
Chaos, Autopoiesis and/or Leonardo da Vinci/Arakawa

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In the Arakawa + Gins conception, there are several distinct theoretical footholds: the enhancement of the dimension with chaos theory; the double operation of action with autopoietic systems theory; and the introduction of da Vinci's non-integral dimension.

I

The first foothold Arakawa is concerned with is the expansion of possibility. Although 'not dying' seems to us rather improbable, the logical possibility cannot be denied. Not only that, but, just as there are many types of infinities, it is indicated that there are also many types of possibilities. Even within such a multitude of possibilities, expanding the possibility of 'not dying' would seem to lie at the very margins. If we view this expansion of possibilities as a dimensional extension, Arakawa's expansion and Chaos Mechanics become nearly synonymous.

Ordinarily, we anticipate future events and prepare our reactions to them using a preconceived notion of what is possible. We do this due to our past experiences – our personal histories and daily routines; making various predictions, imagining various interactions, and expecting various inevitabilities. This phenomenon may be termed 'empirical possibility.' If, however, we redefine the dimensions of possibility, an entirely different perspective should result – our habits and

understandings of our lives, history, the world, etc. would all change. The dimensions of reality's possibilities are undefined. As such, we ourselves should be able to set the parameters that allow for the expansion of human possibility. This can be achieved through science, art, and architecture. Instead of taking human reality at face value, under the conventionally thought of range of possibilities, we are to make expanding human possibility itself the issue. Thus, 'not dying' subsists in the setting of the parameters, allowing for 'the expansion of possibility.'

We can think of the mathematical concept of infinite sets as a metaphor. Within infinite sets, there are countably infinite sets and uncountably infinite sets, and within uncountably infinite sets, there are several types of infinite sets yet – the infinite set of real numbers, which itself contains rational and irrational infinite sets, and so on and so forth. Although all these sets are infinite, the degrees of infinity are different in each. In the same way, the range of possibility is not one-dimensional. We ourselves can reset the boundary conditions such that this range can be expanded. This is what Arakawa + Gins have attempted through their architecture in the cities of Nagi, Yuro, and Mitaka.

We can find the enhancement of the dimension in chaotic movement in rain, for example, dropping as non-regular and non-periodical. Chaos theory is deterministic, because it is mathematically formulated, however, the action born of chaotic behavior resists calculation. Determinism draws a picture of a world in which everything is predicted and extrapolated to the last, but again, in chaos theory, prediction is futile. These two situations seem paradoxical at a glance.

All chaotic movements are presented in a topological space, that is, in a dimension defined by mathematics. Within such movements, one movement suddenly disappears into another dimension. Such a movement cannot be predicted in topological space. Chaotic movement formulated within deterministic mathematical operations contains the possibility for dimension enhancement. Ultimately, chaotic movement includes actions that transcend the

dimensions determined by arithmetic calculation. Such transcendence is intrinsic to chaos theory (Tsuda 1990).

What Arakawa + Gins put into practice included a declaration ("We have decided not to die," etc.) that exceeds the dimensions of human languages including their formulated program. It is a declaration that draws surprise, but curiously, one that somehow feels real.

II

The second theoretical foothold involves the 'landing site.' The 'landing site' is an act of positioning, a basic activity that organizes the relationship between the world and the self through the identification of a said position. Any type of quest for environmental information utilizes the 'landing site.' The act of position-specifying precedes the recognition of a specified position. The 'landing site' has the special characteristic of simultaneously specifying something's position while initiating the organization of the relation between that position and the self. These two movements, which differ qualitatively but move as one, I have come to call "Double Operation." From this standpoint, Arakawa + Gins and autopoiesis become very similar conceptions.

If we only had to know the positions of objects, then we would only need to arrange them on the coordinate axis. However, the act of specifying the location of an object necessarily includes organizing the relationship of the object to oneself, even before placing it on its coordinates. The intellectual aspect of relating to an object is an act of acknowledging its position. The 'landing site' itself is not the concept of recognizing; rather, it is the concept of the action of positioning.

This situation can be phrased in various ways. The landing site itself is one type of action, and it fulfills the role of the hinge between the world and oneself, one that organizes the relation between the two. Or: the knowledge of a position, included in the action of using the 'landing site,' is itself a clue to the action; as

seen from the action, the specified position is an anticipation of said action. Or: though the 'landing site' may already be related to the world through action, it is also the impetus for one's personal organization of the relationship between the world and self; here, action and knowledge are inseparable. The 'landing site' is therefore not the concept of recognition per se; at the very least, it is the concept of the action of organization of the relation between the self and the world.

The action in which recognition and action work inseparably will be called cognitive action. According to this principle, the following situation is inconceivable. An observer, using the 'landing site' as recognition of an object's position, conducts quests for information according to that recognition, and uses what s/he finds to guide his/her actions. This interpretation is impossible – only a robot would do such a thing. The relationship between life forms and the world is firstly a consequence of action. The action is already connected to the world and it is recognition that gives us hints and choices for the organization of that relationship.

Most of the arguments of cognitive science, even in ecological psychology, are mistaken. In such arguments, the relation with the world is formulated first according to recognition, and from there, gathered information guides the next action. Such an argument is like a person who first learns about his relationship to the world from a book, and using the book as guidance, cautiously plans his behaviors. Or it can be likened to a person who, while looking at the sea, practices swimming first on land. Even though the act of swimming is induced by the information one gets from looking at the sea, one can only imitate swimming on the beach. In this case, movement and environmental information are interlocked. However, no one would likely call such a thing 'swimming.' He lacks the action of specifying his position, and all action subsists in the landing site, not in affordance (Kawamoto 2007).

The landing site holds yet another significance. Above being another person's nature (or change in that nature thereof), the position the person occupies is their most basic characteristic. By putting that other person in front of us, the question

of *where* that person is – as opposed to *who* or *what* that person is – signifies the person's true nature. Thus, every time that person formulates the self, s/he simultaneously occupies that position. Here is a Double Operation at work.

To formulate the self is to occupy the place one is in, and to occupy said place is essential to the possibility of action (such as moving to another place, etc.). If we were unable to occupy a place, we would also be unable even to move to another place. The situation in which a person becomes something is connected to the possibility of that person's self-recognition, and occupation of a place is connected to the possibility of action. To occupy this place is "the landing site of action." If the possibility of self-recognition and the possibility of one's actions were the same thing, we would be unable to act in the world – the 'landing site' supports the possibility of action in the world.

Moreover, when a person perceives the world, it is through a certain perspective – one through which many things can be seen – and at the same time, that person occupies a space. In this case, the function of occupying 'Here' is connected to the possibility of action. Cognizance advances with the personal identification of 'Here' in the world. When one perceives the world, one is at the same time occupying that space. This is "the landing site of cognition," or "the landing site of perception."

To this point, the concepts of 'being in the world' and 'existence' are born. Sometimes it is said that "People recognize the world while existing in it." However, the occupation of a place in the world functions as the action of using the landing site, as an active 'relating to the world.' That occupation operates at the same time as the cognitive perspective that is open to the world. In both cases of 'landing sites,' occupying a place identifies the possibility of the action that accompanies recognition.

An autopoietic system operates by connecting one process to the next. The recurrent processes form the 'self of the system,' in other words, the 'self of the system' is made up of these continuous processes. In chemistry, catalyst matter

reacts with other matter, regulating its reaction velocity. At the same time, through a crystallization process, something outside of the recurrent processes is formed. Maturana and Varela defined autopoiesis, which includes various forms of double operations, in the following way.

An autopoietic machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components that produces the components which: (1) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (2) constitute it (the machine) as a concrete unity in the space in which they (the components) exist by specifying to the topological domain of its realization as such a network. (Maturana and Varela 1980: 78-79)

In this formulation, there are at least four modes of double operation: the formation of the systems boundaries through continual processes; definition of components through continual processes; the formation of the 'self of the system' through continual processes; and the formation of topological space of the system through continual processes (Kawamoto 2006).

A property of autopoiesis is that Double Operations also occur. This property is included somewhere in the basic conceptions of both Arakawa and autopoiesis. In this way, Arakawa's landing site and autopoiesis share similar basic features.

III

The third foothold concerns changing the structure of architecture such that the body's possibilities are expanded. Most architecture follows a plan that does not allow for the expansion of possibilities (of life, the body, etc.). However, in Arakawa's architecture, this is not the case; rather, architecture is a procedural device to expand possibilities. Life forms are not formulated in integral dimensions such as the third or fourth dimensions; thus the goal of architecture is to create a space appropriate for life and the body, a space in which one is free to consider expanding possibilities. In this way, Arakawa and da Vinci are nearly the same.

Things which act like life forms (whether it be humans, animals, plants, etc.) not only specify a place – they possess a physical body. Where there is a gaze, there must be a body from which that gaze originates. The body itself moves, and thus also establishes its own domain or region. Rather than recognition or occupying a space, a special trait of the body is that it itself moves. In that situation, the space that connects movement and the position-specifying ‘landing site’ becomes insufficient. The ‘landing site’ occupies the position and movement changes that position. But the body forms its own topological space. It is then necessary to introduce a fluid-state space in which mass energy can flow freely. In this situation, we must set up a system that cultivates regionalization or classification of the environment. This is where ‘cleaving,’ or cutting and closing, is introduced.

Cleaving provides the basic image of this fluid formation of space, a type of model image. Take, for example, putting a finger in a container of water. In a split second, a division is created, but in the next, the water closes around your finger and the division is closed. Or, a swarm of gnats on a riverbank after the rain: you can split the group into two by cutting your hand through it, but the division is only momentary. They quickly reform as one group. This action of simultaneously creating divisions and restoring connections is ‘cleaving.’ Cleaving supports the articulation of both the world and the distribution of landing sites.

It is in this environment that Arakawa’s architecture makes its advent. Architecture appears as one of the many methods of formation considered suitable for life’s actions, and is itself a form of life. An ant’s nest is as such, as is a bee hive, a snail’s shell, etc. Thus from the point of this natural architecture, the buildings that humans produce are exceptions, for they are not built to draw forth life’s possibilities. To change this at the most basic level, the destiny-reversal house stands.

In the human case, architecture is usually geometrically formulated. However, we should view this as arising from special circumstances surrounding production. Humans have unfortunately picked out things that are too strong for construction. While carving a stick, we make predictions like, "If I shave it down a little more here, it will be even straighter" in the production process. However, physically, it's nearly impossible to make it completely straight. Nevertheless, we grasp the concept of 'straight.' Taking the physical stick as an example, the concept of "the straight line" is born. This concept can be called an idea, and taking these ideas and putting them into formulas and equations is 'geometry.' Thus, due to what we have learned in the construction process, most architecture constructs with physical materials that match this conceptual model.

However, whether or not such construction techniques are suitable for life activities is heavily questionable. In geometrically assembling the straight line, the plane, and the solid body, integral dimensions such as the first, second, and third dimensions come into existence. Yet there is no guarantee that such integral dimensions are compatible with life. In the mathematically deterministic techniques of chaos mechanics, the possibility of non-integral dimensions such as the 3, 12 dimension or the 3, 24 dimension have been identified (Kaneko and Tsuda 1996).

Therefore, the probability that integral dimensions are sufficient for or compatible with life is likely quite low. We must create a topography appropriate to nature, one that is intrinsic to life itself.

By creating spaces that take into consideration life's movements, and from the point/perspective of formulating personally intrinsic spaces, da Vinci and Arakawa utilize the same techniques. When space is thought of in non-integral dimensions, things that we perceive appear as differentiated movements. Things which have been formed according to this differentiation of movement are da Vinci's space. This is to say, to create space according to life's movements (Kawamoto 2007). From the perspective of space formation, da Vinci and Arakawa are moving in the same direction.

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