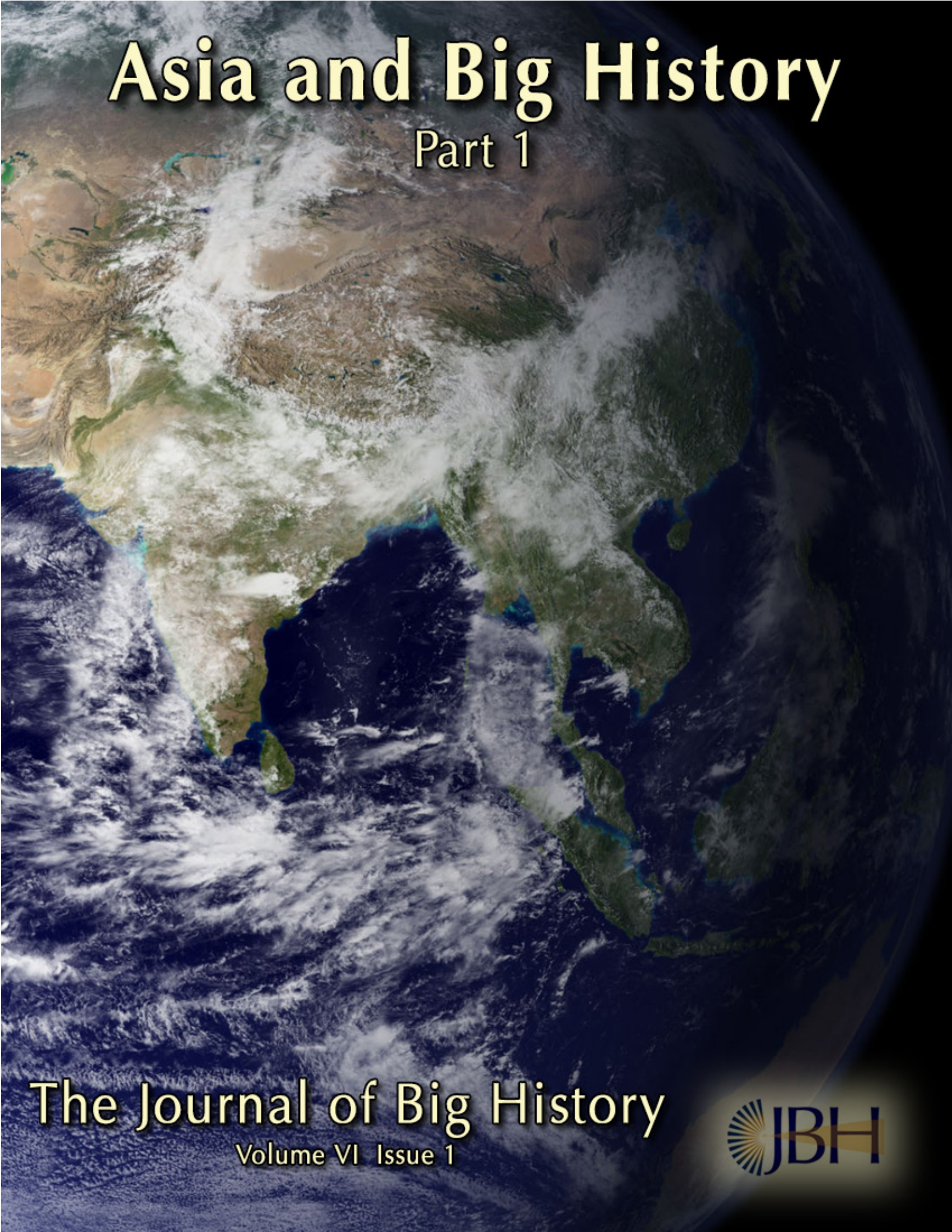
Asia and Big History

Part 1



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JBH, the journal of the International Big History Association (IBHA), is published on line and is accessible to members of the IBHA. The IBHA also publishes its bulletin, *Emergence*. The bulletin contains members' accounts of their activities and views, announcements of conferences and meetings of interest, and other communication of interest to IBHA members.

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International Big History Association
SAC 253
Villanova University
Villanova, PA 19085 USA
jbh@bighistory.org

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The IBHA appreciates its members for their participation in the IBHA. Membership dues all go towards the administration of the association, but do not by themselves cover our costs. The only paid position is a part time administrative assistant. Other costs are for our website and for the JBH, for example. Please consider a tax deductible (in the US) gift to our 501(C)3 and please consider remembering the IBHA in your will.

Contents

Big History Teaching and Learning

Greetings and Welcome

Barry H. Rodrigue
Symbiosis School for Liberal Arts, Symbiosis International University

We welcome you to the first of two special issues of the *Journal of Big History*, which focus on eastern Asia – from Afghanistan and India, through China and Siberia, into the islands of the Philippines and Japan. The topics are wide-ranging and, in this issue, include lessons for us today from medieval Mughal schools in Delhi and from modern big-history classrooms in Kanagawa and Tohoku, Hong Kong and Taiwan.

Some writings demonstrate how urbanity needs to both learn from traditional societies and draw on the theoretical landscapes of modern thought if it is to survive our present global crises. We see the fusion of the natural world with society in Assam, Nagaland, and Luzon. In addition, from Tokyo and Shanghai, we ponder an exciting conception of existence, spun from the thinking of Chinese science philosopher Wang Dongyue.

Other writers consider the importance of macro-management in business and social psychology in times of crisis. Surrounding these concepts is a pertinent warning about the need for a new narrative framework for Big History, so that it can spread among the public worldwide. What is the point of having an idea, if only a handful of curious intellectuals engage with it!?

We hope you enjoy these contributions from Asia. You might wonder, how this special collection came about? Not meaning to sound very cosmic (in its New Age sense), this effort resulted from the intersection of several life-threads through time and space!

Around 2007, I'd begun assembling a big-history directory and bibliography with the help of the few western scholars who were visibly active in the field, such as Fred Spier, Cynthia Brown, and David Christian.[1] In assembling these *gazetteers*, it had been necessary to form a network of hundreds of correspondents around the planet. As a result, I realized that our handful of big-historians were just the tip of a large, global iceberg! So, we began the International Big History Association in the Apennine mountains in 2010 to encourage macro-thinking worldwide.

I joined the IBHA executive board as International Coordinator and embarked on an effort to learn about precedents and parallels to our big-history vision. Early on, we had developed a good relationship with world historians, largely through the work of David Christian and Craig Benjamin. Our first major event was in Beijing, where the IBHA joined the World History Association's 20th Anniversary Conference in July 2011. For it, we organized six panels and two round-tables on Big History.[2]

Professor Sun Yue was a lead organizer of that conference at Capitol Normal University. He introduced me to historian Qi Tao, who had initiated a big-history approach

Figure 1: Big History events in Jinan, Shandong, China. Left – Poster for public presentation on Big History at Shandong Normal University, 29 March 2013. Right – IBHA panel (left to right) Barry Rodrigue, Lowell Gustafson, Seohyung Kim, and Liu Shanshan listening to Sun Yue's presentation at the International Congress of Historical Sciences, Shandong University, August 2015

of his own design in his scholarship twenty years before. Sun and Qi then facilitated a series of big-history seminars for me to present at Shandong Normal University in Jinan in 2013. This tour also included lectures and meetings in Vietnam and Japan.[3]

One of my most active engagements was with the Institute of Global & Cosmic Peace in Japan, where Nobuo Tsujimura and I began collaborating on projects. In 2014, we founded the Asian Big History Association at the Second IBHA Conference in San Rafael, California with Seohyung Kim (Korea) and Sun Yue (China). In 2015, we returned to Jinan, to make a panel presentation on Big History for the five-year conference of the International Congress of Historical Sciences.[4]

These interactions in East Asia led to further intersections, as when Nobuo pointed out how Neo-Confucian scholar Miura Baien (1723–1789) had anticipated the work of Alexander von Humboldt (1769–1859), and how both were precursors to big-history. In modern times, Nobuo also saw the creative big-history connections in the manga of Osamu Tezuka and observed: 'Art is not just means to explain and spread Big History, but Big History itself is art to explain humanity in the whole universal history.'[5]

We also came to other realizations, in discussions with historian Orla Hazra and theologian Prashant Olalekar in Bombay, Sun Yue in Beijing, and universal scholar Osamu Nakanishi in Yokohama. We saw how Big History in Asia tended to be more linked to engaged philosophies and social engagement – applications to better understand and perfect human endeavours.

This activist paradigm was manifested in the 2021 Global Big History Conference, which was organized in India and themed as *Changing the World: Community, Science and Engagement with Big History*.[6] As a result, the papers in these issues of the *Journal of Big History* were developed from many of the Asian conference presentations. It has been my pleasure and honor as guest eidtor of this issue to work with the authors of the articles here. We hope you enjoy some of the big-history iceberg we are uncovering and invite you to stay tuned to the next issue of the JBH, which will continue this sharing!

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Endnotes

1. Rodrigue with Stasko 2009. Stasko and Rodrigue 2010 a, 2010 b.

2. *World History from the Center and Periphery*, World History Association, 20th Anniversary Conference, Capitol Normal University, Beijing, China, July 2011. Rodrigue 2013.

3. Rodrigue 2013.

4. Rodrigue 2013. 'Big History: Our Shared Diversity,' International Congress of Historical Sciences, Jinan, Shandong, People's Republic of China, August 2015.

5. Nobuo Tsujimura, e-mail to Sun Yue and Barry Rodrigue, 9 June 2018. David Christian and Fred Spier had connected Alexander von Humboldt's work to Big History, but not the work of Miura Baien. Christian 2010: 12. Spier 2010: 10. Tsujimura 2014.

6. The 2021 Global Big History Conference was centred in India and co-sponsored by the IBHA as its Fifth IBHA Conference, along with the Asian Big History Association, the Indian Association for Big History, the Eurasian Centre for Megahistory & Social Forecasting, and the Symbiosis School for Liberal Arts.

Historical and Cultural Contexts of Big History

Folklore as Big History

Theyiesinuo Keditsu
Kohima College, Kohima, Nagaland (India)

Correspondence | **Theyiesinuo Keditsu** theyiek@gmail.com
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Folklore in Indigenous and Tribal societies are storehouses of knowledge. Origin myths, stories about nature, flora, fauna, narratives about ancestors and histories about moments in time and places – they all coalesce to provide a people with a sense of place in this world, conferring identities and inculcating customs relating to their community and world. Drawing on folktales from the rich canon of Naga folklore, this paper looks at ways folklore offers an alternative arc for Big History. My presentation will take the form of storytelling, where I will share a few folktales to demonstrate how the timelessness of folklore serves to inform us of our place in time – a time where past, present and future fold into each other.

I am a woman from Nagaland, a state in the Indian North East that shares its frontier with its sister states of Assam, Manipur, and Arunachal Pradesh, and borders the nation-state of Myanmar. It is home to over 16 distinct Naga tribes, each with their own language and culture. From my father's side, I am Angami and from my mother's side, I am Sümi. Being from two different Naga tribes, I have had the privilege of receiving indigenous knowledge from both. Since we are a predominantly oral culture, transmission of knowledge, folklore and culture largely occurs through communal as well as personal acts of narration and storytelling, in formal and informal settings. Most of the myths I recount in this article were told to me by my parents. Those I have cited from other tribes have been so indicated.

In a myth about our origins, told to me by my father, it is said that in the land where our ancestors came from, a person was born on one day, crawled on the second, and walked on the third. S/he grew from a child on the fourth day to be young on the fifth, married on the sixth, became parents on the seventh, and old and bent over on the eighth day.

Upon first hearing this story, a listener imagines a mythical utopia that defies modern conceptions of time and biology. So, we place this in the realm of past fantasy or future science fiction. But when some Nagas travelled to Scandinavia in recent times, they returned with a fresh interpretation of this age-old origin myth. In this north country – 'land of the midnight sun' – the day and the night stretched for many months, as the Earth's axis tilted through the seasons.

This seasonal Earth movement allowed for a child to be born one day, during the 24-hour day of an Arctic summer. Then, after months of winter darkness – 'night,' the sun would rise again in the spring, and the child was old enough to crawl. Looking through this new lens of a wider geography and science, we could now sit around our hearths in Nagaland and imagine that our ancestors came from the Arctic … and suddenly mythical history could be traced on a real map across the globe to a time and place that really was and still is today!

Folklore does not sharply distinguish between the stuff of matter – solid, liquid, gas, earth, water, fire, wind. Human

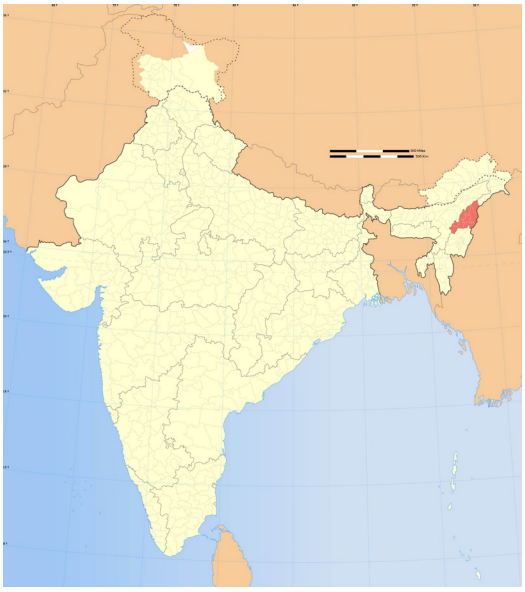

Image 1: Left – Map of Nagaland (red) and India. Courtesy of *Wikimedia Commons*. Below – Forest trail into the Dzüko Valley, Nagaland / Manipur, December 2016. Photograph by Barry Rodrigue.

flesh is just another iteration of the substances of Nature. This informed our interactions with mountains, forests, rocks, and water, which are all believed to be imbued with life-force, animated or possessed by spirits, capable of thought, feeling, and emotion. Poet Robert Frost writes:

> We dance round in a ring and suppose /
> But the Secret sits in the middle and knows.

We can say folklore has known secrets that science can only glimpse, as it dances around in a ring. The Ao people, along with other Naga tribes, trace their origins to a place called *Lungterok*, which translates as 'six stones.' This is where three women and three men burst out of stone and became the ancestors of these tribes. Other tribes believe they emerged from caves deep in the mountain, others from water.

One of the most important and prevalent ways we communicated with Nature was through dreams. In dreams, the natural world spoke to us of their desires, consenting, negotiating and directing us as to how we should conduct ourselves with them. This is why our ancestors asked permission from mountains and trees before cutting them, why it was considered a bad omen to disrupt the course of rivers, why certain stones were sacred, and when, even after conversion Christianity, those who desecrated them experienced real illness, misfortune, and even madness.

If Big History weaves all disciplines together to create a lifeline for humanity and this Earth's crises, then it follows in the tradition of folklore, which conceived of the world as an integrated entirety. To know one part, one had to know everything else. This synthesis was appreciated by big-historian Barry Wood, who developed an interdisciplinary study called *Cosmic Narratives*.

> I take ancient myths seriously, unlike those who dismiss them as just stories rendered obsolete by science. … [C]osmic narratives are presented as a form of narrative that dominates storytelling from the earliest tribal cultures to the most recent issues of Nature and Science. … One notices, for instance, a general principle of clumping at work in galaxies, planetary systems, schools of fish, bands of primates, modern cities, and highway traffic jams. Gravity and social bonding provide scientific frameworks for such clumping as well as for emergent complexity of systems. In literary terms, such repeating patterns suggest metaphorical linkages, where each may become a symbol of the others. A scientific mind sees resemblance between whirlpools, hurricanes and spiral galaxies as illustrations of the self-patterning of energy flow; the poetic mind sees these as repeating themes that unify narratives of cosmic history.

Folklore teaches us about our ties to flora and fauna. In fact, folktales of most tribes trace the ancestry of Tiger and Man to their having the same mother; they were brothers who parted ways when their third and eldest brother, Spirit, favoured Man in a contest, enabling him to win. Angered by this betrayal, Tiger leaves for the Forest and warns Man of the dangers that await if he leaves the safety of the Village. Despite this enmity, which explains why one must kill the other if they meet, all tribes considered it taboo to eat the meat of a tiger and, when a man killed his brother tiger, he had to mourn him and observe death rituals usually reserved for humans.

The Sümi Naga folktale of *Khwonhyetsü*, who killed tiger cubs while the tiger mother was away, explains why a person who has killed a tiger can no longer eat certain herbs as long as s/he lives – as penance. Another Sümi folktale about a war between Birds and Reptiles helps to explain why some indigenous birds look the way they do and provided an oral taxonomy for ancient bird watchers. After the Eagle defeated the King Cobra, all the birds divided the flesh. The crow rubbed himself in the gall and became black. The Scarlet Minivet rubbed itself in the blood and became red. The Ruby-Throat arrived late, so it took the last remaining blood and smeared it on its chin, which is why it has a red throat.

The Nagas have an oral culture, one where knowledge is passed from one generation to another through dormitory-based institutions organised along the lines of gender and age. Folktales like these were the means by which every new generation learnt about why plants and animals look the way they do, as well as the hierarchies and conventions that governed interactions and relations between and amongst humans, plants, and animals. This was a precursor of natural science and history; and it still provides alternative explanations for adaptation and species interactions.

Naga folklore marks a time when Birds, Animals, and Humans shared the same language. When Dog befriended Man, he divulged all the secrets of the Animals. This allowed Man to kill almost all the Animals in the forest. Fearing they would become extinct, the Creator pulled out Dog's tongue to keep him from talking to Man. Dog lost the ability to speak, so the other Animals could live. This is why dogs hang their tongues out of their mouths. Shared language is also seen as a way Animals taught Humans to find precious resources and plants for food, medicine, and poison.

The Sangtam Nagas share a folktale with other tribes about how water was found. Before there was clear water, people harvested it from the hollows of cane. This water was tinted red and coloured the food that was cooked in it. Semphirong was working in the fields with his brother, Yemsüphirong, when he heard a *Kiphilung* (Red Vented Bulbul) call out to them: 'Yemsüphirong, Semphirong, there is water in the rocks.' The brothers followed the bird, who led them to a rock marked with small holes all over its surface. In these small holes, the brothers found clear water. They kept this a secret from other villagers, using it to drink, cook, and wash only for themselves.

One day, during community work, when the men broke for lunch and opened their food packs, the others saw that the rice of the brothers was white, while their rice was red. They followed the brothers the next day and found the rock with pools of clear water on it. Because the brothers belong to the Rütithongrü clan, whenever the villagers do community world, this clan is not allowed to cook rice or meat, serve food, or even sit in the kitchen. They are given only rice and meat, without a drop of gravy, because it is believed that if they eat with gravy, it would rain too heavily and destroy the crops.

In this way, a folktale about finding clear water with the help of a bird becomes a manual for kinship, social structure, and customs. Folktales provide an alternative trajectory to scientific, empirical methods and present unconventional metaphysical answers for why we are the way we are. Folklore imagines the world as an interconnected community where harmony and balance are vital to survival.

This is not to say that all structures that folklore reinforces are just or unbiased – definitely not, especially in those that further the cause of patriarchy. But learning about these networks allows us to understand our current circumstance and rethink notions of what constitutes harmony or balance. Folklore's ontologies direct us toward social action based on empathy and an awareness that all actions have consequences beyond the individual and even beyond the human. In this same way, I share two of my poems – 'Whore' and 'Hibiscus' – from my first book of poems, *Sopfünuo*.

The book takes its title from an Angami folktale about a woman named Sopfünuo, who is said to have left her husband's home because she was unhappy in her marriage. She left in the night with her infant child and made her way back to her village, Rüsoma, with a fire-torch for light. As her villagers watched the fire-torch make its way in through the forest, its light was put out. In the morning, some of her village people went to investigate and found two stones lying next to each other, one adult-sized and the other infant-sized. They understood that mother and child had been transformed into stone. They pulled them into the vil-

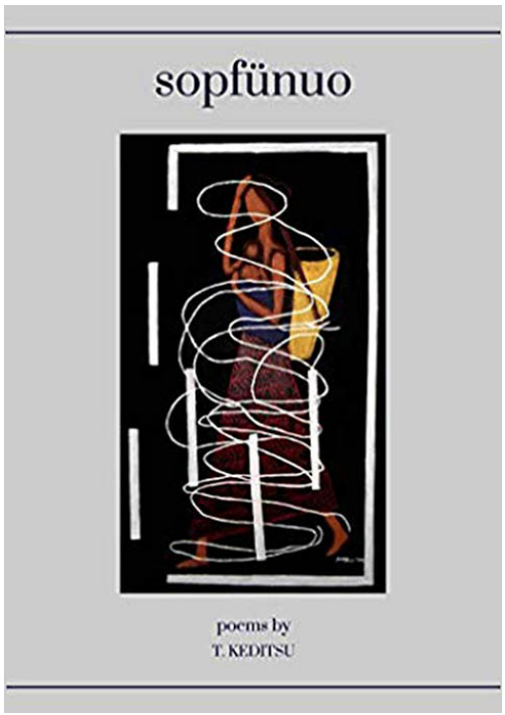

Image 2: Left – Stones of Sopfünuo and her child outside Rüsoma village, Nagaland. Centre – Theyiesinuo Keditsu. Right - Dr. Keditsu's book of poetry, *Sopfünuo*

lage where they stand, enshrined, to this day. Rüsoma is the village of my paternal grandmother's mother and I grew up being told this folktale by my father, who always reassured me that, if I were ever unhappy in my marriage, I had a home to which to return.

As an adult and married mother, this folktale and the context in which it was passed to me grew in significance. It speaks to how women navigate the patriarchal institution of marriage, and it exposes patriarchy as a multifaceted, nuanced structure specific to time, context, and culture. It allows one to see resistance and subversion within the narrative – whether it is Sopfünuo or the people of her village – and, on a metatextual level, it shows how a patriarch (my father) used a story from his mother's heritage to provide his daughter with an escape from patriarchal oppression. Using this folktale as a backbone, I wrote a collection of poems that explored the way Naga women – as girls, women, wives and mothers – negotiate self and power within patriarchy. The two poems I contribute belong to the book's last section, dedicated to ways we reject and confront patriarchy.

The first poem, 'Whore,' is an ecofeminist piece that addresses the way our land has been treated in the name of development. I imagined what it would be like if our land were a woman who could tell us about her past and current condition – about how her relationship with us, the indigenous people who have lived on, with, and through her, has changed. The second poem, 'Hibiscus,' takes the form of a sestina – a 39-line poem of Italian style that I have taken a liking to because it brings to mind the structure and motion of our indigenous backstrap loom, with its recurring cycle of end words. When I work on sestinas, I try to recreate the sensation of 'weaving' my words.

Thematically, 'Hibiscus' tells a story from the perspective of a flowering shrub indigenous to our part of the world. It is a hardy plant that can survive drought, extreme heat, and cold, and is used in traditional medicine to treat high blood pressure, burns, and many ailments afflicting today's population. In the poem, I juxtapose tensions between traditional and modern patriarchy, spirituality, culture, and customs. Both poems embody big-history concerns about the interconnectedness of past and present as well as manifestations of knowledge – by indigenous ways of knowing or modern ways, as well as the way we record / represent what we know.

Colonisation and western academic discourse have relegated folklore to the realm of the creative, often going further to strip these narratives of their political stimulus, positing them as mere 'primitive' entertainment. I propose that folklore needs to be brought back into the sphere of the political and be reinstated as a frame of reference through which we can engage contemporary challenges.

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Endnotes

1. Frost 1942: 71.
2. Wood 2016: 84–85.

The following poems, "Hibuscus" and "Whore", were included in T. Keditsu, Sopfünuo, Dimapur: Heritage Publishing House, 2018 (Kindle edition, 2020). A 'dao' is a traditional Naga cutting implement - a cross between a knife and a hatchet.

Hibiscus (sestina) T. Keditsu

Oh no, we don't do things as barbaric and heartless as burning brides for money or killing
Fetuses because they are female. No, we grow and temper our women to bend
Without breaking, or if they must break to break without a fuss, silently
In stealth, in secret, in solitude – a woman's pain should not be a spectacle for
Others to see and pity. No, we teach our women resilience so they can survive
Without succour and bloom without months of rain like the hibiscus.

Solitary tongues of night wing must have seen Sopfünuo that night, helpless. Had the hibiscus
Stood watch, her tale may not have ended with stone – a chronicler's subtle way of killing
But told of how the red-tongued flower turned terrifying goddess and helped her survive,
Slaying her tormentor and brought back his head severed and bleeding on a bamboo bending
From the weight of the silence custom demands from women cursed to suffer
Acts that have no words or place in chronicles men tell their sons but are passed on silently

Like our stones and monoliths outliving generations of men, speaking silently
Of things that cannot be told but must be known, like the many forked tongue of the hibiscus
A voiceless Babel hissing at the way men congress to discuss matters or fight for
Their honour wearing cloths dyed by women with madder that bid enemies to kill
And take the heads of the dyers; aged women who give the last of their strength to bend
Over vats of red or those whose hands stained blue or black so the stories of women can survive

As patterns on cloth branding our sons who will grow to forget their mothers survived
The tyranny of men and become tyrants who shun the counsel of women, demand silence
And absence from spaces of power and take pride in compelling their wives and daughters to bend
To their will. In the shadows of pink cherry blossoms briefly bursting on our hills, the sturdy hibiscus
Blooms in blood. But, as blood only seethes red while it flows and turns to rust after the killing,
So too the red of the hibiscus menstruates and browns into the colours of dead earth before

It fades like the deeds of our mothers we recall through muted sepia, reaching and grasping for
Memories pulled into the quicksand of forgetting. (or is it apathy?) While so many women survive
Now, still, because the light in their children's eyes sustain them through times when life is killing
Their spirits, parting woman from woman by servitude to fathers, brothers, husbands and sons, silently
Eating into the times mothers spent sharing their dreams with their daughters at dawn while hibiscus
Woke from wandering the realm of sleep where our men wearing newly woven clothes bent

Over rivers and prepared to cut them into new roads for their sons and brazenly called the hills to bend
And bow to them. Prophecy from an old dying religion that men cleansed in new blood do not suffer
Blind to the life that yet lives in our forests and the blood that throbs in the hibiscus
Which was used by ancients to cure the very ailments men now fight to survive
Even as their women inter the shame of their men into unmarked graves of silence.
And so, while their men learnt warfare and ventured out to avenge a killing

Our foremothers learnt to teach their daughters they must bend to survive
Suffer silently
For daos of men and not droughts kill the hard-wearing hibiscus

Whore

T. Keditsu

Who asks how I want to be taken?
Who asks me if I am ready?
Where I love to be touched
And which parts are out of bounds?

Here I lie sprawled wide open
In the aftermath of repeated assault
Once mighty mountains macerated
Into muddy tears mourning the ravages of rain
My rivers torn from their riverbeds
And cast out to run rampant through frightened forests
Fleeing into frenzied incoherence.

I had lovers once
Who reverently slipped tender saplings
Into the trembling wet of my terrace fields
Hills pregnant with the scent and sweet of Zünhe nectar
In that epoch of trust, taro thrust up towards the sun
Spreading the bodies of their leaves for lovers
In search for their navels, red, black, brown, silver

I had lovers once
Who knew me, my hills, my creatures, my waters, my jungles
Laying with my trees and sleeping by my streams
Forging paths with the flesh of their naked feet
Lovers desiring my trees returned to their beds
To ask my consent in the realm of dreams

I have no lovers now
Only assailants who do as they wish and take what they want
Unloved, unknown I fade and fall apart
Weak and waiting for someone to ask me
How I want to go? For someone to hear me say
I would like to stay and wait for one last lover

Pedagogy in Akbar's Reign: A Big Historical Perspective

Afshan Majid
Symbiosis School for Liberal Arts
Symbiosis International University
Pune, Maharashtra, India

Correspondence | **Afshan Majid** afshan.majid@ssla.edu.in
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This paper looks back at the reign of Emperor Akbar with a fresh perspective of Big History. When one is undertaking such an endeavour, there is an apprehension of crossing rigid boundaries of disciplines that have been set. In this case, there is a tendency to adhere to the sensibilities of the 'serious,' traditional historian, but, most importantly, staying true to the methodology of the discipline, while taking the leap with a new perspective. So, interestingly enough, while this paper looks at some of the educational reforms brought about by Akbar (from the perspective of Big History), this paper itself becomes an exercise in Big History.

Akbar, the third Mughal Emperor, came to the throne at the very young age of twelve in the year 1556 CE. After the four-year regency of his guardian and military commander, Bairam Khan, Akbar took up his responsibilities as a ruler. While on one hand we see Akbar as a powerful Emperor, on the other hand we see a different facet of Akbar when he took certain measures, such as abolishing the *jizya* [pilgrimage tax] and establishing an '*ibādatkhāna* [House of Worship] where dialogue between religions could take place.[1] Akbar's reign is known for its openness, magnanimity, and inter-faith dialogue. It is a very well-recorded period of history.

For this paper, two sources of Akbar's reign have been considered. One is the *Muntakhab-ut-Tawārikh* [Selection of Chronicles], written by courtier and historian Abdul Qādir Badāūnī, while the other is the *'Aīn-i-Akbarī* [Laws of Akbar] by companion and historian Abuʿl Faẓl. Both are important primary sources for the period and yield crucial information, as both the authors were the contemporaries of Akbar.

The first text was written by ʿAbdul Qādir bin Mulūk Shāh bin Ḥāmid Shāh. He was better known as Badāūnī, the location where he came to settle later in his life. His significance lies in the two works that he wrote: the well-known *Muntakhab-ut-Tawārikh* and the less perused *Najāt-ur-Rashīd* [Salvation for the Faithful]. The *Muntakhab-ut-Tawārikh* is a controversial work that was written in secret by Badāūnī. It places him in an important position among historians of the 16th century.

Muntakhab-ut-Tawārikh is a work of history written in three volumes. The first begins its narrative in the year 977, during the reign of Subuktegin, founder of the Ghaznavid dynasty, which became an empire that stretched from Afghanistan into India; it then covers the history of the Indian subcontinent until the reign of Humayun, the second Mughal emperor and father of Akbar. The second volume is the one that has been read by historians with great interest. It describes the reign of Emperor Akbar, under whose service Badāūnī worked and whose reign he saw in detail. It is also the fact that the *Muntakhab-ut-Tawārikh* was written in secret that lends to its importance.

Badāūnī saw himself as an orthodox man who was writing to protect Islam from the 'travesty' into which he believed Akbar had turned the religion. Interestingly enough, it is this very attitude that made Badāūnī record details that help us recreate a clearer picture of the time. It comes as a wonderful surprise that one of the biggest critics of Akbar ended up giving one of the best testimonies of the openness and tolerance of his reign. The third volume of the *Muntakhab-ut-Tawārikh* contains biographies of learned people, a valuable source with which to study the intelligentsia and literati of the time.

buʿl Faẓl, on the other hand, was a much-celebrated author. His work, *Akbarnāma* [Book of Akbar], is a rich and detailed account of Akbar's reign commissioned by Akbar himself. Being the official court chronicler, Abuʿl Faẓl had access to all the Mughal documents and archives, which lends to the richness of his work. The *Aīn-i-Akbarī* was originally part of the *Akbarnāma*, but it is now published separately. Even when treated as a distinct work, the *'Aīn-i-Akbarī* is a *magnum opus* by itself. It contains not just the court laws but also the accounts of various departments and provinces, Akbar's sayings, and even recipes! It's a statistician's delight because of the meticulous data. The 19th century translator of the *Aīn-i-Akbarī*, Heinrich Blochmann, compared it to a modern-day gazette or statistical compilation. It is the *Aīn-i-Akbarī,* and specifically the *Aīn* [law] on education, that holds importance for this paper.

Before we proceed to compare the information given by these two authors, a word of caution needs to be said. History is a discipline that relies heavily on the authority of a text. While the written word is easier to verify and compare than, say, oral histories or artefacts, the motives that drive the writing of a text place it in uncertain, murky territory. The task of a historian is, therefore, a difficult one: events must play out in order for a later historian to gauge earlier historians and their history. Similarly, for authors, one must apply the same critical method. An author, and their work, is the product of their time and circumstances. In many ways, Abu˜l Faẓl's success was opposite of that of Badāūnī. They had an almost poetic relationship.

Both were taught together by the same teacher, Shaikh Mubārak Nāgori, and both took service in the Mughal court at the same time. Their futures, however, could not have been more different. While Abu˜l Faẓl rose to heights, Badāūnī did not achieve such success. Abu˜l Faẓl wrote the official chronicle of the empire, but Badāūnī wrote his work in secret.[2] Their works were a product of their different proximities to Emperor Akbar–Abu˜l Faẓl's close proximity versus Badāūnī's lack of it. Both must be considered with caution. One must read Abu˜l Faẓl with a pinch of salt because he was too close to the emperor, while Badāūnī's words must be received with caution because he blamed Akbar and Abu˜l Faẓl for his failures.

Therefore, while truth in itself is an elusive concept, it becomes even more fickle for a student of history. One may hope to capture it somewhere between the discourses created by Abu˜l Faẓl and Badāūnī. The attempt in this paper would be to collect the information scattered in both the texts and compare the opinions of the two authors to understand what reforms in education were made by Akbar and finally look at it from a big-history perspective.

There is another disparity that arises between the two writers. While on one hand, Abu˜l Faẓl, a meticulous chronicler, lists the events, measures, imperial orders, and reforms of Akbar's reign in a systematic manner, Badāūnī makes his reader toil. His account is passionate, and he himself is moody. Badāūnī does not care for the reforms nor for a systematic account. He wants to tell a story, of his being relegated to the side-lines in the court and how he suffered all life because of it. Thus, information in the *Muntakhab-ut-Tawārikh* is not only scattered but often in-

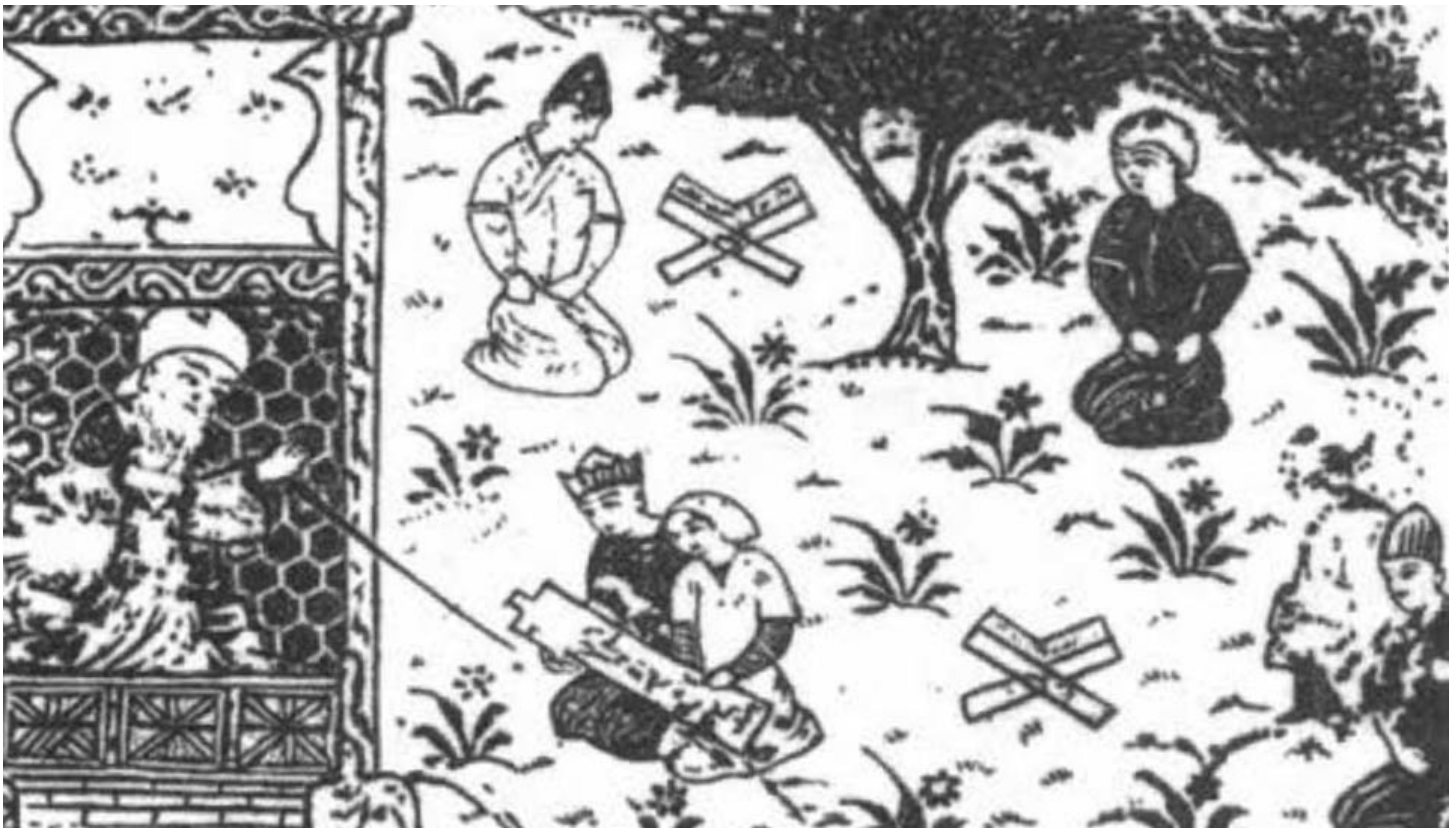

Figure 1: Grayscale of a school scene, Sultanate of Malwa, central India, from *Miftah-ul-Fuzala* [Key of the Learned], an illustrated dictionary by Muḥammad Dā'ūd Shādiyābādī, c. 1490, held by the British Library, no. 3299.

direct. It is for this reason that we look at his work first and try to reconstruct the education system. Then we undertake the easier task of locating the information in Abu'l Faẓl's text.

Mughal education formally began when a child reached the age of four (4 years, 4 months, 4 days to be precise), marked with a ceremony called the *Bismillāh Khwāni*, in which *Bismillāh* [In the Name of Allah] was written on a tablet [*takhtī*] and the child was made to read it.[3] There were two ways for a child to receive education: home schooling and/or attending an educational institution such as a *madrasa* or the shrine of a *sufi*.

Badāūnī tells us about Mir Fathullah Shirazi, who taught the children [*atfal*] of amirs and would go daily to the houses of the royal family [*ba manazil-i-muqarraban*]. He tutored the slave of Hakim Abu'l Fath and the son of Abu'l Faẓl as well as various other children of the *umara* [nobles]. Badāūnī reports on the subjects that Shirazi taught these children–writing [*naqṭ-o-khat*], to draw circles [*daira*] or geometry, and alphabet [*abjadham*].

From Badāūnī's description, Mir Fathullah Shirazi must have been a proficient tutor, who was much in demand, as it appears that his timetable was quite full from teaching so many of the royal and aristocratic children and those of their servants. Confirmation of this can also be found in Abu'l Faẓl's *Akbarnāma*.[4] Thus, schooling at home appears to have been one of the primary ways for a child to start their education.

The other way of imparting education to young boys of course was to send them to *madrasas*. A famous *madrasa* of the time that Badāūnī informs us about was the *Khair-ul-Manāzil* or *Madrasa-i-Begum* established by Maham Anagā, the foster mother of Akbar, where students would have lodgings. He talks of a similar centre at Agra, which was situated in the hospice of a *sufi* named Shah Mīr. Thus, *madrasas* and the hospices of Sufis acted as residential centres of education.[5]

While the locations and manners of provision of education to children is interesting, more crucial is the type of subjects that were taught. In this case, fortunately, we repeatedly get the names of topics throughout Badāūnī's narrative. These repetitions are enough to make a reader confident of drawing a conclusion that there was a standardization of subjects taught both at home and in *madrasas*. These subjects were grammar, *fiqh* [jurisprudence], logic, and philosophy. Just when one starts to wonder if it would it be too bold to refer to this list as a curriculum, Badāūnī provides us with terms that for all intents and purposes indicate the presence of such a well-organized system of education.

Badāūnī lauds a certain scholar, saying he was learned in the *'ulūm-i-mutadāwila* [*ulūm*: branches of learning/sciences; *mutadāwila*: common/customary]. Similarly for another, Shaikh 'Abdul Ḥaq Dehlvi, Badāūnī writes that Dehlvi used to give instruction in the *'ulūm-i-rasmia* [*'ulūm*: branches of learning/sciences; *rasmia*: customary]. Praising Shaikh 'Abdul Ghani of Badaun, he says that Ghani became a disciple of Shaikh 'Abdul 'Azīz and studied from him, *tamām kutub-i-muta'ārif-i-mutadāwil* [all the well-known and customary books].[6]

The use of a terms such as *'ulūm-i-mutadāwila* [customary branches of learning] signifies that there were certain common subjects/themes that were followed to impart instruction. Likewise, use of the phrase, *tamām kutub-i-muta'ārif-i-mutadāwil* [all books in the common/ordinary course of education] indicates that not only were there common subjects, some prescribed or favoured books were used by teachers. The term, *'ulūm-i-rasmia*, which literally translates as 'customary,' implies knowledge used for official or bureaucratic purposes and suggests that other practical and official skills, such as *inshā'* [composing letters and documents] and *siyāq* [accountancy], were taught. The usage of these terms suggest that some standardization of subjects in the form of a curriculum had taken place and had been in practice since long before.

Two contemporary authors substantiate this information through their research. Muhammad Zaki in *Organisation of Islamic Learning Under the Sayyids and Lodis* and Mohammad Mujeeb in *The Indian Muslims* both note that there was a curriculum standardised by Sikandar Lodi (1489–1517). The kind of subjects that were generally taught under this curriculum were law and theology, Arabic grammar and syntax, Islamic law [*fiqh*] and the principles of jurisprudence, *tafsīr* [exegesis of the *Qur'an*], *hadith* [traditions of the prophet], *kalām* [scholastic philosophy], and *mantiq* [logic].[7] Thus Badāūnī and his peers were taught according an educational system that was formulated around 1500.

It also seems from Badāūnī's description that these traditional subjects were divided into two categories: those that required application of the mind and those that required learning by rote. For example, in the case of Miyān Vajīhuddīn Ahmadabadi, Badāūnī writes that he was a good scholar who had knowledge of all branches of study: those that required application of reasoning and those that were to be learnt by heart [*ulūm-i-'aqli wa naqli*]. He calls Miyān Ḥātim of Sambhal a scholar of both perceptive and received knowledge [*ālim-i-jāmi māqul wa manqūl*]. For many others, he uses similar terms, which indicate two cat-

egories of topics, those learned by heart and probably without an understanding of the subject, and those that required the exercise of reasoning and mental faculty. It seems that law, theology, and *hadith* [traditions of the Prophet] were *ʿilm-i-naqli* / *manqūl* topics, while *kalām* [scholastic philosophy], mathematics [*hisāb*], logic [*mantiq*], and grammar were *ʿilm-i-ʿaqli* / *mʿāqūl* subjects.[8] It was this system of learning by rote that Akbar had sought to change when he proposed reforms in pedagogy. It comes as no surprise that Badāūnī takes good care to show his displeasure with the changes that were brought about.

Badāūnī says that learning of Arabic was looked down upon as for a crime, while *fiqh* [jurisprudence], *tafsīr* [commentary on the *Qur'an*], and *hadith* [traditions of Prophet] were disfavoured. In contrast, the study of *nujūm* [astrology/astronomy], *ḥikmat-o-tibb* [medicine], *ḥisāb* [mathematics], *sher* [poetry], *tarīkh* [history], and *afsāna* [storytelling and writing] were given precedence. He notes that in the year 1586 it was ordered that everyone should give up the study of Arabic and instead should take up astrology/astronomy, mathematics, medicine, and philosophy. While one can trust Badāūnī to be dramatic in his choice of words, his information hints towards an imperial effort of regulating education. The testimony of this measure can be confirmed by the *Āīn* on education given by Abū'l Faẓl.[9]

> In every country, but especially in Hindustan, boys are kept for years at school, where they learn the consonants and vowels. A great portion of the life of the students is wasted by making them read many books. His Majesty orders that every schoolboy should first learn to write the letters of the alphabet, and also learn to trace their several forms. He ought to learn the shape and the name of each letter, which may be done in two days, when the boy should proceed to write the joined letters. They may be practised for a week, after which the boy should learn some prose and poetry by heart, and then commit to memory some verse in the praise of God, or moral sentences, each written separately. Care is to be taken that he learns to understand everything himself; but the teacher may assist him a little. He then ought for some time to do daily practise in writing a hemistich or verse. [This way he] will soon acquire a current hand. The teacher ought especially to look after five things: knowledge of the letters, meaning of words, the hemistich, and the formal lesson. If this method of teaching be adopted, a boy will learn in a month, or even in a day, what it took others years to understand, so much so that people will get astonished. Every boy ought to read books on morals [*akhlāq*], agriculture [*falāḥat*], measurement [*masḥāhat*], geometry [*handasāh*], astronomy [*nujūm*], physiognomy [*ramal*], household matters [*tadbīr-i-manzil*], the rules of the government [*siyāsat-i-madan*], medicine [*tibb*], logic [*mantiq*], physical sciences [*ʿilm-i-tabii*], spiritual sciences [*ʿilm-i-ilāhi*), as well as history [*tarīkh*], all of which may be gradually acquired. In studying Sanskrit, students ought to learn the *byākaran* [grammar], *niyāī, bedānta* [Vedanta] and *patānjal* [yoga]. No one should be allowed to neglect those things which the present time requires.[10]

We must realise that even Abū'l Faẓl cannot be absolved from the charge of being dramatic. While Badāūnī's reaction was to disagree with Emperor Akbar's methods and opinions, Abū'l Faẓl's would try to show them to be highly efficient. For Abū'l Faẓl, His Majesty's suggestions in the learning process were so good that they would teach a boy how to write within a matter of a day. Thus, the probabilities of a true account are most likely to be found between sighs of exasperation and disapproval uttered by Badāūnī and the fawning admiration of Abū'l Faẓl. It is this revised curriculum that we can examine from a big-history approach.[11]

It is important to note that Sanskrit studies were also being encouraged, which indicates a watershed moment in historical cultural awareness. The dominance of a language for scripture has been seen numerous times in history, and, in this way, Arabic was the language of Islam. However, it became irrelevant for a person who is not a native speaker; it can even become a barrier. Arabic had no deep roots as a language of the Indian subcontinent and it appears that this was understood by an emperor in 16th century Mughal India. Not only that, Akbar seems to have also understood the relevance of Sanskrit as the language to understand the past of his empire. As Abū'l Faẓl's wrote, 'No one should be allowed to neglect those things which the present time requires … .' This indicates that an emphasis was being placed on an education relevant to the time. With this understanding, a translation bureau was established by Akbar that undertook translation of Sanskrit texts such as the *Ramayana*, *Mahabharata*, *Singhasan Battisi*, *Panchatantra*, etc.[12]

Thus, Akbar sought to revise a curriculum that had re-

mained more or less the same for the previous 86 years. Yet these reforms in education might seem to be appearing in a vacuum. There is a need to contextualize them and to see the bigger picture: a big-historical picture.

Akbar came to the throne at a very young age and grew into the crown that was placed on his head. After his father's untimely death, he had the task of consolidating the empire. After much of the territory was conquered, Akbar embarked on a journey to rule with tact and diplomacy. He sought to bring change to governance, the court atmosphere, and its policies. His court was a place for not only open dialogue but a space where one could even crack a witticism at the expense of the emperor.

He sought to have dialogue and debates among different religions so that he could arrive at a higher conclusion: There is truth in all faiths. When seen with the other measures that Akbar undertook, we witness openness and reform. Among these progressive efforts were his attempt to abolish *sati* [burning widows on their husband's funeral pyre], abolishing the *jizya* [religious tax on non-Muslim subjects] and the pilgrimage tax, the translations of Sanskrit works into Persian, and establishment of a Mughal school of painting.[13]

This approach is an historical parallel to that which can be found in big-history classrooms today. It is importune for the author of this paper to place herself on the cusp of various disciplines she has interacted with in her academic span. It begins with the understanding of history as a holistic discipline. Furthermore, the methodology of history emphasizes that events do not happen in a vacuum or as accidents. This reasoning brings us to two assertions: firstly, history by nature is an inter-disciplinary subject and, secondly, there is fluidity in historical events.

Equipped with historical methodology, one can say that the present and future are informed by our past. They take shape through the decisions that the humans of the past have made and how the world changed as a consequence of them. This idea emerges when one imagines the past and the present to be in constant interaction with each other. The classroom then becomes the physical space where this conjugation takes place, especially the big-history classroom.

Big History is a field that uses super-disciplinarity as a tool to prepare minds with a holistic understanding of the world around them. It helps them grow into better problem-solvers by understanding a situation / problem / event from multiple levels, instead of being confined to the compartments of a specific discipline. The instructors for Big History are drawn from various disciplines, where they bring their own expertise to the classroom in order to provide students with a holistic perspective. They borrow from disciplines such as physics, chemistry, medicine, geography, geology, history, sociology, and political science … to name a few.

This subject list carries the echo of the syllabus introduced by Akbar. Thus, in that context, teaching subjects such as agriculture, household matters, measurement, medicine, physical sciences, logic, and the other subjects to a student is a very empirical and big-historical approach to education taken by an Indian emperor in the 16th century.

If I may be so bold as to put forth a personal perspective, for me, Big History acts more like a philosophy than as a subject. It is a wholesome view of the past that creates wholesome individuals. It constitutes comprehensive education, combined with introduction to multiple methodologies. Such humans inherit the Earth far more responsibly. We may understand this development in pedagogy as a recent innovation. However, many instances of such innovations and measures can be found in our past, which become lessons for the future. Akbar and his policies are one such example of that.

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Endnotes

1. For more details on this subject as well as history of Akbar's reign, see the following. Rizvi 1975. Rezavi 2008: 24, 195. Habib 1997; idem 2007.

2. For more details, see Majid 2016.

3. Badāūnī informs us of the Bismillāh Khwāni ceremony of Prince Salīm (later Emperor Jahangir), who was offered a tablet (takhta-i-tālīm) from the hands of Maulāna Mīr Kalān and was made to read the Bismillāh by Mīrak Shāh bin Mīr Jamāluddin. Historian Muhammad Zaki's comments on the education system under Sayyids and Lodis would be noteworthy here: 'The primary education of child usually started with the ceremony known as Tasmiya Khwānī or Maktab ceremony. When the child completed the age of four years, four months and four days he was brought before an 'Ālim or a pious saint. The teacher wrote Bismi'llāh on a piece of wood and the child was made to recite it along with some other verses from the Qur'ān. Then sweets were distributed and formal education started under a teacher.' Badāūnī 1865: 170. Zaki 1977: 2.

4. The scholarship of Mir Fathullah Shirazi is praised by Abu'l Faẓl, who says that the Mir possessed such knowledge that if all the books of wisdom in the world were to disappear, the Mir would have written it all again, so much so that what was lost would not have been missed at all. Abū'l Faẓl 1873: 401.

5. Badāūnī offers many examples of such centres of education in the biographies of Sufis and theologians given in the third volume of the *Muntakhab-ut-Tawārikh*. Badāūnī 1865: 3, 4, 24, 42, 74, 119.

6. Badāūnī 1865: 107, 111, 114.

7. Mujeeb 1967: 404–408. Zaki 1977: 3. From Badāūnī's own biographical account, it seems that he was taught the same subjects. Majid 2016.

8. Badāūnī 1865: 43, 66–67, 70, 77, 105, 129.

9. Badāūnī, *Muntakhab* II, pp 306–307, p 363. Abū'l Faẓl, *Āin-i-Akbarī* I, p 201.

10. I have quoted the translation of Blochmann 1869: 143.

11. Badāūnī 1865: 360–361. It is important to note that we do not find much reference to the education of girls in the above narratives, although we do know that there were learned women in those times from other sources. An example that stands out is Gulbadan Bano Begum, the author of *Humāyūnnāma*, along with some oblique references to learned women from Badāūnī and others, such as Ma-

ham Anaga, a lady qualified enough to act as the *wakil-us-salatanat* and establish a *madarsa*, Salīma Sultān Begum, and a poet called Nihāni. Nihāni means 'hidden,' and many women of that period composed poetry under such names to hide their identity. More examples of this could be found in the cases of Salīma Sultān Begum, Nūr Jahān and Zebunnisa, who composed poetry under the name of *Makhfi*, which also means hidden or concealed. It seems that because women were expected to remain under *purdā*, their *nom de plumes* reflected that condition. It is interesting to observe that Salīma Sultān Begum, the senior wife of Akbar, had her own library and was very protective of her books. There was a time when our dear Badāūnī vanished from court for a long time, and he took with him a book that belonged to her. Messengers were sent to him repeatedly to return the book and, when they fell on deaf ears, Badāūnī's *madad-i-ma'āsh* (stipend from the Imperial court) was stopped until he produced it.

12. For details, see Truschke 2016.
13. For details, see Habib 1997.

Indigenous Knowledge: Contours for a Science of the Folk Community

Joel S. Regala
Holy Angel University
Angeles City, Philippines

Correspondence | **Joel S. Regala** jregala@hau.edu.ph
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> To uncover the indigenous in our souls is the work of decolonization. But even as we decolonize, it is not enough; it is merely a beginning. The work must continue to deepen until the body, mind, and soul, become one.
>
> — Leny Mendoza-Strobel (2010)

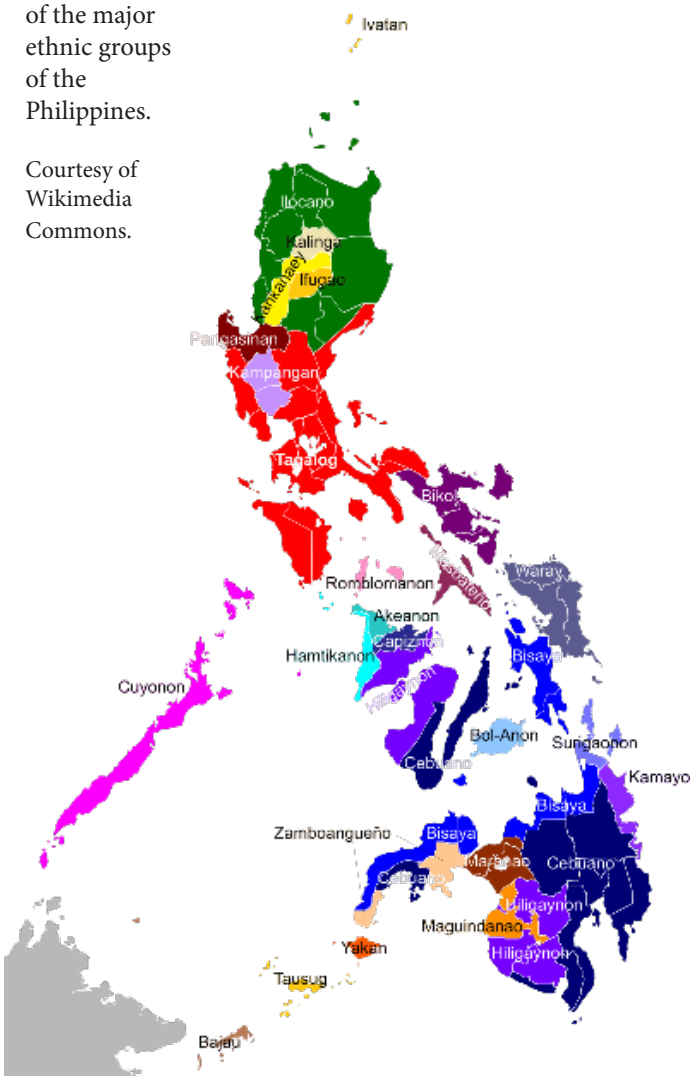
The Philippines have a complex history. Aspects of Indian, Arabic and Chinese culture spread to the early indigenous kingdoms of the Philippine archipelago, which were colonized by the Spanish in 1565, followed by the United States in 1898. The colonizers thought Native peoples had no civilization, so indigenous knowledge was relegated to the category of 'superstition.' National independence came in 1946 and, with it, a globalized business culture, which also disregarded indigenous knowledge. Finally, the recovery of indigenous heritage is now seen as vital, so that we may understand the full richness of our national identity.

My own specialization is Philippine Studies, where history and anthropology intersect. I find that a strategy for recovering indigenous knowledge is to engage with the abundant culture of our ancestors. My heritage is Kapampangan, an Austronesian farming and fishing people of central Luzon, and Holy Angel University, where I am a professor, lies in the heartland of Kapampangan territory, which is felicitous for my research. Our university hosts the first program of big-history in the Philippines, so this is where Indigenous Knowledge and Big History intersect.

Humanity's interaction with the environment has greatly influenced our worldviews. One of our most important cultural systems is knowledge acquisition. According to UNESCO's program on *Local and Indigenous Knowledge Systems*, indigenous knowledge is a mosaic of understandings, skills and philosophies that have been shaped by local communities through their interaction with Nature and resulted in many deep-time narratives.[1]

Indigenous knowledge stands in stark contrast to the global knowledge system that has been created by universities, research institutes, and private business. In a vernacular sense, indigenous knowledge is local – specific to a particular society. As a society's information base, it serves as a foundation for decision-making. Other terms used in ethnoscience to describe it are *folk knowledge* and *peoples science*.[2]

Based on deep awareness of the local environment, indigenous knowledge grows over many generations. It comes from inside the community and is imbedded in its way of life, as a means of survival. It often utilizes a non-formal mode of transmission, is collectively owned, and subject to adaptation. As Kenji Yamada, a specialist in East-Asian science history, wrote: 'Every culture and every society has its own science, and its function is sustaining its mother society and culture.'[3]



Map 1: Map of the major ethnic groups of the Philippines.

Courtesy of Wikimedia Commons.

Indigenous Knowledge and Astronomy

Anthropologist Dante Ambrosio is considered the 'Father of Philippine Ethno-Astronomy.' He argued that whenever early Filipinos looked into the sky, they would see not just stars but their own civilization. He defined his *ethno-astronomy* as the study of civilization through astronomy, a form of traditional knowledge similar to archeo-astronomy, which investigates astronomical techniques that ancient peoples used to establish cycles of the year, especially for agricultural purposes.[4]

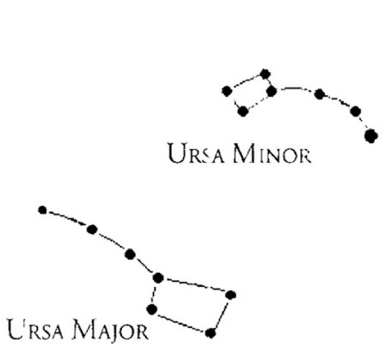
In reclaiming the stars, Ambrosio realized how the Indigenous peoples of the Philippines read the sky. He saw that early Filipinos imprinted their cultural identity onto the heavens and, in return, their cosmic vision affected their ways of life, thinking, and even worldview. These Indigenous tribes consulted heavens for their daily activities, as when selecting the best times for hunting, planting, and fishing.[5] At Holy Angel University, we include ethno-astronomy in our discussions of Thresholds 2 and 4, as part of our indigenization approach.

Such viewpoints can still be found in some Kapampangan planting strategies. They avoid planting when there is a full moon, and they don't like to have a woman with menstruation come close to their crops. They avoid planting during the full moon because this is the time of some insects' mating seasons. They have a belief / tradition that if they plant during this time, the newly hatched pests will be fully developed in three months – before the crops can be harvested. Similarly, they forbid a woman with menstruation from approaching their crops since the smell of uterine blood is thought to attract certain insects.[6]

Early Filipinos had named celestial bodies long before Westerners arrived 500 years ago. In the Tagalog language, there are *Buntala* [planet] and *Bitumpuk* or *Talampad ng mga Bituin* [constellations]. For the Milky Way, they say *Dinaanan ng Barko ni Apung Noe*, while the Sama and Tausug of the archipelago surrounding the island of Mindanao use *Naga*. For an eclipse, the Visayan of southern Luzon and northern Mindanao say *Bakunawa*, while for the Kapampangan of central Luzon it is *Lauo*.

There are also specific terms for the planets. Venus is called *Sulung Daguis* by the Kapampangan and *Tanglao daga* by the Tagalog. For Jupiter, the Tausug from the Sulu Archipelago employ *Bituing Maga*. When a Tausug woman became pregnant, they believed ceremonies should be

Figure 1: Left – Dante Ambrosio's illustration of two of the modern constellations recognized by indigenous Philippine peoples, as he writes (in translation from Tagalog): 'The stars that made up the constellations of the Philippines are included in these constellations of modern astronomy.' The Big Dipper (Ursa Major) was called, *Bubu*, a celestial representation of a traditional fish trap [*bubu*], used by the Sama people of the islands in the south-west Philippines. They saw it as a way to forecast their catches from the sea, depending on the number of stars seen in its boxlike end. Ambrosio 2005: 25. Right – Setting fish traps at sea by the people of Bucas Grande Island, in the south-west Philippines. Photograph by Jay Rosas 2015.



performed in Jupiter's honour in the hopes that her child would be beautiful.[7]

For the constellations, *Balatik* was commonly used by early Filipinos and other ethno-linguistic groups to refer to Orion's belt. The *balatik* was a hunting trap for wild boars, as used by the Tagalog, Maguindanao, Bikol, Antique and Bagobo peoples, who thought it looked like Orion's belt cluster. For the Bagobo, the *Balatik's* emergence in the night sky in December signified the start of *kaingin*, the slash-and-burn method of preparing land for farming. Then, in April, they'd see *Marara*, a constellation that they describe as resembling a man with just one hand and one foot, which would signal the beginning of the planting season. *Marara* is not matched with other existing cultural constructs of constellations, so it could be a unique conception of stars understood by just by the Bagobo.[8]

The Big Dipper was given the name *Bubu* by the Sama, a maritime people from Tawi-Tawi, because it resembled the *bubu*, a cage-like fish trap. The Sama people used this to predict whether or not fishing would be fruitful. For example, if they discovered a lot of stars within the sky 'cage,' they believed the weather would be ideal for fishing.[9]

Indigenous Knowledge for Human Survival

Using in-depth interviews, I talked with two key informants from the Aeta community – Pan Tugak Lanum and Arnel Camaya – to learn of their peoples' indigenous knowledge. The Aeta live in western Luzon and are thought to be the oldest surviving inhabitants of the Philippines.[10] Five issues became prominent in our discussions – food, warfare, medicine, worldview, and their own survival as a people during crisis.

Food Culture

The Aetas are famous for their *Imbungoy* or *Binulu*. In the absence of cauldrons or pots in the past, they, starting from their *manantau* [ancestors] used the *Bulu* (a variety of bamboo) to cook food, such as *kamuting dutung* [cassava)] and *kanin* [rice], *kina* [fish], *manuk lalik* [native chicken], *babuy lalik* [native pig], and *ulang* [shrimp].

The *binulu* tradition is accompanied by a ritual dance, if somebody from the family is ill. The ritual is intended to drive away the evil spirit that causes the sickness.[11] This is similar to the *Canao / Kanyaw* ceremony, a ritual special to the Igorots in the Cordillera, a mountainous region in northern Luzon. The cooked fish is served on banana leaves as communal meal. It is consumed by all members of the community as a reflection of their *kalu-kalu* or *bayanihan* [communal] spirit.[12]

Indigenous Knowledge Systems and Practices (IKSP) in the Philippines contribute to sustainability and productivity of their ecosystems. The Ifugao peoples live in the mountainous areas of northern Luzon and developed traditions of *payoh* [rice terraces] and *muyung* [private-woodlots]. The Hanunuo people, on the island of Mindoro in the western Philippines, practice a traditional form of swidden

Figure 2: Left – Aeta river boat and crew, early 1900s. From the Mario Feir Filipiniana Library, Manila (Philippines). Right – Author Joel Regala (left) with his guide and informant, Arnel Camaya (right), from Sapang Uwak, Porac, Pampanga (Philippines).

agriculture that promotes biodiversity. Likewise, the Dumagat Aetas of eastern Luzon live along the coast and practice fish conservation.[13]

Historian Lars Raymund Ubaldo of De La Salle University in Manila discovered a tradition among the Bicolano fishing people of Catanduanes Island (eastern Philippines) that the optimum time to catch fish is right after a storm, based on their study of climate change in the typhoon-prone homeland. According to the fishing community, this is due to the fact that the fish are still 'dizzy,' making them easier to catch.[14] Certainly, such local knowledge is Indigenous science.

Ethnomedicine

Scholars and field workers around the world advocate for how traditional healthcare practices should be recognized and integrated within the public framework to ensure long-term viability.[15] Similarly, there are ethnomedicines of the varied Filipino Indigenous Cultural Communities (FICC).

Pan Tugak Lanum, also known as 'Apung Jungle,' described how the Aeta use herbal medicines to help them live. They collect *sulasi* [*Ocimum tenuiflorum* / holy basil] to treat headache, *pansit-pansitan* [*Peperomia pellucida* / pepper elder] for stomach pain and *tawa-tawa* [*Euphorbia hirta* / asthma plant] as an anti-bacterial. He reports that because of the success of *tawa-taw*a, which is used to treat dengue fever, they do not fear Covid-19.[16]

Experience in Warfare

Apung Jungle is not only a culture-bearer, but he was also a veteran of the Second World War. The Aeta fought the Japanese with their *uyung* [bow] and *paslu* [arrow] using indigenous poisonous herbs. During the mopping-up operations with the American military in 1945, they helped pursue the Japanese in the tunnels in Bamban, a town in Tarlac province. Because they could smell the Japanese inside the tunnels, they were asked to lead the hunt. The Americans would next employ flame-throwers to eliminate their enemy in the tunnels. The Aeta had developed a keen sense of smell, an ability that was passed down to their descendants.[17]

Figure 3: As part of Aeta ethnomedicine, *pansit-pansitan*, or 'pepper elder' (*Pepromia pellucida*) is used for gastric ailments.

After the war, Apung Jungle took care of Kaneko, an orphaned Japanese boy. For three years, Kaneko lived in one of the Aeta caves, adopting their traditional way of life. He wore a traditional *lubay* [loin cloth]and ate *tugak* [frog], *bitin* [python] and *barag* [monitor lizard]. As soon as the Porac municipal authorities became aware of Kaneko's whereabouts, they informed the Japanese embassy, who were unaware that the youngster had survived the war. Kaneko went back to Japan around 1949 and, years later, out of gratitude, he invited Apung Jungle to visit. According to Apung Jungle, he received VIP treatment in Tokyo.[18] This shows that humanity knows no borders.

During the Vietnam War, Apung Jungle, along with other Aetas, assisted in the training of American pilots in jungle survival. According to Shimizu, the Americans travelled to Mount Pinatubo to acquire Aeta techniques for camping in the woods, cooking without smoke, collecting water from vines and trees, healing dangerous snake bites, and hiding from pursuing adversaries.[19]

Worldview

The Aeta innate spirituality is shown by their harmony with nature. The mountains surrounding them are named. Apung Jungle says that they even speak with the hills, as when he would call out:

> *Apung katuno* [Apung Jungle is here]. Please spare my children and grandchildren from any harm and sickness!

The Aetas live among the Zambales Mountains in western Luzon, home of their most important landmark, Mt. Pinatubo. The Aetas call it, *Apo Malyari*, after their supreme deity. She is the Keeper / Guardian of Mt. Pinatubo and the nemesis of King Sinukuan, represented by Mt. Arayat in Pampanga. The Aetas feared *Apo Malyari* and paid homage with animal offerings embellished with ornate rituals. Mt. Pinatubo exploded in 1991 and was the second largest eruption of the 20th century (the Aetas believe it was caused

Figure 4: Left – Pan Tugak Lanum, 'Apung Jungle,' one of our primary Aeta informants and guides from Sapang Uwak, Porac, Pampanga (Philippines). Courtesy of Tonette Orejas, a journalist with the Philippine Daily Inquirer. Right – Mt. Punatubo, which is the Aetas supreme deity and they call, *Apo Malyari*. This photo was taken on 16 April 1991, just before its eruption. Photograph by the United States Geological Survey; courtesy of Wikimedia Commons.

by *Apo Malyari*'s wrath). As literary-scholar Julieta Mallari wrote: 'As far as the contending forces of the two mythical gods are concerned, [the Aetas] god overpowered the mythical god of the lowlanders and straight-haired Kapampangans.' Many Aeta villages were buried by lava, ash and mud, requiring their relocation. Land rights were given at lower altitudes, which resulted in many new social adaptations by the Aeta.[20]

The Aeta have few distinctions of territorial borders. The mountains are interconnected, and so too the mountains also connect them as a people. They can visit their Aeta kin on foot in Zambales (a nearby province) in only 5 or 6 hours. As a result, they teach us to embrace such awareness.

Disaster Knowledge

In addition to the crisis of volcanoes, earthquakes and invaders, other disasters court daily life in the Philippine for indigenous peoples. Batanes, an archipelago in the northern Philippines and home to the indigenous Ivatan people, is the country's 'typhoon capital,' but it is said that no one dies in a tropical storm.

The Ivatans have relied natural indicators for their weather forecasts. Birds, wind, cloud movement and hue of the sky can all give omens for the weather, sometimes days in advance. An imminent typhoon is anticipated when birds start seeking cover inside houses or go down on the ground, or when the sky turns pinkish orange.[21] Cows are the most dependable forecasters for storms.

'You will know there's a typhoon coming when the cows at the *payaman* [communal pasture] come down to seek shelter,' reported Carlos Balasabas, a local Ivatan. The pastures are normally located on higher slopes, so cows automatically seek shelter as a storm approaches. They only return to the slopes after the rain and wind have subsided.[22]

Indigenous Knowledge and Disaster Relief

While there has been an insufficient acknowledgement and use of Indigenous Knowledge in risk-reduction initiatives, there is strong evidence that it has the ability to decrease disasters on many levels. It is especially of value since it is:

- understandable to users
- easily implemented
- originated within communities
- based on local needs
- specific to culture and context (environment and economy)
- provides core knowledge with flexibility for local adaptation
- uses local knowledge and skills
- uses materials based on local ecology
- proven to be time tested and useful in disasters

- applied to or applicable in other communities or generations.[23]

These considerations are important, as researchers should follow a code of behaviour when rushing to a disaster zone, so as not to upset the inhabitants' delicate position, as had happened in Ache, Indonesia in 2004. In that case, residents were exhausted and enraged by the influx of foreign scientists, with many turning down requests for interviews. Likewise, understanding local languages, policies and customs is critical and can help improve reaction and recovery times. Despite this, a lot of disaster research is still framed by limited worldviews. Vulnerability and resilience are two concepts that don't always translate well. Even if analogous phrases exist, they may be dismissed as meaningless, because natural disasters such as cyclones and floods are not often regarded as threats.[24]

In terms of understanding the local language, in 2013, Filipinos were struck by the super-typhoon Haiyan, one of the most powerful and deadly cyclones ever recorded. It was an event intensified by climate change. Haiyan killed over 6000 people in the Philippines and laid waste to the homes of 11 million residents in Micronesia and the South China Sea. The effects could have been reduced in the Philippines, if the government had used the indigenous word *humbak* (Hiligaynon/ Bisaya) or *daluyong* (Tagalog) instead of 'storm surge,' which was not familiar to the villagers. The residents argued that if only the word 'tsunami' had been mentioned, they would have been able to evacuate quickly.[25]

Incorporating indigenous knowledge into existing practices and policies encourages the impacted community's engagement and enables its people to take the lead in disaster risk reduction actions. Various Indigenous techniques and strategies are ingrained in local knowledge that have proven useful in the face of natural disasters can be shared and adapted to other communities facing similar challenges.[26]

Conclusion

This paper shares some examples of how early and modern Filipinos' indigenous knowledge interacts with conceptions of astronomy, human survival, and disaster risk reduction, particularly in forming their culture and defining their indigenous science. This is closely linked to Big History's Threshold 6 and the concept of collective learning, which is a most essential to the creation of culture.

There is also the issue of indigenization to consider. Big History is vast field. Dr. Vicente Villan, a historian, once commented that:

> The danger there – it can be a threat to the discourse of nation-state formation, and it can weaken the nationalist discourse. Hence, there is also a need to focus on the self- as a nation.[27]

Such indigenization in Big History education is critical to comprehending our complex environment. As we advance in trying to resolve our societal and global problems, we also need to step back … to rediscover and reclaim our basic knowledge and humanity.

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4 Early on, archeo-astronomers focused on well-known sites, such as Stonehenge in the west of England, the ziggurats of Mesopotamia, and the observatories of Mesoamerica. Brown 2016.

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16 In addition, Apung Jungle told of two other plants – *hakyapal* for fever and *sampalaud* for deep wounds, but their scientific identity was not clarified. A military veteran himself, Apung Jungle told a story of how former President Ferdinand Marcos escaped the Bataan death march and was shot by the Japanese during World War II. The Kapampangan residents in Porac, in south-west Luzon, rescued him and used *sampalaud* to cure his gunshot wound. Despite questions of Marcos' military record in World War II, the importance is how tribal people attributed the success of a tribal remedy to successfully treat a serious wound. Lanum 2021.

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Epidemic Cholera and Reform in the 19th Century: Crisis Management and Linkages to Big History

Seohyung Kim
Research Professor (Former) Ewha Womans University
Seoul, South Korea

Correspondence | **Seohyung Kim** flanders77@gmail.com
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We tend to think of Big History in a 'big way' – the cosmos, billions of years, trillions of kilometres … but this isn't the whole picture. Biologist Lynn Margulis produced a book about small-scale life, *Microcosmos* (1986), which led her to collaborate with chemist James Lovelock on Earth dynamics. In this way, molecular biologist Elizabeth Martin-Kutter also worked with microbial life and helped develop one of early courses and texts in Cosmic Evolution and Big History with astrophysicist G. Siegfried Kutter.[1]

In my work, I've experienced such cross-disciplinary integration of fields too. My doctoral research focused on the history of infectious disease and public health in the United States, and then I became a professor of world and global history at Ewha Womans University in Seoul. In 2009, our university joined a national campaign to revitalize education, and I became the first resident professor to teach Big History in Korea.[2] This led me to think about how these two studies might be joined together to benefit the global community.

This is not as theoretical as it might seem. The present problems that we face in the world today demand change and creative thinking from all of us. Our colleague at Ewha University, world historian Ji-Hyung Cho, assessed the climate crisis in its global and integrated complexity, while geographer Barry Rodrigue sees Big History as a paradigm for us to better move forward into our 21st century world.[3] As a start, let me first share with you a story set in New York City in the 1800s. It was a time that shares such themes with our world today.

Cholera 1832: Social Reform

After completion of the Erie Canal, which connected the Great Lakes to the Hudson River in 1825, many other canal and railway projects followed. By 1830, New York had become the largest city in the United States – with over 200,000 residents. The transportation revolution fuelled industrialization, which needed workers. Immigration from the British Isles provided them. By 1850, the urban population had doubled, but the immigrant population had gone from 10% to 50%, further driven by the Irish Famine. Social crises developed.[4]

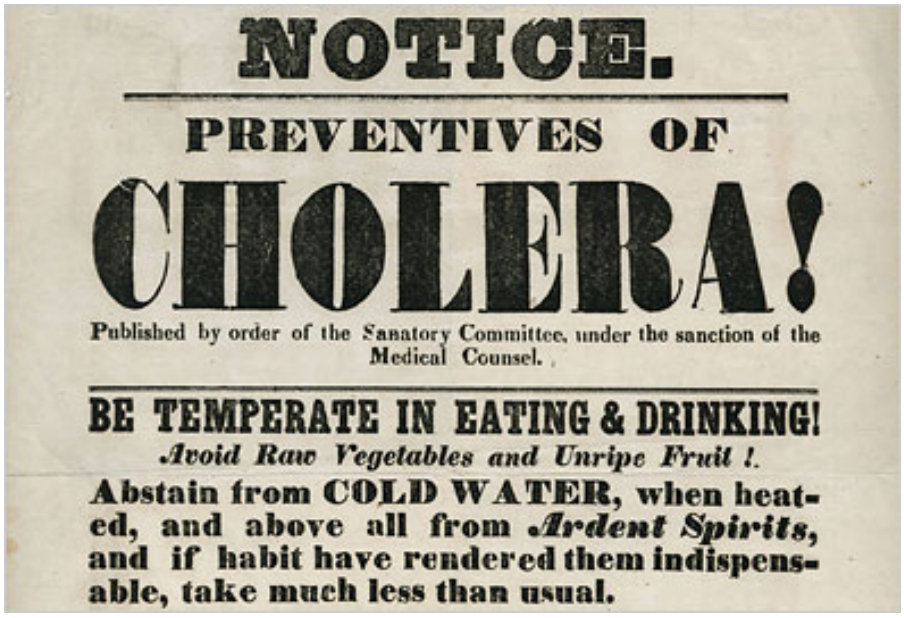
Cholera is caused by the bacteria, *Vibrio cholerae*, which leads to severe dehydration through diarrhoea and vomiting. Humans are the microbe's primary host, which are ingested via water, foods and surroundings contaminated by intestinal wastes. Endemic to India, the expansion of global trade networks had led to cholera's spread. The first widespread outbreak erupted in Bengal in 1817 and infected millions of people throughout Eurasia. Its progress continued.[5]

Cholera entered North America for the first time in the summer of 1832. In New York City, the mortality rate for infected patients was almost 50% – over 3500 people died. The dominant theories of disease at this time were that illness was caused by 'miasma' (bad air) or 'contagion' (touch). So, the direct treatment of individual patients was seen as being most important, with many doctors prescribed opium or bloodletting.[6] For cholera, these treatments had no effect.

It was widely felt that the cholera outbreak was linked to increased immigration from Europe, especially from Ireland, which had experienced a major famine in 1830. Irish migrants flocked to the colonies in British North America by June 1832, and cholera came with them to the ports of Quebec City and Montreal. New York newspapers proclaimed that 'Cholera broke out by Irish immigrants,' and the State of New York enacted a law 'to quarantine goods and people from Ontario and Quebec, Canada to New York State.'[7]

In response, seven prominent physicians were appointed to a special Medical Council in New York City. They ordered makeshift hospitals to be established, which had positive results, since it isolated patients from unsanitary environments. The council also published a *Cholera Report* to inform citizens about the epidemic, such as the numbers of patients and deaths per day, and it advised people 'not to eat raw vegetables or fruits.'[8]

Nonetheless, fear and horror about cholera spread rapidly. The Medical Council failed to settle the anxiety of citizens. As a result, distrust of public officials accelerated and private reform movements to control cholera began. Religious people insisted that cholera resulted from the immoral state of American society. Drawing on the Second Great Awakening, their arguments reflected the changes that were happening in American society.



NOTICE.

PREVENTIVES OF

CHOLERA!

Published by order of the Sanatory Committee, under the sanction of the Medical Counsel.

BE TEMPERATE IN EATING & DRINKING!

Avoid Raw Vegetables and Unripe Fruit !.

Abstain from COLD WATER, when heated, and above all from *Ardent Spirits*, and if habit have rendered them indispensable, take much less than usual.

Image 1: Left – Patient M.W. at the Rivington Street Cholera Hospital, New York City. She successfully recovered and was discharged from the hospital. Image in Bartley 1832. Because of dehydration, oxygen was not sufficiently carried throughout the body, which resulted in a bluish skin colour from hypoxemia. Hence, cholera was also called the 'Blue Death'. Right – Broadside from the New York City Medical Council, 1832. Courtesy of Wikimedia Commons.

New York City was the country's economic centre, the commercial link between America and Europe. Its residents had become more materialistic and pleasure-seeking. So, when the president of the New York Medical Council announced that 'cholera broke out more frequently among the intemperate and dissipated,' it appeared to lend support to a need for moral reform.[9]

In the late of 18th century, the celebrated Dr. Benjamin Rush of Philadelphia had noted that excessive drink did physical / mental injury. Many temperance organizations also emphasized that drinking caused economic poverty, split families apart, and led to inefficiency and decrease of productivity. Physicians and the Medical Council worked with social reformers, and in this way temperance reform and disease prevention influenced the enactment of prohibition laws.[10]

A pernicious movement developed around ethno-religious bias. Until this time, Euramericans tended to be relatively homogenous – of British and Protestant heritage. Because of an upsurge in Irish-Catholic immigration, Euramerican Protestants tried to maintain their ascendancy, which pitted 'nativists' against 'immigrants.' While reform movements were made up of educated Protestants, nativist workers spawned the violent Know-Nothing Movement.[11]

Irish Catholics were regarded as a threat, not least because they tended to be poor and lacked skills. Crowded together in urban slums, disease ran rampant. Almost 40% of the deaths from cholera in New York in 1832 were Irish – 1400 people. As a result, many American nativists believed that fatal infectious disease broke out because of the Irish and their 'intemperate life.'[12] The cholera epidemic became a chance to spread hostile discourse about immigrants.

Cholera 1849: Sanitary Reform

The movement to control epidemic cholera had improved by the time it next entered New York City, in December 1848, aboard a ship from France.[13] The Board of Health isolated passengers and crew, but almost half died. Cholera spread to the city, and almost 5000 people perished. Since the population had grown to half a million, mortality was not as bad as it could have been. The fewer deaths resulted from two English innovations.

When cholera had been in full swing in England in the 1830s, the government had empowered regional health boards to deal with elements that threatened community health, such as managing drains and cleaning streets. In 1848, the British government enacted the Public Health Act, which mandated the establishment of boards of health.[14] They also had learned that it was most important to improve water quality to control epidemic cholera.

Waterworks had begun to come into existence in the United States earlier in the century, but there was no fa-

cility to drain wastewater. Each home had a sewer, but few managed them hygienically. Many left a sewer until it overflowed and then threw wastewater into a street or river. When cholera began in 1849, the New York State Board of Health pointed to these sewers as a cause of cholera.[15]

Officials divided the city into districts and examined the sewers by visiting every home. Some resisted, saying it infringed on their individual rights, but most who had witnessed the effects of cholera accepted the suggestions of States Board of Health so as to better manage their sewer facilities.[16] Toilet waste was another concern.

A privy was outside the home, and faecal waste was collected in large baskets and used as farm fertilizer. The waste from homes in New York City was more than 100 tons a day. Collection reduced the problem for individuals, but it piled up for transportation and the Board of Health identified it as a cause of cholera. The city decided to install an underground septic system.[17] Sewage treatment equipment required large construction projects and huge amounts of money, but state and urban sanitation and public health agencies had no choice but to expand. Although there were objections about the burden of taxation, sanitary reform was implemented at private and public levels. It was felt that the cost to process wastewater and sewage was worth it, because of the lives it saved.[18]

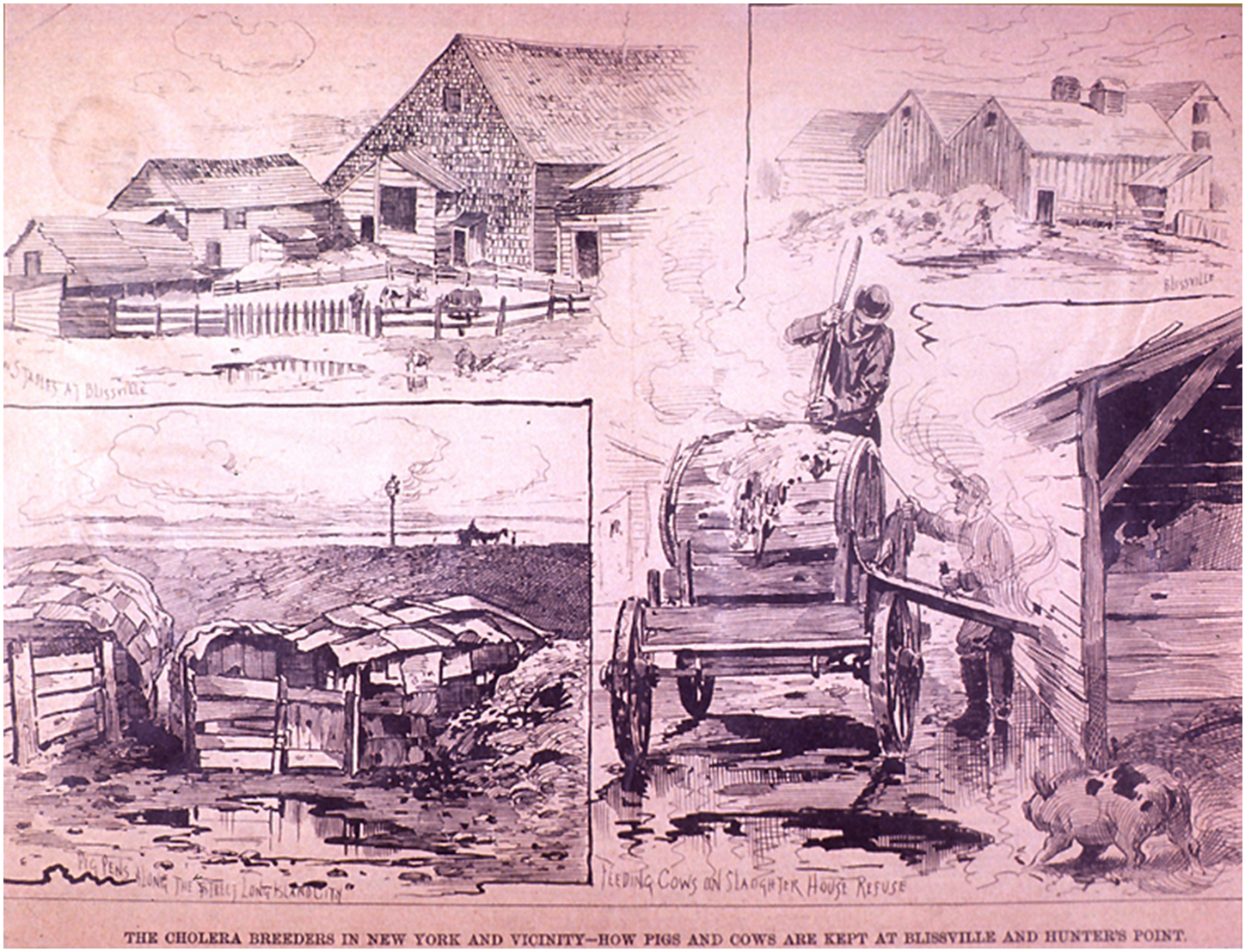


Image 2: 'Cholera Breeders of New York and Vicinity' – cow stables, pig pens, and slaughter-house fodder. National Library of Medicine, public domain, unsourced / undated, mid-19th century.

The *Report of the Sanitary Commission of Massachusetts* (1850) reflected this mood. It put emphasis on 'the necessity of public health' for development of the United States.[19] The cholera outbreak of 1849 was a watershed time for spreading public understanding of sanitary reform in American society. It was seen that sanitation in homes could be the foundation of urban and national public health.

Cholera 1866: Private Property and Medical Reform

Reforms continued through the Civil War (1861–1865), which included improvements in military surgery, nutrition, clothing, and accommodation.[20] Concerns about infectious disease remained, and moved in a new direction. A New York City physician, Stephen Smith, criticised close-living quarters as incubators for epidemic disease and emphasized the 'compulsory right to improve sanitary conditions had to be given to city government' to control cholera.[21]

Likewise, *The Report of the Council of Hygiene and Public Health of the Citizens' Association of New York* (1865) predicted that, if the problem of tenements and public health could not be solved, considerable loss would happen. New Yorkers began to see that sanitation was not only an individual problem but a group and social one too.[22]

The Metropolitan Health Bill was established in February 1866 and focused on sanitary reform of tenement houses. It set up the Metropolitan Board of Health, the first established by a municipality to improve sanitation in the United States. Immediately afterwards, cholera broke out. By May 1866, more than 1000 died of cholera. The Metropolitan Board insisted unsanitary conditions of tenements was the main cause of this outbreak of cholera.[23]

The Metropolitan Board's first strategy to improve tenement sanitation was to examine sewage arrangements and ventilation. They found, in one instance, almost fifteen people living together in a room. The city enacted the Tenement Law (1867), the first of its kind. Each bedroom had to have a window, an emergency exit route was required and a sanitary toilet.[24] In this way, epidemic cholera led to public regulation of private property so that American society could deal with infectious disease. It also had an impact on the medical profession.

Before the creation of the Metropolitan Board of Health in 1866, medical doctors had only been dispatched to boards of health after an occurrence of infectious disease. As a result, broad discussions of sanitation, public health and infectious disease had been confined to the political arena. The Metropolitan Board, however, stressed the necessity of having 'trained medical staff' such that at least three physicians were among the ten-member staff of the board. As a result, medical doctors began to take charge of public health in American society.[25]

Before this time, people believed disease resulted from 'natural causes' and preferred general treatment over professional care. Books on domestic medicine had been popular, and licensed physicians held little professional standing. Medical students took classes for three years and wrote a dissertation, but few schools kept to strict standards. A license was required to practice, but this didn't restrict who could treat patients. Although New York City issued licenses only to medical graduates and imposed fines on unlicensed doctors, there was little effect.[26]

But after 1866, the expectation that medical knowledge and professionalization was required to control infectious disease gained ground in the United States. People began to think of infectious disease in the discourse of science and medicine, not politics. They argued it was necessary to have a professional education and real medical experience to successfully investigate causes of disease and to implement effective treatments and policies for individuals and society.

In the 1850s, physicians Filippo Pacini and Joaquim Balcells i Pascual identified the microbe that caused cholera. Thirty years later, microbiologist Robert Koch and his colleagues elaborated the microbial process. And, in the 1950s, medical scientist Sambhunath De found the toxin generated by the cholera bacillus and amplified the details of infection. These studies encouraged new research in epidemiology and phage therapy, as well as revolutionized public health.[27]

Conclusions

Epidemic cholera was the most fatal infectious disease to enter American society in the 19th century. Social dynamics – migration, industrialization and urbanization – exacerbated the first epidemic. A few control strategies merged with moral reform movements in an attempt to solve the outbreak. Knowledge and remedial action evolved. The need for sanitation and public health was begun by the time of the outbreak of 1849, and, by 1866, public regulation of the private sector began, along with professionalization of the medical sector.

Cholera during the 19th century significantly contributed to development and change in American society. Efforts to control infectious disease and to improve sanitation and public health began to be recognized not just an individual problem, but also as a social concern. In this sense, three outbreaks of cholera incrementally brought about reform in American society. These movements were never isolated: Moral reform expanded to sanitary and medical reforms,

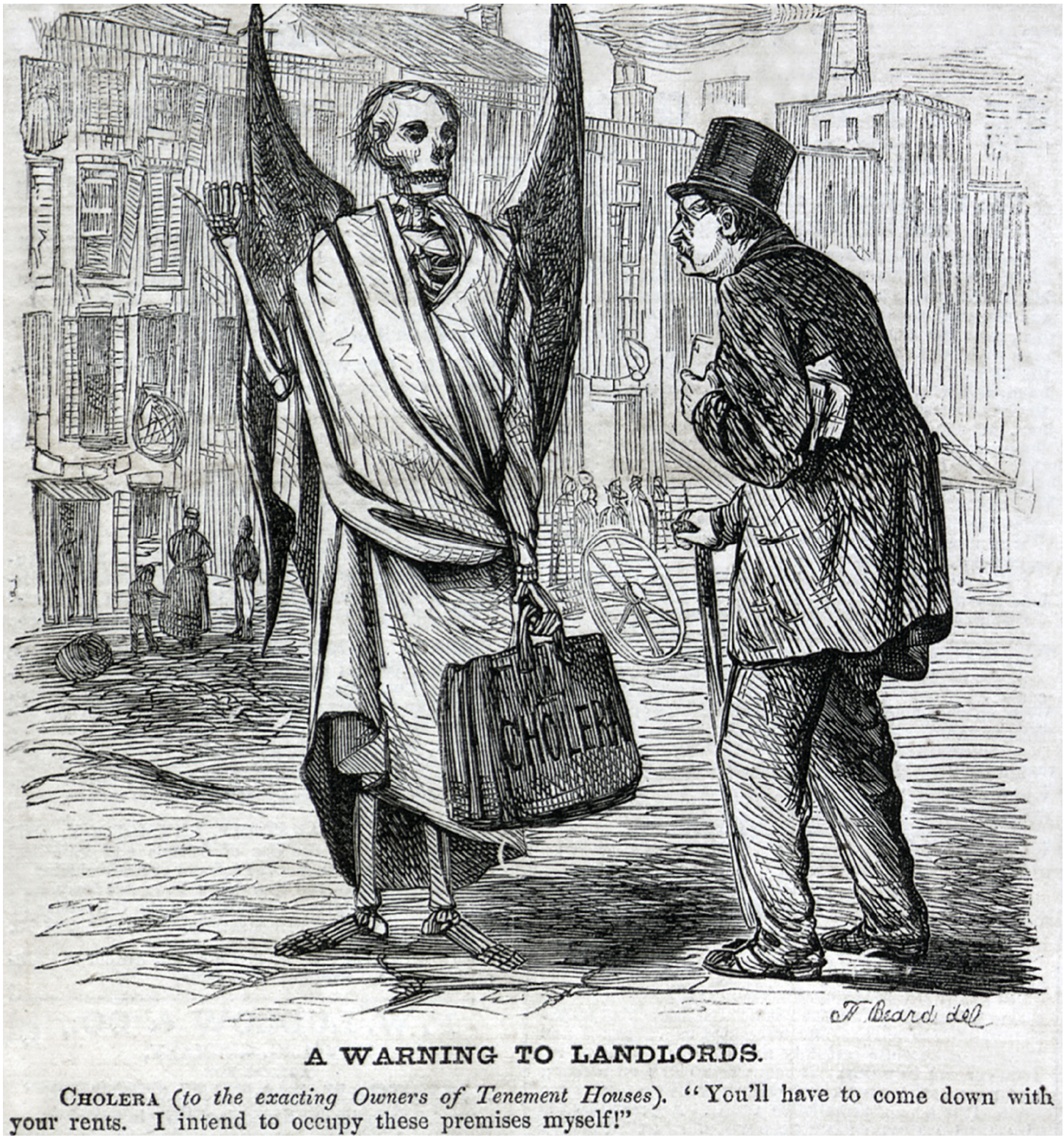


Image 3: In this illustration, the blame for cholera focuses on the landlords of New York City's tenement houses, in which poor ventilation and running water served as a breeding ground for disease. *Harper's Weekly*, 24 March 1866: 192.

and they influenced each other.

The circumstances were not dissimilar to those we face today. We have a climate crisis linked to population and industrial growth, with impeding migration of climate refugees about to unfold in a massive way. Our political infrastructures are ill prepared to handle existing crises, let alone the enormity of events in the near future. Social reform movements have proliferated – both positive and negative – and are better linking with each other. Will humanity survive? It is an unknown process.

Some big-picture scholars are engaged in these issues. Besides being an astronaut, physician Roberta Bondar has helped to document the changing pattern of disease as a result of climate change and has worked to develop the infrastructure changes to mitigate the effects.[28] And while medical anthropologist Robert Aunger had been an early contributor to Big History, his public-health work has led to projects in water, sanitation, nutrition and disease on the African and Eurasian continents.[29]

The 19th century was a time of grim change. Cholera was one of incidents that gave the most concern and produced terror for people. The interaction of competing and cooperative forces led to integration and improvement in both science, critical judgement, and social justice. This article is intended to show that there is hope by considering the big picture and applying Big History in our world actions.

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Big History
Outlooks and Philosophy

Wang Dongyue's Weakening Compensation: An Asian Approach for Big History

Hirofumi Katayama
J.F. Oberlin University
Tokyo, Japan

Correspondence | **Hirofumi Katayama** katayama@obirin.ac.jp
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In this paper, I introduce a theory of Chinese philosopher, 王东岳/ Wang Dongyue, and discuss the implications of it, reflecting on its possibilities for Asian Big History and as an alternative or complementary way of constructing grand theories of Big History.[1] I believe Wang's theory of weakening-compensation liberates us big-historians from a stereotypical understanding of our field. It enables us to acquire diversified perspectives on Big History and helps us overcome some serious problems that mainstream Big History faces.

Problems of Mainstream Big History

I've long been dissatisfied with mainstream Big History, as represented by David Christian and other's text, *Big History: Between Nothing and Everything* (2014), and Fred Spier's *Big History and the Future of Humanity* (2015). My dissatisfaction is primarily because of their anthropocentric and modernistic characteristics.[2] The principal keywords of mainstream Big History are 'complexity' and 'collective learning.' As a result of this focus, the history of the universe is one of increasing complexity, where human beings of the modern era are placed at the highest state of complexity, or evolution, thanks to their abilities with collective learning.

Of course, I admit the amazing accomplishments of modernization and the greatness of humanity, but when I try to apply Big History to today's global problems, which complexity and collective learning themselves have helped to bring about, I find it difficult for mainstream Big History to critically understand and offer clear solutions to the problems of the Anthropocene. This is especially true for global, ecological problems like climate change and the loss of biodiversity, as well as problems of our information society, called *Dataism* by historian Yuval Harari (2015).

We can position mainstream Big History alongside the variety of complexity theories that arose in the 20th century, such as self-organization, cybernetics, dissipative structure, general systems, synergetics, autopoiesis, and spontaneous order. These approaches regard an organism and its eco / social habitat as *complex systems*, which evolve by adapting to the environment. Biologist Stuart Kauffman discusses the motivation of complexity in his book, *At Home in the Universe* (1995):

> The second law of thermodynamics has been thought to be rather gloomy … UNIVERSE RUNNING DOWN, HEAT DEATH HEADED OUR WAY, DISORDER IS ORDER OF THE DAY …. It is not entropy but the extraordinary surge toward order that strikes me.[3]

Kauffman implies that an aim of complexity theory is to help calm humanity from developing too pessimistic a sense of a 'paradise lost' in the modern world.[4] Astropysicist Eric Chaisson's use of the concept of 'free energy rate density' played an important role in this respect.

Free energy rate density is an equation that relates units of energy per time per mass, and it clearly shows that more complexity requires more energy (per time per mass). This is his key concept to 'reconcile the theoretical destructiveness of thermodynamics … with the observed constructiveness of cosmic evolution.'[5] He summarizes various complexity phenomena and assembles them into a unified history of the universe, thus laying a foundation for mainstream Big History as a history of increasing complexity. Chaisson does indicate the 'cost' of complexity – an increase of energy use and entropy – and shows that it is unable to overcome the Second Law of Thermodynamics. Unfortunately, he doesn't emphasize this last point, keeping his focus is on complexity increase and related structural changes.

In his book, *Origin Story* (2018), David Christian emphasizes the negative side of complexity as a 'tax,' as in a complexity tax or entropy tax. He argues: 'Increasing complexity is not a triumph over entropy.'[6] The notion of an entropy tax is one of the most important keywords in his book, but complexity still forms the core of his story, along with the characteristics of mainstream Big History. Christian considers complexity to be a good thing. He feels a sense of crisis about the cost of complexity, but not about complexity itself.

Wang Dongyue's Weakening Compensation

Mainstream Big History is confined in a cage of modernization and its consequence – the Anthropocene. This is a reason for considering Wang Dongyue. Wang is an independent Chinese scholar, whose specialty is philosophy. The title of his main work is 物演通论 [General Theory of Evolution].[7] An English translation is titled, *A Unified Theory of Evolution: Natural, Mental, and Social* (2020), and I introduce his theory based on this English translation.

The source of Wang's idea is from 老子 [Laozi], the famous Chinese scholar from the 6th century BCE. Laozi defined 'origin' of all beings as 道 [Dao]. Here are two key phrases from Laozi's work 道德经 [Daodejing], section 40.

First, 反者道之动 [Reverting is the movement of Dao]. Wang points out that Laozi believed human civilization was moving away from the Way of Nature – 'losing Dao.' So, Laozi advocated for a 'return to simplicity' or a 'return to origin,' to 'discard wisdom' or 'reject knowledge.' Wang calls it a 'doctrine of doing things unintentionally.'

The second is弱者道之用 [Weakening is the effectuation of Dao]. This roughly means that the phenomenon of weakening is the unfolding of Dao and the form of its realization. Wang calls it 柔弱论 [doctrine of weakness].[8]

Wang boldly applies Laozi's Taoist philosophy to Big History, especially in his doctrine of weakness, and makes a unique interpretation of cosmic evolution from this standpoint. His book has three parts – philosophy of Nature, philosophy of Mind, and philosophy of Society. He discusses his theme based on his broad Western philosophical knowledge.

Philosophy of Nature

The starting point of Wang's theory is the concept, 存在效价 [potency-of-being], an entity's strength or stability. Its amount is expressed by 存在度 [degree-of-being], which determines stability.[9] When a degree-of-being is low, it means an entity is fragile and easy to destroy, but when it is high, it is stable and able to last for a long time in the universe. Wang asked: How is the distribution of the degree-of-being accomplished? There are five possibilities:

- Chaotic distribution –
  there is no tendency.
- Equal distribution –
  relative stability of each entity is equal.
- Wave distribution –
  each entity's stability has periodic wave movements.
- Rising distribution –
  a tendency to increase.
- Falling distribution –
  a tendency to decrease.[10]

Perhaps mainstream big-historians consider the evolution of the universe is in the rising distribution. For example, Darwin's evolution theory and his view that 'the fittest survive' seems to imply that the tendency of a species' degree-of-being is to increase. Surprisingly, Wang adopts an entirely opposite conclusion.

Entities in the universe have evolved from a physical structure of particles and atoms to chemical arrangements of molecules … then biological beings emerged, followed by human beings. Wang sees this process of transformation as a tendency to decrease. He summarizes this as:

1) 相对量度递减 –
   gradual decrease in relative quantity.
2) 相对时度递短 –
   gradual shortening of relative existing time.
3) 衍存条件递繁 –
   gradual complexification of the sustaining condition.
4) 存变速率递增 –
   gradual increasing rate of variation.
5) 自在存态递失 –
   gradual disappearance of being-in-itself.
6) 自为存态递强 –
   gradual invigorating of being-for-itself.

Figure 1 is a diagram of an evolutionary gradient based on these tendencies. When an entity climbs up a gradient, mass distribution decreases, time-span shortens, and the complexity and differentiation increase. As for 5) above, *being-in-itself* means that an entity has independently existing power, while for 6), in contrast, *being-for-itself* means that an entity's existing power is so weakened that it cannot exist without supplementing itself with subsidiary attributes or structure.[11]

Wang explains these tendencies with an example. Single-celled organisms, such as cyanobacteria, have the highest degree of being of all biological beings. Their volume is small but their relative surface area in contact with the environment is large, so they can efficiently absorb nutritional substances. Their growth potential and adaptivity is high. They occupy a broad area or space. In contrast, the more evolved an entity is, the lower the degree-of-being and the more complex the attribute-of-being it has. Wang expresses it concisely in thirty Chinese kanji characters:

体积小, 面积大 – Small volume, large area.
吸收多, 转化强 – More absorption, strong transformation.
生长旺, 繁殖快 – Vigorous growth, fast-breeding.
适应广, 易变异 – Broad fitness, easy variation.
分布广, 种类多 – Wide distribution, numerous types.[12]

Why do entities tend to weaken? And how can weakened entities continue existence? Wang argues that, from the very beginning, entities have been unable to sustain themselves sufficiently, so they have a tendency to compensate for their own inadequacy. This is the inner driving force of evolution or development. From this standpoint, every compensation is a loss from the previous degree of being, and this compensation and loss creates a positive feedback loop – compensation caused by weakening, and a weakening process caused by compensation. In consequence, as Figure 2 shows, the movement from sustaining being to 失存 [losing being] is the irreversible path of material evolu-

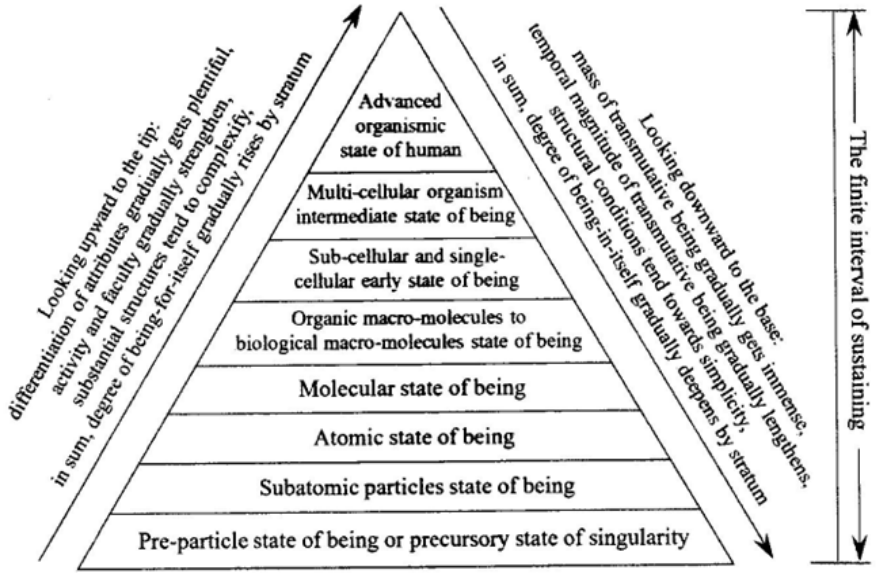

Figure 1: Diagram of Evolutionary Gradient. Wang 2020: 18.

tion. Wang calls this tendency 递弱代偿法则 [the law of gradual weakening compensation]. This is the most fundamental law in his theory.

In the diagram, Wang shows how the original-entity, which is unified, simple and stable, passes away, as its potency-of-being gradually diminishes and its 代偿效价 [potency-of-compensation] and 代偿度 [degree-of-compensation] gradually increases. The degree-of-compensation is a concrete indicator of the potency-of-compensation, which determines how any transmuted entity sustains its qualitative state of being while inevitably losing its potency-of-being.[13]

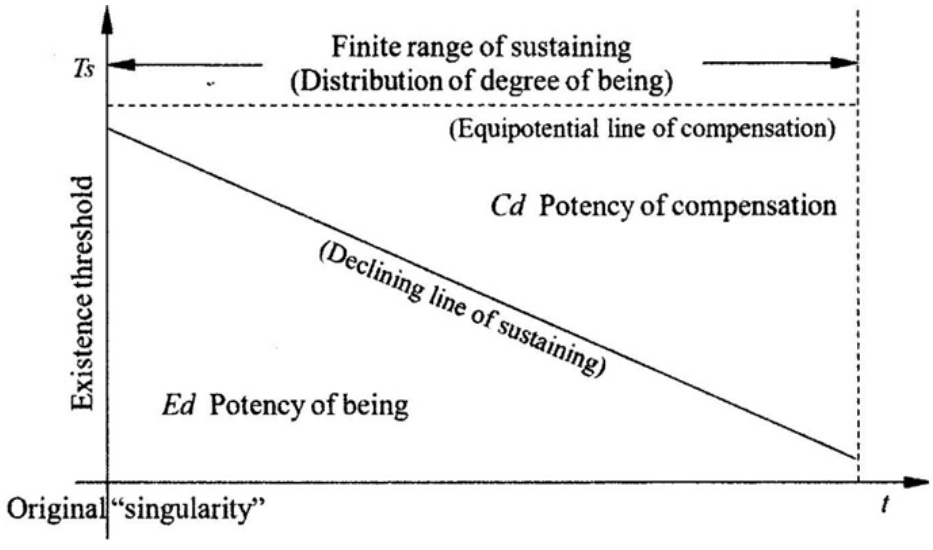

Figure 2: Diagram of the low of gradual weakening compensation. Wang 2020: 66.

What is important, especially for mainstream Big History, is that in this law: *Weakness bears an inverse relation to complexity*. Wang argues: 'all beings in the universe are gradually transmuted and bustle with activity and that attributes of being gradually rise in complexity, which leads to faltering instability.'[14] These attributes express themselves in the forms of 'mind' and 'society.'

Philosophy of Mind

According to Wang, there are two ways for compensation to happen – acquiring new attributes or making a new structure with other entities. An attribute is an entity's qualities, and structure is an entity's interdependent form. All entities compensate their weakness by adding attributes or by forming a structure, which raises their complexity, and therefore weakens their potency-of-being, leading to more instability.

In this process, for social lifeforms, an entity's attribute evolved into mind and its structure evolved into society. According to the theory of weakening-compensation, the potency of any concrete entity inevitably tends to decay, demanding a corresponding amount of attributive-compensation to maintain itself. Because this process goes on irreversibly in the long run, it results in modes of attributive-compensation developing to an extremely complex level, which is the origin of mental beings.

Wang calls an entity's ability to sense and respond to outer circumstance感应属性 [affective attributes]. Even the most primitive matter, such as electrons, have affective attributes – 感应 [affectivity]. This is the physicho-chemical stage of induction. An electron gets into the orbit of a proton and makes an atom, which is a starting point of the mind. Next, this physicho-chemical matter's attribute of sense-response evolves into the biological attribute of perception – 感性 [sensibility]. This is the primitive stage of lower biotic entities. They acquire a sense-organ system and neural network, which is the origin and foundation of perceptual physiology. 知性 [understanding] is the formation of judgement emerging in animals at the vertebrate stage.[15] This is the source and foundation upon which humans established their categorized identifying response. And finally, 理性 [reason] is the

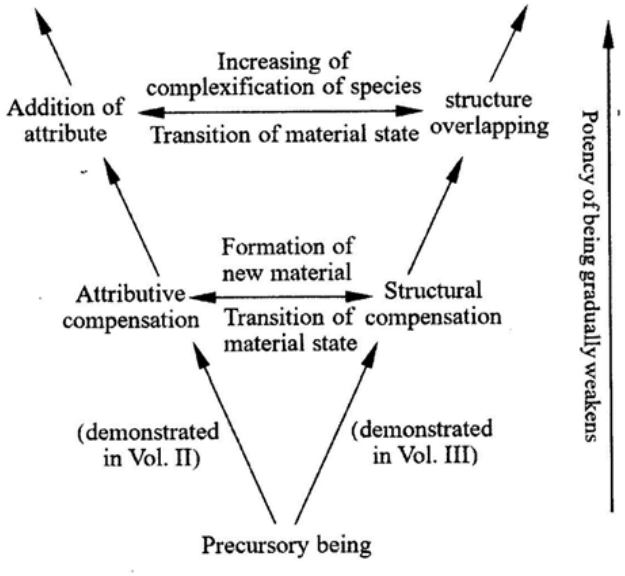

Figure 3: Pathway of parallel compensation for attribute and structure. Wang 2020: 38.

affective attribute in the stage of human civilization that uses symbolic languages.[16]

Reason is the extreme product of the 虚代偿 [virtual compensation] of affective attribute. Reason uses 理想逻辑 [ideal logic] for the thought of pure reasoning and thus transcends the intuition of sensibility and the judgement of understanding. Ideal logic has a plastic moving constitution of 伪在 [false being] and its unsteady solo progression presents a vector of 危在 [critical being]. Reason is the affective-attribute of the weakest and the most interdependent being.[17]

Philosophy of Society

Each weakened being not only adds new attributes to itself, but it also makes coupling linkages of mutual supplementation with each other and in doing so they attain the restructuring vitality of social-compensation. Society is the derivative carrier of the evolution of natural structure and the collective realization of the coupling of evolved attributes. Of course, this process also involves the Law of Weakening Compensation. The degree of being / stability declines, while structure and interdependence inside each group continually rises higher.

Society is the evolved form of structure, so we could say a molecule is a 'socializing' compensation of atoms. However, society's original meaning is related to life. An organic entity's physical attributive-compensation makes it weaker, and this requires organisms to develop social-structural compensation.

Wang points out three stages of society. 1) 初级社会 [elementary society] is that of single-celled organisms. The degree of single cells is rather high, so they live in the most stable natural society. 2) 中级社会 [intermediate society] is the social stage of all multicellular organisms from the Cambrian Period into the Quaternary. 3) 晚级社会[advanced society] refers to civilized human society. Since intelligent reform transcends the space-time restrictions of physical variation, its degree of differentiation is extremely high, and the degree of survival of its social constituents is drastically reduced, thus making it rapidly approach toward the highest degree of biological social structure and the most unstable critical point of losing being.[18]

The evolutionary course of society is described in Figure 2. If the socially structured state increases its complexity and shifts from left to right, the individual and overall survival power of the species tends to weaken in biological evolution.

At the end of his book, Wang states his conclusion: '"Human nature" is the expression of "all natural beings," and "human being" is the miniature of "the universe," or rather, "human being" is the latest weakened sustaining constitution of "the universe's evolution," which is the modern annotation of the Idea on 天人合一 [the integral oneness of Nature and humans] found in ancient Chinese philosophical thought."[19]

What does this Wang's phase mean? Isn't it another form of anthropocentrism? I do not think so. The ancient Greek philosopher Socrates said, γνῶθι σεαυτόν [know thyself]. Following the phrase, what Wang means is 'know thy weakness,' or, more precisely, 'know thou art weak.' That is, when you realize and admit you are the weakest being in the universe, you can see you are connected with, interdependent with, and supported by everything in the universe. This is the most important massage I received from Wang's theory.

Weakening Compensation / Relational Big History

So, what implications his theory has for mainstream Big History? The first is the possibility of relation-oriented Big History. Wang's weakening-compensation shows that modernization and the complex structures that humans have attained express not only their strength but also their weakness. Wang says simple and clearly: 'Complex forms directly express the weak essence.'[20]

In other words, we can say that complexity is a relationship. It is not a substance that belongs to any one being but to a nexus of beings. A being having more complexity means that it is connected with others in more relations. In this respect, we can distinguish two kinds of complexity – *closed-complexity* and *open-complexity*. In closed-complexity, potency-of-being is higher as complexity increases. In

open-complexity, potency-of-being is lower as complexity increases, because the sum of its potency-of-being and potency-of-compensation is constant (as shown in Fig. 2).

Mainstream big-historians also refer to the negative side of complexity. For example, David Christian argues:

> It's as if entropy demands more energy from an entity if it tries to get more complex: more complex things have to find and manage larger and more elaborate flows of free energy. No wonder it's harder to make and maintain more complex things, and no wonder they usually break down faster than simpler things … . Increasing complexity is not a triumph over entropy.[21]

However, Christian doesn't put the relation-nature of complexity in his perspective and recognizes it only a closed aspect of an individual being.

Wang's theory has an affinity with relation-oriented theories of big-historians such as Sun Yue's 'Tao of Big History,' Lowell Gustafson's 'Big Politics,' and Barry Rodrigue's *mutualization*. Rodrigue argues:

> Big History is a process of mutualization, since it results in heightened awareness of the fragile, mutual dependence between human and non-human worlds, between organic and inorganic regimes, as well as between microscopic and macroscopic levels – on Earth and beyond.[22]

What Rodrigue states here is completely the same as Wang's concept of weakening-compensation. In fact, Rodrigue himself refers to Wang and argues:

> Many scholars focus on complexity as a benchmark of evolution. While this is an important concept, philosopher Wang Dongyue reminds us of the fragility of complexity: as things become more complex, instability increases.[23]

Wang's weakening-compensation doctrine and related-oriented Big History can provide a strong foundation for 'care' and 'empathy.' In capitalist society, especially that of neoliberalism, people have considered care to be of low or inferior value. Care means weakness and dependence, and is less valuable than capitalist-neoliberal concepts such as autonomy, independence, and competitiveness. The pandemic of COVID-19 all over the world shows how caring efforts are essential for our society and how they have been underestimated in our capitalist society. Political scientist Joan Tronto stresses the importance of care in a democratic society and defines care:

> … in the most general sense, care is a species activity that includes everything we do to maintain, continue and repair our world so that we may live in it as well as possible. That world includes our bodies, our selves, and our environment, all of which we seek to interweave in a complex, life-sustaining web.[24]

She points out that care is an activity rooted in the essence of our species as *Homo sapiens*. In addition, care is always relational. Interactions among people through caring-for, caring-about, care-giving, and care-receiving make us interwoven into the web of life.[25]

Empathy is another keyword in the present world. The Anthropocene is an era in which we must reconsider what humanity is. On the one hand economic and cultural activities of human beings have influenced the Earth severely and have brought many species into extinction. On the other hand, astonishing development of information technology has caused AI to surpass our intelligence, which was formerly regarded our excellent ability compared to other animals. We have to redesign our relationship with other lives and AI, and I think empathy is an ability we should rely on for making new relationships. Animal ethologist Frans de Waal argues in his *The Age of Empathy*: *Nature's Lessons for a Kinder Society* that empathy is human being's profound emotion which had been built in the long evolution process as mammals:

> As is true for many mammals, every human life-cycle includes stages at which we either depend on others (when we are young, old or sick) or others depend on us (when we care for the young, old or sick). We very much rely on one another for survival. It is this reality that ought to be taken as a starting point for any discussion about human society, not the reveries of centuries past, which depicted our ancestors as being as free as birds and lacking any social obligations.[26]

Empathy can be a tie between us and other lives, based on our weakness as mammals. And, at least for the near future, AI cannot acquire the ability.

As explained, Wang's weakening-compensation offers us a vision of care, empathy and mutual support, instead of the jungle law of neoliberalism. The values of 'complexity-oriented' Big History are pluralism and diversity. Kauffman provides us with a vision of world civilization as a pluralistic global community, providing evidence that it is not merely

a human creation but part of the natural order of things.[27] Of course, it is very important, but it is not enough. Paying attention to weakness, and admitting we are weak, allows us to find the importance of care and empathy. Weakness (and mutualization) is not only a description of the situation but also a way for us to change the world.

Altermodern Big History's Critique of Modernization

The second implication is the possibility of altermodern Big History. *Altermodern* implies an alternative way of overcoming defects of modernism, modernization, and the Anthropocene. Wang's theory urges us big-historians to question modernism, and the process of modernization, by an altermodern understanding of Cosmic Evolution. As examples, I share two of the most serious problems of modernization in the Anthropocene.

1. Humankind's Engineering Approach towards Nature

The basic characteristic of engineering is to control Nature – imposing a uniform framework of change from outside, regardless of a situation's unique characteristics or potential to change on its own. One of the most prominent examples is how we fill the Earth with artificial objects, such as concrete construction materials and plastics. This human-made mass – *anthropogenic mass* – currently equals ≈1.1 teratonnes and has been doubling every ≈20 years in recent history. In 2020, it surpassed all living biomass on Earth, equalling more than every human's body-weight each week.[28]

The climate change we are facing will acelerate this process in a vicious cycle, because we tend to use engineering technologies to adapt to climate change, such as additional dam construction for flood control, climate engineering for climate control, and genetic engineering for making animals and plants endure rising temperatures. The future of the Earth may become a concrete-covered 'engineering planet.'

A problem is that mainstream Big History cannot criticize this engineering future, because mainstream Big History itself is a product of modernism and cannot escape its influence. Complexity theories regard engineering as a kind of adaptation, a desired complexity, and even sustainability. David Christian distinguishes two types of Anthropocene – Good and Bad. He argues that we should preserve the best of the Good Anthropocene and avoid the dangers of the Bad Anthropocene.[29] But, these are two sides of the same coin. It is modernism that has caused not just the Good but also the Bad Anthropocene. Without this recognition, we would improve the results of modernism by the method of modernism.[30] It involves the risk of making the engineering planet happen.

Obviously, we need another paradigm to supplement mainstream Big History. Wang's weakening-compensation gives us a useful theoretical foundation to criticize the modernization process. The world becomes more and more destabilized with a lot of floods, wildfires, and droughts. The more we compensate our weakness by engineering, the more we become weak. Wang's theory provides a good explanation about how and why the engineering approach falls into this vicious cycle.

2. Destabilization of the Information Society

As Yuval Harari argues in his book, *Homo Deus* (2015), information and communication technologies interpret life and humanity as mere algorithms, and, in consequence, our existence dissolves into *information*. He asks three questions:

1) Are organisms really just algorithms, and is life really just data processing?
2) What's more valuable – intelligence or consciousness?
3) What will happen to society, politics and daily life when nonconscious but highly intelligent algorithms know us better than we know ourselves?[31]

How should we recognize *Dataism*, a consequence of modernization, and how should we deal with its harmful effects? Mainstream Big History cannot provide good answers to these questions, because complexity is its principal criteria for judgement. Wang's theory can provide a critical viewpoint about this problem.

He criticizes *logos*, an important concept in Western culture. The term refers to a simplified, mechanistic understanding of how things work and fit together, and so it often is a conceptual abstraction of reality. According to Wang, logic (in a broad sense) has a 'logic-sequence' that includes 'logic-of-physicho-chemical affection' and 'logic-of-biological-instinct.' It reaches a final stage, for Wang, in logic-of-reason, the concept that people usually call 'logic' (in its narrow sense).

Wang sees logic as a product of weakening-compensation that promotes 虚化 [virtualization]. At the stage of logic-of-reason, mental activity becomes the dominant element of an actual physical being. This makes us weaker and, for compensation, we promote further virtualization. As a result, it leads to 危在 [critical being] and a subject's state of being becomes

increasingly unstable – to the point of self-disappearing.[32] Wang describes the negative side of information society, but he doesn't provide a solution.

To my mind, it is necessary for big-historians to reconsider 'knowledge' in collective learning. In the field of biodiversity conservation, for example, the knowledge of indigenous peoples is often regarded as important as scientific knowledge, because it is more concrete, contextual, and often more harmonious with Nature. In Wang's terms, the degree of compensation of indigenous knowledge is lower than scientific knowledge, because indigenous knowledge has a higher potency-of-being. In this way, weakening-compensation corrects the tendency for mainstream Big History and complexity theories to impose ranks on things, according to its views of complexity.

Vision of Asian Big History

An implication of Wang's critique is an alternative narrative for Big History. Wang's weakening-compensation, based on Taoist philosophy, gives us new insights for unifying the connections between Nature, Life and Society, based on contemporary scientific knowledge. By doing so, he showed it is possible to interpret Big History in a different ways from the mainstream. We can call Wang's theory part of 'Asian Big History.'

I believe that Big History as science is one approach, but the field has more than a single unfied perspective. What does the perspective mean? The celebrated Japanese Buddhist priest 日蓮Nichiren, who was born just 800 years ago, said that hungry spirits perceive the sacred Ganges River as fire, human beings perceive it as water, and heavenly beings perceive it as *amrita*. Amrita is a drink that gives us immortality. Nichiren argues that, though the river is the same, it appears differently, according to one's mental state. Similarly, we can see the Ganges of Big History differently, according to our cultural background and practical position.

My own vision of the Ganges is a form of 'Buddhist Big History.' Wang's concept of potency-of-being has a sense of respect for Nature, respect for all life, and respect for all nonliving beings. Buddhism has embodied this idea in the concept of 仏性 [Buddhahood].[33] Later, Japanese Tiantai [天台], a 6th century BCE East Asian form of Mahayana Buddhism, developed the idea by adapting it to everything in the universe and summarized it in the word 草木国土悉皆成仏, which means that grasses, trees and lands, indeed all beings, have Buddhahood.

As an example, let me share a poem that shows the viewpoint of Buddhist Big History. This poem, 大漁 [Big Catch], is a work of Japanese poet 金子みすゞ Misuzu Kaneko (1903–1930).[34] It is well-known in Japan, because you can see it in Japanese textbooks, even for elementary schools.

I teach a Big History course at J.F. Oberlin University and make it a rule to read this poem after I finish the lectures on the eight thresholds and the Anthropocene. Then students easily recognize that the theme of the poem is as Big History tells us – respect for all existence and a need to avoid anthropocentrism. Mainstream Big History also has respect for all life in its key concept of *emergence*, as well as in complexity. Every entity and being has emerged in the universe in the cosmic historical process. The problem is that it tends to rank these beings by the criteria of complexity.

Philosopher Ken Wilber criticizes the egalitarian viewpoint of eco-philosophers as 'flatland' in his book, *A Brief History of Everything* (2007). He says that if a being is more complicated, it has greater 'depth' and less 'span.' There is a 'holarchy of value' in which every being has intrinsic value, but these values are in gradation. He argues:

> Many ecophilosophers agree with those statements, but they can't say why, because they have a hierarchy that denies hierarchy – they have only the flatland web of life and bioequality, which is not only self-contradictory, it paralyzes pragmatic action and cripples intrinsic values.[35]

However, from the viewpoint of weakening-compensation, such an anthropocentric, complexity-oriented approach blinds us to the fact that we are weak and connected with everything. Depth is weakness. The gradation of depth is the gradation of weakness. Asian Big History finds in itself not only respect for others but also self-affirmation. While modern and Western self-awakening is derived from Descartes' axiom, 'I think, therefore I am,' in contrast, Asian self-awakening is between the macrocosm and microcosm, such as the Chinese 天人合一 or Hindu 梵我一如 (corresponding to Brahman and Atman). The self-awakening stems from awakening of the understanding: 'I am weak.'

Conclusion

In this paper, I have tried to describe the vision of Asian Big History based on Wang Dongyue's weakening compensation theory. My vision of Asian Big History is relation-oriented, altermodern, and non-anthropocentric.

Perhaps mainstream big-historians will ask me: 'Do you run the risk of dissolving Big History into different regional forms?" I admit that

朝焼小焼だ	At sunrise, glorious sunrise
大漁だ	it's a big catch!
大羽鰯の大漁だ。	A big catch of sardines!
浜は祭りのようだけど	On the beach, it's like a festival
海の中では何万の	but in the sea, they will hold funerals
鰯のとむらいするだろう。	for the tens of thousands dead.

Big History is and should be humankind's common story and that mainstream Big History is a great achievement. However, mainstream Big History is captivated by modernism. So, we have to get out of it and look at it from outside – a new perspective. There are various ways to do so, and, for me, the way is Wang's Asian approach for Big History and my own vision of Buddhist Big History. As of now, I have no intention to propose that it is 'the' alternative to mainstream Big History. Asian Big History may be the *yin* [陰], which has a complementary relationship with *yang* [陽], as physicist / ecologist Fritjof Capra argued in *The Tao of Physics* (1982).[36] I would like to emphasize that I do not want to return to Asia but want to go to cosmic space and get a truly cosmic perspective. The only thing I know at present is that mainstream Big History itself needs a viewpoint from outside. Go out of it, and we will get a broader perspective of Big History.

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Endnotes

1. Wang Dongyue is an independent scholar. He was a medical student and acquired a master's degree in medical science, but he left the healthcare field shortly after he graduated. For a period, he worked as a guest professor of philosophy in the Northwest University in Shaanxi and also as a guest professor of Eastern Culture in the Communication University of Xi-An, Shaanxi, China. Wang 2020: v.

2. This point is argued also by Tsujimura and Katayama 2017.

3. The capital letters were in the original. Kauffman 1995: 10.

4. In his *The Entropy Law and Economic Process*, Georgescu-Roegen stresses the importance of the irrevocability of the entropic process and argues: 'It concerns one of man's weaknesses, namely, our reluctance to recognize our limitations in relation to space, to time, and to matter and energy. It is because of this weakness that … the idea that we may defeat the Entropy Law by bootlegging low entropy with the aid of some ingenuous device has its periodical fits of fashion.' Georgescu-Roegen 1971: 6.

5. Chaisson 2001: 132–136.

6. Christian 2018: 48.

7. Wang's book was first published in 1995, and, in 2015, the fourth edition came out.

8. Wang 2020: 26.

9. Wang 2020: 62.

10. Wang 2020: 17–18.

11. Wang 2020: 22–24

12. Wang 2020: 348–349.

13. Wang 2020: 62.

14. Wang 2020: 47.

15. Usage of the term 'understanding' is different from that of Western philosophical tradition. Wang explains the term at the glossary of the book: it specifically refers to the acute response of judgment emerging in animals of the vertebrate stage, that is, the complex identifying functions exhibited by the lower central nervous systems that begin to develop since notochord animals. It is the source and foundation upon which humans established their categorized identifying response. Since past philosophers failed to grasp where it comes from, they viewed it unique to humankind and confused it with the categorical classification of predicates in elemental judgement of reason, or even arranged it to represent the totality of human perceptual capabilities (as Kant did). So, I cannot help but follow the old usage at some points in my book, but the reader should rigorously distinguish them when it comes across" (Wang 2020:526-527). In general, mainstream Big History tends to stress discontinuity between thresholds, whereas Wang pays attention to continuity. In the present various disciplines, especially neurobiology, are also more concerned about the continuity of mental phenomena among humans and animals. For example, see Ginsburg and Jablonka (2019).

16. Wang 2020: 154.

17. Wang 2020: 239–242.

18. Wang 2020: 378.

19. Wang 2020: 511.

20. Wang 2020: 55.

21. Christian 2018: 47–48.

22. Rodrigue and others 2015: 10.

23. Rodrigue 2022: 29. He also argues on the point: 'In other words, building on what mainstream big historians already know - complexity is dangerously fragile. So, in our understanding of the present and in planning for the future, we need to strongly engage with understanding the fragility of our complex existence. While we plan, we must logically simplify and allow for variety … in order for all lifeforms to have a better chance of survival together.' Barry Rodrigue, e-mail to Hirofumi Katayama, 27 August 2022.

24. Tronto 2015: 3.

25. These are the *four phases of care* that Tronto describes. Tronto 2015: 5–6.

26. Waal 2009: 21.

27. Kauffman 1995: 5.

28. Elhacham and others 2020: 442.

29. Christian 2018: 282.

30. In the field of environmental economics, this approach is called *ecological modernization*.

31. Harari 2015: 462.

32. Wang 2020: 226, 250, 259.

33. The Buddhist text, the *Tathāgatagarbha Sūtra* [如来蔵経] first explained that every living thing [sattva / 衆生/] has buddha-essence [tathagatagarbha / 如来蔵/], while the *Mahāyāna Mahāparinirvāṇa Sūtra* [涅槃経] provided the concept of Buddhahood [仏性 / Buddha-dhātu] and explained that '一切衆生悉有仏性' [every living thing has Buddhahood]. The *Ratnagotravibhāga* [

宝性論] completed the theory of Buddhahood, arguing that the purpose of preaching Buddhahood is to correct five mistakes: self-humiliation, contempt for other inferior living thing, obsession with delusion, slander of the Law, and self-centeredness. Buddhahood also confers on us five merits: self-affirmation, respect for others, wisdom [般若 / prajñā], knowledge [jñāna], and compassion for self and others.

34. This translation is in Kaneko (2016).
35. Wilber 2017: 31.
36. Capra 1982: 339–340.

From Story-Telling to Story-Exchange: A Shared Map to Navigate into the Future

Yuri Matsuzaki
Tokyo Tech Academy for Leadership
Tokyo, Japan

Correspondence | **Yuri Matsuzaki** matsuzaki.y.ad@m.titech.ac.jp
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People who read history books – be it fact or fiction – try to identify and relate their own personal time-frame to the story. This allows them to personally locate themselves in a narrative. A story has the power to help us find connections to the past and find meaning in our present lives. But it is not powerful enough to simply encourage us to collectively act for the distant future, for such action needs exceptional imagination, critical thinking, and a sense of responsibility. Humans understand the world as a story, but we do not often experience our own lives in that large cohesive a narrative. Rather, we create it when we look back on our experiences later. So, our own story is an afterthought

Presently, the impact of human activities on the global environment has become apparent, even leading to the identification of a new time-frame – the 'Anthropocene.' So people have to consider the impact of their actions over a more extended duration than their own lives, as well as on a global and even cosmic scale. This issue might be one of the reasons why Big History, which shows humanity's location in a cosmic context, has been well received by society. But are big-history stories effective in influencing people's actions?

I studied bioinformatics and systems biology in graduate school. As a researcher, I wondered why we could collectively create various concepts, structure that knowledge, and invent technologies that change the way we see the world and the way we live. After several years of my research career, I am currently involved in a leadership education program for science and technology majors at the Tokyo Institute of Technology. The program is open to students from all majors, and I have noticed that we sometimes have conversations without realizing that we stand on very different assumptions and values.

I am interested in learning about Big History since it provides a common ground for discussing current social and technological issues. Big History attempts to create a narrative based on scientific facts obtained by various disciplines. On the other hand, the 'interdisciplinary' departments in academia are often nothing more than a collection of people with different and incompatible views and ideas. My interest in Big History is how efforts to combine multidisciplinary perspectives can lead to meaningful results.

The Shifting Perpectives of Cynthia Brown

Taking her cue from historian David Christian's book, *Maps of Time* (2004), historian Cynthia Brown refers to her big-history story a 'map' in her last text, *Big History, Small World* (2016). She provides readers with a metaphor of Big History as a map created with the best available and correct information.[1] Unlike Christian, though, she takes her assessment in a different direction and encourages readers to explore possible connections between themselves and a cosmic context. Brown explained why she moved in this direction:

> I wanted to write another account of big history … . I wanted to re-think the story once more, after becoming familiar with the various versions of it and the issues involved in how it is structured and presented.[2]

What issues did Brown see in the various big-history stories, and how did she tackle them in her new book? Unlike her previous work, *Big History: From the Big Bang to the Present* (2007), the first noticeable difference is its balance. Both books tell of the ever-changing universe, but human beings emerged early in her narrative in 2007 – in Chapter 3. Humanity appears much later in her 2016 work – in Chapter 8. What happened?! As she wrote, she wanted:

> … to put humans in their proper context … . Humans have been around only the tiniest fraction of universe time, and modern life is only a tiny fraction of human life. That is how it looks in a cosmic context.[3]

By being made aware of cosmic time and humanity's place in it, we can better understand the enormity of how our actions can lead to Earthwide effects and influence our future actions.

Her book also includes two new chapters, sandwiched before and after the familiar big-history narrative. In the first chapter, Brown describes how the scientific narrative

is open to change when new insights and knowledge are discovered.[4] The final chapter shows how science can serve as a shared base across the globe, despite humanity's many divides. In an article published in the IBHA newsletter, *Origins*, she wrote:

> The old origin stories that we have inherited culturally are not working productively anymore. To the extent that they are still believed, they separate people and cause social tensions and even warfare. We need a new orienting story that belongs to all human groups around the world.[5]

She accepts multiple narratives, and, compared to other big-history scholars, Brown does not propose replacing religious stories with a big-history narrative.[6] Instead, she encourages readers to talk about it with people around them:

> What can you do if you already have a different framework of knowledge, say, from a religious background, which conflicts with this naturalistic, scientific one? ... you can discuss these issues with your teacher and classmates. If you are reading this book by yourself, you can discuss them with your parents, friends, pastor or clergy. Many people find it possible to combine both scientific and religious frameworks.[7]

The results of such dialogues have no simple outcomes. They can, for example, develop other controversies, as in a doubt of the ability to converge natural history and human history[8] Also, many people around the world might have little urge to combine stories into a unified whole, since they are already used to living with multiple narratives. Nonetheless, her open attitude makes Brown's vision more accessible for future developments and discussions.

Scientific discoveries and a body of knowledge in each discipline can potentially change the worldview of the general public. But some concepts are counterintuitive and incorporating them into one's worldview is not straightforward. For this reason, people read popular science books, hoping they can find insights from authors who understand the frontiers of knowledge. However, making sense of the world is different from constructing scientific theories.

Being the best scientist does not mean one is also good at making sense of the world. Popular science can be good at presenting humans in a biological context, but it rarely can do so in a social context. The most potent form for people to of make sense of the world is in a story. One of Big History's potential roles might be in mapping the current social situation in relation to the cosmic context. But some big-historians hesitate to take on this role.

Sociologist Fred Spier 'wants to keep the academic account of big history as free as possible from personal or collective worldviews.'[9] This is reasonable in two ways:

> 1) Only by **not** detailing what Big History should mean in people's lives can we allow it to serve as common ground for many human beings.
>
> 2) It is difficult, even unwise perhaps, to plant meaning in people's minds from outside. Everyone has their own web of meaning, and to connect it to new knowledge is their job.

Brown adopts Spier's abstentious attitude, but she suggests *ways* to extract meanings, values, and ethics from Big History, while she shares the meaning she herself has found in it.

Brown's chapter discussions often include: 1) How a group of experts work together to generate knowledge, 2) Questions about the topic's frontier of knowledge, 3) How new understandings relate to general people, and 4) Life stories of people who contributed to significant discoveries. These examples provide a voice for openness and clarify concepts.

For example, descriptions of how a group of experts work together illustrates how a big-history narrative is ever-developing. The life stories of the people who contributed discoveries are colourful and varied, but weave together into one story called Big History. It even serves as an invitation for readers to become actors in the story themselves. In this way, examples clarify concepts through interesting stories.

Connectivity: Is Big History a Moving Story?

Brown shares a fundamental standpoint with other big-historians by carefully keeping to empirical knowledge. It leaves the role of interpreting meaning, values and ethics up to the individual reader. This attitude gives Big History a down-to-earth reality. But, at the same time, it has less power for influencing peoples' lives than traditional mythology or religious stories.

Religious stories and mythologies offer powerful narratives that connect with emotions and supply cultural recognition, models of the world, and day-to-day sensibility. Many have passed through generations and have been edited by society to meet social needs. In a process similar to evolution, they are subject to change and selection. In contrast, the new big-history narrative has not gone through this process. Another reason for its lack of social effective-

ness is that the big-history narrative does not directly speak to peoples' inner experiences. Traditional stories give individuals the strength to live their lives.

Conflict of narratives also can lead to divides between people, with some finding different meanings in the same story. Big History tells of several goldilocks conditions that enabled the transition from threshold to threshold, and, while some find deep meaning in this, others feel that humanity is meaningless in the universe's perspective, because everything is made possible by just a series of coincidences. In some ways, Big History can be seen as too big to be lived.

If Big History is to become a notable story passed down from generation to generation, what form would it take? It would not replace ancient stories by simply grafting itself onto them. And seeking a single over-arching story is also not realistic, or necessary, because people already live with many, sometimes contradictory, stories. Sometimes strong narratives have the power to attract and bond many people, but they can also at the same time create a divide between friends and enemies. We will have to figure out how to link Big History – a story created through the lenses of human perception, from microscopes to telescopes – with other narratives … in some kind of a web of stories.

It is challenging for a story to create strong enough emotions to motivate people to act for their descendants' benefit in the distant future. The same applies to catastrophes that we cannot plan for, such as nuclear plant accidents, whose probability is estimated very low. We need to admit our limitations and discover a way to imagine the future with more vivid actuality. We humans do not have an answer for this issue yet. For example, climate change has long been raised as a severe planetary issue that calls for global action, but humanity still faces difficulties sharing an awareness of the problem.

Conclusion: The Limits of Individual Effort

For Big History to be a sustainable and powerful story for people around the globe, the encouragement of personal engagement needs to be extended to a more diverse group of people – to the point where we collaboratively exchange and create stories that give the strength to live our lives. It is not easy to feel connected in today's individualized society if we attribute our search for meaning in Big History to just individual efforts.

Current big-history narratives do not penetrate people's inner lives. They lack a community that passes them down from generation to generation. Big History needs to be a collaborative effort, not just the work of individuals trying to figure out what meaning people are trying to find. Therefore, the meanings and wonder we perceive should be expressed to other people and fed back into an individual story-making process. It will help people being aware of diverse interpretations and future possibilities.

I see an opportunity to do Big History not just for educational programs but also for creating a public space where the stories of multiple individuals can be placed and exchanged. For example, we can try picturing various futures from various cultural and disciplinary perspectives together. Once the various patterns of the future are imagined, people will be able to work backwards to construct a story toward some desired futures, and acquire the motivation to act toward better futures.

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Endnotes

1. Brown 2016: 249.
2. Brown 2016-a: xvi
3. Brown 2016-b: xvi, 18.
4. Brown 2016-b: 5.
5. Brown 2016-a.
6. See, for example, Christian 2018.
7. Brown 2016-b: 15–16.
8. See, for example, Hesketh 2014.
9. Brown 2016-b: 246.

The General Law of Being
Article 1: Being of Interrelation

Ye Chen
Asian Big History Association

Correspondence | **Ye Chen** nighton352@gmail.com
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Introduction

In December 1998, Dongyue Wang, a polymath with almost no engagement in the academic community, published his work, 物演通论 [*A Unified Theory of Evolution*], in which he shared his new cosmological system – a model of existence that unifies every being with a simple, universal law. It is profound and a fundamental challenge to existing thought about perceptions of reality in our universe.

Astonishingly, this ingenious, fundamental theory sprouted in China, which has almost no soil of philosophy to nourish it. While the literature of Laozi, Confucius and the Hundred Schools of Thought are recognized as Chinese metaphysics, little philosophy can be found afterwards for over 2000 years – until Wang appeared with his ideas that propose an ultimate principle of all beings, including the very basis of being and how changes of the properties of beings are possible.

It should be noted that Wang's philosophy is different from classical Chinese logic systems, primarily because of his use of the hypothetico-deductive method. The ancient Chinese systems of philosophy proposed hypotheses, but they lacked reasoning steps to verify them. Wang's philosophy, however, does not require readers to possess prior knowledge about Chinese culture, for the model is universal and lives up to the three standards of legitimacy that Wang himself proposed:

> 1) The entire model must be self-consistent, with no contradiction or anomaly.
> 2) The model must be consistent with other acknowledged models or systems. This means that his model can incorporate past models or combines well with them. If it doesn't, then defects of the past model must be explained.
> 3) The model must be consistent with facts that emerge in the future, which means that the model should be universally true to facts through all times.[1]

Wang's model has had little impact in the Western world, given the inevitable language barriers and its specialist philosophical terms. Without references or literature reviews from the West to point to the works on which his work is grounded, Wang's arguments can seem abrupt and bold.

Although my studies and Wang's work address the same fundamental theory of being, our reasoning and presentation are different. I focus on comparing Wang's thoughts to theories that are already widely known in the wider world. This includes the autopoiesis theory, Kant's transcendental idealism, Wittgenstein's philosophy of logic, systems-thinking, Schrodinger's negentropy, Prigogine's dissipative structure, Thomas Khun's paradigm, Popper's falsification, and so forth. Most of these do not appear in Wang's work. I also re-reasoned Wang's model of existence by grounding it on Humberto Maturana and Francisco Varela's equal-adaptation / equal-existence principles, then I provided falsification and upgraded their model to accord with Wang's philosophy.

By taking an evolutionary approach, Wang's model of existence rectifies Platonic notions of reality. Ancient Greek models had influenced the early development of science, and so this had led to descriptions of existence as mechanistic, reversible, and relatively static, as seen in Isaac Newton's idealised models in the 17th century. But, starting with Joseph Fournier's law of heat conduction (1822), irreversible processes were revealed, which revolutionized scientific thinking.[2]

Wang's model of existence provides the only path to the essence of irreversibility, by which he explains how the continuously-increasing complication of properties is possible. This conclusion cannot be had without deep reasoning and presentation of the facts on which his model is grounded. This necessity forms the core of my work. The present article is a selection from my book, *Introduction to the General Law of Beings*, which is in the process of composition.[3]

As you will see in Wang's framework, a 'being' does not refer just to a human individual, as is customarily spoken of in many world languages. Wang confers the name on any entity, living or not living, which can serve as a subject or an object. Since we are talking about *being* or *existence*, we should be aware that all *beings* are actually nothing but their *properties*, which allow their existence to appear to us.

Wang's model explains how diverse beings evolve from the 'one' (the being with the least properties) and it describes how living organisms and mental phenomena occur. This ontological background explains epistemological questions, such as the origin of our ability to make distinctions, the essence of the world as it appears to us, and the essence of 'properties.'

This paradigm provides us with a holistic, inclusive, and cosmological picture. By using Wang's perspective, the emergence of everything is linked by his evolutionary outlook. A common essence is then apparent. I contend that this model is what civilization urgently needs at this point in time. As a fundamental theory, it will add fresh thought to all fields, develop new facts across disciplines, and point us to a new era.

This understanding of the need for a new direction for humanity is well understood in Russian studies of megahistory, which indicate that a crisis or at least a global, social anomie will peak in the near future. As nuclear physicist Alexander Panov has written:

> If the potential for overcoming the information crisis is possible, then, in accordance with the principle of superfluous diversity, a solution to the problem should already exist in a rudimentary form. Perhaps these new sprouts in the culture of humanity are already here, and we only need to look more closely to see them.[4]

Perhaps we have some aspects of a new model here at hand within this paper. I believe that Wang's philosophy is no longer that hard to understand if one is ready to become involved in a new way of seeing the world!

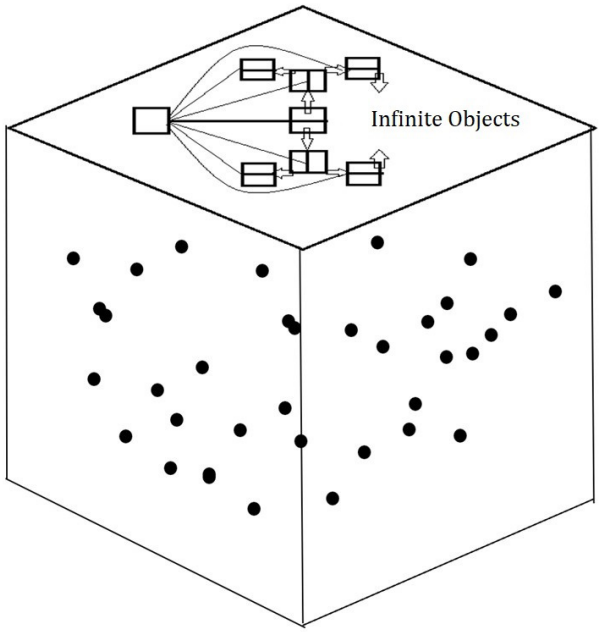
The Benefits and Limits of Dualism

Cartesian dualism has deeply influenced how experts in all fields develop their research, thus affecting the process of knowledge-building and its contents. The harvest of data from this strategy has been rich. In order to explore items, we divide them into their constituent parts (reductionism) and then keep breaking them down to study them in greater depth. The increase of information has resulted in a wealth of scholarship, where different portions of an object are analysed by different groups of people, often in different disciplines.[5] While it is an efficient way to produce knowledge, it also has caused a shattered distribution of learning and the loss of holistic vision, which skews our perception of existence.

By the mid-20th century, the huge amount of scientific information that had been generated could not be adequately managed by Cartesian dualism and its process of reductionism. In the physical sciences, the uncertainty principle and the observer-effect process ignited a distrust in reduction. In the life sciences, a reductionist approach could not explain the emergence of many biological phenomena.[6] In the social sciences, the complex array of societal events could barely be reimagined by reductionist strategies. This scholarly impasse came to a head because the study of even just two factors by reductionist processes does not address the system that the factors constitute as a whole.

As a result of such limitations, *systems theory* was developed to transition from an atomistic perspective to a more holistic understanding.[7] It was a stop-gap method. Even though systems-approach incorporated a limited form of evolution by considering the emergent properties of a process, it still existed – essentially – on a horizontal plane. Indeed, systems-approach can be considered a form of *horizontal holism*. Considering the circumscribed scale of operations being studied, the span of evolution that systems theory accommodates is relatively shallow.

Diagram 1: The top side of the cube represents how human beings – as a subject – explore objects by dividing them over and over. The dots in the cube represent information that humans study in various disciplines. Diagram by Ye Chen.



For example, ecology uses the systems-approach at one of the largest scales among the disciplines, since it unifies non-living and living beings to examine their complex interrelationships. Nonetheless, such research is grounded just on the Earth. Because of this limitation, many ecological questions remain elusive, such as whether the Earth can be regarded as an organism capable of making its own adjustments in the support of life – the Gaia Hypothesis.[8]

The controversies surrounding the Gaia Hypothesis is a natural by-product of horizontal holism. By perceiving existence from such a flat angle, we do find complexity and contingency, but it is hard to draw out wider principles. Such axioms can only be found by placing the Earth and all its 'beings' in a larger, evolutionary framework. Solely by exploring the evolution of all entities and figuring out the fundamental factor in their occurrence can we understand why Earth might act as if it is a self-regulating organism.

So, apart from Cartesian dualism and horizontal holism, are any other approaches possible? Can we break the restrictions of this horizontal plane and expand our view? Such a new approach must be completely different and largely erase the disadvantages of dualism and horizontal holism.

In respect to humanity, such a new approach would no longer regard smaller, self-contained systems or entities as its focus, but instead the totality of humankind (*units* to *unities*). Cognition would not mean just biological variation and its by-products – sensory organs, mind or logic-forms – but rather the expanding process of all human culture. This would include the relay-system of logical models (culture in a broad sense) and its role in the continuation of species. This new outlook will require re-evaluation in all fields of study, where logical models of thinkers must be expanded and reshaped.

As for such an adjustment in the scale of thought about humanity, we also need to shift our view for the rest of existence from individual units to the totality of units (*unities*), and thus escape the instant, static scene of dualism, in order to experience the evolving quality of all existence. In this new model, the task wouldn't be so much on observation of changing facts, but instead on contemplation of *how such change is possible*.

For example, sometimes we cannot discover a fact directly but can only infer it from other outcomes. In the 1840s, the concept of magnetic vector potential was introduced as a mathematical tool in electrodynamics, but no physical manifestation for it was detected. A century later, physicists Yakir Aharonov and David Bohm designed a solenoid and observed a phase difference of ejected electrons, which could be explained only by magnetic vector potential. This confirmed its physical existence.[9]

In contrast to systems-approach, the most characteristic trait in this new way of thinking is its evolutionary / vertical perspective – a *vertical holistic approach* – (as opposed to *horizontal holism*). As we move away from a planar perspective and explore from where a being comes, we gain extra clues about its total existence.[10] This new approach eliminates anthropocentrism and expands to include earlier species, matter, and energy.

Human society carries huge amounts of information in numerous subjects, from cosmology to biology, and

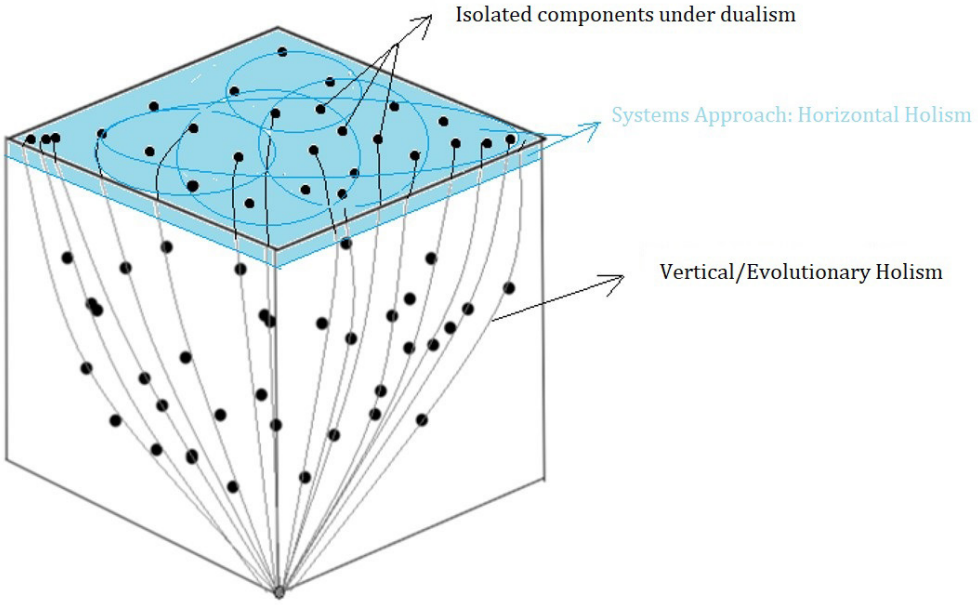


Diagram 2: A tripartite cube of knowledge that illustrates the differences between the three approaches – 1) The *dualist approach* is represented by discrete dots everywhere on / in the cube; 2) The *systems-approach* is indicated by a blue horizontal slice – its integrating effort indicated by ellipses but with a relatively shallow depth of evolution; 3) The v*ertical holistic approach* unifies every dot in the diagram. Diagram by Ye Chen.

anthropology.[11] We now have a better chance to observe changes at a much larger scale, if we use the new methodology that unifies all subjects and explains the existence of everything. Such a vertical perspective can give us a clear picture of how we and everything else ended up here.

The Being of Horizontal Interrelation – Structural-Coupling

This section invites the reader to a different view addressed in autopoiesis theory that guides us to better understand Wang's *model of existence*.[12] It pulls the logical starting point of Kant – *cognition* – backwards to a definite mechanism, which functions at every instant of a being's existence and makes cognition possible (as for us, our feeling of *knowing something*). Thereupon, 'knowing' is no longer a static concept but a series of continuous *actions* by a being that bring forth a world of one's own.[13]

This situation is called *structural-coupling*, which takes place among all beings and results in their *identity*. It suggests that:

1) A subject cannot operate independently without corresponding conditions from the environment: '… one thing cannot exist without the other … [it] acquires its properties from its relation to the other … the properties of both evolve as a consequence of their interpenetration.'[14] Hence, we must define a range of external conditions (environment) that has to exist for the subject to survive, without which the subject disintegrates (a goldfish dies without oxygen).

2) A subject's structure is relatively fixed. This means that there is a range of evolutionary change (organization) that can occur, and, within those boundaries, a subject maintains its identity. For example, the phylogeny of a cat determines that it cannot use language, which is beyond its range of action.

Disintegration and Maintenance of Identity

Disintegration means that a being no longer exists in its form (organization) and so it loses its *identity*. For example, a dead cat is not a functional cat, and a torn banknote is not a negotiable banknote. A failure in their structural coupling with their environment leads to a loss of adaptation and it disintegrates. In this sense, 'to exist' or 'to live' means that a being maintains its identity by adaptation to the environment from moment to moment.[15] It should be noted that 'environment' does not necessarily mean natural surroundings; it can be any other object(s), single or multiple, that interacts with or causes structural change in a subject.

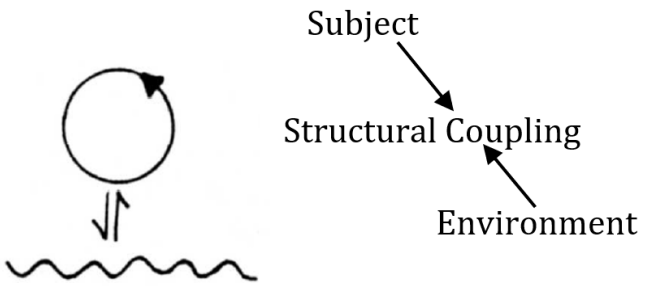


Diagram 3: A subject interacts with its environment at every instant. Interaction means that both the subject and environment continuously change their states to reach *mutual structural congruence*. All internal dynamics of a subject aim to maintain its realm of existence (presence) and its structure determines or restricts its dynamics. The presence of a subject is inseparable from the presence of the environment. Every structural change that occurs in a subject is triggered by perturbation of the environment, so the subject's dynamic balance is maintained.[65] Diagram adapted from Maturana and Varela's *The Tree of Knowledge*.

We need to know that every act of a being – observable behaviours, such as walking and speaking, or unobservable internal dynamics – are all properties that maintain the coherence of a being. These acts are not independently invented by the being, and they are not independently selected by the environment. Instead, they are the necessary consequence of a structural congruence between the being and the environment. This *structural-coupling* generates a system by which the subject and the environment are horizontally interrelated and interdependent.

Cases of Structural Coupling – Living Beings

For an elementary prokaryote, such as a bacteria or archaea, the mechanism of structural-coupling is simple; they quickly adapt to nearly all environments on Earth.[16] Many conditions from the environment, such as light, chemicals and carbon dioxide can trigger their internal dynamics – like energy intake and metabolism. An amoeba engulfing a protozoan reflects the same principle. When an environmental condition is sensed (such as a nearby protozoan), the amoeba's sensory surface coordinates with its internal protoplasm to produce movement to engulf the food.[17]

For the structural-coupling of plants, the condition of different temperatures triggers biochemical dynamics in ways determined by their structure. Under cold stress, plants will

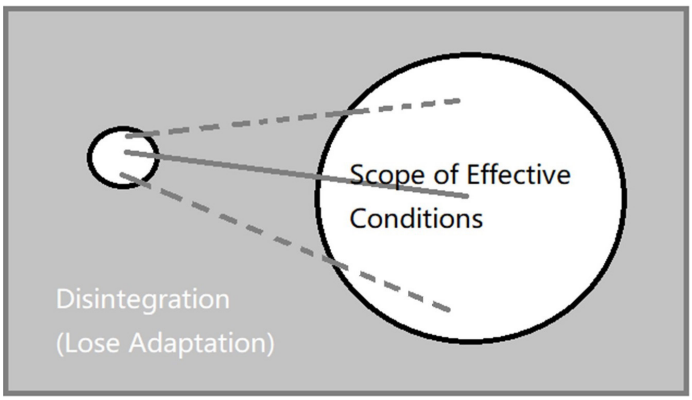


Diagram 4: Structural Coupling. The left circle represents a subject, with its white area representing the range of the possible structural changes that constrain its identity. The right circle represents the range of conditions (perturbations) that effect the subject. Structural-coupling must occur between these two scopes, represented as a drifting line that links these two areas. But when the subject experiences a condition out of its range, the line will reach the grey area, representing disintegration (Loss of Adaptation). Diagram by Ye Chen.

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activate metabolic pathways to accumulate sugars or produce proteins to protect their cells.[18] Movements of plants vary, such as when sunflowers (*Helianthus* species) turn towards the position of the Sun. Through this constant interaction / adaptation, plants maintain their integrity.

Despite the myriad possible changes in a beings' internal dynamics or external movements, the mechanism is essentially identical – **to maintain a dynamic balance in their structure by coupling with a given condition.** Behaviours, movements or biochemical reactions are merely different forms of the necessary structural changes for a being to maintain its existence. This means that changes in the internal dynamics of prokaryotes, feeding behaviours of amoebas and movements of sunflowers all express the same general principle of structural-coupling.[19] The difference lies only in their distinct actions, as determined by the range of the subject's structural abilities.

Due to the immense number of neurons in the human nervous system, the number of possible interactions is huge, thus producing a rich human-behaviour domain. This mechanism has the same structural-coupling requirement as those beings without a nervous system – it continuously operates with the environment (conditions): 'The functioning organism, including its nervous system, selects the structural changes that permit it to continue operating, or it disintegrates.'[20]

We should keep in mind that this process occurs all the time: as first-order autopoietic systems in a cell or as second-order autopoietic systems in metacellular beings. This explains how the act of learning occurs and why people often acquire completely different information from the same book or even the same word. The key lies in how the human organism structurally-couples with a given *condition* – such as a book, the environment, or other possible factors. The condition triggers a structural change.[21]

What we learn or understand is *not* the product of a book's content itself, but instead it is the product of structural-coupling with a corresponding condition (what the subject prefers or what is suitable for it). Linguistic behaviour and self-consciousness follow the same rule. Even though a word and an action are not congruent, structural-coupling brings forth the idea that a word is a description of what we do.[22] Our experiences flow according to coherences in our nervous system.

Structural-Coupling of Non-living Beings and Human Society

Non-living physical and chemical substances (such as particles, atoms, elements and molecular compounds) are subject to the same interactions as living beings. But, with their simpler structures, the required conditions for their maintenance is simpler. Since they exist under almost all conditions, abiotic forms occupy most of the universe.

Human society abides by the same conditions, but it does so in a way opposite to those of abiotic systems. Society holds the most complicated and dense structure, and

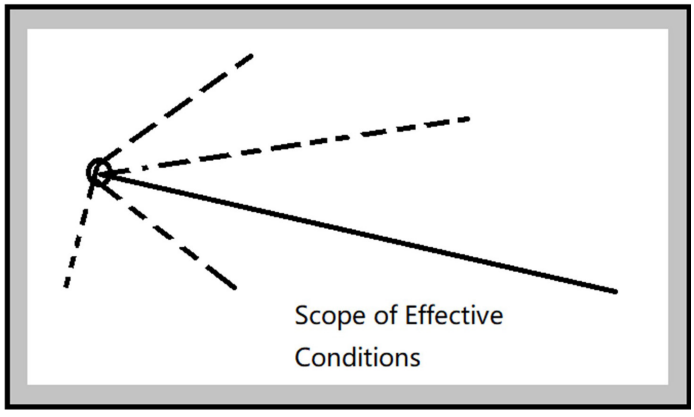

Diagram 5: Structural coupling of non-living substances. The small circle represents the subject, the white area the range of effective conditions, and the grey area disintegration. The shifting lines represent structural-coupling and reach anywhere within the effective conditions. Diagram by Ye Chen.

so it has the greatest flexibility. To maintain its dynamic balance (such as in economics, culture, and politics), society relies on a considerable variety of conditions and any lack of them may threaten its adaptation. The demanding requirements for the maintenance of society also means it has a small range of effective conditions in which to survive.

The range of effective conditions does not mean the number of conditions, but instead the portfolios of conditions. For example, if light or water alone can support a being's existence, its possible portfolio of conditions would be: [light/water] + X, where X is any condition that does not hurt the condition of light or water. If the being needs air, water, light and fertilizer simultaneously, then the possible portfolios of conditions would be [air + light + water + fertilizer] +X, where X is any condition that does not hurt any of these four conditions.

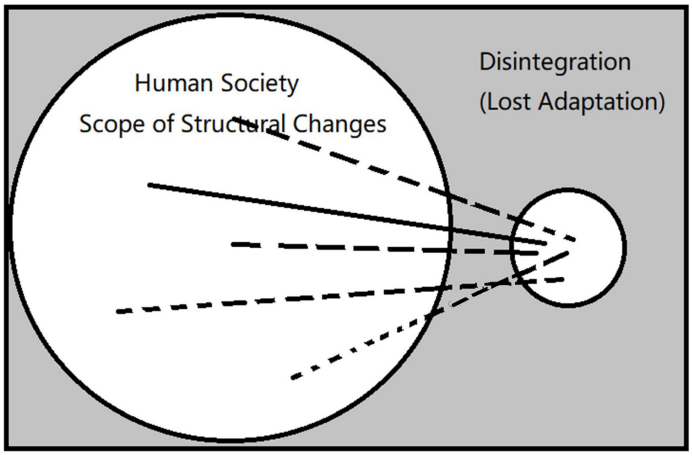

Diagram 6: This image provides a sense of the structural-coupling involved in human society. The left circle represents the subject, the right circle the effective portfolio of conditions, and the grey area is disintegration. The shifting lines represent structural-coupling and can reach anywhere within the range of effective conditions. Diagram by Ye Chen.

Criterion of Structural-Coupling

As to the structural-coupling process for biological beings, according to Maturana and Varela, it is impossible to extract all the environmental variations and decide the ways these fluctuations can cause structural changes in a subject. Thus, we must describe each particular case as the result of random variation.[23] This is true for everything that we are able to acknowledge as a product of structural-coupling. Structural changes occur, but the specific factors involved are ambiguous.

The structural-coupling of a subject and object is like what takes place in a melting pot. We do not know precisely what happens inside the pot all the time, as we only see the results at each observed moment.[24] What can only be certain of is that the subject and object are structurally-coupling from moment to moment. Even if the subject disintegrates, it transforms into another form of being and so it is still structurally-coupling with its corresponding object! Based on this, we can establish a criterion for structural-coupling.

Wang's theory includes the *interactive quality* of a subject and the *interactable quality* of an object.[25] Although we cannot acquire the factors involved, we at least know that some properties of the subject are interacting with some properties of the object.

The properties of a subject allow it to make selections of an object's properties, which involve structural changes within the realm of the subject's existence.

An object has countless properties, and those selected by the subject are determined by *which of the object's properties are able to couple* with the subject so as to maintain its *realm of existence*.

Therefore, it follows that: **The subject's function that can interact with certain properties of an object is an expression of the subject's *interactive quality*, and that part of the object's properties that couples with a subject's interactive quality is an expression of the object's *interactable quality***.

A subject is always adapting, and so it is always structurally-coupling with an object. Any drift in the interactive quality will cause a drift in the interactable quality, and, if the interactable qualities drift, it will also result in a drift of the interactive quality. This occurs because they are coupled and correspond to each other. The significance of these concepts is that they abstract and generalize the process of structural-coupling.

We can expand this situation as a 'realm,' which includes all possible structural-coupling situations of a subject in its existence. We can do this because the interactive quality and interactable quality of every being is limited, though hard to specify at each instant. Again, consider the melting pot filled with endless types of structural-coupling that we might never know … .

The melting pot for a human being, a cat, and a bacterium is different. We don't have to scrutinize the instant changes, but we can explore the interactive quality of each being and the interactable quality it requires. For example,

human beings, in their realm of existence, contain interactive qualities that can be classified as follow:

> **The Interactive Layer** is made up of fundamental particle-particle interactions, such as electrical attractions between an electron and a proton, strong and weak forces of nuclear interactions, and so forth. This layer is basically invariable.[26]
> **The Perceptual Layer** includes activities within / between cells, heart rhythms, peristalsis, perception, and others.[27] These dynamics are autonomic and occur as a result of an organism coupling with conditions that are not consciously controlled.[28]
> **The Intuitive Layer** is the process of making distinctions based on perceptions through sensory organs, motor organs, and neuron networks. High-level animals possess this layer, which allows for instinctive behaviours, learning behaviours, tool use, and so forth.[29]
> **The Reasoning Layer** is the ability for logical derivation, abstraction, and organization. Only with this, and the other layers, can human-beings generate knowledge systems.

These layers are vertically connected from basic to complex, following an evolutionary sequence. They allow us to embrace countless interactable qualities, from the most negligible environmental variations to the most obscure philosophical theories – all of which represent our realm of existence as human beings. Our ability is equivalent to an electron embracing the positive charge of a proton, which is *its* realm of existence.

The significance of our interactive quality is to maintain our realm of existence – our identity – by selecting conditions (interactable qualities) from the environment and achieving a dependent relationship with them. **At each instant of structural-coupling, a subject's interactive quality confirms its condition (interactable quality) for the subject's existence**.[30] This axiom doesn't mean that the interactable quality is the subject's entire existence; rather, it means that the coupling of the interactive quality and interactable quality merely fulfils the subject's ability to exist.[31]

For instance, when a tiger smells a deer, the tiger's interactive quality (sense of smell) couples with the deer's interactable quality (scent). The coupling-process involving scent is just one factor in their larger existence. Only through this relatively minor structural-coupling can the tiger launch its hunt and obtain the more important nutrition necessary for its existence.

Diagram 7: This diagram shows the three qualities of existence – the interactive quality of the subject and the interactable quality of the object, which together result in the realm of existence. Diagram by Ye Chen.

Everything, as long as it exists, is a result of structural-coupling. The 'becoming' of any *identity* is all about the structural-coupling of the interactive quality and interactable quality. What sets identities apart from each other is only in the realm of possibilities of their structural-coupling, which is also the *realm of their existence*. Of all the past disciplines, we either research interactive quality (epistemology) or interactable quality (science), but now we have managed to find an approach to unify the two.

Readers who hold a firm belief in subjective idealism may suggest that this discussion is based on knowledge generated by cognition, and so the emergence of all beings follows no rules but is merely the result of possibilities or accidents. This is a valid approach, but how would it help us understand the world? Indeed, the 'possibilities statement' itself is also a 'rule' drawn from the cognition of humans. If there is another principle that explains why we are here, how everything evolves to what it is today and eventually reveals the ontogenetic mechanism of subjective idealism, which philosophy should we choose?

The Being of Vertical Interrelation

Earlier, we discussed the horizontal interrelation of a subject and an object. In retrospect, further questions might be raised: How did this situation happen? Why did the subject and object just appear to be functioning like this? These questions require us to trace back the origin of the subject and object – to the 'beginning of all beings.' Living beings do not appear suddenly on their own; they are possible only through countless repeated *material transformations* of non-living beings over billions of years.[32]

The universe is 13.8 billion years old. Our solar system formed 4.6 billion years ago. Earth with its atmosphere and seas produced abundant molecules, which formed the oldest forms of life, appearing 3.7 billion years ago. This is a continuous process of material transformation, an historical sequence. As Maturana and Varela state: '… each one of the stages described arises as an inevitable consequence of the previous one.'[33]

This implies that each stage must be a superposition of all previous stages before a new stage can appear. There is no 'leap' in the sequence – beings naturally synthesize, transform and evolve from what existed at the start of a process to what the being becomes. According to the mechanism of structural-coupling, the appearance of a subject must be based on successful coupling between its *interactive quality* and an object's *interactable quality*. Absence of either would not lead to the establishment of a new being, since it would not be born at all or it would disintegrate immediately.

This explains why subject and object are in a natural, harmonious relationship from the beginning (beings that are discordant cannot just appear, except for a brief time). Let us imagine nature conducting random 'experiments' over and over. Most of the time, these fail – nothing new is formed. But at a particular moment, one succeeds, and a new being appears. At this moment, the potential being's *interactive quality* is activated by the *interactable qualities* with which it couples and gives rise to its *realm of existence*.

The occurrence of these three factors (interactive quality, interactable qualities, realm of existence) is simultaneous, or else nothing would happen. **The phylogeny of all beings has nothing to do with inferiority or superiority of their qualities**; **the only existence criteria is whether the interactive quality of the subject matches up with the interactable quality of the object**.

What does Superposition Imply?

The forming of autopoietic unities infers the presence of a living being that has been realized by the process of structural-coupling between organic molecules and the right conditions. Maturana and Varela state it in this way:

> It was only at that point in the Earth's history when conditions were right for the forming of organic molecules such as proteins, which have enormous complexity and pliancy, that conditions were right also for the forming of autopoietic unities. In fact, we can assume that when all these sufficient conditions were present in the Earth's history, autopoietic systems formed inevitably.[34]

Both the organic molecules and the right conditions had to take place in an historical sequence for a living 'being' to form. This implies:

1. The existence of molecules like H_2, CO_2, and iron, which have *interactable qualities* for the phylogenic pathway leading to a living being.[35] These non-living beings had to undergo stage after stage of structural-coupling from the Big Bang to the appearance of important elements to form the interactable qualities for a potential living being's interactive quality to occur and couple with. Thus, the first principle of Descartes's philosophy, 'I think, therefore I am,' can be turned into **'They exist; therefore, I am, and therefore I think.'**[36]
2. The forming of autopoietic unities (subject) also has undergone countless stages of evolution, from carbon atoms and hydrogen atoms, inorganic and organic molecules, to bio-macromolecules … all before it finally joins in an autopoietic system – a living being with an interactive quality (function) distinct from other non-living molecular transformations. The interactive quality of a being, such as the function of metabolism, does not magically appear – it can only take its shape through a progressive process of structural-coupling.[37] For human beings, formation of the reasoning layer depends on its historical superposition of the coupling sequence, namely, the interactive layer, perceptual layer, and intuitive layer. The absence of any of the three layers means that their corresponding interactable quality would not result in a reasoning layer.

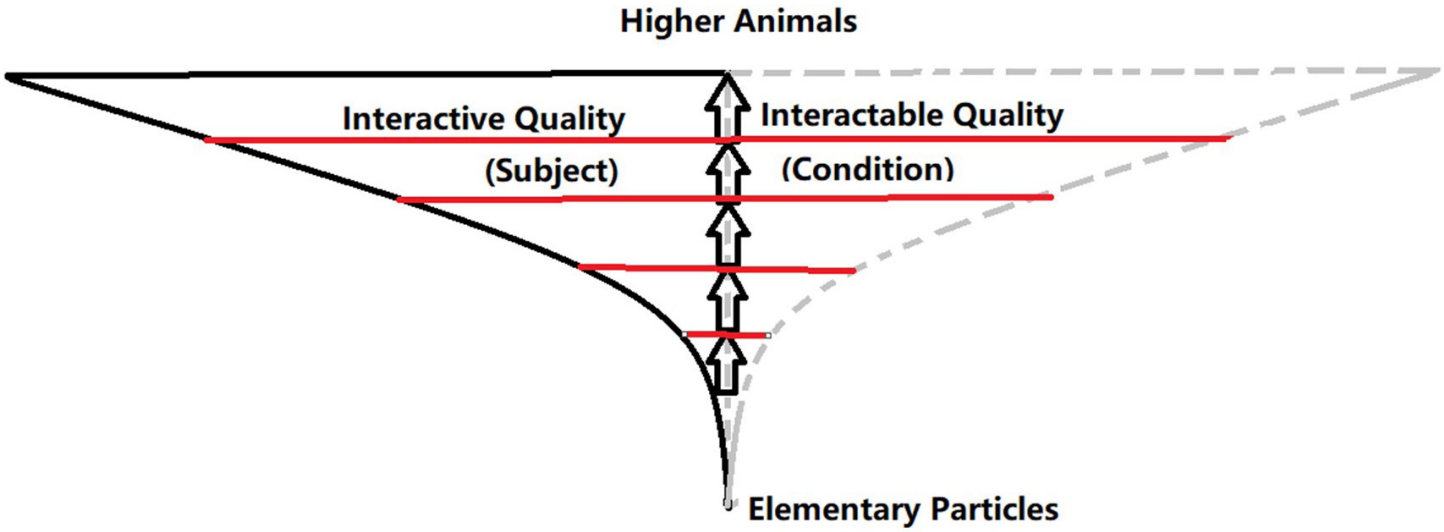

Diagram 8: This image shows the overlying evolutionary phases, from elementary particles to higher animals. Diagram by Ye Chen.

3. There is a **different evolutionary speed of beings**. If we trace back to the source of an autopoiesis unit, we find the crux of the sequence – the carbon atom. It is the *instability* of carbon that enables it to take the 'leading role' as subject to form all beings equipped with a larger realm of interactive quality, while other relatively stable beings, with a narrower realm of interactive quality, become an object, with interactable qualities of environment / conditions.[38]

Physics gives us certainty, as it selects a few variables and studies their relationships. This however is not the case in biology, since its activities are a product of horizontal structural-coupling, in which each participant variable is a result of the superposition of vertical evolutionary phases. The coupling state becomes too intricate to analyse since both the subject and object has gone through countless stages where countless variables have been involved both vertically and horizontally. This explains why it is so difficult for us to synthesize a living being from scratch.

The evolutionary progress of all beings is of no discontinuity with each evolutionary phase applying the same criteria of structural-coupling.[39] There is not supposed to be a sharp intrusion of outside forces. For example, the biological macromolecule is a natural product of evolution from the structural-coupling of organic molecules – if we look closely at the features of organic molecules, such as self-producing RNA, we find them to be somewhere between non-living and living beings.

Likewise, eukaryotes are a natural product of evolution from the structural-coupling of prokaryotes - a hypothesis suggests that an invasion of prokaryote cells by two smaller prokaryote cells produced eukaryotic organelles.[40] Structural-coupling of unicellular eukaryotes then formed multicellular aggregates. Increasing cell specialization (more structural-coupling options) led to a natural drift from colonial aggregates to the complexity and diversity of multicellular organisms, which make up present-day plants and animals, including human beings.[41]

Not all phenotypic changes are small and incremental.[42]But the quantity of change, whether it is slight or large, is irrelevant. It is the continuous superposition of structural-coupling in a holistic system that is important. The Cambrian Explosion wouldn't have occurred if there were no preceding accumulated stages, such as an increase in oxygen from cyanobacteria, ozone formation, nutrient-rich ocean sediments, and other factors.

Same Origin – From the Big Bang Singularity to All Beings

We see multifarious beings in today's world, but **all of them have been derived in the same vertical evolutionary process**.[43] It started 14.8 billion years ago with the Big Bang – a singularity of extreme density that contained all

the energy and space / time of the universe.[44] It is thought that, at this starting point, there was only one fundamental force. Others came from it as the universe expanded (inflation).

Temperatures dropped with the expansion, and the gravitational force appeared.[45] Then, the strong force separated, as the energy of the inflation field filled the universe with a dense, hot plasma of quarks, anti-quarks, and gluons. Exotic particles arose, and their interaction gave them sufficient mass to cause the separation of the weak and electro-magnetic forces. In less than a picosecond, the universe's four fundamental forces had evolved – the gravitational, strong nuclear, weak nuclear, and electromagnetic forces.[46]

Hadrons formed, including protons and neutrons. A second after the Big Bang, leptons arose, which included electrons. These decoupled ten seconds after the Big Bang, which produced most of the mass-energy in the universe, in the form of photons. Between three and twenty minutes after the Big Bang, the photon temperature dropped, which allowed nuclear fusion to take place. Some neutrons synthesized with protons to form hydrogen isotopes as well as those of heavier elements, such as beryllium and lithium.[47]

By 300,000 years after the Big Bang, when the universe had cooled enough, electrons rapidly combined with protons to form hydrogen atoms.[48] Hydrogen and some helium coupled with each other, through gravity, to form early stars and galaxies a billion years after the Big Bang. The continuous collision, interaction and coupling of particles formed other elements, and, by similar mechanisms, inorganic and organic molecules, and other beings were formed, including what it takes to make living beings possible.

What does the Big Bang Imply?

This evolutionary history – from the initial singularity to diversified particles and more diversified substances and living beings – allows us to derive the following ideas.

The phylogeny of all beings, non-living and living, entirely originated from *the one*. This concept of *the one* refers to the simplest, initial 'being.' It was so simple and compact that it unified all fundamental forces and energy into 'one' primordial being – rendering all physical characteristics meaningless.[49] We can see how new beings are generated from this singular entity, step by step, after the Big Bang. This tells us that all beings (including those beings that we call **'conditions'** or **'environment'**) are **interlinked** vertically, belonging to the same evolutionary tree and sharing the same root, as they were built upon, one after another.

We need to note that 'force carrier' particles like photons, W bosons and gluons must be created preceding or at least at the same time as other elementary particles, since the particle-coupling process would require their role as *mediums*. Based on this, we can say that **all beings are fundamentally made of the same 'material.'** Although we cannot describe what exactly the material is, we know that it is derived from the initial being – *the one*. It is that material that produced all beings from simple (with fewer configurations) to complicated (with greater configurations).[50]

But then, how could this same material make up different *forms* of beings? The answer lies in how these same components are arranged. Taking H_2O as an example, it is in different forms when it is ice, water and gas, although its atomic component – H_2O –remains the same. What makes its form vary is its molecular arrangement. As the temperature goes up to 2200°C, some H_2O molecules turn into H, H_2, O, O_2 and OH. When the temperature goes over 10,000°C, the molecules break into atoms, and then into ions and electrons to form plasma.

When we consider H_2O molecules as 'constitution units,' we would call ice, water and steam the 'same being' (in different forms), since they are all composed of H_2O; and we would consider the mixture of H, H_2, O, O_2 and OH 'a different being,' because it is no longer composed of H_2O. But what if we consider the basic elements – hydrogen atoms and oxygen atoms – as constitution units, wouldn't it make H_2O and the mixture of H, H_2, O, O_2 and OH the 'same being,' because they are all comprised of hydrogen atoms and oxygen atoms? Then, what if we consider something even more basic, such as an elementary particle or a fundamental energy unit? **We then find all beings are the 'same beings,' but only constituted in different forms.**[51]

As soon as the balance in *the one* is broken, it begins its magnificent process of creating new forms of being. We can imagine that all types of subatomic particles were generated, but most of them couldn't stay in that form, and so they transformed quickly into other forms. This transformation continues, until all beings in the universe remain stable in their forms for a time, creating a state of equilibrium.

It is worth pondering the types of beings that can survive and those that cannot. Only those that can couple with conditions (other beings) survive. **Temporary equilibrium is a state in which all beings have a harmonious relationship, which means that, for each being, its interactive quality can couple with the interactable quality of other beings.**

This harmony was manifested by the Big Bang. Quarks could not bind to form atomic nuclei in the presence of

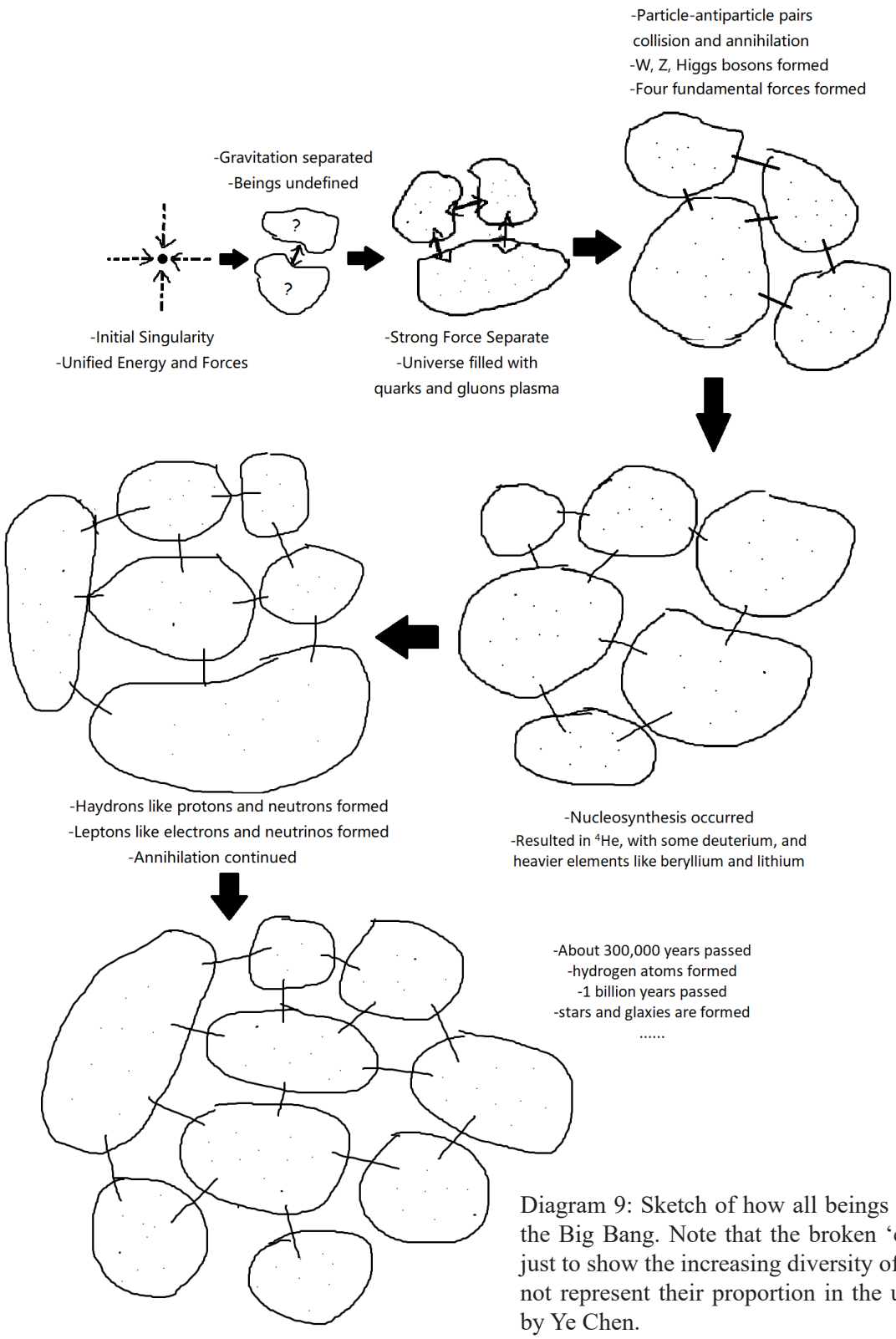

Diagram 9: Sketch of how all beings were generated in the Big Bang. Note that the broken 'energy pieces' are just to show the increasing diversity of particles; they do not represent their proportion in the universe. Diagram by Ye Chen.

high-energy photons because the nuclei would be blasted apart. In contrast, the formation of hydrogen atoms could not occur when the energy of photons was not sufficient.[52] When a form of being does not meet its existence criteria, it is considered discordant and gets quickly kicked out – it does not disappear, but instead it transforms to become other beings, until it reaches equilibrium, which means it possesses a 'right' interactive quality.

This evolutionary progress – from *the one* to a relatively stable state of various types of 'energy units' coupling with each other harmoniously – can be viewed as an autogenic 'separation' and 'recombination' process. This means that *the one* first separated itself and then went through innumerable, continuous changes to keep the derivative beings in a balanced state. Such a separation and recombination process was repeated among energy particles, through which the energy-density of radiation and vacuum transformed into the energy-density of mass.

At the moment when different particles evolved by random coupling, it seems that their *respective evolutionary destinies* were doomed by their formation as beings. For example, the hydrogen atom has a less stable configuration compared to other particles in the universe. It has only one electron, so its orbital is half-filled. As a *dissatisfied particle*, hydrogen atoms, like those of carbon, have an active role in the universe.

Under certain conditions, such as strong stellar winds, a molecular and neutral hydrogen cloud collapses from gravitational instability and a protostar begins to form. Hydrogen fusion takes place in the core, as hydrogen burns itself into helium-4 and releases a huge amount of energy. After accumulating sufficient helium in its core, the star grows into a red giant and the helium begins to fuse to produce beryllium-8, an unstable element that quickly fuses with a third helium-4 and produces carbon-12, followed by oxygen-16, neon-20, and magnesium-24 … through sequential reactions.[53]

Then, through further nuclear fusion, sodium and silicon nuclei as well as heavier ones like sulphur, argon and calcium are generated. The energy released by these reactions results in a further expansion of the star to form a red supergiant, during which time, heavier elements up to iron and nickel are formed. Those elements heavier than nickel are produced in rare but spectacular explosions called supernovas.[54] This separation and recombination process shows how *defective hydrogen atoms* become the ancestor of other nuclei, 'evolving' into a variety of elements to form more substances.[55]

In contrast, noble gases – like helium, neon and krypton – have their outer shells full, so they are less reactive and can be considered as having *bleak evolutionary prospects*.[56] Most elementary particles formed in the Big Bang – such as photons, protons, neutrons, electrons and dark matter – have not yet started their volatile evolutionary journey. They remain relatively still and make up the *majestic background* of the universe – what we could call the 'living environment' of the planets.

These examples of interatomic potentials show us that **the different properties that particles are born with determine their different motive power to evolve.**[57] In this immense and intricate evolutionary 'tree,' we see some units develop into the main trunk – a minority – such as some of the hydrogen and carbon atoms that become the principal units of evolution. Some units turn into branches – like the inert elements. Others – the majority – remain part of the background / environment, some of which (like photons) become a medium for structural-coupling.

Illusion of the Independent Being

We must keep in mind that evolutionary 'stages,' 'phases,' 'thresholds' and so forth are merely landmarks created by humans to distinguish one period from another. Likewise, the variety of forms, like atoms, molecules, prokaryotes, eukaryotes, plants and humans are also concepts defined by humans for **the daily necessity of making distinctions.** Our interactive quality, as proposed by Kant (the innate laws of mind) require us to live with a clear classification of different beings, without which we cannot realize the realm of our existence as human beings.

But this also gives us an unconscious yet powerful implication from moment to moment that we are all totally 'different' and 'independent' beings. We imagine that we are different from the objects that we cognize and different from the environment we are living in. 'We' is the subject, and the thing that we act on is the 'object' – apparently *something else*. In this way, we gradually set our position apart from the objects that in fact gave birth to us. This is why we believe subject and object exist in contrast to each other, across a border that metaphysics, classical philosophy and modern philosophy are not able to break through.[58]

Conclusion - Finite Interval of Beings

Having read this concrete view of evolution and understood the horizontal and vertical interrelation of all 'beings,' we must now rethink the 'I,' our 'self-consciousness' and 'mental phenomena.' They are neither independent nor absolute. **All beings are finite, since they cannot ex-**

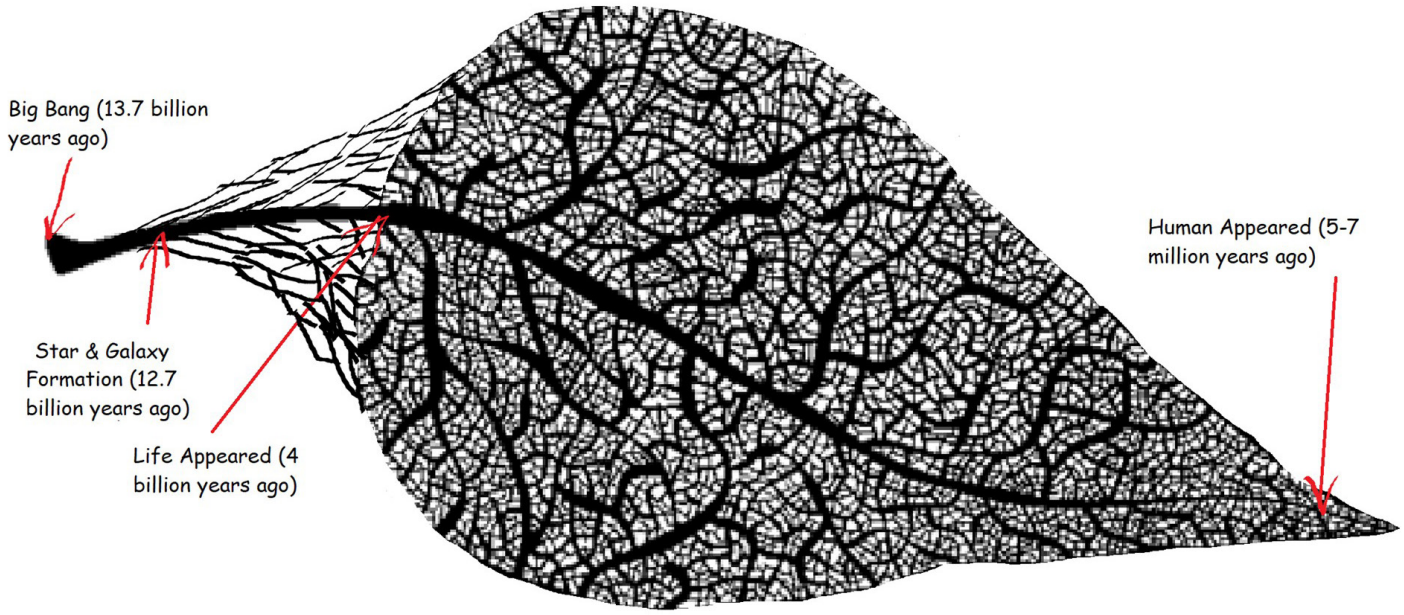

Diagram 10: This leaf can be regarded as a metaphor for the evolution of *the forms of being* –from simplicity and uniformity to complexity and diversity, especially after life appeared. There are plenty of branches, yet, among them, we can identify a main trunk that continuously grows and eventually develops into human beings / human society. Diagram by Ye Chen.

ist just in themselves; instead, they have to couple with and depend on each other horizontally and vertically, as part of the historical sequence through which their being has passed. It is the joint realization of these two directions that permits the realm of existence to become valid in evolutionary history.

Therefore, only the being of interrelation is absolute.[59] There is no division of inferiority or superiority, subject or object, since all beings have the same origin, are made of the same material, and flow in the same progressive evolutionary river. The difference lies only in their forms.

The horizontal interdependent relationship between beings can be reached only through the vertical superposition of effective coupling, step by step. From the moment of the Big Bang to that of human society, every being and every state of the holistic universe is built on effective structural-coupling.

This is why harmony between all beings is pre-established, as noted by philosopher Gottfried Leibniz.[60] Evolutionary progress is continuous, without any leap or fracture (nothing can occur on its own), so **the 'valid' occurrence of any being can only be based on *harmonious coupling* with an other / others**. The effectiveness of human cognition, manifesting in a way such that the interactive quality can maintain its realm of existence as a human – enabling an individual to make distinctions, learn knowledge, and so forth – is a representation of this harmonious coupling.

At the start, all beings are included in *the one*.[61] No matter how time and space are extended, the holistic being (beings as a whole) remains invariant according to the law of the conservation of energy. Based on this, we can build up an abstract *finite interval of beings* in which the question of finity and infinity of extended time and space can be eliminated.

There is only one holistic being that contained all the forms of beings / properties that have emerged.[62] In this finite interval, all beings are interrelated – horizontally, they are interdependent, and vertically, they are in a derivative relationship. **Present (and new) forms of beings exist as derivatives of former forms of beings.**[63]

During the Big Bang, there were many types of particles quickly created and destroyed. Should they be considered part of the finite interval of beings? The answer is, 'No.' Those beings that appeared and disappeared quickly imply that they were not able to exist (adapt to conditions). Only relatively stable units can be viewed as 'legitimate' and be

placed on the large-scale evolutionary tree.

Nonetheless, some of these live-and-die beings may have played an essential role (such as beryllium-8) in the production of other beings. They are considered 'transitional instants' that led to stable forms of beings. The finite interval of beings focuses on stable forms and derivative relationships among them.

Having explained the finite interval of interrelated beings, it is necessary to supplement a few philosophical concepts to make our reason complete. 'Outside interval' is absolute nothingness / non-existence, or absolute being.[64] Neither absolute nothingness nor absolute being are related to the beings in the interval. This means that they are in neither an interdependent relationship nor a derivative relationship, and so they are 'outside the interval.' Logically, the 'nothingness of interrelation' is an empty concept and stays in the finite interval of interrelated beings, referring to those potential beings that have not yet been realized, owing to the failure in structural-coupling, hence the 'nothingness.'

Let us now settle down to feel the beings around us: not just those visible objects but also the emptiness, air, light – feel them as beings that existed before us, our old ancestors; feel how the coupling between their interactable-quality and our interactive-quality is reached, in such a harmonious way; feel their preceding historical sequence, as well as our structures … how every cell, every molecule is formed through the harmonious coupling along history, until finally, the gap between human, nature and everything is completely healed.

Preview of the Next Article

In my next article, I will discuss new forms of generation, the conservation force and variation force of beings, and their division-coupling process. We will come back to the criteria of structural-coupling and establish the being of equivalence model, with which we will see how a being is differentiated so as to have an 'equivalent' existence. Charles Darwin's natural selection will be examined, and principles will be drawn from the differentiation process. I will also look at the essence of crises – how the being of differentiation results in an accelerated growth of conditions that leads to harder and harder challenges for human society to confront …

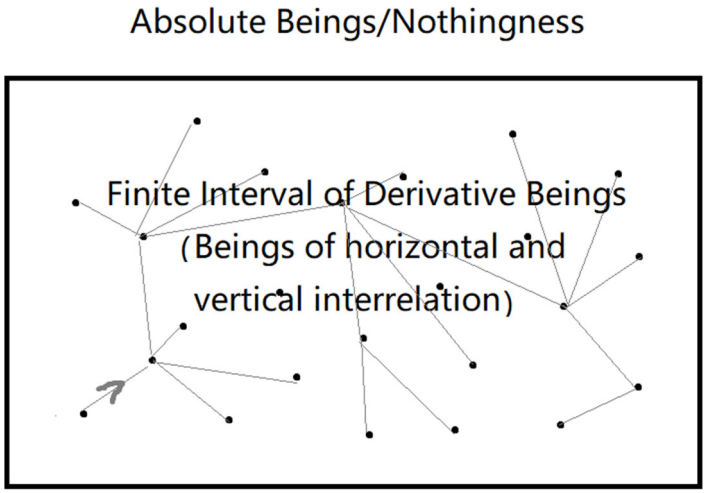

Diagram 11: A Sketch of the finite interval of beings, outside of which is absolute beings or nothingness. Diagram by Ye Chen.

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Endnotes

1. Wang 1998: 205.
2. Prigogine and Stengers 1984.
3. My book, *Introduction to the General Law of Beings*, consists of my reasoning of Wang's fundamental law. Chapter 1 covers the development of philosophy, critiques mainstream research methodology, and provides a brief introduction of Wang's new approach. Chapter 2 supplies the basis of my thought – the first three sections address concepts that one must hold to read Wang's theory, as an essential part of the deduction process, while the fourth to sixth sections constitute a reconstruction of the deduction process. The last section helps consolidate the philosophy through self-questioning and answering. The paper you are reading includes portions of Chapter 1 and the first three sections of Chapter 2.
4. Panov 2017: viz. 395.
5. Checkland 1981.
6. Jackson 2019.
7. Checkland 1981. Jackson 2019: 157.
8. Jackson 2019: 35–39.
9. Aharonov and Bohm 1959.
10. Wang 2002.
11. Wang 1998: 454.
12. The two terms, 'autopoiesis' and 'self-organization' cannot be viewed as equivalent. Autopoiesis, introduced by Chilean biologists Maturana and Varela, entails the maintenance of a living organism's identity. Strictly speaking, when a subject changes its organization, it also changes its identity, which makes the term 'self-organization' inaccurate to describe a subject's structural-coupling activities to maintain its identity. Maturana 1987. Many scholars use 'self-organization' as a synonym for autopoiesis. This is sometimes reasonable, as they tend to focus on the autonomous organizing process of 'a particular subject,' such as that of a society or a management system. There is no shifting of identity under this context, since the research objective is always on that particular subject, in a micro-scale. However, the concept of 'identity' is especially important in distinguishing a being's different positions on its macro-scale, evolutionary route. Thus, only the term 'autopoiesis' fits into the vertical approach.
13. Maturana and Varela 1987: 27.
14. Lewontin and Levins 1985: 4.
15. Varela 1991. Maturana and Varela 1987: 102. It is also possible that a form of being evolves into another form

of being – another situation of losing 'identity,' but one in which disintegration does not occur.

16. Taylor and others 2017.
17. Maturana and Varela 1987: 147.
18. Kidokoro and others 2017.
19. Maturana and Varela 1987: 144.
20. Maturana and Varela 1987: 170.
21. Maturana and Varela 1987: 174.
22. Maturana and Varela 1987: 208.
23. Maturana and Varela, 1987: 113–115.
24. The black-box theory addressed by Ashby is also used as a description of this phenomenon, whose internal mechanism cannot be examined and what is producing the results cannot be revealed. Jackson 2019: 98.
25. Translated from Dongyue Wang's Glossary in Chinese: 'Gan Ying Shu Xing' and 'Ke Gan Shu Xing.'
26. Wang 1998: 168.
27. Albert and others 2014: 1–10. The perceptual layer here is the ability to perceive in a broader sense. To humans, perception refers to the ability to perceive through sensory organs, but cells and molecules also have their ability to perceive and react. Perception does not include a judgement on what is perceived, because that belongs to the intuitive layer.
28. Wang 1998: 168.
29. Aristotle's laws of thought are typical laws of intuitive judgement – the law of identity (A=A); the law of non-contradiction (A≠non-A); and the law of excluded middle (A=B or A≠B). Wang 1995: 168, 189. Imagine you search for your child in a room of 20 children with just your visual sense or search for a bottle of vinegar among 10 bottles containing flavors of the same color by using just your sense of smell – you are relying on these three laws of thought to make distinctions, otherwise the miscellaneous conditions will trap you in confusion. The stress response is a quick process of making distinctions (immediate judgement) to a given condition. When water suddenly falls above your head, and you immediately close your eyes implies 'this is the condition my eyes should avoid.'
30. Wang 1998: 130.
31. Wang 1998: 156.
32. Maturana and Varela 1987: 34.
33. Ohtomo 2013. Maturana and Varela 1987: 44.
34. Maturana and Varela 1987: 49.
35. Weiss and others 2016.
36. Wang 1998: 5.
37. Maturana and Varela 1987: 44.
38. Wang 1998: 75.
39. Wang 1998: 38.
40. Moulton 2004: 129.
41. Cooper and Hausman 2013: 4–13
42. Hickman and others 2002: 20.
43. Wang 1998: 7.
44. Hawking 1996.
45. Kolb and Turner 1994: 447–451.
46. Ryden 2003: 196. Allday 1998: 337.
47. Allday 1998: 262–263.
48. Ryden 2003: 117–118. Allday 1998: 264.
49. In the 5th century BCE, both Parmenides of Elea, a pre-Socratic Greek philosopher, and Laozi, a Chinese Taoist philosopher, claimed that all beings began with 'the One.' This is seen in Parmenides' *Way of Truth* and Laozi's *Tao Te Ching*. Thus, to put the singularity in a philosophical way, we would also call it *the one*.'
50. Wang 1998: 9.
51. Wang 2002: 147.
52. Allday 1998: 261–264.
53. Jones 2010: 35–36, 71–72, 82–83, 150.
54. Haas 2019.
55. Wang 1998: 74.
56. Wang 1998: 74.
57. Wang 1998: 29.
58. Wang 1998: 68.
59. Wang 1998: 7–8.
60. The concept of 'pre-established harmony' is borrowed from Gottfried Wilhelm Leibniz (1646–1716).
61. Readers may doubt that science will discover the universe uncovered by the Big Bang and the being before the singularity might be accessed. So, the Big Bang singularity may not be the origin of the universe. But still, the general evolutionary routine is definitive: beings much develop from the simplest/the least properties to the most complicated/the most properties. Therefore, we can still define a philosophical singularity in logic – 'the One", the origin that is the simplest/with the least property.
62. Wang 1998: 13.
63. Wang 1998: 7.
64. Wang 1998: 27.
65. Maturana and Varela 1987: 74, 95.

Integrating Freshman STEM Education into a Big-History Course in Japan

Martin Robert
Laboratory of Microbial Systems Biology
Graduate School of Pharmaceutical Sciences
Kyoto University
Kyoto, Japan

Correspondence | **Martin Robert** robert.martin.4m@kyoto-u.ac.jp
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Undergraduate education for Science, Technology, Engineering and Mathematics (STEM) has been a global priority of governments for decades, because of its direct connection to work-force development in a world with growing dependence on technology and information. Technology is the outcome of an evolutionary process leading to increases of complexity and emergence of new functionalities, which is a central theme in Big History. In modern Japan, large public universities focus on undergraduate STEM education, originally inspired by the American model. This Japanese STEM approach is rather heavily based on liberal arts and general education courses that are taught as distinct silos in mathematics, physics, chemistry, biology, etc. At least, this is the case for most of the first-year and some of the second-year content in most four-year degree programs. This model has its benefits and provides a solid foundation in these disciplines, one that expands on high school experience. However, this often means that students tend to overlook or forget the deep connections between disciplines.

Most students are eager to go on to the more advanced courses in their chosen program. Such specialization is understandable and desirable, but understanding how it emerges and why it can work in a larger context of differentiation, connections, exchanges and self-organized complexity is an important message to convey to the budding scientist / engineer. The first year of general-science education seems to be an ideal moment at which to provide an opportunity to look more deeply into these critical connections.

I was faculty at Tohoku University, a top national research university in Sendai, north-eastern Japan. In 2013, I was asked to teach a course on 'Life and Nature,' a requirement for international students studying in English at our Future Global Leadership Program. The majority of students came from South Asia and East Asia to study in specific STEM programs – 1) Marine biology, 2) Molecular chemistry, and 3) Aerospace / mechanical engineering. 'Life and Nature' was meant to provide a good, general education STEM component in preparation for more advanced studies.

Evolution of the Course

Fortunately, I was given much freedom regarding the orientation of the course content. The 'Life and Nature' course title inspired me, in 2013, to connect fundamental principles of biology to their roots in the inorganic world and the cosmos. Indeed, I saw how an integrated STEM experience is more about what lies between different forms of complexity than about the complexity itself.

Early in my career, I had become fascinated with the concept of emergence, a process that had deepened my own research interests on the biochemical analysis of bacterial metabolism. This led me to study cell-cell interactions in bacterial populations. From there, it was a small step to appreciate how all major steps in evolution are based on increasing interactions between otherwise similar elements. It was this narrative of elements coming together, mediated by physical / chemical forces, to bring new complexity into being that I was hoping to instil in my students.

Of course, this complex process needed to be simplified for 'Life and Nature.' I had to distil away many of the details about the elements themselves and focus instead on the process. I thought that the freshman level was an ideal time to do this, considering the liberal arts emphasis on basic knowledge. I was hoping to offer a way for students to better connect the basic mathematics, physics, chemistry and biology they were learning and bring them more satisfaction along the way.

Little by little, this blending of life, cell biology, earth science and ecology grew into something more, as I dug into the underlying principles of physics and cosmology. At that point, there seemed to be no other logical starting point than the Big Bang. But teaching these additional themes was unsettling for me as a biochemist! Then, in 2015, by chance, I watched David Christian's inspiring Ted Talk, 'The History of our World in 18 Minutes.' As a result, I leaned about the Big History Project that Christian had developed with Microsoft Research and realized that this was a resource that matched my ambitions to introduce concepts of complexity science in an accessible way. Big History brought together a mixture of content that fulfilled

our curriculum expectations and helped students connect the disparate and individual silos of disciplines they were learning. Much of the desirable material outside the scope of my original course could now be accessed freely from the Big History Project website.[1]

Such courses had been taught at universities around the world for some time, but, in Japan, Big History remained relatively unknown. I taught my revised course for the first time in the Fall of 2015 as 'Big History: The Organization and Evolution of the Universe (From the Big Bang to Now).' It was the first such course in English at the university level in Japan.[2]

Following its development, I was asked to participate in a multi-instructor course at Tohoku University also based on big-history concepts – 'Big History: Connecting Natural Science to Society.' It aimed to engage a freshman Japanese student audience as an elective offered to first-year students, regardless of program. It was more focused on Earth sciences, astrobiology, the origin of life, evolution, natural selection, and human history. As such, it had a different ambition with a different set of trade-offs, providing more depth but less breadth than the English-language course on which this article is focused.

Strategy and Objectives

The Big History Project was originally developed for middle and high-school students, but I rarely, if ever, felt that the content was underwhelming for our university students. Its relative simplicity but elegant focus on connections was ideal. For the students, many studied in English for the first time, so a less-challenging content was advantageous as they adjusted to Japan and a heavy curriculum. Most of their videos and documents were well designed.

The course was brief, considering the material covered – fourteen weeks of 90-minute classes. Covering Big History in such a limited time obviously comes at a cost. The course focused on the first five units of the Big History Project for eleven weeks, covering cosmology, earth, the origin and evolution of life, ecological balance, and the scientific foundations of this knowledge. It then went more quickly through the next five units in only three weeks about early humans, agriculture, expansion, acceleration, and the future.

The Big History Project lacked some content in areas I was hoping to explore, so I added content on biology and ecology for the Life unit, which was prominent in my course. I also added new data about physics, forces and particles, inspired by astrophysicist Eric Chaisson's website on Cosmic Evolution (2013).[3] With reluctance, I reduced the content about human development, due to our semester's time constraints and focused on the STEM part of the Big History Project. I hoped that students, regardless of their origin, had learned enough of that in high school and could extrapolate their knowledge.

The choice of a single-instructor model for such vast and diverse content resulted in significant challenges, but I thought it would enable me to maintain a well-integrated structure along with smoothly linked methods and activities. I also could more easily highlight connections between the different units. There were challenges, given that my expertise is in biochemistry and microbiology, but my scientific training and broad interests allowed me to successfully achieve my ambitions.

With a class size of about twenty-five to thirty-five students, I opted for an evaluation model in five different categories – attendance, homework, in-class work, a project, and a final examination. This helped relieve the pressure common in final-exam-based evaluation systems common to STEM. It also facilitated progressive and constant effort. Assignments and in-class activities included questions from the Big History Project related to videos or written documents on their platform. This allowed me to confirm whether students used the material and understood its content. Many open-ended questions were used for in-class discussions in groups of three to five students. Answers were often reviewed live and shared with the whole class. The main objective of the project, done in pairs, was for students to choose a topic relevant to Big History on which to further elaborate. The final examination contained a series of multiple-choice questions, as well as some development type questions, with more focused or open-ended questions to verify that they understood key concepts for each unit.

Results: 2015–2019

A central goal was to provide students with an overview of the physical and natural processes of the last 13.7 billion years, which led to the world that surrounds us today, especially the fantastic growth in complexity. My ambition was to help students from various fields appreciate the interdependence between physical, chemical, biological, and social sciences. While I won't present empirical evidence about course outcomes, I will share some students' comments about the course:

> *Learning Big History throughout this semester was new and interesting topic for me. It's such a great course overall but please cut the amount of homework.*

> *BHP is a very great resource. I really like Life and Nature as it showed me the world in a new perspective.*
>
> *There are so many assignments and projects even it is just the general class.*
>
> *I don't see its usefulness to engineering students. Rather one more physics or math class would have been more useful.*

Many felt a final exam was unnecessary, but I saw it as a healthy part of individual assessment. Overall, students thought that the content was too vast! I responded that – obviously – it is, but each component has relatively little depth, so the amount of information is similar to any other course. The major gain is in making sense of things rather than just information or facts acquisition.

Some reported that they felt little connection to their future specialized programs in marine biology, molecular chemistry, or aerospace / mechanical engineering. I explained that a better ability to see connections will help them downstream in their careers. I may have been only partially successful at convincing them.

Many of the student comments reflect the very trade-offs made in teaching big-history – captivating but overwhelming at the same time … providing many answers while leaving some explanations ambiguous. I'm hopeful that by adjusting some of the content and activities to reduce pressure on students, the majority would count it as a positive learning experience.

Benefits / Critiques of Big History

I believe the power of using Big History in STEM education is in how it allows students to connect disciplines at a moment when they begin to study each of them in a deeply focused but disconnected way. The single most important theme of Big History is the growth in complexity exemplified in the eight-threshold vision of the Big History Project. These allow us to make sense of much of the natural world that surrounds us and integrate those disciplines. Occam's razor comes in handy too, doing away with some details that obscure the simple.

From the interactions of a small number of elements and forces that emerged early in the history of the universe, amazing complexity has emerged. This is the powerful message that is both inspiring and reassuring in its power to explain the emergence of complex, living organisms. Big History is really a story about complex systems, a repeating pattern of coming together at different spatial-temporal scales, where emergence takes the central stage and leads to us humans and to what lies ahead. Simple, understandable, flexible, expandable and comforting in what otherwise can look like an incomprehensible, tangled mesh of details.

While many details of the origin of the universe and the origin of life continue to be debated at length when our knowledge is short, the growth of complexity by successive steps of assembly is not. This is a central process in the evolution of the universe. Destruction and reconstruction are also part of the scenario, from stars and planets to cells and metabolism and our own societies. Rebuilding is a crucial process for continuation of evolution over time.

In spite of all its appeal, Big History has also been the subject of criticism. It's mass appeal seems to leave historian Ian Hesketh wondering about important missing parts in the narrative:

> What this means is that Big History necessarily privileges the cosmic at the expense of the human, the natural at the expense of the political.[4]

It seems that Hesketh misses the point. Even traditional human history hides complex dynamics that we are still uncovering, and, in so far as it is based on written records that survived by chance, it also introduces significant biases. Certainly, the complexities of our modern world cannot be reduced to natural events predating human history, but this was never the idea behind Big History. As David Christian described, not satisfied with his knowledge of the history of one country, he needed to explore the history of the world, which ultimately led to an additional need to explain earlier events, such as the origin of humans, life and other events, ultimately all the way back to the Big Bang. But the goal was not to explain everything.[5]

History records events over time, so it requires a beginning. The Big Bang represents the very emergence of space-time and is therefore the ultimate starting point, while acknowledging that the subject is debated and that there are alternative models. At the same time, Big History seeks to provide a unifying narrative leading to humanity's emergence. Beyond these points, we see that human history is not unlike the natural history described in Big History – a small number of elements coming together in larger numbers, where more is different, differentiating and developing mutual dependences and interactions. The narrative is rather similar.

This, I think, is where the power of Big History lies – in showing us that the same process occurs at all scales in

both the living and non-living worlds. It can take us from a hot plasma of particles to our interconnected socio-biosphere in an incessant energy-driven process of assembly and reconstruction. While some criticism is warranted and healthy, the simplified but unified view of Big History is where its power resides.

Hesketh's criticism also identifies Big History's ambition to fill the gap left by secularization in society. The message of Big History is satisfying in the sense that it provides a framework to connect areas of knowledge that appear disparate. He also resents the lack of details about Goldilocks conditions that are used in the big-history narrative. While at times unclear, Goldilocks conditions highlight the importance of suitable environmental conditions that act as selecting agents in an evolutionary process that, while different from a biological one, follows a fundamentally common mechanism. Hesketh adds:

> This speaks to the difficulty of integrating a sense of human agency into the Big History narrative, a problem that becomes particularly important at the end of the story. … Humans are passive observers to the major developments of the period we are supposedly shaping.

While there may be some truth to his assertion that Big History is privileging the cosmic at the expense of the human and the natural at the expense of the political, I was not preoccupied by this issue in my STEM course but was more focused on the events leading to origins of humans. Hesketh argues for more human agency to be injected into the big-history narrative, which I think is a good point but is less problematic for early thresholds. The human development part may be more challenging, since many of its complexities are ignored, but these include many cultural and political biases.

Big History has been criticized for 'dehumanizing' history, a judgment that may come from a narrow reading of just human history. David Christian meant to use history as a track-record of events, whether before or after the emergence of humans. In that sense, it does not need to be in conflict with history but rather it is an extension of natural history.[6]

Understanding the major events that led to human emergence is a necessity for human history, and so it is that which really distinguishes Big History. Eric Chaisson shows that when the nearly 5-billion-year history of our planet is scaled to a 50-year duration, all of recorded human history represents only the last half-hour.[7] So the appeal of exploring and making sense even in a superficial way of the major natural events leading to us does not appear misguided.

For me, focusing on scientific content was both an objective (for a freshman STEM course) and a necessity (time and an expertise shortage). In that sense, the course I developed, while based on Big History, could easily do away with 'Big History' in its name and be called simply 'Evolution of the Universe,' as in the course subtitle. There are gaps in the big-history narrative that I have tried to fill to some extent, but these choices were subjective.

These additions include my additional introductory content on forces, particle physics, the standard model, the origin of life and biology/ecology. On the other hand, I reduced the parts about human development while keeping the critical role of the development of symbolic language and agriculture in terms of solidifying the themes of interactions, energy harvesting, and the immense growth in human complexity. Finally, briefly introducing the modern energy revolution was important to the introduction of technology and its expansion while other elements appeared dispensable from the STEM perspective of the course. I also tried to introduce the versatile concept of energy-rate density as an observable calculation, whose values grows as our universe increases in complexity.[8]

Addressing some of the criticism about Big History might be as simple as just clarifying the big-history objectives that vary from human history. More depth is not necessarily a solution. Depth can be easily outsourced. Perhaps, the links and references to external and highly curated resources just need to be reinforced. Big History must remain, in its fashion, a quick-user guide to our universe, one that indexes details when needed. This, I think, is its main appeal.

For STEM courses, improvements could also include more developed scientific content for each unit and expansion of the mini-thresholds of life. They may appear smaller in scale, but innovations like photosynthesis, the emergence of eukaryotes, evolution of multicellularity, animals moving from the sea to the surface and mammal development all had massive repercussions for life that warrant a closer look into driving forces and mechanisms.

A Universal Appeal for STEM Education?

The theme of Big History has universal appeal for students, especially in STEM. A narrative based on knowledge collected from scientific evidence should have such appeal. At the same time, language reflects culture – course content limited to resources in English obviously entails limitations. Students from East-Asian cultures may be more familiar with themes of interconnectivity and interdependence that

shape the big-history narrative. On the other hand, Japanese students often can be hesitant to express opinions publicly. A test-taker mindset common in Asia can confuse some students when the emphasis and evaluation of a course is more diversified, and at times open-ended. These cultural nuances are thus all factors to keep in mind.

Early on, the Big History Project confronts varied cultural traditions in its origin-stories component, which offers a good chance to identify similarities and differences across the world. Many of these we can connect to topics in evolution. Although their human-development component neglects many cultures around the world and is biased toward a Western view, there are efforts to profile important events events and historical figures in other cultures. On top of that, natural and human-made conflicts that led to the destruction of important sources also introduce its users to additional biases. However, for the STEM focus I chose, the ramifications of these events are more limited.

Big History provides a view of what unites all humans and cultures rather than what differentiates them.[9] This universal appeal can be adapted to all levels of education and is suited for all cultures. Its focus on the growth of complexity through similar processes at different levels is at its core. Specific content and attention to mathematical understanding is where there is freedom to adjust the educational level. There are many things that can be improved on in the course I decided to teach, such as more discussions, debates, and research-oriented activities.

Physicist and Nobel Laureate Philip Anderson rightfully pointed out in 1972 that 'More is different …. Biology is not applied chemistry and psychology is not applied biology.'[10] Anderson was describing emergence and the role of complexity at all levels of organization and the difficulties faced by reductionist approaches. In a sense, this is also the main message of Big History. As our universe organizes and evolves into systems with increasing number of elements, it becomes different, it gains new properties that make completely new and different things possible.

I think that, by providing evidence and examples of key events that reaffirm our dependence on each other and on the natural world, and by highlighting the deep connections between all evolutionary steps in the universe's history, the narrative of Big History seems to encapsulate the essence of what one should know as a person, at least from a STEM perspective.

Closing

The elegance of the big-history and cosmic-evolution narrative is that it describes growth of complexity as an intimate coming together of similar elements, at all scales from the subatomic level to ourselves. Humans and our emerging global societies pass though molecular and biological evolution. The forces that catalyse the process take on different forms but ultimately serve a similar objective of assembly making possible a remarkable growth in complexity. Some singularity events like the origin of the universe and the origin of life remain to be better understood, but, overall, the scheme makes sense in a way that is satisfying for young enquiring minds.

Whether our universe is headed for a heat-death or a new beginning remains an open question for which the big-history narrative has no answer, and that is its very essence. I hope that Big History or similar forms of integrative and transdisciplinary education will continue to grow in popularity, in Japan, in Asia, and the rest of the world. As a key learning instrument, it can help students make sense of the multiple disciplines they are trying to master individually, make them better able to see and appreciate the essential connections between them, and what it means for us, our past, present, and future.

Martin Robert's supplementary big-history course material: <https://drive.google.com/drive/folders/1ndMFg6aS-3sO7BiG_U-B6MmVO01OM3vS_?usp=sharing>.

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Endnotes

1. Big History has rapidly gained global attention from its origins in universal history and cosmic evolution. David Christian coined the term 'Big History' over thirty years ago. In 2011, he and his colleagues launched the Big History Project as a freely accessible set of online resources. They focused on secondary students in the United States, Australia and the Netherlands, but their model and materials also spread independently to other educational levels around in the world. Rodrigue 2022. Christian 1991. Big History Project c. 2022.

2. Historically, there have been independent efforts to teach big-history concepts in Japan, some as early as the late 19th century and some more focused on the modern big-history narrative in the 2000s. From 2013, academics from Soka University and J.F. Oberlin University started to collaborate on a project that resulted in Oberlin's Big History Movement and their course on 'Understanding Nature (Big History)' in 2016. It also led to the founding of the Asian Big History Association in 2014. Nobuo Tsujimura, personal communication, 2022, Tokyo. Rodrigue 2022.

3. Chaisson 2013.

4. Hesketh 2021.

5. Christian 2011.

6. Chaisson 2014.

7. Chaisson 2013.

8. Chaisson 2011.

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10. Anderson 1972.

Big History
Teaching and Learning

Introduction of Big History Education in Japanese High School

Kenji Ichikawa
Aletheia Shonan High School in Chigasaki, Kanagawa, Japan

Correspondence | **Kenji Ichikawa** fumimaya001@gmail.com
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This paper reports on the first big-history course at a Japanese high school. Aletheia Shonan High School is a private, co-educational institute in Chigasaki, Kanagawa, Japan. In April 2016, I introduced Big History in my World History class at Aletheia, and that class marks its sixth year as of 2021.[1]

Backgrounds and Aims of Introducing Big History

There are two reasons that I decided to introduce big-history education in my school: 1) My dissatisfaction with world-history education in Japanese high schools and 2) The spread of online supplement classes in Japanese school education.

First, I became dissatisfied with the traditional way of teaching world history. In Japan, school textbooks are made by private publishers and then screened by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). There are several MEXT-certified world-history textbooks for high school, but all of them have traditional content focusing on political history. Usually, a world-history course is taught in a one-way fashion – from teacher to students – and lacks active interactions. In addition, world-history exams aim just to assess students memorization of important figures, events, and dates. I wanted to change traditional education away from such one-way teaching, political history, and memorization.

Second, in recent years, more and more Japanese schools have adopted information communication technology (ICT) for education, including my school. Aletheia introduced ICT in April 2016, so that students could watch online supplemental classes on tablets. These online classes are given by famous cram-school teachers through a service called Study Sapuri.[2] Aletheia students came to use ICT for study at home. Since it enabled them to learn the basic contents of textbooks on their own, I took the opportunity to create new educational materials that I had cherished for a long time.

In October 2015, the Japanese edition of David Christian's book, *This Fleeting World: A Short History of Humanity*, was published. I immediately read it and became convinced that this was exactly what the new world history education was all about. So, I proposed it as an introduction of Big History at our Aletheia social-studies meeting and incorporated it into my world history class for first-year high-school students (tenth grade) in April 2016.[3] I decided to teach Big History at that grade level because the first-year students have more time than the third-year students, who are busy with study for university entrance exams. Also, since our school is a private high school, it was easier for us to develop our own curriculum than public schools, which are more tightly managed by MEXT. These conditions gave me flexibility to develop my own unique class.

In this way, David Christian's book became a catalyst for combining these educational backgrounds, challenges, and conditions. It started big-history education in my school. Fortunately, about three years later, I welcomed Professor Christian to my big-history class, in collaboration with the *Big History and Liberal Arts* symposium at J.F. Oberlin University in Tokyo in November 2019. At Aletheia, he gave a special lecture titled, *Big History and Climate Change*, for my students.[4]

Next, in the process to introduce Big History into my world-history course, I set the following four goals.

1. To cover the entire history of the universe from its beginning to its end.
2. To understand that we are at the end of a series of miraculous events.
3. To emphasize connections between these events and our present.
4. To let students think on their own by asking many questions of them.

My big-history class covers the history of the universe from the Big Bang to the Big Freeze. Students learn that the universe has a history from its birth to its end, that we are living in the midst of this history, and that the history of the universe has just begun. By teaching history from the Big Bang to the appearance of humans first, I aim to make them understand that we would not have been born without the events that took place during pre-human history. So, it is very important to learn 'where we come from' in history class. I also provide world-history education in which protagonists are not just humans, by taking knowledge from natural-science disciplines, such as astrophysics, planetary science, geology, and palaeontology. These are what Goals 1 and 2 above aim to accomplish. Goals 3 and 4 aim to improve teaching methods. I try to break away from the traditional way of making students memorize historical facts, and instead to encourage them to think for themselves by asking questions. That, of course, involves reformation of memorization-centred exams, as I will explain later.

Outline of My Big History Class

I teach first-year high-school students for 50 minutes for each class, roughly two hours a week and fifty hours a year.

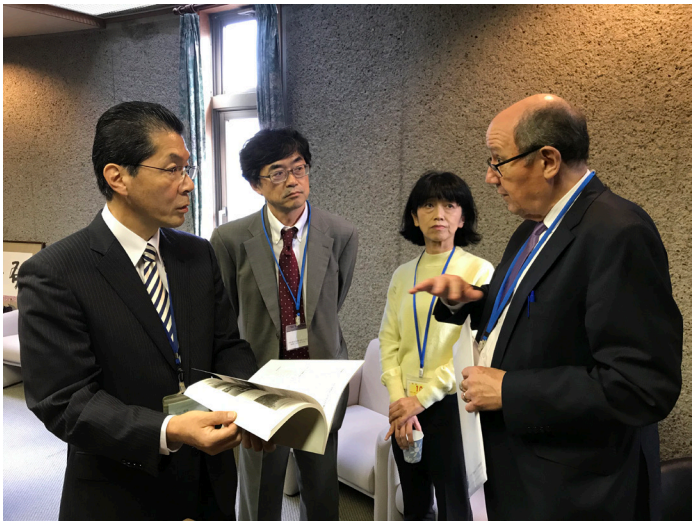

Image 1: David Christian's visit to Aletheia Shonan High School on 25 November 2019. From left to right: Kenji Ichikawa, Professor Hirofumi Katayama of J.F. Oberlin University, Tokyo, Japanese-Russian interpreter Kaoru Sakurai, and Professor David Christian of Macquarie University, Sydney (Australia). Photo: Nobuo Tsujimura.

The annual class schedule is as follows.

Basic Knowledge of World History

Part 1: Prehuman History
Big Bang, Birth of the Universe and Solar System
Birth and Evolution of Life
Era of Dinosaurs
Era of Mammals

Part 2: Era of Hunting and Gathering
Appearance of Humans
Life of Hunting and Gathering

Part 3: Era of Agriculture and Livestock
Emergence Farming and Civilization
Ancient Orient
Ancient Greece and Hellenism
Ancient Rome and Christianity
Ancient Civilizations of India and the Americas
Yellow River Civilization to the Han Dynasty
Post-Han Breakup to Song Dynasty
World of Pastoral Nomads
World of Maritime Peoples (Oceania)
Islamic World
Medieval Europe
Giant Empires of Asia
Modern Europe

Part 4: Era of Industry
Industrial and Civil Revolution
19th century
Imperialism and Nationalism
World War I and Russian Revolution
Versailles System and Washington System
World War II
Cold War

Part 5: Future History
The Future

There are five parts in total, with three parts of human history between Prehuman and The Future. Human history is divided into sections based on the livelihoods of humankind: hunting and gathering, agriculture and livestock farming, and industry. In addition, there are 27 more detailed units. Conventional world history tends to focus on the history of agrarian civilizations. Therefore, in Part 3, 'The World of Pastoral Nomads' and 'The World of Maritime Peoples (Oceania)' were set up as independent units to emphasize the role that both peoples played in world history.

I created the teaching materials, and they are shared with students on tablets. It takes two hours to teach one unit, in which I give a 1½ hour lecture with a projector. Using the remaining 30 minutes, students study and discuss questions from me in groups, and each group shares their answers on the projector. Finally, I wrap up the whole class.

Unit Questions to Have Students Actively Learn

To give students an opportunity to think for themselves, I set questions for students in each unit (unit questions). Some units have more than one question, making a total of thirty-six. Here I've selected seven of them, based on my four goals of Big History.

Earth History and our Relation to it

Question: If an asteroid had not hit the earth 66 million years ago, what would the rest of history have been like, and what would we be like today? Let's imagine!

Sample Answer: It is possible that the dinosaurs would not have become extinct, and that the age of dinosaurs would have continued to the present. As a result, if the age of mammals had not come, humans might not have arisen.

Intention of the Question: The question asks us to think about the fact that even events that took place before the ap-

Image 2: My big-history class

Image 3: Lecture with a projector

Image 4: Study and discussion in groups

Image 5: Students using tablets

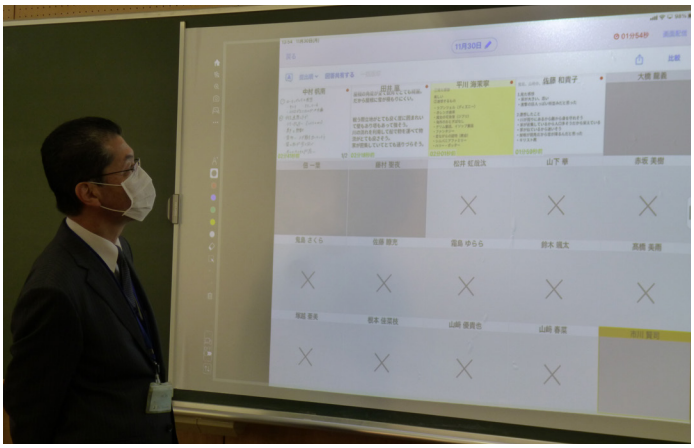

Image 6: Answers submitted from each group

Image 7: Giving feedback about answers

pearance of humans have a deep connection with the people who live today. And it is a question that makes us think that the very fact that we are alive today is extraordinary. 66 million years ago, off the coast of the Yucatan Peninsula in Mexico, an asteroid 10 to 15 kilometres in diameter hit the earth at an extremely high speed of 20 to 30 kilometres per second. The energy generated by this impact was one billion times greater than that of the Hiroshima atomic bomb, and equivalent to a magnitude 11 earthquake. Such an event occurs only once every 500 million to 1 billion years in our solar system. This event marked the end of the age of dinosaurs and the beginning of the age of mammals, and we are on the cusp of that. The asteroid impact itself was an astounding event, but students will learn from this question that we are alive today because of it.

Formation of Civilization and Happiness of Individuals

Question: Through agriculture and livestock farming, the world's population has grown from 6 million to 7.7 billion (2019). While the population has increased, how has each person's life changed? How did life in Catalhoyuk compare to that of hunters and gathers? Let's think about it!

Sample Answer: Ancient cities were unsanitary, and disease spread because of the dense population. Since food was supplied by agriculture, there was a high possibility of starvation if there was a crop failure due to bad weather. Staple foods such as wheat and rice were introduced, but this led to uneven nutrition. The working hours of agriculture were longer than those of hunting and gathering, and people had to work in the same position more often, so they suffered from back pain.

Intention of the question: The emergence of agriculture and the formation of civilization are considered to be one of the major revolutions in world history. However, the question asks students to think about whether each person became happy. The question asks students to think about the issue of 'happiness' by comparing it to the hunting and gathering era studied earlier.

History of Horses

Question: The picture is of the City of London Mounted Police passing Buckingham Palace in London, England. As represented by the word 'horsepower,' let's think about the capabilities of horses and the role they have played in human history. The history of the world has been changed by people riding horses. Take a look at picture, paying attention to the following: (1) Look at the difference in size between the human body and the horse's body. Imagine the courage and fear of the first person who rode a horse. (2)

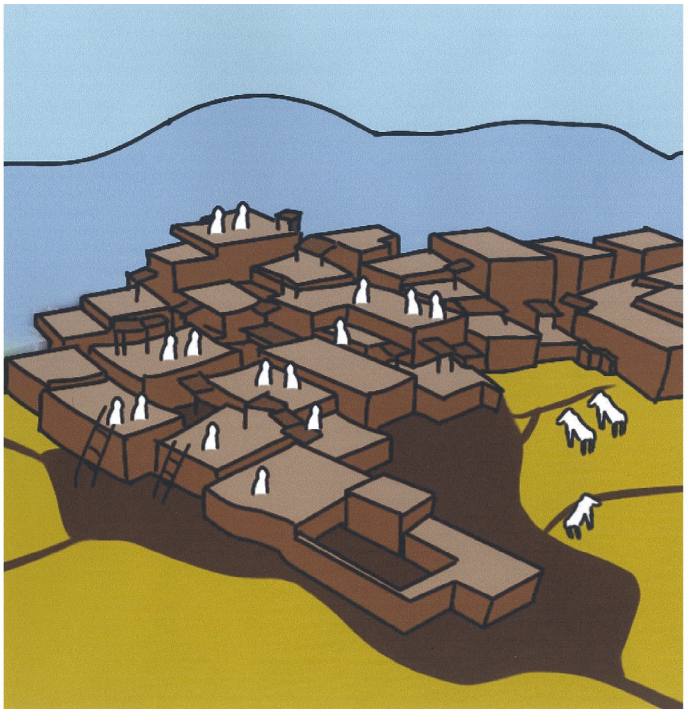

Image 8: Sketch of Catalhoyuk. Image by Aletheia Shonan High School's Cartoon Research Club.

How high is the horse's back from the ground? How high are the eyes of the policeman on top of a horse from the ground? What does the world look like from up there? (3) What kind of things do horses carry? What role have horses played as a source of power?

Sample Answer: (1) We know that horses are much larger than humans. The first human to ride a horse must have been quite scared. (2) The horse's back is as tall as a human being, and, since the human is riding on top of the horse, they are high above the ground. Compared to people who walk or run on the ground, we can see the world from a much higher perspective. (3) Horses carried not only people and goods, but also information. Horses were not only used for transportation, but also for agricultural work, so it is safe to say that civilization would not have been possible without them. At that time, the fastest and most powerful power source was a horse.

Intention of the Question: The question is to make us think that humans are not the only 'heroes' of world history. The purpose of the question is to make students think about the role that horses also played in world history, such as the impact that pastoral nomadic states had and the fact

that horses were the greatest source of power until the Industrial Revolution.

Taxes

Question: *Jizya* is a personal tax and *kharaj* is a land tax. In ancient China, there was a personal tax and a land tax. Today, Japan also has a personal tax and a land tax. Why do we impose taxes on people and land? Let's think about the reasons!

Sample Answer: The government needs to ensure that it collects taxes from the people, and, if taxes are not collected properly, such as through tax evasion, the government will not be able to function. What should be taxed to prevent tax evasion? The answer is: something that cannot be hidden. There are two things that you cannot hide: yourself and your land. For these reasons, the basic items of taxation are people and land.

Intention of the Question: The question is to make students think about why taxes exist. The fact that taxes consist of a personal tax and a land tax is not only practiced all over the world, but they were practiced in ancient times and are still practiced today. So, there must be a fundamental reason why these types of taxes are used. This leads us to think more deeply about the structure of human society and its maintenance.

Thinking Deeply about History

Question: The history of humankind that we have studied so far has been the history of the agrarian peoples. However, not all of humanity has been agrarian. Pastoral, nomadic peoples have also had a great impact on world history. But for some reason, textbooks do not cover much about them. Let's think about the reason why their number of pages in the textbook is so small.

Image 9: The City of London Mounted Police (Public Domain)

Sample Answer: It is because pastoral nomads lived in tents and were on the move, so was difficult to preserve their remains.

Intention of the Question: This question asks students not only to understand the contents of the textbook, but also to think about the conditions under which history is written in the textbook. Current world history is centred on agricultural civilization and consists of archaeology (artefacts) and historiography (documents). Even though the pastoral nomads played a major role in world history, the pages about them in textbooks is limited because of the lack of archaeological sites and historical documents about them. The same can be said for maritime peoples and other minority groups. We discuss with the students the mechanisms and limitations of this kind of historical study.

The Age of Discovery

Question: Voyages in olden days had a lot of risks, and the people returning safely was few.

Sample Answer: A cause of the crews' sickness and death was scurvy, due to a lack of vitamin C from fruits and vegetables, due to long voyages without a refrigerator. There were also diseases caused by poor sanitary conditions. If a ship was wrecked, many people immediately died. In those days, spices were very expensive in Europe, so if one returned home with a full cargo of spices, they could become wealthy. On the other hand, there were not many people who volunteered to become seafarers because they were afraid to go into the unknown. Many seafarers were criminals who had been pardoned.

Intention of the Question: Students learn how the Age of Discovery was an extension of the Christian Reconquista that lasted for 800 years in the Iberian Peninsula, and I explain the Europeanization of the world that followed. These questions help students learn about the efforts and hardships of people involved in the Age of Discovery, as well as the context of global European expansion. They also consider vitamin sources and cargo preservation in the context of collective knowledge.

Industrial Revolution and Schools

Question: The Industrial Revolution gave birth to factories, where production was carried out by engines and machines, replacing human power, animal power, and manual

Voyager	*Size of Fleet on Departure*	*Size of Fleet on Return*
Columbus	Three ships, 90 crew members August 1492	One ship, 40 crew members March 1493
Vasco da Gama	Four ships, 170 crew members July 1497	Two ships, 44 crew members July 1499
Magellan	Five ships, 265 crew members September 1519	One ship, 18 crew members September 1522

Table 1: This information shows that the average chance of survival was less than 20 %. Although Magellan's voyage was only three years, less than one in ten people survived. Would you be willing to participate? What was the cause of death? And why did they risk their lives to participate? Table from Aletheia Shonan High School's Big History / World History Course.

labour. Schools have a role to play in training factory workers. What are the lessons that schools teach for workers to succeed in factories?[5]

Sample Answer: Factory workers need to be on the job before the machines start. For this reason, tardiness is strictly prohibited, and punctuality, even a five-minute head start, are considered important. If one person is late, the factory will not be able to move efficiently. It is also required for everyone to wear the same uniform (work clothes) for better cohesion. Being on time and wearing a uniform properly is taught in school. In other words, schools trained factory discipline.

Intention of the Question: This is a question to make students understand that what they learn in history class has an impact on their school life today. The basics of school life, such as being punctual and wearing a proper uniform, are the things that students dislike the most. However, these questions will help them understand that there is a historical background for these things.

At the end of each unit, students separate into groups, do research on unit questions, and exchange opinions for deeper learning. In contrast to lecture-style classes, where students learn knowledge from the teacher in a one-way manner, group-learning is an output of research, discussion among students, and summary of their opinions. In this way, the program is a balance between input learning and output learning in each unit.

Exams for Students to Explain Rather Memorize

In E.H. Carr's book, *What is History?*, there is a passage that says that history is an unending dialogue between the present and the past. From this, I believe that the protagonists of history are those of us who are alive today, and that history is about us explaining the events of the past in our own words, from the perspective of modern people. History is not a memorization of key words, but an explanation by modern people. Based on this understanding of history, my tests ask students to give a one-to-two-line explanation. In our school, tests are held five times a year, and each 50-minute test consists of 20 questions. There will be a total of 100 questions per year. Here, I share five questions and sample answers for them, as well as the intention of each question.

What Photosynthesis has Brought About

Question: Cyanobacteria use sunlight for photosynthesis, and the increase in oxygen is considered to be a major event in the history of the Earth. Explain what happened as a result.

Sample Answer: The decrease in carbon dioxide, which has a greenhouse effect, caused the Earth to become colder, and eventually the entire planet froze. Oxygen dissolved in the ocean and combined with iron, causing iron-oxide to precipitate and accumulate on the seafloor, forming a striped iron-ore layer.

Intention of the Question: The oxygen on the Earth did not originally exist, but it was created as a result of the growth of cyanobacteria, 2.7 billion years ago, and their photosynthesis over the next 500 million years. The newly generated oxygen was poisonous for much life and caused a major event called the 'oxygen holocaust' in the history of the Earth. However, as a result of this, we are able to breathe in oxygen and extract iron-ore from the surface of the Earth. This is a question to see if students understand the above.

The Use of Fire and Enlargement of the Brain

Question: We know that *Homo erectus* used fire. As a chain of results, they were able to eventually increase their brain size. Explain this connection between the increase in the size of their brain and use of fire.

Sample Answer: Because cooking meat over a fire improved digestion and increased leisure time, and gathering the family around the fire developed communication skills.

Intention of the Question: This question is about the relationship between fire and humans. The diagram below is the one I use in class. It shows that *Homo erectus* became almost the same as us, *Homo sapiens*, by making stone tools, running, and using fire. This is a question to see if you understand the whole picture.

Definition of Slaves and Slavery

Question: The following sentence is translated from Article 199 of the Babylonian Code of Hammurabi. 'Whoever blinds or breaks the bones of another's slave may pay half of the slave's value.' In other words, there was a price for slaves. Explain why slaves have a price and give a brief definition of a slave.

Sample answer: Slaves were supplied as prisoners of war, treated as livestock, and sold as commodities in slave markets … so they had a price.

Intention of the Question: This question asks what a 'slave' is. In class, I show how slaves were discussed in the Code of Hammurabi almost 4000 years ago and that they also existed in the 19th century of the modern era. For example, the U.S. Civil War was a war about slavery. This shows that slaves have existed throughout almost all periods of history and that it has not been long since slavery was banned.

War in Medieval Europe

Question: For what personal reason did lords and knights wage war in medieval Europe?

Sample answer: Since lords and knights held landed estates, their main purpose was to get additional feudal lands from the king, by providing service in the king's wars.

Intention of the Question: This question asks what it meant to be rich and happy for lords and knights in medieval Europe. The question also tries to assess if the students understand that the meaning of war differs, depending on the historical period. In class, I relate how the samurai tradition continued in Japan from the Kamakura to Edo period. It too was a long era of feudal society.

Round Table Conference

Question: Explain the purpose of a round-table conference, as opposed one at a square table.

Sample answer: A round table shows that there is no distinction between upper and lower seats, and that it is a conference of equals.

Intention of the Question: We use the term 'round table conference' casually in class, but the concept of round ta-

Homo erectus* ⇒ *We can see that they are almost the same as modern humans

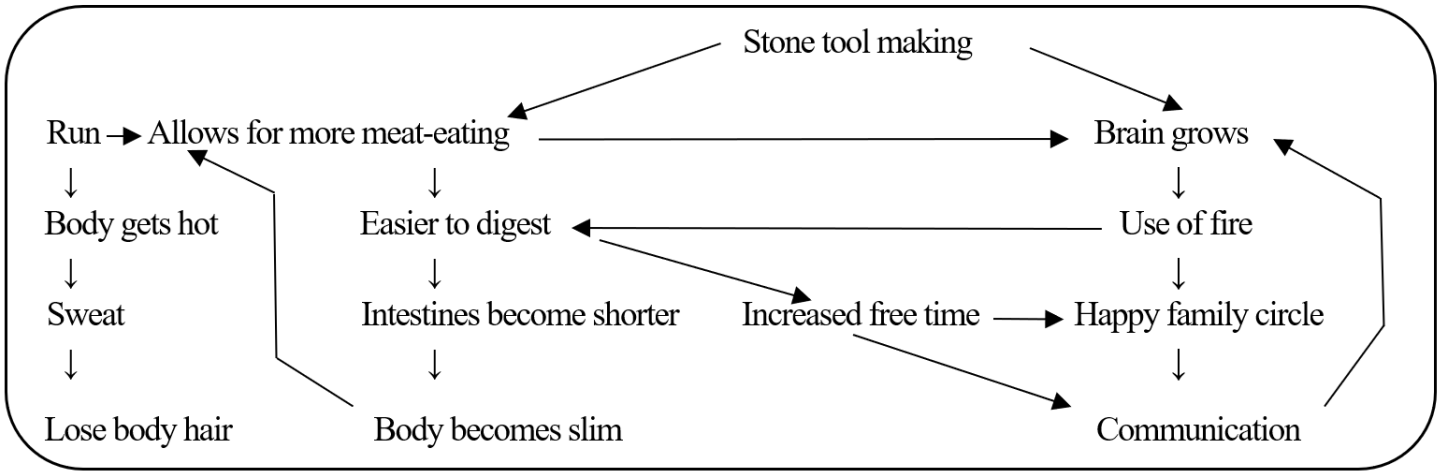

Table 2: Comparison of *Homo erectus* and *Homo sapiens*. Table from Aletheia Shonan High School's Big History / World History Course.

bles is also used in our daily lives. This question judges if students understand the deeper meaning of a round table.

Just as I ask a lot of questions from students in class, my exams aim to make students not memorize keywords, but instead to describe why things happened the way they did and how they happened. The ideal and goal of learning history is not just to understand the background, causes, contents, results and effects as independent issues, but also to be able to grasp the whole picture and explain it in one's own words. Students are required to notice the intents of the questions and answer them by summarizing their thoughts in one sentence or two. These are exams to test their critical thinking skills.

Student Feedback

On 22 February 2019, the last day of my Big History class for the school year, I reviewed the whole big history in 22 minutes as a summary.[6] After that, I asked my students to write their comments for the course, and I share four of them:

> We should be grateful for the fact that we are alive now, remember that it is a miracle that we are alive, and cherish every day of our lives. The human being has come this far after repeating mass extinction and evolution many times, and there is a possibility that another mass extinction will occur, but I would like to do everything I can until then. We should do our best to prevent mass extinctions caused by humans.

> I thought that I must be grateful for all of history, starting with the Big Bang, the birth of living things, evolution with extinction, and as a result, now, I am alive. Everything that happens from now on will somehow be connected to me, so I want to tackle things seriously.

> When I think again that such a big world began with a single event called the Big Bang, I realize that the fact that we exist (and are alive) now is a miracle that happened by chance. We are lifeforms that began with the miraculous story of the Big Bang, and our current existence itself is a miracle. I want to live every day with this in the back of my mind. I can't stop thinking about the events that have taken place in the universe up until today, and what it is that makes us exist. Laughter!

> In today's class, I realized that the existence of the Earth is a miracle, and that my own existence is also a series of miracles. And once I learned about the process, I found it strange that I am still alive. I also thought that I would like to live my life by comparing the past with the present and with learning how things have changed.

'Miracle' and 'grateful' were the key words that caught my attention in their comments. It was a great joy for me too, as the class instructor, to see that they feel that we are kept alive as an extension of the accumulation of various miracles, that our very existence is a miracle, and that they wanted to be grateful for their very existence when they learned about it. The students' comments that they were able to understand that we live in the universe and the history of the universe, and that they were able to understand the connection between the events of the past and our present, showed that I had achieved my goals of Big History.

A Future Challenge

Finally, I would like to point out a challenge that I am currently facing. I have not yet been able to smoothly tell a big-history narrative from the beginning to the end of the universe.

My big-history class consists of five periods (shown in a table below). The first two periods, prehuman history and the era of hunting / gathering are covered by natural science. On the other hand, the next two eras, agriculture / livestock and the era of industry are still taught through conventional world history. Future history is again covered by astrophysics.

In other words, my big-history class is sandwiched between traditional world history and natural science. I believe that one of the main features of Big History is that it mobilizes all the disciplines, including the humanities, social sciences, and natural sciences. But the world-history part of my big-history class remains a collection of histories of states driven by elites and centred on politics as before. Can we incorporate more knowledge of natural science into conventional world history? Can we better connect the different periods in Big History?

I believe that development of big-history pedagogy demands a change in world-history education.

Periodization	Disciplines	Research Domains
Prehuman History	astrophysics palaeontology	natural science
Era of Hunting / Gathering	anthropology	
Era of Agriculture / Livestock Farming	world history	humanities social science
Era of Industry		
Future History	astrophysics	natural science

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Endnotes

1. This paper is based on Ichikawa 2019-b. From 1949 to 2021, world history and Japanese history were taught separately in Japanese high schools. In 2022, these two subjects were partly integrated into a single subject called 歴史総合 [Rekishi Sōgō], or Modern History United in English. This new course focused on modern history of the world, including Japan. Because I taught Big History through the former world history subject, this nationwide reformation of history education ended my big-history class described here. Instead, since the 2022 school year, I have taught Big History for six third-year students who don't take a world history exam as part of university entrance exams.

2. Study Sapuri <https://studysapuri.jp/> means 'study supplements.' It is an educational service run in Japan by Recruit Company, which provides a wide range of online classes for junior-high-school students to review their courses and for high school students to study for entrance exams to university.

3. In Japan, elementary school educates children from the first grade to the sixth grade; junior high school from the seventh grade to the ninth grade; and high school from the tenth grade to the twelfth grade.

4. See the following video: Chikuma Shobo 2020. Another big historian Nobuo Tsujimura interpreted this lecture.

5. Toffler 1980.

6. Ichikawa 2019-a.

Education in a Playful Universe

Prashant Olalekar
Former Head of Department of Interreligious Studies, St. Xavier's College, Mumbai, India

Correspondence | **Prashant Olalekar** prash7654@gmail.com
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The 13th century Sufi poet Muhammad Rumi [جلال‌الدین محمد رومی] vividly incorporates the image of dance and movement in his lyrics, while the Mehlevi Order of Sufi Islam (popularly known as 'Whirling Dervishes') was founded on Rumi's teachings. Such expressions of emotive joy were among the favourites of my students, when I served as Director of Inter-Religious Studies at St. Xavier's College in Mumbai. The testimony of a college student in our Honours course, 'Awakening to Cosmic Compassion,' gives an idea of the impact that movement and embodied meditation makes on learning.[1]

> The 'Poem of the Atoms' by Rumi sent me into a state of ecstatic joy. I felt like dancing to celebrate my connection with the universe. During the meditation, I could feel vibrations in my hands and my arms. I could imagine the Earth rotating as we lay prostrate. When I rolled over on my back, I could take in every feeling … . I felt the connection to the universe deep inside my bones … . During the ACC course, I danced with freedom, with openness and vulnerability … . I think the dancing was a kind of healing, like a final release. I have just never danced this way before! To let go of every inhibition, every fear, to reveal myself finally, to breathe as the real me, to move as the real me … !²

This student's deep insight reveals a need in education for expanded programs of creativity, joy and expression – for learners, teachers, administrators and parents, for people of all ages. It is a need that Big History is well-positioned to provide.[3] As Rumi wrote about his wonderment with the universe:

Each atom dancing in the plain
Or in the air,
Behold it like us, insane
It spinneth there.
Each atom, whether glad it be
Or sorrowful,
Circleth the sun in ecstasy
Ineffable.[4]

From the atoms in our bodies to the stars in the galaxies everything is involved in motion, a veritable cosmic dance. Simple adjustments in our daily life can have profound effects in reinforcing expansive, big-history connections. At the Roman Catholic Ash Wednesday liturgy, the traditional prayer while applying ashes to each devotee's forehead is: 'Dust you are and unto dust you shall return.' But, in the college, we initiated the alternative: 'Stardust you are and unto stardust you shall return.' As a result, I am now filled with an ecstatic sense of hope that overcomes the fear of death, for that, even if we die, we will be returning home to the universe and shining as a star somewhere!

Need for a Revolution in Education

Educator Ken Robinson, in his Ted Talk, 'Do Schools Kill Creativity?', makes the provocative observation: 'There isn't an education system on the planet that teaches dance every day to children the way we teach them mathematics'![5] Most education focuses on academic themes that strengthen the dominant left brain with topics and skills that are job-oriented. This is a worldwide pattern. The arts (dance, drama, music and painting) are given secondary importance and are usually included as optional, extra-curricular activities. The major concern of most students today is to get good results in their exams, which serve as a passport to a job that will give them money, status and power in society.

Despite efforts at reform, we still find ourselves trapped in an antiquated educational system that is preoccupied with amassing information, rather than stimulating discovery and triggering transformation. How long do we continue with making just small adjustments to a system that we have inherited from the time of the Industrial Revolution? These tiny reforms only succeed in effecting some cosmetic changes to a structure that is deeply entrenched 'in the box.' The rapid pace of change in the 21st century calls for reimagination beyond narrow boundaries. Something more radical is demanded and nothing short of a revolution will suffice.

Playful Universe

What can we learn from observing the universe, which is our primary educator, according to philosopher Thomas Berry. Dance is built into the universe. Who is not fascinated by the dance of dolphins and peacocks, birds and butterflies, fish and snakes? The blooming and blossoming

of flowers display a unique dance of their own. We nonchalantly speak of dancing waves and leaves dancing in the wind. In many Indian communities, as in tribal cultures, there is a dance for every important occasion like birth, death, and weddings. Religious and cultural festivals are often linked with the rhythms of nature. The whole of creation is connected with this fascinating dance. Dance reminds us that we are part of a playful universe that is constantly in motion.

Play, which includes dance, is all-pervasive in nature. Steve Keil, an advocate for transformative play, states: 'Evolution has selected, over millions and billions of years, for play in animals and in humans.' Ants and elephants play; so do rats and cats, dogs and bears. Play is innate in children. We are hardwired to play from childhood to old age. Stuart Brown, a researcher on play, claims that humans are 'the most youthful, the most flexible, the most plastic of all creatures.'[6] From the atoms in our bodies to the stars in the galaxies everything is in constant motion, everything is involved in a cosmic dance.

Does it not seem quite crazy that in a playful universe that is vibrant with motion, for most of the time, students are stuck behind desks passively listening to teachers transmitting information? Teachers also have a hard time to raise the flagging interest of passive students. There is hardly any play, dance or movement in a normal classroom, with not much scope to discover and innovate. Students have a lot of fun when they feed their hunger for the arts in the various cultural programmes that nurture the right brain. There is much informal learning too that takes place in extracurricular activities and exposure visits.

God at Play

The extent to which God and dance have been divorced from each other can be gauged by the celebration of movement and music by agnostic philosopher Friedrich Nietzsche who inextricably linked dance to spirituality.[7] In the Indian tradition, the Hindu creation myths depict a god in motion. Shiva or Nataraja, the Cosmic Dancer, who is considered to be the source of all movement in the universe, revels in the ecstatic dance of creation, preservation, and dissolution.[8]

We also have the multifaceted Krishna as the uninhibited child, the playful prankster, the elegant dancer and the captivating flute-player for whom life is *leela* (divine play) in the universe – the playground of life.[9] This is a compelling reminder that life is playful and joyful.

Quantum physicist and philosopher Fritjof Capra shows that modern physics and traditional Eastern mysticism concur on the reality of cosmic dance.

Image 1: Nataraja, the Cosmic Dancer, Hindu source of movement in the universe. Bronze statue, Tamil Nadu, India, 11th century CE, Guimet Museum, Paris, France. Wikimedia Commons.

> Modern physics has shown us that movement and rhythm are essential properties of matter; that all matter, whether here on earth or in outer space, is involved in a continual cosmic dance. The Eastern mystics have a dynamic view of the universe similar to that of modern physics, and consequently it is not surprising that they too, have used the image of the dance to convey their intuition of nature.[10]

Many are not aware that, in early Christianity, the Greek term περιχώρησις [*perichoresis*], the relationship between the Holy Trinity of the Father-Son-Holy Ghost] is also a dance metaphor. The word *peri* means 'around' and *chorea* means 'dance', and *perichoresis* has been used to symbolize the intimate dance of the Trinity into which human beings are invited to join.[11] Church tradition has been so caught up with heady philosophical speculation that this embodied trinitarian image used by the early Church has not been popularized.

Jesus, who is usually presented as a serious person, uses the playful pedagogy of the parables to educate his disci-

ples. The fact that children were attracted to him is a sign of his warm and spontaneous personality. In the post-Resurrection narratives, one notices Jesus mischievously playing hide-and-seek with Mary Magdalene and his disciples. So there is an abundance of warm, playful images Jesus, if one just thinks to look for them in the Gospels.

The 13th century Rhineland mystic, Meister Eckhart, who was censured for his radical ideas, once preached a sermon with an unusual title, 'God Laughs and Plays.' After reading this sermon, I googled 'God and laughter,' but was shocked to find a YouTube video of demonic laughter. On reflection, I was puzzled why laughter is associated with demons and why images of a laughing God are hard to find. This has since changed.

This perception was dramatically altered when I took a group of students from St. Xavier's College, as part of our Honours course on the 'Joy of Self Discovery', to Asha Daan, a home run by Mother Teresa's nuns for the physically and mentally challenged destitute. While preparing the students for interactive meditation, a terribly deformed child, whose gender was difficult to ascertain, came into the centre of the group and began wishing each one of us well, with delightful, unabashed laughter. Like a bolt of lightning, an insight – almost mystical – hit me: This is the laughter of God, a God who is beyond gender, a God whose face shines resplendent in vulnerable brokenness.

Benefits of Play

Lack of play leads to ill-health and a host of diseases. Experiments have shown that depriving rats and kittens of play leaves them handicapped with regard to social skills. Studies have shown that deprivation of play in humans can lead to violence and even murder.[12] Our personal experience confirms the benefits that research shows about play.

Play stimulates joy and is a great antidote to depression. It is a great stress-buster. Play not only keeps us physically fit but also lights up the brain when neural growth in the amygdala, the area that is linked with emotions, is activated. The pre-frontal cortex, which controls cognition, is also stimulated. Play enhances emotional maturity and decision-making.[13] It develops cooperation, collaboration, creativity and other skills for teamwork, while it cultivates empathy that can offset narcissism. Play encourages

Image 2: St. Xavier College students at Asha Daan, a home run by Mother Teresa's nuns in Byculla, Mumbai, India, 2 October 2016. Photograph by Fr. Cleo Braganza SDB.

risk-taking and develops confidence, so we can solve problems; it kindles the imagination to think out of the box and fosters adaptability.

These are precisely the skills needed for life, as well as for jobs in whatever field one chooses. As noted by psychologist Peter Gray: 'From a biological evolutionary perspective, play is nature's means of ensuring that young mammals, including young human beings, acquire the skills that they need to acquire to develop successfully into adulthood.'[14] So it looks obvious that play should play a great role in any education system.

There is an urgent need for a paradigm shift to safeguard and promote community wellbeing. We need to think more of *We* than *I*. This implies moving from an individualist, competitive, consumerist culture to one that is more communitarian, collaborative, and compassionate. Thich Nhat Hanh, a brave and reknowned Buddhist monk, promoted *interbeing* as a way of life. He captured this countercultural mentality in his maxim: 'To be is to interbe.' Likewise, *ubuntu* is a valuable Bantu concept for collective, interconnected humanity that also conveys this needful idea of interdependence.[15]

In the Hindu tradition, the Sanskrit phrase, वसुधैव कुटुम्बकम् [*Vasudhaiva Kutumbakum*, One Earth Family] envisages the entire planet as one family [*Vasu* = Earth, *kutumbakum* = family]. This concept that is often translated "the whole world is one family" encompasses not only humans but all the inhabitants on the planet. Similarly the 17th century poet-saint Sant Tukaram from Maharashtra sings of the enchantment of birds, trees, air, nature and the whole universe considered as a family.[16] Personal well-being is interconnected with community well-being and the well-being of the entire planet. Besides the traditional golden rule of loving neighbour as self, fidelity to the green rule of loving the Earth as oneself offers hope for the future.

Play is Fun but not Frivolous

There is a common tendency to discard play as pointless. Play is surely fun, but it is not frivolous. Those who do not consider play serious enough would do well to heed the advice of the mystic Thomas Merton to his colleague Jacques Maritain:

> … and do what you do more as play than as work, which does not mean that it is not serious: for the most serious thing in the life of a Christian is play.… All life is in reality the playing and dancing of the Child-God in His world, and we, alas have not seen it and known it.[17]

In a similar vein, Indian Jesuit spiritual-guide Anthony de Mello shares an interesting eastern wisdom story:

> The Master once referred to the Hindu notion that all creation is '*leela*' – God's play – and the universe is his playground. The aim of spirituality, he claimed, is to make all life play.
>
> This seemed too frivolous for a puritanical visitor.
> 'Is there no room then for work?'
> 'Of course there is. But work becomes spiritual only when it is transformed into play'.[18]

For those who consider work and play as opposites, psychiatrist Stuart Brown offers sound advice on integrating play into our daily lives.

So I would encourage you all to engage not in the work-play differential – where you set aside time to play – but where your life becomes infused minute by minute, hour by hour, with body, object, social, fantasy, transformational kinds of play. And I think you'll have a better and more empowered life.[19]

Type of Play

It is good to note that play includes a wide range of right-brain activities like dance, music, visual arts, humour, and meditation. What we refer to here is not competitive play, focused on victory or loss and resulting in stress, nor the type of contemporary play that has been highly commercialised. Our kind of play is best exemplified by a practice called InterPlay.[20] It facilitates improvised movement, song, story, shape and stillness, based on the wisdom of the body. I was fortunate to discover InterPlay during a sabbatical in Berkeley, California in 2004. At one of their retreats, I became aware of the call to be a bridge for global peace.

On my return to India, and through the newly launched InterPlay India movement, we organised peace pilgrimages. InterPlay has been used in India for many groups, ranging from the educated elite and tribal communities to poor basti-dwellers, ill patients, confined prisoners, sex workers, transgender folks, and many others. We pioneered efforts in awakening the joy of compassion beyond boundaries, where these interactive activities encouraged ways of getting in touch with personal, inter-personal and social bodies, as well as connections to nature and the universe. In the course of time, I merged InterPlay with Eastern forms of spiritual activity to develop a new practice called *Cosmic Meditation*.

Image 3: Cosmic Meditation at Fireflies Ashram in Dinnepalya, Karnataka, India, 2016. Prashant Olalekar, developer of Cosmic Meditation, is centre left in the dark kurta. Photograph by Shabin Paul.

The idea of 'meditation' usually brings up images of tranquillity, so most participants expect that they will sit cross-legged and motionless. They are pleasantly surprised by the ordinary movements of walking, running, and improvising. From time to time, we challenge them to notice their sensations, feelings, memories, or thoughts. We then take this activity further, when they are asked to flit like a butterfly, swim like a fish, fly like a bird, or sway like a tree. Through simple, creative movements, they explore their innate connections for themselves, with each other, and in nature.

The participants are gradually made aware of their inner universe and its intimate connection with the outer universe. After spontaneous movement, they have the opportunity to enter the depths of stillness and experience deep relaxation. This process of mindful awareness, together with other inputs, leads to a transformation of consciousness. They are guided to trust the wisdom of the body: personal, communitarian, and cosmic.

We also do the Cosmic Walk, which is a reflection of our on-going 13.8 billion year journey. It is made of fifty meters of rope (with each three-metres representing a billion years) in the shape of an open-ended coil. The events of our universe are marked along the coil, according to the timeframe, and tagged with a candle. A reader narrates the story, beginning with the Big Bang, represented by a large candle in the centre of the coil. A walker lights a candle from the

Image 4: Students reflect during the Cosmic Walk. St. Xavier College Retreat Centre, Khandala, Maharashtra, India. Photograph by Orla Hazra, 2016.

original flame and, as each event of our cosmic history is narrated, s/he lights the candle beside the event. Arriving in the present moment, emerging from the labyrinth of time, the walker announces: 'Today, I know the story of myself.'[21]

Cosmic Meditation has become a highly useful tool for embodiment at the 'Awakening to Cosmic Compassion' Honours course. Together with the Cosmic Walk, it provides an opportunity to embody and integrate learnings from the Universe Story, which traces the evolutionary journey of the universe from the Big Bang about 13.8 billion years ago to our present times. I also use Cosmic Meditation for other courses, retreats and sessions that include marginalised groups in rural and urban areas.[22]

In 2015, as part of the Special Course on Environment for first-year Bachelor of Arts students at St. Xavier's College, we presented the film, *Journey of the Universe*, which narrates the process of cosmic evolution and discusses the complexity, connectivity and creativity permeating the universe.[23] A brief meditation to help students integrate the message in the film followed, in which the insight that we have the same atoms as the stars in our bodies provided them with a strong personal connection with the universe.

Challenge: Can we Design a Playful Education for a Playful Universe?

If the purpose of education is to prepare students for the future, then how do we educate them so that they can make their contribution to a rapidly changing world? Two qualities that they will undoubtedly need in large measure are

creativity and flexibility, which are the major points of play. Due to science and technology in a globalised world, our horizons are being considerably widened, and we are becoming conscious that we are part of a global village. However, we often draw up development plans and policies as though the entire planet and the wider universe do not exist. Alarming signals of global warming are compelling us to take ecological factors like pollution, climate change and ecocide into account.

Eco-theologian Matthew Fox reminds us of the original purpose of formal education: 'University originally meant a place where one went to experience his or her place *in the universe* – thus, to find wisdom.'[24] Thomas Berry offered his new perspective by situating education in the overall context of the universe. He wrote:

> The American college may be considered a continuation, at the human level, of the self-education processes of the earth itself: universe education, earth education, and human education are stages of development in a single education process. We cannot adequately discuss any stage of the development without seeing it within this comprehensive context.
>
> By universe education I do not mean universal education or university education, but the education which identifies with the emergent universe in its variety of manifestations from the beginning until now. So, too, by earthy education I do not mean education about the earth, but the earth as the immediate self-educating community of those living and nonliving beings that constitute the earth. I might also go further and designate earth as the primary educational establishment, or the primary college, with a record of extraordinary success over some billions of years.[25]

To spell out the implications of the paradigm shift involved in regarding the universe or the Earth as the core reference point of education will require a separate paper. It is important to take note that, while it is vital to consider the local and global context in the educational process, so too the comprehensive context of the universe and Earth is absolutely essential.

Why is play, which has such a tremendous potential for learning, so divorced from education, with play exiled to the playground and education to the classroom? This paper is my earnest plea for a complementary arts-based approach to education, in order to balance the one-sided emphasis on the right brain. Play will have a key role in this new system. This will require a step-by-step process in a strategy for structural transformation. It will involve a host of changes in curriculum, teaching pedagogies, appropriate venues for classes, frequent exposures to listen to the poor and Mother Earth. It will be well worth it, for the rewards will be immense in the field of education and for the challenging future for which the students are being prepared.

Play can revolutionise education and make it come alive with much more fun. Study, work and life can become much less stressful and much more enjoyable. Integrating it into the educational system will be a great challenge. Opportunities will have to be provided so that students can learn how to integrate study and play as a foretaste of integrating work and play later. We are being trained for work, can we be trained for playful work?

Educator and peace-activist Satish Kumar makes a plea for a holistic approach to education that involves not just heads but hearts and hands too.[26] We believe that education is about catering to the integral growth of the whole human person to play a transformative role not only in a globalised world but an evolving universe. One of the best ways to do this is to learn the art of play from the universe and to use it effectively in the pedagogical process![27]

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Endnotes

1. This was one of the Awakening to Cosmic Compassion (ACC) special Honours courses that was co-facilitated in September 2016 by Department of Inter-Religious Studies (DIRS), St. Xavier's College, Mumbai. Besides the DIR's regular academic courses, these special Honours courses provided scope for innovation with creative assignments. Its team consisted of Orla O'Reilly Hazra (PhD), Candice Menezes (MASW, MPhil), and Prashant Olalekar, (SJ, DMin).

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3. My thanks to Orla Hazra for introducing me and so many others in India to the Big History movement and to Barry Rodrigue at Symbiosis International University. This led to our offering of Cosmic Meditation sessions for Big History events in India and US.

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Indigenous Values and Sustainability: Possible Linkages to Big History

Yangkahao Vashum
Professor of Systematic Theology at the Eastern Theological College, Rajabari, Jorhat, Assam, India

Correspondence | **Yangkahao Vashum** yvashum@gmail.com
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Christianity and Western scientific knowledge have dominated academic research and its disciplinary education. At the same time, Indigenous knowledge and religious traditions have been dismissed as a way-of-knowing by Western and dominant power-structures. Since Tribal systems often cannot be easily quantified, they have been frequently dismissed as 'superstitious,' 'primitive,' or 'unreliable.'

But recent works by Tribal peoples around the world have resulted in a growing recovery of Indigenous knowledge for the benefit of Native and non-native people alike. This paper looks at Indigenous values and practices as alternative ways to sustain people in close relationship with Nature. In the context of the present-day ecological crisis and global warming, we must seek sustainable development, such as by learning about Indigenous values and practices.

This paper shares some vital traditions of the Tribal peoples of North East India.[1] It also argues that the rights of Indigenous peoples must include their recognition of the validity and value of their collected knowledge and ways of knowing. Of interest to this paradigm shift is how the inclusive ways of Tribal knowledge occasionally intersect with Big Histories' inclusiveness, especially in its Asian formulation.

Holistic Vision of Life

Let me begin by reminding ourselves that we are all influenced by our worldviews, ideologies, and philosophies of life. Our attitudes towards life, the ways we think and act, and even our lifestyles are shaped by our worldviews and values. A worldview is an underlying foundational principle that holds peoples' visions, orientations and thinking together as a community. It is a foundational principle that informs and directs all aspects of existence – how people relate to one another and how they interact with Nature, creation, and God(s).[2] Worldview shapes and is shaped by such attitudes and orientations toward life and the world.

Broadly speaking, there are two opposing worldviews – a neo-classical, capitalist worldview and an Indigenous worldview. The former holds a dualistic perspective that makes sharp distinctions between the physical and spiritual, secular and religious, matter and spirit. The latter affirms a holistic vision of life with no such distinctions. The former is characterized by anthropocentric and highly individualistic attitudes, while the latter is creation-centred and characterized by communitarian values. Our Indigenous perceptions about life, creation and the world are deeply influenced by the way we understand ourselves, our communities, and the world.

If you understand the nature of human beings to be inherently egoistic – as it is understood by neo-classical theorists – then the idea of ethics and development will be shaped and influenced by that view.[3] Neo-classical theory is based on the premise of individual freedom and the maximization of individual satisfaction. Its proponents understand development in terms of economic growth and production. Driven by an ideal of individual satisfaction, neo-classicists work toward accumulation of wealth by all means available.

Their understanding of ethics is predicated on the valuation of individual freedom and worth. It is ethical so long as one's actions are geared towards achieving egoistic goals. It does not seek well-being for all, while the ideal of sharing natural resources and wealth goes against their goal of competitive development. As ecological economist Herman Daly and environmental philosopher John Cobb point out, the individual-centred economy 'has no place for fairness, malevolence, and benevolence, nor for the preservation of human life or any other moral concern.'[4]

Holistic Worldview of Indigenous People

Space, creation and land together serve as the foundation of Indigenous people's concept of life –relationship and interdependence. Indigenous worldview is creation-centred and is characterized by understanding the interdependence and the inter-relatedness of all, including human beings. Therefore, Indigenous people all over the world, including those in North East India, believe that the whole of creation are our relatives. Everything is connected; there is nothing / no one which / who is not connected / unrelated. So one must act responsibly.

The Lakota Nation in North America have an expression that describes beautifully all that concerns the Indigenous worldview: 'We are all related.' According to Standing Rock Sioux scholar Vine Deloria Jr, the similar phrase, 'All my relatives,' is not merely a religious sentiment, as many people have supposed, but it also 'describes the epistemology of the Indian worldview, providing the methodological basis for the gathering of the information about the world.'[5] Deloria goes on to explain the implication of this worldview:

> 'We are all relatives' when taken as a methodological tool for obtaining knowledge means

> that we observe the natural world by looking for relationships between various things in it. That is to say, everything in the natural world has relationship with every other thing and the total set of relationships makes up the natural world as we experience it. This concept is simply the relativity concept as applied to a universe that people experience as alive and not as dead or inert.[6]

I believe the Covid-19 pandemic reminds us just this. Unlike the West's utility and mechanistic worldview which posits that Nature and creation derive their identities from humans, Indigenous people believe that every creation has its own identity given by the Creator. Let us consider a few examples.

Spatiality vs. Temporality

The relationship between space and time is another critical issue. Indigenous people give space precedence over time. Their worldview is spatially oriented rather than temporally focused, in contrast to Euramericans. This sense of spatiality accentuates and locates all important Indigenous relationships among human beings and the whole of existence. This understanding embraces the way Indigenous peoples view the world and relates to spirits and god(s).

In the West everything is centred on time. Time is money; time is everything. So they rush to meet deadlines, with little time for family, friends, or even oneself. There is no time for rest, being always on the run.

Indigenous peoples give importance to building relationships and quality of life. In a sense, they control time, not the other way round. They utilize time for enhancing relationships, friendships and quality of life. For Indigenous scholars, the traditional linear-thinking of temporality that is fundamental to the Western intellectual tradition is quite alien and is seen to be, in fact, destructive to their livelihood.

Need Based Economy: Simple Living and Lifestyle

Indigenous people follow and practice a need-based economy or subsistence economy. Their life has often not been complicated by global and external intrusions, but this has been changing. They live in tune and in tandem with Nature and their surroundings. There is an Ao-Naga myth about Lijaba, their Supreme Being and 'earth designer,' which goes like this:

> Lijaba came disguised in the form of an old man, almost naked, having sores all over his body … . He blessed the rice field of the two orphan sisters who were residing at the outskirts of the village. The old man instructed them to cut a string or rope of their basket when they had enough harvest. Then he left them. The harvest time came. The two sisters had such bountiful harvest that they had no place to store their grains. Then, as instructed by Lijaba, they cut the basket-strings and to their surprise the harvest was completed.[7]

The Indigenous people's wisdom of 'Cut the basket-strings when it is full' represents their life attitude towards wealth, natural resources and relationships. It means not to be greedy and selfish. Do not accumulate wealth and resources for yourself. Take what is needed and necessary. They do not cultivate the land throughout the year. Indigenous people live by the season, and so they have plenty of time for rest, recreation, visiting friends and families. This is in stark contrast with the neo-classical capitalist view of 'the sky is the limit,' 'winners take all,' 'limitless profit,' 'accumulate as much as you can' …

Sharing and Hospitality

Commercialization of land and resources is a recent development for Tribal people. In the past, they practiced barter / exchange or sharing of resources according to their needs. Tribals are known for their hospitality and generosity. They loved to share whatever they have. To a large extent, under a subsistence economy, everyone is given a fair share. The poor are given necessary care and protection. In the past, every time a crop was harvested, certain quantities were left un-harvested and set aside for poor people. This was also clearly seen by how Tribal society did not have beggars among them. On the whole, Tribal society was known for taking care of each other. Of course, things are changing rapidly. Influenced by the ideology of profit, people have become individualistic and highly commercialized. The culture of consumerism has taken over people's lives and is reflected by new lifestyles.

Indigenous People and the Land

For the Tribal people, land is life. All life activity revolves around land and its surroundings. It is central to their identity, history, spirituality, economy, and their very survival. Land has her own distinct life; it is never a dead object. It is a living entity endowed with spirits. As Mizo scholar K. Thanzauva has written: 'In a non-literate society the land is their scripture through which they read about the spirits and God and create myths and songs.'[8]

The importance of land to Indigenous people lies in the fact that even their Supreme Being is understood in rela-

tion to the land. A number of the Northeast Indian tribes, including the Aos, Sangtams and Chang Nagas, call their Supreme Being, *Lijaba – li* [soil] + *jaba* [enter] can be translated as: 'the one who enters or dwells in the soil.'[9] It is the belief of the people that *Lijaba* enters into the earth with the seeds and rises up again along with the crops. Hence for the people, the blooming flowers, the trees bearing fruits and the rice signify the presence of the Creator.

The Tribal people's notion of time and history are related to the land. Their yearly calendar and agricultural activities are based on the cycle of the earth. All the festivals, dances and songs of the people are connected with land. Moreover, their religious activities are all centred on the land. R. R. Shimray poignantly puts it, 'Every mountain, every range, and every ridge has a legend and every peak a tale to tell.'[10]

Tribals believe that it is the land that owns the people, not the other way round. The people know that it is the land that gives them their identity. Land is therefore highly respected.

Ethical life is closely based on the land. As long as one lives on the earth, one is expected to live an honest and truthful life. They believe their Supreme Being is everywhere and knows everything, and so they live in constant awareness of the eternal presence. They believe land is older than human beings and so is wiser. Tribal wisdom says: 'The land never lies; do not lie to the land.' Making a vow in the name of the highest divinity and the land is anathema, so people resort to it only for serious cases, such as land or boundary disputes, when every possible effort fails. They will eat a lump of soil and, normally, the one who gets sick or dies prematurely is declared guilty.

Land Tenure System and the Tradition of Conservation

In Tribal society, land is generally owned by the community. For example the land tenure in Naga society is well reflected in this Government of India report:

> In Nagaland, each tribe had a well demarcated territory within the villages inhabited by that tribe were located, with well-defined boundaries. Though the practice of each tribe differed, the village land was generally classified as (a) common village land, (b) clan land, (c) individual land, and (d) *morung* land. The village council was responsible for the management. Clan land was mostly jhum land owned by a particular clan. Certain areas, usually terraced land were owned by individuals. Some portion of the village land was designated for *morung* where the young boys slept there.[11]

A similar pattern is also found among the Khasi-Jaintia of Meghalaya, where the land is classified as *Ri Kynti* [clan land] and *Ri Raij* [community land].[12] The principle behind this system is to ensure that no one in the village is landless or poor, so, as a result, landlessness and beggars had been unknown to Khasi-Jaintia society.

The India Planning Commission report is expressive of land systems among the Tribals in Northeast India. In most cases, the community or village owns the land, with the chief holding nominal control.[13] The village chief is normally assisted by the village council, the people's representatives, while the ultimate power rests in the hands of the people as a whole. It is they who empower the chief and the council to carry out tasks on behalf of the village. There are a number of ways by which the tribal people conserved and preserved their lands.

- Terrace cultivation methods are widely practiced in the region to protect the land from erosion and landslides.

- Shifting/Jhum cultivation takes place after six to eight years, a cycle that leaves the land fallow and allows for its rejuvenation for a year. In recent time, however, the length of the cycle-years has shortened due to a number of factors, including increases in population and the need for more food, logging, business demands, etc.

Ethics of Conservation: Genna, Taboo and Totem

Land is regarded as a Mother who nourishes her children with fruitful bounty. For Indigenous people, Earth Day is not new. Our ancestors have held their own Earth celebrations since antiquity – for days or even weeks at a time – as they consecrated *gennas* for the land and the earth. There are many taboos for conservation of the land and Nature. Hunting and trapping are prohibited during breeding seasons, pregnant animals cannot be killed, and use of poisonous roots or leaves that kill fish while spawning is outlawed.

When animals give birth to new life, such as a calf or piglet, or when chickens hatch, a family honours them with taboos to protect the young ones. Wanton felling of trees and cutting of plants are strictly prohibited. Whenever trees are felled, Indigenous people first pray and ask their forgiveness. Before clearing the jungle for cultivation and farming, ceremonies are conducted to get approval of the land. Only then could they begin their work.

Closely connected with the observance of *genna* and taboo is the practice of totem. There are a number of clans in the Northeast who trace their origin to a totem animal

or plant. They have a great deal of respect for this totem, and hence they would not eat their totem animal or plant. The other way of maintaining their close relationship to the totem is by conferring religious significance on the totem animal or plant. In such a case, the totem being is eaten sacramentally at certain ceremonial feasts (but is otherwise tabooed) by all those descended from that totem life.

All these practices – *genna,* taboo and totem – are part of Tribal people's prudent ways of relating and conserving the land, Nature, and creation.

Conclusion

I started by claiming that the idea of ethics or development is influenced and shaped by the worldview one holds or by the way one perceives the human self to be. Accordingly I argued that the ethics of neoclassical economists are shaped by the way they perceive the nature of human as being 'egoistic.' The neoclassical theorists claim that their view of human nature is universally true for all people, which is of course making a huge general assumption and thereby committing a serious mistake. If this is true, how do we explain those societies and communities, including Indigenous people, that practice subsistence economy based on reciprocity and sharing? For these societies, humans are essentially relational beings whose existence depend upon the interdependence of each other. Their ethics are based on conceptions such that humans are relational beings and that everyone in the community works for the good of the community. Working for the good of the community includes taking care of each other and sharing the resources that are available among people.

Te need of the hour is for conversion of our attitude, values of life, and our ways of life and lifestyle, etc. I believe there is something we can learn from the Indigenous people, their knowledge and wisdom, and ways of life, as we search for alternatives in the midst of ecological crisis and innumerable crises brought about by modern development. What we need today is to look for values that promote quality of life and sustainability. The recent crises – such as floods and raging wildfires in and around the world – speak volumes about the perils in which we live today. And this calls for urgent action from the world community to mitigate the challenges and begin leading a different ways of life. Big History's openness to alternative views and ways of knowledge makes it possible for me to talk about Indigenous peoples' knowledge, values and ways of life. And I hope, I am making the connections between the Indigenous ways of knowing and the ideals of Big History as I spelled out the values of the Indigenous peoples.[14]

It is something important for us all to think about.

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Endnotes

1. I will be referring to the Tribals in Northeast India and other Indigenous peoples using the terms 'Indigenous' and 'Tribal' interchangeably. While the Indigenous populations in India are commonly referred to as 'Tribals', they are all integral members of the world's Indigenous community. My consistent use of 'Indigenous-Tribal / Tribe' affirms that membership and its fundamental relationships and my use of the terms will reduce much confusion. Secondly, Tribals in Northeast India are themselves Indigenous people, meaning they are the Native people of the land. The term tribe or tribal is an imposed term given to the Indigenous people of Northeast India by the colonizers and Western anthropologists and sociologists. Additionally, the Indian Government, for administrative purposes, has simply categorized the Indigenous people in the region as 'Scheduled Tribe.' The people never called themselves tribals; they know each other by their own ethnic names, such as Sumis, Khasis, Garos, Tangkhuls, Boros, Mizos, Adis, Wanchos, etc.

2. Cajete 2000: 62. Smart: 2000: 54.

3. DeMartino 2000: 38.

4. Daly and Cobb 1989: 159.

5. Deloria 1999: 52.

6. Deloria 1999: 34.

7. Longchar 2012: 32.

8. Thanzauva 2004: 130. For a detailed discussion on tribal concept of land, please refer to the following. Longchar 2012. Vashum 2020.

9. Longchar 1998: 16.

10. R.R. Shimray 1985: 6.

11. India 1984.

12. Rymbai 1998: 16.

13. For example, there are tribes like the Kukis of Manipur and the Sumis of Nagaland where land-holding is in the hands of the village chiefs.

14. This article is a revised and expanded version of a presentation I made in the 2021 Global Big History Conference on 'Changing the World: Community, Science and Engagement with Big History,' organized at the Symbiosis School for Liberal Arts, Symbiosis International University, Pune, Maharashtra, India on 1–4 August 2021. In addition to SSLA and J.F. Oberlin University (Tokyo), its sponsors included the International Big History Association, the Asian Big History Association, The Indian Association of Big History, and the Eurasian Center for Megahistory & Social Forecasting.

Contributors

Ye Chen (Zora) did her undergraduate degree in economics and arts, followed by a master's in the social sciences. Zora has always been passionate about literature, art, and philosophy. Composing poetry and prose, and analysing literature and art / pieces cultivated her aesthetic world view, which was challenged by Wang Dongyue's *A Unified Theory of Evolution*. The book lit up her curiosity about the ultimacy of beings, a topic that covers multiple disciplines of nature and social studies. Through Wang's model, the world (with its chaotic and fortuitous phenomena happening at every instant) turns out to be reasonable and clearer than ever in Zora's view. Currently, she is planning to do a PhD on macro-evolution, philosophy and nature, which would contribute to the final completion of her book, *Introduction to the General Law of Being*. Zora may be contacted at <nighton352@gmail.com>.

Kenji Ichikawa 市川賢司 is a teacher at Aletheia Shonan Junior and Senior High School in Chigasaki, Kanagawa, Japan. He teaches world history and began the first high-school Big History class in Japan in 2016. As an extension of his teaching, he organizes field trips to nearby Enoshima Island, which provides students with important experiences with which to understand the world and the cosmos. In 2019, he gave a report about his teaching of Big History and the liberal arts at the first international Big History symposium held in Japan. Kenji may be reached at <fumimaya001@gmail.com>.

Hirofumi Katayama 片山博文 is professor at J.F. Oberlin University, Tokyo, where he specializes in environmental economics. He organized and teaches one of the first big history courses in Japan <http://obhp.org>. In 2019, he and Nobuo Tsujimura organized the first Japanese Big History symposium, Big History and Liberal Arts, hosted by J.F. Oberlin University. Hiro's goal is to construct a 'Buddhist Big History,' which is based on the respect for all life and existence. His publications include *Politics of Climate Change over the Arctic: Preliminary Thoughts on the Global Commons* (Bunshindo 2014) and *Free Market and the Commons: An Introduction to Environmental Finance* (Jichosha 2008). His e-mail address is <katayama@obirin.ac.jp>.

Theyiesinuo Keditsu is a feminist poet, folklorist, writer, and educator. She is co-founder of the Centre for Indigenous Knowledge & Alternative Learning and advocates the revival of Indigenous Naga textiles and women's narratives through her popular Instagram avatar: @mekhalamama. She has published two books of poetry, *Sopfünuo* and *Wake*, under the pen name T. Keditsu, and has contributed to a number of anthologies and journals in her academic and literary capacities. Her poem, 'Whore,' was translated into Gujarati by Sitanshu Yashaschandra. Theyiesinuo has a PhD in Cultural Studies from the Tata Institute of Social Sciences, Mumbai. A member of the Angami tribe, her research focuses on contemporary Naga culture, Indigenous knowledge, Indigenous feminisms, and the oral and written literatures of Nagaland. She is widely sought as a motivational speaker and compére, and conducts trainings in diction, communication, performance, and creative writing. With over fifteen years of teaching, Theyie has taught at Sazolie College in Jotsoma (Nagaland) and at Hindu College and Delhi University. She is currently Assistant Professor in Kohima College, Kohima, Nagaland (India). She may be reached via <theyiek@gmail.com>.

Seohyung Kim, PhD, is a historian who studies infectious disease and medicine, as well as Big History. She was the first Korean professor to teach Big History – at Ewha Woman's University in Seoul. She structured her course as a convergence between the natural sciences and humanities. She also introduced the Big History Project into Korean high schools with world historian Ji-Hyung Cho. Seohyung has widely disseminated big-history knowledge to Korean scholars, teachers and students via public lectures for universities and government agencies, as well as in newspaper columns, on TV and for radio. In addition, she was a member of the Committee of 20 Big History Books, released in Korean by Y School Publishers, for which she wrote *Big History for the Primary Student* and *Six Vaccines that Changed World History*, among other titles. She also translated David Christian's *This Fleeting World* (2008) and *Origin Story* (2018) into Korean, as well as Alfred Crosby's *America's Forgotten Pandemic* (2003). Seohyung may be reached at <flander77@gmail.com>.

Afshan Majid is an Assistant Professor for History at Symbiosis School for Liberal Arts. She co-developed and co-teaches the first course in Big History in a university in South Asia. She has a PhD in Medieval Indian History from the Centre of Advanced Study in History at Aligarh Muslim University in Aligarh, Uttar Pradesh (India). Her thesis involved a reconceptualization of Mughal society and culture as gleaned from 16th century historian 'Abdul Qādir Badāūnī's work, the *Muntakhab-ut-Tawārikh*. In addition to her specialisation in history, Afshan also holds a degree in Women's Studies and has interdisciplinary publications in both fields. She may be reached at <afshan.majid@ssla.edu.in>.

Yuri Matsuzaki obtained her PhD from Keio University in Tokyo, where she developed biochemical simulation models to study the regulation system of bacterial signal transduction. She then worked as a post-doctoral researcher at the Tokyo Institute of Technology, where she investigated protein-protein interaction-prediction systems and their application to systems biology. After her post-doctoral work, Yuri shifted her focus toward promoting the

improvement of scientific research culture. She joined the Education Academy for Computational Life Sciences at the Tokyo Institute of Technology as adjunct faculty and later moved to the Tokyo Tech Academy for Leadership, where she designs leadership education programs for graduate students in science and technology from various majors. She seeks to use Big History as a part of this leadership program because it helps to bridge different scientific and engineering fields and spark discussions. Yuri may be reached at <matsuzaki.y.ad@m.titech.ac.jp>.

Prashant Olalekar is a Jesuit from Bombay who completed his Doctor of Ministry in Peace Studies at the Graduate Theological Union, (DMin) Berkeley, California in 2006. Recently retired as Head of the Department for Interreligious Studies, he was also Adviser of the All India Catholic University Federation unit at St. Xavier's College, Mumbai. Prashant coordinated *Jagruti* (Awakening), an experiential value education programme for junior college students, which included exposure trips to slums and rural areas of India. He was Novice Director and Coordinator for Formation of the Bombay Jesuit Province, Episcopal Vicar for Religious of Vasai Diocese, and Director of Pasayadaan Holistic Spirituality Centre, Vasai, and Retreat House, Bandra. Co-founder of *Samanvaya* (Harmony), a network for grassroots research scholars to collaborate for community peace, Prashant also founded InterPlay India and organized Peace Pilgrimages to India from the USA and Australia. InterPlay and Movement Meditation workshops are popular with professionals, students, teachers, as well as marginalized groups like the tribal community, the differently-abled, sex workers, and slum dwellers. He has facilitated Movement Meditation retreats in India, the United States, and Ireland. An active member of the Big History movement, he makes presentations on topics related to Cosmic Spirituality for the World Union of Jesuit Alumni, the Jesuit Educational Association of South Asia, and Fireflies Ashram in Bangalore. He may be reached at <prash7654@gmail.com>.

Joel S. Regala is Assistant Professor and former Chair of the General Education Department, School of Arts & Sciences, Holy Angel University, Angeles City (Philippines). He finished his BSEd in History, Magna Cum Laude, at Holy Angel University, then obtained his MA in Philippine Studies at the Asian Center, University of the Philippines, Diliman. Joel sits as a Vice President of ADHIKA (Asosasyon Ng Mga Dalubhasa May Hilig at Interes Sa Kasaysayan) Ng Pilipinas Inc. [Association of Professionals, Enthusiasts, and Interests in History of the Philippines]. He attended the Big History Summer Institute at the Dominican University of California in 2017. He may be contacted at <jregala@hau.edu.ph>.

Martin Robert is Associate Professor at Kyoto University in Japan, where he teaches undergraduate and graduate students about life and systems biology, data analysis, and scientific writing and communication. He obtained his BSc and PhD in the field of biochemistry from McGill University in his home city of Montreal, Canada. This was followed by postdoctoral training at Chugai Pharmaceuticals, near Tsukuba (Japan), and work as a project manager at Euroscreen, a biotech company in Brussels (Belgium). In 2003, Martin joined the Institute for Advanced Biosciences, a pioneering institute of Keio University in Tokyo. A decade later, he joined the Institute for Excellence in Higher Education at Tohoku University in Sendai, where he developed and taught his first big-history course. He is pursuing research on bacterial biofilms as a developmental model, with an emphasis on metabolic function. His research interests include among others the systems-biology and sociobiology of E. coli. Martin may be contacted at <robert.martin.4m@kyoto-u.ac.jp>.

Barry H. Rodrigue is a geographer, archaeologist, and professor of anthropology at the Symbiosis School for Liberal Arts, Symbiosis International University in India. He was a founding member of the International Big History Association, the Asian Big History Association, and the Indian Association of Big History. Along with Andrey Korotayev and Leonid Grinin, he compiled the three-volume collection, *From Big Bang to Galactic Civilizations: A Big History Anthology*, which includes chapters by one hundred scholars from two dozen nations. Barry serves on the editorial board of the *Journal of Big History; History, Archaeology and Ethnography of the Caucasus*, a journal of the Daghestan Scientific Centre, Russian Academy of Sciences, in Makhachkala; and the first anthropology journal in South Asia, *Man in India*. He sees the use of big history's micro/macro lens as an important tool for humanity's understanding of its place in the cosmos as well as a key to our survival as a species on Earth. He may be contacted at <rodrigue@archinets.org>.

Nobuo Tsujimura is a big historian living in Tokyo and has played a role as a hub to activate big history at home and abroad as president of the Asian Big History Association. He has served as a board member of the International Big History Association and the Institute for Global and Cosmic Peace in Yokohama and as adviser for the Oberlin Big History Movement based in J. F. Oberlin University in Tokyo. In 2019, he co-organized the first international big history symposium in Japan with Professor Hirofumi Katayama at Oberlin, where he is currently teaching three big history courses as adjunct lecturer. He may be contacted at <palettehole@gmail.com>.

Yangkahao Vashum is Professor of Systematic Theology and Tribal Theology at the Eastern Theological College in Jorhat, Assam (India). A member of the Tankhul tribe, he is also the Dean of the Tribal Study Centre and Executive Editor of the *Journal of Tribal Studies*. Ahao has also served as Head of the Department of Theology and Dean of Post-Graduate Studies. He received his ThM from Princeton Theological Seminary (New Jersey) and his PhD from the Iliff School of Theology and Denver University (Colorado) in the United States. He has authored, edited and co-edited a number of books including *Tribal Theology and the Bible* (2011); *Peacemaking in Northeast India* (2012); *Search for a New Society* (2012); and *The Quest for Harmony* (2013). *His Christology in Context: A Tribal-Indigenous Appraisal of North East India* received the J. G. Frank Collison Award for Outstanding Contribution to Theological Research in India in 2017. His latest, *Faith Seeking Transformation: Rethinking Faith, Theology and Mission in North East India*, was published in 2020. He has written many scholarly papers nationally and internationally. Ahao can be reached at <yvashum@gmail.com>.