

Infrastructures of Care

Activism and Robotically Assembled Habitats in light of Patricia
MacCormack's "Ahuman Manifesto"

Number of the student:
25185907

Theory Seminar / RC3 Cluster / Living Architecture
Theory tutor: Jordi Vivaldi

The Bartlett School of Architecture



Univeristy College London
Bartlett School of Architecture
2025 - 2026

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Submitted on the 21st of July of 2026

During the 20th century, phenomenological approaches to the notion of care in architecture have emphasised concepts such as habitat, atmosphere, or genius loci, often accentuating the folkloric and the local, the identitary. In recent years, Bruno Latour has departed from such phenomenological traditions and their modern counterparts by insisting that we are bound to a fragile, contested ground: the “Terrestrial,” that thin envelope where biological, geological, and atmospheric processes sustain life. In what ways might engaging with architectural design in the wake of Latour’s proposal help us articulate notions of care that release it from the identitarian and often patronising temperament of 20th-century phenomenologists?

This research hypothesises that Patricia MacCormack’s notion of ahuman activism, in dissolving the sovereign caregiver in favour of concepts such as polyvocality or accommodative care, offers the seed of a model of care that aligns with Latour’s work on the “Terrestrial.” The thesis claims that MacCormack’s ahuman activism might find material expression in what we call infrastructures of care, and more specifically, in the architectural project TetrAgora: distributed robotic ecologies that assemble and reconfigure adaptive structures from locally found waste materials. The thesis concludes that terrestrial care can become architecturally instrumental as the generative core of practice itself.

Keywords: Terrestrial care, ahuman, accommodative design, infrastructures of care, distributed robotics, robotic assembly, more-than-human architecture, material circularity, adaptive structures.

abstract

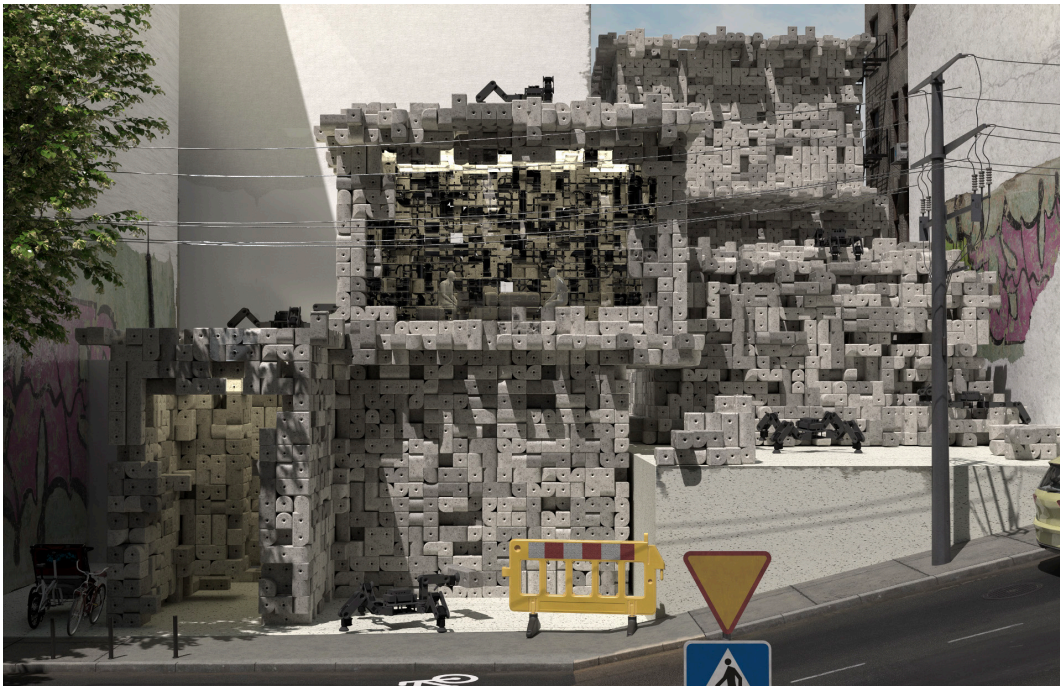


Figure 1: TetrAgora assembly sequence.

representative image

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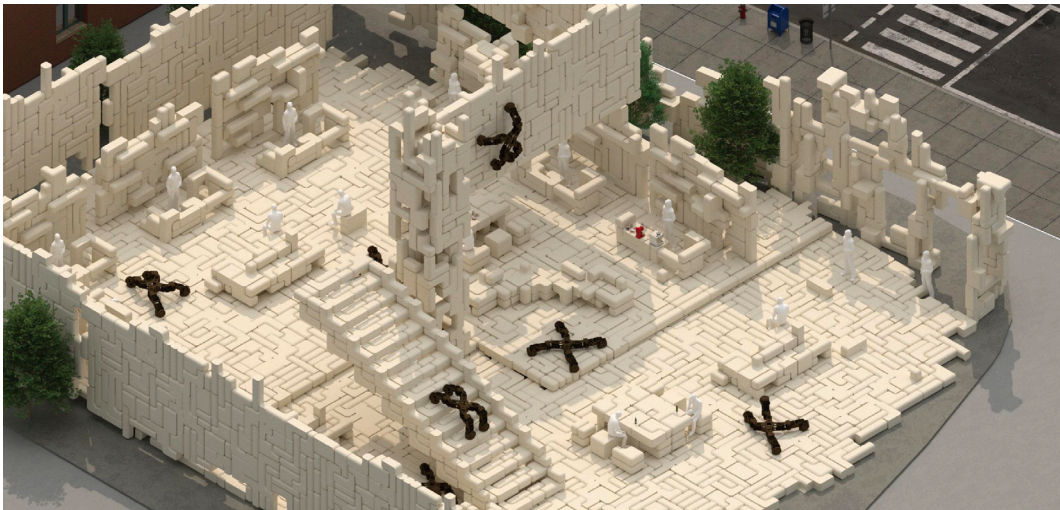


Figure 2: TetrAgora assembly sequence

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Introduction:

Architecture has rarely theorised care, although it is a discipline built around human habitation, because doing so would reveal the discipline's inherent dependency and contingency¹. Theorising care exposes architecture to unanticipated complexities and evolving social dynamics of the built environment (Till, 18, 19, 2009). By embodying only independence and control, the discipline limits its focus to aspects easily mastered, such as form, tectonics, and aesthetics (Till, 2009).

Moreover, care is intrinsically linked to routine infrastructural maintenance, repair, and continuous daily life. This ongoing labour is treated as invisible background work or domestic drudgery; the discipline suppresses it to avoid acknowledging that buildings are fragile, continuous processes (Puig de la Bellacasa, 2017; Graham et al., 2007). The neglect of care also relates to a lack of multi-scalar thinking, treating care as a domestic gesture.

To understand the relationship between architecture and care, we turn to Bruno Latour, who challenges the traditional political opposition between the "Global" (limitless modernisation, abstract space) and the "Local" (nostalgia, borders) by proposing the "Terrestrial" as a new political attractor, that thin envelope where biological, geological, and atmospheric processes sustain life² (Latour, 2018).

¹ This disciplinary reluctance is not unique to Till's analysis; see also (Care Collective, 2020), who identify a comparable avoidance of dependency and interdependence across design and planning fields more broadly.

² Latour's "Terrestrial" builds on, but explicitly departs from, James Lovelock's Gaia hypothesis. Unlike Gaia, which risks being read as a single self-regulating organism, the Terrestrial is conceived as a contested, non-unified assemblage of competing agencies with no overarching homeostasis guaranteed (Latour, 2018)

Drawing from Latour's terrestrial thinking, we address the question: In what ways might engaging with architectural design in the wake of Latour's proposal might help us articulate notions of care that release it from the identitarian and often patronising temperament of 20th-century phenomenologists?

1.1 Research framework and method

We deploy Patricia MacCormack's *Ahuman Manifesto*, which advocates an "ahuman" ethics rooted in "radical compassion" that we observe as accommodative care, and demands the complete cessation of human privilege and anthropocentrism (MacCormack, 2020). This study examines the infrastructures of care by first identifying two inadequate frameworks: phenomenology's folkloric retreat (Bachelard, Norberg-Schulz, and Heidegger) and modernity's universal erasure (Le Corbusier, CIAM). We then turn to Latour's terrestrial orientation and the Critical Zone, and MacCormack's ahuman ethics, to develop a method for infrastructures of care as architectural practice, operationalised in our project *TetraGora*: a distributed robotic system assembling adaptive structures from waste materials.

1. Two Failures of Care:

1.1 Phenomenological care: The folkloric trap

Heidegger's ontological care lays the philosophical foundation for architectural care by highlighting that to build (*bauen*) originally means to dwell; to cherish, protect, preserve, and care for. He argues that dwelling is the fundamental manner in which human beings exist on earth (Heidegger, 1975).

Secondly, Bachelard's poetics of space and intimacy locates this ethical orientation at the intimate scale of domestic dwelling, centring the house as a "large cradle" that provides absolute security and protects human daydreaming; care here is a deeply practiced intimacy, where "housewifely care" polishes and awakens the home, linking it to the past (Bachelard, 1957).

Lastly, Schulz expands phenomenological care outwards through his concept of *genius loci*, the "spirit of place," within critical regionalism, arguing that true dwelling demands active attentiveness, where humans adjust and orient themselves to their surroundings, becoming "friends" with a location's specific materiality and atmospheric character (Schulz, 1979).

Yet phenomenological care harbors a "folkloric trap." By centring dwelling, intimacy, and *genius loci*, these frameworks retreat into identity-based nostalgia. "Becoming friends" with place implies an exclusionary belonging that privileges those who "fit" its spirit, just as Bachelard's intimate cradle presumes a stable domestic subject already at home. Heidegger's Black Forest farmhouse romanticises a pre-industrial, culturally homogenous local that patronises the inhabitant by assuming shared cultural memory and stable rootedness. This approach

cannot account for displacement, migration, or contested inhabitation. As Latour argues, the “Local” becomes folkloric when separated from the biological and geological processes that constitute place, treating atmosphere as an aesthetic spectacle (Latour, 2018).

1.2 Modernist Care: The Universal Erasure

Modernity erases care by imposing universal principles that treat buildings as self-sufficient machines. Le Corbusier’s *machine à habiter* (machine for living) exemplifies this logic: the house becomes a standardised product designed for efficiency and hygiene, detached from site-specific ecological or social processes (Corbusier, 1923). The CIAM’s Athens Charter extends this erasure to urban scales, advocating *tabula rasa* planning and the wholesale demolition of existing fabric to inscribe rational order onto supposedly blank terrain (CIAM, 1943).

This modernist universalism dismisses maintenance as menial labour beneath the architect’s concern; buildings are designed as finished products. It dismisses ecology by treating sites as abstract, neutral ground, ignoring local hydrology, soil microbiomes, and microclimates. It dismisses situated needs by assuming universal spatial standards (such as the *Modulor*) that are applicable regardless of culture, climate, or use patterns.

As Till argues, this delusion of permanence and seeing the buildings as static, perfect forms makes weathering, decay, and entropy appear as failures (Till, 2009).

1.3 From Maintenance to the Terrestrial: Limits of Anthropocentric Care

To move beyond both the paternalistic phenomenological dwelling and modernity’s universal erasure, we must restructure how we frame architectural care through the gritty and mundane realities of maintenance and the infrastructures of repair.



Figure 3: Schweitzer, Pius. (1922). Heidegger’s Hut from North West. [Photograph].Germany. <https://thinkingplace.org/heidegger/>

Infrastructural care is the backbone of continuous labour that keeps building systems alive. Although already a highly essential architectural practice, it remains structurally invisible³. Easterling's defines modern infrastructure as a hidden substrate, which is a spatial operating system governing the built environment. Because these systems are designed to function smoothly, they are "black-boxed" and designed to disappear from conscious awareness (Easterling, 2014).

Graham and Thrift's discuss how designated invisibility causes us to overlook the continuous labour of maintenance and repair that defends against constant decay. Together with Heidegger, they observe that we only notice infrastructure when it breaks down, when the responsible tool suddenly becomes an obstacle demanding attention. Although maintenance create the "engine room" of modern societies, architectural theory regularly overlooks this ongoing operational care as essential background work effectively erasing it from the realm of design (Heidegger, 1975; Graham et al., 2007).

To integrate infrastructural care into architecture, we must engage with Puig de la Bellacasa's concept of "matters of care." Borrowing from political scientist Joan Tronto, she defines care generically as "everything that we do to maintain, continue and repair 'our world' so that we can live in it as well as possible," stripping care of its domestic, patriarchal, romanticised gloss and redefining it as messy, ongoing labour that exposes "invisible labours and unruly contingencies" as a situated obligation (Puig de la Bellacasa, 2017). Mattern makes a parallel argument through what she terms "infrastructural inversion": everyday repair practices actively draw attention to the techno-social systems underlying our environment, exposing the hidden maintenance work fundamental to their upkeep and grounding it as a material, architectural concern (Mattern, 2024).

Till, drawing on the work of Mostafavi and Leatherbarrow, grounds this understanding in the messy, physical reality of time and the constant need for care. He argues that weathering and physical decline constitute continuous forms of completion. From this perspective, architectural care is implemented through continuous maintenance, repair, and the acceptance of the "unfinished." This approach redirects the ethical emphasis towards the routine collaborative labour necessary to sustain, adapt, and perpetually complete an inhabited space (Till, 2009).

Both the phenomenological tradition and infrastructural maintenance reveal a notable limitation: they uphold a predominantly human-centered perspective as the principal mechanism and beneficiary of architectural care, retreating into the "Local" and its nostalgic, "folkloric" connections to place in their attempts to counteract the abstract and isolating effects of globalisation (Latour, 2018). Neither approach sufficiently addresses the care required by terrestrial, biological, and atmospheric processes, which range from microbial metabolic activities to global atmospheric systems and function as active co-agents within the habitats

³ The concept of "invisible work" is developed most fully in Susan Leigh Star's foundational studies of infrastructure, which argue that infrastructure only becomes visible upon breakdown (Star, 1999)

we inhabit, extending beyond the human (Likavčan, 2019). Addressing this limitation calls for an emergent terrestrial and ahuman reorientation: by embracing an ahuman activism that dismantles anthropocentric privilege, architecture must redefine care as a terrestrial, situated, and interdependent responsiveness to the fragile and reactive realities of the Earth's Critical Zone.

2. Latour's Terrestrial: A New Ground for Care:

2.1 Beyond local–global: The Critical Zone

Latour dismantles the traditional political geometry that has long defined modernisation: the pathway leading away from the "Local" (associated with archaic tradition and borders) towards the "Global" (the horizon of top-down universal progress, modernisation, and abstract space). According to Latour, this framework has collapsed; the local has become an impossible, nostalgic retreat, while the global has revealed itself as an ungrounded illusion disconnected from planetary limits. Latour proposes the "Terrestrial" as a new political attractor that is not anthropocentric. The Terrestrial is an active, reactive ground where human and nonhuman forces are densely entangled (Latour, 2018).

To comprehend what the Terrestrial means scientifically and spatially, we must examine the "Critical Zone." According to Mahony, it is the "heterogeneous, near-surface environment in which complex interactions involving rock, soil, water, air, and living organisms regulate the natural habitat and determine the availability of life-sustaining resources." It is the thin, fragile "biofilm" or "skin" of the Earth, extending from the top of the vegetative canopy down to the active groundwater and bedrock. The Critical Zone paradigm advocates a localised, interdisciplinary approach to understand the biogeochemical interactions that sustain life (Mahony, 2022; Latour, 2018).

This reorientation is significant for architecture because it fundamentally challenges the discipline's reliance on abstract, Cartesian space. Historically, modern architecture conceptualised space as an empty, neutral container. Architecture became a mathematically measurable extension that can be freely divided, contained, and mastered. However, from a terrestrial perspective, space is an "agitated history in which we are participants among others" (Till, 2009). Given that the Earth is reacting to human activities, each architectural act constitutes a direct intervention in the Critical Zone. Architecture must be acknowledged as intricately involved in the thermodynamic, biological, and geological metabolisms of this thin layer. Designing for terrestrial conditions necessitates relinquishing the illusion of architectural independence and acknowledging that structures function as active nodes within the fragile, life-sustaining network of the Critical Zone (Frank et al., 2022; Till, 2009; Latour, 2018; Herrmann-Pillath, 2023).

2.1.1 Phenomenology's failure: The folkloric retreat

As established in 1.1, phenomenology's dependence on *genius loci* retreats into folkloric attachment. Heidegger's 'fourfold' treats Earth as a passive 'serving bearer,' reducing biogeochemical process to atmosphere or aura that is blind to the Critical Zone's metabolic entanglements.

2.1.2 Modernity's Failure: The Universal Imposition

As established in 1.2, modernity's universal abstraction treats earth as inert substrate. Bratton's account of planetary-scale computational governance such as data centres, smart grids, 'Planetary Skin' extends this to a totalising fantasy the Critical Zone's local, contingent biology resists.

2.1.3 The Terrestrial alternative: Fragile, contested, biological

The Critical Zone is a thin layer upon which all terrestrial life depends. This fragility demands careful attention. Architecture must acknowledge its entanglement with vulnerable, metabolic processes.

Second, contested ground: The Terrestrial is conflictual. Human activities, such as urbanisation, extraction, and pollution, directly disrupt the biogeochemical cycles that sustain life. Architecture within the Terrestrial must navigate this conflict, recognising that every intervention redistributes resources, alters microclimates, and affects more-than-human inhabitants.

Third, biological activity: Terrestrial is metabolically alive. Soil microbiomes, hydrological flows, atmospheric exchanges, and these are active co-agents shaping habitats. Architecture must engage these biological processes as collaborators.

2.2 Architecture as terrestrial mediation

Architecture must be reconceptualised as an active negotiation among diverse agencies: human inhabitants, nonhuman organisms, material flows and atmospheric conditions (Garcia, 2024). This dynamic is framed by Carsten Herrmann-Pillath's concept of "more-than-human co-evolutionary technology," in which the built environment serves as a shared infrastructure, offering spatial affordances for multispecies niches. Buildings and urban spaces operate as nature-culture hybrids that invite spontaneous cohabitation, allowing plants, animals, and microbial life to adapt, participate, and reshape human-made artefacts (Herrmann-Pillath, 2023).

In practice, taking the terrestrial seriously in urban contexts means recognising that architecture directly interacts within the Critical Zone. This involves designing local microclimates, water cycles, and soil microbiomes. For example, "sponge city" models and restored wetlands actively manage stormwater flows while mitigating urban heat⁴. Terrestrially oriented design

⁴ "Sponge city" is a Chinese national policy initiative launched by the Ministry of Housing and Urban-Rural Development in 2013, promoting permeable surfaces, wetlands, and green infrastructure to absorb stormwater. For an empirical performance assessment, see (Wang et. al.,2022).

also requires cultivating the “living soil” food web, complex, interdependent networks of bacteria, fungi, and invertebrates that cycle nutrients and allow spontaneous vegetation and micro-biodiversity to flourish in the urban fabric (Herrmann-Pillath, 2023; Puig de la Bellacasa, 2017).

Ultimately, this terrestrial perspective shifts the discipline to cultivating adaptive architectural ecosystems where mutual flourishing and planetary interdependence are continuously negotiated.

2.3 What does it mean to care architecturally within the Terrestrial?

In addressing terrestrial conditions, architectural practice must be attuned to various interconnected influences. The conventional anthropocentric framework is characterised by the “arrogant eye,” a dominant viewpoint that reduces all life to a readable index for human benefit, thereby sustaining the exceptionalism responsible for the current ecological crisis. Engaging with the reactive Critical Zone necessitates what Michel Serres and Patricia MacCormack describe as an epistemology of “grace”: a conscious, cultivated act of “stepping aside.” This “active passivity” involves a heightened attentiveness to the multifaceted complexity of biogea, enabling nonhuman organisms and geological forces to express themselves autonomously (MacCormack, 2020; Latour, 2018).

Spatially, this ahuman ethic requires intervention that preserves ecological resources by shifting design to tactical, non-intrusive mediation. It aligns with transpecies design and the conceptualisation of the built environment as “more-than-human co-evolutionary technology,” where architecture functions as a porous, adaptive scaffold for multispecies flourishing. This approach operationalises “unconditional hospitality”: infrastructure that sustains itself through localised waste flows. By utilising these flows, embedding responsive biological systems, and embracing physical decline as collaborative engagement with entropy, architecture becomes an ongoing practice of ecological maintenance that sustains the terrestrial web (Till, 2009; Zaretsky, 2025).

2.4 State of art: Who else is studying the theory of care today?

Having established maintenance as care infrastructure and Latour’s terrestrial orientation, we survey how contemporary care scholarship extends beyond anthropocentric maintenance towards more-than-human and ecological concerns, which sets the stage for MacCormack’s radical dissolution of the human caregiver in Chapter 3.

Puig de la Bellacasa’s broader work expands the notion of care beyond human infrastructure to include multispecies ecologies and geological timescales. Puig de la Bellacasa posits that soil requires care as a living assemblage comprising microbes, fungi, invertebrates, and decomposing matter. She formulated the concept of “thinking-with care” as a mode of attention that regards nonhuman entities as co-participants in shared ecologies. Importantly,

her framework of “speculative ethics” recognizes that we cannot fully ascertain the needs of nonhuman beings; nevertheless, this epistemic humility does not exempt us from our responsibilities. Consequently, care becomes a practice of attentive uncertainty that engages with soil microbiomes, atmospheric processes, and more-than-human temporalities, while acknowledging the limits of human mastery. This situates care firmly within the terrestrial realm: fragile, contested, and irreducibly biological (Puig de la Bellacasa, 2017).

Mattern’s work on “infrastructural inversion” (discussed in 1.3) extends to environmental sensing and biodata infrastructure. Her recent work examines how repair practices increasingly engage with ecological monitoring, including tracking air quality, water contamination, and microbial populations as part of urban maintenance regimes. This shifts infrastructure care from purely techno-social systems (pipes, grids) to hybrid techno-ecological assemblages, where human and nonhuman metabolisms are mutually implicated (Mattern, 2024).

Similarly, Till’s assertion that “all architecture is waste in transit”(1.3) positions care as collaborative engagement with entropy and decline. His concept of architecture’s contingency aligns with the Terrestrial condition: structures remain entangled with fragile, reactive ecologies (Till, 2009).

Stengers’ cosmopolitics introduces care for nonhuman knowledge practices, arguing that scientific and ecological knowledge must remain open to what exceeds human comprehension (Stengers, 2010). Her work bridges care scholarship with post-anthropocentric philosophy by insisting that humans participate in ecological futures alongside other beings.

Yet all these scholars retain the human as care agent and challenge anthropocentrism while maintaining it. MacCormack’s manifesto diverges by demanding the dissolution of the sovereign human caregiver. MacCormack radicalises care beyond even multispecies frameworks, asking what it means to care when humans step aside entirely.

3. MacCormack’s Activism:

3.1 Reading MacCormack: Radical compassion and the ahuman

Patricia MacCormack’s *The Ahuman Manifesto* demands the abolition of anthropocentrism through the intersections of abolitionist veganism, death activism, and care politics. MacCormack’s ahuman approach diverges from conventional posthumanism, which frequently reinforces human exceptionalism by utilising nonhuman creatures for technological or philosophical advancement⁵. Posthumanism often retains the human subject as the privileged site of transformation, whereas the ahuman requires an ethics of “radical compassion” that prioritises the flourishing of the larger ecological system over human privilege and power

⁵ This characterisation applies more accurately to transhumanist strands of posthumanism than to critical posthumanism as developed by (Rosi Braidotti, 2013), who similarly seeks to decentre the human subject. MacCormack’s ahumanism should therefore be read as a more radical extension of, rather than simple opposition to, critical posthumanist thought.

(MacCormack, 2020).

Radical compassion functions as an unconditional and asymmetrical duty towards others. MacCormack characterizes this as a form of care that rejects equivalence, recognition, and reciprocity. Conventional ethical frameworks assess others by comparing their capacities to human standards, such as sentience, utility, and aesthetic value. Liberal welfarism offers protection to nonhumans only when they exhibit sufficient similarity to humans. Radical compassion completely dismantles this anthropocentric model. This demands the complete cessation of the use, extraction, and evaluation of nonhuman entities, acknowledging that forcing them into human frameworks of communication and value constitutes both epistemic hubris and material violence (MacCormack, 2020).

Central to MacCormack's framework is the concept of "grace," which Michel Serres describes as "stepping aside and making room."⁶ Grace operates as a kinetic performance: "Not to touch the ground with one's force, not to leave any trace of one's weight, to leave no mark, to leave nothing, to yield" (Serres, 1997:47). This withdrawal does not mean abandonment. Grace requires a highly calculated, active spatial gesture. In architectural terms, grace means deliberately suspending the Cartesian urge to zone, master, and containerise space. The designer cultivates a disciplined attentiveness that creates openings for more-than-human forces (hydrological cycles, soil microbiomes, spontaneous vegetation) to express their own potentia free from rigid anthropocentric enclosures. MacCormack's concept of "letting be" functions as active attentiveness. Deliberate spatial and conceptual thresholds are established to allow nonhuman entities to manifest their distinct differences without being coerced into human-centric values or utilities. This approach must be clearly differentiated from passive non-interventionism, which resembles *laissez-faire* abandonment, where designers relinquish spatial responsibility.

Contemporary automated design processes in artificial intelligence illustrate this relinquishment, as human agency becomes obsolete and machines assume the role of designers without ethical accountability⁷. Active "letting be" necessitates continuous, focused attentiveness. Architects intentionally create spatial thresholds that enable more-than-human forces to express their non-hierarchical potential. This approach constitutes an activist, tactical performance. MacCormack sharply distinguishes this approach from liberal ethical frameworks. Liberal models attempt to protect nonhumans by extending human-defined negative rights or evaluating them for equality based on sentience. In doing so, liberal ethics subjects the other to human parameters, requiring them to be recognised, measured, and assimilated into dominant judiciary logic.

⁶ Serres develops the concept of grace across several works; (Connor, 2024) broader philosophy of the "parasite" and communicational exchange, in which withdrawal is itself a form of relation rather than absence (Serres, 1982).

⁷ See (Tsao et. al., 2026) for aritical study of generative AI in architectural design workflows.



Figure 4: Grandin, Temple. (1976). Designed to naturally move cattle or other livestock without inducing stress or panic. Today, over half of the cattle in North America are handled using facilities that incorporate her systems.

In contrast, the ahuman spatial approach entirely rejects the notion of animal use. Architecturally, this is realised through wildlife-exclusive sanctuaries that physically restrict human access or through the intentional abandonment of infrastructure, transforming human-made enclosures into autonomous, unconditioned environments where nonhumans organise their territories. Similarly, sustainable green stewardship involves managing and regulating urban ecology to ensure environmental stability for future human generations, whereas human deceleration emphasises the creation of slow, winding-down frameworks. The architect facilitates a seamless material transition, detailing how structural remnants, such as ruined concrete and derelict foundations, can safely degrade and support biogeography without catering to human aesthetic or recreational purposes.

MacCormack's ahuman "letting be" diverges from Heidegger's phenomenological concept of "sparing". Heidegger's sparing is an ontological gathering of the "fourfold" (earth, sky, divinities, and mortals) that secures a foothold for the human subject (Dasein). As discussed in Chapter 1.1, this tradition often collapses into nostalgic retreat, romanticising vernaculars to shield against globalisation. Heidegger's sparing frames the earth as a "serving bearer" that mortals must save and preserve, a power in which the human acts as "shepherd" managing the environment. The nonhuman is preserved for the human and evaluated through utility.

MacCormack's abolitionism shatters this framework. Ahumanism demands cessation of the use of all nonhuman entities and refuses metrics of equivalence. Sparing remains bilateral, preserving the observer at its centre. MacCormack's letting be is asymmetrical and asubjective, seeking dehumanisation and the twilight of human dominance. Architectural care performs environmental maintenance (stabilising substrates, scaffolding metabolic flows) without demanding reciprocal human benefit or pleasure from the ecosystems it hosts (MacCormack, 2020).

Adaptive architecture has reproduced the anthropocentric paternalism that MacCormack

critiques. Smart city paradigms and building management systems rely on control, surveillance, and optimisation that treat human and nonhuman behaviours as data to be managed (Bratton, 2015; Garcia, 2024). MacCormack's framework offers distributed, non-coercive systems and principles: accommodative care and polyvocal care.

3.2 Accommodative care

Accommodative care establishes spatial conditions that invite others without dictating their occupation, behaviour, or significance within the space. In contrast to traditional architectural practices, which impose programs, zones, and behavioural scripts, accommodative care intentionally refrains from enforcing anthropocentric closure. The designer creates thresholds, scaffolds, and affordances that are open to appropriation by non-human entities, which operate according to their own metabolic logics. This principle operates through what MacCormack terms "letting be" as architectural practice. The architect deliberately suspends the Cartesian urge to zone, master, and containerise space. Accommodative care attends and listens; it hosts and gives; it operates with care. The designer curates spatial thresholds where hydrological cycles, soil microbiomes, and spontaneous vegetation can express their potential, free from rigid enclosures. This represents intentional design because it resists the compulsion to foreclose spatial possibilities through fixed programs or permanent forms. Concrete spatial examples distinguish accommodative care from liberal reform. Liberal spatial approaches attempt to improve conditions within exploitative frameworks. Temple Grandin's infrastructure to reduce animal stress, yet preserve the fundamental premise of animal use. SKROZ Architects' "Chickenville" and "Eco Pig Farm" similarly offer enriched environments for livestock destined for slaughter. These projects render exploitation more palatable through spatial mitigation; however, the animal remains a consumable human resource.

A productive theoretical tension exists between Puig de la Bellacasa's and MacCormack's conceptualisations of care. Puig de la Bellacasa grounds care in the messy, material reality of everyday life, defining it as "everything that we do to maintain, continue, and repair 'our world' so that we can live in it as well as possible" (Puig de la Bellacasa, 2017). For her, care requires ongoing physical maintenance, affective engagement, and ethical implication. Care manifests as situated, laborious doing. Conversely, MacCormack envisions care as radical withdrawal from intervention. Drawing on Michel Serres, she defines ethical action as grace: the deliberate decision "to yield, to step aside" and leave no trace of human weight. For MacCormack, care operates as active passivity, a "leaving be" that dismantles human privilege so that the nonhuman can flourish on its own terms. One framework demands rigorous, embodied intervention, while the other demands the cessation of human mastery. These philosophies can be held together as complementary forces when operationalised at the architectural scale. Accommodative care recognises that certain forms of maintenance labour establish the infrastructural scaffold required for letting be. Composting systems, water



Figure 5: SKROZ. (2031). Eco Pig Farm. Croatia.

filtration through constructed wetlands, and soil remediation represent ongoing physical work. Yet, this work systematically refuses to centralise authority, impose static master plans, or police the inhabitation of the environment. By removing the human architect's "arrogant eye" and relinquishing top-down control, the system steps aside even while it maintains. It builds infrastructural conditions that host multispecies flourishing without demanding reciprocal human benefit (MacCormack, 2020).

Accommodative care is expressed architecturally through various techniques. Open thresholds involve spatial interfaces designed for appropriation by both human and nonhuman users. These include apertures, perches, cavities, and canopies that invite occupation without dictating specific behaviours. Non-prescriptive design allows architecture to offer material possibilities that inhabitants can utilise according to their needs and abilities. Material degradation is embraced as a form of hospitality, accepting weathering, colonisation by vegetation, and physical decline as expressions of ecological generosity. The structure gradually dissolves, returning nutrients to soil systems and providing substrates for microbial and fungal colonisation. Minimal, distributed intervention involves maintenance labour that functions as background scaffolding, with small, tactical adjustments preserving spatial openness. Accommodative care necessitates an architectural approach that resists the discipline's inclination toward permanence, mastery, and anthropocentric utility. This approach requires design practice to embrace vulnerability, incompleteness, and the ongoing renegotiation of spatial occupation by more-than-human assemblages.

3.3 Polyvocal care

Polyvocal care distributes agency across multiple actors without centralising authority in a singular decision-making node. Where accommodative care operates through hosting and threshold-making, polyvocal care concerns the organizational logic of architectural systems

themselves. Polyvocal care refuses the architect-as-master paradigm, cultivating distributed intelligence where multiple voices (human and nonhuman, biological and computational) negotiate spatial outcomes through peer-to-peer bottom-up coordination. MacCormack's ethics of affect redefines care through receptivity. True care is attentiveness that hosts and responds to the other (MacCormack, 2020).

In architecture, this shifts design from mastery to yielding, producing structures "moved by" their environment. Adaptive architectures, encompassing embedded sensory systems, living materials, and distributed computational ecologies, exemplify receptivity by continuously monitoring, adjusting, and reconfiguring in response to the metabolic flows of surrounding biota. These structures serve as frameworks that channel environmental intelligence. Kopitz conceptualises this dynamic as "affective architecture," wherein the built environment becomes a receptive site for engaging with care. Kopitz posits that buildings function as both material and ideological entities that influence the movement of other organisms while remaining open to transformation through these interactions.

By embracing vulnerability and receptivity, architecture evolves into a multisensory dialogue where care is embedded within the structural capacity to listen, adapt, and allow change (Kopitz, 2022). Polyvocal care is manifested through distributed decision-making systems, where multiple agents operate with local autonomy and negotiate collective outcomes via proximity, feedback, and emergent coordination. Swarm robotics exemplifies this logic: individual units adhere to simple local rules (such as avoiding collisions, maintaining formation, and seeking materials), yet their collective behaviour results in complex spatial assemblies without centralised planning⁸. No master robot dictates the structure; architecture emerges from distributed negotiation.

This organizational model addresses the theoretical tension between Bruno Latour's "Terrestrial" and Patricia MacCormack's "ahuman" subject. Latour's Terrestrial condition defines a contested political arena within the Earth's Critical Zone, demanding active participation and geo-social struggle over fragile habitats (Latour, 2018). Conversely, MacCormack's ahuman abolitionism seeks the dissolution of the human subject who fights. Ethical action operates through grace, demanding that humans "step aside" and practice radical "letting be" that removes human mastery. Polyvocal care mediates this tension: distributed systems enact terrestrial care while decentring human privilege, functioning without centralising authority. Thus, architecture participates in care ahumanly.

Polyvocal care is architecturally expressed through several organizational principles:

Peer-to-peer coordination involves agents: robotic, biological, computational, and engaging in direct interaction to negotiate spatial adjustments. Each node maintains local autonomy, and collective behaviour emerges from distributed negotiation.

⁸ This logic follows system developed at Harvard's Wyss Institute, termite-inspired robots build complex structures through local rules alone (Nagpal, et. al. 2014)

Emergent assembly refers to the final spatial configurations that arise from collective behaviour and cannot be predicted solely from individual agent rules. The architect sets the initial parameters and constraints but relinquishes control over specific outcomes. Consequently, the form becomes genuinely adaptive, responding to contingent site conditions through a distributed intelligence.

Multiple feedback loops are established as sensory systems monitor biological, climatic, and metabolic flows and transmit data laterally across the network. Adjustments occur locally and propagate throughout the system, resulting in polycentric structures.

Non-coercive scaffolding provides structural support and material organization without dictating how humans and nonhumans occupy the resulting spaces. The system assembles and maintains these spaces but does not enforce behavioural scripts.

Polyvocal care challenges architecture's disciplinary investment in singular authorship and masterful control of the design process. This demands that designers cultivate systems capable of autonomous negotiation, embracing the messiness, unpredictability, and genuine agency of distributed assemblages. This represents a profound epistemological shift from architecture as the imposition of human will upon passive matter to architecture as the cultivation of responsive, multiagent ecologies, where the designer operates as one participant among many.

3.4 Conclusion: MacCormack's Challenge to Architecture

MacCormack's ahuman framework poses a fundamental challenge to architectural practice: can a discipline predicated on intentional spatial intervention ever truly "let be"? Architecture requires design decisions, material assembly, and imposition of structures on sites. Even the most minimal intervention remains an act of human will that shapes spatial conditions. This creates an unresolved paradox at the heart of any attempt to translate MacCormack's absolute abolitionism into built form.

MacCormack's manifesto includes radical demands that architecture cannot fully embrace: the call for voluntary human extinction through the cessation of reproduction, complete withdrawal of human presence from terrestrial ecosystems, and the literal twilight of anthropocentric civilisation. Architecture, as a practice of creating spaces for human and nonhuman inhabitation, cannot operationalise these absolute abolitionist positions without negating its own existence. Architectural design constitutes an intentional, structured intervention in the material world, making a pure state of "letting be" an ongoing, unresolved paradox within any discipline predicated on manipulating and assembling space (MacCormack, 2020)

However, this tension is productive. Architecture can adopt what might be termed tactical abolitionism: the systematic dismantling of extractive, exploitative, and coercive spatial practices without immediately ceasing human spatial occupation. Tactical abolitionism operates through concrete refusals (animal products in material supply chains, site remediation techniques that extirpate spontaneous vegetation, and centralised control systems) while acknowledging that the designer remains implicated in networks of harm. The goal is to minimise violence and

maximise openness to nonhuman agency, even while recognising that absolute innocence remains impossible.

MacCormack's framework demands that architecture cultivates profound epistemic humility. Designers cannot know what nonhuman entities need; they cannot translate their modes of communication or evaluate their flourishing through anthropocentric metrics. This epistemic opacity does not absolve us of our responsibility. Accommodative and polyvocal care operates as a practice of attentive uncertainty, engaging with soil microbiomes, atmospheric processes, and more-than-human temporalities, without claiming mastery. Architecture is a form of situated care labour that continuously rebuilds infrastructural conditions for multispecies flourishing, while systematically refusing to impose anthropocentric closure.

The tension between MacCormack's abolitionism and her architectural practice remains unresolved. Design requires intervention; MacCormack demands a withdrawal. While architecture serves human needs, MacCormack seeks dehumanisation. Structures impose order; MacCormack celebrates messiness and decline in her work. These contradictions cannot be theoretically resolved; however, they can be materially negotiated through specific projects that test how far architecture can move toward a human ethics without negating its own possibility.

4. TetraGora: Infrastructures of Care as an Architectural Practice:

TetraGora tests whether MacCormack's accommodative and polyvocal care can materialise through computational and robotic means. Chapter 3 established the theoretical paradox: architecture requires intentional intervention, yet MacCormack demands withdrawal. The project operationalises this through distributed robotic ecologies that assemble adaptive structures from waste materials on irregular urban sites, creating spatial conditions that host and can reconfigure.

4.1 Project overview: Housing crisis, irregular sites, robotic ecologies

TetraGora is tackling the global housing affordability crisis by focusing on a unique type of space: odd urban spots that are not suitable for regular development. We are referring to leftover areas that developers usually avoid. In cities like Athens and London, which are part of our research, there are thousands of these vacant sites. They often do not meet the minimum lot size, lack road access, or have challenging terrain that makes building too expensive to be profitable.

Traditional solutions to housing shortages usually involve making spaces denser, such as co-living setups that pack in as many people as possible per square meter, or prefabricated modules that standardise spaces and remove the need for site-specific adjustment. These methods tend to increase human control, whether through squeezing profit from efficient space use or through strict management systems that enforce rules and maintain the original design

indefinitely.

TetraGora, however, sees these irregular sites as opportunities for something different: temporary, community-based living spaces that can accommodate multiple species.

The system integrates three components: a generative algorithm, a quadruped robotic swarm, and modular oyster-shell concrete blocks. The generative algorithm operates through large language model interaction, translating natural language user requests (“I need two bedrooms and a kitchen”) into spatial configurations adapted to site constraints. The algorithm generates multiple layout options, hosting user agency by offering possibilities that users complete through selection and post-occupancy modification. This computational hospitality operationalises accommodative care because the system responds without dictating. The robotic swarm comprises low-power quadruped units capable of navigating irregular terrain. Each robot operates with local autonomy, making pathfinding and assembly decisions through peer-to-peer coordination. The swarm exhibits weak emergence: collective behaviours (queueing at supply zones, collision avoidance, and load distribution) arise from simple local rules. This distributed intelligence operationalizes polyvocal care: no master

The robot directs the assembly, and spatial outcomes result from negotiated collective action.

The material system uses oyster-shell concrete cast into hollow modular blocks. The seafood industry discards over 7 million tonnes of mollusc shells annually as unwanted waste (Popović 2023). With the potential to substitute a large portion of cement. Oyster concrete has up to 50% less environmental impact than regular concrete⁹. Oyster shells, sourced as waste from fishmongers and restaurants, replace conventional aggregates, reducing embodied carbon by approximately 50% compared to standard concrete, while offering structural compressive strength suitable for low-rise assemblies. The blocks with internal cavities to be lightweight. These cavities function as infrastructure, serving as thermal buffers, acoustic dampeners, and refuges for multiple species, including insects, and nesting birds. The modular design allows for post-occupancy reconfiguration, thereby extending hospitality beyond the initial assembly into ongoing habitation.

Robot development advanced through iterative prototyping: early biped designs proved inadequate for off-grid terrain, prompting a transition to a quadruped morphology for stability on irregular surfaces¹⁰. Movement repertoires developed from basic crawling to optimised trotting (diagonal leg pairs) with minimal lateral sway.

Site selection criteria prioritise affordability considerations over conventional development metrics. The project targets already damaged or underutilised sites (contaminated soil,

⁹ The Substitution Effect of the Fine Aggregate in Concrete with Oyster Shell (Chudhury et. al., 2024).

¹⁰ Successive prototypes increased degrees of freedom per leg and introduced magnetic pads and a flexible spine, allowing solid contact with block geometries and an expanded reach radius; the final point-symmetric body geometry eliminates the need for turning, as the forward direction reverses through control orientation alone.



Figure 6-7: TetraGora, material trials

compacted earth, invasive vegetation), accepting Tsing's premise that care operates in ruined ecologies (Tsing 2015).

TetraGora occupies a temporal middle ground. This intentional impermanence refuses architecture's permanence delusion (Till 2009). Conventional architecture claims eternal relevance, whereas TetraGora embraces planned obsolescence as an ethical position. When blocks separate, vegetation infiltrates, and structures return to the substrate, this represents design intent. Material returns to the earth, sites are restored toward ecological complexity, and the refusal of property as an eternal claim operationalises MacCormack's grace: the willingness to let go.

4.2 Spatial outcomes

TetraGora structures manifest as porous, incomplete assemblies that resist architectural categorisation. They neither replicate traditional housing typologies nor conform to contemporary prefabricated aesthetics. Spatial organisation emerges from voxel-based logic, where blocks cluster into room-scale volumes without fixed programs. Interior boundaries remain ambiguous and are defined by degree of permability. Dry-stack assembly creates intentional gaps between blocks, producing coffered surfaces with alternating solids and voids. These gaps perform multiple functions, including cross-ventilation, visual porosity, acoustic baffling, and multispecies habitat.

A typical single-room configuration measures approximately 4x4 meters in plan, with a 3-m

ceiling height, requiring 120–150 blocks depending on the opening placement. The generative algorithm proposes wall aperture locations based on solar orientation; however, users modify these suggestions based on their lived experience. The inhabitants insert wooden panels, or leave openings uncovered depending on seasonal conditions and personal preference.

This spatial experience demonstrates MacCormack's letting be in architecture. The structure provides an enclosure without prescription. Inhabitants (human and nonhuman) occupy space.

Spatial reconfigurability operates across temporal scales. During initial assembly, users modify algorithmic proposals through feedback: "Move the bedroom north; add a window here; make the kitchen larger." Post-occupancy, inhabitants physically rearrange blocks, creating furniture (benches, shelves, and room dividers) from structural elements. This malleability extends to non-human agents: weather erodes mortar-free joints, encouraging settlement and creating new gaps; animals repurpose cavities, establishing territorial claims unrelated to human intentions. The structure's capacity to be changed by forces that designers did not anticipate operationalises letting be through systemic vulnerability.

The relationship between the interior and exterior remains perpetually ambiguous. Partial walls suggest room boundaries without enforcing them to be permanent. Roofs provide overhead cover but leak during heavy rain. This incompleteness resists the traditional promise of total environmental control in architecture. Inhabitants adapt through portable modifications (tarpaulins, textiles, and movable panels). The building accommodates weathering through collaboration.

Collectively, multiple TetraGora structures on a single site produce village-scale spatial complexity. Irregular placement (determined by robot pathfinding and site topography) creates in-between zones: informal courtyards, shaded passages, and shared outdoor rooms. These

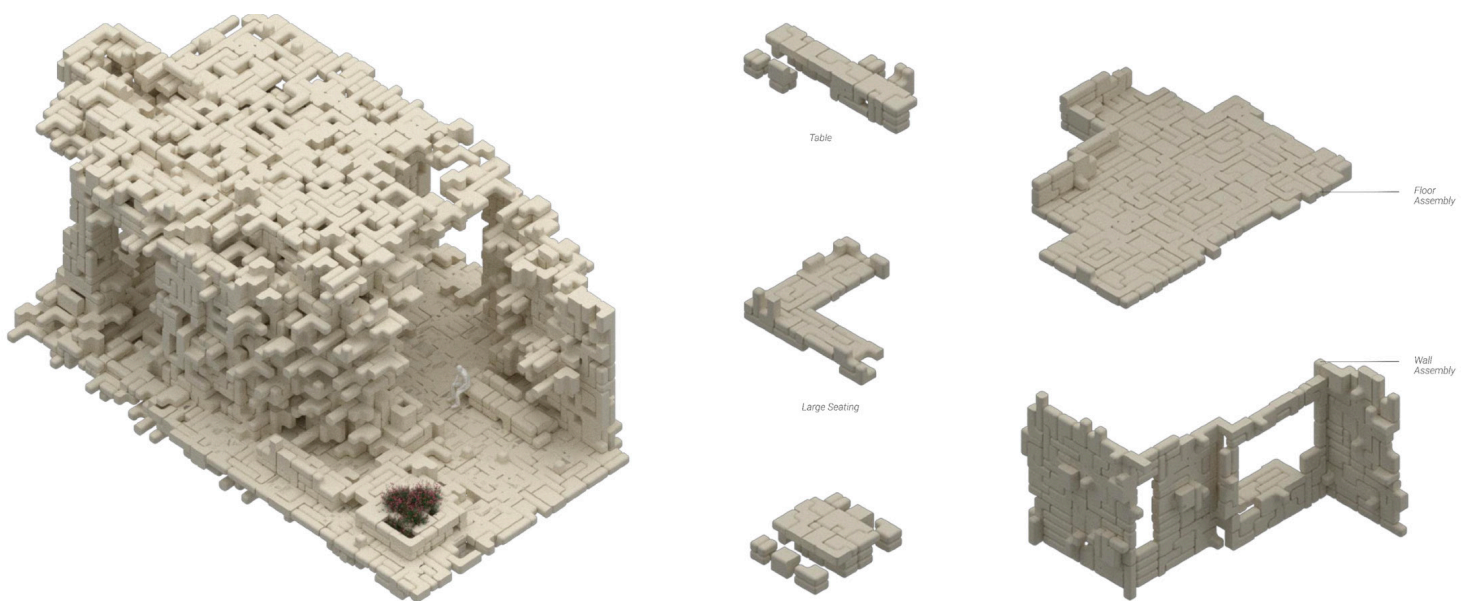


Figure 8: Spatial outcomes

residual spaces operate as commons where property boundaries dissolve. Children play, neighbours gather, and animals transit. No single owner controls these thresholds because the architecture refuses to demarcate clear possession.

4.3 Evaluation: MacCormack alignment, and limitations

This section assesses TetraGora using MacCormack's framework, examining both its successes and shortcomings across four dimensions: accommodative care, polyvocal care, ecological performance, and unresolved contradictions. While the project cannot completely achieve ahuman ethics, it identifies specific mechanisms through which care functions computationally, robotically, and spatially.

4.3.1 Accommodative care in TetraGora

Accommodative care primarily manifests through computational flexibility. The generative algorithm hosts user agency by generating possibilities and operationalising MacCormack's accommodative care as algorithmic hospitality.

The LLM-based system converts natural language requests into spatial configurations that are tailored to site constraints. When a user specifies a need for "two bedrooms", the algorithm produces three to five layout variations, each illustrating different room placements, orientations, and aperture locations. Users then select their preferred options and refine them using iterative feedback. This process counters architectural paternalism, as designers program constraints such as structural stability, material availability, and buildable area boundaries.

In the Athens site simulations, when users requested bedroom additions, the system proposed northern placement (cooler summer temperatures, and courtyard-adjacent placement (privacy + ventilation). Users completed the design through selection, exercising agency within computationally hosted possibilities. This differs from conventional architectural practice, where the designer presents a single "best" solution, forcing users into acceptance or rejection without collaborative iteration.

Algorithmic accommodation extends to site irregularity. The system parses complex geometries (non-orthogonal boundaries, slope variations, and existing structures) and adapts layouts accordingly. Where conventional architecture demands site regularisation (grading, excavation, and demolition), TetraGora's algorithm treats constraints as creative parameters. Irregular boundaries produce irregular rooms; sloped terrain generates stepped sections; existing vegetation remains uncleared and incorporated as courtyard features. This computational flexibility operationalises grace: the algorithm yields to site conditions.

Quadruped robots can adapt to material availability, site obstacles, and assembly disruptions. If a specified block is unavailable in the supply zone, the robots select alternative pieces with similar dimensional properties. Pathfinding algorithms adjust routes when they encounter obstacles (existing structures, terrain features, and human activity). Assembly

continues despite disruptions, such as missing pieces, material inconsistencies, or human interference, which trigger replanning.

Robotic accommodation also manifests as a graceful failure. When robots encounter insurmountable obstacles (shallow bedrock preventing placement or excessively heavy blocks beyond the load capacity). Conventional construction overrides resistance using force (excavating deeper and deploying heavier machinery). TetraGora robots stop. This cessation, whether strategic or pragmatic, operationalises Serres's grace: stepping aside when conditions resist intervention. The site remains unbothered; incomplete assembly is evidence of a respectful withdrawal.

Modular geometry allows post-occupancy reconfiguration. Inhabitants disassemble and rearrange blocks without specialised tools, adapting spatial layouts to their changing needs. This material flexibility extends accommodative care beyond the initial assembly to ongoing habitation.

The waste material selection (oyster shells, timber offcuts) reflects local availability. The system accommodates whatever materials the site context provides, refusing the extractive logic that demands specific products be transported globally. This pragmatic circularity operationalises care as situated responsiveness: using what is at hand.

4.3.2 Polyvocal care in TetraGora

Polyvocal care emerges from distributed intelligence across human, computational, and robotic actors, and spatial outcomes result from negotiated collective actions.

Each quadruped operates with local autonomy, making pathfinding and assembly decisions through peer-to-peer coordination. The swarm does not have a master agent. Collision avoidance occurs through proximity sensing, and load distribution emerges from availability heuristics (robots select tasks based on the distance to the supply zone and their current workload). This distributed logic operationalises MacCormack's polyvocality as computational democracy: multiple agents contribute voices without hierarchical domination.

For example, Athens site simulations with four robots demonstrated emergent self-organisation¹¹. In the supply zone, robots developed spontaneous queueing (yielding, waiting, and replanning) without pre-scripted turn-taking protocols. When one robot stalled (motor overheating), the others redistributed their remaining tasks without central reassignment. This collective behaviour exhibited weak emergence: outcomes arose from local rules but remained within programmed parameters¹².

The distinction between weak and strong emergence is thus significant. Strong emergence involves radical unpredictability, with behaviours entirely unforeseen by the designers. TetraGora

¹¹ This refers to an original simulation we conducted in Unity.

¹² The distinction between weak and strong emergence originates in philosophy of mind and complexity theory; see Bedau (2008) for the foundational articulation of "weak emergence" as emergence that is unpredictable in practice but reducible in principle to underlying rules.

exemplifies weak emergence, where unexpected solutions arise within the anticipated range. However, post-assembly temporality introduces conditions for a stronger emergence. Users modify structures, weather erodes the joints, and animals establish territories around it. These post-design reconfigurations occur without robotic correction or human oversight, resulting in genuine polyvocality, wherein multiple agents (computational, robotic, human, nonhuman, and climatic) continuously renegotiate spatial outcomes.

Optineering as Distributed Problem-Solving: The optimisation system evaluates competing metrics simultaneously, such as packing density, structural stability, reconfigurability, and solar exposure.

This distributed problem-solving resists totalising optimisation. Conventional computational design pursues singular objectives (minimising cost, maximising efficiency). TetraGora balances competing goals, acknowledging trade-offs. When structural stability conflicts with packing density, the system presents options. Users select priorities, reintroducing human judgment as one voice among many.

User-algorithm-robot triangle: Polyvocality operates across actor categories: designer programs rules, algorithm generates options, user selects, robots assemble, inhabitants modify, environment reconfigures. Each agent contributes without dominating. The designer establishes constraints but cannot predict specific outcomes. The algorithm proposes layouts but cannot enforce selections. Inhabitants complete spaces but cannot prevent weathering. The environment erodes forms but cannot prevent human adaptation.

This multiagent negotiation operationalises MacCormack's critique of singular authorship. Architecture traditionally privileges the designer's vision; TetraGora distributes agency across computational, robotic, human, and nonhuman participants. The designer becomes one voice in a polyvocal conversation.

4.3.3 Tensions and limitations

TetraGora cannot fully realize MacCormack's ahuman ethics. This subsection identifies unresolved contradictions, acknowledging architecture's limits rather than claiming theoretical resolution.

TetraGora oscillates between serving human habitation needs and MacCormack's demand for absolute withdrawal. The project operates within what Serres terms the social contract: it produces shelter for humans, prioritizes anthropocentric occupation, and measures success through habitability metrics. However, by utilizing already-damaged sites, incorporating multi-species spatial affordances, and resisting extractive development logics, the project attempts care within impossible conditions. This constitutes harm reduction rather than abolitionist purity.

MacCormack's full ahumanism would demand cessation of all building. TetraGora cannot embrace this while remaining architecture. The project's position accepts architecture's limitation: we build for humans, acknowledge this anthropocentrism, and minimize violence through

tactical refusals. This represents pragmatic compromise rather than theoretical resolution.

Optimization and extraction pose parallel limits. When TetraGora “maximizes site potential,” it means human occupancy; optimization remains inherently anthropocentric, evaluating outcomes against human-defined metrics such as structural stability and spatial comfort. The project distinguishes scales of optimization: at robotic-assembly scale, it operates as pragmatic necessity, but the project refuses to extend that logic into inhabitation, where structures are

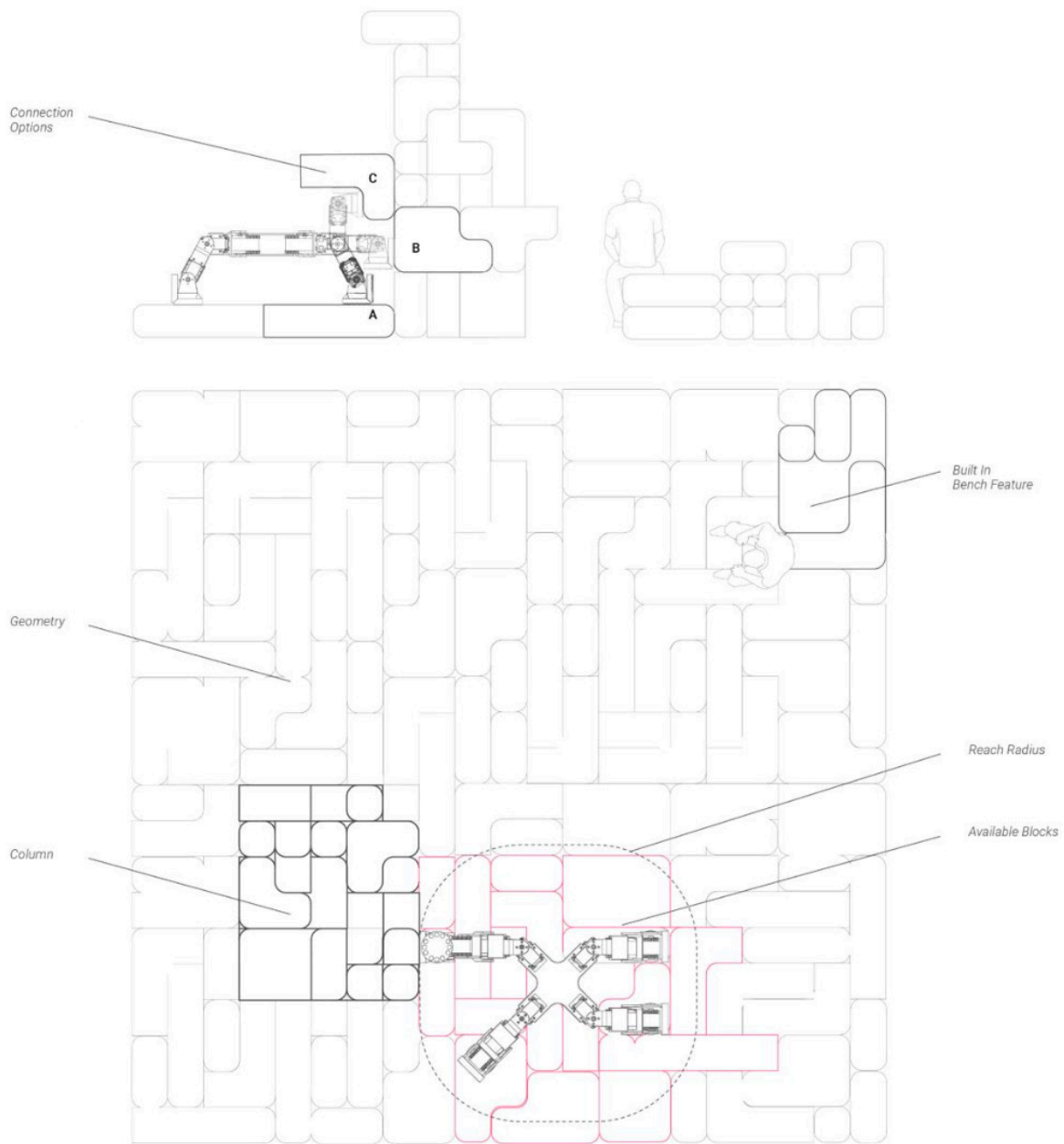


Figure 9: Robotic assembly sequence

delivered as spatial potentials rather than prescribed programs. Similarly, TetraGora critiques anthropocentric extraction while remaining dependent on extracted materials: oyster shells, though sourced as waste, remain corpses from industries that commodify marine life, and servo motors, sensors, and moulds rely on rare-earth mining. In both cases, the project embraces harm reduction over purity rather than claiming resolution. Oyster concrete eliminates roughly 50% of cement CO₂, robotic assembly avoids heavy machinery, and modular geometry enables reuse but we cannot claim non-extraction, only reduced extraction, just as we cannot claim non-optimization, only its refusal at the scale of inhabitation. MacCormack's full abolitionism would require ceasing to build entirely; we are not prepared for that cessation, and operate instead within capitalism's extractive paradigm while attempting incremental corrosion through material alternatives.

Reconfiguration operates across two temporal scales. Initial assembly remains algorithm-mediated and human-directed: users request modifications, algorithms generate options, robots execute. This guided reconfigurability cannot claim to be ahuman since it responds to human language and prioritizes human agency.

Extended inhabitation introduces ungoverned reconfigurability. Once assembled, structures become commons where anyone physically present can modify them. This includes nonhuman agents (weather, vegetation, animals) whose reconfigurations proceed without human permission or robotic correction. Care manifests here as refusal to maintain original design intent. The structure degrades, adapts, and transforms according to forces the designers neither control nor attempt to manage.

Robots enforce no property boundaries; they assemble and withdraw. If unhoused individuals occupy formally "owned" structures, human owners must invoke state violence for removal; the architecture itself offers no exclusion mechanism. This creates friction against anthropocentric property logic while operating within it. Full unconditional hospitality requires legal commons frameworks beyond the project's scope, yet spatial design prepares ground for post-ownership inhabitation.

When robots encounter cracked blocks, shallow bedrock, or assembly errors such as dropped pieces, they override the obstacle through off grid walking, as conventional construction would (excavating deeper, deploying adhesives, immediately replacing failures). But when a robot drops a block, shattering oyster-concrete, it cannot clean its own mess or erase the intervention; the shattered debris remains as evidence of violence (assembling structures is violent, pieces extracted, transported, placed). By failing to conceal this violence, the system refuses architecture's typical denial of its own impacts. Debris stays, the robot waits, and this vulnerability operates as accountability.

4.4 State of the art: Architecture, and arts instrumentalizing MacCormackian care

TetraGora situates within a broader constellation of practices across architecture and arts, and cinema that instrumentalise care as withdrawal, incompleteness, and material vulnerability. This section presents precedents that share MacCormack's gestures.



Figure 10: SKROZ. (2017). Chickenville. Croatia.



Figure 11: Miyazaki, Hayao. (1984). Toxic jungle as misunderstood ecological agent. Note. *Nausicaä of the Valley of the Wind*. [Movie]



Figure 12: Ceylan, Nuri Bilge. (2018). Architectural failure, incomplete structures. Note. *The Wild Pear Tree*. [Movie]. Cannes film festival.



Figure 13: Spatial outcomes

5. Conclusion:

This thesis has critically examined care within architectural discourse by moving beyond twentieth-century phenomenological and modernist frameworks. Engaging Bruno Latour's *Terrestrial* and Patricia MacCormack's *ahuman* activism, it articulated a model of care transcending anthropocentric and identitarian paradigms.

The research proposed infrastructures of care as accommodative and polyvocal care embracing ongoing maintenance. TetraGora operationalised these principles through distributed robotic ecologies and waste-based modular materials, creating adaptable inhabitation.

While acknowledging the unresolved paradox between architecture's interventionism and MacCormack's call for radical withdrawal, TetraGora demonstrates a tactical abolitionism: a pragmatic refusal of extractive practices combined with openness to nonhuman agency. It challenges architecture to rethink its role not as sovereign creator but as participant in multiagent ecologies.

Several lines of inquiry remain open for future research, including longitudinal studies empirically tracking weathering, animal cohabitation, and vegetal infiltration over time, as well as comparative studies of other waste-material economies (mycelium, recycled textiles) to test the model's material catalogue beyond oyster-shell concrete, in dialogue with circular-economy research. Further work could also deepen the algorithm's engagement with the Critical Zone itself, incorporating real-time environmental and social data, such as weather patterns, microclimatic conditions, and the socio-spatial context of each site, to inform generative design decisions that are even more finely calibrated to the specificities of place.

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7. List of figures:

Figure 1-2-9. TetrAgora Assembly Sequence. A human ecologies and polyvocal care through adapting to the critical zone.

Figure 3. Schweitzer, Pius. (1922). Heidegger's Hut from North West. [Photograph]. Germany. <https://thinkingplace.org/heidegger/>

Figure 4. Grandin, Temple. (1976). Designed to naturally move cattle or other livestock without inducing stress or panic. Today, over half of the cattle in North America are handled using facilities that incorporate her systems.

Figure 5. SKROZ. (2021). Eco Pig Farm. Croatia.

Figure 6-7. TetrAgora, material trials

Figure 8-13. TetrAgora spatial outcomes

Figure 10. SKROZ. (2017). Chickenville. Croatia.

Figure 11. Miyazaki, Hayao. (1984). Toxic jungle as misunderstood ecological agent. Note. Nausicaä of the Valley of the Wind. [Movie]

Figure 12. Ceylan, Nuri Bilge. (2018). Architectural failure, incomplete structures. Note. The Wild Pear Tree. [Movie]. Cannes film festival.

