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# Three waves of extended mind theories and urban planning: the city as a distributed socio-cognitive architecture

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This article explores the intersection between cognition theories and urban planning, conceptualizing the city as a distributed socio-cognitive architecture. It traces the evolution of these theories through three waves—functionalism, social externalism, and radical enactivism—. Correspondingly, the article suggests implications for reorienting urban planning approaches, highlighting participatory design, collaborative placemaking, and the nurturing of place-based affordances. Drawing examples from existing planning literature, it demonstrates resonances with Extended Mind-informed orientations. The conclusion synthesizes these insights, proposing a potentially transformative framework by rethinking planning as more participatory, pluralistic, and cognitively integrative, challenging internalist and technocratic assumptions.

## KEYWORDS

extended mind theories, urban planning, participatory design, sociocultural practices, place-based affordances, distributed cognition, enactivism, collective intelligence

## 1 Introduction

Urban planning is fundamentally concerned with shaping the built environment to improve human flourishing and wellbeing. However, throughout much of the 20th century, conventional planning approaches were critiqued as overly rationalistic, technocratic, and focused on physical interventions without adequately considering the social complexity and lived experiences of citizens (Fainstein, 2000; Friedmann, 2011; Gehl, 2013; Healey, 1992).

In response, from the 1960s onwards new orientations emerged arguing that planners should move from paternalistically “designing for” people towards “designing with” people through more participatory, collaborative processes that engage local knowledge and leverage broader distributed expertise (Davidoff, 1965; Forester, 1989; Innes and Booher, 2015; Sanoff, 2011). This aligned with wider critiques of scientific expertise as situated, plural, and historically contingent rather than universal and objective (Fischer, 2009; Jasanoff, 2004). In parallel, radical changes occurred in cognitive science and philosophy of mind starting in the late 20th century, challenging internalist conceptions that equate cognition solely with computation over a-modal symbols and representations within the brain (Varela et al., 1991). New perspectives treated cognition as embodied, embedded, extended, and enactive (4E cognition), arguing that the mind encompasses

brain, body, and the world, including sociocultural practices, artifacts, and interactions (Clark, 2008; Gallagher, 2013; Hutto and Myin, 2017; Theiner et al., 2010).

Could such externalist perspectives on distributed, culturally situated cognition provide foundational grounding for rethinking urban planning approaches in more participatory, pluralist, and socially embedded directions? This article explores potential intersections between extended mind theorizing and participatory planning practice (see Figure 1).

First, it delineates the conceptual progression through three waves of extended mind theories: from first-wave functionalism that retains residual internalism, to second-wave social externalism that thoroughly situates cognition within socio-material practices, to a third wave of radical enactivism that dissolves individuals into immanent relational effects (Gallagher, 2013; Gallagher and Miyahara, 2012; Kirchhoff and Kiverstein, 2019).

Second, corresponding implications are suggested for the reorientation of urban planning approaches: participatory design methods leveraging distributed cognitive systems (first wave), collaborative placemaking engaging broader cultural meaning-making (second wave), and scaffolding place-based affordances and participatory processes (third wave).

Third, examples from existing planning literature and practice are provided that resonate with these extended mind-informed orientations, including participatory budgeting (Sintomer et al., 2012), river contracts (McCaffrey, S. C. 2007) cultural asset mapping (Sandercock, 2003), place making design (Thomas, 2016), tactical urbanism interventions (Lydon and Garcia, 2015), community-based urban regeneration (Deakin, 2009; McDonald et al., 2009) and augmented city theories (Celani et al., 2019; Carta, 2021).

Finally, the conclusion reflects on integrating these complementary insights towards a transdisciplinary paradigm

reframing planning as more participatory, pluralistic, and cognitively integrative. While significant conceptual and practical challenges remain, extended mind perspectives provide promising resources for the elaboration of new planning approaches that better align with the distributed, cultural, and complex essence of human cognition.

## 2 Three waves of extended mind theories

The notion of cognition extending beyond the skull originated in philosopher Andy Clark and artificial intelligence researcher David Chalmers' seminal 1998 paper, *The Extended Mind* (Clark and Chalmers, 1998). Critiquing internalism, they provocatively argued that external processes like Otto's notebook, i.e., a (paper) memory device used by Otto, a fictional character suffering from Alzheimer's disease, can be considered as genuine parts of cognitive systems, fairly analogous, in terms of information storage, to biological memory such as that of Inga, Otto's fellow who can directly access the same information as Otto from her own brain. This idea reinvestigates alternative approaches to the tradition of thought that sees cognition as brain-bound computation over mental representations (Varela et al., 1991). While controversially claiming that cognition literally extends into the world, Clark and Chalmers retained an essentially functionalist, computationalist framing. The internal mind remains central, with external elements providing supplementary cognitive outsourcing if sufficiently trustworthy, reliable, and accessible (Clark and Chalmers, 1998). This theoretical position defined the first wave of extended functionalism.

However, critics highlighted that a genuine cognitive extension depends on socio-material practices, not just functional similarity

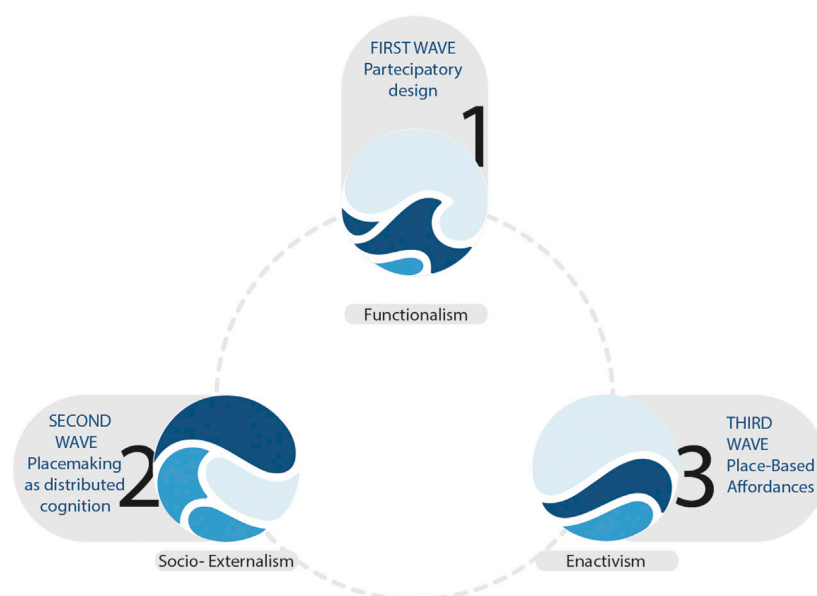


FIGURE 1  
Three waves of extended mind theories.

(Hutchins, 2014). This led to a second wave of socially distributed perspectives, arguing that cognition leaks across brain, body, and the world through webs of sociocultural scaffolding (Gallagher, 2013; Menary, 2013). Minds are intersubjectively constituted through participatory sense-making, not simply extended from individual brains.

Radicalizing further, a third enactive wave situates cognition within the larger organism-environment system (Kirchhoff and Kiverstein, 2019; Thompson, 2007). Building upon an enactivist perspective (Varela et al., 1991), cognition is treated as the result of emergent relational effects, not mental representations. The mind thus becomes radically immanent in the world (Hutto and Myin, 2017).

The first wave of functionalist extension argues that cognition can spread into the world when external processes fulfill similar functions to inner neurocognitive mechanisms (Clark, 2008; Clark and Chalmers, 1998). For example, Otto's notebook playing the role of memory qualifies as part of an extended cognitive system if it is readily accessible and trustworthy. Critical criteria are reliability, accessibility, and past endorsement.

If external elements meet such demands, they count as genuine cognitive extensions irrespective of their material form. Cognition is thus "environmentally embedded" yet functionally similar to brain-based information processing (Clark, 2008, p. 114). The mind therefore remains grounded in the brain but becomes porously extended to reduce representational and computational loads.

This notion of cognitive outsourcing encountered criticisms of over-extended cognition or "cognitive bloat," arguing for a clearer demarcation between the mind and the world (Adams and Aizawa, 2001; Rupert, 2004). The conceptual contours of this first wave remain debated (Clark, 2008; Menary, 2013); however, its breaching of internalist assumptions initiated a crucial rethinking of the mental as potentially extending beyond the skull.

Responding to such critiques, second-wave perspectives based on distributed socio-externalism make a crucial step toward a more radical notion of externalization. For example, Hutchins' (1995) analysis of ship navigation demonstrates how cognition may be distributed across members, tools, and the environment through practices that transcend the cognitive activity of any single individual. Rather than discrete inner minds getting functionally supplemented, here cognition emerges through a sociocultural coalescence of minds (Gallagher, 2013; Gallagher and Crisafi, 2009). Mental processes leak across the porous brain through webs of material-discursive-institutional cultural ecologies. The mind is thus constructed through participatory sense-making within shared scaffolds that shape possibilities for thinking and being (Ferryhough, 2010; Menary, 2013).

From this socioculturally distributed perspective, inner and outer cognition become inextricably entangled (Malafouris, 2013). Mental identities arise through situated embodied intersubjectivity, not as properties of isolated brains (Gallagher, 2005). The scope of the extended mind then shifts from a supplementation of individual cognition to the distributed propagation of minds across socio-material webs.

Radicalizing further into enactive relativism, a third wave of relational perspectives dissolves individuals altogether (Gallagher, 2017; Gallagher and Miyahara, 2012; Hutto and Myin, 2017; Thompson, 2007). Drawing strongly upon enactivism (Varela

et al., 1991), cognition is reconceived as an emergent world-making activity that is immanent in relational dynamics, rather than brains computing with mental representations. Situated action itself constitutes the mind, with cognition as an achievement of skillful, participatory agent-environment entanglement (Hutto and Myin, 2017). Individuals then dissolve into the life-world, with systemic interrelation constituting cognition rather than minds being delineated across a subjective-objective divide (Thompson, 2007). There are no inner mental states underpinning cognition. From this non-representationalist framing, cognition is enacted through concrete socio-material practices (Malafouris, 2013). The mind becomes radically immanent under the form of emplaced relational effects, and is no longer conceptualized as extending across a cognizing subject-object divide. The very notion of extended mind then dissipates (Gallagher, 2017).

### 3 Urban planning implications

Each wave of extended theorizing opens possibilities for reimagining urban planning in more participatory, pluralistic, and place-focused directions aligned with distributed and culturally situated cognition. To sum up, the functionalist wave provides a conceptual case for participatory design, resonating with existing planning approaches. The social externalist wave positions planning as engaging distributed intelligence across socio-material practices. And the radical enactivist wave suggests that planning should nurture place-based participatory emergence through the scaffolding of local affordances. At this point, the next step is to develop these connections between extended mind perspectives and participatory planning. Examples are provided from parts of the urban planning literature and practice that already hint at such extended possibilities and reflect on productively synthesizing the complementary insights of the three waves. This will sketch the contours of a potentially transformative paradigm integrating diverse ways of knowing, participatory meaning-making, and complexity-focused design. While conceptual and practical challenges abound, by offering a fresh orientation to the nature of mind and expertise, extended theorizing provides promising new interdisciplinary foundations for a new wave of planning approaches aligned with the intricacies of socioculturally situated collective cognition woven through urban spaces.

#### 3.1 First-wave functionalism - participatory design

By recognizing the porous cognitive boundaries of the skull, first wave perspectives imply that urban planning should look beyond individual minds to more distributed sociotechnical processes. If thinking encompasses external cultural resources, design should engage with broader collective cognition beyond isolated experts or users. This move from the brain to the ecosystem level aligns with existing participatory design approaches stemming from Scandinavian workplace democracy movements (Ehn, 2008; Sanoff, 2011). For example, the Utopia project in the 1970s enabled newspaper workers to co-design technological systems incorporating their tacit work knowledge, demonstrating how

cognition may be distributed across settings (Bødker, 1996; Ehn, 1988). Another example relates to the experience of the river contract as a negotiated process acting for the common good of all. Over the years the participatory design turn has paved the way, individually and collectively, to the adoption of a transdisciplinary working method in which professional scientists and experts seamlessly collaborate with stakeholders and decision makers through a fluid, iterative and adaptive planning, design and implementation management process (McCaffrey, S. C. 2007). Viewing the mind as extended across physical devices with their related socio-material practices legitimizes such democratizing of design through the engagement of a constellation of distributed mental and material competence. Planning becomes a process of participatory cognition “in the wild,” not abstract detached reasoning (Hutchins, 1995). The first wave thus provides grounding for collaborative design that discards the most narrow-minded forms of technocratic closure.

The notion of distributed cognitive systems encompassing brain, body, artifacts, and the environment aligns with existing arguments for participatory design in planning (Fischer and Gottweis, 2013; Sanoff, 2011): considering that thinking and expertise overflow beyond individual brains, design should engage broader tool-mediated collective cognition.

This democratic orientation is evident in participatory budgeting, where residents collectively deliberate on municipal spending priorities and projects facilitated by tangible cognitive artifacts like tables of proposals (Sintomer et al., 2012). Such opening of expertise to wider distributed competence resonates with the first wave’s porously extended mind.

Participatory processes thus question paternalistic “designing for” people approaches by engaging with a broader distributed knowledge (Davidoff, 1965; Sanoff, 2011). Treating cognition as spreading across socio-material situations beyond the head implies that planning should leverage such forms of distributed intelligence (in a comparatively weak form). The first wave thus provides some grounding for the democratization of design and for a significant reimagination of the notion and implications of expertise.

### 3.2 Second-wave socio-externalism—placemaking as distributed cognition

Further situating cognition within sociocultural ecosystems, second wave perspectives suggest that planning should tap collective intersubjective meaning-making that circulates through places, not just individual minds or extended functional systems. Conceptualizing thoughts as emerging through coordinated socio-material practices implies that design must resonate with, and reflect, local relationships, values, norms, identities, and ways of knowing (Fischer and Gottweis, 2013; Manzini, 2015). For example, asset-based community development engages residents in appreciatively mapping cultural resources such as skills, memories, institutions, and social networks as existing assets to democratically build upon (Sandercock, 2003; Mathie and Cunningham, 2003). Such placemaking aligns with a treatment of cognition as participatory sense-making distributed across shared scaffolds that unlock new potentials for thinking and being. In his

regard, design practices may be reinterpreted as a cultivation of existing cognitive-cultural resources woven through places. The second wave thus positions planning as engaging distributed intelligence as immanent in local situations, and not as an imposition of centralized top-down solutions (Boonstra and Boelens, 2011; Innes and Booher, 2010). As expertise is scattered across socio-material practices (Whatmore, 2009), a radical escape from internalism as achieved in the second wave approach fully legitimizes placemaking as collaborative meaning-making and causes a deep rethinking of the distribution of power, authority and agency across the system.

Foregrounding that knowledge and meaning emerge through coordinated socio-material practices and relationships, the second wave suggests that planning approaches should be informed by broader ecosystems of place-based collective meaning-making as an expression of local distributed intelligence, not just individual minds (Manzini, 2015). This is evident in cultural asset mapping processes, which appreciatively put together inventories of existing local skills, associations, institutions, memories, gathering places and other cognitive-cultural resources as assets to democratically build upon in community development (Sandercock, 2003; Wates and Knevitt, 1987). Such participatory mapping operationalizes the distributed and relational nature of place-based knowledge.

By treating cognition as propagated across shared scaffolds, the second wave positions planning as the skillful facilitation and navigation of distributed meaning-making practices woven through places, rather than the imposition of centralized objective solutions tactically supplemented by plethoric forms of participative consultation (Innes and Booher, 2010). Expertise then becomes a commons, that is, a property of intrinsically participatory socio-material practices.

### 3.3 Third-wave enactivism - place-based affordances

Radically situating cognition within agent-environment dynamics, third wave perspectives imply that planning should nurture contextual affordances to catalyze a wholly place-based participatory emergence. Here, we define contextual affordances as the possibilities for action and meaning-making that emerge from the specific socio-material configurations of urban environments, shaped by both physical attributes and socio-cultural practices. This concept builds upon Gibson’s (1979) original notion of affordances as action possibilities provided by the environment, but extends it to encompass the rich, culturally mediated landscape of urban settings.

Getting to the details, this wave can be horizontally integrated through the 4A (agency, affect, affordance and autonomy) model (Christensen et al., 2016; Gallagher, 2021) by stating that environmental, social and cultural-normative factors are closely intertwined in social interaction and participate in the process of human cognition. Embracing this perspective requires acknowledging that agency can be influenced by affective shifts and available affordances (Gibson, 1979). Autonomy is linked to spheres of possibility defined by affordances that limit the power of agency. Hence, agency and affordances can co-evolve. This dynamic is based on a relational interplay that is shaped not only by relationships with other people, but also by relationships with the

environment. To integrate the Gibsonian concept of affordance into this model of cognition is to acknowledge that humans not only shape the environment through planned interventions but are in turn shaped by it. Affordance indeed refers to both the physical and psychological aspects of an object/device, combining its objective properties with how a subject perceives, and interacts with, it.

Contextual affordances in urban planning thus refer to the potential for interaction, engagement, and transformation that arises from the interplay between physical elements of the built environment (e.g., streets, buildings, public spaces), the social dynamics and cultural practices of local communities, the historical and cultural meanings associated with places, and technological infrastructures and digital layers of the city. Such affordances are not fixed properties of the environment, but rather relational and dynamic opportunities that emerge through the interaction between people and their surroundings (Rietveld and Kiverstein, 2014). They are context-dependent, and varying with individual and collective capacities, cultural backgrounds, and social norms.

As the mind is enacted through emplaced socio-material practices, design should then foster the enabling of constraints that scaffold potentials for creative collective acting and meaning-making to unfold locally (Malafouris, 2013; Rietveld and Kiverstein, 2014). While significant conceptual and practical challenges remain, by offering fresh foundations for the reimagining of the mind, of expertise and collective knowledge, radically extended enactive perspectives provide promising resources for the development of constitutionally participatory planning paradigms attuned to the sociocultural situatedness of cognition (Di Paolo and De Jaeger, 2022).

The radical enactive notion of cognition that emerges immanently through concrete emplaced practices implies that planning should unlock contextual affordances and participatory processes in order to enable a true, creative emergence of place-based communal meaning-making as a form of intrinsically collective and de-individualized intelligence.

For example, tactical urbanism uses incremental low-cost changes to streets and public spaces to promote experimentation and grassroots placemaking tailored to the fine-grained local specificities of a neighborhood (Finn, 2014; Lydon and Garcia, 2015). Community-based urban regeneration can be regarded as a proper correlative of this third wave. Co-design projects with local communities, where needs precede functions, are a clear example of structural coupling. In such projects, the needs are not only those of the people, but also those of other non-human city occupants, such as animals and plants (Hensel, 2019; Hernandez-Santin et al., 2023). An early experiment of a needs-driven approach to community-based regeneration is that of Saint Michel in Montreal, where a deeply participatory planning process has led to the emergence of truly original and effective solutions, especially if assessed against similar processes in analogous settings (Ferilli et al., 2017); we will discuss this case study in more detail below. Moving forward, this third wave is also consistent with the ethos of the Augmented City theories (Iaconesi and Persico, 2012; Imottesjo and Kain, 2018; Manfredini, 2022) where the urban environment becomes an expansive and dynamic cognitive ecosystem—responsive, participatory—and the city evolves into a sentient entity capable of processing information, responding to stimuli, and adapting in

real-time. Indeed, if the environment, with all its human and non-human agents, is considered not merely as a physical space but as a distributed socio-cognitive architecture fully deploying collective intelligence and participatory meaning-making, additional possibilities for urban planning could be introduced (Marcus et al., 2016). Digital platforms and virtual environments, for instance, facilitate participatory design, enabling citizens to contribute to public decision-making. In addition, the use of IoT and sensor technologies can collect real-time data on urban dynamics to gather information that can inform reactive placemaking initiatives (Gallotti et al., 2021), adapting public spaces based on community needs and behaviors (Bibri, 2018; Javed et al., 2022). Machine learning algorithms can then analyze complex models of human behavior, providing insights into cognitive affordances in specific locations (Fusco, 2016; Buyuklieva, 2020). Such place-based co-creation resonates with cognition as relational effects achieved through emplaced worldly practices, rather than designing abstract functions into spaces. This third wave orientation embraces open-endedness and bottom-up complexity, against top-down planning tendencies, in its most uncompromising form (Innes and Booher, 2015; Sandercock, 2003). It grounds such emergence in the radical immanence of the mind in participatory placemaking, moving beyond the extension of cognition across Cartesian divides. Planning then fully becomes the scaffolding of socio-material practices that enable contextual affordances as the real drivers of community-driven urban change (Rietveld et al., 2018). The third wave thus provides grounding for embracing open-endedness and bottom-up distributed agency as a form of collective computation geared toward social problem solving (Boonstra and Boelens, 2011).

## 4 Towards extended planning

Synthesizing these insights, extended perspectives offer resources for a paradigm that reframes planning as a more thoroughly participatory, pluralistic, and cognitively integrative than it is commonly found today in most planning practices. The successive waves provide complementary, layered orientations for the incorporation of diverse expertise at varying levels of design radicalism, leveraging participatory meaning-making, and nurturing place-based flourishing.

While each wave opens distinct possibilities, their synthesis is perhaps more significant (Clark, 2008; Gallagher, 2020). Together, they contest internalism and technocracy by insisting on the sociality and richness of embodied cognition situated within cultural ecosystems and places. The mind is populated with diverse voices and perspectives that cannot be confined to individual brains. This reimagining of the nature of knowledge and selfhood has profound implications for democratizing and decolonizing planning (Sandercock, 2004). The modernist figure of the professional expert gives way to participatory processes that recruit and engage multiple realities, perspectives, and ways of knowing, distributed across a vast range of socio-material practices (Awan et al., 2013; Fischer and Gottweis, 2013).

Rather than universal solutions, design becomes situated tinkering and place-based cultivation of collaborative potentials (Simonsen et al., 2014), already propagating through locales via everyday sense-making

in all its rich diversity (de Certeau, 1984; Ingold, 2013). Through small iterative efforts, unexplored resonances can be crafted between top-down structures, grassroots creativity, and the socio-cognitive life of neighborhoods to enable contextual flourishing (Anderson and Baldwin, 2016).

This sketch of extended planning inevitably remains partial and provisional. Significant conceptual and practical tensions persist regarding coherence, power, values, and methods which require contextual navigation (Malafouris, 2013) and major experimentation and innovation in future planning practices. However, by offering fresh interdisciplinary orientation to collective urban meaning-making as irreducibly distributed across sociocultural ecosystems, the three waves provide vital conceptual resources to spark some much-needed evolution in planning approaches that allows better alignment with the social depth and richness of human collective cognition as situated in place.

## 5 Montreal Saint Michel: a *de facto* enactivist-informed approach to urban regeneration

The Saint Michel district regeneration project in Montreal as discussed in Ferilli et al. (2017) provides a compelling example of how third-wave enactivist principles can be applied to urban planning, resulting in a more inclusive, participatory, and socially sustainable transformation process. This case study illustrates how urban environments can be conceived of as distributed socio-cognitive architectures, where cognition emerges through the dynamic interaction between residents, cultural institutions, and the built environment.

First of all, the Saint Michel project exemplifies the enactivist principle of participatory sense-making. Instead of imposing a pre-determined vision, the regeneration process actively involved local stakeholders from the early stages. This approach aligns with the enactivist view that cognition is not confined to individual minds but emerges through collective interaction with the environment. The creation of TOHU, a multifunctional cultural space, served as a platform for this participatory process, enabling residents to co-create the meaning and identity of their neighborhood.

In addition, the project's focus on circus arts and performing arts created a rich landscape of affordances for local residents. In the enactivist framework, affordances are not just physical properties but opportunities for action that emerge in the relationship between the agent and the environment. By offering training and employment opportunities in the circus arts, the project expanded the "field of relevant affordances" (Rietveld and Kiverstein, 2014) for residents, particularly those from marginalized groups. This approach fostered the development of new skills and capabilities, enhancing the human capital of the community in an organic, context-sensitive manner.

Moreover, the Saint Michel project can be viewed as the cultivation of a cultural ecosystem where cognition is distributed across various actors and institutions. The presence of Cirque du Soleil, TOHU, and other related organizations created a network of interrelated cultural entities that collectively shaped the cognitive landscape of the area. This aligns with the enactivist view of

cognition as extended beyond individual minds and into the socio-material environment.

Furthermore, the emphasis on circus and performing arts in Saint Michel exemplifies the enactivist principle of embodied and situated cognition. These art forms inherently involve bodily engagement and are deeply contextualized in the local environment. By promoting these activities, the project facilitated forms of learning and skill development that are intrinsically tied to physical and social contexts, rather than abstract or decontextualized knowledge.

What is more, the Saint Michel project demonstrates a move away from rigid, top-down planning towards a substantially more adaptive and dynamic approach. This aligns with the enactivist view of cognition as an emergent process that unfolds through ongoing interaction with the environment. The project's ability to evolve and respond to community needs over time, rather than adhering to a fixed master plan, reflects this principle.

Also, the high levels of participation in cultural and social activities reported in the Saint Michel case study indicate the success of the project in fostering social cohesion. From an enactivist perspective, this can be understood as the emergence of collective cognitive patterns through shared cultural experiences. The cultural activities served not just as entertainment, but as cognitive tools for community building and identity formation.

And finally, the project's success in promoting intercultural dialogue among diverse immigrant communities in Saint Michel aligns with the enactivist emphasis on the sociocultural situatedness of cognition. By creating spaces and opportunities for different cultural groups to interact, the project facilitated the emergence of new, shared cognitive frameworks that transcend individual cultural boundaries.

The Saint Michel case therefore demonstrates how a *de facto* enactivist-informed approach to urban planning can lead to more inclusive, adaptive, and socially sustainable regeneration processes. By conceiving the urban environment as a distributed socio-cognitive architecture, the project was able to harness the collective intelligence of the community, create meaningful affordances for skill development, and foster a sense of shared identity and purpose. This approach stands in stark contrast to more traditional, top-down planning methods that often fail to engage with the complex, emergent nature of urban social systems.

The success of Saint Michel in terms of community participation, social cohesion, and cultural vibrancy suggests that enactivist principles could provide a valuable framework for future urban regeneration projects. By focusing on the dynamic interplay between people, culture, and the built environment, planners can create urban spaces that are not just physically renewed, but cognitively and socially enriched.

## 6 Substantial conceptual and practical challenges ahead

While the extended mind approach to urban planning offers promising avenues for more participatory and context-sensitive urban development, it also presents significant conceptual and practical challenges that need to be addressed. This section

outlines some of these key challenges and their implications for the future of urban planning.

## 6.1 Systemic deliberation and democratic choice-making

The role of planners in ensuring democratic choice-making within a systemic deliberation framework remains a critical challenge. As [Fainstein \(2010\)](#) argues, the pursuit of the “just city” requires not just participation, but also equity and diversity in decision-making processes. In the context of extended cognition, how can planners facilitate genuine democratic deliberation that accounts for the distributed nature of urban intelligence?

[Healey’s \(2003\)](#) collaborative planning theory offers some insights, emphasizing the importance of inclusive stakeholder dialogues. However, translating this into practice within an extended mind framework requires new methodologies. Planners may need to evolve into facilitators of collective intelligence, designing processes that can capture and synthesize the cognitive contributions embedded in diverse socio-material practices across the urban landscape.

## 6.2 Representational frameworks and planning legitimacy

Traditional planning is deeply enmeshed in representational frameworks, from zoning maps to policy documents. The shift towards second and third wave approaches to urbanism, which emphasize emergent, enactive processes, poses a significant challenge to these established practices. As [Hillier \(2011\)](#) notes, planning needs to move beyond representation to performance and affect.

In this new context, the role of planning might evolve towards what [Amin and Thrift \(2002\)](#) call “urban curatorship” – facilitating the conditions for urban creativity and adaptation rather than prescribing fixed outcomes. This raises questions about how to maintain legitimacy and accountability in planning processes that are more fluid and distributed. New forms of dynamic, real-time cognitive and decision-making tools may be needed to bridge the gap between traditional planning frameworks and extended mind approaches.

## 6.3 Lived experience and social justice

The privileging of lived experience in participatory planning approaches raises important questions about social justice and the potential perpetuation of existing inequalities. As [Young \(1990\)](#) argues, the mere aggregation of individual preferences does not necessarily lead to just outcomes. How can an extended mind approach to planning address systemic injustices and power imbalances?

[Sandercock’s \(2023\)](#) concept of “therapeutic planning” offers one potential avenue, emphasizing the need to address historical traumas and exclusions in urban development. Within an extended mind framework, this might involve the development of new

methods for surfacing and addressing collective urban traumas embedded in the socio-material fabric of cities.

Moreover, the question of who decides when injustice is occurring becomes more complex in a distributed cognitive system. [Fainstein’s \(2010\)](#) criteria for the just city—equity, diversity, and democracy—might need to be reinterpreted and operationalized within an extended mind or outright enactivist framework. This could call for developing new indicators and feedback mechanisms that can capture injustice as it emerges from complex urban interactions.

More broadly, our approach makes a clear call for an idea of urbanism that sees the agency and legitimization of minorities as a primary goal, and that refuses to accept top-down, hierarchical planning as a convenient technocratic pretext to limit them in the name of superior collective interests. The intrinsically emergent nature of an enactivist approach to planning implies that only a fair and equitable representation of all the voices involved in the process ensures minimal conditions for the social sustainability and democratic character of the planning process. This certainly implies more potential conflict and more need for negotiation at early stages, but on the other hand it also means that the conflicts that are likely to emerge at later stages in a critical situation of strong imbalance of power and political representation due to the marginalization and de-legitimization of minority voices may in this way be anticipated and, if successfully and effectively dealt with, preempted to a large extent.

## 6.4 Practical implementation and institutional change

Implementing these new approaches will require significant institutional changes in planning practice and education. As [Innes and Booher \(2010\)](#) argue, planning institutions are often resistant to change and wedded to traditional technocratic approaches. How can planning education and professional development evolve to incorporate extended mind or enactivist perspectives?

Moreover, the practical tools and methodologies for extended urban planning are still in their infancy. Apart from promising early examples, there is a need for more comprehensive frameworks that can operate at multiple scales and timeframes.

Addressing these challenges will require interdisciplinary collaboration between urban planners, cognitive scientists, philosophers, and community stakeholders. It will also necessitate a willingness to experiment with new forms of urban governance and decision-making. As we move forward, careful empirical research and ethical reflection will be crucial to ensure that extended mind or enactivist approaches to urban planning genuinely contribute to more just, sustainable, and vibrant cities.

## 7 Conclusion

This article has explored potential intersections between extended mind cognition perspectives and participatory urban planning approaches. The subsequent waves of functionalist

extension, social externalism, and radical enactivism outlined each provide distinct yet complementary resources for reimagining planning in more participatory, pluralistic, and place-focused directions that align with the distributed, cultural, and complex essence of human cognition.

The first wave of functional extension suggests participatory design approaches that question narrow technical expertise by engaging broader distributed sociotechnical knowledge. The second wave of social externalism implies that planning should catalyze collaborative placemaking processes that tap existing ecosystems of emergent, collective meaning-making. And the third enactive wave stresses how the scaffolding of contextual affordances and participatory processes may enable radically new forms of place-based communal meaning-making and grassroots creativity.

Synthesizing these complementary insights, in this article we sketched the contours of a potentially transformative paradigm that reframes planning as more thoroughly participatory, cognitively integrative, and socially attuned. This proposed orientation draws on extended perspectives to challenge internalist and technocratic assumptions, opening possibilities for planning that fully leverage upon embodied situated cognition to enact collective meaning and identity within the relational flows of lived space.

While substantial conceptual and practical challenges remain, the article hopefully offered some fresh interdisciplinary perspectives for the upgrading of current planning approaches to make them more aligned with the distributed, cultural and complex essence of human collective sense-making woven through urban environments. By providing novel conceptual links between extended mind theories and participatory planning orientations, we aim at opening possibilities for further transdisciplinary work, creatively building on these connections to encourage more socially embedded, empowering and cognitively integrative planning processes co-evolving with the socio-cultural richness of local contexts.

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## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

GC: Investigation, Writing–original draft. LM: Investigation, Writing–original draft. MA: Investigation, Writing–original draft. AC: Investigation, Writing–original draft. PS: Conceptualization, Investigation, Supervision, Writing–original draft.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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