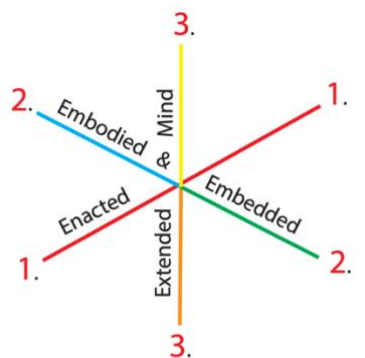


## An Enactive Theory Model of Design Thinking

“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.”  
Buckminster Fuller

The present-day cognitive science that is turning away from computational models and toward enactive models of thinking provides fresh new ground for exploring design thinking. To this end an enactive theory model of design thinking is proposed based on the interaction of its four (4E) central concepts: Enactive transformation, Embodied and Embedded informational relationships, and a workplace of Extended mind.

In the 3D enactive model below, these four concepts are shown intersecting: **Extended mind (3-3)** is the motivational workplace for the characterization of information in enactive situations. **Embodied and Embedded (2-2)** is a physical, biological and cultural field of informational relationships in mixed and multimedia. And **Enaction (1-1)** is the {embodied thought-in-action} reflective phase transformation and reification of enactive thinking.

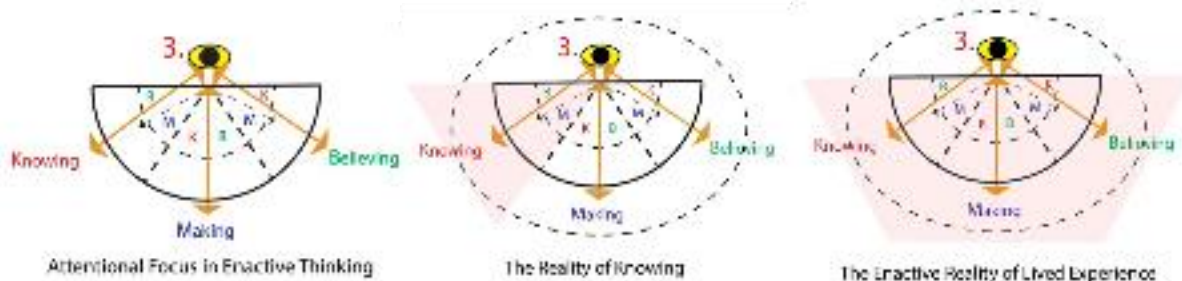


**The Intersection of the 4E Concepts**  
Enacted Embodied & Embedded  
in Extended Mind

The **4E** conceptual model follows the insight of Richard Rorty's observation that there are fundamentally different ways in which we engage with the world. It focuses on three principal and purposeful orientations of Being: Making, Knowing and Believing. The informational characterization of situations from these three primary ways that we exercise agency in the world is shown to be dynamically entangled with the thoughts, language, probable actions and material transformations unique to their orientation in the world. The model presents an understanding of design thinking when territorially identified as an enactive transformational process centered in the mode of Being that is Making.

### An Anatomy of Enactive Reality

Knowing's truth targets and its empirical measures continue to dominate our contemporary conception of reality: how things are and how they work. The enactive model requires consideration of a wider a wider conception of reality, one that portrays knowing as only one of three primary ways of situational engagement in a reality of experience. An enactive reality is



an anatomically complex experiential reality of targeted purposeful action. In this reality, Knowing, Making and Believing each have their own unique focal targets, processes and evaluative measures that dominate engagement.

### **In this reality of experience**

- Knowing's primary focus is on how things are and how they work. Its principal measures are empirical truth, falsification and verification.
- Believing's main target is all that is held valuable, significant and sacred: the ultimate meanings of human existence and conscious life; the ground of moral and ethical convictions and practices. Believing's efficacy is measured by the success and satisfactions of its motivated belief and value-expressive actions to shape personal and community life.
- Making's target is the conscious creation of the preferred situations and things that make a whole human life and world. Its principal motivations are those of cultural valuing and meaning. Making's measures are those of cultural significance, satisfaction and success, of human life support, enrichment and flourishing.

Knowing, Believing and Making, however, each play significant but secondary instrumental roles in each other's primary target of engagement.

- In Knowing, Making is instrumental in the empirical distillation of truth. Believing directs Knowing toward significance targets of human existential understanding.
- In Making, Knowing underpins the successful creation and functioning of qualitatively oriented things and experience. Believing motivates what cultures consider valuable, significant and meaningful to create.
- In Believing, Making reifies the sacred actions, objects, institutions, rituals, and places of faith. Knowing's techniques and processes bring the corporal manifestations of Believing into being.

### **A Post-Rittel Reality of Experience**

The differentiation of targets of engagement and how they're measured in an enactive conception of reality presents a post-Rittel perspective on what have come to be known as wicked problems in planning and design. So-called wicked problems are those culturally intractable situations that find their resolution in culturally varied preferences rather than unique truth. They lead toward choices of the transitorily desirable, not to the empirical and falsifiable definitive. From the wider reality of an enactive perspective, wicked problems lose their uncooperative "wickedness" when they are understood as belonging to the targeted engagement of Making and measured by Making's rather than Knowing's and Believing's standards. The belief and value-motivated processes and probable manifestations of design are only metaphorically "true," i.e. when measured by Knowing's truth, in the domain of Making.

A central aspect of this differentiated engagement is the role played by conceptual metaphor in characterizing situations. Each of the principal prospects for engagement comes embedded into its own unique linguistic and conceptual informational frames and filters.

Situations involving matters of Belief quite naturally favor the processing of information through conceptual metaphoric filters that target such concepts as religious faith, sin, grace, morality, hope, charity, forgiveness, atonement... Conceptual metaphoric filters in Knowing automatically default to and prioritize empirical facts and falsifiable truths over the metaphors that structure values, beliefs and embodied responses. In Knowing, Making's embodied frames are of minor importance considered wicked and unreal. Making's frames prioritize the metaphors of positive and preferred situational change, those related to renewal and repair, the search for the better, the missing, the new, those pointed toward the enhancement of human life and culture.

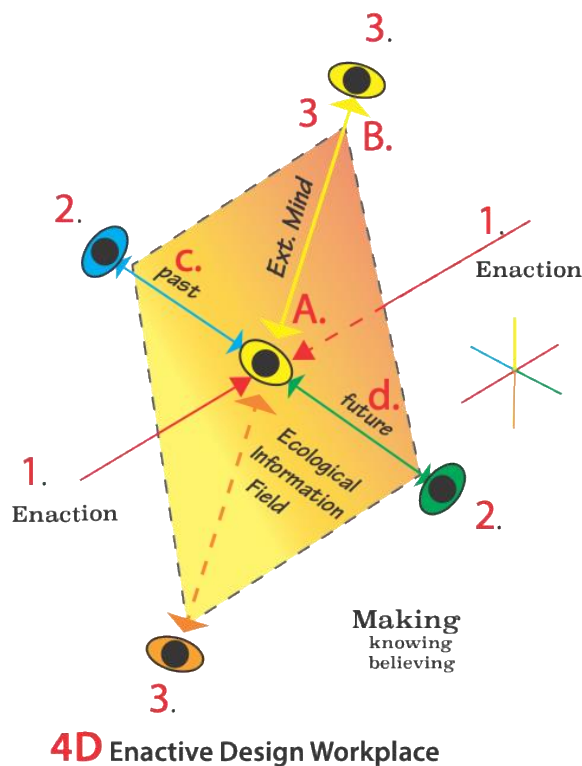
### The 4D Enactive Workplace of Extended Mind

Extended Mind's 4D enactive workplace is the attentional hub of a network of enactively informational processes and actions. Enactively, it is a *workplace*, not a mental *workspace*,

because enaction does not dualistically separate thinking from its physicality and materiality. In this workplace, consciousness makes possible the ability to "view and inhabit" situations through multiple perspectives and levels of abstraction as they intersect with the iterative, integrative reordering, change-of-state processes of reification.

The eye symbols in the 4D Enactive Workplace Diagram indicate some of the key attentional prospects in Making.

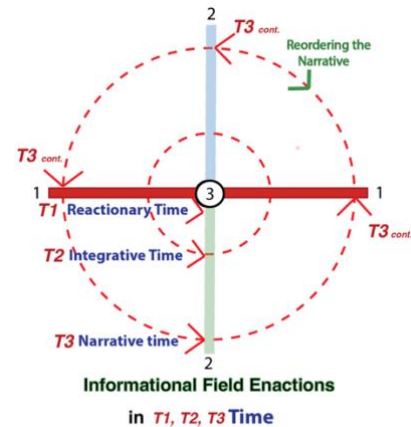
In 3.-3., the yellow eye at A. at the center of the model represents the phenomenal experience of immersion in a field of embodied and embedded situational information. At B. the yellow eye represents the prospect of an informational stepping back conceptually in relevant levels of context and abstraction.



The gold diamond represents a field of embodied and embedded ecological information that enactively revolves developmentally as it travels in cultural time. 2.-2. represents a past and future continuum of relevant informational experience, knowledge and imagination. 1.-1 represents enactive situational development in time.

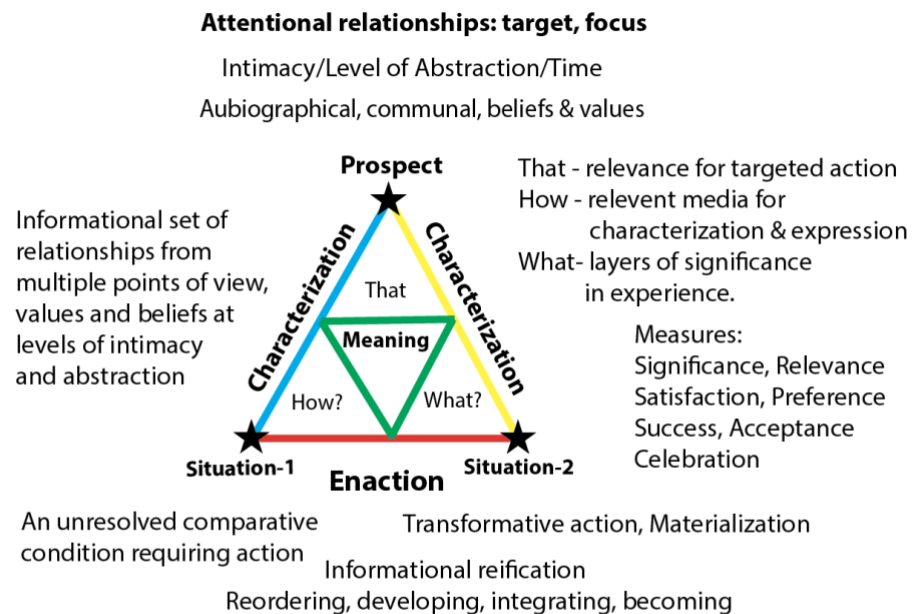
## Enactive Making in Time

Enactive making is the motivated reordering and reforming of characterized information into preferred and satisfying reifications. Time at **T1**, **T2** and **T3** represent three primary temporal nodes in a continuum of enactive becoming. **T1** is the reactionary time of immediate action. **T2** is the more integrated and determinative processes and actions of problem solving. **T1** and **T2** are nested instrumental participants in **T3**, the evolving human story of situational transformation into preferred actions, cultural plans, and products.



Cognitive science focuses on the more empirically accommodating and determinative measurability of **T1** and **T2** enactions. **T3** is labeled narrative time because it is a more open-ended, storied and probabilistic process of people in places making things, designing, re-designing and inventing. Narrative time is the time of an unfolding, reciprocal working and thinking in and through relevant media toward desirable outcomes.

## An Enactive Informational Network



## Making: Design Thinking As Informational Enaction

Donald Schön's writings portray designing as a reciprocal and thoughtful making, a "reflective practice." Enactive design thinking provides a new conceptual path to understanding how the informational relationships of relevant motivated knowledge, skills and experience are embodied and embedded in the reflective practice of developmental transformations.

Here, a network metaphor portrays the derivative entanglement of reflective informational processes. In the diagram, relevant informational information in meaningful media inform stages of enactive developmental. The enactive model identifies and makes visible key conceptual elements, meaningful informational relationships and stages of enactivity of that reflective process.

Herbert Simon's "Everyone designs who devises courses of action that change exiting situations into preferred ones" importantly points to the role of informational preferences in successful and satisfying transformations. Simon's insight here, however, belongs to his quest for a *Science of the Artificial*. The implication is that critical conditions in existing situations can be scientifically, or at least sufficiently, well-defined that the connection to preferences can be made rational, accountable and determinant. From an enactive prospect, the Herbert Simon formulation appears as design thinking being conceived from the dominant T2 problem-solving reality of Knowing where there is an accountable form of rational cloture. There is no dispute that Knowing and Know-how are critical inputs, but in enaction they remain servant to the more inclusive, value-driven T3 experiential time umbrella of reflexive Making.

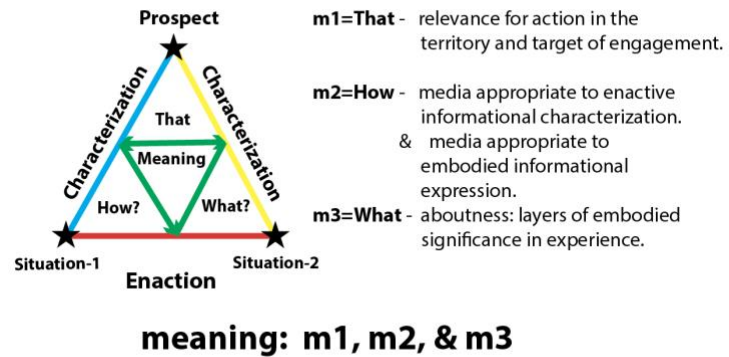
Existing and preferred situations in an enactive design thinking inhabit a reality of informational construction. The temporal and conceptual prospects of extended mind cast in relevant media informationally characterize difference in situations as comparatively directed actions. This informational characterization of needs and priorities, both existing and preferred, reflect Richard Rorty's insight that there are different kinds of attentional engagements with the world. In the language of the later Wittgenstein's *Philosophical Investigations*, Knowing, Making and Believing each play their own "language game" by their own rules. Entanglement, for example, is an empirical concept in the quantum foundational basis of Knowing. In Making, entanglement becomes a metaphor for the derivatively inherent nature of thinking and action in enaction.

$$\frac{F_{\Delta S1 - S2,}}{\partial S_{\Delta S1 - S2}} = \frac{\partial C_m M_{m1, m2, m3}}{\partial S_{\Delta S1 - S2}}$$

$$\frac{F_{\Delta S1 - S2,}}{\partial C_m M_{m1, m2, m3}} = \frac{\partial S_{\Delta S1 - S2}}{\partial C_m M_{m1, m2, m3}}$$

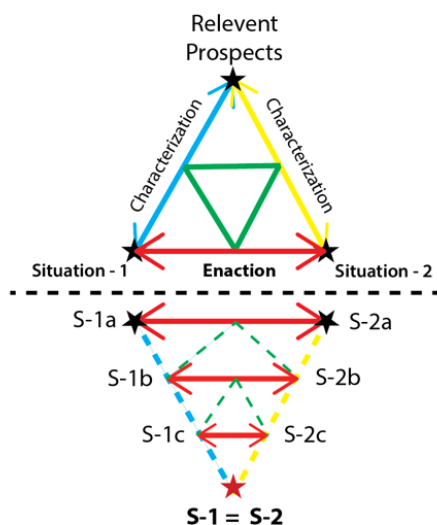
In the same vein this Leibnitzian expression of simultaneous equations can only be understood as a metaphor for the derivative characterized relations of the embodied and embedded informational relations in this model of enactive design thinking.

In two simultaneous equations, the relevant meaning (m) Characterizations (C) in Media (M) from the  $m_1$ -that,  $m_2$ -how, and  $m_3$ -what perspectives of meaning are functions of situational (S1-S2) change. And the reflection is also true. Understanding this Knowing-like expression of the enactive model, however, requires engaging each of these design concepts in their own language game of Making, their own prospect mode of Being.



### Situation and Characterization in Media

An enactive situation arises when there is a perceived difference, the awareness of a “difference that makes a difference,” between existing and preferred situations, between what exists and what is needed or wanted. In the diagram, it is the widening gap between Situation – 1 and



### Making: Enactive Neural Network

Characterization in the model emphasizes the bringing of all of who you are to the informational understandings relevant to the actions needed in both existing and preferred situations. Analysis, diagnosis, interpretation and evaluation in relevant media are all at work here, but their primary focus is on the qualitative, the framing of valuing relationships that matter and point toward preference. Belief, necessary knowledge, and know-how all remain essential to the underpinning of that process. Meaning brings a structure of what matters to the conscious awareness of embodied thoughts, perceptions, sensations and feelings in the differing informational engagements of

experience. The mattering of facts takes informational priority in Knowing.  $E = Mc^2$ , for example, is common to all cultures and the embodied understandings of Making play a minor role. In Believing, it is the expression, interpretation and validation of the sacred that matter. In Making, however, embodied cultural, geographical and autobiographical meanings become the central informational relationships that matter most.

### The Embodiment of Value and Valuing

The enactive thinking of Making prioritizes qualitative concepts like value and valuing that can reveal both the qualitative state and qualitative relational pattern and structure of situations. From this prospect, the state of an existing situation is one of reified embodied and embedded value, value as a persistence of relational meaning in memory, one that has been synthesized



and materialized out of previous actions and choices. The recent destruction of the White House East Wing, for example, was a significant loss of embodied social and historical value.

This is the view that architecture, and by extension, all the embodied actions and products of Making, can be understood as the embodiment of persistent personal and social meanings in human memory. Value as valuing changes from an overall prospect on general significance to the finer grain of

meaningful relational patterns and priorities, e.g. the office of the 1st Lady, the purposeful modesty of the entrance to the public's house, the role of women in government, a denial of process that signals an altering of the balance of power between the people and the state... that add up to the persistent presence of social and historic meaning. As Henry James has written about embodiment, "Italy is the land of art...where every corner whispers history, and every meal is a masterpiece." The image above represents the shouted deconstruction of that presence. And to the right the enduring of that presence both literally and figuratively.



The characterization of a preferred situation follows the same path. Relevant past and present examples with some of the qualities desired are comparatively mined, probed and tested. Idealized and imaginative possibilities are projected and tested in an extended mind that allows backward phenomenal: what it would be like, and strategic: what significant changes would be necessary to get here, considerations. Reflective practice then becomes the comparative "pumping" of significant qualitative relationships and their informational supportive systems back and forth, with models and drawings and prototypes developed in appropriate media, until what was existing morphs into modified framing, into new patterns of preference – and the presence of enactive form!

## Enactive Theory Building

The concept of enaction takes some getting used to because it does not follow the familiar subject-verb-object divisional structure of language or the scientific dividing of reality into mind and world. Designers intuitively recognize what Richard Feynman said is true about his notebook's, that they weren't a *record* of his thinking, that they *were* his thinking. That thinking occurs in a mixed and multimedia that includes language that doesn't just stop when action begins. Embodiment helps explain how that thinking evolves and persists. Cooks know as they experiment with ingredients that their original recipe continues to change with them, and that it's their doing that brings clarity and new possibilities. In architecture, it's the required as-builts that record those thinking-action changes. I hear the cognitive embodiment of thinking of reflective action in Einstein's insight from the Maxwell equations, that "light carries mass in it." And I hear it in his famous thought-experiment of riding alongside a beam of light leading to the mathematical recipe for its energy, mass and space-time ingredients.

Rorty's insight that there are significantly different ways in which we engage with the world challenges our present ontological rigidity and enlarges the territory of reality. Wittgenstein's pointedly reminding us that different territories have their own language games, concepts, targets, measures and rules helps explain away the "wickedness" that can occur from ontological colonization and hegemony. "Did you receive your package, yes or no? is markedly different than, "How satisfied were you with your purchasing experience?"

And so, I find this enactive direction in cognitive science helpful in bringing new insight into why the early proponents of "designerly thinking" believed it to be its own way of thinking. I think it illuminates the significance and substantive reality of embodied valuing relationships and expressions even if they aren't the same everywhere and at every time or reliably permanent. And I believe that the uncoupling of thinking from action to be a consequential mistake. People trying to build their worlds can be messy, but the relegation of design and design thinking to an enabling technology only isolates it from its imaginative culture-making agency, meaning and morality. Sanatayana wrote that, "The aesthetic appreciation of the morally good is the finest flower of humanity." And those are but two from the array of valuing characterizations that drive this enactive theory model of design thinking.

Jerry Diethelm - Nov. 2025

## Bibliography and Notes:

1. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983).
2. Shaun Gallagher, *Enactivist Interventions: Rethinking the Mind* (Oxford: Oxford University Press, 2017), 6

3. Shaun Gallagher, "Pragmatic Interventions into Enactive and Extended Conceptions of Cognition", (Philosophical Issues, 24, Extended Knowledge, 2014), 112
4. Mark K. Smith, 'Donald Schön: learning, reflection and change', The encyclopedia of pedagogy and informal education, (2001, 2011).  
<https://infed.org/mobi/donald-schon-learning-reflection-change>
5. Herbert A. Simon, The Sciences of the Artificial, 3rd ed. (Cambridge, MA: The MIT Press, 1996).
6. Richard Rorty, "A Pragmatist's View of Contemporary Analytic Philosophy", (Articulos: 2002), Vol. 7, No. 16. 29-40. See also: Gary Gutting, interview, "What Philosophers Know", Richard Marshall, 3:AM Magazine, Dec. 12, 2012. Gutting: The skeptical thought that science might have important cognitive limitations was important in my early work. But an even stronger influence was Sellars' idea that science has an ontological primacy (as he put it, "science is the measure of what there is, that it is, and the measure of what there is not, that it is not"). Like Sellars, I never took this to mean that science was the only way of knowing. There is normative knowledge (about meanings and values) that is not about what exists in the primary sense of exercising causal power in the world. Science tells us nothing about this domain of non-ontological truth. .... I've also become more sympathetic to Rorty's pragmatic take on different ontologies as corresponding to different interests we have in engaging with the world."
7. L. Bruce Archer, Nigel Cross et al, "Design in general education", (London: Royal College of Art, 1979)
8. Nigel Cross, "Designerly Ways of Knowing," Design Studies 3, no. 4 (1982): 221–27, 18, DOI: [https://doi.org/10.1016/0142-694X\(82\)90040-0](https://doi.org/10.1016/0142-694X(82)90040-0)
9. Gregory Bateson, Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology (Chicago: The University of Chicago Press, 2000), 459.
10. Richard Feynman: in Andy Clark's Supersizing the Mind:(2008). See physicist Richard Feynman's infamous disagreement with historian Charles Weiner, who pointed out how good it is to have a record of Feynman's thinking in his notebooks. Feynman pushed back strongly, asserting that the notebooks are not a record of his thinking, in fact the notes in the notebooks are the actual thinking, unfolding, in process.
11. Rittel, H., Dilemmas in a general theory of planning. (Policy Sciences, 1973). 4, 155e169.
12. Pieter Vermass, Udo Pesch, "Revisiting Rittel and Webber's Dilemmas", She Ji: The Journal of Design, Economics, and Innovation 6, no. 4, (Winter 2020): 530–545.
13. Jerry Diethelm, "The Vivid Presence of Design Thinking", July 22, 2013. 3. The four stages of looking at a Chinese landscape painting: See, Travel, Ramble, Dwell.  
[https://www.academia.edu/4081488/The\\_Vivid\\_Presence\\_of\\_Design\\_Thinking](https://www.academia.edu/4081488/The_Vivid_Presence_of_Design_Thinking)

14. Jerry Diethelm, "Embodied Design Thinking." *She Ji: The Journal of Design, Economics, and Innovation*. [https://www.academia.edu/144754960/Embodied\\_Design\\_Thinking](https://www.academia.edu/144754960/Embodied_Design_Thinking). Volume 5, Issue 1, Spring 2019, Pages 44-54
15. Jerry Diethelm, "Enactive Design Thinking in an Ecology of Mind," May 2024. [https://www.academia.edu/117905224/Enactive\\_Design\\_Thinking\\_in\\_an\\_Ecology\\_of\\_Mind](https://www.academia.edu/117905224/Enactive_Design_Thinking_in_an_Ecology_of_Mind).
16. Jerry Diethelm, *Designing in an Environmental Field*. (Eugene, OR: Aurora Books, 1998).
17. Jerry Diethelm, "De-Colonizing Design Thinking." *She Ji: The Journal of Design, Economics, and Innovation*. [https://www.academia.edu/30790628/De\\_Colonizing\\_Design\\_Thinking](https://www.academia.edu/30790628/De_Colonizing_Design_Thinking). Volume 2, Issue 2, Summer 2016, Pages 166-172
18. Jerry Diethelm, "Situations of Significance: Late Modern Design Thinking." [https://www.academia.edu/12012142/Situations\\_of\\_Significance\\_Late\\_Modern\\_Design\\_Thinking](https://www.academia.edu/12012142/Situations_of_Significance_Late_Modern_Design_Thinking).
19. Jerry Diethelm, "A Paradigm Shift in Design Thinking." [https://www.academia.edu/7153275/A\\_Paradigm\\_Shift\\_in\\_Design\\_Thinking](https://www.academia.edu/7153275/A_Paradigm_Shift_in_Design_Thinking)
20. Jerry Diethelm, "An Essay on Meaning in design Thinking." [https://www.academia.edu/1769428/An\\_Essay\\_on\\_Meaning\\_in\\_Design\\_Thinking](https://www.academia.edu/1769428/An_Essay_on_Meaning_in_Design_Thinking). July 2012
21. Jerry Diethelm, "A Metaphysical Sketch of Making: Designing, Knowing & Believing." [https://www.academia.edu/3570566/A\\_Metaphysical\\_Sketch\\_of\\_Making\\_Designing\\_Knowing\\_and\\_Believing](https://www.academia.edu/3570566/A_Metaphysical_Sketch_of_Making_Designing_Knowing_and_Believing). May 2013
22. Jerry Diethelm, "{Designing in an Intentional Field}" [https://www.academia.edu/447705/Designing\\_In\\_An\\_Intentional\\_Field](https://www.academia.edu/447705/Designing_In_An_Intentional_Field).
23. Walter Benjamin, "Theses on the Philosophy of History", in *Illuminations*, ed. Hanna Arendt. Trans. Harry Zohn (New York: Harcourt Brace and World, 1968), 257. See also: 'Louis Menand, *The Free World: Art and Thought in the Cold War*, (New York: Farrar, Straus and Giroux (2021) 103. "History is not facts, but the meaning of facts...(they) became historical posthumously: this is the principle of historical hermeneutics, a rejection of the assumption<sup>21</sup> that we can attain an objective understanding of a prior moment, on the grounds that we are, ourselves, products of that moment. But our present experience of the past is not something that needs to be overcome. Our present experience is precisely what gives the past its significance."
24. Meghan O’Gieblyn, "The Trouble with Reality", *The New York Review of Books*, Mar. 21, 2024, 10-16.
25. John Stachel ed., *Einstein’s Miraculous Year: Five Papers that Changed the Face of Physics* (Princeton: Princeton University Press, 2005) 117
26. Antonio Damasio, *The Strange Order of Things: Life, Feeling, and the Making of Cultures* (New York: Pantheon Books, 2018)

27. George Santayana, *The Sense of Beauty* (Dover Publications, 1955)