Enactive Design Thinking in an Ecology of Mind

Jerry Diethelm – May 3, 2024

"Art doesn't render the visible. It makes visible."¹ Paul Klee

A sea-change in the science of cognition known as enactivism or 4E cognition presents a new prospect from which to view design thinking. According to this unfolding science, thinking isn't just isolated in the brain. It is better understood as being cognitively embodied, embedded, extended, and enacted in environment and world. These four concepts, when taken together, form what has been described as an "ecology of mind." What follows is a discussion of how an enactive design thinking challenges our taken-for-granted conception of reality, transcends dualism, makes thinking visible and tangible, and allows us to see Horst Rittel's now 50+-yearold list of unresolved planning dilemmas as signaling the system failure of rational problemsolving rather than as an unaccountable wickedness. The 4E-based enactive design thinking model I am proposing provides a new and legitimate reality home for Rittel's authoritatively indeterminant planning considerations. It enfolds rational problem-solving into an ontology of making, knowing, and believing, identity orientations of being for engaging the world, each with its own primary mission and measures. And it holds forth the prospect of realizing designerly thinking's original aspirations of educational parity with the sciences and humanities, not as a special way of knowing, but from its own home in making, the bringing into being and expression of human culture.

Embodied, Enactive Thinking

The central idea of an enactive view of human cognition is that thinking is embodied and action oriented. Thinking is a cognitive, brain-in-the-body-in-the-world, action-oriented system. Thinking and actions are systemically and holistically coupled in the sense that "We think to act and act because we think." We perceive and make sense of the world from within a cognitive system, one that has evolved from pragmatic engagement in a social-cultural-physical environment. Enactive perceptions are biologically and physically constrained and culturally conditioned. Unaided, our bodies experience only a small portion of the electromatic spectrum and the information that surrounds us. "Nature is full of infinite causes," as Leonardo noted in the 15th Century, "which were never set forth in experience." Enactive perception is a filtered and valanced experience that reflects how meaningful an enaction is to our immediate needs, focal interests, both personal and social, preconceptions, emotions, values and beliefs.

The concept of mind as an adaptive cognitive-environmental system reaches back to such writings as Gregory Bateson's, *Steps to an Ecology of Mind* (1972), and to earlier writings in phenomenology, pragmatism and the thought-speech-bodily intentions conception of action in Buddhist thought. Husserl's "I can," I see things in terms of what I can do with them, Heidegger's "ready-to-hand," and Merleau-Ponty's unity of behavior and intentionality, are all phenomenological forerunners.

In an essay on pragmatism and enactive perception, philosopher Shaun Gallagher discusses the foreshadowing insights of Charles Peirce, John Dewey and George Herbert Mead. Peirce wrote that, "just as we say that a body in in motion, and not that motion is in a body, we ought to say that we are in a thought, and not that the thoughts are in us." Dewey believed that "The brain is essentially an organ for effecting the reciprocal adjustment to each other of the stimuli received from the environment and responses directed upon it." This reciprocity was more than an interaction. He called it a dynamic transaction. And Mead wrote, "We see the objects as we will handle them....We are only 'conscious of' that in the perceptual world which suggests confirmation, direct or indirect, in fulfilled manipulation."²

Contemporary 4E cognitive science, builds on this phenomenal and pragmatic groundbreaking with the advent of such systems concepts as autopoiesis in the 1970s and 80s and has since matured into a flourishing branch of enactive inquiry that is increasingly favored over earlier computational and computer concepts of mind and cognition.

Here are four of present-day enactivism's central background assumptions that impact the conception and practice of design thinking:

- 1. Cognition is not simply a brain event. It emerges from processes distributed across brain-body-environment. The mind is embodied; from a first-person perspective is equivalent to the phenomenological concept of the lived body. From a third-person perspective the organism-environment is taken as the explanatory unit.
- 2. The world (meaning, intentionality) is not pre-given or predefined, but is structured by cognition and action.
- 3. Cognitive processes acquire meaning in part by their role in the context of action...
- 4. Higher order cognitive functions, such as reflective thinking or deliberation, are exercises of skillful know-how and are usually coupled with situated and embodied actions.³

Enaction is then fundamentally a fusion of thinking and action. It steps beyond the idea of an interactive coupling or a transaction of organism *and* environmental processes to merge the two into a one. The enactive event is a mutuality, a wholeness that is {*thinkingaction*}, where the attentional and behavioral perspectives are always functionally present in some form, however minimal and potential, each in and of the other.

This inclusion of corporality as integral to thinking is in effect a structural eviction of Cartesian dualism. It requires a radical altering of the ways we think about mind, world and thinking itself. It means a purging of the ingrained, habitual everyday language of subject-object, inside-outside, and mind-body separation. This feels awkward because of the explicit subject-object structure of language. Fortunately, the quantum world we now live in provides some preparation with such forerunner fusion identity models as {*waveparticle*}, {*spacetime*} and

{*entanglement*}in physics, {*tensioncompression*} in engineering, {*feltquality*} in aesthetics and {*valuingmeaning*}in art and design thinking.

We have been habituated to the belief that thinking was a separate, sequestered and private affair, but an enactive {**thinkingaction**} bodies forth a continuum of thinking that reaches from the invisible to the visible and creates an {**invisiblevisible**} continuum of cognitive corporality. A conception of cognitive corporality lifts the veil to reveal a broad band of thinking's visibility. It opens out into multi and mixed media spectrum of greatly increased visible and tangible ecological information for public participation, consideration and discussion, feeding the potential for innovation and transformation.



Here in Fig.1, Saul Steinberg⁴ harkens back to a 17th century *Descartes* astride the landscape of his world conceiving of himself as being fully separate from the *Descartes* of his thoughts, an event that successfully clouded out the sun until a 20th century philosophical and scientific reelightenment.

Embodied Thinking

Brain and body and world are one. The brain is not an isolated organ in a vat that is fed information to be processed, but a brain-body-in-the-world unity of {*thinkingacting*}, an evolutionary product of dynamically enactive nervous system development in environment and world. While the terms environment and world are often used synonymously in the 4E

literature, there is a consequential distinction to be made that is significant for design thinking. World is a first-person phenomenological perspective. Environment in enaction is a thirdperson stepping back perspective. The former is experiential; the latter is conceptual and analytical. Designing is born in situational experience. We step back to honor, appreciate, understand, and reimagine experience in order to reorder and order new its transformation.

Time in the 4E system dynamics of enactive cognition is associated with three major diachronic scales: 1. elementary scale: 10-100 milliseconds, which corresponds to the activity of basic neuronal processes; 2. integrative scale: 0.5-3seconds, which corresponds to the *thinkingaction* perceptual experience of everyday living; and 3. narrative scale involving memory: everything beyond 3 seconds. Narrative scale, according to Shaun Gallagher "is meant to capture longer time periods that may involve recollection, planning, intention formation and so on." 4E science's primary focus has been on the elementary and integrative scales. Design thinking's focus is on integrative and narrative scale, with increasing attention to trans-generational scales of enaction required to resolve such crises as planetary warming.

Some, arguing from the perspective of elementary scale, have questioned whether the millisecond time lag between direct action responses and our conscious awareness of them is proof that there is no free will. The 4E response is the need to distinguish between the longer and shorter scales of {*thinkingaction*}. Enactivism takes the position that it is a mistake the see the millisecond delays in becoming conscious of emergency actions as other than the organic immediacy of a pre-prepared response. Free will's real home lies in the longer {*thinkingaction*} time dimensions of narrative, contemplation, and ethical and moral consideration.

Embedded Thinking

Embedded thinking involves the embodied, situated and conditioned experiencing of enactive processes embedded in a culture. To be embedded in a culture means to be personally and socially situated within it, to be decentered within its history, institutions, and customs, to be a product of its deepest rituals and myths and the languages through which it is perceived and understood. To be embedded in a culture is to be nested in a geography of experience made up of situations, people, places, occasions, and worlds.

Remarkably, we experience an embedded embodiment as though we were simultaneously both an engaged participant and a stepped-back observer and critic. To be embodied and embedded is to be both participating and reflective, both in and about the experience. Cognitive science literature generally employs such metaphors as "stepping back" or "distancing" to avoid the dualistic perspectives of subjective and objective. The popular version on the evening news would have the interviewer asking, "And how would you describe the matter from 30,000 feet?"

An embedded, embodied and enactive thinking both explains and potentially transcends the historic polar division of continental from analytical philosophy - of a first-person phenomenology from a third-person conceptual analysis – and gives each perspective a

significant role to play in understanding world experience. In literature and writing, we have grown so accustomed to the interplay between 1st person, 2nd and 3rd person voices that we forget that their existence exposes a foundational structure of how we think.

Extended Thinking

An embodied and embedded thinking that is extended out conceptually from its isolation in the brain, operates on both the personal and social levels of experience. A personal, embodied enactive thinking is a brain-body-in-world cognitive system. And the plural of such cognitive systems becomes the interpersonal world of social experience and discourse. 4E literature habitually describes this social intercourse, which is so central to human experience, as intersubjectivity. Enactively, intersubjectivity is a regressive colonization of the present by the past. With its deference to dualism, intersubjectivity points backwards to understanding social exchange as having to overcome the isolation of inner consciousness. And this has led to an empirical focus on searching within brain biology and emphasizing such physical and mechanistic explanations as mirror neurons. Intersubjectivity, conceptually, doesn't acknowledge the social reality of an enactive ecological spectrum of informational corporality and visibility.

A more productive 4E path to revealing social cognition is directed toward the decoding of the many ways we actually read the commonalities and cultural expressions of social world experience. After all, familiarity with and projection into the social worlds of others is an evolutionary thinking skill developed from birth. What child hasn't tried to pull a fast one only to be told, "I can read your little book." We spend a lifetime learning to gather significant information from interpersonal dialog and larger venues of social exchange using all the senses. Gesture, intonation, urgency, attitude, expressions of feeling, motivation and commitment all matter and convey meaning: all are involved in informational exchange. "The logician's dream that men should communicate only by unambiguous digital signals has not come true and is not likely to."⁵

The extension of brain into a brain/body/world system also raises the question of what we are pointing to when we say mind and mental. Gregory Bateson's answer in *Mind in Nature*¹¹ was to conceive of mind as the organizing principle for the information exchange taking place in whole systems. In an early C2 cyberneticist forerunner of enactivism, Bateson wrote, "In principle, if you want to explain anything in human behavior, you are always dealing with whole circuits, completed circuits. This is the elementary cybernetic thought."¹² Giving the example of a blind man with a stick as an information system, he would ask, "Is my mental system bounded at the handle of the stick? Is it bounded by my skin? Does it start halfway up the stick?"⁵ Aldo Leopold in the environmental classic, *A Sand County Almanac*, described such ecological engagement as a "round river."

The concept of extended thinking as a whole system also begs the question and the status of "tools" in personal and social cognition. Is a person's personal notebook or sketchbook a part

of her thinking, or should they be considered scaffolding? Does the thinking end at the computer keyboard, include developing (and oft-corrected revisions), include inchoate notes, the final essay or report, the recycling of models and prototypes used for development and review, the progress reports and images in a meeting, the final presentation, the corporate artifact? Barbara Tversky, in Mind in Motion, tells us that "Talking isn't thinking. Talking," she writes, "can reveal thinking and talking can change thinking, but it shouldn't be confused with thinking. Talk is only one way to express thought; there are others...The face, the hands, the body – all express thought. As do sketches and diagrams and models and arrangements of things in space."⁶

Tversky's view is that thinking "in the form of language, gesture, or graphics," are expressions of thought, forms of thought that are "*put into the world*" (my emphasis). As rich as her discussion of such expressive forms as: "Maps, Diagrams, Sketches, Explanations, Comics" is, and as consequential to the practice of thinking as they are, it remains that Tversky's cognitive universe is the more taken for granted interactive model of mind **and** world. Richard Feynman better captures the enactive view in his famous response to historian Charles Weiner that his notebooks were not a record of his thinking.⁷ The notes were not a scaffold or a form of external representation. They were, he said, the actual thinking in the process of unfolding. And E.M. Forester agreed when he said, "How will I know what I think until I see what I say [write]?"⁸

Toward An Ecology of Mind in Design Thinking

The Reality of Problem-solving

The dominating conception of designing from the early modern era on has been that of a classical, rational, problem-solving reality wrapped in the certainties and accountabilities of empirical knowledge and objective truth. The modernist dream of an algorithmic description of "the design process," with empirically grounded prescriptive means, methods and accountability, remains alive and well. But it has been apparent, at least since the Rittel and Webber critique of the rational planning and design methods in 1972, that the system failure of such methods reflects serious inadequacies in their ability to serve the complexities and contradictions of motivations of an evolving human culture.

Here are two recent examples that exemplify that continuing conceptual disconnect between a conception of design thinking that is restricted to a reality within rational problem-solving boundaries yet, 1. still has the need to account for - in some manner - the reality of that missing cultural content; 2. looks for ways to make normative considerations respectable; and 3. conceives its role as restricted to providing professional services once goals outlining what's wanted and needed have been determined.

Ascribed Reality

Michael Lissack in, "Understanding is a Design Problem...Part 1 and Part 2," and Yes, We Can, and Do, Design Our Understanding,"⁹ writes that designerly thinking (as the British continue to call it) can be importantly used to improve overall cognition, by better thinking about problems in an ascribed reality. An ascribed reality, he writes, is "*a region of thinking beyond the real*, (my emphasis) where we can self-reflectively and critically opt to what we attend to in order to improve (our) understanding." – an improvement in understanding needed to build greater confidence, efficacy and accountability in our actions.

This region of the ascribed real that Lissack describes consists, he says, of "characterized normative perceptions... qualities about objects, others, situations and contexts (that) determines the reality with which we deal." And our "better understanding self" benefits from the recognition that the label is but an ascription...that ascriptions are "<u>not real and not true</u> <u>anyway</u> (my emphasis)," and not being true...can be manipulated" and made better.

Designerly thinking, can be very helpful, he says, when one attempts to develop a process by which those ascriptions can be "better." Designerly thinking, however, can't be used for the kind of general cognitive development he believes needed to improve understanding because designing starts in a problem-solving process of goals and intentions that predefine what is to be understood. And such normative perceptions as values, beliefs, qualities, powers, entailments, beliefs etc. ..., that have their own measures in significance, goodness, satisfaction and success, fall outside the boundaries of truth and certainty.

"The hardest thing on Earth is choosing what matters."

> Larry McMurtry, Lonesome Dove

In his book, *Fundamentals: Ten Keys to Reality*, Nobel Prize physicist, Frank Wilczek writes, "I have been at pains to be clear that science teaches us what is, not what ought to be. Science can help us attain our goals, once they are chosen, but it does not choose our goals for us."¹⁰ An analysis of the physical facts of a complex "existing" situation, while integral and instrumental, are never dispositive to the assigning of significance, of deciding what to do, who gets to decide, or the best way forward.

Lissack substitutes a vocabulary of ascription to signal that he knows the rules of the modernist reality game even as he reaches across its epistemological borders. His view is that we could manipulate characterized normative perceptions better if we could just reason better. Manipulation, in Lissack, doesn't suggest unscrupulous coercion, exploitation, falsification, or distortion. But it does still project a conceptual separation between operational rationality and embodied and embedded motivations and aspirations.

Lissack needed to invent a separate "ascribed reality" in order to exercise agency in social and cultural innovation and creation. He claimed that the "characterized normative perceptions" of this ascribed reality were "a product of choices that are forced upon us as we seek to overcome the mismatch between the relentlessly rich, interwoven complexity of the world and our minds'

limited ability to cope with it all..." But this view of a forced normative perception as primarily a coping mechanism doesn't quite square with the rich history of purposeful and strategically directed cultural productions of conscious choice. The contrasting embodied and enactive view is in one that is deeply embedded in the intentional aspirations and choices of situated culture. Am enactive design thinking holds out the prospect of a interest-directed, meaning-based, knowledge-enabled, self-reflective adaptation and creation in a reality of experience.

Revisiting Rittel and Webber's Dilemmas

In another recent article, Revisiting Rittel and Webber's Dilemmas,¹¹ Pieter Vermass and Udo Pesch's critique concludes that designerly thinking can't resolve the critical social planning dilemmas that Rittel and Webber raised in today's environment of heightened governmental distrust.

They find that designerly thinking still can't:

- 1. ...resolve problems of social goodness because good or bad problems are not true or false.
- 2. ...turn wicked problems determinative because of the inherent differences and conflicts of worldviews, interests, values and beliefs.
- 3. That "There is no theory of equity between social groups that can guide professionals as they address societal problems," because "Different members of society harbor different conceptions of good and bad...".
- 4. Design testing doesn't reveal social or long-term consequences.
- 5. And because, designers are not responsible for the consequences of their responses.¹²

They view designerly thinking as an objective planning and designerly instrument that is incapable of resolving wicked problems or of determinative authority in the generation of goals.



Therefore, it's role is to wait to receive its direction from external social and political determination. Designers, they assert, can of course participate as citizens but would do better to stay in their own lane as designers and concentrate on improving the quality of their outcomes and accountability for their work.

Hardly anyone today practicing in some area of design professionally subscribes to Pieter Vermass and Udo Pesch's chambered instrumentally and empirical

classicism. The post-Rittel era of user and stakeholder-related engagement with its interest and respect for stakeholder culture and the incorporation of significant qualitative informational

concerns into designing continues to expand and progress. The preceding examples, however, provide an insight into the paradigm shifting base in design thinking that is taking place.

Saul Steinberg, who called himself "the writer who draws," portrayed the walling-off of human experience from reality as being boxed off into a too restricted view of the real.⁴ The poets have been even more dismissive and derisive. Northwest poet Theodore Roethke, for example, labeled that box a "hutch for grubby schoolboys" with its "peephole on reality," while the late 18th Century English poet, William Blake, warned early on against such singleness of vision with:

May God us keep From single vision And Newton's sleep.

An embodied and enactive design thinking calls for a larger conception of reality. After several centuries of having been excluded from empirical reality, it has been proven necessary to return the observer, participant, measurer, decider, and maker, to the fold, acknowledging that their prospect and experience matters. What began three centuries ago with Galileo's, "Just ignore all the other stuff and pay attention to what we can measure and express mathematically," now calls for a more inclusive angle of observation and participation.

Enactive Reality

"If you want to change the world, you have to change the metaphor." Joseph Campbell

Making, Knowing and Believing

The dominant cultural reality of our time is an ontology centered in the scientific truth of knowledge. Heidegger wrote that truth was possible because there is "an open realm in which statement and thing can correspond," and that "it is in this realm, or field, of the open that things show themselves and the truth comes to be."¹³

None of the critiques of design thinking above contradicts this conception of an empirically based knowing that has proven so powerful and productive. But each of the planning and design examples brings forward situations where this truth of knowing doesn't happen. Rittel's 1972 analysis of rational planning exposed significant "showings" that just didn't fit with an empirical reality system's requirement for certitude. Vermass and Pesch's more recent look confirmed that conclusion and advised planners and designers to be honest about what could and could not be confirmed true and confine their practice to a corresponding accountability. Lissack's strategy for moving forward in designing, was to invent a rational for temporarily ascribing reality to those normative considerations and interpretations that were needed for his goal of improving over-all cognition. Both examples reside in the dual reality of thought and world. Post Rittel, the basic problem-solving fix for taming wicked nonconformance has been to rationalize the irrational. Quantify the qualitative. Favor operational goals that are accountable. Make the problem-solving of design thinking conform to reality.

Enactive thinking follows Richard Rorty's suggestion of a wider conception of reality in which, "there are different ontologies that correspond to different interests we have in engaging the world." "One of Plato's worst ideas was the idea that we can divide up the culture into the hard areas where the non-human is encountered and acknowledged and the softer areas where we are on our own."...."Changing ontological perspective and position thus opens the way to the development of a fully humanist culture, one which "will emerge only when we discard the question, "Do I know the real object or only one of its appearances?" and replace it with the question "Am I using the best possible description of the situation in which I find myself, or can I cobble together a better one?"¹⁴

An enactive design thinking's fundamental interest of engaging the world is in making, not knowing. Plato described making as "the bringing of non-being into being."¹⁵ Making's lack of congruence with knowing is not contrarian, but a signal of system failure in knowing that reveals making as belonging to a separate state of being. This is a recognition that making is an engagement with the world with its own fundamental interest and is not a special kind of knowing. Instead of a focus on the knowledge of how things are and how they work, making's primary target is the transformation, creation, and expression of human culture. Where knowing's main measure is truth, making's ontological actions and products carry their own measures of meaning, viz. excellence; goodness; significance; satisfaction; success...: phronesis. And to the anatomy of being as making and knowing, believing adds the profound human realm of valuing where the prime motivations of culture are forged. Making's orientation in being is about creating the things we care about and have meaning, through knowledge, know-how and imagination. Making, knowing, and believing together create a multiply targeted reality of experience in which the three fundamental identities alternate between primary and instrumental roles.



Extended Reality in Enactive Design Thinking

The Reality Diagram of Design Thinking

The diagram projects the late-modern reality home of an embodied and enactive design thinking. The designerly thinking problem-solving models of the Lisack and Vermass-Pesch articles are mapped as problem-solving against their classical empirical boundaries. The emergent, enactive thinking model, shown in red, overlaps and integrates the problem-solving model in experiential reality. In the enactive conception, the center of meaning of design thinking (*) steps back from its classical grounding in the knowledge and certainty of empirical truth to the contingencies of meaning in embodied experience (*).

Herbert Simon's definition of designing, "Everyone designs who devises courses of action aimed at changing existing situations into preferred ones,"¹⁶ straddles the line between problem solving and design thinking identities. It acknowledges a normatively targeted making but situational changes are still based in the scientific reality of a determinant present, rational actions and choices.

A 4E Model of Enactive Design Thinking



A non-dualistic enactive conception of design thinking arises when we model the 4E concepts of

enfolds design thinking conceived as problem-solving into a wider reality of making. In this threedimensional model, enactive thinking occurs at the intersection of enaction, embodiment, embedment and extended mind. The model's alignment toward making is supported and enabled by knowing and driven by the motivational dimensions of believing and valuing. The diamond area is an ecological field of embedded and embodied information. Enactive design thinking is envisioned as a 4E transformative and quantumdynamic process.

an ecology of mind, one that

The model, following the diamond metaphor of dualistic, doublediamond thinking, is of a single diamond, its two faces representing the integrated wholeness of cognition and materializing action in a transformative situation. The model turns and travels in time, the three rotational dimensions of enaction are modeled after the t1,2, and 3 of cognitive science, and "the times," the cultural affordance of a time and place. 1.-1., in the model is Embedded and Embodied Information; 2.-2, is Enactive Structure; and 3.-3, is Extended Mind.

The model portrays the characterizing of ecological information's entanglement with probable actions under the inquiry from multiple prospects of extended mind.

- Embodiment in body and embedment in time, place, and culture widen the scope of real and relevant information.
- Embodiment contributes the sensations of bodily and social experience. It sources the motivations of need, desire, confidence, commitment and courage needed to pursue transformation and creation.
- Embodiment and embedment, from the personal to the social to the mythical, create a spectrum of ecological information, frameworks of knowledge, experience, beliefs and values to be interpreted, characterized and entangled with probable actions and choices.
- Enaction entangles an affordance of probable actions with the ways that participants see, interpret and envision the world.
- Enaction in design thinking structures a dynamic learning system of mutual affordance in which changes in one induce and reflect changes in the other.
- Enaction's motivating forces carry a full baggage of attentional priors: prior knowledge, know-how and experience; prior beliefs and values; personal biases; social allegiances and responsibilities; bodily and affective dispositions; metaphorical frameworks, patterns and associations.
- These aggregate into individual and social characterizations of information strategically relevant to the development and choice of desirable actions.
- Extended Mind integrates the multiple attentional prospects of its workspace in the reflective enquiry of material development and expression.
- Communication in extended mind differs from Stanislas Dehaene's conception of a global neuronal workspace, which opens up "a space for thought experiments, purely mental operations that can be detached from the external world."¹⁷ Enaction makes extended mind communication an open, visible, tangible, and media-rich reflective process.

Enactive Design Thinking in An Ecology of Mind models making's "bringing into being" as an affordance-based process of characterized ecological information entangled with its signature probabilities for cultural action.

Time in Enactive Design Designing

The diamond in the model portrays a transformative situation as a rotating field of ecological information traveling in situated time. The motivational forces of making, such as will, want,



need, desire, and delight..., drive a continuum of enaction that echos cognitive science's three lengthening periods of transformation: the T1. of elementary and immediate reflective actions at the model's axis; a T2. integrative time of problem-solving as it becomes nested in enactive thinking; and at T3., design thinking's primary home in Narrative Time.

Narrative time in making instrumentally enfolds the neural and everyday immediacy of journeyman actions. It instrumentally enfolds the empirical processes and measures of problem-solving where goal-making is more easily resolved and made operational, and where techo-rational measures of accountability remain useful and desirable. The wider aperture of Narrative Time marks a

paradigm shift in being from knowing to making's more inclusive scope of motivations and measures in the creation of cultural meaning.

Narrative time is the wider scope of storied time, the extended time of reflective change-of-state learning through inquiry and materialization resolving in creative action.

In Narrative Time, the time relationship of thought/action is a maturation through a sequence of systemic trials and reflections. In our mythology, the hero must undergo a series of trials to grow worthy and capable of resolving action. In Shakespeare's Hamlet, a young and indeterminant Prince Hamlet must off to England to grow kingly capabilities before he can return to Denmark to act and resolve his father's murder.

Narrative Time in making is the experiential time of situational interpretation, characterization,



Narrative Time Enactions in Enactive Design Thinking

transformation, and creation. Donald Schön described this process as sense-making through



frame reflection, frame restructuring and metaphoric generation tied to the iterative pragmatic decisions and choices of a doubleloop reflective practice.¹⁸ The enactive perspective sees this aggregate of insightful framing as a characterization, one not just tied to or associated with possibilities, but entangled with a superposition of probabilities for action and materialization. Inquiry and imagination from the multiple prospects of extended mind drives an arc of double-loop growth potential in both characterization and probable action.

Enactive designs in Narrative Time are significant and satisfactory spinoffs in the potentiality of characterized action. They remain significant and satisfactory until they are not, until Mind and the times move on. They are both capacitors and catalysts. As catalysts they inspire creative effort, growth

and confidence. And as capacitors, as for example a musical score, a plan, or a constitution, they materialize the potential of actions to come, adaptive frameworks on which to hang new meaning (Lynch).

A performance in Narrative Time is a culmination of a becoming spread over time. The young pianist confronts the Appassionata Sonata score of Beethoven as music too hard to play. Years of acquiring necessary technique, combined with a maturing interpretative conception of the role its sections play in overall meaning, slowly become integrated into performance and in time a life-fulfilling performative occasion. Resulting audience enactions of appreciation, comparison, interpretative criticism, and inspiration become catalytically entangled into broadcasting making's further cycles of composition and performance.

The Minded Enaction of Information

In this two-dimensional illustration of the model, the multiple prospects of design thinking strategically engage the ecological information of a transformative situation. Such prospects include a stepping back contextually and conceptually, a stepping backward and forward in time, as well as a stepping into phenomenal experience. Enaction (2. $\langle - \rangle 2$.) is the structure in which the sense-making entangled inquiry takes place. (1. - 1.) is a field of ecological information, (3.). points to the horizontal and vertical prospects of extended mind (Mind) in transformative situations.

- Metaphors for attention in Mind are built upon the first, second and third-person nested perspectives of fiction. Third person is overview, the capacity for overall conception, significant contexts in space and time, "the view from 30,000 feet," priority motivations, the cultural affordance of the times. Second person is communicative inquiry in social settings through the visible and tangible media of design thinking. First person is the reality of personal and social phenomenal experience.
- Stepping forward in time is an imaginative enactive dwelling. The Futurists of the early twentieth century had phenomenally proclaimed, "Make the future a movie in your mind," an imaginative projection of what was desired right now. An enactive design thinking's projection is an imaginative dwelling, a long enough and deep enough stay "in place" to enable insight into the key steps needed for getting from "here" back to there.¹⁹
- Looking backward in enaction is not just an historic reconstruction of a sequence of facts, "like the beads of a rosary,"²⁰ as Walter Benjamin famously described it, but the meaning of those historic facts as they relate to present choices and probable actions.
- Taken together, these multiple prospects enable the frame inquiry and restructured characterization of situations needed to create fresh probable options and actions.

In an ontology of making, unlike knowing, there is no prospect from outside Mind, no Archimedean prospect of objectivity (Arendt), no *sub specie aeternatitis*. (Spinoza) In Mind, the reality that exits is the reality we are able to know, the "reality exposed to our method of questioning." (Heisenberg)²¹



ENACTION OF INFORMATION



The Enactive Mind Revealed

Once unmasked, the enactive Mind is everywhere. We see it in the theater when an actor asks, "How would my character act in this situation?" We recognize it in behavioral therapy where new behaviors are intended conscious replacements to retrain conscious reactions. The enactive Mind of character entangled with characteristic actions shines forth most clearly in our literature, from Anna Karenina to Little

Orphan Annie, when we are prepared to see it. In Tolstoy's eponymous classic, Anna, having violated the normative boundaries of her social class, is so deeply embedded in her society that the "only" choice left to her is to throw herself beneath a train rather than endure the shunning and shame of a social outcast's fallen life.

Here, drawn from the comic strip world of popular culture, is a conceptual model of the extended, enactive Mind of Little Orphan Annie's, created by Harold Gray in 1926.²² It illustrates her storied adventures seen through her signature empty oval eyes as an entanglement of her designed character and the reverse – the way that her adventures are drawn to bring out the defining elements of her character's way of being in the world.

Gray casts Annie's character as an expression of Emersonian self-reliance, courage, determination, honesty and personal responsibility. As a visitor in a temporary home, she is the perfect child, helping them plan out their family finances, getting a part-time job, and refusing to join their children in neglecting their homework because, she announces: "<u>she wants to</u> <u>make something of herself</u>." Gray expresses Annie's characteristic courage and commitment to social justice at the children's school where she stands up to and mindfully socks the schoolyard bully in the nose for terrorizing the younger children. And not to be overlooked is Annie's capacity for empathy and kindness through the perfect love and trust relationship she has with her dog Sandy, believed by some to be the source of the expression: "if you want a friend in Washington, get a dog!" During the Second World War, Gray expressed both his and Annie's super patriotism through drawings of her as a "Jr. Commander" collecting metal scraps for the war effort, catching German spies, and honoring Gold Star families.

Annie's mind is being portrayed as an enactive continuum of thought/action. Looking both ways through her unique eyes, we can see the enactive field in which Annie's adventures are projections that grow out of her created character just as her adventures reveal, are unique to, and express that character. Character/adventures: adventures/character; each is a mirroring process and an embodied function of the other. Looking at the presence and structure of

enactive Mind in our artifacts helps clarify the multiple prospects of Mind in enactive design thinking. Gray, in authorial third-person position, brought his enactive world view to the enactive whole of his creation. His were the same prospect advantages of every designer. Stepping back, Gray could contemplate and mold his characters and their actions from either end. He could imaginatively enter-into and coordinate first-person phenomenal positions in both states of enaction. He could overlay second-person dialog, using language to focus and sharpen the conceptual meaning of his imagery.

Harold Gray's characterization of Annie and its supporting characters was a reflection its times and a vehicle for his ultra-conservative world view and politics. Daddy Warbucks, Annie's protector from her frequent dangers, was a billionaire WW1 arms dealer drawn in the ethical black and white of good or bad, right or wrong. The extra judicial lethal actions of Warbuck's associates, Punjab and The Asp, earned the strip the sometime sobriquet of "fascism in the funnies."

After Gray's death in 1968, changes in successive authors' world-views tempered some of the strip's socialist fears, anti-New Deal neoliberalism and Manichean overtones. And by the year

2000, the strip's world-view and character evolution had transformed Annie into a feminist icon, star of stage and screen, belting out songs on Broadway!

The arc of character that occurs in Annie and in all literature, mirrors the potential arc of character growth and change in enactive designing, where growth in living character equals new ways of looking at information equals new potentials and probabilities for action in the world - and the reverse.

The Prospect from Enaction

Enactive thinking in an ecology of Mind is a paradigm shift as it relates to the cultural agency of design thinking. For fifty years we have concentrated on finding ways to rationalize and civilize Rittel and Webber's host of wicked contradictions and put them back into a problem-solving box. The belief remains strong that normative information must be made subject to the measuring standards of the real. In their articles, Lissack's strategy of an ascribed reality offered his normative needs a temporary pass. Vermass and Pesch's critique of designerly thinking held tight to their rigid objective standards.

The Rortian view of their being ontologically targeted regions of reality offers the enactive prospect a less restrictive and enfolding box. An architecture of being as making, knowing, and believing arises from the generative metaphor of knowing's struggle to remove itself from believing as being profoundly like making's own struggle for identity from knowing. Those who

"Design Thinking brings the affordance of things that matter into being." foresaw and sought a similar cultural independence for designerly thinking had to do so from within the restrictions of a scientific reality of knowledge. In their 1979 Royal College of Art report,²³ Archer, Cross et al. conceived design thinking as <u>designerly ways of knowing</u> with its "own distinct things to know, ways of knowing them, and finding out about them." They proposed Design with a capital D as the missing third culture, along with

Science and Arts or Humanities, in the study of human knowledge.

"Perhaps," they wrote, "it would be better to regard the 'third culture' as technology, rather than design. This 'material culture' of design is, after all, the culture of the technologist – of the designer, doer and maker."....and "the conception and realization of new things."....and "the application of science and *other organized knowledge* to practical tasks...(Cross, et al. 1981)²⁴

The original insight of designerly thinking as something unique and special has had to await a turning in cognitive science toward the 4E concepts of enaction and an accommodating reality where "there are different ontologies that correspond to different interests we have in engaging the world." They have had to await the return of the observer and the decline of certainty in relativistic and quantum science. They have had to await a new narrative of thinking's emergence from a classical reality of thinking *and* action, cognition *and* materiality, subjectivity *and* objectivity into the systemic wholeness of a non-dualistic, enactive identity. And this may yet lead to the transformation they envisioned in an educational architecture that acknowledges the centrality of design thinking in the making of a "learning society" (Schön)²⁵ needed for the "bringing into being" of healthy societal change and cultural evolution.

In the Karma restaurant, where there are no menus, they serve what you deserve. The 4E enactive menu entangles the prospect of probabilities and choices with the capacity to grow in ways we see the world, and you may reorder until everything's just right.

And from this prospect Emily Dickenson's, *I dwell in Possibility*,²⁶ might have been written (with apologies):

I dwell in Probability. A roomier House than Knows More reflective through Windows Revolving - of Doors

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