

Digital Confucianism: A Confucian Take on Computation and Algorithm

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Abstract

The paper attempts to open up the conceptual framework of Confucianism to accommodate questions relevant to today's digital society. Both Confucian and Whiteheadian philosophy favor processuality to fixed entities in analyzing beings and phenomena of the world. Hence, computational algorithmic processes, or "computational thinking," can be recast in light of the concurrent Neo-Confucian notions of *qi* and *gan*, as well as Whiteheadian notions of *prehension* and speculative reason. Computation, *qua* adding new data that alter the initial condition, manifests speculative reason, which resonates with Neo-Confucian view of change as the nature and order of being. The paper concludes with an artistic work substantiating this analysis.

Why Digital Confucianism?

How would Confucianism deal with computation and algorithms? What would be possible Confucian intellectual resources for thinking the technical processes of computation? How could Confucianism address the process of bifurcation informing both computation and life? With these questions in mind, this paper aims at opening a conceptual space in the traditional thinking systems of Confucianism to make it more relevant for today's digital humanities. To this end, the paper draws on Alfred North Whitehead's theory of *prehension* and Chinese Neo-Confucian view of 氣 *qi* and 感 *gan* (feeling, sensing, stimulating) to construct a framework of analysis. This conceptual enquiry will be substantiated and further developed by two works of media art. The upshot of Confucian philosophy in various schools throughout history has been the great alignment of man and nature in the identification of being at one with each and all. Confucian philosophers of all times have concerned themselves with lofty questions like how nature gives rise to things and how such arising reflects the order of immanence; despite fine differences, there is a common narrative that centers on the creative advance of nature manifested as change, which transforms and transmogrifies beings, and through which it affirms the relationality between beings. This is reflected in the most diligent efforts of annotating the 易經 *I Ching* (Book of Changes) through ages. The goal of practice for man is to attain this knowledge and act accordingly to ensure the advancement of such creative force. While true, this high-spirited philosophical interpretation on and its

practice of life face new tasks of regenerating itself in a way that is adequate to our time. Indeed, studies have been dedicated to rethinking political governance, social, gender and ecological issues through Confucianism; my attempt in the following is to relate Confucian thinking to the digital and the computational.

By the digital and computational, I mean the automated algorithmic processes of data in general. Given the allusion to digitality fundamental in Chinese philosophy – *yin* and *yang* as binary codes, which has gained awareness in the West since Leibniz published about binary systems, the task is to go a step further and look at more complex operations based on it such as algorithmic processes, together with processes of life. It would be justifiable for a 21st century reader of Confucianism to ask: how is computation part of nature and how could I relate to its operation, instead of relegating it to a substratum that I simply ignore while typing with the computer? Hence a first step to extending Confucianism for a digital world would mean to account for the exact processes or happenings between bodies, things and events. It is in this interest that we resort to Whitehead's concept of *prehension* to flesh out the Confucian rendering of *gan*.

Prehension, Qi and Gan

The concept of *prehension*, which Whitehead defines as "uncognitive apprehension," renders legible the relational connections between people, things and their surroundings by highlighting the operation of uncognitive "grasping" – a pre-epistemic, not necessarily knowledge-based operation of relating to things and environments. [1] *Prehension* "does not require explanation but must enable the exhibition of the common feature of all situations in which something makes a difference for something else." [2] So the earth orbiting around the sun prehends the sun, the apple falling from the tree prehends the ground, and we prehend the subtle layers of the physical and cultural environment. In light of this, no entity is ever fixed or static, for "[a] new entity comes into being by prehending other entities; every event is the prehension of other events." [3]

Neo-Confucian philosopher 張載 Zhang Zai (1020-1077) has developed a unique theory around the idea of

qi, at once physical and metaphysical. Expanding and contracting as it does, *qi* is the nature of a bipolar, *yin-yang* cosmology, whose continuous interactions account for all things and phenomena of the world. As such, Zhang Zai paved the way for a concept of nature and man imbued with *qi*, for “no one had said that *qi* unified above form and below form, being and non-being.” [4] That the infinite and continuous variation of *qi* conditions the interaction between things and phenomena, and that it happens as much on a global as on a local level, make possible a comparison between Zhang Zai’s *qi* scheme and Whitehead’s operative system of *prehension*.

A “feeling” for Whitehead is “positive *prehension*”, or “the definite inclusion of [one] item into positive contribution to the subject’s own real internal constitution.” [5] This image of positive *prehension* is a generic and technical operation, as “it has been chosen to suggest that functioning through which the concretes actuality appropriates the datum so as to make it its own.” [6] As such, the “feeling” operates regardless of the human perceiving mind, as indeed the apple tree can be side to “feel” the earth. This may be likened to *gan*, feelings, sensing, interaction or stimulus, in an equally impersonal sense in Neo-Confucianism. Zhang Zai holds,

“有兩則須有感，然天之感有何思慮？莫非自然。

When there are two, there must be interaction (*gan*); but what thoughts or concerns do the interactions of heaven have? There is nothing that is not spontaneous.” [7]

Therefore, the interactions or *prehensions* of things and events following the *qi* could be recast into the following frame of interpretation: the universe is “full of entities of sensing that attract one another and incorporate into one another according to their emotions, desires, aspirations, intentions, and needs, etc.” [8]

In Zhang Zai’s view, each discrete thing is but “a process of beginning and ending, extension and contraction. It is generated through the intercourse of preceding things and, therefore, unless there is transformation of preceding things, will not be brought into existence.” [9] Tang Junyi comments that for Zhang Zai, “the ‘thing’ is a secondary ontological concept, while “the transformation of *qi* is a primary one.” [10] This is very similar to Whitehead’s assertion on how entities come about through prehending other entities mentioned above. Importantly, “there is no ontological difference between what we generally call physical objects, and what we generally call mental or subjective acts.” [11] To push the implications further still, “events themselves are the only things.” [12] For both Zhang and Whitehead, discrete things and events are not only on an equal footing as *prehension* materials; discrete things are made of events.

For Whitehead, perception is the “cognition of prehensive unification” or more simply, “cognition of *prehension*,” it follows that the image of thought as an anthropocentric, representational operation has to be dethroned. [13] That is to say, the intelligible process we characterize as thinking is to be untied from an exclusive

and defined human subject, and is indeed to be understood as “nonphenomenological, insofar as it goes on without establishing relations of intentionality to anything beyond itself and even without establishing any sort of reflexive relation to itself.” [14] Examples from natural science abound, which draw our attention to how fruit flies make decisions and trees demonstrate perceptual and cognitive activities.

In the paramount Confucian interpretation of *I Ching*, *yi* or “changes” are harbinger of the virtual (in Deleuze) and the potential (in Whitehead), which are latent “until all beings begin to sense and feel.” [15] The way this potential is actualized is exactly through the workings of *gan* between everything. As argued earlier, *gan* must be located as much between the sun and earth, the apple tree and the ground, as between them and the human. We can thus see how the *gan* de-couples an experience with the human and thus expands into a non-anthropocentric realm. As such, it is radically empirical, even though the experience of which is not directly available for human perceivers.

The *gan*, “feeling” of a non-intentional kind, as much as *prehension* as pre-cognition, work to disassociate the perception from a human sensing subject. Hansen aptly describes this as “feeling without feeler.” [16] However, this does not discount the experience of the human by negating it and pronouncing it as unauthentic all together, but questions the registration of the feeling by posing a contrast “between a ‘self’ and ‘that of which there is experience,’ but without duplicating it by reference to an ‘I’ or a ‘me’.” [17]

Now what does this have to do with computation?

Speculative Reason and Computation

It is on this notion of perception unbound from cognitive activities that we base the following analysis of Whitehead’s speculative reason and Zhang Zai’s reading of *I Ching* in the context of computation. If physical *prehension* can be derived from the actual entities of the world, a conceptual *prehension* bears “no reference to particular actualities, or to any particular world,” and as such, it also posits the difficulty to the understanding for it suggests “no particular exemplifications.” [18] For Luciana Parisi, conceptual *prehension* is “the abstract, non-cognitive, and non-physical capture of infinities.” [19] This leads her to make a case for computational processing of data, or what she calls “computational thinking,” as a form of pure conceptual *prehension*.

Zhang Zai, though living in a pre-digital world, has clearly entertained with an idea not unlike “pure conceptual *prehension*.” He studies the phenomena of sound echoes in situations where there are material entities as causes (such as in drumstick hitting a drum) and where there is none (such as sound of thunder). In the context of an all-embracing continuum of *qi*, both scenarios illustrate the bipolarity of the forms of *qi*, as his intellectual successor 王夫之 Wang Fuzhi would comment centuries later, “感者，交相感；阴感于阳而

形乃成，阳感于阴而象乃著。 Stimulus (*gan*) delivers mutual resonance (*jiao xianggan*). The yin resonates to yang and form (*xing*) can be created, the yang resonates the yin and a phenomenon is marked.” [20] For him, we could infer, condensed *qi* assumes forms and participate in physical *prehension*, while *qi* not articulated in discrete form participate in conceptual *prehension*.

With the conceptual recourse to Whitehead, one is hence able to draw a Confucian framework of the digital and computational. It favors Zhang Zai’s *qi* as the primary nature that underlies change and transformation in the material realm (in operations of physical *prehension*), just as it undergoes transformation in the conceptual and computation realm (in operations of conceptual *prehension*).

In light of this, when Zhang Zai speaks of “性者感之體 The nature (*xing*) is the substance/capacity (*ti*) of responses (*gan*),” the interpretation seems equally applicable to the material world of physical prehension, as in the computational world of conceptual prehension. Just as the capacity of the interacting physical responses reflect a nature, so too are the algorithmic activities, or conceptual *prehensions*, equally part of nature. [21]

For Whitehead, the view of speculative reason does not conform to conditions set by antecedent circumstances and hence offers a state of being not determined by linear chain of cause and effect. Parisi extrapolates this into computation world, and highlights the proliferation of what cannot be calculated in the face of the infinite amount of data introduced into computation. For her, the incomputable conditions computation today. It means that “a notion of speculative reason is not concerned with the prediction of the future through the data of the past, but with incomputable quantities of data that rather transform initial conditions.” [22] This reading of the computational automation, which lies at the foundation of learning algorithm and artificial intelligence undergoing great technological advancement today, is radically different from the mechanical view of computation, according to which a machine is made up of a discrete set of components and that each component entails a set of step-by-step instructions that can be iterated *ad infinitum*. Thus to endow computers with speculative reason is to depart from the mechanical view of computers as rule-obeying and subject only to deterministic randomness.

As *qi* moves, it necessarily enfold new conditions for new emergences that are no longer subject to causal relation to the initial condition. Zhang Zai speaks of this as the wondrous making of change: “（《易》）語其推行故曰‘道’，語其不測故曰‘神’，語其生生故曰‘易’，其實一物。 [Book of Changes] speaks of its moving along and proceeding, and therefore it says ‘the Way’; it speaks of its unfathomableness, and therefore it says ‘the marvelous’; it speaks of its continuously producing [things], and therefore it says ‘Change.’ In reality these are all one thing.” [23] “The marvelous” discerned here refers to how, in the metaphysical system of *I Ching*, continuous and progressive changes may yield results too wondrous to be graspable by common reason, or a

causal way of reasoning based on fixed initial conditions; it suggests a similar articulation as Whitehead’s speculative reason at a given moment. Ultimately Zhang Zai attributes this to the law of change, though this should not be taken as a totalizing concept.

Hence we have come to points of concurrence between Neo-Confucian thinker Zhang Zai and Whitehead with the common focus on the processual, defined variably as *gan* or *prehension*. From this elementary and processual perspective, reason in the context of computation is rendered speculative in that the course of progression is not to be determined by a linear chain of cause and effect. The purpose of such a theory and practice amounts to 日新 *rixin* (the constant self-renewal), or in the words of Parisi, “[making] here and now different from the time and the space that were there before.” [24]

Artistic Position

The reason to draw on artistic works is to find tangible ways to illustrate and, more importantly, to “enact” these philosophical arguments.

What follows is a brief study of German media artist Ralf Baecker’s installation *Mirage* (2014) featuring a “sleeping” computer. The core computational component is inspired by the “Helmholtz Machine,” an unsupervised learning algorithm that adopts “wake” and “sleep” phases, or respectively, pattern recognition and pattern prediction phases. *Mirage* captures the output of a computer’s “sleep” phase, i.e. anticipatory pre-response in the form of random data based on real-time data input, and translates it into mechanical movement, which is then made visible as a projection of undulating landscape on the wall. The audience is confronted with a poetic rendering of the computer’s “dream”, without access to the algorithmic processes starting from data input to “wake/sleep” calculations.

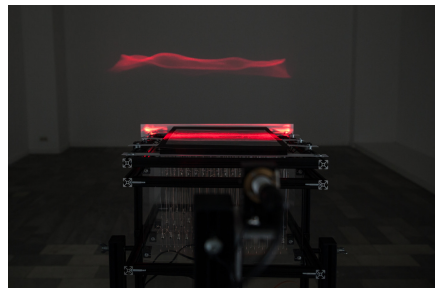


Fig 1. *Mirage*, 2014, Ralf Baecker, mixed media, image courtesy of the artist.

Though on a limited scale, the set of algorithm at play in the “Helmholtz Machine” is imbued with speculative reason, in the sense that its anticipatory function, or active and productive pre-response function shows

exactly the conceptual *prehension* of input data. In the event of prehending input data, the possible events where patterns correspond to the representation of data get reorganized. Insofar as the relation of the input data to the possible patterns that potentially inform it in the background is not deterministic, they could be likened to the emergence relative to the virtual or the potential. The virtual or the potential is the immanent condition of all emergences. Importantly, “it does not prefigure or predetermine the actualities that emerge from it. Rather, it is the impelling force, or the principle, that allows each actual entity to appear (to manifest itself) as something new.” [25] The work enacts the reality of algorithmic processes, which we have examined with the conceptual parameters of Whitehead and Zhang Zai. We can hence adequately engage in local analysis and furnish computation with speculative reason, which contribute to the novelty, or creative advance, of algorithmic processes.

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