hoping-me is numerically distinct from me. So it is something numerically distinct from me that hopes in the primary sense. And the same goes for each of my mental temporary intrinsic properties. But then it is not me that thinks my thoughts in the primary sense. It is something else. And thus I conclude that the hylomorphic solution is at odds with the Priority Principle [Priority Principle: we human persons have mental properties (like hoping for rain) in the primary and nonderivative sense. We think our thoughts in the primary and nonderivative sense]".

Brower may reply to Bailey that although hoping-me and I are distinct, they are still numerically the same, for Brower proposes the so-called doctrine of numerical sameness without identity, i.e., "for any distinct hylomorphic compounds x and y, and any time t, x is numerically the same material object as y at t if and only if x and y share all of their matter in common"[18]. That is, hoping-me and I share all of the matter (or stuff) in common, so we are still numerically one and the same material object. However, the problem still remains, for even though hoping-me and I are said to be numerically the same, they are still nonidentical in the sense that one is the proper part of another, and it is the whole rather than the proper part that hopes for the rain *simpliciter* or primarily.

Notably, the reason why the change-involved predicates are not allowed by Brower to apply to the enduring subject *simpliciter* is that he endorses the principle of timeless predication. So if the enduring subject is non-F at some time and F at another time, then according to the principle, the enduring subject would be both F and non-F (and full stop). However, as indicated in the second section, imposing the principle of the timeless predication on the subject of change will eliminate the dynamics of change. Therefore, although Brower claims that the subject of change successively *enters into* different hylomorphic wholes, in Brower's ontology, nothing could genuinely move.

[18] See Brower (2010), p. 899.

By contrast, our interpretation of Aristotle's endurantist view of change is immune to Bailey's objection. Let's take the example of Sam's coming to be happy from being sad. In our view, to secure the dynamics of the change, the relevant changing subject must maintain its complete identity over time along with being sad and being happy *simpliciter* at different times. Importantly, the identity in virtue of which the changing thing endures over time is independent of both being sad and being happy, i.e., neither being sad nor being happy constitute its identity, and this allows us to claim that when the changing thing is no longer sad, it is still identical to the thing that was sad without resulting in any contradiction. Moreover, in this case, the account of the persistent identity signifies a material substance, i.e., what endures through this change is a material substance, which is signified by the term "Sam", so the changing thing endures as a numerically one thing (i.e., the changing thing that is sad in the beginning and the one that is happy in the end, as well as anything that is in an intermediate state are numerically the same; moreover, if asked about each of these things "what is this?", we will have exactly the same proper answer) and this numerically one thing *is* just Sam, where "is" is understood as identical relation. Hence, it is the changing Sam that is sad and happy *simpliciter* at different times.

In addition, at each of the times the changing Sam exists, there are two accounts of it: one is the account of the persistent identity of the changing Sam, and another is the account of the changing Sam in the current actual state, where the former is an incomplete, abstract, and general description of the changing Sam in the current actual state, which means that the former is a part of or embedded into the latter. Accordingly, it is the relation between the accounts, as two determinate sets of sentences, rather than the relation between what these accounts signify, i.e., Sam *as such* and the *enformed* Sam at a certain time, say sad-Sam, that is appropriate to be described in terms of part-whole relation, because at the time when the changing Sam is sad, Sam *as such* is a determinable that is abstracted from sad-Sam as one of its determinates, which means that Sam as such is not a *numerically* additional thing to sad-Sam, as blue (determinable) is not a *numerically* additional thing to navy blue (determinate), although they are different in account.

In a nutshell, our interpretation of Aristotle's endurantist view of change is immune to Bailey's objection and captures the dynamics of change which Brower's cannot do. Therefore, ours better represents Aristotle's endurantism as a competitive theory alternative to other contemporary endurantist theories and the perdurantist theories in explaining persistence and change.

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