

Learning-as-Corresponding: An important new way to conceptualize learning

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Abstract

Human learning is narrowly defined by conventional psychology through the lens of objectivist-rationalist science. Learning is much richer than psychology's framing, however, and better understood as arising via a broad phenomenality rooted in subjectivity in which we may perceive our interacting with the worlds within and without. Anthropologist Timothy Ingold has proposed the terms *correspondence* / *co-correspondence* to reflect the interactions of human cultures with their engulfing worlds and, in this paper, I propose extending this notion to include human learning.

Learning-as-corresponding implies a dynamic, holistic and volitional interaction with all aspects of our learning lives, and recent neuroscience research helps confirm this conceptualization.

Keywords: *learning as corresponding, holistic learning, personalized learning, neuroscience, neurobiology, phenomenology, education*

Introduction

In this paper, I advocate re-cognizing human learning as an act of *corresponding* / *co-responding* (hereafter denoted as "corresponding") with the things of the world through animated, dynamic, self-reflective and volitional gesturing. Perceiving learning in this way counters empirical-rational depictions of learning, conceptualized as the (passive) transmission and reception of ready-made packets of information applied in particular contexts of practice, and identifiable through scientific measurement and evaluation.

I will develop a notion of learning-as-corresponding following

anthropologist Ingold (2017) who denotes the terms "correspond" and 'co-respond' as more volitional and dynamic than terms such as relate, attune or associate, a point grounding my proposition. I draw, as well, from educator-philosopher John Dewey (1938) who asserted that to "live in a world" (p. 43) implies each individual experiences a world of transactions, or I would say, correspondences, between self and the objects or subjects manifesting in the conscious attention of one's "environment." "Even when a person builds a castle in the air," Dewey writes, "he is interacting with the objects which he constructs in fancy" (p.43).

Re-conceptualizing learning-as-corresponding will help liberate learning from the straitjacket of empirical-rational psychology, enabling it to be considered through a lens of its own phenomenality, coinciding with the dynamic emergence of subjectivity wedded meaningfully to the circumstances of one's lifeworld.

Previously, I have described learning as arising and appearing through a range of phenomenological gestures and interactions, including intersubjectival relationality (Maser, 2023; 2024). Perceiving human learning through a lens of corresponding extends this consideration. I believe it also serves other educational frames of references, gestures, and practices, ranging from pedagogy to curriculum development to evaluation. Especially, conceptualizing learning-as-corresponding provides impetus to nurture learning through a lens of personalization, reflecting the subjective nature of each student's corresponding with the world. Personalizing learning with correspondence in mind is an aspect of this paper I will address in more detail.

At the outset, I overview a recent personal learning experience to help frame my proposition, after which I elaborate on the nature and appearing of corresponding and learning. Finally, I will consider the implications of this new framing for educational praxis.

Doggone it

I surmise I am continuously learning new *things of the world*—new subjects, new processes, etc.—as I encounter them through circumstances engulfing my living. That said, in the past 18 months, one extended learning experience has endured as novel and challenging: the training of a new dog—*Ruby*—whom I adopted from a local rescue center. Previously, I have owned various dogs, all of them fairly well-adjusted. Ruby was different when we first joined up: largely untrained, very anxious, and reactive to other

dogs. In committing to adopting her and helping her overcome her anxiety, I needed to quickly learn many features of dog training and log many hours enacting this training with her. My training included consulting books and online resources, working with mentors, and conversing with numerous other dog owners. I modified the landscape of my home to accommodate her, I originated a new vocabulary to audibly communicate with her, and I developed a performative suite of physical gestures to control and 'be' with her in presence over hundreds of hours. So, too, have I often gone to sleep thinking about dog training or *Ruby issues* and woken up with similar thoughts.

I perceive Ruby's learning to date reveals itself through her ways of responding, and, to my relief and satisfaction, I now consider her much less anxious and reactive, and well-adjusted to living and being with me and other dogs, in all kinds of circumstances.

As for myself and my own learning during this time and ongoingly, I reflect on this as an intensive experience characterized by much variegated learning arising observationally, cognitively, physico-somatically, emotionally, intuitively, empathetically and psychologically. Sometimes these arisings are distinct but more often they are blended, ephemeral experiences. These are qualities of learning I am familiar with from previous research (Maser, 2023, 2024), but I also denote a new quality I had not distinguished, a kind of dynamic relationality with the 'things' of the world I have encountered through this training: what appears in my vision; what I hear; the pitch of the terrain; the subtle, interactional gestures with Ruby including the tug of her leash; an anticipation of future events. This extends to moment-to-moment self-reflecting about how training (even a simple walk) is going in-the-present (good or bad), how a training session went (ranging from successful to terrible),

and how I might modify my behavior according to an emerging situation or idea.

To me, this arises as a complex of learning that transcends what is often labeled in conventional psychology as relational, or in philosophy (phenomenology, especially) as inter-subjectival. It is more deeply imbued with a personal, animated, and oft-ineffable agency or volition that may be seen more definitively as a kind of *correspondence* with Ruby, and the myriad things she and I encounter on our ramblings.

The Nature of Correspondence

Anthropologist Ingold (2014) introduced the notion of correspondence (and co-response) as a refinement in distinguishing the interactions of humans and human cultures. In proffering this, Ingold deliberately invoked and favored the preposition *with* over *and* or *between*, to denote a more volitional gesture of engagement. To this end, he saw people working *with* animals, *with* tools, and *with* material substances like clay. He also extended this consideration to include the things of one's imagination, such as mythical figures and ideas. Ingold (2017) invokes the idea of correspondence to "capture the dynamic of lives going along with one another," (p. 9). If interaction is about "*othering*", he says, "correspondence is about *togethering*. It is about the ways along which lives, in their perpetual unfolding or becoming, answer to one another" (p. 41).

Writing in 2014, when he first invoked the notion of correspondence, Ingold made an important clarification that also helped distinguish it from intersubjectivity, a related term arising in phenomenology:

[W]hen we invoke the phenomenology or the anthropology *of* this or that, it seems we run rings around the thing in question, turning the places or the

paths from which we observe into circumscribed topics of inquiry.

(Ingold, 2014, p. 22)

Ingold (2014) here makes the point that analytic observation or analysis of a material or imaginative act held in consciousness leads to an objectification that obscures what might be understood, through perceiving how a form of correspondence / corresponding reflects a deeper attentiveness to such an act. He writes:

The operative word, I think, should not be *of* but *with*. I would start from the postulate then, that consciousness is always consciousness *with*, before it is ever consciousness *of*. Whereas '*of-ness*' is intentional, '*withness*' I would argue, is attentional. And what it sets up are relations not of intersubjectivity but of correspondence. (p. 22)

I think Ingold's conception of correspondence and corresponding, and its application to anthropology, is an important clarification. I mentioned that I have previously refracted human learning as a relational act, writing (Maser, 2023), that learning arises:

through aspects of relationality (intersubjectivity, empathy and pedagogy), and in some fusion with the surrounding environment, the 'lifeworld', which includes non-human living things" (p. 123).

I asserted that such relationality may also extend to include 'a preconceived idea, circumstance, ethical concern or sensibility held in consciousness as a vision, goal or idea, an ethical concern or sensibility.' (p. 181)

After reading Ingold's conceptualization of correspondence and corresponding as he applies it to anthropology, I think it is an appropriate and valuable characteristic that likewise may be applied to human learning. Per my previous research into learning drawing from autobiography – a rich source of insight, when I apply the notion of correspondence to my earlier analysis and conclusions, I perceive a deeper and richer apperception of learning.

For example, I interpreted Helen Keller's (2023) autobiographical and epiphanic description of the sensation of running water with the signed word "w-a-t-e-r" spelled in her hand by her tutor Ann Sullivan as a relational learning act. :

As the cool stream gushed over one hand (my teacher) spelled into the other the word water, first slowly, then rapidly. I stood still, my whole attention fixed upon the motions of her fingers. Suddenly I felt a misty consciousness of something forgotten—a thrill of returning thought; and somehow the mystery of language was revealed to me. I knew then that "w-a-t-e-r" meant the wonderful cool something that was flowing over my hand. That living word awakened my soul, gave it light, hope, joy, set it free! (Keller, 1905, pp. loc. 263–264)

I now consider that my analysis falls short in a subtle but significant way, in not recognizing how the sensation of water flowing over her hand, together with spelling of "w-a-t-e-r", enabled a *together-with* experience or correspondence for her in this learning event.

Likewise, when I re-visit other examples from my previous research, which I interpreted as learning acts through a lens of *relationality*, I see how they, too, can be extended and re-characterized as acts

of correspondence. These include the child-actor John Lithgow's reflection of somatic and emotional memories that propelled him into his acting career. In this excerpt, Lithgow (2012) recounts a childhood acting experience in which the words of Shakespeare's *A Midsummer Night's Dream*,

washed over me in waves, unamplified and gorgeously spoken, especially in the honeyed baritone of Earle Hyman as Oberon. And age seven, I barely knew what any of those phrases meant, but their sheer beauty enthralled me... The laughter was earsplitting. It filled me with joy. (p.12)

The *with-ness* in this example is explicit; Lithgow's learning is an act of volitional, attentive, and compelling fusion. His learning corresponds to the act of water flowing through a riverbed and adjusting its *being*, molecule by molecule, to the circumstances of the watercourse.

I perceive this kind of correspondence in all the autobiographical examples I shared in my PhD dissertation which drew from an autistic, non-verbal writer; First Nations students recounting the searing experiences they endured in Canadian Residential Schools, a poet's account of emotional abuse, and writer-photographer Jill Bourne-Taylor's (2022) description of intimate contact with a baby bird over 84 days that helps the bird survive and fledge:

I learned his different calls; he purred when he was content, sounded a high-pitched alarm when he was afraid. ... Our bond was so strong that it became immeasurable – we both needed each other. In return for putting his life back on course, he was replottting mine by giving me purpose and a new perspective. (p. 3)

To borrow from Ingold (2017), this description of Bourne-Taylor's poignantly refracts a mutual learning act shared between her and the young bird as "the dynamic of lives going along with one another" (p. 9).

This is also how I feel about my recent learning-and-training experiences with Ruby, summarized above. In suddenly encountering a herd of deer or a strange dog, I act moment-to-moment, adjusting my somatic, emotional, and cognitive responses in a dynamic transaction with Ruby and the deer or dog, the terrain, possibly the traffic, and other elements shaping the circumstances and influencing me. Sometimes this can feel like dancing a tango on rollerblades in a house of mirrors. I do my best to *stay with* rapidly evolving circumstances, continually responding and ongoingly managing Ruby to (hopefully) effect a positive outcome. All of these are impressionable learning experiences; full and sometimes fraught with new details to note and remember: the deer's location and movement, the new dog's coloring and name, the owner's attitude, Ruby's response and mine. All of this unfolding, as I suggest above, as a kind of watercourse corresponding to a flow of situational and intersecting events and thoughts. Even after hundreds of such experiences, I continue to register new forms and qualities to this ever-unfolding learning. And though I may index events with similar characteristics, for example, successfully restrained Ruby on morning walk from chasing a cat, generally, I interpret this spectrum of learning experiences as beyond the reach of or mismatched to objective analysis.

Confusion about the nature of learning

Learning is a fact of our living. Arising naturally and commencing from birth or earlier and experienced lifelong. It unfolds with the help of bodily senses, organs, and tissues that conspire to help human babies crawl, walk, and embrace the

surrounding world with animated determination. As perceiving bodies, we touch and explore, listen and mimic, and discover (learn) the nature of the world through this engagement. The arc of this pathic *learning journey*, within and without, opens into a horizon of being and knowing that, itself, seems boundless. Educator-philosopher John Dewey (1938) ascribes a *with-ness* in childhood learning in this synoptic description:

As the infant learns to reach, creep, walk, and talk, the intrinsic subject-matter of its experience widens and deepens. It comes into connection with new objects and events, which call out new powers, while the exercise of these powers refines and enlarges the content of its experience. Life-space and life-durations are expanded. The environment, the world of experience, constantly grows larger and, so to speak, thicker. (p. 74)

Sociologist Edith Cobb (1970), who astutely documented childhood development in her seminal book *The Ecology of Imagination in Childhood*, perceives something similar when she writes:

As the child develops a continually wider ability to create ever greater complexity of *gestalten* in play, thought, and word, the shape and meaning of his own perceptual world emerges, and the continual interplay of perceptual relations with environment sharpens the contours of his own image and deepens the reflections of the effects of his own identity on others. (p. 95)

Cobb and Dewey, to my perception, are describing childhood learning as a form of correspondence, highlighting not a passive responsiveness to the engulfing world of the child

but a dynamic interplay. This interpretation of learning stands in contradistinction to how learning has been characterized, especially through a lens of objectivist thinking.

The emergence of natural science based on objectivity is traced to the Enlightenment, several hundred years ago. In the latter 1800s, the first analytic psychologists abstracted theories of animal learning from crude, empirical-objectivist experiments on pigeons, horses, rats, and humans (Kaufman, 2013; Smith, 1998). German researcher Hermann Ebbinghaus, a pioneering and renowned empirical psychologist of this period, formed his theories about learning based on a regime of experiments focused on how quickly humans forgot nonsensical information (Smith, 1998).

Such simplified pronouncements about learning influenced and shaped the direction of mass education in the 1900s. Streaming, standardized curricula, schooling regimes, and technological developments like the Pressey Teaching Machine (See Figure 1), mass produced for classroom use starting in 1926. Pressey's machine, and other developments that followed, reflected such conceptions and constrained mass education to narrow interpretations of human learning potential (Gatto, 2000; Kaufman, 2013).

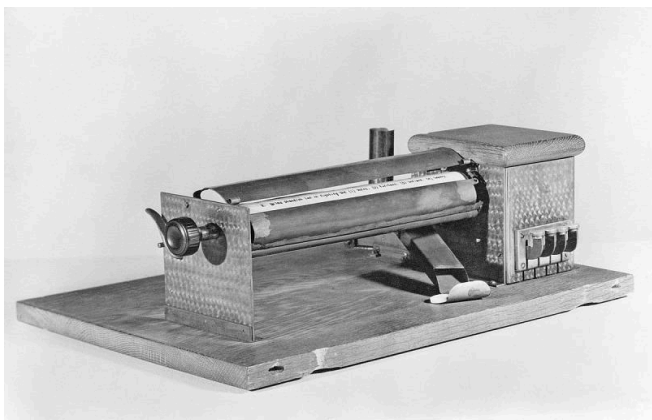


Figure 1: *Pressey Machine: Sidney Pressey Teaching Machine, ca. 1925*

Note: Photo courtesy of Smithsonian Institution per Creative Commons Zero licensing agreement;

https://www.si.edu/object/pressey-teaching-machine%3Anmah_1367149

Today, objectivist thinking, posited in the language of prediction, measurement, and emphasizing cognitive schemata and objectivist psychologism, continues to frame how human learning may be gauged. This is reflected in a recent definition of learning by the American Psychological Association (2022):

the acquisition of novel information, behaviors, or abilities after practice observation, or other experiences, as evidenced by change in behavior, knowledge, or brain function. Learning involves consciously or nonconsciously attending to relevant aspects of incoming information, mentally organizing the information into a coherent cognitive representation, and integrating it with relevant existing knowledge activated from long-term memory.

I consider this definition as clinical and myopic, narrowly constraining qualities of learning that appear when it is considered through a lens of subjectivity. As I documented (Maser, 2023; 2024), a lens of subjectivity enlarges the personal nature in which learning dynamically unfolds for each. This lens also reveals the scope of human learning as much broader than "behavior, knowledge or brain function (p. 25)." To this end, it may be said that there are potentially no limits, or constraining factors, to what may be considered human learning. This point is underscored by Indigenous educator-writer Gregory Cajete (1994):

Learning and teaching unfold through time, space and place forming a path through life. ... It (learning) is always a creative act. We are continuously engaged in the art of making meaning

and creating our world through the unique processes of human learning. Learning for humans is instinctual, continuous, and the most complex of our natural traits. (p. 68)

This (broad) characterization of learning is also reflected in this description by author-philosopher Peter Jarvis, who writes (2012):

Learning, then, is not a single process but a family of different processes that occur in the sequence of experiences we have in the course of our daily living – it is about our being and becoming in a lifetime of learning. (p. 23)

Aligned with Cajete and Jarvis, Philosopher Don Beith (2018) casts learning as an immanently generative and transformative upwelling force. He writes:

Learning is an experience where confusion, a furtive beckoning, or nonsense portentously explodes into a new domain of sense, transforming the very field from which it emerges, taking up and recasting previous indeterminacy into new determinate meaningful dimensions. (p. 9)

Beith perceives learning as a generative force that exceeds the determinations of analytic science. He writes further that through the accomplishment of new activities, our learning experiences confer a kind of “a power (puissance)” that exceeds and grounds us, announcing itself to us, inviting us to assume and inhabit it, to take it on as one of our active capacities (pouvoir)” (p. 9).

This conceptualization of learning as a complexly generative and dynamic phenomenon, "inviting us to assume and inhabit it" (p. 9) and "take it on as

one of our active capacities", helps us better understand learning-as-corresponding.

How correspondence *matters* - In what other ways might one perceive learning as a correspondence?

Though we have pondered the question, what is learning, for centuries, the substance of learning remains elusive, invisible and often ineffable. No one can hold learning in their grasp as an object, or point to something and say, definitively, "ah hah, there is learning." Clues to its nature may be gleaned, however, from interpreting its materialization in subjective consciousness. This is the purview of phenomenology, in which scholars have described the *appearance* of things in consciousness in terms of 'events', 'situations'; and experiences of pathic attunement correlated to the sense-making instituted in what we often regard as significant moments of our lives.

In my research (Maser, 2023), I described a phenomenality of learning in just such terms, and in this next section I seek to identify a phenomenality of learning-as-correspondence grounded in the things of our world, the matter of our existence. Specifically, I will reference languaging, the elements of our minds, and life-learning as emergent fields of correspondence guiding our learning. Following, I will attempt to correlate the phenomenality of such correspondent-learning to insights from neuroscience.

Language / Languaging

Sophisticated languages, and the *languaging* that accrues to each language and related culture, distinguishes humans from other mammals (Whorf, 1964). Anthropologists recognize that language plays a unique role in providing cultures with systematized means to communicate meaningfully with cultural members about events unfolding around them and to teach about these

events and many other things. Language also establishes the means by which a culture and its members uniquely *correspond* with the world around them. This is reflected in the examples I proffer, below. The first is from American author-essayist Susan Sontag, describing how, from childhood, she read, and was compelled into her writing life through her initial contact—her correspondence—with artifacts of the writing world:

When I was five or six, I read Eve Curie's biography of her mother. I read comic books, dictionaries, and encyclopedias indiscriminately, and with great pleasure. ... It felt like the more I took in, the stronger I was, the bigger I got, the bigger the world got.

(cf Sacks, 2018; *The Creative Self in The River of Consciousness*; pp. 130-132)

Here is a second example, also from Helen Keller's autobiography (1905):

Literature is my Utopia. Here I am not disfranchised. No barrier of the senses shuts me out from the sweet, gracious discourse of my book-friends. They talk to me without embarrassment or awkwardness. The things I have learned and the things I have been taught seem of ridiculously little importance compared with their "large loves and heavenly charities." (loc. 2, par. 561)

Another example reflects how Indigenous peoples acknowledge the potency of language as a medium of communication. Over millennia, they developed language, and oral language, especially, as a basis for prayer and meditation, song, culturally significant storytelling, teaching, and interacting with the non-human world

(Whorf, 1959). In her book, *Braiding Sweetgrass* (2013), indigenous (Potawatomi) scholar and scientist Robin Wall Kimmerer points out the important ways in which her native language inscribes relationality and a "grammar of animacy" that informs learning. She writes,

In Potawatomi 101, rocks are animate, as are mountains and water and fire and places. Beings that are imbued with spirit, our sacred medicines, our songs, drums, and even stories, are all animate. ... The language reminds us, in every sentence, of our kinship with all of the animate world. (p. 17)

Other indigenous writers confirm that language is used to convey world-meaning and strengthen living connectivity to place and also cultural history through storytelling, naming and specific language use. In *Indigenous Storywork* (2008), Sto:lo First Nation author-researcher Jo-Ann Archibald says the most important qualities of native culture are their language and stories. Telling stories, she writes, is how the history and teachings of our ancestors is passed on. "Teachings in the form of stories are an integral part of our identity as a people and as a nation." (p. 29)

In numerous examples, Archibald identifies how language and *languaging* through the means listed above, define a critical path of corresponding with many elements of indigenous culture: history, interacting with the human and non-human world, strengthening a firmament of place, and educating.

I can also confirm that the act of writing is a potent means of self-learning and, for me, a professional writer for more than 40 years, a precious way of corresponding with the subject of my focus. Writing, for me, unfolds mysteriously and methodically as I experiment with language,

trying this and that, until I am satisfied with the linguistic synthesis of my thoughts.

Elements of Mind

The human mind is a protean and enigmatic entity, linked across generational studies to myriad, interrelating processes that arise through human *being*. These processes, including perceiving, cognizing, reflecting, imagining and responding, correlate to learning.

While it is beyond the scope of this paper to unpack the elements of mind in any detail, psychiatrist-author Daniel Siegel (2017) generalizes the mind as arising through "the emergent, self-organizing, embodied, and relational process that regulates the flow of energy and information." Siegel hypothesizes the mind as an open, complex system regulating the sharing of energy and information between an individual and others and the environment in which the person lives (par. 12). "We can see," he says, "how the mind is both within us and between us, within the body and the brain, and within the relational connections we have with one another and the world around us." This is a helpful insight to consider in the context of "relational connections" arising through learning-as-corresponding, as may be perceived in the example I provided above from Keller, describing the embodied-relational experience of running water.

I also ascribe this to the example below, in which MIT science and sociology professor Sherry Turkle (2012) relates her discovering about her father experimenting on her as a one-year-old child, through a conversation with him, 31 years after this event:

Charlie said that when I was a baby and my mother was not around, he experimented on me. He began to describe what he referred to as "our work." In one experiment, he would

remain in my presence but not speak to me, sometimes for hours. Or he would isolate me in a room and make no contact. Or he would sit with me but not touch me. He wanted to know how human infants responded to deprivation, he said, and how they behaved when deprivation was lifted.

With this story, my time of trying to find ways to identify with Charlie ended. Now I put myself in my mother's place. For so many years I had resented her keeping my father from me; now these feelings fell away. She had fled him. She'd been trying to protect me from his appalling experiments.

... I had been objectified as a child. And now, again, I felt objectified. I didn't think Charlie was capable of anything else. I saw the irony of the moment. In my work, I tried to move engineering and science students away from seeing people the way Charlie saw me. (pp. 308–309)

In this excerpt, the author reflects on how a new encounter provides her with additional information leading to her re-processing a deep memory and re-organizing her thoughts. All in all, a potent example of learning-as-corresponding with the things of her mind.

World-Making, Life-learning

Ingold (2018) perceives living as a way of inhabiting the world, of *conversing* with it. In this conversation, he says, "lies *ontogénèse*, the becoming of being" (p. 169) which helps us see "the possibilities of being our one world affords and a contribution to its ongoing formation—to its worlding."

Sociologist Edith Cobb says much the same thing when she writes (1970),

"Worldmaking is learning in the widest sense, but it is also an adaptation to environment as nature, a search for higher levels of synthesis of self and world drawn from the recognition that outer and inner worlds are interdependent aspects of reality, rather than independent states." (p. 66)

These insights frame a dynamic relationality in the ongoing unfolding and conversing between a self and world. These characteristics are apparent in the examples below, which also frame the arising and appearing of learning through corresponding with the world. The first is from *Uncle Tungsten*, a memoir by psychiatrist-author Oliver Sacks (2001) recounting childhood experiences with the objects and subjects of his world.

My mother showed me that when tin or zinc was bent it uttered a special "cry." "It's due to deformation of the crystal structure," she said, forgetting that I was five, and could not understand her—and yet her words fascinated me, made me want to know more.

Then there was the crystal radio my brother Michael gave me, which I played with in bed, jiggling the wire on the crystal until I got a station loud and clear. And the luminous clocks—the house was full of them, because my uncle Abe had been a pioneer in the development of luminous paints. These, too, like my crystal radio, I would take under the bedclothes at night, into my private, secret vault, and they would light up

my cavern of sheets with an eerie, greenish light.

All these things—the rubbed amber, the magnets, the crystal radio, the clock dials with their tireless coruscations—gave me a sense of invisible rays and forces, a sense that beneath the familiar, visible world of colors and appearances there lay a dark, hidden world of mysterious laws and phenomena. (pp. 39-40)

The next example is from a biographical memoir profiling research biologist Anna Brito (Goodfield, 1981):

Here is a cell. It has been going round all the time, and nobody has taken any notice of it. ... suddenly you become attracted to that cell, or to that problem. Then you are going to have to go through an active process in relationship to it, and this leads to discovery. First, there is the building up of the attraction, and the object of your attention eludes you. Then you must try to do things to gain its attention with your concepts. I keep inventing more refined concepts. ... Finally, there is a moment when the girl recognizes the boy, and no longer eludes him, accepts by going up the hill and really getting on with it and expressing it fully! That is the moment of discovery. ... When you do an experiment that proves your point. That is the orgasmic moment. It is an exciting and most *intimate* moment. You can get that moment from a graph, or from numbers in a machine, or you can see it under a microscope. (pp. 229-230)

The scope of learning-as-corresponding in the above examples is broad, encompassing the psychological, emotional, somatic and intellectual registers of human experience. In the next section I show how learning-as-corresponding also correlates with elements of neuroscience.

Correlations of learning to Neuroscience

Human learning is generally defined as the growth of specialized neuronal cells expressed genetically and correlated to a myriad of experiences over a lifetime (Silverman & Casazza, 2000). In recent decades, neuroscientific research has greatly expanded understandings of human neurobiology and neurobiological systems, shaping and modulating human responsiveness. Our neurobiology evolved over many millions of years in response to changing environmental conditions, consonant with Darwin's theory that a species' success reflected its ability to adapt to changing conditions. While this can be noted as an expression of species-level correspondence, in this section, I wish to identify and generalize several recent neuroscience findings that correlate to learning-as-correspondence, specifically profiling mirror neurons, the nature of neurochemical release and information processing networks.

Mirror neurons: As described in Psychology Today (2025), mirror neurons are specialized cells found in the brains of humans and other species, activated synchronously when one individual performs an action, while observing another species member perform the same action. Researchers believe this process helps an individual recognize or understand the behavior of another. Since they were first discovered in monkeys, mirror neurons have been identified in the brains of songbirds, mice, and humans. Research is ongoing, though, some researchers have speculated that human mirror neurons may be responsible for a wide array of human social

behaviors, from imitating someone else's actions to learning music to feeling empathy.

The nature of neurochemical release: This refers to a sophisticated neurobiological system in which, following stimulation, various chemicals—neurotransmitters—are produced and released by cells, tissues, and organs distributed throughout the body, leading to a spectrum of neurological, physiological, and behavioral changes (Biochemistry Den, 2024). Neurochemical release can take place in microseconds in response to things such as perceived threats, stress, lack of nutrition or dehydration, illness, disease and pre-existing conditions, and other factors, too. The release of neurotransmitters contributes to mood regulation, cognitive function, sleep, eating, social behavior, neuroplasticity and other outcomes. All these outcomes can influence learning.

Information processing networks: Neuroscience studies reveal that external information received via organs and tissues (e.g., eyes, ears, sensory cells, etc.) is, in turn, processed through several highly specialized networks. These have been identified as the saliency network, the central executive network, the default mode network, the dorsal attention network, and others (Goldberg, 2022). These networks, working in isolation and in coordination, rapidly parse incoming information, determining which is salient to attend to, which is superfluous and ignored or discarded, which is committed to memory, and which merits response. As Goldberg identifies, the interactive functioning of these networks correlates to cognitive performance, meaning making, thinking and more. Learning is an obvious outcome of such *correspondent* processing, whether our attention is held by a math worksheet, a sporting event we are observing or participating in, reading a text or listening to a podcast.

The elements mentioned above add much information about neurobiology, and future neuroscience research will assuredly provide more information. This does not mean, however, that learning is synonymous with or can be reduced to the workings of the brain, a theory neuroscientists have advanced in the past. I perceive a gap or challenge in directly correlating neuroscience to anything but the simplest behaviors arising from training or learning. Perhaps such correlation will be more detailed in the future.

Psychologist Patrick Whitehead (2020) argues the human nervous system “provides only one of the backgrounds” constituting human existence (p. 208). The full panoply of human experience plays out and is organized, he says, through vision, touch, emotional sensing, attuning, and other such existential acts that contribute to shaping the meaning of any experience. “Meaning is not a consequence of the brain,” he writes (p. 221). Though he doesn’t mention learning *per se*, it is clear to me that the acts he references, especially attuning, may be interpreted as acts of correspondence.

Implications for education

The machinations of education' reflect many different, and sometimes competing agendas, but most notably, the enterprise is 'entangled' with learning. As mentioned above, crude and simplified assertions about human learning shaped the direction of mass education last century, and such assumptions continue to influence education today. This influence can be seen most clearly in the continuing and widespread use of standardized curricula and mass processing of students. Standardization rests on false or specious assumptions about learning and learning potential; among the most specious is the notion that human learning is best determined through a lens of scientism rooted in mathematics (Smith, (1888; Kaufman, (2013; Gatto, 2000). While there is

some validity to this assumption as it is applied to a few endeavors like physics, or some vocational training, it is egregious to insist that all education be evaluated through standardized methods, which can be seen wherever dozens or even hundreds of learning outcomes are ascribed to educational curricula. Unfortunately, this is too often the case.

Human learning varies widely, as I revealed in my research (Maser, 2023; 2024) and it is especially seen through the lens of autobiography. It is highly subjective or idiosyncratic in nature. Generally, learning pulses with volition reflecting a drive oriented to self-agency. The fruits of human learning are also seen in a vast historical tapestry of human achievement and accomplishment revealed through a lens of innovation and adaptation to evolving circumstances. These are hallmarks of learning-as-correspondence and education would be better served by conceptualizing learning this way and adapting the means and goals to serve it.

An obvious adaption to serve this conceptualization is to expand personalized approaches to nurturing learning to enable students of all backgrounds to better engage and *correspond* with the *things of learning* to which they are attending, and also those that matter most to them—the subjects, ideas and goals that hold their attention and interest and offer promise of future growth. This is what Dewey referenced in his essay, *My Pedagogic Creed* (1897) when he asserted that students' habits and interests were "signs and symptoms of growing power and dawning capacities" (p. 294). Standardized textbooks, worksheets, and evaluative measures do not serve this end; rather, when they are imposed *en masse*, they most often stifle learning interest, harboring, in the words of learning expert Smith, “enormous destructive power” (p. 31). An exception to this is when a student enthusiastically chooses to learn through standardized means,

which can and does happen, and should likewise be supported as a viable choice among others.

Conclusion

The examples I've provided above, including my experience of dog training, help reveal an aspect of learning-as-corresponding in deference to researcher-author Ingold who has proposed the notion of correspondence in anthropology. Ingold posits that this framing more accurately describes how cultures dynamically relate *with* the things of their engulfing worlds. Adopting this reference frame to human learning enables me to extend accounts of learning beyond conventional empirical-rational definitions, and more accurately portray learning's dynamic, phenomenological and volitional nature, manifest through language and languaging, elements of mind and aspects of our worldmaking and life-learning. Neuroscience research confirms several ways by which human neurobiology, including various neurobiological systems, enable our correlation or correspondence with engulfing environments, through our perceiving and processing of information. This correspondence extends from engaging worlds without, to worlds within, including retrieving memories and registering new impactful thoughts.

As a career educator I have seen and experienced the benefits of personalized / personalizing learning from primary school through graduate-level programs. To this end, I have supported individualized projects and studies, self-directed learning, and student-driven learning evaluations. In almost all cases, learning goals exceeded institutional expectations and was reflected in student enthusiasm. To now view learning-as-corresponding, provides me with additional insight and enthusiasm for nurturing it where I might, and I recommend it as a worthy addition to teaching praxis. I also recommend orienting students to how their neurobiology

influences their emotions, behaviors and, ultimately, their learning.

Excuse me now while I continue my learning-as-corresponding; it is time to take my dog Ruby for another walk.

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Author Bio

Michael Maser has been an educator, researcher, coach, tutor, and author for many years. In 2023, Michael completed his PhD at Simon Fraser University (Vancouver, Canada) on the nature of human learning. His research essentially confirmed the idiosyncratic/subjective character of learning as it arises for each person, young or old.

Since 2021, Michael has been faculty with Antioch University (online), where he teaches research fundamentals and educational neuroscience in the Individualized Masters (IMA) program.

Professional interests of Michael's include personalized, holistic learning, neuroscience, Phenomenology, Goethean and ecological sciences, and project-based learning. Informal interests include writing, music (guitar), DIY projects, woodworking, gardening, and recreational activities, including dog training.

Michael has also worked as a journalist and researcher, a geologist, and a middle and high school educator. In 2007 Michael shared a Prime Ministers Award (Canada) for his work in co-founding and leading the SelfDesign Learning Community in British Columbia.



The author and his dog, Ruby, on a forest trail, (again) reviewing a lesson on the futility of chasing squirrels.

