arq (2024), **28.2**, 206–209.
doi: 10.1017/S1359135525100808

Problematic vision: using problem creation to shape research[1]

Randall Teal

> True freedom lies in a power to decide, to constitute the problems themselves. And this 'semi-divine' power entails the disappearance of false problems, as much as the creative upsurge of true new ones.[2]
>
> Giles Deleuze

Once, in the offices of Behnisch Architects in Stuttgart, I asked the simplistic question of the complex architectural formation before me: how do you all get these things built? The reply was swift and succinct: 'we work with the best engineers in the world'.[3] This comment, for its very reduction, has stuck with me over the last twenty years as a powerful statement about the relationship between architect and engineer. In the context of an ongoing interdisciplinary collaboration,[4] our own version of this provocative simplification is – *engineers solve problems; architects create them*.

This commentary comes from the perspective of the architecture group working as part of a US National Science Foundation (NSF) team researching innovations in 3D-printing and wood composite technology in order to create new techniques and products that will utilise wood waste, both the 20% left over from the forest products processing as well as reclaimed wood from construction refuse and demolition.[5] As a point of beginning, our team proposed to develop a '*wood flour*' that would be mixed with a bio-based resin to create a medium suitable for additive manufacturing applications; however, with little certainty about the specific insights, artefacts, or architectural ends that should emerge from this process.

In this face of these ambiguities, the architecture team posited that progress would require posing problems that appeared insoluble and unrealisable, because, as we discuss below, seemingly intractable situations engender creative thinking and speculative innovation. We aim to create such problems by using design to do research, not just as prototyping proofs-of-concept, but also through a process of cajoling, shaping, twisting, tooling, interpreting, and misinterpreting ideas until they become problems worthy of a solution. In what follows, we discuss why problem creation is key in pointing research towards solutions of consequence and how a problem becomes problematic.

From problem to problematic

> *Whether a proposition can turn out to be false after all depends on what I make count as determinations for that proposition.*[6]
>
> Ludwig Wittgenstein

The move from problem to problematic is partly an exercise in 'not-believing'. Martin Heidegger described 'not-believing' as a disposition where life is not allowed to 'come to a standstill at one possibility, one configuration'; not-believing affords life 'its inalienable right to become', and this occurs when one ventures 'new and higher possibilities […] creatively conducting life out beyond itself'.[7] In other words, belief chains one to the familiar; and is frequently deployed, according to Peter Sloterdijk when 'we are about to tackle something unprecedented'.[8] Not-believing is essential to an effective futural disposition.

Not-believing is not scepticism or nihilism, it is a projective position that desires to entertain an array of possible scenarios; it means sticking with an idea, but not getting stuck on it. An example of the crossroads of believing and not-believing came in the form of an early catalyst to the formation of PrintTimber. Initially, the team had imagined a bio-based, 3D-printed, structurally insulated panel (SIP). This idea helped us visualise a connection between additive manufacture (AM) and bio-based materials research. However, as the research moved forward, it became clear that sticking with a panel *as the project* might not properly acknowledge the actual material properties of the PrinTimber medium (e.g., limited tensile strength). It put us in a position of erroneously deploying a new technology to poorly replicate an existing one (i.e., factory-based panel manufacturing processes). It also meant that we would likely miss some of the undefined potentials of a greater hybrid manufacturing problematic (e.g., robotics, onsite/on-demand output, complex form used for greater structural and energy efficiencies, and design for deconstructability).

Our backstory points to a common fallacy associated with problem solving: namely, that 'problems are given ready-made', and simply 'disappear in the responses or the solution'.[9] This conception of the problem is conditioned by the dominant mode of thought through much of the history of Western civilisation: representation. The roots of representational thought are found in Plato's concept of anamnesis.[10] Through this concept, Plato suggested that knowledge is something already within us, waiting to be recovered; it is easy to see how this notion privileges what is or has been. As such, anamnesis prefigures the contemporary misstep of treating remembering, realising, or recognising as thinking. Since one is always remembering and recalling as part of their daily lives, this misstep reinforces the idea that thinking, like breathing, is an involuntary facility we use to do other things. The issue here is that the habits of representational thought tend to neutralise thinking as speculative/creative/innovative endeavour, because thinking becomes a kind of 'radio quiz' aimed at answer seeking.[11] And since the measure of a 'good' problem cannot be its perceived solvability, more effective modes of engagement must be adopted.

However, adopting more effective modalities and avoiding the impulse towards answer-seeking is easier said than done. Despite its creative potential, the human brain has many functions, designed to help us more easily navigate the world, that actually eliminate the nuances and 'extraneous' data of new encounters. Henri Bergson describes this phenomenon as follows:

> *Our mind has the irresistible tendency to consider the idea it most frequently uses to be the clearest* […] *(and) instinctively selects in a given situation whatever is like something already known; it seeks this out, in order that it might apply its principle that 'like produces like'.*[12]

Herein lies the basis of the 'ready-made' problem. Hélène Frichot explains this tactic: 'to describe something that at first confounds us we superimpose a more familiar image, one that almost fits, but not quite.'[13] In problem formation, this cognitive bias towards conscious intention takes on a typical form, which is to take a statement of intent and invert it into a question. In the case of our research, this might be, 'we will 3D-print houses with wood waste', flipped into the 'research' question, 'how do we 3D-print houses with wood waste?' Such simplistic reversals distort something known into something falsely ambiguous. Or, in the case of our question, the reversal flips an ambiguous ambition into a limp generalisation where almost any response can count as success. Such reversals are what Deleuze refers to as *bêtise,* by which he means, 'nonsensical sentences, remarks without interest or importance, banalities mistaken for profundities, ordinary "points" confused with singular points, badly posed or distorted problems.'[14] He goes on to explain how conscious intention, because it is 'essentially *reactive*' tends to find itself more often than not mired in *bêtise*.[15] A well-posed problem does not arise from the trivialities of representational thought or recollection. Rather, it arises from disturbances and requires thinking that goes beyond conscious intentionality.

Disturbing creativity

> *To think is to create – there is no other creation–but to create is first of all to engender 'thinking' in thought.*[16]
>
> Gilles Deleuze

Manuel DeLanda sees, 'framing the right problems' as a means to engender 'true thinking',[17] knowing, as Deleuze says, 'that creative thinking *is* thinking and that creative activity begins when 'something in the world forces us to think.'[18] The right problems not only force one to think, but as Bergson says, 'a speculative problem is solved as soon as it is clearly stated.'[19] Problems are the engine that drives thinking out of the representational realm. They are also the means of ensuring that not-believing does not become 'not progressing' as one stands paralysed by infinite possibility.

However, a problem, 'does not exist, apart from its solutions'.[20] Thus, an effective process of problem formation requires embracing the problematic problem as problem/solution – a metastable construct of both/and. When treated as humming totality the problem/solution becomes the 'problematic'. Embracing the problematic forces a thinking that sharpens definitions via hunches, scribbles, analytics, equations, erasures, augmentations, and all other manner of provisional solutions. Each provisional solution that contributes to the problematic becomes what Deleuze calls a 'problem determination', which is 'not the same as its solution'.[21] Instead, problem determinations modulate, amplify, complicate, deepen, destroy, refine, and rearrange the layered relationships of a problem. They make a problem elusive, which makes it interactive. A problem undertaken as a problematic turns problems into fields of investigation that can be inhabited, cultivated, and circumscribed via problem determinations. This brings certain configurations and possibilities into visibility as the metastable knowledge/problem evolves.

Deleuze compares this process to the traditional practice of

mapmaking, which required that one be amidst the landscape being mapped in order to map it. Analogously, one might think of the process in these terms: when one walks into a patch of forest, at first all feels homogeneous and mysterious. However, the more time one spends navigating this particular place-in-time, the more it becomes imageable/memorable and there begins to emerge specific places and things from the initial nebulousness of understanding. Eventually, one begins to see *that* tree, *this* rock, *that* drainage, the little clearing where the sun rises in the morning, and so on. In this procedure, there is no standing 'outside'. By staying within – working, traversing, and reflecting – an increasingly vivid and knowable place begins to take shape. With this description in mind, one can appreciate Deleuze and Guattari's emphasis on 'the middle', where it is difficult to see things clearly, but where things pick up speed.[22] The problematic depends upon the blur, the smear, the smudge – a being amidst things.

In design, being amidst means literally *becoming* an attendant force – the force of the snow falling on the roof, the light coming into the space, the drainage paths of the rainwater, the wandering visitor, and so on – through the immersive material thinking of as drawing and making.[23] Here, understanding, 'it is not a question of our undergoing influences, but of being "insufflations" and fluctuations or merging with them.'[24] That is, one *breathes in* (as in taking medication) and *blows upon* (as in an exorcism) the material at hand; like a simple breath, the thinker/maker becomes a small – yet indispensable – part of the greater evolving organism of the problematic.

Sloderdijk explains how this process of understanding is uniquely suited to staying within the complexity of a given situation:

> *When we participate in the elemental we are in the world like a fish in water, but while the terms 'fish' and 'water' represent tremendous complexities, the participation effect itself is not problematic* […] *participation in the complex is the simplest thing, it is the basic relationship that cannot be realized except in the mode of being in the middle.*[25]

In other words, it is natural to swim in the water (so to speak), but it is very difficult to explain the water as an inhabited environment without reducing its inherent complexity. With this in mind, Sloterdijk says, 'When it comes to reducing complexity, you can only ever choose between the terrible and the not-so-terrible.'[26] Either choice leads to *bêtise*.

The participatory understanding of design/making is critical to overcoming *bêtise*, but so too are ideas. Importantly, unlike the overused and underperforming term, an 'idea' should be regarded as: 'a rare event'; occurring 'infrequently'; ideas are 'consecrated potentials […] already engaged in one or another mode of expression'; and are 'inseparable from that mode of expression'.[27] For Deleuze there are no general ideas, there are only ideas *in* something.[28] An idea demonstrates significance by shining in the light of specific knowledge and particular agendas.

Concluding ideas

> *Steam-engines, petro-engines, turbines, and engines powered by springs or weights are all engines; yet, for all that, there is a more apt analogy between a spring-engine and a bow or cross-bow than between the former and a steam-engine; a clock with weights has an engine analogous to a windlass, while an electric clock is analogous to a house-bell or buzzer.*[29]
>
> Gilbert Simondon

Simondon understood the specificity of ideas as 'the profound intention', which informs technological objects and is the basis of 'their technical essence'.[30] Technical essence, speaks to familial – technical – commonalities between technical objects he describes above. The point here is that there is both an anthropological basis for technical taxonomy (what people use things for) and techno-centric logics basis for technical taxonomy (a technical genealogy where families of technicity are identified and developed via their technical logics). Simondon talks at length about revealing possibilities and capacities of techno-centric logics through participatory evolution (versioning). He points to the example of early x-ray technology where the Crookes Tube already contains 'in a confused but nevertheless real state' the next step in x-ray evolution – the Coolidge tube – which merely 'organizes, stabilizes and refines' what is virtual in the Crookes Tube.[31] Put differently, the possibility of the modern x-ray *only* becomes possible through the commitment to resolution of each successive tube, each of which, ironically, are meant to be *the* solution.

In architecture, a nice example of a solution creating a new potential can be found in the work of Reima and Raili Pietilä. After winning the competition to design the Dipoli student centre in 1969 one of the jurors, Alvar Aalto, asked Reima Pietilä why he had differentiated the roof form of the functional core from the roof form of the public social spaces (suggesting that Pietilä should have made it all the same). Pietilä replied: 'I could not answer a question what was not posed.'[32] In other words, it was only in the completed design that an alternate reality emerged: the continuous surface of Malmi Church.

The interdisciplinary nature of our PrinTimber research requires similar problem determinations to force intersections between disciplinary teams. In these intersections, making is the catalyst that can synthesise the requisite multitude of ideas in specific areas: these include, for instance, ideas in biochemistry used in extracting lignans from trees to form a binder for the flour; ideas in engineering to design a gantry/nozzle/pump to print a wall; ideas about architectural configurations and construction techniques. This synthesis of ideas via making is what can lead the work to insight, intention, and applicability. The current problematic, created by the architecture team, is to design an affordable single-family home that explores in various formulations of the Printimber material. Hopefully the emergent problem/solution can be the armature from which all the ideas in particular areas of expertise can hang, pushing the technology and the project to concurrent fruition.

Notes

1. Some ideas for this article are drawn from: Randall Teal, 'THINKINGdesign: Towards an Architecture of Critical Indeterminacy and Temporal Affectivity', in *DATUTOP*: Vol. 37 (2018), ISBN 978-952-15-4263-3-0 (printed); ISBN 978-952-15-4264-0 (PDF).
2. Gilles Deleuze, *Bergsonism*, trans. by Hugh Tomlinson and Barbara Habberjam (New York, NY: Zone Books, 1991), p. 15.
3. Randall Teal, Conversation with David Cook, Behnisch Architects, Stuttgart (2002).
4. 'Interdisciplinary studies are those in which concerted action and integration are accepted by researchers in different disciplines as a means to achieve a shared goal that usually is a common subject of study. In contrast, transdisciplinary contributions incorporate a combination of concepts and knowledge not only used by academics and researchers but also other actors in civic society, including representatives of the private sector, public administrators, and the public.' <https://www.ed.ac.uk/files/imports/fileManager/RJL-2010Inter-Trans.pdf>.
5. Our project team is composed with areas of expertise that include: composite materials, wood durability, bio-material mechanics, resins, industrial 3D-printer design, energy modelling in architecture, resilience in architecture, architectural structures, mass-timber, architectural theory, and design/build.
6. Ludwig Wittgenstein, *On Certainty*, trans. by Denis Paul and G. E. M. Anscombe, 2nd edn (San Francisco, CA: Harper Torch Books, 1969).
7. Martin Heidegger, *Nietzsche Volume 2: The Eternal Recurrence of the Same*, trans. by David Farrell Krell (New York, NY: Harper One, 1984), pp. 125, 126.
8 Peter Sloterdijk with Hans-Jürgen Heinrichs, *Neither Sun Nor Death*, trans. Steve Corcoran (Los Angeles, CA: Semiotexte, 2011), pp. 348f.
9. Gilles Deleuze, *Difference and Repetition*, trans. Paul Patton (New York, NY: Columbia University Press, 1995), p. 158.
10. See the dialogues 'Meno' and 'Phaedo'. There is also an allusion to anamnesis in 'Phaedrus'.
11. Deleuze, *Difference and Repetition*, p. 150.
12. Henri Bergson, 'Introduction to Metaphysics', in *The Creative Mind* (New York, NY: The Philosophical Library, 1946), p. 34.
13. Hélène Frichot, 'The Making and Unmaking of Sense: Gilles Deleuze and the Practice of Creative Philosophy' (PhD thesis, University of Sydney, 2004), pp. 112–13; Sloterdijk and Heinrichs, *Neither Sun Nor Death*, pp. 348f.
14. Deleuze, *Difference and Repetition*, p. 153.
15. Gilles Deleuze, *Nietzsche and Philosophy*, trans. by Hugh Tomlinson (New York, NY: Columbia University Press, 2006), p. 41.
16. Deleuze, *Difference and Repetition*, p. 147.
17. Manuel DeLanda, 'Diagrams, and the Genesis of Form', *Amerikastudien / American Studies*, 45:1: Chaos/Control: Complexity (2000), 40–1.
18. Deleuze, *Difference and Repetition*, p. 163.
19 Bergson, 'Introduction to Metaphysics', p. 58.
20. Deleuze, *Difference and Repetition*, p. 163.
21. Ibid.
22. Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism & Schizophrenia* (Minneapolis, MN: University of Minnesota Press, 1987), p. 25.
23. Here 'drawing' is meant to evoke architectural media more generally.
24. Gilles Deleuze, *The Logic of Sense*, ed. by Constantin V. Boundas, trans. by Mark Lester (New York, NY: Columbia University Press, 1990), p. 298.
25. Sloterdijk and Heinrichs, *Neither Sun Nor Death*, pp. 348f.
26. Ibid.
27. 'Gilles Deleuze on Cinema: What is the Creative Act 1987' (English subtitles) <https://www.youtube.com/watch?v=a_hifamdISs>.
28. Ibid.
29. Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. by Ninian Mellamphy (Paris: Aubier, Editions Montaigne, 1980, 1958), p. 29 <https://english.duke.edu/uploads/assets/Simondon_MEOT_part_1.pdf>.
30. Gilbert Simondon, *On the Mode of Existence of Technical Objects*, trans. by Ninian Mellamphy (Paris: Aubier, Editions Montaigne, 1958), p. 38.
31. Simondon, *On the Mode of Existence of Technical Objects*, p. 38. The first X-ray tube was invented by → Sir William Crookes <http://en.wikipedia.org /wiki/William_Crookes> in the nineteenth century. The → Crookes Tube <http://en.wikipedia.org /wiki/Crookes_tube> also known as discharge tube or cold cathode tube was used to make a visible fluorescence on minerals. In 1913 the Crookes tube was improved by → William Coolidge. In the Coolidge, aka hot cathode tube, the electrons are produced by a tungsten filament. <https://miac.unibas.ch/PMI/pdf/PMI-01-BasicsOfXray.pdf>.
32. Malcolm Quantrill, *Reima Pietilä : Architecture, Context, and Modernism* (New York, NY: Rizzoli 1985), p. 195.

Author's biography

Dr Randall Teal is Chair of the Architecture Department at the University of Idaho. He is a designer, builder, and theorist. His writing focuses primarily on the pedagogy of thinking and dialogues between design processes and the built environment. The latter is further explored through his design practice, Teal Studio.

Author's address

Randall Teal
rteal@uidaho.edu