

Relationships between “When a Person Collapses” and Calculus: What is the State between Human Pathology and Creativity

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The three of us met on the university campus. Somehow, I think we met under a tree. The mathematician Sakie Suzuki, who was a faculty member at Kyoto University, often used to take us freshman students outside during calculus classes. The reason I took this “blue sky” or “tree-shaded” course as a graduate student in the Graduate School of Education was that, ever since I was introduced to the theory of human transformation as a “story of repatriation” in a lecture on the anthropology of education, I wanted to reflect on these outgoing and returning phases by applying the concepts of differentiation and integration. Then, one day, I heard that Hisao Nakai was using the concepts of “differential circuits” and “integral circuits” in relation to human pathology in psychopathology, so I visited my friend Ms. Kyoko Toyohara, who studied clinical psychology and who still works as a clinical psychologist. So the three of us teamed up; mathematics (Sakie), clinical education (myself), and clinical psychology (Kyoko), and since then, we have focused on the inextricable relationship between the pathological crisis of humanity and creative possibilities, questioning the nature of the “fields” that are involved in such possibilities.

Pathology and creativity

Kenji Miyazawa's words “when a person collapses” seem to convey the danger of the mental state that the “I” can be unraveled and also the fascination of this.

We live under various systems of order that we share with others, including language, meaning, values, laws, rules, and relationships. We live in a kind of network that our communities have cultivated over time, and each of us has acquired that network. But we also constantly face events that make it impossible to maintain such an orderly system and cause it to unexpectedly disintegrate or collapse. Whether individually or collectively, the intensity and frequency of these changes varies from person to person, but in each case the “I” that existed before collapses and must be transformed. Humans don't just live by following the existing system. We weave our lives in outgoing and returning phases through this dismantling and destruction and the following rebuilding and creation.

On the other hand, we cannot always accept this “outgoing and return” as creative enrichment. There is great suffering when we cannot accept the quality and intensity of our

experience, when we remain blind on the way to express it. The process of accepting experiences is unbound and therefore a lonely struggle. Therefore, it is impossible to accept and bridge the gap between experience and expression without help, in other words, it is impossible to “return.” Here I would like to take another look at the process of “dismantling” and “reconstructing” in the world through the conceptual pair of differentiation and integration.

Differentiation is the point of production

First, I will consider a derivative as an implicit entity (hereafter referred to as an implicit derivative) that appears in philosophical discussions of derivatives.

Calculus is said to have been founded independently by Newton and Leibniz in the second half of the 17th century, so how one defines the derivative (infinitesimal) is linked to the philosophical question of how one views the relationship between the part (derivative, infinitesimal) and the whole (continuous).

Newton defined the derivative from his concept of motion dynamics as the limit value of the ratio of “amount of change,” a “number” that can be used in mathematical calculations. On the other hand, Leibniz's concept of analytic geometry defines the derivative in terms of a “quantity” which includes the qualitative meaning “a line segment of non-zero but infinitesimally short length.” This derivative defined as an “implicit quantity” is a relatively unwieldy concept in mathematical calculations, but Hermann Cohen reads it in a philosophical context as a “point of production” and recognizes its immense importance. The early epistemology of Kitaro Nishida and Hajime Tanabe was influenced by Cohen's differential theory.

The basis of this view of continuity is that the whole is not the sum of its parts. The whole is formed only from parts that already intuitively form a unity with the whole. In other words, the derivative does not arise relative to an infinite division of the whole; rather, the derivative is the absolute basis (the implicit derivative, the point of production) from which the whole arises.

One could argue that this view of continuity is a logic that recognizes the absolute nature of parts. A derivative is an absolute principle that can never be relatively decomposed within the whole and that “is not determined by a given sequence, but itself generates the sequence at the time through its implicit dynamics. I think this is an extremely important point about various “part” elements. It is a worldview that underlies the fact that parts are the “primary entities.” However, at the same time, we can immediately see that the analogy between this logic and personal life is limited. For example, we can consider conflicts between primary entities or about situations in which the primary entity is instead exposed to the danger of being disintegrated by the “primary entity” dynamics and pressures of other dimensions. The

specific dynamics of the struggle when the primary entity faces a crisis cannot be represented on the lines drawn by this principle of differentiation. (Text by Yuria Yanagisawa)

Using differential circuits, we can predict the future to some extent from that point. In his “Final Lecture: A Personal View of Schizophrenia,” Hisao Nakai superimposes differential circuits on the behavioral characteristics of schizophrenics.

“The anticipatory nature of differential circuitry, the instability of recognizing changes in details but becoming grotesque when forced to zoom in, and so on, are all like observing the behavioral characteristics of a schizophrenic in a moment of crisis.”

Integration is a narrative

Unlike differential circuits, which take the “difference” between two points and find the slope, integral circuits find the total area by taking the limit from the “addition” of the values in a graph. Differentiation and integration are dual concepts of each other, and the original form of the function can be restored by “adding up” the “differences.” Nakai also overlaid integral circuits with the behavioral characteristics of depressed patients.

Differential circuits are local, while integral circuits are global. According to Nakai's concept, devices in differential circuits are small because they are localized. They correspond to living things that are younger from an evolutionary perspective, such as predictions made by juveniles without past data and as the vision of flies and frogs which use fewer neurons to perceive change. If so, integral circuits would come later from an evolutionary perspective and correspond to brain activity that uses language and weaves stories (including the retrieval of episodic memories).

And, outgoing and return between differentiation and integration

Until recently, I had not seen Nakai's concept of brain function as described above, but I discovered it because it coincided with what Tsuyoshi Kobayashi discussed in his intensive course. He and I talk about “doing math” and “thinking” from time to time, and last fall we turned these discussions into an intensive course. He discusses the outgoings and returns between unconscious and conscious thought in mathematics and gives the following quotations:

“ What, in fact, is mathematical discovery ?(Omitted)Discovery is discernment, selection. (Omitted)The useful combinations are precisely the most beautiful.” Henri Poincaré, Science and Method

“Mathematical discoveries, like their proofs, are always accompanied by a great joy” Kiyoshi Oka, “Collected Papers”

“There could be many perfectly acceptable results in our mathematical literature whose proofs require insights that lie far from the original rules and axioms of the standard formal systems for arithmetic. All this shows that the mental procedures whereby mathematicians arrive at their judgements of truth are not simply rooted in the procedures of some specific formal system.” Roger Penrose, *The Emperor's New Mind*

When doing mathematics, people (at least Mr. Kobayashi and I, and probably Poincaré and others) move back and forth between differential circuits (the primitive brain) and integral circuits (the cerebrum). Unconscious thought calls the expression of the senses. This corresponds to “beautiful,” “joy,” and “insights that lie far from the original rules.” The conscious mind creates order in this. This is the case with formal systems such as rules and axioms. Discernment and selection are made both unconsciously and consciously.

I once wrote an article that said, “Doing mathematics and painting are similar. I imagine writing a novel and building a house are also.” I can explain this now. I think I can.

What kind of field allows people to move back and forth in peace? Imagine it. I imagine the face of the person who does mathematics, the faces of people who live at “Bethel House,” and the face of that girl. I feel a sincere wish that society allows us to keep some space in which we can perform outgoing and return without feeling pressure. (Text by Sakie Suzuki)

Modern society, in which growth and development are achieved through increased productivity and efficiency, seemed to be full of shining light. However, the stronger and brighter the light is, the darker is the shadow it casts. This is true not only of physical phenomena, but also of the state of societies and groups, and of the inner lives of individuals. It is well known that C. G. Jung's struggle with his own shadow played an important role in the formation of Jungian psychology. Light has its appeal and significance, and so does shadow. Denying, ignoring or separating one from the other can mean the loss of the chance for outgoing and returning from both worlds, and then we also lose the seeds of creation that come from this process.

In the field of clinical practice in psychology, even today people talk about all kinds of suffering, injury and difficulties in life. In narratives and silences, sometimes through tools such as dreams, sand pictures, drawings, or playings, clients encounter aspects of themselves they did not expect and go into a world of shadows. On the other hand, when clients leave the clinical setting, they are also people living their daily life. In clinical practice, it is essential to address psychological problems as well as maintaining their daily life.

One of the indispensable mechanisms for thinking about the outgoing and return between clinical practice and daily life is the “frame” in psychotherapy. This simply involves a promise of a specific day, time, place, and price for the session, and a promise that what is said in the session will not be shared without permission. In this way, the therapy room

becomes a protected space, set apart from everyday life, where it is safer to work on mental health issues than in an environment without such a frame. The frame is a constraint, but it is also a device that protects freedom and safety within the frame.

On the other hand, even though clients are in distress, it is often difficult for them to access psychotherapy because there are various practical constraints that become barriers. Not only in psychotherapy, but also in health, welfare, and educational systems, those who fall out of the existing system remain somewhere alone. In fact, all people are alone. But circumstances that force people to be alone often intensify their suffering and make them sick, although the time you intend to spend being alone can be fulfilling.

So, creating a field...

Hisao Nakai points out that the humility described below is common sense among people in societies where they live with sick people.

“Anyone can be sick, and it is just that by some grace you are not sick at the moment.” Nakai
“Psychiatry in Nursing”

A community where sick people can live peacefully and without segregation and exclusion must also make life easier for people who are not sick. Creating an open “field” is a small act of resistance to a system that leaves the sick and lonely behind. A place which allows you to be with someone or be alone. Be there to listen, even if you can’t do or say anything. Play with random events. This activity may seem simple, but it is never easy and is based on relationships between people and between people and places. Creating a “field” can start with getting to know the people in front of you.

Using concepts such as differentiation and integration as cues to think about pathology and creativity of human beings, the three of us thought about the individual and the community, bringing issues and feelings in our own lives into our discussions. The conversations between the three of us always generate far more questions than solutions. What is pathology? What is normal? What is creation? What is destruction? To ask is to reach out and listen. Even if we don’t know, because we don’t know, we keep thinking alone or with the three of us together. What is natural for one becomes a new knowledge for the others. After spending such time, the daily life we return to becomes somehow more lively. (Text by Kyoko Toyohara)