Wicked Neuroarchitecture

Reciprocity, Shapeshifting Problems, and a Case for Embodied Knowledge

Wicked means evil. Devilish. Tricky... Mischievous? In contemporary jargon, wonderful. Another meaning is employed within a framework of problem-solving. "*Wicked problems*" [1] are shapeshifters, virtually impossible to solve, extant in incomplete, unstable conditions. Wicked problems are vexing, however neither in architecture nor in neuroscience - always dealing with evolving conditions and shape-shifting questions - are wicked problems necessarily a concern and most problems here are a little wicked. A wicked neuroarchitecture - mischievous, wonderful, shapeshifting - necessitates rethinking and suggests embracing rather than avoiding uncertainties. This neuroarchitecture is emotive, critical, reflective, reciprocal, intuitive, inventive. Drawing upon experience in research, practice, and pedagogy, a case can be made to explore neuroarchitecture and intuition as embodied knowledge to make a case for wickedness.

Devilish and Tricky. Neuroarchitecture and Evidence-based Design

Neuroscience often still feels strange to architects - "*a world outside [one's] usual comfort zone"* [2]. While neuroarchitecture often suggests itself as a recent invention, a history of reciprocal interaction between architecture and brain science can be traced, not least, but also not solely, through phenomenological thinking and spatial cognition. Recently, and in line with the neuro-turn, an appetite for working with hard neuroscience has emerged. Evidence-based neuroarchitecture considers the neuroscience of how inhabitants experience architecture to make design decisions and positions itself to validate design rationale, often framed as design guidelines. This emerges from the sincere motivation of employing scientific insight to support rigorous decision making, however, at times the devil is then no longer in the detail but eradicates it. To make sophisticated architecture – and science - details and complexities are decisive and inherent fuzziness over neat answers must not only be endured but embraced. Neat, evidence-based neuroarchitecture ignores that it contributes to – messy - production of knowledge, avoiding or renouncing the enigma of intuition as embodied knowledge. As promisingly affirmative as arising collaborations are, they must be viewed critically. The oft-dominating strand of intersectional *ars directionaria* neuroscience *for* architecture focuses on evidence with a, scientifically often insensitive, agenda of collating and applying knowledge to architecture, overlooking reciprocal potentials. This is common to many neuro-affine developments in which neuroscience (through technology) is seen as providing privileged access to the human condition. An intersection of disciplines without mediation is problematic, as knowledge inserted from one discipline into another without critical interrogation is read outside the framework which gave it meaning. Wicked research and practice embrace this challenge through shifting work contexts to learn and build embodied knowledge.

Image1_FIONA ZISCH

Image2_FIONA ZISCH

'Contracted time and expanded space' and '*Hippocampal and prefrontal processing of network topology to simulate the future'* are examples of steps in setting a foundation for understanding across separate disciplines. In the time study, architectural involvement, initially a mutual learning exercise, soon showed how design intuition uniquely contributed to ways of analysing and visualising insights and cognising them. The space-syntax study saw a range of

researchers involved, arguably within an already shared interdisciplinary framework and results corroborated common hypotheses. In both studies understanding was possible within respective frameworks and the shared intersection was legible from both angles. The work substantiated previous projections, but a more challenging neuroarchitectural contribution was not yet possible. Appetite was whet to seek out more radical, reciprocal engagement and transdisciplinary thinking. Transdisciplinarity can transcend through its shapeshifting capabilities; in solving shapeshifting problems, it is prevalent in addressing wicked questions, evolving reciprocal, temporal and dynamic methodologies based on ontological, logical, and epistemological axioms [8].

A lack of reciprocity in understanding disciplinary images of knowledge hinders a mutual, inventive workspace. The possibility of future insight that is dynamic, sophisticated, and idiosyncratic can be approached by constructing an immersive design research environment, first learning how to understand differently, allowing process to lead to unknown outcomes. At present, specious claim is often laid to universally relevant innovations, suggesting architecture as subservient to a neuroscience which can (pre)validate and collateralise outcomes and support solely through the analysis of brain events. Certainly, using robust evidence within design considerations demonstrates rigour and can contribute to decisions. However, foregoing intuitive, diacritic capabilities in favour of acceleration of process and global applications depletes both architecture and science. The fearlessness and willingness to commit to exploring novel terrain in evidence-based design is laudable, nonetheless it may be prudent to suggest that methods and outcomes deserve reflection before being positioned as, arguably naïve, "*universal design innovations*" or "*neuro-universal design principles*" [3]. The deserving predictive powers of evidence-based design are so diminished and prescriptive where, when used more openly, they could instil reflection and retain architectural agility. Premature claims *"amount to a super claim that the richness of human experience […] is entirely reducible to brain events"* [4]. Neuroarchitecture, as any architecture, cannot be categorically universal, nor can it be neutral. Inherent biases in science and design are undeniable and should be wielded knowingly. Paradoxically, bias and intuitive dimensions that evidence-based design eschews are interwoven. Rather than fetishize neuroscience as holding privileged, universal immediate insight into the human condition, might we not delight in understanding that neuroarchitecture is not about speed or ubiquity but that it can reveal more about dynamic, idiosyncratic, relative, lateral processes?

Image3_FIONA ZISCH

This realisation is starting conversations in shared learning environments, not demanding that exchanges immediately produce results ready for application. Disciplines and learnt differences of understanding extant in each can mutually benefit, by getting to know the other. Interwoven conversations, collaborations, and ruminations with architects and neuroscientists have allowed a continuous discernment of positioning and creativity. Enacting differences and similarities, for example, by constructing experimental talkspaces around focused themes resulted in conversations at Sir John Soanes Museum in '*Talkspace'.* These strengthened critical consideration of intersections and the aim of a neuroarchitecture as *ars combinatoria;* inventive, not intent on immediate answers and guidelines through simplified evidence, but evoking and inspiring discourse and practice and shaping its own intuition.

Mischievous and Wonderful. Intuition as Embodied Knowledge

Paradoxically, where neuroarchitecture can be naively optimistic and surprisingly absolutist with misconceptions about what can be understood through brain events, critical neuroscience already recognises openness in its evinced interpretations emerging from intuition. Intuition, often seen as unreasoned conjecture and "*merely an empathetic*

guess" [5], is a feedback loop of emotive, intellectual, radically embodied knowledge. Intuition is not guesswork, but part of a cognitive, epistemological, emotional understanding and virtually irreplaceable through neat, contained sets of insight. Neuroscience suggests the continuum of emotion-feeling-thinking to enable action and higher-order mental processes and "*there is no cognition without emotion, even though we are often unaware of the emotional aspects of our thinking [as] a fundamental part of human meaning*" [6]. The sophisticated method through which architects and neuroscientists acquire deep knowledge cannot be comprehensively externalised into a syllabus but must remain emotive and enacted. Bypassing learnt sensitivities in favour of prescriptive knowledge evades intuition and creativity in the development of concepts, atmospheres, spatial articulation. A lack of integrating embodied knowledge through experience and neural, physical long-term potentiation hinders action from cursively unfurling. Each concept, idea, decision should be dynamic, informed by what came before and forming what comes next. Design from experience and lived knowledge is evidence-based, albeit complex and refined. The embodied human brain with its extensive, speculative, high-level potentials is more creative than disembodied design guidelines as *"cognition depends upon the kinds of experience that come from having a body with various sensorimotor capacities […] embedded in a more encompassing biological, psychological and cultural context*" [7]. Intuition as a cognitive relation between environment and human state – relation *qua* intuition –allows momentum in method and thinking.

Shapeshifting. Neuroarchitectural Intuition

If intuition is already a sophisticated, evidence-based cognitive mechanism, what can neuroscience and architecture contribute to one another? Do we need neuroarchitecture? The answer is yes, however a shapeshifting neuroarchitecture with its own intuitive repertoire. This is not the immediate arrival at answers and a formalised codex drawn from (scientific) evidence but understanding that wicked problems need wicked thinking. Wicked and intuitive thinking allows transferable and adaptive action in changing circumstances. Neuroarchitecture is not neat and linear but experimental and a current interest in understanding the neural dimensions of accepted design processes omits neuroarchitecture as producing its own intuition and processes. Cognition is embodied, embedded, enactive, extended, affective and building neuroarchitectural intuition through enacting knowledge aims for sensitivity and a nimbleness towards change.

Image4_FIONA ZISCH

Image5,6,7,8_FIONA ZISCH

Knowledge emerging from research in cognitive science (one example identifying a network of interconnected brain regions that represent space through spatial neurons) can be explored to show that architects not only hold embodied knowledge about space but intuitively externalise neural mechanisms as spatial concepts. The doctoral work '*Wicked Neuroarchitecture'*, demonstrates this through a parallel analysis of spatial mechanisms and modernist concepts. Neuroarchitectural intuition subliminally and wickedly combined and transfered interwoven concepts to emerge in design vignettes enacting spatio-cognitive mechanisms of boundaries, directionality, grids, place. These '*Design Enactments'*, informed by reciprocal relevance, bore out parallels.

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Reciprocal honing of architectural and neuroscientific sensibilities through exchange is a wickedly inspirational objective. Neuroarchitecture should not be about idealised knowledge, form, or function, but rather a dynamic process. Intersectional neuroarchitecture is a space of answers; however, it can be rigid, leaving no space for failure and emergence. Neuroarchitecture as a space of exploration, situated on a dynamic, uncertain threshold centres on adaptive mechanisms and intuitively evolving methods, continuously subject to interrogation and dynamic revision, and requiring novel, shifting approaches that transcend orthodox avenues. The student projects '*(Un)Balance'* and '*NeoTouch'* are critical investigations of neuroscientific knowledge within a contemporary technological context that speculate and push thinking into extended realms. Neuroarchitecture aiming to be truly creative should exist as an open system, inviting complexity, interpretation, creativity, and transdisciplinarity by embracing unavoidable ambiguity and uncertainty. Our intellect, ethics, and intuition informed by the experience of being both-and will be more than merely a collaboration, but lived, dedicated embodied transdisciplinarity.

A Necessary Open End

A wicked, open system will not result in immediate deliverables and is not universal; however, it is conceivably truly creative *and* scientific. Wickedness requires translogic that "*enters the relations and tweaks as many as it can to get a sense of what may come*" [9]. We need to immerse ourselves and twist from within to project into the future. It is incumbent on us to address geopolitical, ecological, ontological challenges that lie ahead in an indeterminate world. Decisively, neuroarchitecture needs to be open to unknowns and move with them. Neuroscience can be affirmative to architectural queries, as can architecture to neuroscience, both complementary to the other, but true neuroarchitecture should be more. Critical, reflective movements foregrounded; the role of cursive, wicked neuroarchitectural intuition strengthened.

At the time of writing, many of us are isolated in our homes as the global coronavirus crisis unfolds around us. Suddenly and unforgivingly confined, we find ourselves rethinking everyday life, practice and research. This wicked crisis, adverse and disruptive, is challenging our humanity, already always out of place. In times of disruption, spatiotemporal transgressions and uncertainties, we might remember that, as a complex and capricious process, "*life cannot in any way be limited to the closed systems assigned to it by reasonable conceptions*" [10]. It can be hoped that neuroarchitecture will look to the future by being an open and inventive system that contributes more than validation and meets the wicked problems of life with its own wickedness.

Endnotes

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[4] Shaun Gallagher, Scanning the lifeworld. Critical Neuroscience: A Handbook of the Social and Cultural Contexts of Neuroscience, 2012, p. 86.

[5] John P. Eberhard, Applying neuroscience to architecture, Neuron, 2009, p. 753.

[6] Mark Johnson, The meaning of the body: aesthetics of human understanding, The University of Chicago Press (Chicago – London), 2007, p. 9.

[7] Francesco Varela, Evan Thompson, Eleanor Rosch, The embodied mind: Cognitive science and human experience, MIT press, 2017, p.172-173.

[8] Basarab Nicolescu, Methodology of transdisciplinarity, World Futures, 2014, p.191.

[9] Brian Massumi, Parables for the virtual: Movement, affect, sensation, Duke University Press, 2002, p. 207.

[10] Georges Bataille, The Notion of Expenditure, Selected writings 1927-1939, Manchester University Press, 1985, p.128