The Elements in the Past, Present and Future

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The Past

The classical four elements of the Ancient Greeks – Earth, Water, Air and Fire – are no longer valued in the same way today, and as far as serious scientific research goes, are treated mainly with historical interest. This appears justified in many ways, since the intricate detail in modern material science and electro-magnetic technology hardly seem suitable to be handled by the seemingly primitive notion of the four elements.

However, did the ancients mean the same thing as we mean today when we say an "element"? According to the modern definition, oxygen is an element, as is sulfur, iron and neon. What is the difference between this notion of "element" and the classical elements? The classical element Earth, for instance, does not distinguish between table salt, sand, and glass powder, and counts them all as Earth, while in today's terminology we have to do with the elements sodium, chlorine, silicon, calcium and oxygen. It is clear from this that the classical element Earth has to do with what we call *solidity* – namely it refers to a state of matter or a phase of matter. This has to be investigated a little bit more to distinguish it from what we today call an "element".

The Present

The interesting aspect of using a state of matter as a classical element is that the same modern element, such as sodium, can manifest the behavior of all the classical elements. For example, sodium is solid in its natural state (Earth), and this can be melted (Water), and vaporized (Air). The question of Fire will be discussed later. At this point it is important to see that the modern element is capable of being expressed using multiple classical elements. How about the opposite? Is it possible to express a classical element in terms of modern elements? This is, indeed, how things are looked at nowadays: "Earth" is made up elements like such as silicon, aluminum, iron, and so on.

It is hence possible to tease apart these two types of elements, for the classical element takes the quality of the physical structure as a whole into account. A solid, or Earth, is hence bounded and fixed, while liquid is bounded, yet mobile. Gas is unbounded and mobile, while Fire seems to pass over from mere mobility to transformativity. Hence, the classical elements can be said to be derived from the mechanical and spatial qualities that are observed. What are the corresponding qualities associated with the modern element? How can we establish the identity of a modern element by saying, for instance, that this is oxygen, and not some other element?

The history of discovery of elements shows quite clearly that the crucial requirement for this discovery is the *discovery of electricity*. The discovery of new elements proceeded rapidly with the methods of electrolysis once the voltaic battery was discovered, and almost unconsciously, the very definition of an element began to molded on its electric behavior. Even though with the use of terms like atomic weights and chemical activity, one may well imagine that the separation of elements is based only on the weights which chemically react together, this is not fully accurate. For instance, carbon-14 and nitrogen have

similar weights, but their chemical reactivity is very different. Isotopes of carbon, carbon – 12 and carbon – 14, have different weights but are yet assigned to the same element: carbon! In addition, many of the rare earth elements had very similar chemical reactivities, so it was very difficult to separate them out (See https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/earthelements.html). The separations that occurred ultimately had to use the so-called "ion-exchange methods" i.e. once more appealing to electrically charged systems to separate the elements.

So, the birth of the modern element is inseparable from the discovery of the electrical nature of matter. It is as if the world is looked at strictly through the "eyes of electricity" and the "sense of weight" (or pressure), and the differentiation that shows up to these senses is the basis for what are called elements today.

In light of this, let us reconsider the classical elements form the point of view of the senses. What are the differentiations sensed by the different senses in their case? To the sense of sight, it is mainly Earth and Water that are visibly distinct. Air or Vapor is seen through the world of colors of the atmosphere. Fire is not really visible, for instance: when touching a metal kept in the sun, one can burn one's hand easily, but cannot see that it was hot. In a burning flame, one only sees the gases emanating in the flame (Air) and not the heat itself. The sense of sight is complemented by the sense of pressure or touch: Earth is easily touched and grasped, Water is easily touched, Air less easily so, and Fire or Warmth is perceived as we are touched *by* it. It is a different quality for sensing warmth as compared to that of touch, since warmth penetrates into the organism. In addition, it can also be said that taste, sound and smell help one sense *through* Earth, Water and Air. Hence, all the usual senses of the human organism are involved in the detection of the Four Elements, in sharp contrast to the modern elements for which we do not have an "eye of electricity". It can be seen here that this is the reason for the distinct alienation felt by the average person towards the elements in the periodic table: they are arranged mainly according to the differentiations in the electrical nature.

While most of the senses are involved in characterizing the four classical elements, is there a sense that predominates? Let us take the case of a blind man. His sense of sight is inactive, but his sense of touch is intact. He will have no difficulty in recognizing the solidity of Earth, the flowing surface of Water, the blowing of the Air, and the heat emanating from Fire. The sense of sight may not always be able to get these distinctions: while seeing through a transparent glass wall, the eye does not always detect the substance of Earth, while bumping into it makes it clear that it is a solid. Smell, taste and sound have similarly compromised distinctions between the elements, since they are not able to detect heat, for instance. The senses selected by the Ancient Greek for differentiation of the four elements are therefore:

Earth:	Sense of Touch
Water:	Sense of Touch
Air:	Sense of Touch
Fire:	Sense of Warmth

The different elements of the modern periodic table, on the other hand, are detected by:

Periodic Table of Elements:	Sense of Touch

Sense of Electricity

The intimate combination of touch with electricity on the one hand, and touch with warmth on the other, differentiates the classical elements from the modern elements:

Fire –Warmth

Air

Water

Earth – Touch

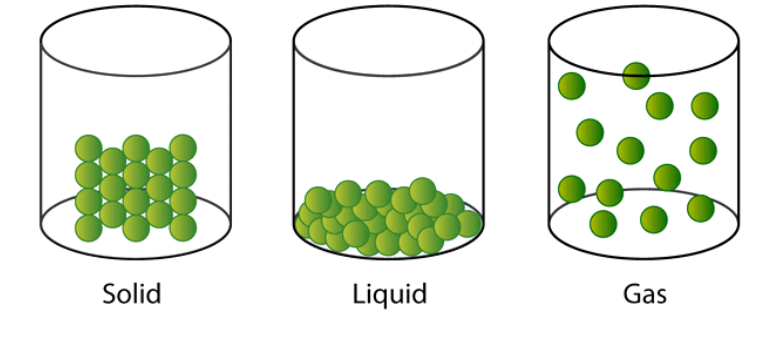
Classical Elements

Modern Elements

Electricity – Shock

The element of touch or pressure is common to both elements. An interesting aspect of these relations is that the sense of touch, which occurs through sensing pressure, and the senses of warmth and electricity are all sensed by the *entire organism*, while the sense of sight, taste and smell are more dependent on differentiated sense organs. Another important distinction between the classical elements and the modern ones is that we are much more **conscious** of the sense of warmth, while the sense of electricity usually leads to a *lack* of consciousness or **unconsciousness**, as it happens in an electric shock where one cannot properly feel one's hands.

So, from the 18th century till date, the modern elements have configured the scientific mind. This has had two major effects. The first one is the effect on the modern view of the states of matter. Since touch and electricity are predominant, the tendency is to project back the behavior of solids onto the behavior of the other classic elements. For example, this image is present everywhere:



With centuries of repetition, it is quite possible that regardless of all the modern developments of quantum mechanics and so on, it is a subconscious habit for most of us to think and visualize the states of matter in this way. A closer look reveals that this is NOT a visual of solids, liquids and gases, but rather the visual of solids extended in finer states of dispersal. In the first case, a solid is imagined as marbles stacked neatly (perhaps held together with glue), a liquid is seen as a loose stack of marbles, and a gas

perhaps a collection light and miniscule pin-pong balls bouncing off of each other. So in a sense, all the elements are seen only as Earth! This leads to several conceptual problems, such as the lack of clear reasons for phenomena like boiling and melting points, but we need not go into that here. It is sufficient to show how the idea of a solid graspable substance is "propagated" upwards to the other elements.

On the other hand, another important development is that the classical elements or states of matter are *reintroduced* in the description of electricity. So with discoveries relating to electricity, the view of electrons was also based on solids, as fluids, as gases or warmth. In other words, we have Electron-Earth, Electron-Water, Electron-Air and Electron-Fire. The "Electronic Classical Elements" are:

Electron-Earth: Electron as a tiny particle/billiard ball, orbiting like a mini-planet or moving in matter.

Electron-Water: Flow of electricity in wires, or Maxwell's "hydrodynamic analogy".

Electron-Air: Evaporation of electrons in old vacuum tubes, electron gas models, electro-magnetic waves similar to sound waves in air.

Electron-Fire: Plasma, where a substance is heated enough to charge it up and make it sensitive to magnetic fields.

It must be noted that the popular identification of plasma as the 4^{th} state of matter is inaccurate – it is the fourth state of *electrification*. Magnetism is seen in modern science as an effect of electricity, so this does not change anything essential in the concepts.

But, is this approach justified? Is there a different way of looking at these two major effects of the modern world view, and create alternative paths for the future?

The Future

Treating liquids and gases as a dispersed solid is not only conceptually cumbersome, it is also physically wrong. It introduces a corpuscular nature to physical reality which is not perceived at all. While one can imagine the flow of sand in an hour-glass to be similar to the flow of water in a stream, there is an essential difference between the two: *continuity*. Solids can be broken up as grains, but liquids are never "broken up", but exist as continuous wholes. Two drops merge to form one drop, where the original two drops lose their distinctness. A liquid always maintains a surface, while a solid maintains its three-dimensional shape. There is hence a *dimensional* difference between solids and liquids, which is completely ignored in the marble-stack approach. Liquids and gases, once again, have a distinct dimensional difference. For instance, water seeps and penetrates in the direction of the center of the earth, but gases penetrate in all directions. The dimensions of space are exhausted with the three dimensional spreading of gas, and we now entire the dimension of time, where matter changes. So when it comes to Fire or warmth, it not only penetrates all matter but also *transforms* it. Hence, as Hegel rightly says: *Fire is materialized time*.

Some solids, as crystals and other regular forms, are still continuous while others such as dust and powder become discontinuous. The solid Earth therefore forms a boundary between continuity and discontinuity. The difference between continuous and discontinuous matter is described thus by Rudolf Steiner: "I can say that the very nature of the animate requires that I conceive of it continuistically, whereas the nature of

the inanimate requires that I think of it atomistically." (See Origins of Natural Science, Lecture 5) Animate or living nature requires a continuity of existence in time, without a break, and this continuity is hence an integral aspect of life itself. What this means is that in creating pictures where the classical elements are made of discontinuous marble-particles, not only is the picture a false one, but *it also empties the elements of their capacity to hold life*.

When water, for instance, is looked at as hydrogen and oxygen, we are already looking with the "eyes of electricity", since water is electrolyzed into specific volumes and weights of hydrogen and oxygen. When it is also seen as consisting of small ball-and-stick molecules, this brings us back to the "sand" picture of water, which removes the possibility of harmonizing with life. On the other hand, when the continuity of water is taken to be as essential an aspect of it as its electrolytic products, the water is capable of sustaining life. A view such as this, taken by a few researchers like Victor Schauberger and Theodor Schwenk, opens up the possibilities of handling water in a living fashion. It allows water to transmit life.

Therefore, continuous solids (Earth) can potentially *hold* or *carry* life, water and other liquids (Water) can *transmit* life. This is the foundation for the sprouting of a seed.

Air and gases exist as infinitely stretchable entities, with no boundaries whatsoever. In solids and liquids, there is at least a termination of the shape, bound by many surfaces and at least one single flat surface respectively. In Air, even that discontinuity is removed, making it possible for Air to *sustain* life. Warmth or Fire goes one step further in its penetrability and transformativity, and it acts as something that can *stimulate* life. The picture of a hen brooding over an egg, or a seed buried in the warm ground, describes this process. A picture with discontinuous "photons" of infrared radiation is hence very different from the picture of continuous living warmth. To summarize:

Earth – holds life

Water – transmits life

Air – sustains life

Fire – stimulates life.

Hence, it is possible to re-enliven the classical elements, and characterize their qualities in relationship to life. This approach keeps the distinctness of the states of matter in mind, and does not simply extrapolate solids in sparser and sparser form into the other states. In this article, only the relationship of the different classical elements with life is considered. It is possible to elaborate other relationships as well, as will be done in later articles, which will create a body of knowledge regarding the functioning of each element.

The differentiation of these functions of the elements is what opens the door to the *study of the ethers*. It is only then that a clearer description of the functioning of electricity and magnetism can also be given.