**Lecture 6.2: Change, Potentiality and Causes** Rorty UCSC

**Substances:**

We talked Tuesday about Aristotle's basic constituents of reality: substances. To be a substance, in A's terminology, is to be an individual—a 'this such', capable of being designated in some way; and independent—a thing whose being is not dependent upon something else being modified in some way or another, a non-parasitical thing. The first and plainest examples of substances are animals and plants; and as we saw in Zeta, artifacts, things made. [Aristotle in some of the texts we are not reading seems to consider not only artifacts, but perhaps the heavenly bodies (sun, moon and stars) as substances.] As Barnes puts it, "perceptible things--middle-sized material objects—are the furniture of Aristotle's world."

**Matter and form:**

Tuesday I attempted (with what success only you know) to give you one tool of analysis by which to understand the nature of a substance: the analytic correlative tools of "matter" and "form." They go together: something is 'matter' or indeterminate with respect to the 'form' which determines what kind of thing it is. The brass is the matter out of which a vase is made. The yarn is the matter out of which Aunt Leslie forms a scarf. The matter is called so relatively to the form which gives it further determination.

> [What I mean to say by calling them 'analytic tools' is that you can perform the same operation with them on, for instance, the brass itself, or the yarn: brass is a combination of copper and iron in a certain proportion. The copper and iron are the 'matter' of which the brass is made; the ratio of their combination is the 'form' which is imposed upon them that turns them into brass. The yarn is made up of wool and nylon blended together to form a strand; the wool and nylon are the 'matter' of the yarn, just as the yarn is the 'matter' of the scarf.]

Looking at a substance, analyzing it in terms of its matter and form, is to look at it statically. Today we want to look at substances dynamically. Because one of the most important features of substances, of things in the world, is that they can, and sometimes do, *change.* And to explain change, we need to introduce today another pair of correlative terms of analysis: potentiality and actuality. By saying they are correlative terms, I want to emphasize that, just as brass is the matter of the eventual vase which has a particular form, something is understandable as potential only with respect to the eventual end-point that is its actuality.

**Potentiality and actuality:**

Substances—things in the world, of both kinds—are what changes.

In the first book of the Physics (which like so much is NOT in our text) Aristotle argues that every change involves three things: the state **from** which the change proceeds; the state **to** which the change proceeds; and the object, the substratum, the substance, the thing, which persists through change, whose (or what's) change it IS. The sentence that I think best focuses our understanding of change is the following:

> *Change is **from** something **to** something else—**in** something:—a thing can alter from one place to another, from one condition to another, from one state to another and still be the same thing.*

The "thing which alters its condition" from State A to State B can be a substance of either of the kinds we looked at in Metaphysics Zeta: an artifact, or a natural thing, an organism. And substances, as we know, are essentially informed matter—'this-such' es. Their properties can change in various respects, in various categories, without altering their essence, the kind of thing they are.

In Book III of the Physics (which also is NOT in our text), Aristotle introduces an alternate vocabulary to talk about change. He says there "change is the actuality of the potential of a thing, as determined by the kind of thing it is--" Think of potentiality as the capacity for change; and of actuality, as what the end-point is if it does change.

The potentiality of a given substance is a function of the kind of thing it is—and often, most determined by its matter. A thing's potentiality is its power to change or be changed, or to be in a different and more completed state (SEP). The brass is potentially a vase or a cannonball. It is currently in a state from which a change will proceed, which will eventuate in either an actual vase or an actual cannonball. The yarn is potentially a scarf or a sweater. The process of knitting the yarn will actualize one of its many potentials—it will become either an actual sweater or an actual scarf (or something else, if Aunt Leslie wishes). The brass, because of the kind of thing it is, cannot become a scarf, or a window. The yarn will not make a very good vase—and an even worse cannonball.

Aristotle often talks of potentiality and actuality in terms of the capacities things have. And for that reason, many of the contexts in which we use the terms are in discussion not of artifacts, but of organisms, living things, natural substances.

Consider, Taylor suggests, the embryos of two animals, or the seeds of two plants. Indistinguishable (save by genetic analysis, which Aristotle did not have at his disposal, thank you) at one stage, it is nevertheless certain that one of the seeds will grow into a carrot and the other into a radish; that one of the embryos will grow into a chimpanzee, the other into a man. Because of the kind of thing a given substance is, it has a range of implicit capacities, things that can happen to it, things it can become. Those are its potentialities.

Using the vocabulary A has given us, then, *change (from state a to state b) is the actualization of the potential of substance X ( to change to state b).*

**What categories are subject to change?**

We talked in class Tuesday about the various categories; and it is clear that in some of them things are subject to change without in any fundamental way changing what they are. I think we listed quantity, quality, place/space/location, position and state.

Quantity: growth and decay, of which all living things are capable by virtue of being alive, are forms of change; and of course external agents can add to or reduce the size of inanimate objects. Example: I make more cookie dough by doubling the recipe.

Quality: I tend to think of this as the most obvious example of properties that are capable of change. If we think of the categories as properties, then we can talk about the things that can change about a thing while it still remains the same thing it is—and can ask how much it can change before it becomes another thing. Example: I change the color of the white wall by painting it blue.

Place: In space, or in time. Locomotion is simple change of place, from place s1 to place s2, motion from one point in space to another. This podium can move from the right side of the desk to the left side of the desk.

Position: A substantial form of any sort—natural things or just thingy things—can readily be understood to change position (as in when I cross my arms or tilt my head) or arrangement of parts (hmm—how about when I move the pieces in a chess game? Or—move the smile on my statue a bit to the left?) or location (put the mat on the cat instead of the cat on the mat?).

State: When I learn something, the privation of my ignorance of it is removed by the addition of it, and I am now in a state of knowing (or perceiving or any other of the activities of which I am as a natural thing capable). Change of state from hunger to satiation. Change of state from sleep to waking.

The thing IN WHICH change from state a to state b takes place, is the thing itself, which becomes different in some respect after the change, but persists through it: the cookie dough, the painted wall, the podium, the statue…

[Can things also undergo change in the category of substance? I confess I find this question deep waters; I'm not entirely sure how to answer it, especially in terms of organisms, natural things.]

Substantial change in natural things: All men, all living things, are mortal. Individual substances, for instance--even the best primary substances, can come into being and go out of being. He talks about that in *de Anima* as a function of the unity of form and matter; if the essence, the definitional form, of a specific particular changes, it ceases to be the thing it is and becomes something else. With death, a man becomes a corpse. A cow becomes beef. The matter persists—but the thing is no longer the thing it was. (But we would not speak of that as an actualization of its potential, probably, unless we managed a McDonalds; and if we did say something like that, we'd consider it somehow disrespectful.)

What kind of alteration a given **organism** is capable of depends on the kind of thing it is. Plants can grow (and decline). They can nourish themselves: interact with their environment in such a way to change it, and change some of their properties in the process; they cannot locomote (change position); but they can endure through a specific period of time. Animals are capable of a wide range of possible alterations—and Aristotle talks about those in the deAnima in the language of potentiality and actuality. Animals are capable of motion, for which a prerequisite is perception—touch, taste, smell, hearing and vision, touch being the most important for their survival. Humans, the most highly developed of the sublunary beings, can reason as well, can talk, imagine, dream, create, reason and understand.

What Aristotle seems to want to make clear with his vocabulary of change is that subjects of predication can be said to change their properties within a given category without themselves being substantially altered. Natural things—animals, humans, plants—can do or make or have things, or have them done to them, within a range, and still be the things they are. Because of the things they are, they have those capacities, that potential.

**Some varieties of change / ways of talking about change:**

Actualization of a potential

Alteration with respect to state of being

Alteration with respect to a property: quantity, quality

Motion: change of location, change of position/organization/relation

All of these are change from something to something. If we can explain change in both of the languages Aristotle has given us—form/ matter and potentiality/ actuality—we will understand Aristotle's doctrine of change. Here are some examples I can think of (you might be able to think of some better ones):

(1) a brazen sphere is hit with a hammer. It becomes a flat circle of brass.

Here are some of the ways Aristotle would talk about that thing and its change:

f/m: It changed **from** a brazen sphere—one kind of matter, brass, enformed into a sphere--**into** a brazen circle, the same matter, now enformed into a circle. Its matter did not change, but its shape changed from spherical to flat-circlical. Because it is no longer a sphere, we no longer pick it out as the same kind of thing. It still exists; it is still one thing—just a different thing than it was before.

p/a: Because of the kind of thing it is, brass in a particular shape, the brazen sphere has a limited range of **potentialities**, one of which is its capacity to be formed into different shapes. This is a capacity it has by virtue of the matter of which it is formed. Its potential to become a flat piece of brass is **actualized** when someone (eg, me) or thing acts upon it from outside and flattens it. [This is a very boring example.]

(2) This acorn, given the proper circumstances, will grow into, become, an oak tree.

f/m: At this point in time this natural thing is a small round woody thingy with a soft center. That is its present **shape-form**: acorn shaped living matter. Because of the kind of thing it is, it will add to its matter (by nourishing itself, drawing water and necessary minerals, etc. from the soil) and grow into a different, much bigger, different coloured, probably uniquely-shaped thing: a mature oak tree. That which it will grow into is part of its present form; that is the kind of thing it is, a natural thing.

p/a: To be an acorn is to have implicit within itself the potential, the capacity (given certain conditions of soil and nourishment) to become a grown-up tree. If it succeeds in doing so, it will be an actual grown-up tree; it will have actualized its potential to become an oak. (It also has right now the capacity to nourish a pig or a squirrel, and if it gets eaten, that is the potential that will be actualized, and the other one won't be actualized.) That it has the capacity to rot or be ground up and made into a component of concrete is the function of the kind of matter it is, but not necessarily an expression of ITS capacities.

(3) I can make this lump of clay into a vase.

f/m: Clay, as Neolithic man discovered, is very good for forming useful items, for making things out of. I can take this clay and shape it into something that will hold water, bake it, and use it for a variety of simple household tasks. I call it a lump because it doesn't at this point have much of an identifiable 'form' at all, although it is in the strictest sense already a composite of (ungainly) form and matter, already a kind of thing, namely clay.

p/a: This clay is a super example of potential anything; uniform and malleable, I can make it into anything I want or intend. Its potential now, in this situation, is determined by my intention, since it is through my agency that it will become something in particular.

In Aristotle's use of these terms, I think he would want to say that the actuality of the clay, after it has been subjected to my will and formed according to my intentions, is more properly its form than anything it has while it is still sitting there as clay.

**The 'Four Causes'**

Scientific knowledge (which is what Aristotle is all about) requires explanations. Things in the world change; and their changes are caused. The core of Aristotle's account of explanation is found in his doctrine of the 'four causes', which is found in Book II chapter 3 of the Physics, found in your text on about page 327. Taylor calls it "the conditions for the production of things."

When we ask "what is responsible for the fact that x exists, or that such-and-such is the case," there are 4 partial answers that may be given, and each corresponds to one of the 'causes.' A complete answer requires enumeration of all 4. That is, in order to feel we have got an adequate understanding of any object (or change, motion or alteration OF an object), we need to ask ourselves four different kinds of questions about it, and be able to answer them. They are the four causal principles that give us knowledge of things—their fundamental structure and why they are the kind of things they are.

(a) the **material** cause: matter, which is the locus of change and the potential bearer of form; the stuff, out of which something comes to be. The matter individuates this thing. What is it that persists through various changes of quality or property?
(b) The **formal** cause: the structural organization which is realized in the matter (he speaks of the 'paradigm' or the formula). What **is** it that this thing is?
(c) The **efficient** (or effecting) cause: what brought this thing about, brought it into being, or brought abut its condition of change or rest? The initiator of a change is the cause of a change. (Think billiard balls.) Thus the agent or initiator of a particular change is its efficient cause; the father of a particular child is its efficient cause; the intention of the creator or the producer is the efficient cause of an artifact. The advisor is the efficient cause of the invasion.
(d) The **final** cause: why did it get here? For what purpose (end, goal, telos) does it exist? What plan does it fulfill? What accomplishment does it represent?

If any of the 4 had been different, the end result of the action or change would be different.

The explicit introduction of the final cause is very important, for Aristotle. He is considered a 'teleological' thinker. The analytic pole of the telos inserts directionality and intentionality into the processes of change.

In non-natural things, explaining the causes of products of artifice, the four kinds are particularly salient. The artisan (efficient cause) takes the clay (material cause) and forms it into something to hold his flowers (final cause) by making it a round fat vase (formal cause). The agent can be spoken of as potential (capable of potting) or as actual (in the process of making the vase). The clay too can be spoken of as a potential vase—that is, as possessing the capacities that will make it suitable in this transaction of contributing to the desired end-product.

Explanation of changes (of quantity, quality, state, attribute, place, etc) is the main function of the 'four causes.' The acorn (its own efficient cause, by virtue of the life within it) nourishes itself and grows in order to become the full-blown oak that is its fullest actualization, its telos. It grows for the sake of being a grown-up. Similarly with

human beings;  the human being, its own efficient cause, a self-mover by virtue of the life within it, by virtue of which it is the kind of thing it is,  has, and is. an end in itself, its own telos. Aristotle considers the soul the formal, final and efficient 'cause' of the human being—the material cause, I suppose, being the gestating mother.

**On the Soul**

There is a fundamental distinction in the sublunary world—our world.  Some things are animate, alive; others are inanimate. What differentiates the two kinds of substances is the possession of a *soul*—an animator.  In this book, of which we have in our text, as usual, only selections, Aristotle discusses what it is to be besouled, alive, to have an animator.  And as you have seen in our text, this is more a discussion of psychology than of theology.

To have a soul, to be besouled, to be alive, animate—is to have a range of capacities, potentialities, a range of possible functions:  nutrition, reproduction, locomotion, perception, and for some small (but very fine) subset of besouled creatures, thought.  The organic world is organized hierarchically; to have more capacities is to be better.

In the *de Anima*, the soul is characterized as 'the form of the body.'  And he spells out the various aspects of this using the vocabulary of potentiality and actuality.  The soul is the form of a natural body that is potentially alive; it is the actuality of this specific sort of body; it is the 'first actuality' of a natural organic body, that is, a body that is potentially alive.

'Potential' indicates a range of things that something can do or have happen to it. No individual thing has an infinite range of potential; the kind of thing any thing is limits the kind of things it can do or have happen to it.  When it does one of those things, or when one of those things happens to it, it is actualizing one of those potentials, doing (or suffering) one of the things it is capable of doing or suffering.

Souls are sets of powers, capacities, or faculties.  Possessing a soul is like possessing a skill.  Souls, Barnes tells us, are not pieces of living things; they are not bits of spiritual stuff set inside living bodies, any more than my skills are a part of me responsible for my skilled acts. Souls cannot exist apart from bodies; they are not separable from bodies, any more than skills are separable from skilled men. How could my skills, my character, my temperament, survive without me?

I'm not sure if this is what one expects when, having spent 4 weeks reading Plato, we encounter a book titled "On the Soul." Plato had held that souls pre-existed the birth and survived the death of the bodies they animated.  Aristotle thought that was impossible.  Descartes wondered how such different things as souls and bodies could co-exist and work together; for Aristotle, such questions did not arise.  Aristotle's view of the nature of souls is elaborated in his detailed accounts of the different life-functions: nutrition, reproduction, movement, perception, thought.  This book is governed by a biological approach to animation.

**Perception and Forms**

When we considered the soul in the Platonic dialogues, we spent some time on its nature (which involved the question of whether it was substantial, its pre-existence and immortality)—but we also looked at its functions:  what role it played in our knowledge

of the nature of reality. When we consider the Aristotelian counterpart, the first question that comes to mind is: how do we come to know? Does Aristotle's 'soul' contribute anything to our understanding of how human beings can think? How they gain knowledge of the world in which we live?

You remember from your reading of the *Categories* that Aristotle has an analogue to Plato's forms in his ontology: secondary substances, the universals, concepts on a different logical level than the particular individual primary substances which they define or describe. Where do those come from? How do we get the ideas with which we think, if they are not innate in our soul, the gift of a pre-existence?

I asked you to read Chapter 19 in the Posterior Analytics (pp 322-3 in your text). Aristotle there explains our capacity to know as being based upon, dependent upon, our faculty of perception—called (at 99b35) 'a congenital discriminative faculty.'

. Through our senses (and I will use vision, because it is the faculty which produces the best metaphors for the process concerned) we sense objects in the world.

. The interaction of the visible and vision produces a sense-impression, a sensation, upon the eye.

. In some lucky animals, those impressions are retained, by memory.

. The retained impressions accumulate; we call that 'experience.'

. When a number of logically indiscriminable particulars accumulate in the soul, they constitute the earliest universal—"for though the act of sense perception is of the particular, its content is universal." (100b1)

I see a white paper, a white wall, a white cloud;

In seeing them, I am seeing the whiteness of the wall, paper, cloud

Although they are all different individuals, and seen as such, their whiteness is "logically indiscriminable"—the same thing, common to all white things.

From that repeated experience, then, I develop the concept of 'white.'