

Transductive Convergence of Digital Humanities/Trans Media Art/World Literature

Kim Youngmin

Jack Ma Chair Professor, Hangzhou Normal University, Hangzhou, PRC
Distinguished Research Professor Emeritus, Dongguk University, Seoul, Korea
Email: youngm@hznu.edu.cn; youngm@dongguk.edu

Abstract The singular and constant interaction of form and matter, as well as the potential and dynamism of matter, have been overlooked in material morphology theory. Gilbert Simondon's individuation theory ingeniously identifies these blind spots and defines "individual" as the consequence of the "individuation process." By revealing the potentials of a "pre-individual" that has not yet been individuated as a focus, Simondon demonstrates how "pre-individual forces" as the conditions of natural and technological existence contribute to the formation of "individuals" such as organisms, non-organisms, biological entities, and individual technical objects. The "pre-individual forces" exist temporally prior to the individual and possess the energy of the sustaining constitutive force by which the individual sustains and evolves itself. The pre-individual condition of being is an endless "resource of potentiality" from which being emerges from becoming, which is analogous to Heidegger's concept of "Bestand/standing reserve" in his "Question concerning the Technology." Once the pre-individual is conceptualized as a "metastable being" in relation to its surroundings or "associated milieu," the individual's movement is termed as "transduction," referring to an operation that generates itself by elaborating, concretizing, and structuring the surrounding area. Similarly to how deduction and induction seek to solve problems associated with an already-individuated context, transduction is a problem-solving ability. While elucidating transduction in terms of "feedback loops" within the "associated milieu" of humans, science, and technology, the purpose of this work is to apply transduction logic to the convergence of transmedia, world literature, and digital humanities in terms of aesthetics and ethics.

Keywords convergence; transduction; individuation; pre-individual; Gilbert Simondon; feedback loops; ethics; world literature

Author Kim Youngmin Dr. English and Comparative/World Literature is Jack Ma Chair Professor of the Ma Yun Education Fund at Hangzhou Normal University, China, and Distinguished Research Professor Emeritus of Dongguk University, Seoul, Korea, and current Director of the Digital Humanities Lab, Dongguk University, Seoul, Korea. He has served as Editor-in-Chief and is currently Editorial Supervisor of the Journal of English Language and Literature and was President of the English Language and Literature Association of Korea. He is Vice-President of the International Association of Ethical Literary Criticism (IAELC), an Executive Council Member of the International Comparative Literature Association (ICLA), Vice President of the Korea Digital Humanities Association (KADH), and Chair of the International Affairs Committee of the Korea East-West Comparative Literature Association (KESTWEST). His research is mainly focused on modern poetry, comparative and world literature, critical theory, digital humanities, and translation studies.¹

Introduction: Problems and Solutions: The Phenomenon of Convergence of Humans and Technology in the Era of Pandemic

There is a saying that there is nothing new under the sun. Everything was before and therefore what changes is what has already been changed. Is there anything that doesn't change? It is not an easy problem to find an answer to. So let us deal with the accessible problem first. Under the assumption that nothing in this world does not change, we begin our quest for change. First, let's consider non-living things (non-organisms) and living things (organisms) that exist as objects in this world. It seems that we need a scale of vision that requires viewing through both a telescope and a microscope at the same time, thereby zooming-in and zooming-out of the problem at stake.

When considering changes in organic beings (including animals, plants, and humans) and inorganic things, a crystal (crystalline solid) can be taken as an example of the basic unit of inorganic entities that are typically changing at the material level. A crystal is a material in which the arrangement of atoms has a spatially repeated pattern. When a liquid is cooled, the molecules move slowly, and

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the molecules at a certain temperature finally begin to form a uniform arrangement and reach the state in which they cannot move around freely. Under this temperature, molecules (or atoms) are arranged in a regular manner and compose a homogeneous substance with a shape surrounded by planes, called a crystal.¹

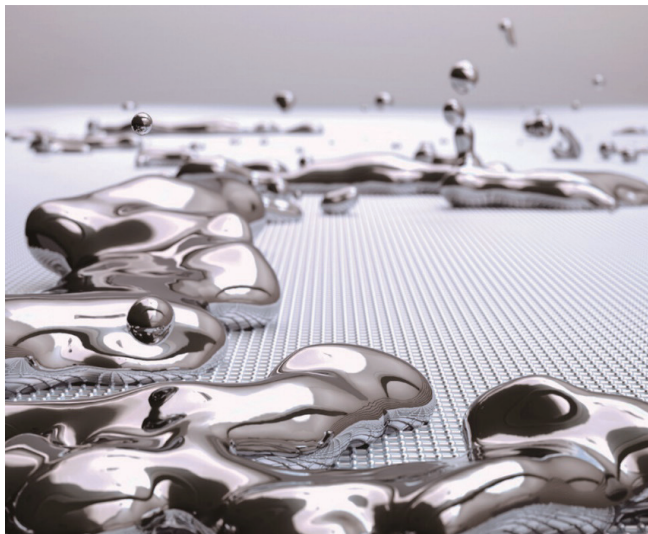
The maximum amount that a solid material can dissolve in a liquid is called solubility, and the solubility varies greatly depending on the type of solvent, temperature, pressure, and solution composition. Most of the solubility of a solid substance is almost independent of pressure, and especially in the case of an aqueous solution in which the solvent is water, the solubility of a solid substance depends only on temperature. The tendency of the solubility of solid substances to depend on temperature differs depending on the type of substance. A decrease in solubility due to a decrease in temperature leads to the formation of supersaturation conditions in a solution of relatively equal concentration. In the case of a supersaturated solution, crystallization such as solid precipitation may occur, so a solution in this state is called an “unstable solution.” However, a solution in which no change, such as solid formation, occurs even in a supersaturated solution is called a “metastable solution.” The characteristic of a metastable solution is that it does not cause crystallization by itself in the solution, but when a determinant is provided from the outside, crystal grains are ready to grow.

We have examined the natural process of crystallization of liquid solid. However, humans have engineered crystallization. In the artificial crystallization process, the target material moves to the surface of the crystal in solution, or particles are generated in a supersaturated state. This is called a “crystallization” process, and the key mechanism is that crystal nuclei are first generated and then crystals grow in this crystallization process. In solid physics, in general, the atoms that make up matter in a crystalline solid are regularly arranged. Therefore, it is easy to explain the electrical structure. In an amorphous solid such as liquid or glass, the arrangement of atoms is irregular and the shape can be changed freely, making it difficult to explain the electronic structure theoretically. Philip W. Anderson and Neville Mott established the theory that the electronic structure of liquid metals has a unique and incomplete energy gap, unlike the electronic structure of solid metals with regular atomic arrangement, but that the electronic structure could not be elucidated by measuring liquid metals that can freely change shape, such as mercury, sodium, lithium, and

1 Examples of crystal are mostly minerals and metals. The structure forming the crystal mainly represents the spatial arrangement of the three-dimensional structure. The unit cell is classified in accordance with the regularity of the arrangement of atoms. A crystal is a polyhedron with planes and edges, and according to the sub-law, even the same material has different sizes of faces or edges, and has the same properties to form an angle between the crystal faces. For the overview of crystal, refer to Britannica: <https://www.britannica.com/science/crystal/Structure>.

potassium alloys, or just water.

In August, 2020, a research team proved “the theory of the electronic structure of liquid metal” through experiments and published it in the journal *Nature* for the first time since Nobel Prize winners Philip Anderson and Neville Mott received a Nobel Prize in the 1960s. The Nobel laureates have already presented a theoretical model of “the electronic structure of liquid metals.” This new discovery goes beyond the theory of the electronic structure of liquid metals established by Philip W. Anderson, Bell Telephone Laboratories, USA, Neville F. Mott, Cambridge University, UK, and John H. Van Vleck, Harvard University, USA. Unlike the past method, this research team succeeded in measuring an alkali metal such as sodium, potassium, rubidium, and cesium on the surface of a crystalline solid called “black phosphorus.” What they discovered is the electronic structure of interface between crystalline solid and liquid metal. You can see in the picture that a substance in which atoms are regularly arranged at the bottom represents a crystalline solid, and that a liquid metal irregularly distributed thereon represents alkali metal atoms doped on the surface. According to Keunsoo Kim, the leader of this research team, “The term pseudogap also appears in high-temperature superconductivity. This study revealed the cause of the pseudo-gap in liquid metal, so if it is the same as the cause of the pseudo-gap in high-temperature superconductivity, it will be an important clue for research.”¹



(Figure 1: Pseudo-gap in liquid metal)

¹ S.H. Ryu, M. Huh, D.Y. Park, C. Jozwiak, E. Rotenberg, A. Bostwick, and K.S. Kim, “Pseudogap in a crystalline insulator doped by disordered metals.” *Nature* 596.68 (2021). doi:10.1038/s41586-021-03683-0.

(*An artistic representation of the interface between a crystalline insulator and a liquid metal, where a key feature of the predicted electronic structure of liquid metals was discovered.)

Superconductivity refers to a physical phenomenon in which electrical resistance suddenly disappears in a cryogenic state close to absolute Zero degrees (about 273 degrees below zero). In the film “Terminator 2,” liquid metal robot “T1000” debuts, capable of regaining its shape after being shot or struck by a car. It is said that the scientists have succeeded in measuring the “electronic structure” of such a liquid metal, and that this structure was experimentally discovered for the first time in the world. High-temperature superconductivity is a mechanism in which resistance disappears at a specific high temperature. If it is realized at room temperature, power transmission is possible without energy loss. Furthermore, if the principle of this high-temperature superconductivity phenomenon can be identified and ultimately room-temperature superconductivity can be developed, it will be possible to solve the problem of maglev trains and power supply and demand. Looking at the process of discovering the properties of electronic structures and functions in crystalline solids and liquid solids, the interaction between science and technology in the process of analyzing and exploring various phenomena occurring in inorganic substances and their “associated milieu” correlation can be inferred.

Now, let us change our focus to the organisms. Take an example of blood vessels and cells inside the human body to see what happens in organisms, which is also related to human cognition ability. In 2014, Tony Wyss-Coray, a brain scientist at Stanford University in the United States and a world authority on Alzheimer’s disease, incised and sutured the body of an old mouse and a young mouse to connect the circulatory system, called “parabiosis”. The wound healing ability of two animals sharing the same circulatory system was studied by the method of bonding. Injuries to the muscles of old mice combined with young mice were healed much faster than other old mice. On the other hand, wounds in young mice combined with older mice were found to be produced much later than their peers. In 2016, when the brains of old mice were examined, new neurons were three times as many as usual, but the number of neurons produced in the brains of young mice combined with old mice was significantly lower than that of ordinary young mice. As a result, the old mice became more active, while the young mice behaved like middle-aged ones. The same results were obtained when plasma was injected. The hippocampus is a part of the brain responsible for memory, and it was confirmed as a result of the study that abnormal signal “transduction” was reduced in the hippocampus of young

blood transfused Alzheimer’s mice, and that short-term memory and cognitive abilities were actually improved in these mice. Afterwards, Tony Wyss-Coray of Stanford University and his team collected the blood of 4,263 people aged 18 to 95 years from human subjects, selected “aging proteins” whose amount changes greatly depending on age, and published them in the journal, *Nature Medicine* (December 5, 2019). The study developed a system for estimating the age using 373 proteins whose amounts change significantly. Through the system, the amount of protein in the blood can be analyzed and the age can be estimated within 3 years of error. As a result, 1, 379 aging proteins were found and the amount of protein in the blood was found to increase in steps at the age of 34, 60, and 78. Tony Wyss-Coray said that he found a way to treat diseases caused by aging through this study: “Looking at thousands of them in plasma gives you a snapshot of what’s going on throughout the body,” and “Proteins are the workhorses of the body’s constituent cells, and when their relative levels undergo substantial changes, it means you’ve changed, too.”¹

Recently, a research team from the Hebrew University of Israel conducted an experiment in which a blood vessel-making component was injected into mice with old blood vessels and published a study result in the international scientific journal *Science* on July 30, 2021, showing that aging of blood vessels leads to overall aging of the body, including bones, muscles, and liver.² The amount of vascular endothelial growth factor (VEGF) decreases, because the old blood vessels become inflamed and the amount of oxygen in the tissue is reduced, leading to aging of blood vessels, thereby failing to supply enough blood to each tissue. As a result, what they discovered is that when the amount of VEGF decreases, capillaries are significantly reduced, causing a problem with the function of mitochondria which is energy factories in cells. Based upon this scientific research result, the Israeli researchers hypothesized that blood vessels could be rejuvenated by increasing the amount and activity of VEGF, and they injected VEGF into old mice using an adeno-associated virus. As a result, the function of blood vessels in mice was partially restored, body functions improved, abdominal fat and fatty liver decreased, and muscle loss and bone loss were also reduced. The kyphosis, in which the spine curves backward, was also improved.

1 “Stanford scientists reliably predict people’s age by measuring proteins in blood.” *Stanford Medicine News*. December 9, 2019: <https://med.stanford.edu/news/all-news/2019/12/stanford-scientists-reliably-predict-peoples-age-by-measuring-pr.html>

2 “Aging Counteracting age-related VEGF signaling insufficiency promotes healthy aging and extends life span.” M. Grunewald et al. Web. 30, 2021. For full article, <https://www.science.org/doi/10.1126/science.abc8479>.

In fact, the research team conducted an experiment on mice, a non-human organism, and applied the results to a human organism, saying, “The pathology caused by aging, such as osteoporosis, sarcopenia, and fatty liver, has greatly improved. It could be a good way.” When we look at the overall experimental process, we can reflect the fact that we are in the process of analyzing and exploring various phenomena occurring in organic objects and their “associated milieu.” What is significant and relevant for us, the scholars in the humanities, is to be aware of and attentive to these human effort to apply the scientific research results to the human organism through the experiment of a non-human organism, the mouse. Although it is not possible to specifically investigate and present the detailed process for a non-specialist, we are lucky to recognize the “concretization” phenomenon in which the maximization of the interrelationship among humans, science, and technology is concrete.

When we first get COVID-19, it is said that the influx of the virus immediately activates immune cells in the lung tissue. Most of these immune cells are macrophages. Macrophages recognize virus-infected cells or cancer cells and directly eliminate them through phagocytosis. This operation is a defense mechanism that responds immediately at the forefront of protecting the human body from pathogens. Although macrophages respond as an initial defense during COVID-19 infection, they damage tissues in the defense process and fibrosis may occur in the process of recovering from inflammation. Recently, it has been discovered that immune cells that block external viruses seep into the lungs from the blood during COVID-19 infection and transform themselves into a large number of attack cells. In response to this discovery, a paper by a joint research team led by Park Soo-hyung of the Graduate School of Medical Sciences of KAIST was published in *Nature* and revealed the characteristics and origin of specific immune cells that cause lung damage. It is being evaluated as a result of a study that suggests a way to control the lung damage of COVID-19 patients caused by an excessive immune response.¹

As we have seen in the previous cases, humans are still experiencing the process of change during the period of the pandemic, and how science and technology will evolve together in response to COVID-19 depends upon the cycle of the “associated milieu” of humans, science and technology. In order to understand the process of rapid change, what is at stake is the concrete materialization and representation of detailed “associate milieu” of humans, science, and technology in

1 Lee, J.S., Koh, JY., Yi, K. et al. “Single-cell transcriptome of bronchoalveolar lavage fluid reveals sequential change of macrophages during SARS-CoV-2 infection in ferrets.” *Nature Communications* 12. 4567 (2021). <https://doi.org/10.1038/s41467-021-24807-0>

a recognizable pattern. This paper attempts to grapple with some of these practical challenges, explaining the transformation or transduction in the “feedback loops” of the “associated milieu” of humans and science and technology, as well as applying the logic of transduction to the convergence of transmedia, world literature, and digital humanities in the context of aesthetics and ethics.

Theories: Feedback Loops of Humanities, Science, and Technology: Individuation, Associated Milieu, and Transduction

Crystallization and concretization dealt with in the preceding introduction represents the concept of individualization process related to the existence and creation of various types of individuals existing in nature and the world, such as organic and inorganic matters, plants and animals, and living things including humans. The basic model of individualization or what Gilbert Simondon termed as “individuation” begins with a physico-chemical phenomenon called “crystallization.” The crystallization process takes place between the crystalline seed (germ/seed) and the milieu of the mother liquid, referring to a process in which microscopic crystal structure fragments are transformed into crystals in a supersaturated solution. The mother liquid in an amorphous state has no form yet, and a crystal seed, which can be called a seed or nucleus, grows in the mother liquid. This mother liquid is the surrounding environment or “milieu,” and creates its own shape and structure. Crystallization refers to the joint work of a milieu in which seeds that construct an amorphous environment and structure produce crystals through continuous interaction. As time goes by, the crystal grows and the crystal seed expands by forming its own realistic structure in the milieu. On the other hand, the surrounding environment, which remained only as a potential before the crystal seed grows, is activated when the crystal seed starts to grow, and this potential is converted into energy and becomes an environment full of dynamism, promoting the ripening and structuring of the seed. By making it possible, the potential of the seed is realized.

In the theory of material morphology, it can be said that blind spots are still prevalent: 1) the specific and continuous interaction that operates between form and matter, 2) the potential and dynamism of matter that is already in the amorphous state. Gilbert Simondon’s theory ingeniously highlights these blind spots and understands “individual” as the result of “process of individuation” and considers the process of creation of the individual without presupposing the identity on which individuality is based, marking the breakthrough. According to Simondon, simple engineering or reverse engineering simply moves from identity to identity

from one entity to everything else before. Unlike reverse engineering, which deductively moves from the identity of an entity in its present state to an entity with a newly constructed identity in the future, Simondon shows potentials of a “pre-individual” that has not yet been individuated as a focus. Simondon is interested in understanding how the “pre-individual forces” as the conditions of natural and technological existence constitute “individuals,” such as organisms, non-organisms, biological entities (plants and animals and humans) and individual technical objects.

He argues that it is the process of the pre-individual that governs the process of individuation. In his “The Genesis of the Individual,” Simondon makes clear the importance of the individual phase in this:

The process of individuation must be considered primordial, for it is in this process that at once brings the individual into being and determines all the distinguishing characteristics of its development, organization and modalities. Thus, the individual is to be understood as having a relative reality, occupying only a certain phase of the whole being in question--a phase that therefore carries the implication of a preceding pre-individual state, and that, even individuation, does not exist in isolation, since individuation does not exhaust in the single act of its appearance all the potentials embedded in the pre-individual state. Individuation, moreover, not only brings the individual to light but also the individual-milieu dyad. In this way, the individual possesses only a relative existence in two senses: because it does not represent the totality of the being, and because it is merely the result of a phase in the being's development during which it existed neither in the form of an individual nor as the principle of individuation. (300)

An individual can be understood as having “a relative reality” that occupies a certain stage/phase of whole being. These stages (phases/steps/stages) have the inner meaning of “pre-individual state,” referring to the stages that are inherent in simple actions in which all potentials of the individual's previous state “embedded in the pre-individual state” are revealed as a phenomenon. Furthermore, individuation clearly reveals the bilateral relationship of not only the individual but also the individual-milieu. The “pre-individual forces” already exist and make possible the “emergence of individuality,” which is an action force in the individual. These forces, which can be called potentialities, exist temporally ahead of the individual and constitute the individual, and have energy of the sustaining constitutive force that the individual maintains and transforms itself. Thus, the individual is always

more than itself, just as the individual human being “I” always has the potential to be more than “I,” because it is an individual with lasting potential that undergoes further changes even after it has been constructed in such a fixed manner. This pre-individual force also constitutes the milieu in which the entity is located and provides another fictional potential in which the entity participates: persistent virtuality. The individual is but one stage in the process of individuation, surrounded by pre-individual powers, which are potentials before and after their emergence.

What is unique in Simondon’s theory of individuation is the convergence of the individual in terms of the simultaneous tripartite existence of the pre-individual, the individualized, and the terminated individualized, reflecting Heideggerian being in tandem with Deleuzian becoming. Existence becomes something, and in the midst of becoming something, something other emerges. However, existence leaves “residue or excess” as a condition for “future becoming” in its context and milieu. The pre-individual state of being is an infinite “resource of potentiality” from which being emerges from becoming, which is equivalent for “Bestand/standing reserve,” an issue raised by Heidegger in his “Question concerning the Technology.” Individuation is the process of making use of this resource. Pre-individual existence encompasses a wide range of heterogeneous forces, including the action of connections and disconnections, while implementing virtual resources, potentials, and beings in its own way. Simondon’s theory of individuation is very much Heideggerian but in a different context of “ontogenesis” in his elaboration and emergence of the individual/being from becoming/the pre-individual as Simondon further poetizes:

The opposition holding between the being and its becoming can only be valid when it is seen in the context of a certain doctrine according to which substance is the very model of being; that it corresponds to a capacity beings possess of falling out of step with themselves, of resolving themselves by the very act of falling out of step. The pre-individual being is the being in which there are no steps. The being in which individuation comes to fruition is that in which a resolution appears by its division into stages, which implies becoming: becoming is not a framework in which the being exists; it is one of the dimensions of the being, a mode of resolving an initial incompatibility that was rife with potentials” (300-301).

Simondon’s ontogenetic rendering of the concept of “pre-individual” explains that becoming is a mode of existence that functions as a step out of phase through

disconnection and syncopation. Becoming produces a process of individuation by “its division into stages of disparity” that resolves itself of “an initial incompatibility that was rife with potentials” and uses some of the previous resources to make up several entities (referring to individual entities, individual technological entities, or biological entities). Being is the result of a solution to the differentiation of becoming, and individuality is a resolution/solution to the emerging differentiation.

In fact, once individuality exists, it becomes a level or a plurality of levels that were not there before in the pattern of stages (phases or steps). Pre-individual existence is “oversaturated with potential” which is a fruitful creation at the level of an organization that can utilize this power without exhausting it. Thus, an entity is created in phases, stages, steps as soon as it exists, and if it does not exist, there are no phases. Simondon’s main argument is that the existence before the individual or the pre-individual is not static but unstable and dynamic. This point of instability where individuality emerges is called a “metastable” state. Once the trigger is pulled (actuated), the pre-individual generates forces acting on each other, creates tension and excess/excess, and develops a tipping point corresponding to the priming in the form of emergence, creating an uncomfortable but coexistent form of becoming. While individual being represents the cohesive substance of organisms and non-organisms that have the temporary ability to gather certain forces and work together, individuality “erupts from the pre-individual” like a volcano and integrates these tensions. This tension is not a solution to a problem, but rather a reaction or Heideggerian “questioning,” a new order and organization that temporarily unifies previously sources of tension. Therefore, the individual is a mode of existence that manages rather than overcoming instability and excess, representing a phase of being, a period, and a movement. During this process of individuation, the preindividual being is in a metastable state of form-taking towards other types of constructs, and there is a constant departure from always new but usually unrealized virtualities, maintaining, to create a temporary solution. This materialistic and idealized pre-individual existence is always in a state of tension with potentiality, that is, supersaturated in a state of tension with potential.

Once the pre-individual is understood as a “metastable being” in relation to the environment or “associated milieu” of disparity and doubling, the movement is called “transduction.” Transduction refers to an operation that creates itself while elaborating, concretizing, and structuring the surrounding area. Transduction transforms itself by completing dimensions, magnitudes, and directions (vectors), so that an entity can survive amid opposing and competing forces. It should be noted that the movement is through different forces. Transduction, therefore, signifies

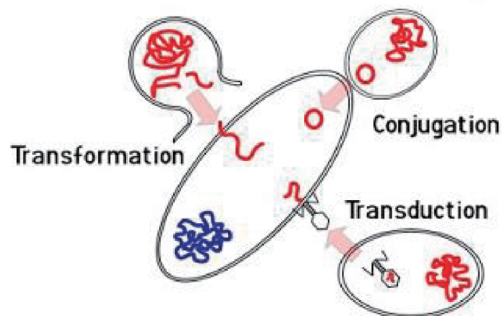
that the entity cuts through the pre-individual state from the resources and forces of the entity's previous existence, structuring the entity itself, and creating (invents) itself. Transduction is a process in which the various transfer forces “dephase” each other and create discrimination or disparity—an issue which refers to the problem raised through the creation or discovery of a process, event, dimension or object via questioning that allows a new order to emerge at another level through individuation. Just as deduction and induction attempt to solve problems connected to an already individuated context rather than in the production process, transduction is a kind of problem-solving ability.

As we follow Simondon's logic, it can be seen that transduction is the most essential principle and *modus operandi* of “conversion.” The process of transduction not only creates unity by temporarily gathering heterogeneous forces, but also describes the structuring of what surrounds being or substance, resulting in the creation of a domain that surrounds and enables existence and its transformation. Transduction creates a creative leap from the past and present of a pre-individual existence to an unknown future, thereby inventing new fields, regions within and in an environment that surround and make existence possible. And the transduction is based on singularity and specificity rather than general rules such as deduction and induction. Based on this logic of “eruption,” such as a volcanic eruption that transforms from a dormant volcano that previously existed with a simple force to an active volcano, transduction deals with real and practical forces with subtle concreteness as a logic for the emergence of entities, objects, and processes. In short, transduction in the context of transformation can be positioned as a principle and logic of convergence, and convergence is a problem-solving ability.¹

To understand transduction, one needs a relevant concrete and practical

1 In his review “On Gilbert Simondon” in 1966, Deleuze praises Simondon's original theory of individuation, claiming that the new concepts established by Simondon seem to be original, striking, and inspiring. Traces of Simondon's thought can be found throughout Deleuze's work, in particular in *Différence et Répétition/Difference and Repetition* (1968), *Logique de Sens/The Logic of Sense* (1969), and in his joint work with Félix Guattari, *A Thousand Plateaus/Mille plateaux* (1980). For his direct comment on Simondon, refer to Gilles Deleuze “On Gilbert Simondon.” *Desert Islands and Other Texts: 1953–1974*. Ed. David Lapoujade. Trans. Michael Taormina. Los Angeles and New York: Semiotext(e), 86–9. I would argue that Simondon's theory of individuation and transduction deeply inspired and influenced Deleuze, provoking a missing link between Heideggerian being with Deleuzian becoming and that I am applying Simondon's theory of transduction as the logic of “convergence” of Digital Humanities, transmedia art and world literature, thereby providing the aesthetics and ethics of technology and the humanities in the age of pandemic and precarity for my NRF project.

example. According to Britannica, transduction refers to “a process of genetic recombination in which genes from a host cell (a bacterium) are incorporated into the genome of a bacterial virus (bacteriophage) and then carried to another host cell when the bacteriophage initiates another cycle of infection.”¹ Transduction signifies the process of creating a new genotype without mutation by breaking genetic elements into two different genomes as a unit. Although this genetic recombination is highly complex and sophisticated, genetic recombination in the genetic engineering of DNA includes transformation, transduction, and conjugation, simply speaking: transformation refers to a method to change the trait of a bacterium by artificially inserting a DNA extract from one strain to another; transduction is the genetic character of a phage using a bacteriophage medium; and conjugation refers to a phenomenon in which DNA is transferred by direct contact between cells. What is distinctive in transduction is that genetic material is carried by a bacteriophage (or phage).² In short, when a part of DNA enters the cell, most of it undergoes a recombination process of “change,” regardless of which process it was introduced into. The following figure gives a glimpse into the logic of the transformation.



[Figure 2: Horizontal gene transfer; transformation, conjugation and transduction: Hendrickson 28]

In the process of transferring a previously transformed bacterium to another bacterium through artificial genetic manipulation in gene “transduction,” the process of transferring a virus with the DNA of a host bacterial cell from another host is itself a response to the recent coronavirus 19. In contrast, Simondon’s transduction

1 <https://www.britannica.com/science/transduction-microbiology>

2 For the simplified types of genetic recombination in terms of transformation, transduction, and conjugation, refer to Heather Lyn Hendrickson’s Ph. D. Dissertation. *Chromosome Architecture and Evolution in Bacteria*. University of Pittsburgh, 2007, 9-33.

can be thought of as encompassing both genetic engineering transformation and transduction. In this context, transduction suggests an “associate milieu” or “associated environment” that complexly occurs “without internal and external boundaries” in the correlation between human and viral entities.

Representation of Transduction: Feedback Loops of Humanities and Technology: Convergence of Transmedia, World Literature, and Digital Humanities

After the 4th industrial revolution, humans are living in the era of big data, which is a repository of information including the Internet and digitized archives. Larger and larger databases have been accumulated and stored on the Internet and in digitized archives, containing ever-expanding amounts of information. Data itself is undergoing an “individuation process” from “pre-individual existence.” This is called Big Data. Big data refers to data that exceeds the size that can be captured, selected, managed, and processed (capture, curate, manage, process) within the scope of a software device. Data includes unstructured, semi-structured, and structured data. Big data refers to data with a scale of several tens of terabytes to several exabytes. A new type of technology is required in order to grasp the information of such a diverse, complex and vast dataset and to obtain useful information. Therefore, the nature of the data itself represents Gilbert Simondon’s “metastable state.”

Recently, even among humanities scholars, the use of database technology has led to a new type of analysis and methodology, particularly in the use of data which draw a cognitive map of the relationship between research subjects, in the collaborative nature of data generation, and in the final visualization of information patterns. It is a known fact that a new research environment is being created by linking existing fields with interdisciplinary research in terms of “convergence.” Both unstructured and structured data can be said to be “metastable pre-individual.” Transformation from unstructured data to structured data is also the goal of Digital Humanities. The prelude to this transformation is coding. Coding literally means making something into a code. It also includes giving symbols. In a computer, it means “code writing work” involved in the programming process of writing a program using a certain programming language.

Coding in Digital Humanities and world literature is being reconstructed in somewhat different contexts. In his essay, “16. Multidimensional Text Code Marking,” Jerome McGann of The University of Virginia, who is a pioneer of Digital Humanities in the field of English literature and humanities, wrote about the

traditional way of reading texts from the perspective of “marked text.” According to him, all the text we read now is coded. When we read a character text that has an external implementation which forms a process of thinking and an idea, we follow the conceptual structure of the text, and as we continue to read, we scan with the eyes to determine the font size, font, and word in a row. While observing the external shape contained in the entire page, such as the number of characters, footnotes, number of pages, margins, and book design, we grasp the content at the same time. Innumerable things other than the content can be read by the reader sensing it, or the content can be read automatically as if watching a movie without recognizing it. Here, although it is not clearly visible in a paper book, various features of linguistically coded electronic documents that are indispensable in a digitized book are inherent. In the case of electronic documents, there is a language indicated as a rule to refer to the format in which the document is displayed on the screen and to specify the logical structure of data, which is called a markup language. Markup functions to “control the linguistic status of the text, not the documentary status.” (McGann, <http://www.digitalhumanities.org/companion/>)

Once it is electronically documented through coding and stored in an electronic archive, how can it be knowledgeable and discoursed by utilizing the information in the informational database? In the field of philosophical representation research, it is already argued that databases are replacing narratives. We can get access to and approach to the information via database which has stored the “metadata” describing files and materials in a repository. This statistical near-objective way of dealing with information provides us with the logic of database according to which linear narratives have multiple forms of elasticity and are continuous. The logic refers to a traditional narrative method that is connected. In contrast, a non-linear database refers to a database whose structural order is discontinuous without elasticity like graphs and trees, as opposed to a linear structure. This is the logic of the new transformation in the 21st century that materialized the conditions of transformation described by Simondon in the process of individuation.

When the “database” of literary texts is put in the context of the “pre-individual” of the existing literature of the entire world, world literature can be constructed from various perspectives. As the positive model, we can look at foreign literature from the future-oriented and progressive perspective to redirect the national literature as an individual. As the negative model, we can view foreign literature as an object to be exclusively avoided while adhering to the tradition of national literature. In the neutral case, foreign literature is accepted as an image of counter-radical otherness, and the tradition of national literature is used as an opportunity to define national

literature more clearly through the reflection from a revisionist perspective.

In the context of Damrosch’s diverse perspectives, Franco Moretti’s “Conjectures on World Literature” represents an interesting case for Simondonian logic of transduction. First, Moretti presents the metaphors of trees and waves. Trees illustrate the transition from unity to diversity. There are many branches in one tree, like branches from Indo-European to dozens of other languages. Conversely, waves/wavelengths have a uniformity that engulfs the initial variability. Trees need geographic discontinuity, waves/wavelengths hate barriers and seek geographic continuity. Therefore, trees and branches are what the nation-state is obsessed with, and waves/waves reproduce the function of the global market. However, trees and branches coexist on the earth and permeate the branches of local traditions in each individual. On the other hand, transcending the boundaries between inside and outside, deep and wide, trees and branches transform themselves transductively into the form of waves/wavelengths in each individual and are transmitted, absorbed, and rejected as the phylogenetic waves, transducting human thought, memory, cognition and creation. In this way, although it is defined as national literature for people who see trees and world literature for people who see waves/wavelengths, the path of world literature becomes digital in a rapidly transformed form after COVID-19.



[Figure 3: Trees of Diversity]



[Figure 4: Waves of Unity]

How should we read the digital world literature that is being coded as it spreads through the logic of change? Moretti’s distance reading allows us to focus on units that are much smaller or much larger than the text, and the text itself disappears between the very small and the very large, thus creating Moretti’s motto, “less is more.” Moretti’s argument is that in order to understand the system as a whole, one must accept to lose something, and that humans always have to pay the price for their theoretical knowledge. In addition, reality is infinitely rich, and concepts are abstract and poor. World literature as a pre-individual existence is the repository of

discourses of human intellect, sensibility, and understanding with infinite potential.

David Damrosch presents the typology of “elliptical refraction” in “What Is World Literature?” and suggests a double reading method of refraction. He explains that the double refraction works in the process of reading works of foreign literature. According to Damrosch, the space of foreign culture within one’s national literature is a space defined in various ways by the national tradition of one’s culture and the immediate demands of the native national writer. Even a single work of world literature is a forum for negotiation between two different cultures. At the heart of Damrosch’s argument is that receptive cultures can use databases of foreign literature in a variety of ways. An image of the fundamental otherness can be used as a positive case that can contribute to the future development of one’s own traditions, or as a more primitive and decadent negative case that should be avoided or eradicated in one’s country, or as a more neutral case that can be used more clearly to define one’s own traditions. This suggests that foreign literature is being transformed in various ways. In conclusion, Damrosch’s theory is that world literature is about the values and needs of one’s own culture, just like the culture expressed in foreign literature, and that it can be explained by the oval image of “double refraction.” He constructed a world literature that is not constrained by each other while connected to the two cultures. Damrosch proposes to combine the double refractions of microscopic concave and macroscopic convex and to constructing double focus in which foreign and native cultures create a mutual oval-shaped elliptical space of “disparity.” In fact, Damrosch presents the transformation of the human intellect toward the direction of the creative and inventive world literature.

I would argue that Moretti and Damrosch’s theory of world literature implies the perspective and logic of convergence, though they were not ready yet to elaborate the transductive process of digital world literature in the era of the pandemic. When Moretti expresses world literature with the concept of “scale,” he first prepared a view of world literature as a “database.” The literature of world literature as a database is also associated with the concept of “glocalization” in terms of “micro-scale” and “macro-scale.” A map scale on a map refers to a graphical scale bar or representative fraction (RF) of the map. The concept of global localization from the perspective of “up-scale” and “down-scale” is, in fact, ironically, simultaneous zooming-in and zooming-out techniques.¹ By zooming-out, the object of observation will be reduced and enlarged simultaneously, explaining

1 For the detailed analysis of scale in world literature, refer to the author’s essay, “Scale, Untranslatability, Cultural Translation, and World Literature.” *Journal of English Language and Literature* 64.3 (Fall 2018): 469-82.

the phenomenon of simultaneous and competitive movement globally as a response to regionally changing economic, political, and cultural influences. It can provide a platform to explain the movement that enables simultaneous movement from downscale to upscale. As such, scale is the basis for a “dynamic, interactive map” of world literature research. Although it is not yet clear how much the convergence of digital humanities, trans media, and world literature will be realized in digital world literature, the rapid differentiation and transduction in the context of the development of artificial intelligence in deep learning and deep reading can prepare us to detect this breakthrough once we are provided with a Simondonian lense. The process of individuation and the logic of transduction will provide the rationales for a new breakthrough in digital world literature.

Conclusion: Ethics of Transduction in Humanities, Science, and Technology

As I have discussed earlier, Simondon’s logic of transduction elaborates and concretizes the existence of an entity before the entity in tandem with the surrounding area near the entity, as shown in crystallization. It creates a self-generating operation (action) process while structuring it. Transduction takes place in an organism, transforming itself by completing dimensions, scale, and direction so that individual beings can survive through opposing and competing forces. Transduction allows the entity to create itself by dynamically moving and remembering the state of the former entity from the resources and potential of the entity before it. In this process, transduction creates a discriminatory problem of different stages as the various transfer forces “dephase” each other. Through this questioning, a new order emerges from the upscaled state, and a new process, event, dimension or object is created or discovered. In a nutshell, individuation also refers to the creation of a relation between an entity and an associated milieu. Therefore, the movement of individuation is transformational and transductive. It traverses countless forces, stages, and dimensions to temporarily structure and reorganize the unorganized potentials of the pre-individual existence.

Countless trans movements such as “Transnationalism, Transculturalism, Transhumanism, Transmedia, Transdiscursivity, Transgender, Transexual” connected with the prefix “trans” are all transductive. Before and after trans, the boundaries between the inside and outside, between above and below, all refer to the membranes in a state of tension and metastable as Simondon pointed out in the crystallization. The work of translating the “metastable” is subtle and complex. Nevertheless, it is my contention that transduction is a structural and executional inventive and creative logic that lies at the center of the continuous and dynamic

conversion between the pre-individual and the individual of each converging event at stake.

Can conversion and transduction have ethics? Is it possible to impose artificial ethics on the changing laws of all things? Unlike morals that can be reached through social unity, is it possible to have ethics based on the autonomous judgment of human individuals? The original English word ethics is derived from the ancient Greek *ēthikós* (ἠθικός) meaning “related to the person,” from *ēthos* (ἦθος) meaning “person, moral nature,” then transferred to the Latin “ethica,” which was translated into French as “éthique” and became “ethics” in English. In a word, ethics must relate to human character and moral nature. I would argue that technology gives humanities a new norm, and that humans can judge the nature of machines properly only when they understand the true nature of them. Depending on how we can explain the relationship between humans and machines in terms of Simondonian “associated milieu,” that judgment will be possible. As we have seen in the crystallization and individuation process, the relationship between humans and technology can vary depending on how we define both crystal and resolution.

In the context of this complex challenge of hyperconnectivity and insecurity of disruption and innovation, writers and critics of world literature are increasingly becoming experts in computing, transmedia, and digital humanities to expand the realms of their critical reading and imaginative thinking, and the growing trend of digital humanities and world literature tells us that big data research is helping humanists to go beyond the global scalability of world literature, sometimes crossing the borders of previously inaccessible data sources, and discovering the interface between cultures. Transmedia artists are conducting new visual and auditory experiments with imagination and utopian thinking to answer questions and solutions to the unsafe biological and ecological challenges facing humanities due to the rapid development of artificial intelligence (AI).

In this new digital and smart environment, it is necessary to implement new ethical values in the newly emerging convergence of humanities and technology. After all, all beings, including human beings, are like open-ended entelechy, and can be said to be the direction and orientation towards the maximization of the force and process that creates existence. Existences are only doomed to evolve, to be mobilized, and to operate to more effectively resource what is judged to be the potential of a resource until it finds a path. The rest is up to humans. Then, one thing is clear: as Nietzsche remarks, we are “all too humans” who are free as what we are as individuals, but becoming “humans” in the community of the ethics of the humanity requires us to remember that we are in the next phase of the pre-individual

at the same time we are part of the pre-individual yet, as in *The Analects*: “If a man keeps cherishing his old knowledge, so as continually to be acquiring new, he may be a teacher of others.”

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