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Designing for possibility in public space: affordance, assemblage, and ANT

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Abstract

The design of urban public space is inherently problematic because the range of its possible uses and meanings is broad and unpredictable. This paper engages this problematic through the lens of Gibson’s theory of ‘affordances’—the ways the material world affords for human desires. We first explore some conceptual and methodological problems of the theory of affordances and its application in understanding and designing public space. These dimensions of affordance theory are then reconceived using the relational thinking of assemblage and actor-network theory (ANT). A key contribution of the paper is an expanded typology of affordances which includes improvised and serendipitous affordances that extend beyond the intentions of designers and users. This opens new ways of thinking about the design of urban public space as a space of possibility where outcomes are open, multiple, and unpredictable. The paper suggests how urban spaces can be shaped to better support rich cultural diversity and social inclusion.

Keywords Public space · Affordance · Assemblage · Actor-Network Theory · Environmental psychology

Introduction

It is the nature of urban public space that it is open to users from a multiplicity of cultural backgrounds and that its uses and users are unpredictable. Increased migration will intensify this condition of intercultural difference, and ensure that all public spaces will host an increasingly unpredictable set of public interests. Two further premises of this paper are that good design of the public realm generates possibilities that cannot be contained by pre-conceived programs, and that the vitality of public life is often reliant on creative improvisation and chance encounter. At its best, public space is open to the broadest range of both people and practices. The challenge for urban designers is to move beyond any privileging of specific design intent or pre-conceived program, toward the idea of an affordance of open outcomes. While the concept of ‘affordances’ has been widely applied across the design disciplines, its application to public space

has been limited and uncritical. We argue in this paper that affordance thinking has been plagued by a limited ontology that can be expanded using the relational understandings of assemblage thinking and actor-network theory (ANT). We propose a new field of affordance types—enabling, constraining, improvised and serendipitous—that encompasses the looseness and openness of public space.

James Gibson’s (1977) theory of ‘affordances’ emerged from psychology as an account of how properties of the material world provide affordances for human desires. Affordance thinking has been highly influential across a range of design disciplines, including urban design. However, there is relatively little research on how affordance thinking can be applied to the design of urban public space beyond a strict focus on functional issues such as ease of movement, health, and safety. As Maier et al. (2009) note, urban public space is a complex, immersive, and dynamic milieu with diverse perceptions, values, and actions; in this context, affordance involves complex relationships ‘between artifacts and users, ... between multiple users, ... and... between multiple artifacts’ (Maier et al. 2009, 397). A key precept of this paper is that the function of public spaces is largely indeterminate; designing for possibility means going beyond pre-conceived functions. A range of authors have begun to apply methodological approaches broadly known as assemblage theory and

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actor-network theory (ANT) to urban design with regard to the design of public open space design (Kim 2018; Sendra 2015); urban climbing (Mubi Brighenti & Pavoni 2018); landscapes (Kullmann 2018); informal urbanism (Dovey 2012); and ontologies of urban design (Foroughmand Araabi & McDonald 2019). This paper examines the potential of such approaches to expand conceptions of affordance, with a focus on the challenges of designing for the complexities of urban public space. We suggest how affordances might productively be re-thought and applied in urban design to open up new possibilities for research and practice.

Affordance thinking

Gibson's thinking on affordances emerged first in *The Perception of the Visual World* (Gibson 1950), where he began questioning prevailing theorizations of behavior within social psychology as lacking an account of how people perceive and respond to the physical environment:

When the constant properties of constant objects are perceived (the shape, size, color, texture, composition, motion, animation, and position relative to other objects), the observer can go on to detect their *affordances*... I mean simply what things furnish, for good or ill. What they afford the observer, after all, depends on their properties. (Gibson 1966, 285)

This was an early 'ecological' psychology that incorporated multi-sensory perception and cultural difference. Culture and cultural variability produced differences within environments and, as a result, differences in the stimuli that people perceive and act upon—different affordances. Gibson also often referred to the ways in which bodily proportions, height, hand size, and shoulder width are geared to the perception and actualization of affordances. Many forms of design that are taken for granted, such as the heights of steps and seats, are geared to bodily proportions that are consistent across large populations. These in turn are strongly connected to the active role of individuals driven by desires to climb or sit, and augmented by the skills and strength needed to do so (Costall 1995). Gibson also acknowledged the importance of interactions between humans, and the role of social learning, in the shaping of tools and environments. This 'ecological' context, formed by both culture and by concrete cultural products such as tools and built environments, shapes individuals' perceptions and actions.

Gibson's most developed account of affordances appears in *The Ecological Approach to Visual Perception* (1979) where he was extending ideas he had developed earlier to encompass a new ecological framework (Heft 2017). His understanding of affordances expanded to encompass both human and animal habitats:

The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill... I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment. (Gibson 1979, 119)

Affordance is clearly a deeply ecological concept that transcends culture and the particular sensory apparatus of the human species; however, it has long embodied some deep uncertainties at both philosophical and practical levels.

A Dual Ontology

Gibson became aware that the concept of affordance embodies a dual ontology: affordances exist as both properties of the environment *and* in the desires of a given actor:

An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behaviour. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer (Gibson 1979, 119).

Thus, affordances are 'real' in the sense of objectively existing in the material environment, whether perceived or not. Yet if an affordance is perceived, then it is defined subjectively, relative to the desires of the person or animal who discovers and 'uses' it. This requires a direct connection between the environment and a body in action, which Gibson (1979) termed 'direct perception.' Ontologically, affordances are simultaneously material and relational. Gibson recognized the problematic nature of the subjective-objective dichotomy but lacked a non-dualist ontology within which to understand it. After Gibson's death in 1979, Norman (1988) sought to resolve the dual ontology of affordances within the design fields by introducing a distinction between *real* affordances (the physical possibilities for action that designers create) and *perceived* affordances (what human actors assume is possible). Norman provided the design disciplines with an enhanced vocabulary to describe their work, becoming widely applied. As a researcher, designer and Vice President of Apple Computer, he was primarily concerned with applying affordances in human-computer interaction and product design, where perceived affordances are key to user satisfaction. The Apple user interface remains the most potent application of affordance thinking in practice.

However, Norman's distinction between 'real' and 'perceived' created further ontological confusion because it necessitated a rejection of Gibson's concept of 'direct perception.' For Oliver (2005), Norman is guilty of falling into material determinism: the object signals and determines the affordances. For Norman, perceived affordances rely on



mental processes derived from human experience, knowledge, and cultural background (Heft 2017). After largely ignoring this problem in earlier work, Norman (2013, p. 11) later noted

The presence of an affordance is jointly determined by the qualities of the object and the abilities of the agent that is interacting. This relational definition of affordance gives considerable difficulty to many people. We are used to thinking that properties are associated with objects. But affordance is not a property. An affordance is a relationship.

The problem of a dual ontology has echoed over the years among affordance scholars; as Chemero (2003, p. 181) puts it: ‘affordances are both real and perceivable but are not properties of either the environment or the animal.’ Another way researchers have understood the ontological dimension of affordances is by distinguishing between *potential* affordances, related to properties of the environment, and *actualised* affordances that are utilized in action (Heft 1989; Kyttä, 2002a, b). This parallels the distinction between perceived and real; affordance remains a problematic relation between two different definitions.

Problems of Perception, Cultural Difference and Designability

For urban design thinking, affordance theory also becomes problematic in three further ways: it needs to account for multi-sensory perception, a multiplicity of cultures, and the indeterminate functions of urban public space.

While Gibson’s theory of affordances is underpinned by a concept of ‘direct perception’ involving all the senses, his later work involved a singular focus on visual perception. The experience of any public environment—hence its affordances—may depend on the smell of coffee or diesel fuel, on the temperature of surfaces, the movement of air or the sound of traffic. Vision is generally a distant sense, with less usefulness in negotiating close-up postures, encounters and actions in relation to material landscapes, where the body’s tactile, thermal, and haptic senses are intimately related to perception. Different people have different skills and abilities in relation to different senses. Haptic perceptions particularly shape the development of affordances of children, and blind people perceive varied capacities for action (E. Gibson & Schmuckler 1989). Affordances of sounds are similarly ‘an emergent effect of the dynamic interactions taking place between a perceiver and their environment’ (Stenson & Rodger 2015, p. 178). Application of affordance thinking to urban public space requires an engagement with multi-sensory perception.

A second problematic involves the problem of cultural difference. According to Gibson’s (1979) concept of direct

perception, the information needed to ‘pick up’ affordances is available to everyone, regardless of cultural background. How is it, then, that people perceive and utilize available affordances differently? Gibson’s concept has long been accused of failing to account for cultural variability in the uptake of affordances (Costall 1995; Parchoma 2014). For Gibson, nature and culture were inseparable:

It is a mistake... to separate the cultural environment from the natural environment, as if there were a world of mental products distinct from the world of material products. There is only one world, however diverse, and all animals live in it, although we human animals have altered it to suit ourselves. (Gibson 1979: 130)

Heft (2017) notes that these practices take place within a ‘shared habitat’—what Bourdieu (1977) calls ‘habitus.’ The knowledge to perceive and act on affordances is embodied and performed through the socially informed movements of the body, from childhood onwards (Inoue 2006)—what Bourdieu (1977) calls ‘practical knowledge.’ Gibson claimed that social practices are intimately entwined with physical environments; a triangulation of human-to-human and human-to-nonhuman relations. This is a form of social learning wherein words, language, and other cultural performances shape how people perceive their environment (Heft 2017). In this way, ‘affordances can be both directly perceived and culturally conditioned’ (Costall & Still 1989, p. 435). For Gibson (1966), the ‘cultural environment’ is defined as the material world altered through human action—‘culture’ emphasizes certain features within these environments and mediates the selection of certain affordances over others (Heft 2017). This sense that social and cultural factors strongly shape affordances has long been widely accepted (Loveland 1991; Reed 1993). It also follows that affordances change as people discover, exploit, and shape new affordances through freely chosen actions (Kyttä, 2002b).

Understood in this way, the spatiality, materiality, and programming of the built environment are always culturally conditioned. Affordances are defined relationally between an acting individual, an environment, and a socio-cultural context (Heft 2003). While cities have long been places of encounter with cultural difference, increasing global migration and diverse lifestyles bring crucial challenges for designers of public spaces. If affordances are culturally conditioned, how can urban environments be *designed for* rich cultural diversity and inclusion, and to shape interaction between people from different socio-cultural backgrounds?

The final problematic here is that Norman’s highly successful application of affordance thinking was only achieved by reducing affordance to a strict functionality and designability at the expense of non-functional affordances. One can ignore the problem of a dual ontology so long as the



functional outcome is clearly defined, but this is clearly not the case for the design of urban public space where uses and meanings are often fundamentally contested, and where good design generates possibilities that cannot be contained by pre-conceived functions. In the following section of this paper, we outline theories of relational thinking with a non-dualist ontology that enables us to progress the application of affordance thinking for the design of public space. We then explore such application of affordance thinking to develop a broader typology of affordances.

Relational thinking

Here, we seek to contribute to affordance theory by considering two more recent relational conceptual frameworks: assemblage thinking and ANT. These two frameworks differ—*assemblage* is primarily philosophy, while ANT is chiefly methodology—but they share a similar ontology. Dant (2007) has suggested that the revival of affordance theory has occurred because of the growing interest in relational frameworks such as ANT. However, the relationship between affordances and these frameworks remains under-researched, particularly in the context of urban design. In the following sections, we suggest how each framework can contribute to our understanding of affordances.

Assemblage

Assemblage thinking has been widely adopted and debated across the built environment field. The key theoretical base for assemblage thinking lies in Deleuzian philosophy (Deleuze 1990; Deleuze and Guattari 1987) as adapted by DeLanda (2006). Assemblage thinking has been variously described as materialist, realist, and relational. An assemblage is a whole that is formed from the interconnectivity and flows between constituent parts, wherein the identities and functions of both parts and wholes emerge from the flows, alliances, and synergies between them. Assemblage thinking is radically relational: interconnections and flows are prior to, and productive of, the people, places, and things being connected. In this sense, a public space is an assemblage that includes material things and people as well as its non-material uses, meanings, and regimes of control (Dovey 2010).

The term ‘assemblage’ is a translation of the French *agencement*, which is akin to a ‘layout,’ ‘arrangement,’ or ‘alignment,’ but also to some degree ‘agency’; it suggests at once a dynamic process and a diagrammatic spatiality, both verb and noun. Assemblage thinking embodies what is often called a ‘flat’ ontology, in the sense that it does not recognize a conceptual hierarchy—particulars cannot be simply reduced to instances of a general order. It offers an approach

to understanding human–environment interactions that is empirical without the reductionism of empirical science; it seeks to understand human experience without either the essentialism that can afflict phenomenology or the physical determinism that can afflict materialism. Assemblage thinking in urban studies connects the disciplines of geography and social theory with practices of architecture, planning, and design, overturning hegemonies of scale and facilitating multi-scalar thinking (Dovey et al. 2017).

Assemblage thinking suggests that flows of desire are the immanent productive forces of life, and that these flows are not limited to the human world. From this view, a plant’s desire for light and water is not fundamentally different from a human being’s desire to dance or sit. Desire is the driving force of design, whether it is the desire for profit, status, speed, or a seat with a good view. It is axiomatic to assemblage thinking that agency is embodied in the materiality of the built environment. This is not environmental determinism, rather a recognition that power is not held only by human agents but is distributed across socio-spatial assemblages. This distributed, relational conception of desire and agency has a range of implications for how we might think about affordances and the concepts of perception, cultural difference, intentionality, and function that have been problematized in this paper.

Assemblage thinking offers another take on what Gibson characterized as ‘direct perception.’ For Deleuze (1990), sensation is an event that cuts across any subject/object or mind/body dualism, and cannot be reduced to either. Our encounter with the world operates at a pre-reflective level and involves a direct ‘affect.’ Seen from an assemblage perspective, the problem of the dual ontology—understanding affordance as both a property of the environment and a relation between animal and environment—is a product of dualist thinking. Assemblage is a realist philosophy, but one where the ‘real’ is not limited to the actual, material world that human actors encounter; the real world encompasses possibilities and embodies a set of capacities that may or may not be actualized. The concept of ‘capacity’ is close to Gibson’s (1967) understanding of ‘real’ affordances, and we have argued elsewhere (Stevens and Dovey 2022, pp. 149–66) that the concept of ‘capacity’ and capacity mapping can be useful in urban design as a means of diagnosing the city as a ‘space of possibility’ (DeLanda 2011, p. 226) that is embodied in the morphology and spatiality of the material world. In a parallel to affordance, the ‘capacity’ of a public space needs to be understood in terms of both its material capacity to accommodate activity (the capacity crowd), and the capacity of its users to achieve their desires.

To ground this empirically, consider the example of ‘stairs,’ defined as a set of diagonal relations between horizontal surfaces (or steps) that are designed to afford human movement between levels. Stairs also embody capacities



to become a seat or stage, depending on the desires that humans bring (Lerup 1977). These possible relationships between built form and human action are limited and relatively stable—stairs largely exclude lying down and dancing. It is crucial to note that in assemblage terms, a stair is not a thing nor a set of things, it is fundamentally a set of relations. Instead of trying to determine whether the ‘affordance’ lies in the relations between steps or between stairs and humans, it needs to be understood as an integrated stair-person assemblage. From an assemblage perspective, design needs to be seen in terms of flows of desire—to sit, climb, or dance. While design is often reduced to a particular problem—this stair, building or street—*assemblage thinking* will situate this within a larger frame where the design outcome will be subject to multiple and changing desires over time. Whatever range of affordances is intentionally designed, any object or environment will embody adaptive capacities that exceed them.

Actor-Network theory

Actor-network theory originated in the sociology of Latour (1987; 2005) with a key focus on giving nonhumans, including technologies and physical environments, equal status with humans in terms of understanding agency and power (Dant 2007). Rather than privileging human actors, as Gibson does, ANT’s flattening of the ontology of agency erases several long-standing conceptual dichotomies, including nature- culture, social-technical, and subject-object. Latour privileges neither the social nor the material but focuses instead on the associations and interactions between them. Anything that modifies a state of affairs and influences other actors is an actant (Latour 2005). ANT has been described as an assemblage theory, based on key similarities (Farías 2011). Firstly, they share a flat, relational ontology, which emphasizes the ways outcomes emerge from heterogeneous networks of human and nonhuman actors. Secondly, both ascribe agency to all these parts/actors. Thirdly, both are concerned with how these networks/assemblages come together, stay together, and break apart. Although several scholars in architecture (Yaneva 2009), urban planning (Rydin & Tate 2016), and urban design (Teh 2014) have explored human–nonhuman relations within an ANT framework, the mechanisms of these interactions remain under-researched. Dant (2007, p. 81) has noted of ANT that ‘there are very few accounts of the perceptual or tactile interaction between humans and objects.’ This gap has limited the potential value of ANT and assemblage for design thinkers. A reappraisal of the concept of affordances holds promise in bridging this gap (Craig & Wayne 2016; Davis & Chouinard 2016).

The key methodological value of ANT is in recognizing and examining actants and networks of relationships that are

overlooked by other modes of analysis, particularly those that are emergent and transformable. This is an ontological innovation in the context of the environmental design disciplines, which tend to focus on and promote the intentions and prescriptions of designers, and on formal design outcomes. In this context, ANT offers a more flexible and nuanced way of analyzing affordances that can address the conceptual and methodological challenges outlined above. From an ANT perspective, to understand how affordances emerge and change, we need to ‘follow the actors’ (Latour 1987)—especially the nonhuman ones—to see just how actants, perceptions, and desires become realigned and connected. Akrich (1992) argues that designers ‘script’ specific relationships between objects and users, and these prescriptions are then interpreted and acted upon by users. Thus, an ANT approach recasts both definitions of, and relations between, ‘real’ and ‘perceived’ affordances as introduced by Norman (1988). Murdoch (1998) further suggests that such relationships remain ambivalent and fluid, subject to constant negotiation.

Kim (2018) uses an ANT approach to distinguish between public spaces that are more or less prescriptive or negotiable, where rules of action are more or less specified, formalized or proscribed. Thus, we find a distinction between intended and unintended affordances, and that it is not only the intentions of designers but also those of users that are matters of concern. For Kim, affordances arise when environmental properties are translated into the intentions of users; when, for example, a bench is performed as being ‘lying-down-on-able’ by a person who wants to sleep. From an ANT perspective, Akrich and Latour (1992, p. 261) define affordance as ‘What a device allows or forbids from the actors—humans and nonhuman—that it anticipates; ... what it prescribes ... and ... what it permits.’ In this view, affordances such as ‘sit-ability’ or ‘climb-ability’ are not necessarily created by designers or inherent in objects, but are negotiated between them. The relationships between people and objects are not fixed by the act of design, but precarious, and therefore in need of constant maintenance, and available for translation into new forms.

Affordance in urban public space

In this section, we seek to apply a relational ontology to explore some implications of affordance thinking for the design of urban public space. There have been a number of applications of affordance theory to the design of the built environment; however, these applications have been largely limited to conditions where the focus is on how designers shape physical environments to create specific programmed possibilities for human action—in line with the approach of Norman (1988). In relation to architecture, Maier et al.



(2009, p. 398) note that ‘designers have control over the structure of the artifacts they design, and thus over what affordances exist with respect to specific users’ and they suggest that affordance thinking can be used to determine a better fit between the design intent and how it is actually used. Yet, as we have seen, Gibson’s dual ontology of affordances raises unresolved conceptual questions regarding the intentionality of the designer. What can be said about affordances when a user’s actions are enabled or constrained in ways neither intended by the designer, nor intentionally sought out by the user? Can affordances exist independent of the intentions of users and designers? Our goal here is to move beyond any privileging of design intention or pre-conceived program toward the idea of an affordance of open outcomes.

For Gibson (1977), affordances can be both positive and negative. Affordances might enable or constrain someone; protect or injure them; advantage or disadvantage them. Although a designer of an object or environment might prescribe a certain intent for users, there always remains a degree of interpretation and improvisation by the user, which can produce both positive and negative outcomes. A person may mistake a window for an opening, and attempt to walk through it. Gibson (1966, 1979) refers to such cases as ‘mis-perceptions,’ emphasizing the user’s inability to correctly perceive and respond to all the available sensory information. Gaver (1991) similarly distinguishes between correctly perceived affordances, what he calls ‘false’ affordances (like a *trompe l’œil* mural) and ‘hidden’ affordances (real but not perceived).

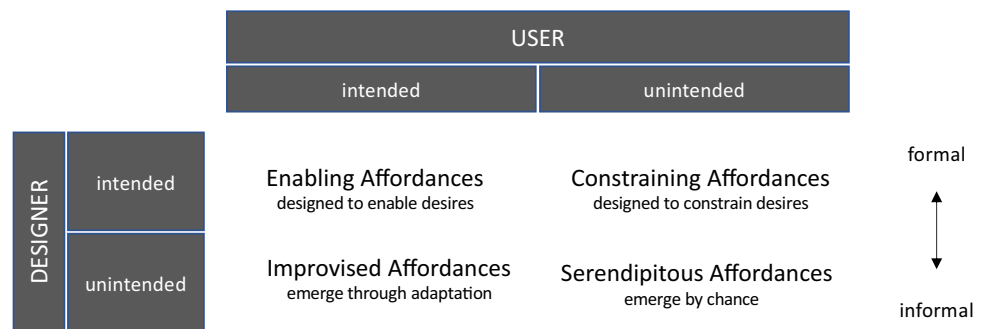
An Expanded Typology of Affordances

We began this paper with the desire to expand urban design thinking beyond specific programs to encompass the possibilities of unpredictable forms of intercultural encounter and more creative and open forms of action in public space. We argue that a combination of affordance and assemblage thinking can frame such possibilities. In order to bring some clarity to this highly complex theoretical field, we suggest a new typology (Fig. 1) that extends the concept of affordance to encompass a broader set of possibilities that are

necessary in the design of public space. Here, we first make distinctions between whether affordances are intended or not, by both designers and users. These distinctions are then deployed to construct a field of four affordance types: enabling, constraining, improvised, and serendipitous. Designers shape built environments in ways that enable certain functions: sit here, walk there, ascend here. If the designer’s intention is matched to the user’s desires, such outcomes can be termed ‘enabling affordances.’ This equates to what Reed (1993) calls a ‘field of promoted action.’ In other situations, a designer may seek to constrain users, either for those users’ benefit or to benefit others. For example, access to an area could be obstructed due to safety or security risks. Kytta (2002a, b) refers to such affordances as the ‘field of constraining action.’ Some public spaces are designed to prevent skateboarding and rough sleeping; they can be construed as ‘dis-affordances’ that are framed as benefitting the general public, but often also cut across the intentions of particular user groups such as the young, homeless, and social minorities (Borden 2001; Low & Iveson 2016).

Enabling and constraining affordance are largely formal and clearly distinguished. The lower categories of Fig. 1—‘improvised’ and ‘serendipitous’ affordances—largely equate with Reed’s (1993) definition of the *Field of Free Action*—undesignated uses or affordances that were not intended by the designers. This is the informal counterpart to the formally designated uses of public space. As Kytta (2003, p. 81) notes ‘there always exist affordances that children discover independently, often to the surprise of their parents.’ Drawing on assemblage thinking, Sendra (2015, 829) highlights that ‘an urban surface... urban infrastructure and... other material objects are some of the actors that enable new assemblages and prompt situations that may not have been planned by the designers.’ The further distinction we draw here is between affordances that users improvise to meet their conscious needs and desires, and serendipitous affordances that surprise users themselves. Serendipitous affordances include activities that emerge and chance encounters that have not been conceived by either designers or users. These additional affordances overlap with each other and with enabling and constraining affordances within

Fig. 1 An assemblage of affordances



an integrated field of action. Improvised affordances may include activities that 'constraining' affordances seek to preclude. Both enabling and constraining affordances such as seats or safety rails will inevitably introduce new possibilities for improvisation and serendipitous encounter. It is also impossible to draw a clear boundary between affordances that are initiated by the improvisation of users and those that emerge serendipitously in everyday life. This model suggests a relational assemblage of affordances wherein the enabling and constraining affordances represent more formal design intent and the improvised and serendipitous are informal. The state, which manages public spaces in the common interest, inevitably prefers law and order, and so the formal takes precedence. However, the vitality of public life is reliant on creative improvisation and chance encounter. The concerns of public space design extend beyond the narrow focus on functionalism to embrace a multiplicity of perceptions and relationships beyond the conscious intentions of designers and users. Gibson himself coined many neologisms to express the wide range of more-than-functional affordances that any given environmental characteristic might offer to action:

If a terrestrial surface is nearly horizontal... nearly flat... and sufficiently extended... and if its substance is rigid... It is stand-on-able... walk-on-able and run-over-able... surfaces, of course, are also climb-on-able or fall-off-able or get-underneath-able or bump-into-able. (Gibson 1979, 127–128)

Urban public spaces that are geared to playful, exploratory, and contested activities operate across the entire field of intentional and unintentional actions of designers and users.

Improvised and Serendipitous Affordances

At the risk of reducing this extraordinarily complex field to what may seem banal instances, Fig. 2 shows a range of public spaces across many cultural contexts to illustrate some of these dimensions. The public artwork known as 'The Listener' in Les Halles, Paris (by Henri Miller 1986, Fig. 2A) is designed for looking at and moving around, but also provides the improvised affordance of climbing and sitting due to the placement of its fingers which work as steps. Thus, the sculpture becomes a seat and vantage point, which then also serendipitously changes the image in a manner that exceeds the intentions of both designers and users. The plaza known as Superkilen in Copenhagen (by Topotek 1, Bjarke Ingels Group & Superflex, 2012) was deliberately designed as an intercultural public space, incorporating a Thai boxing ring (Fig. 2B) that is designed to disrupt user expectations in this European context.

While there is no substantial Thai population in Copenhagen, a detailed field study shows that it affords many

different possibilities depending on differing motivations and skills (Daly 2019). Some young people use the ring to practice martial arts, and on evenings and weekends, a wider demographic appropriate the ring in more varied ways. The setting is shown to be climb-on-able, bounce-on-able, hang-on-able, fall-off-able, jump-off-able, lie-on-able, sit-on-able, and dance-on-able. In the same plaza are many kinds of public seating with designs sourced from a global catalog of types, including a crescent-shaped bench (Fig. 2C). In addition to the designated sitting, the curved and sloped back also accommodates improvisation since it is sit-on-able, lean-on-able, and walk-on-able at various heights. This seat was also the site of the highest levels of serendipitous intercultural encounter observed in the square (Daly 2019). The long and gently curved seat invites occupation by different groups with space between them and just enough curvature for oblique eye-contact—affordances that are not produced by straight or socio-petal seating.

A further example is the staircase at the entry to the Metropolitan Museum of Art in New York (Fig. 2D), designed as steps but also with symbolic intent—placing the museum on a pedestal as viewed from the street. The improvised affordance has long been for sitting and meeting before and after the museum visit; this in turn has produced a serendipitous possibility where those sitting on the steps have become an audience for impromptu street theater on the sidewalk below.

Moving to a very different context and time, the famed Khaju Bridge in Isfahan (circa 1650) has a row of sluice gates designed for irrigation and flood control (Fig. 2E). This lower level, close to the water and largely hidden from an authoritarian public gaze, affords a secluded place for musicians, singers, poets, and lovers. The serendipitous acoustics are crucial to many of these affordances and demonstrate the multi-sensory nature of affordance in public space (Khaleghimoghaddam 2016). The final image, Fig. 2F, is in the town of Pahar Gung, India, where a fountain has been fenced off from the surrounding street. Here, the intended outcome has been supplanted by improvised affordances include a play space for children, a washing line, and tethering goats. The design intention (fountain) is replaced with a constraining affordance (fence) which then opens a space for improvisation. This example shows how affordances are everywhere and always interconnected in complex adaptive assemblages. The six public spaces shown in Fig. 2 are not examples of the four affordance types; they are chosen in part because each of them embodies types of affordances that go beyond design intent to encompass improvised and/or serendipitous affordances. In each particular case, the designated enabling and constraining affordances are what makes the place habitable and safe, but it is the improvised and serendipitous affordances that make it urban.



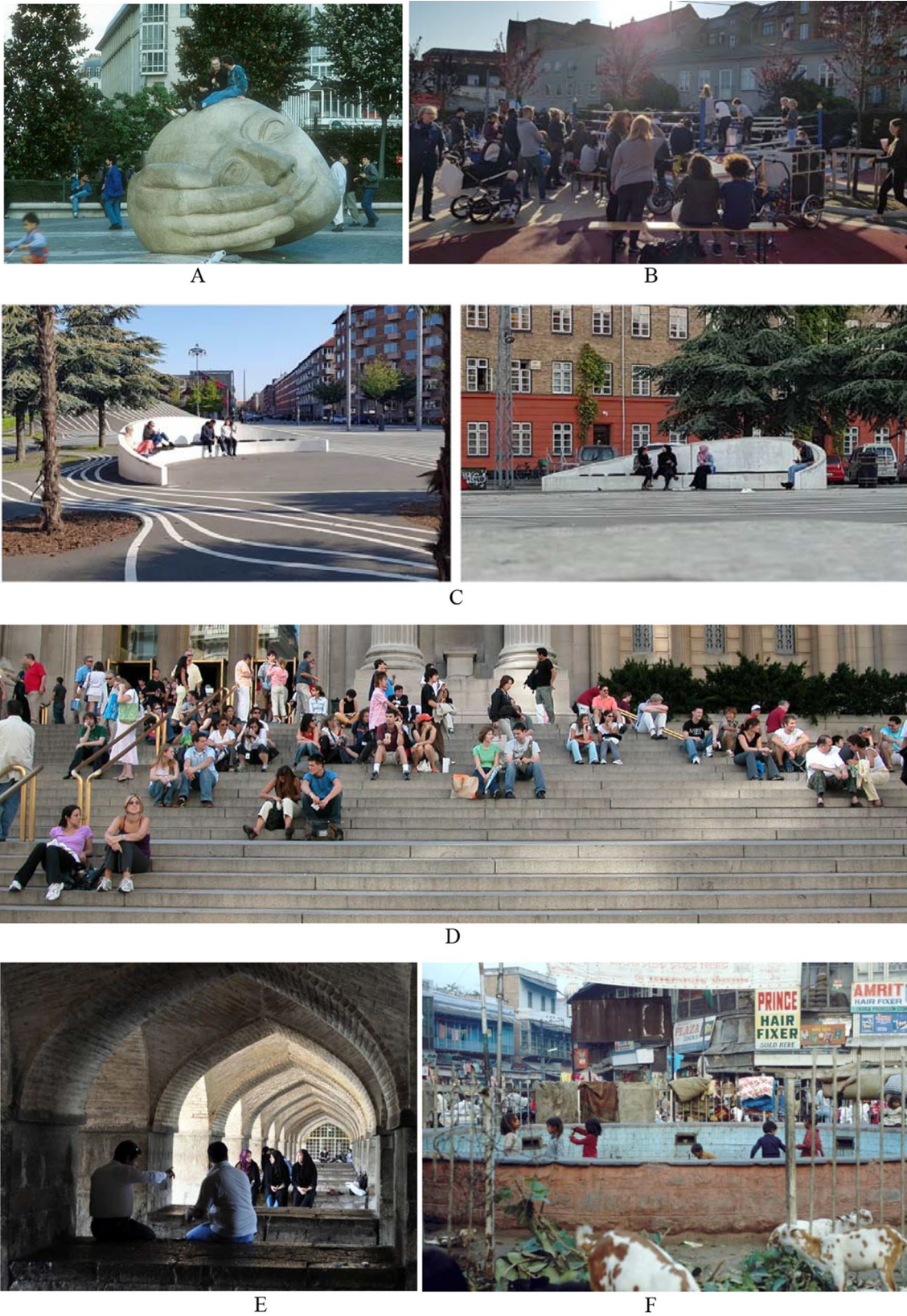


Fig. 2 Improvised and serendipitous affordances (Photos: A-B: Jonathan Daly; C-F: Kim Dovey)



Discussion

We have shown how the concept of affordances has opened up many fruitful areas of design enquiry, but also raises problematic issues in relation to cultural difference and designability which are especially crucial for urban public space. Underlying these problematic conditions is the theoretical problem of a dual ontology—affordance is a relational concept that lacks a relational ontology. Most applications of affordance theory have tended to focus on designability, reducing affordance to ‘function’: a narrow, predetermined action that a designer seeks to enable or prevent, and that a user either perceives or fails to perceive. These are identified above as ‘enabling’ and ‘constraining’ affordances. Our focus here is on the design of urban public space, where we encounter complex and dynamic places where affordance cannot be reduced to function, and where perception is fundamentally multi-sensory and culturally diverse. We have suggested that a relational understanding of affordances, approached through assemblage thinking and ANT, can help in re-thinking affordance in urban design. Within the flat ontology of ANT and assemblage thinking, there is no hierarchy between human and nonhuman entities, only complex networks of interactions between them. Affordance incorporates both the agency of humans and agentic properties of the material world. The focus of both research and design of public space needs to be on the relational assemblage. Whether the form is a stair or a tree, the capacity to be climbed needs to connect with an entity with a capacity and desire to climb. This is not a dual ontology, but an ontology of ‘becoming’ that posits a real space of possibilities that have not yet been actualized. The possibilities described by Gibson as ‘walk-on-able,’ ‘climb-up-able,’ and so on are real even when there is no walking or climbing. These capacities reside in formal attributes that can be designed.

Designers try to shape the properties of objects and environments to match the capacities of other objects and actors. But relational thinking emphasizes that designers are not the only agents to produce affordances: any actor, human or nonhuman, can ‘enroll’ other actors into relationships (Akrich 1992). As Kim (2018) argues, these relationships are negotiated and often exceed a designer’s intent. In Fig. 1, we identified four broad kinds of affordance, framed in terms of the intentions and capacities of both designers and users: enabling, constraining, improvised, and serendipitous. While enabling and constraining affordances are important for effective design, an expanded conception of improvised and serendipitous affordances is crucial for designing under conditions of cultural pluralism, where the dispositions of users cannot be predicted,

and change over time. Affordances are only actualized in the moments of their enactment. These enactments may become routine, but good urban design will remain open to other affordances that can accompany, replace, or translate them. The flat relational ontology we have sketched here is simply a philosophical framework for re-thinking what the design of public space does. This is not a formula for any particular kind of formal design, but a means to rethink the relations between those particulars, and the people who engage with them. A flat relational ontology is also a basis to move beyond the human-centredness of urban design—designing for possibility is not all about us. Gibson was clear that affordance is a relation between animal and environment, but what about other life forms including plants and even viruses? We note that the capacity of public open space to reduce transmission during the COVID-19 pandemic was a highly valuable ‘constraining affordance’ and many aspects of public space were redesigned to take advantage (Stevens et al. 2022). We often celebrate the vitality and liveliness of urban public spaces, but we rarely design them in a manner that considers life in all its forms.

Connecting affordance theory to assemblage thinking and actor-networks has the effect of distancing the concept of affordance from its roots in environmental psychology with its focus on humans and individuals. It enables the designer to better understand the broad and multi-scale assemblages of which they are part and in which they are crucial actants. This is a set of relations between parts—both human and nonhuman—that are constantly being reassembled. Affordances are not properties or characteristics of the parts but relational capacities or possibilities. They can perhaps be best understood through a language of becoming. On one side of these relations are the desires and activities that humans bring to public space—walking, climbing, eating, buying, selling, competing, swinging, skating, meeting, talking, dancing, drinking, running, listening, remembering, singing, protesting, painting, reading, swimming, splashing, planting, advertising, sleeping, watching—within the fields of improvisation and serendipity the list is endless. These ‘-ing’ words (we might call them ‘ing-lish’) are matched by properties of the material environment—the ‘-ability’ words such as sit-ability, walk-ability, dance-ability, run-ability, climb-ability, watch-ability, paint-ability, sell-ability, slide-ability, memor-ability, manip-ability, dig-ability, skate-ability. This is the language of capacity thinking (perhaps ‘abl-ish’), endless sets of relations where multiple possibilities apply to any given set of conditions. This is a conceptual framework for re-thinking the design of urban public space away from objects and onto relations. What is ultimately at stake here is the multiple ways in which the design of public space mediates relations of power; the Latin root of the word ‘power’ (*potere*) is ‘to be able.’ Our goal here has been



to open up prospects for less deterministic forms of urban design practice, conducted in the knowledge that we do not and cannot know many of the most significant outcomes. The deepest challenge in designing urban public space lies in planning for the unplanned, designing for the undesignated.

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References

- Akrich, M. 1992. The de-scription of technical objects. In *Shaping technology/building society*, ed. W. Bijker and J. Law, 205–224. Cambridge: MIT Press.
- Akrich, M., and B. Latour. 1992. A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblages. In *Shaping technology/building society*, ed. W. Bijker and J. Law, 259–264. Cambridge: MIT Press.
- Borden, I. 2001. *Skateboarding, space and the city*. Oxford: Berg.
- Bourdieu, P. 1977. *Outline of a theory of practice*. Cambridge: Cambridge University Press.
- Chemero, A. 2003. An outline of a theory of affordances. *Ecological Psychology* 15 (2): 181–195.
- Costall, A. 1995. Socializing affordances. *Theory & Psychology* 5 (4): 467.
- Costall, A., and A. Still. 1989. Gibson's theory of direct perception and the problem of cultural relativism. *Journal for the Theory of Social Behaviour* 19 (4): 433–441.
- Craig, B., and H. Wayne. 2016. Actant affordances. *Critical Studies in Teaching and Learning* 4 (1): 55–73.
- Daly, J. 2019. Superkilen: Exploring the human-non-human relations of intercultural encounter. *Journal of Urban Design* 25 (1): 65–85.
- Dant, T. 2007. *Materiality and society*. Berkshire: Open University Press.
- Davis, J., and J. Chouinard. 2016. Theorizing affordances. *Bulletin of Science, Technology & Society* 36 (4): 241–248.
- DeLanda, M. 2006. *A new philosophy of society*. London: Continuum.
- DeLanda, M. 2011. *Philosophy and simulation*. New York: Continuum.
- Deleuze, G. 1990. *The Logic of Sense*. New York: Columbia University Press.
- Deleuze, G., and F. Guattari. 1987. *A thousand plateaus*. Minneapolis: University of Minnesota Press.
- Dovey, K. 2010. *Becoming places*. London: Routledge.
- Dovey, K. 2012. Informal urbanism and complex adaptive assemblage. *International Development Planning Review* 34 (4): 349–367.
- Dovey, K., F. Rao, and E. Pafka. 2017. Agglomeration and assemblage. *Urban Studies* 55 (2): 263–273.
- Fariás, I. 2011. The politics of urban assemblages. *City* 15 (3/4): 365–374.
- Foroughmand Araabi, H., and A. McDonald. 2019. Towards a Deleuzoguattarian methodology for urban design. *Journal of Urbanism* 12 (2): 172–187.
- Gaver, W. 1991. Technology affordances. In *Proceedings of CHI'91*, New Orleans, 79–84.
- Gibson, E., and M. Schmuckler. 1989. Going somewhere. *Ecological Psychology* 1 (1): 3–25.
- Gibson, J. 1950. *The perception of the visual world*. Boston: Houghton Mifflin.
- Gibson, J. 1966. *The senses considered as perceptual systems*. London: Allen & Unwin.
- Gibson, J. 1967. New reasons for realism. *Synthese* 17 (2): 162–172.
- Gibson, J. 1977. The theory of affordances. In *Perceiving, acting, and knowing*, ed. R. Shaw and J. Bransford, 67–82. Hillsdale: Lawrence Erlbaum.
- Gibson, J. 1979. *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Heft, H. 1989. Affordances and the body. *Journal for the Theory of Social Behaviour* 19 (1): 1–30.
- Heft, H. 2003. Affordances, dynamic experience, and the challenge of reification. *Ecological Psychology* 15 (2): 149–180.
- Heft, H. 2017. Perceptual information of “an entirely different order.” *Ecological Psychology* 29 (2): 122–145.
- Inoue, S. 2006. Embodied habitus. *Theory, Culture & Society* 23 (2–3): 229–231.
- Khaleghimoghaddam, N. 2016. Spatial analysis of Khaju Bridge as an urban element in the context of space perception through senses. *International Journal of Humanities and Social Science* 21 (4): 66–75.
- Kim, J. 2018. Designing multiple urban space. *Journal of Urban Design* 4809: 1–20.
- Kullmann, K. 2018. The landscape of things. *Journal of Landscape Architecture* 13 (1): 58–67.
- Kyttä, M. 2002. Affordances of children's environments in the context of cities, small towns, suburbs and rural villages in Finland and Belarus. *Journal of Environmental Psychology* 22 (1–2): 109–123.
- Kyttä, M. 2003. Children in outdoor contexts. PhD thesis, Helsinki University of Technology. <http://lib.tkk.fi/Diss/2003/isbn9512268736/>.
- Latour, B. 1987. *Science in action*. Cambridge: Harvard University Press.
- Latour, B. 2005. *Reassembling the social*. Oxford: Oxford University Press.
- Lerup, L. 1977. *Building the unfinished*, 127–160. Beverly Hills: Sage.
- Loveland, K. 1991. Social affordances and interaction II. *Ecological Psychology* 3 (2): 99–119.
- Low, S., and K. Iveson. 2016. Propositions for more just urban public spaces. *City* 20 (1): 10–31.
- Maier, J., G. Fadel, and D. Battisto. 2009. An affordance-based approach to architectural theory, design, and practice. *Design Studies* 30: 393–414.
- Mubi Brighenti, A., and A. Pavoni. 2018. Climbing the city. *Journal of Urbanism* 11 (1): 63–80.
- Murdoch, J. 1998. The spaces of actor-network theory. *Geoforum* 29 (4): 357–374.
- Norman, D. 1988. *The psychology of everyday things*. New York: Basic Books.
- Norman, D. 2013. *The Design of Everyday Things: Revised and Expanded Edition*. New York: Basic Books.
- Oliver, M. 2005. The problem with affordance. *E-Learning and Digital Media* 2 (4): 402–413.



- Parchoma, G. 2014. The contested ontology of affordances. *Computers in Human Behavior* 37: 360–368.
- Reed, E.S. 1993. The intention to use a specific affordance. In *Development in context*, ed. R. Wozniak and K. Fischer, 312–344. Hillsdale: Lawrence Erlbaum.
- Rydin, Y., and L. Tate. 2016. *Actor networks of planning*. New York: Routledge.
- Sendra, P. 2015. Rethinking urban public space: Assemblage thinking and the uses of disorder. *City* 19 (6): 820–836.
- Stenson, C., and M. Rodger. 2015. Bringing sounds into use. *The Open Psychology Journal* 8 (Suppl 3:M2): 174–182.
- Stevens, Q., and K. Dovey. 2022. *Temporary and Tactical Urbanism (Re)Assembling Urban Space*. New York: Routledge.
- Stevens, Q., M. Morley, and K. Dovey. 2022. Understanding the capacities of urban street spaces by mapping Melbourne's parklets. *Journal of Urbanism*. <https://doi.org/10.1080/17549175.2022.2150268>.
- Teh, T.-H. 2014. Actor-network theory coevolution framework for urban design. In *Explorations in urban design*, ed. M. Carmona, 101–110. Farnham: Ashgate.
- Yaneva, A. 2009. Making the social hold: Towards an actor-network theory of design. *Design and Culture* 1 (3): 273–288.

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